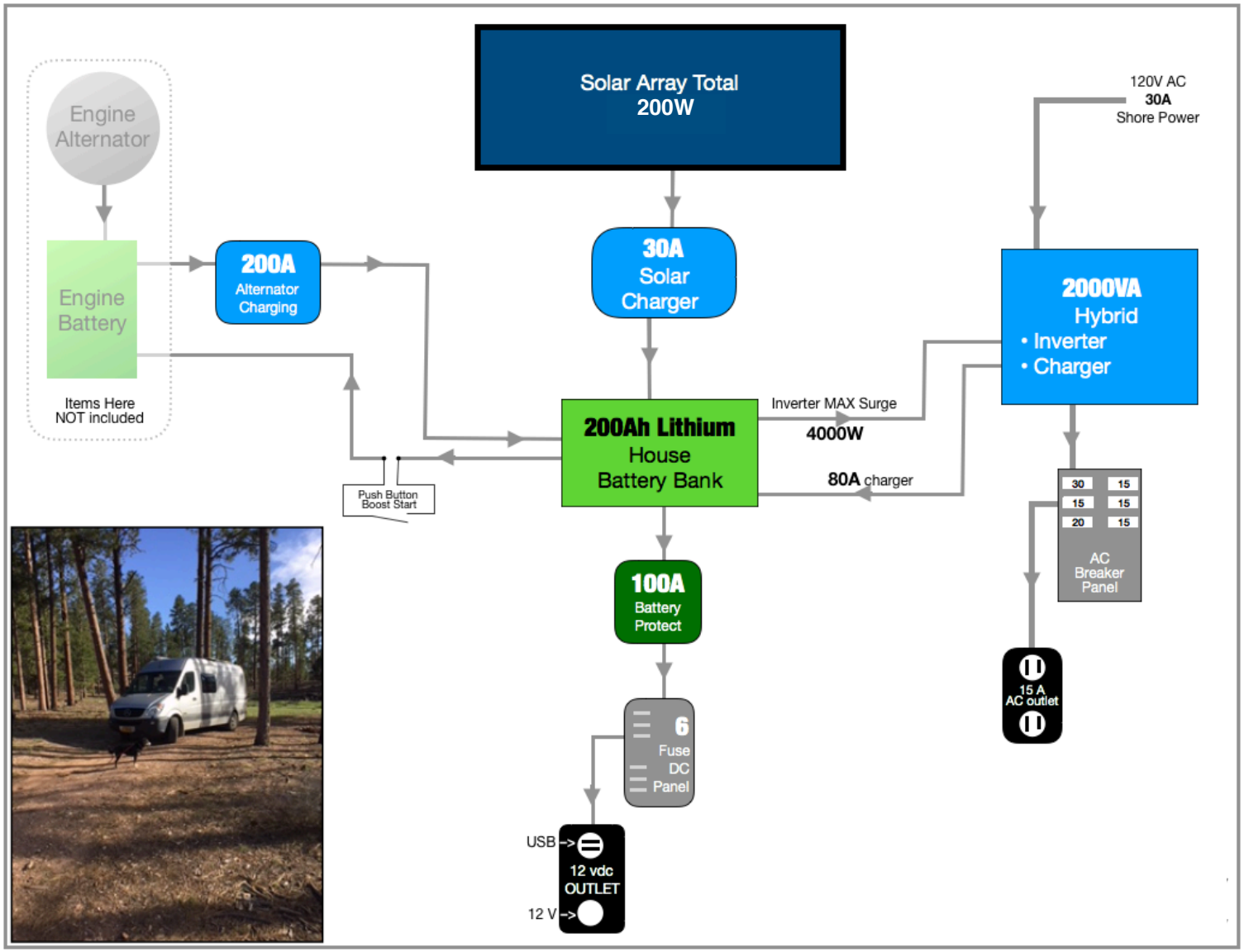
Installation Guide



Online Guide

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General Guidelines and Tips

Congratulations on your purchase of a power system designed by AM Solar! We have assembled this kit to take the guess work out of putting together a complete solar solution. Now the fun begins - It's time for installation. Please read the guidelines below to help ensure a smooth project completion.

Stay safe

Remember that you will be working with both AC and DC power, so whenever possible avoid working with "live" components. Always use caution when working with electricity. When this guide is followed, you'll have a safe and successful installation. Be careful, not frightful - The installation can be fun when following these instructions and not cutting corners.

Keeping a realistic time frame for installation is important

This installation might take 4 to 5 days for an experienced AM Solar technician. So, establishing a realistic goal for completing the installation is helpful and avoids rushing aspects of the project. You'll want to stay consistent with your work beginning to end, without the need to rush.

Don't rush the layout and planning of component placement

The design/layout part of your build is the most important thing you'll do. Skoolies, by design, are great since they start empty and give you many different installation options. Grab some chalk, cardboard, rope and a ball of string - We're going to make some component placement templates. Use chalk to outline spots for smaller items such as breakers and the fuse panel. Use the string to make the small wire runs, rope for heavy gauge, and label them (tape and stickers works well). Then layout the all the components that fit the interior of your rig to prepare for installation.

Keep it organized

Stay organized by making your work tidy and well planned. Read the included product guides / instructions and **ABC** (Always Be Checking). If you are installing and find that something was missed during your layout and planning and can't be installed correctly or safely, don't worry! Just backtrack to that stage in your layout design, and find an alternative placement before moving forward.

Making it last

No matter how long you plan on keeping this kit, it's only going to be useful and have value if it's in good order. This equipment doesn't react well to neglect or abuse. When planning and performing the installation, use proper technique and plan for the long run. Using duck tape to secure a part in place might be a good emergency fix, but you'll want to start as "clean" as possible from the beginning.

Component Proximity

Always keep high current lines as short as possible. The battery to inverter cable should be under 10 feet, 5 feet would be ideal. If you are mounting all the equipment in a very small area, be aware of the distance between all "connection points" - If a component comes loose and shifts for any reason, you will want to ensure it will not result in components touching each other and possibly causing a short.

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Suggested Tools For Installation

Here is a list of some of the tools that might be needed for your installation. If you feel this list is too ambiguous or potentially intimidating, now would be a great time to schedule your installation work with the professionals at AM Solar.

- Sturdy Ladder
- Hammer Crimper
- Hammer
- Heat Gun
- Wire Crimper
- Wire stripper
- Cable Cutter
- Multimeter
- Screwdriver
- Smartphone
- Drill
- Box knife
- 91% Isopropyl Alcohol
- Cleaning rags
- Crescent wrench
- Safety glasses

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Bill of Materials

Solar Panels

Lithium Battery

AMS Control Board

Inverter / Charger

Charge Controller

Battery Monitor

	QTY	AMS PN	Description
SOLAR CHARGING	2	SOLAR-ZS100	Solar Panel Z100
	2	93C-ZCBNR	Zamp Plug & Strain relief for C-Box
	2	91M-ZBZ	Z Bigfoot Mount Set Zamp
	1	SEAL-SKF	Sikaflex 221
	1	20-ROOF	Roof Combiner Box
	1	CCTLR-VT-MPPS-030A	Victron BlueSolar Smart MPPT 100/30 (30A)
	20	CABLE-6GA-2-GRY	Duplex-6/2
	1	92C-INTR	Interior Wire Harness Acc. Kit
	1	93T-NEG-6GA	6ga Negative Terminal Kit
	1	93T-POS-6GA	6ga Brkr Pos Term Kit
	1	93B-040A	40 Amp DC Brkr. w/Screws
BATTERY SYSTEM	1	BATTLI-VT-200S	VE LiFePO4 Smart Batt 12.8V/200Ah
	1	BATTBMS-VT-BUS	VE.Bus BMS
	1	CABLE-VT-RJ45-3	RJ45 UTP Cable 3 m
	2	RELAY-VTBP	BatteryProtect 12/24V-100A
	1	BATTBMS-AMSLB43	AMS Lithium Control Board V4.3
	1	TEMP-BS	Blue Sky Temperature Sensor
	1	93S-MINI	Switch-Mini On/OFF with Screws
	1	93F-ATC-015A	15A ATC Fuse Kit
	1	93P-RED	Junction Post Kit Positive
	1	93P-BLK	Junction Post Kit Negative
	4	FSTSCW-1034Z	Screw-#10x3/4" PHP SMS Z
	4	FSTSCW-1058SS	Screw-#10x5/8" PHP SMS SS
	2	FSTSCW-612	Screw-#6x1/2" PHP BLK OX
	6	CABLE-4/0-1-BLK	Cable 4/0
	24	CABLE-18GA-2-GRY	Duplex-18/2
	4	CABLE-2-1-RED	Cable-2 ga. Red
	1	CABLE-VT-M8-1	Victron M8 circular connector M/F 3 pole cable 1m
	6	LUG-4/0-RING-3/8	4/0 Lug-3/8" Ring
	4	LUG-2GA-RING-3/8	2 ga. Lug-3/8" Ring
	1	LUG-18GA-RING-BR	18-22 ga. Ring Bare
	2	93H-B3/4	Heat Shrink Black 1.5" x 3/4"
	4	93H-R3/4	Heat Shrink Red 1.5" x 3/4"
	5.5	HS-BLK-DWALL-3/16	Heat Shrink 3/16" Black - Cut into twelve 1/2" pieces
	4	HS-RED-HD-1/2	Heat Shrink 1/2" Red

	QTY	AMS PN	Description
AC INPUT & OUTPUT	1	INV-VT-2000	MultiPlus C 12/2000/80-50 - 120V Inverter/Charger combi.
	1	MONITOR-VTDM	Digital M. Contr.200/200A GX
	1	CABLE-VT-RJ45-5	RJ45 UTP Cable 5 m
	1	CABLE-VT-MK3USB	Victron MK3-USB Interface
	8	LUG-2/0-RING-3/8	2/0 Lug-3/8" Ring
	12	CABLE-2/0-1-BLK	Cable 2/0
	6	93H-R3/4	Heat Shrink Red 1.5" x 3/4"
	2	93H-B3/4	Heat Shrink Black 1.5" x 3/4"
	1	95F-CLST-300A	300A Class T Fuse & Holder
	1	FUSE-CLST-300A	Spare 300 Amp Fuse
	1	WIRETIE-05	Wire Tie 5-7/8"
	1	93S-MINI	Switch-Mini On/OFF with Screws
	25	CABLE-10GA-3-GRY	Stranded 10/3
	2	SPLICE-12-CEC	10-12 ga. Closed End Crimp
	1	BRKR-AC-BRKR-15/15	AC Breaker 15A/15A
	1	BRKR-AC-BRKR-15/20	AC Breaker 15A/20A
	1	BRKR-AC-BRKR-30/15	AC Breaker 30A/15A
	1	CORD-30A-25-L	Shore Power Cord, 30A, 25' Locking
	1	OUTLET-30A-B	Power Outlet - 30A - Black
	1	BOX-MSB	Midnite Solar Baby DIN Mnt Box
	1	BRKR-AC-DIN-277V/30A	277VAC/30A DIN Mnt Breaker
	1	BOX-SPBS	Sub Panel Brkr. Box-Surface
	1	STRN-S-11/4	Strain Relief 1-1/4"
	2	STRN-S-3/4	Strain Relief 3/4"
	20	CABLE-14GA-2-WHT	Romex-14-2
	1	OUTLET-15125	15A/125V Outlet
DC OUTPUT	15	CABLE-6GA-2-GRY	Duplex-6/2
	1	FUSEHLDR-MULT	ST Fuse Block 6 Circuit
	1	BRKR-DC-BRKR-060A	60A DC Circuit Breaker
	4	LUG-6GA-RING-3/8	6 ga. Lug-3/8" Ring
	4	HS-RED-DWALL-1/2	Heat Shrink 1/2" Red (4x 1"pcs)
	2	HS-BLK-DWALL-1/2	Heat Shrink 1/2" Black (2x 1"pcs)
	2	LUG-6GA-RING-1/4	6 ga. Lug-1/4" Ring
	2	LUG-10GA-SPD-8	10-12 ga. #8 Block Spade-Bare
	1	OUTLET-12USB	12V/USB Outlet
	4	FSTSCW-834B	Screw-#8x3/4 OHP BLK OX
	10	CABLE-10GA-2-WHT	Duplex-10/2 600V
	4	LUG-10GA-FAST-F	Female Insulated Disonnect 10 ga.
ALT CHARGER	20	CABLE-2/0-1-BLK	Cable-2/0
	30	CABLE-18GA-2-GRY	Duplex-18/2
	1	LUG-18GA-RING-BR	18-22 ga. Ring-Bare
	1	SWITCH-ESSCLD	Essential black momentary switch
	1	PLATE-MOM	Faceplate for Momentary Switch
	4	FSTSCW-612	Screw-#6x1/2" PHP BLK OX
	8	LUG-2/0-RING-3/8	2/0 Lug-3/8" Ring
	1	93B-200A	200 Amp DC Brkr. w/Screws
	2	93H-B3/4	Heat Shrink Black 1.5" x 3/4"
	6	93H-R3/4	Heat Shrink Red 1.5" x 3/4"
	1	RELAY-VTCY	(Li 230A) Victron Cyrix-Li-ct 12/24V-230A Intelligent Li-ion batt

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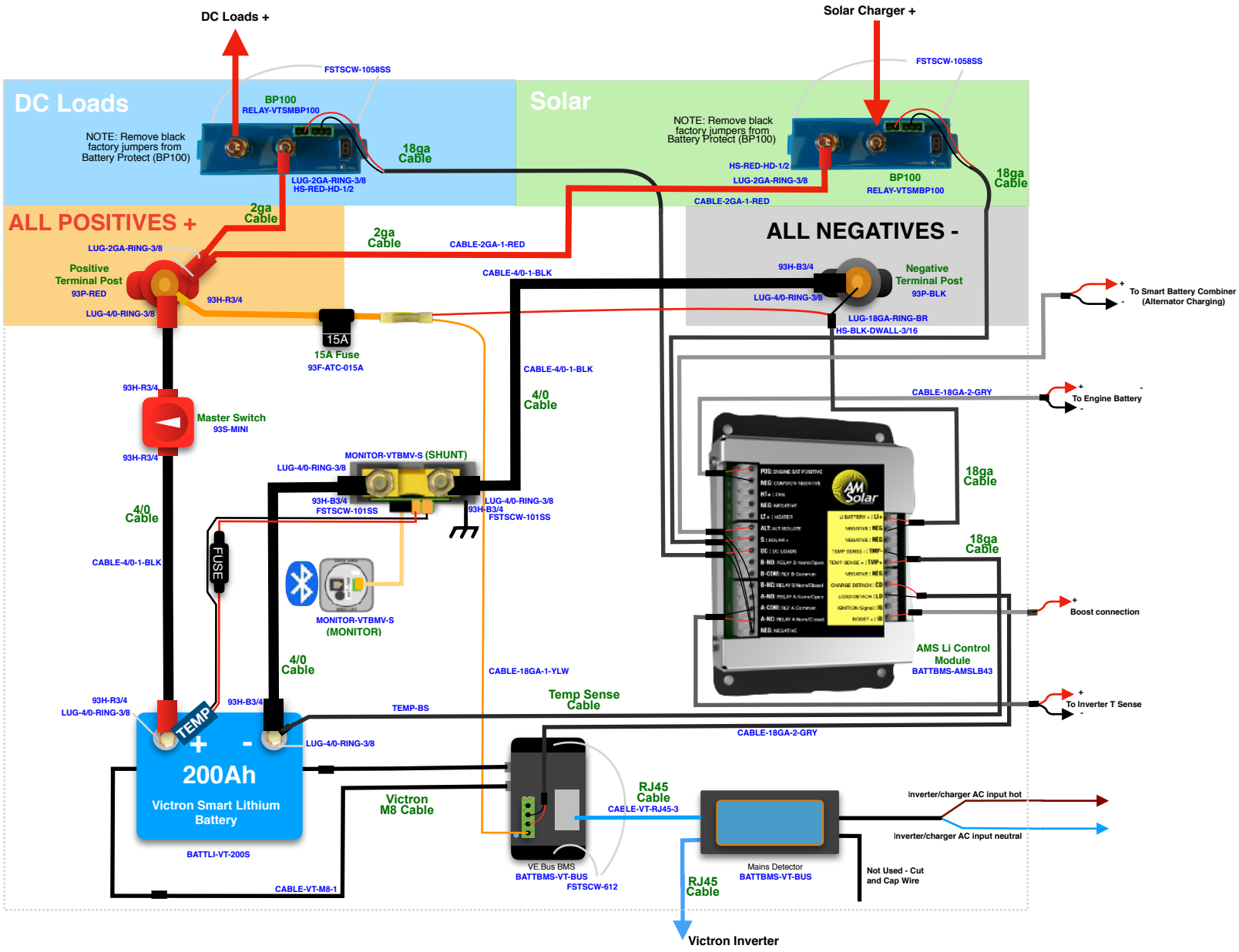
Battery Bank

The battery bank is the heart of the system. Its components usually take up the most space and all other subsystems connect to it. That's why we recommend installing it first. This battery bank consists of a 200Ah Lithium Battery. The Bluetooth battery monitor reads all charging and discharging current through a shunt and is able to interpret that data to compute battery usage, remaining energy, percent charge, etc. When a shunt is used, the load side of the shunt becomes the new negative battery terminal and no negatives will connect to the actual battery.



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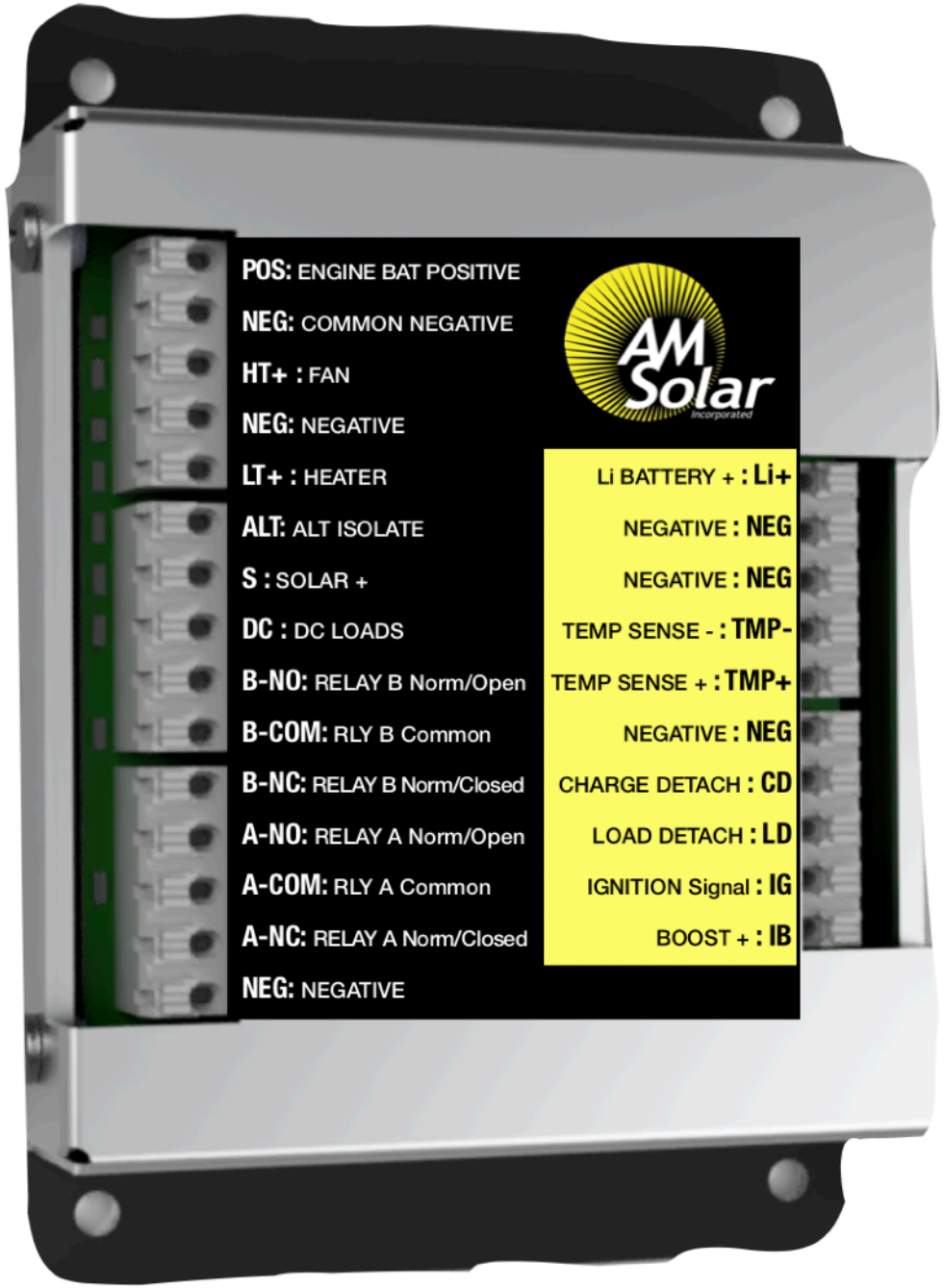
AM Solar Lithium Control Board



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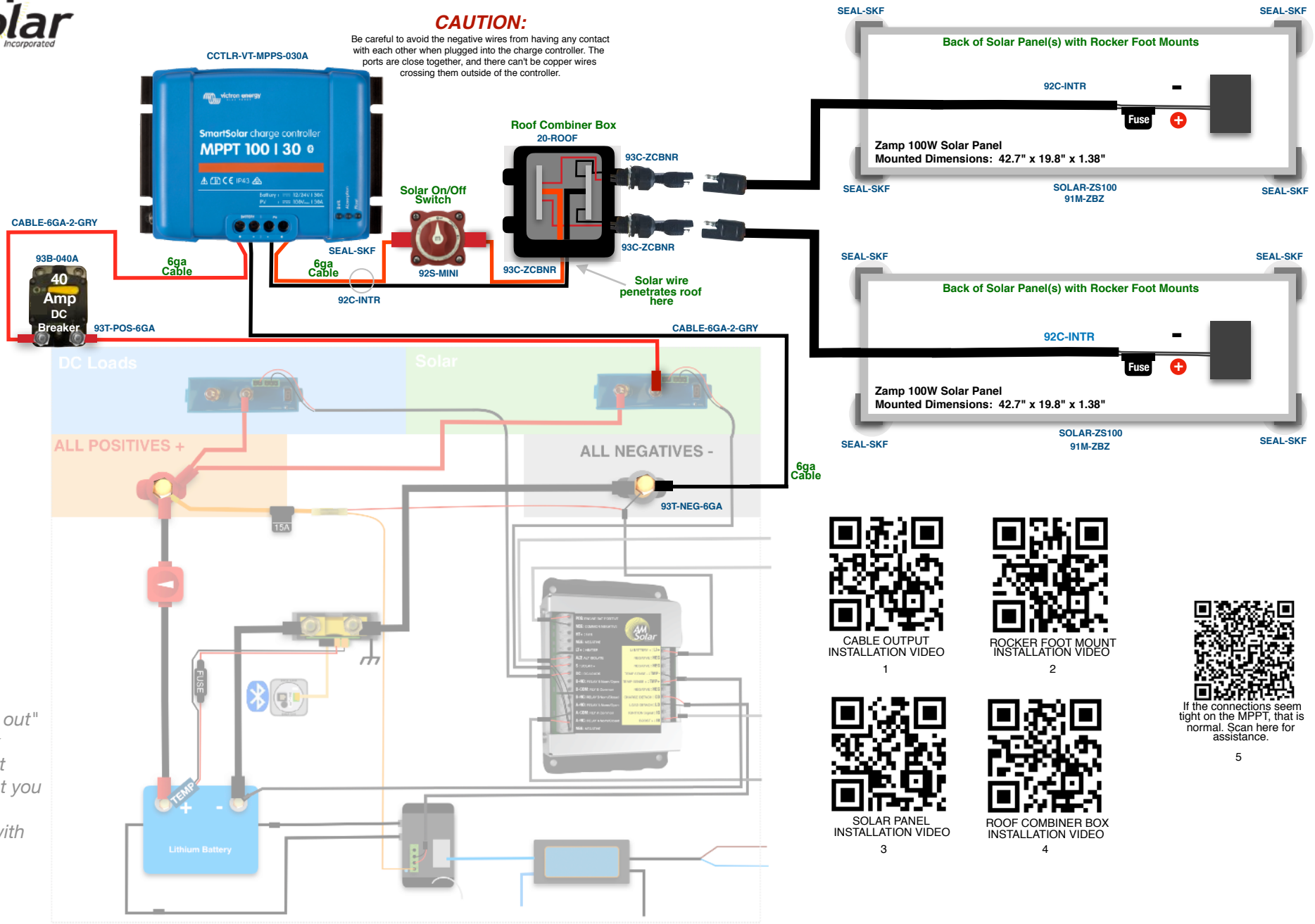
99-VANGLD Deep In The Woods Solar

Rev.20190923

Solar

CAUTION:

Be careful to avoid the negative wires from having any contact with each other when plugged into the charge controller. The ports are close together, and there can't be copper wires crossing them outside of the controller.



NOTICE:

The "greyed out" battery bank items are not included, but you will be interacting with them.

CABLE OUTPUT INSTALLATION VIDEO
1

ROCKER FOOT MOUNT INSTALLATION VIDEO
2

SOLAR PANEL INSTALLATION VIDEO
3

ROOF COMBINER BOX INSTALLATION VIDEO
4

If the connections seem tight on the MPPT, that is normal. Scan here for assistance.
5

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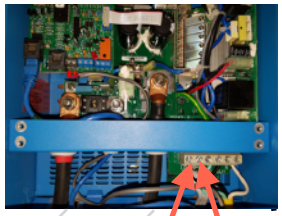
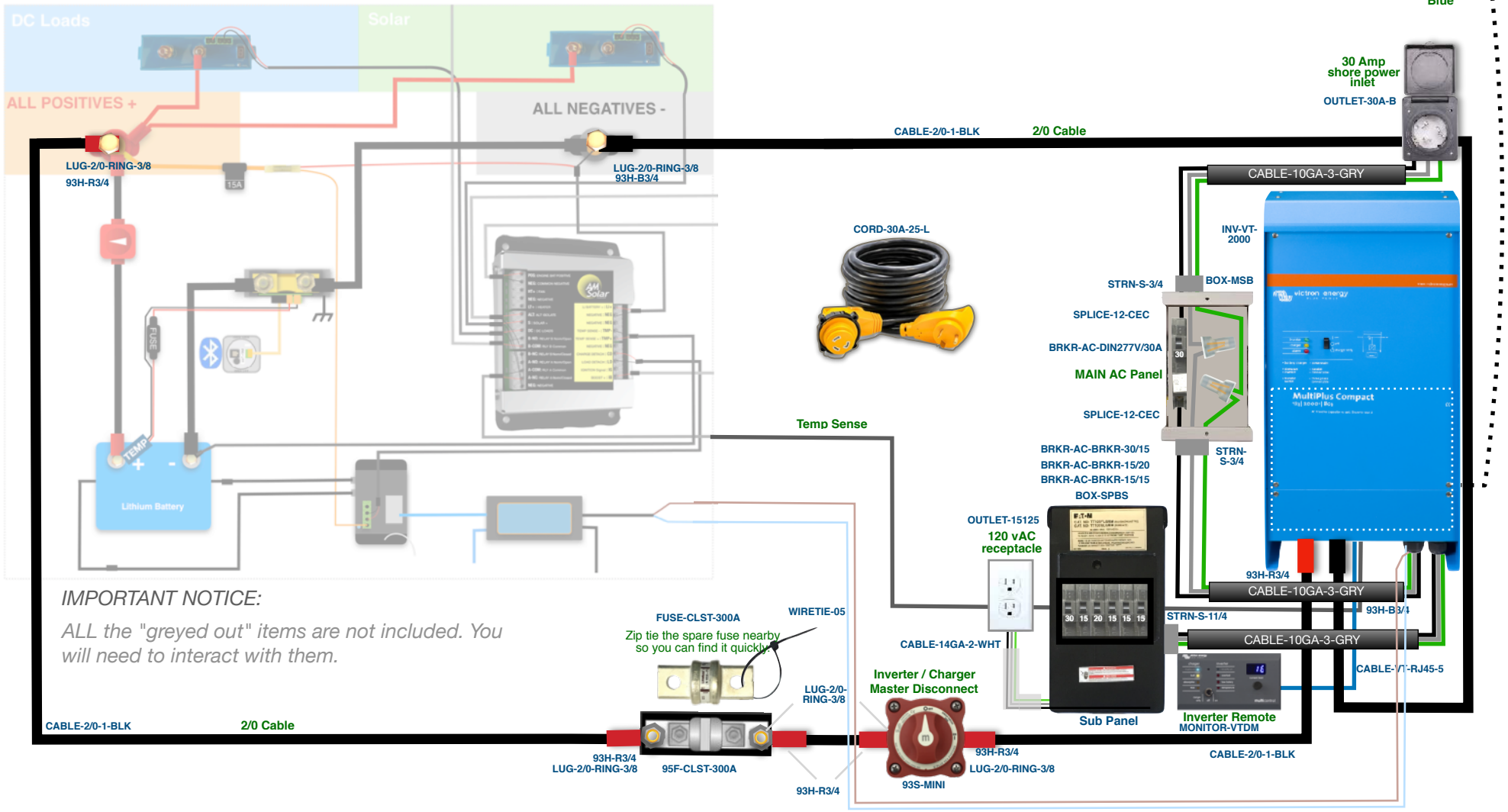
AC Input & Output

The AC Input/Output system is capable of plugging into a standard 30A shore power outlet. (Note: Adapters from 30A to 15A outlets can be purchased at hardware or RV supply stores). The shore power charges the battery bank and can also be passed through the inverter to the AC loads. If the loads draw more current than the shore power connection can provide, the inverter can meet the demand up to the rating of the inverter by simultaneously drawing from the battery bank. When not plugged into shore power, the inverter will draw from the battery bank to power the AC loads. When not in use, save energy by turning off the inverter via Digital Multicontrol included in the kit.

CAUTION:
Household alternating electricity (AC) is dangerous.
Use care and common sense.





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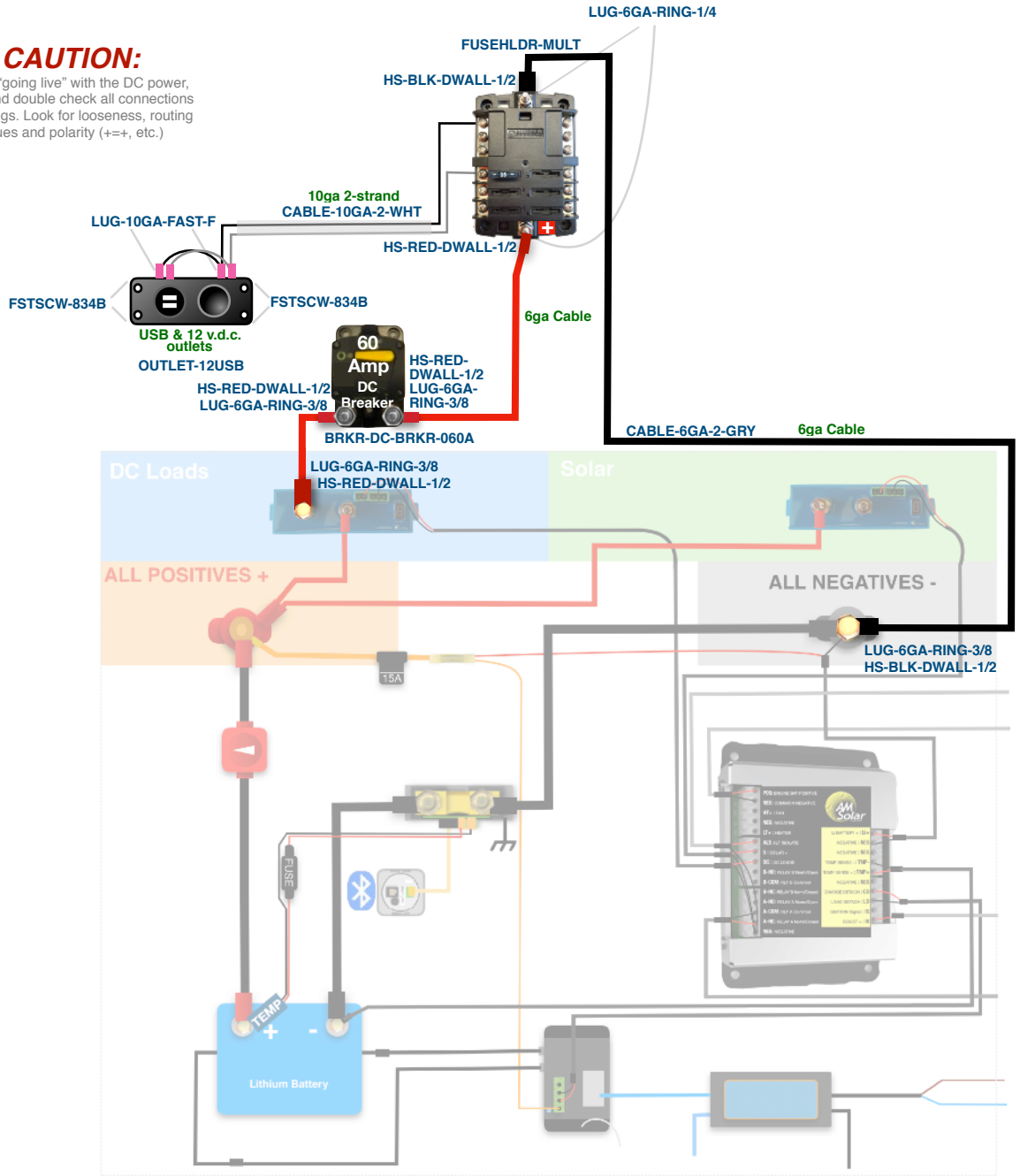
DC Distribution

One DC outlet with dual USB and standard 12V is included. Additional outlets can be connected to the fuse block or wired in parallel to the existing outlet.

CAUTION:

Before "going live" with the DC power, check and double check all connections and fittings. Look for looseness, routing issues and polarity (+=+, etc.)



1. **Position the components** so cable routes can be planned.
2. **Install the negative cable** from the negative terminal to the negative post of the DC fuse block.
3. **Connect the positive cable** from the positive side of the DC fuse block to the LOAD post of the breaker. Turn the breaker to the OFF position.
4. Connect the positive cable from the LINE side of the breaker to the Battery Protect
4. **Install the outlet** and connect it to the fuse block. A parallel connection between the two sets of outlet posts will have to be made by fitting two sets of cable into a positive and a negative female spade lug.
5. **Verify the connections** to make sure that they are correct and tight.
6. **Activate the system** by turning the DC breaker to ON. If the DC loads do not work, toggle the DC load master switch.

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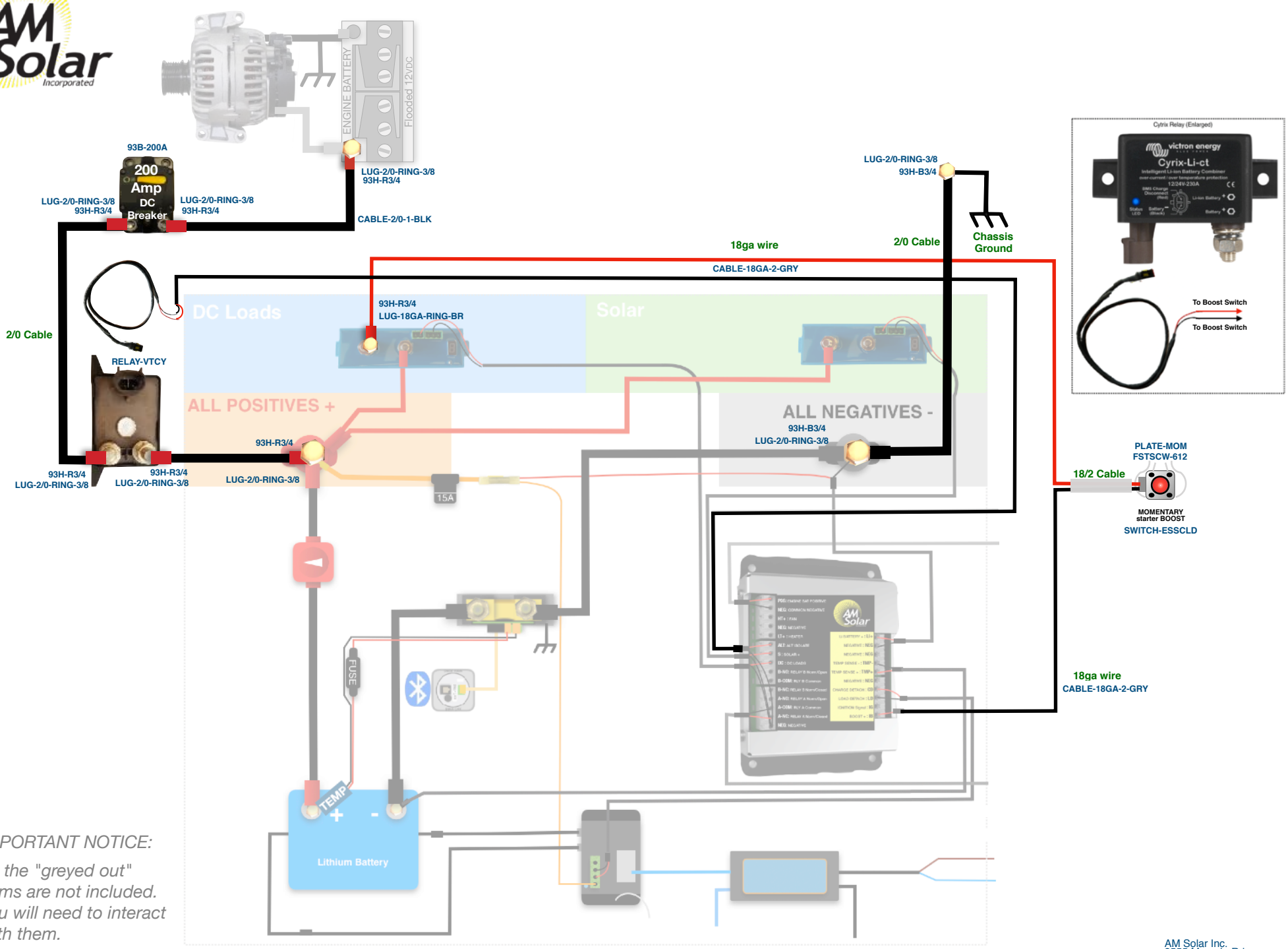
99-VANGLD Deep In The Woods Alternator Charging

Rev20190410



IMPORTANT NOTICE:

All the "greyed out" items are not included. You will need to interact with them.

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Programming / Commissioning Your System - The BMV-712 Smart Battery Monitor

We recommend you interface with the BMV-712 through the Victron app on your phone, and change the settings from there. The app is named “VictronConnect”. Ensure your Bluetooth is enabled before entering the app. Once inside the app you will see your BMV-712 displayed, click on it to change the applicable settings:

Program Settings for Lithium Batteries

- **Battery Capacity**: Enter the total battery capacity in Amp Hours.
- **Charge Voltage**: 13.9
- **Tail Current**: 2%
- **Peukert Exponent**: 1.1
- **Charge Efficiency Factor**: 98%
- **Temperature Unit**: “CELC” (Celsius) or “FAHR” Fahrenheit
- **Aux Input**: User Option (“Temp” works best)

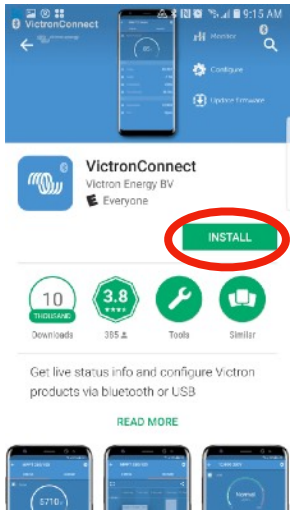
Programming on the BMV-712 Battery Monitor:

1. Download “Victron Connect” from the Google Play Store (picture 1).
2. Turn on your Phone’s Bluetooth, and get as close as possible to your Victron Component(s).
3. Open the Victron Connect app, and after it takes a moment to scan it will recognize your BMV-712.

NOTE: *If your device is not shown, it is probably signal interference. Try closing the app and moving to a different location before re-entering the app in a location that can pick up the BMV signal.*

4. Select the BMV-712 on the Device List (picture 2).
5. Type **000000** to login for the first time.
6. Press the gear icon in the top right corner (picture 3).
7. Enter “Battery Settings” and change the values below (similar to picture 4):
8. **Changing Battery Capacity**: Enter the number of Ah of your entire battery bank
9. **Charge Voltage**: 13.9
10. **Tail Current:** 2%
11. **Peukert Exponent:** 1.1
12. **Charge Efficiency Factor:** 98%
13. **Temperature Unit:** “FAHR” Fahrenheit
14. **Aux Input**: User Option (“Temp”)
15. Exit from the device.

NOTE: *Only one phone can be connected to each device at a time. Be sure to completely disconnect and close the app to log out from the device.*



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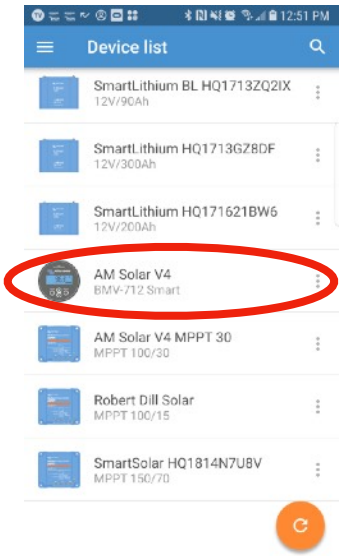

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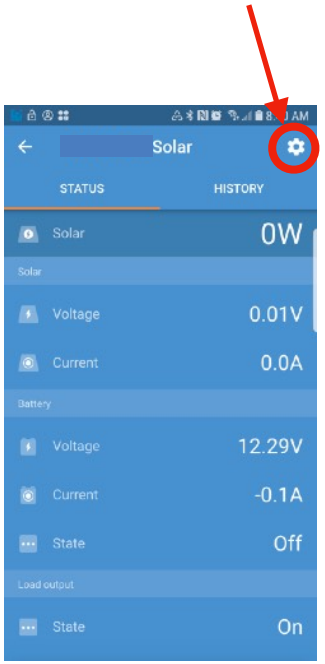

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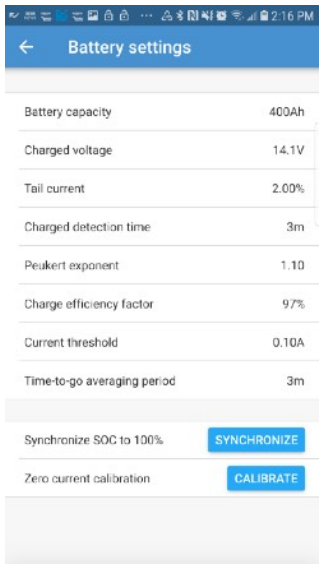

4

NOTE: To change the PIN code from the app, go back to the device list page in the app. Click on the three circles to the right of your device, and select “Reset PIN code”.

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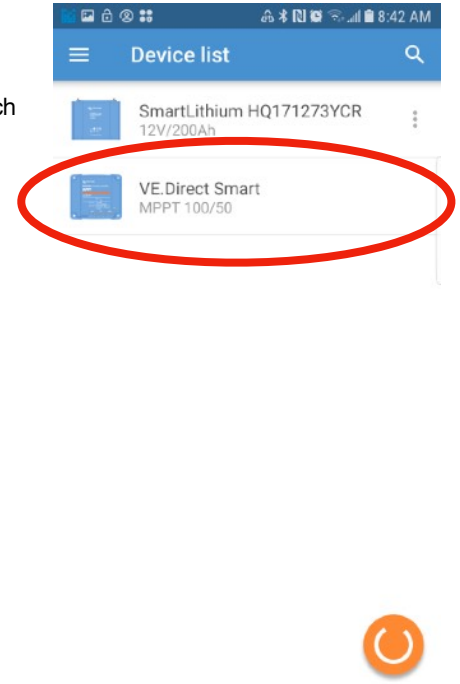
Programming / Commissioning Your System - The Charge Controller

Charge Control Settings for LifeBlue Lithium Batteries:

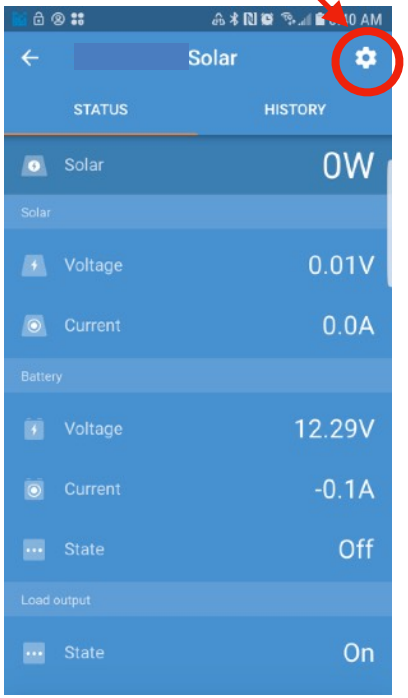
1. Download the "VictronConnect" App to your phone.
2. Open the App.
3. You'll see a selection for your SmartSolar MPPT Charger, select it.
4. Type **000000** to login for the first time.
   NOTE: To change the PIN code, go back one step to the main screen. Click on the 3 buttons to the right of the controller image, and select "Reset PIN Code".
5. Click on the **gear** in the top right corner.
6. Click on "Battery".
7. Click on the settings and adjust them accordingly to match below:

   - Battery voltage: 12V
   - Max charge current: 30A (In this example)
   - Use default charge settings: OFF
   - Charger enabled: ON
   - Battery Preset: User defined
   - Expert Mode: ON
   - Absorption voltage: 14.40 V
   - Float voltage: 13.80 V
   - Equalization voltage: 13.80 V
   - Absorption Duration: Fixed
   - Absorption Time: 00:20 (20 minutes)
   - Auto Equalization: Disabled (Off)
   - Temperature compensation: Disabled (Off)

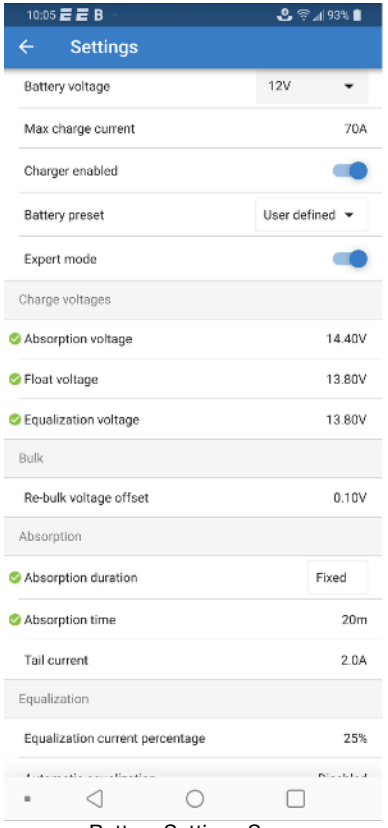
Victron Blue Solar MPPT with Bluetooth or MPPT Control	Lifeblue Lithium
Absorption Voltage	14.40V
Absorption Time limit	15 Minutes
Float Voltage	13.80V
Equalization Voltage	14.20V
Auto Equalization	OFF
Temperature Compensation	OFF
Temperature Compensation	



Device List within VictronConnect



MPPT Charge Controller Screen



Battery Settings Screen

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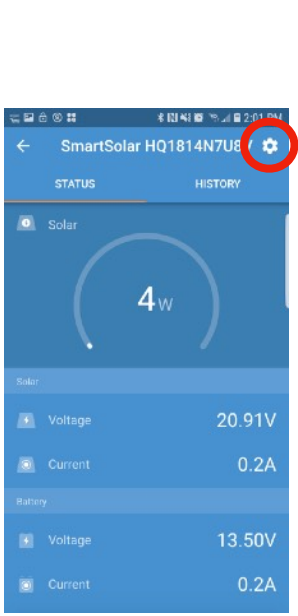
Programming: Linking the BMV and Charge Controller on Smart Network

Creating The Network

1. When in the Victron Connect App, click on one of your devices.
2. Go to “Settings” (shown as a gear symbol in the top right, picture 1).
3. Go to “VE.Smart networking” (picture 2).
4. Go to “Create Network” (picture 3).
5. Enter a name for your network (picture 4).



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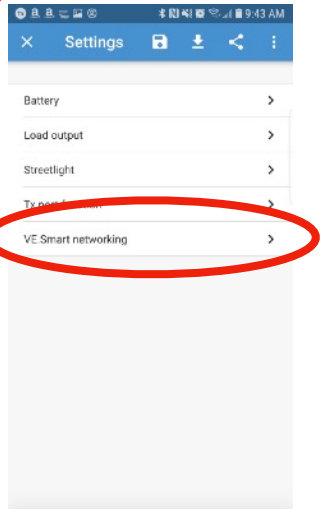

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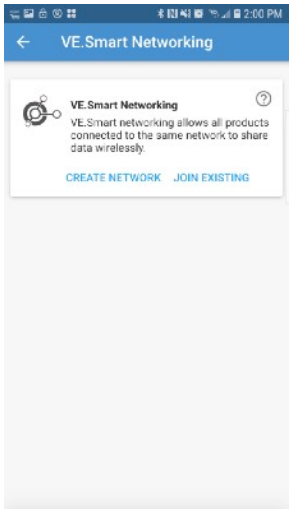
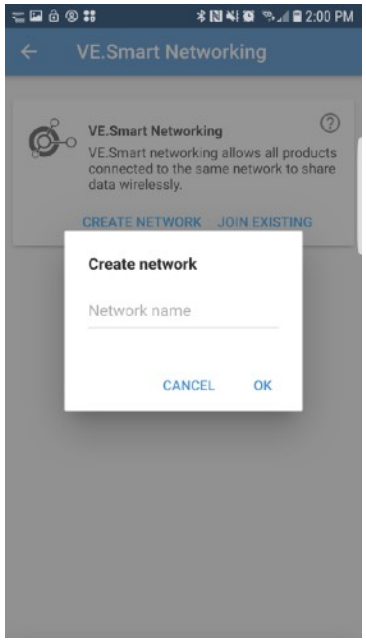


3

Linking Each Device:

1. Enter the Victron Connect App and click on a device.
2. Go to “Settings” (shown as a gear symbol in the top right, picture 1).
3. Go to “VE.Smart networking” (picture 2)
4. Go to “Join Existing Network” (picture 3)
5. Select the network you just created (picture 5).
6. This device is now joined to the network (picture 7). Repeat this step for every other bluetooth enabled device.



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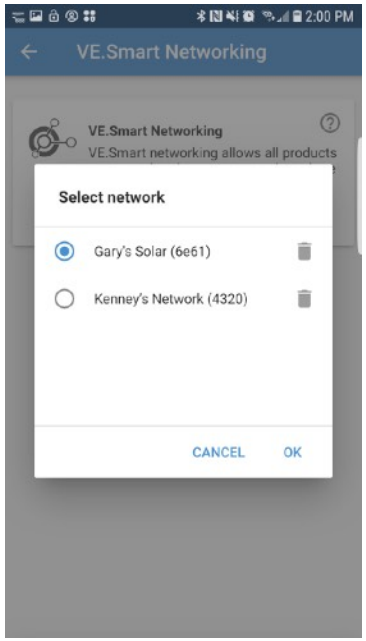

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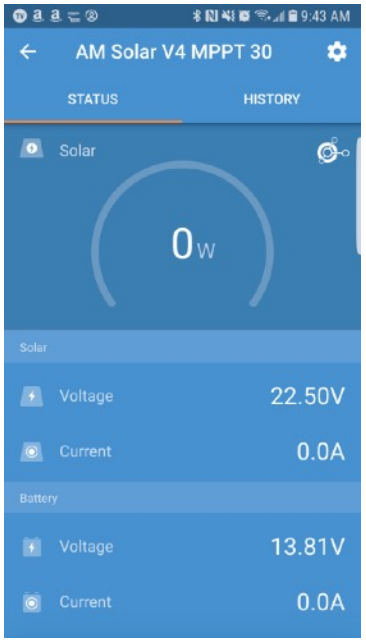
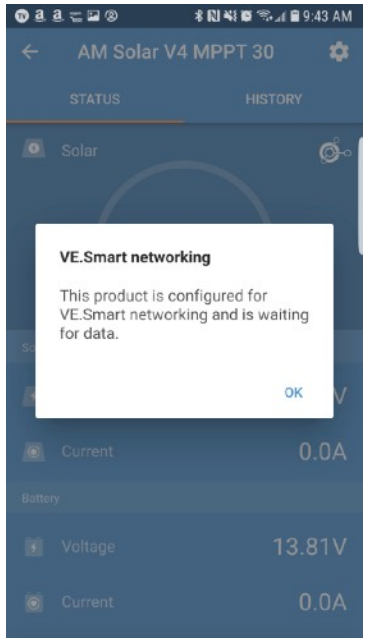
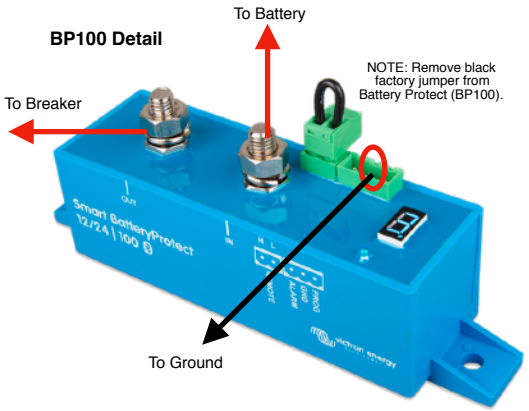


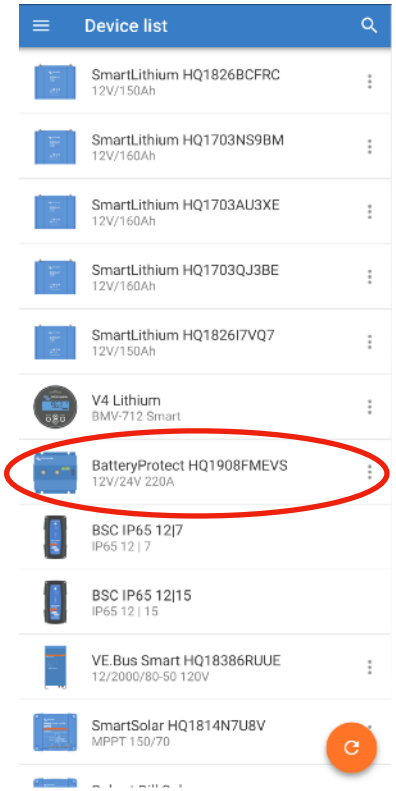


7

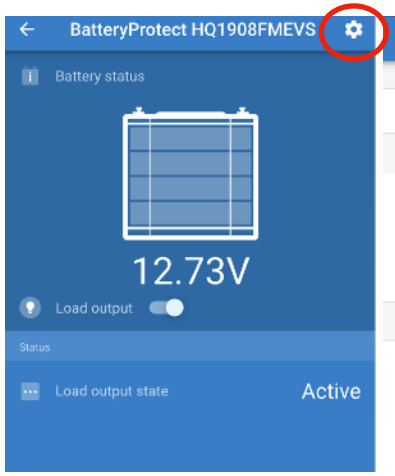
Programming / Commissioning Your System - The Smart BP-100 Battery Protection

1. Supply 12V power to the BP (+ to IN post, - to GND pin).
2. Open VictronConnect and select the Battery Protect.
3. The first screen has a switch to manually toggle the relay.
4. Click the gear in the top right to enter Settings.
5. Select “user defined” from the Preset menu.
6. Enter the following values:
   - Shut down: 10.8v
   - Restart: 11.9v
7. Mode: Leave on “B”
8. Alarm output: Select ”Relay” from the menu.

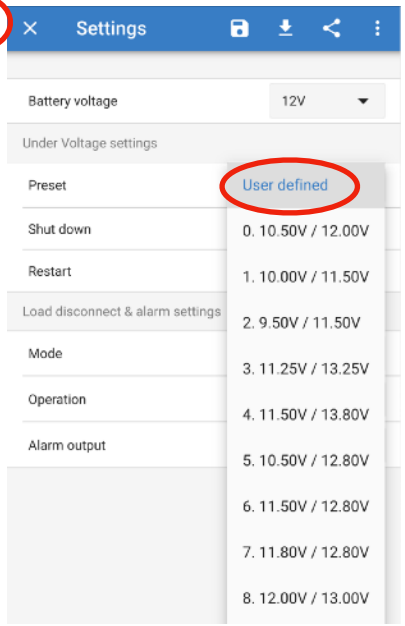




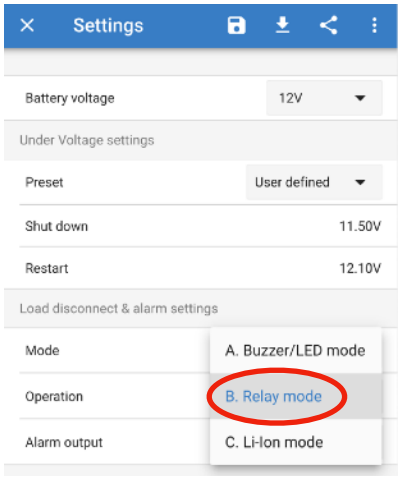
2. Select BatteryProtect from VictronConnect



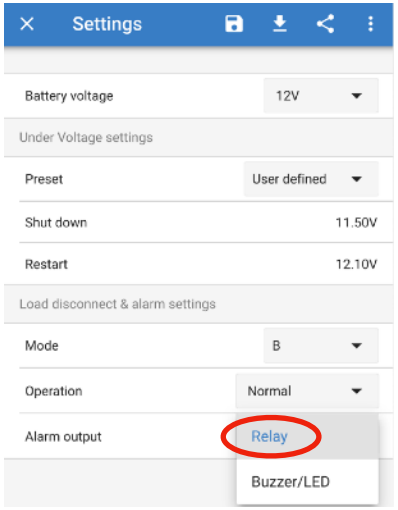
4. Select the gear icon



5. Select “User defined” from the Preset menu



7. Mode should be set to “Relay mode”



8. Alarm output: Select “Relay”

NOTE: These setting were chosen on the conservative side, but can be adjusted depending on your needs. Do not lower the shut down voltage until you are very familiar with your system, since dropping below 12v may result in battery degradation.

If your battery protect shuts down your loads, it’s important you recharge your batteries up to a full charge as soon as possible.

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Programming Your Victron Color Monitor

Connecting Your Victron Display to Wireless:

1. Press the top right button on the display (menu), and use the down directional button to scroll to Settings. Enter the Settings screen by pressing the center button when “Settings” is highlighted.
2. Use the down directional button to scroll to “Wifi” (near the bottom of the list). Press the center button when highlighted to enter Wifi.
3. Highlight the network you are connecting to, using the up and down directional buttons to scroll if needed. Press the center button to connect once the wireless network is highlighted.

   If a password is required, it will prompt you here. Use the up and down directional buttons to select letters. Press the right directional button to move to the next letter. Press the center button when the full password is entered.
4. The connection could take up to 1 minute to complete. Ensure it displays “connected” when done. You now have internet access to your display. Be sure to remain within the wireless signal range during the duration of the firmware upgrade in the next step.

Updating The Display Firmware:

1. Use the left direction button to go back to the “Settings” screen.
2. Use the down directional button to scroll to “Firmware” (2nd down from the top), and press the center button once highlighted.
3. Select “Online updates”. Press the center. Button once highlighted.
4. Select “Check for Updates”. It will proceed with checking for updates.
5. Select “Perform Updates”. It can take up to 5 minutes for the updates to be applied and the system to reboot.
6. It should now display a message stating it’s on the latest version in the “Firmware” section.

These devices connect via Bluetooth to communicate with a smartphone using the VictronConnect app.

Helpful Notes:

- Pressing the center button will always select what is highlighted.
- Pressing the left arrow will take you back to the previous screen.
- Pressing the top right button will pull up the Settings page.

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Recording the VRM Portal ID:

1. Go back to Settings, then enter “VRM Online Portal”.
2. Take a photograph of the VRM online portal ID for future reference.

Changing Settings:

3. Go to settings by pressing the top right button, then enter “Remote Console”.
4. Click on “Disable password check”. It will give you a notice that “Password check has been disabled”.
5. Turn “Enable on VRM” to on.
    1. Ensure you select “No Password Required”
6. Go back to settings, then enter Date and Time and set date/time.
7. Go back to settings, enter “General” then select “reboot?”.
8. Enter settings once rebooted, then enter Services and turn on VRM two-way communication.
9. Go to Settings, then enter “System Setup”.

- Change all settings to the following:
    - AC Input 1: **Shore Power**
    - AC Input 2: **Generator**
    - Battery Monitor: **Automatic**
    - Has DC System: **On**

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Using the Victron VRM Portal

Getting your VRM Portal ID

1. Press the menu button on your Color Control.
2. Go to “Settings”.
3. Go to “VRM Online Portal”.
4. Take a photograph or write down your VRM portal ID shown here. It will be used for later purposes.

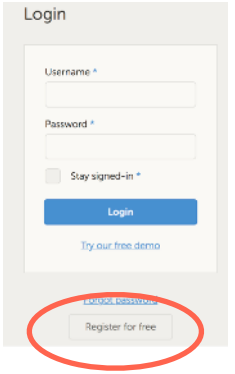
Generating A Login:

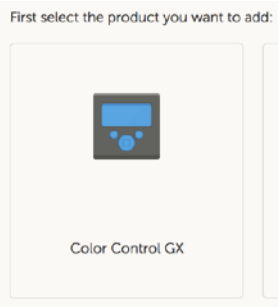
1. Go to vrm.victronenergy.com from a computer or tablet.
2. Click on the “Register For Free” button.
3. Complete all the fields with your name, etc. except “Company”. Enter AM Solar for the field “Victron Dealer”.
4. Click “Register”.
5. Upon registration, you will get an email sent to the address you entered. The email includes a link to verify your account, click on the link in the email.
6. Once clicking the link in your email to confirm your account, you are now registered. Your browser window should automatically log you into the VRM portal. If it doesn’t automatically log you in, you can visit vrm.victronenergy.com and enter your login credentials.

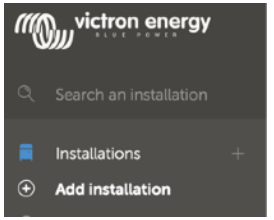
Adding Your Color Control To Your Portal Account:

1. Click on “Add Installation” in the top left menu.
2. Click on the picture of the Color Control GX.
3. Scroll down to the bottom of the screen, you’ll see a box where you can enter your VRM Portal ID
4. Enter your VRM Portal ID here that you obtained from your Color Control Settings.
5. The device is now always viewable under “Installations” in the top right menu when you login.

VRM Screenshots:







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Troubleshooting Steps

Steps to take before calling AM Solar:

1. Get a voltmeter and test the voltage of the batteries directly to ensure they aren't drained.

   - If you aren't familiar with how to operate your voltmeter, test it on a known power source like your car starter battery to ensure you are reading it correctly.

2. If your problem is related to solar:

   - Perform a system reset on the solar side. First disconnect the panels from the controller, usually done with an on/off switch. Then disconnect the battery from the controller. After 10 seconds, reconnect the battery to the controller and give it 15 seconds to boot up. Then reconnect solar.

   - Download the latest version of the VictronConnect App to your device, and attempt to reconnect

3. If you problems is related to the inverter:

   - Power cycle the inverter by powering it off and back on.

   - Check the display(s) to ensure it isn't remotely powered off, or the current limit is set too low to not allow enough power from shore.

4. Check all connection points to ensure there are no loose connections.
5. Check all on/off switches to ensure they are on, and all DC breakers are reset.
6. Check all inline fuses to ensure they haven't blown. You have the following fuses in this kit, with a spare included for each:
   - Inverter 300Amp Class T Fuse
   - Victron BMS 15A fuse
   - Temperature Sensor Fuse
7. Power cycling the entire system by turning the master electrical on/off switch to off, give it 5 seconds, and then back on.

If you are still having issues with your system, call AM Solar at 541-726-1091 to be put into our troubleshooting queue. Give us a shout ***before*** you get a headache and we'll help you through things! Please have a volt meter handy and performed the applicable tests above before contacting us. We'll be glad to help get you back up and running as quickly as possible!

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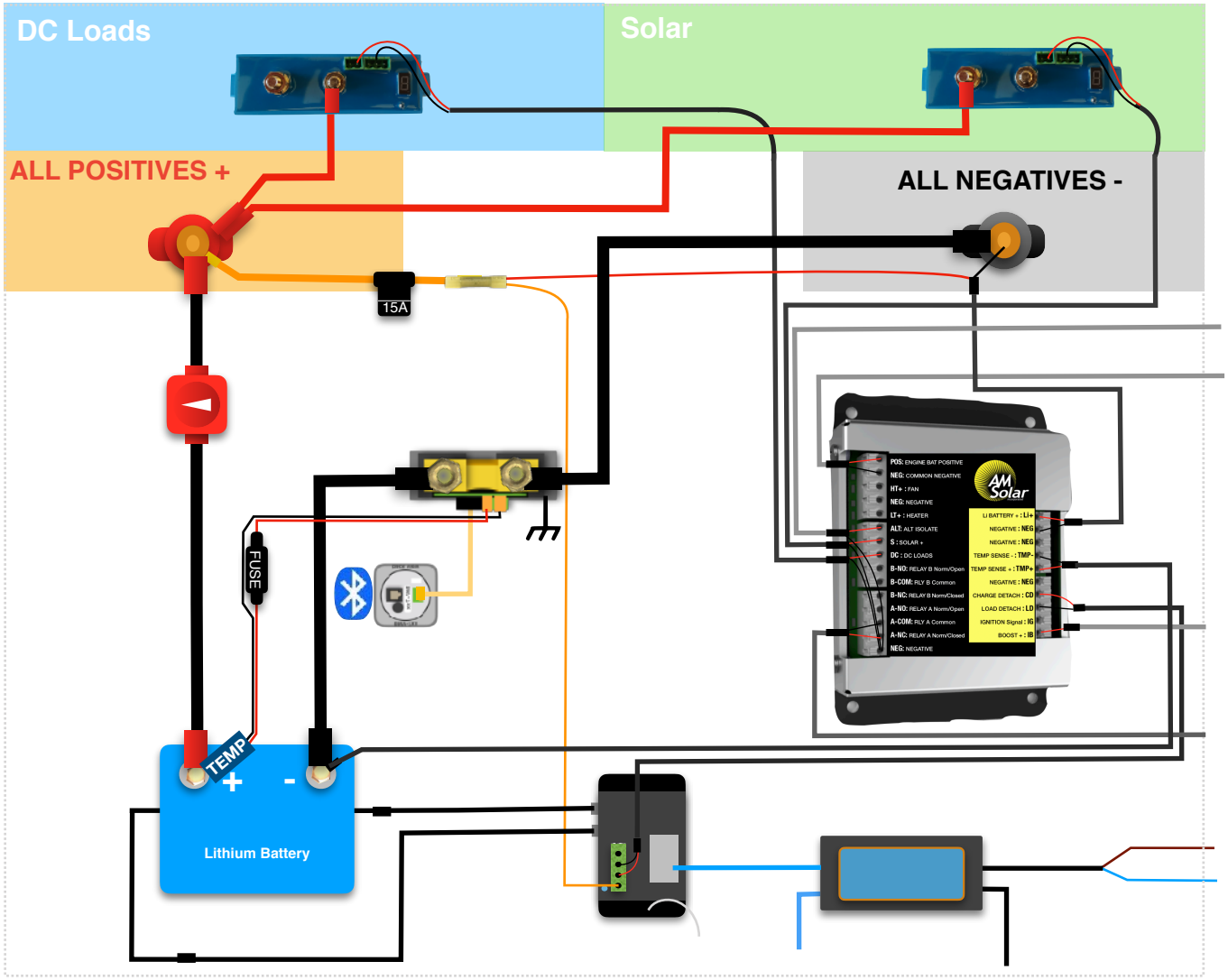
DC Loads
Solar
ALL POSITIVES +
ALL NEGATIVES -
15A
FUSE
TEMP
+
-
Lithium Battery
POS: ENGINE BAT POSITIVE
NEG: COMMON NEGATIVE
HT+ : FAN
NEG: NEGATIVE
LT+ : HEATER
ALT: ALT ISOLATE
S : SOLAR +
DC : DC LOADS
B-NO: RELAY B Norm/Open
B-COM: RLY B Common
B-NC: RELAY B Norm/Closed
A-NO: RELAY A Norm/Open
A-COM: RLY A Common
A-NC: RELAY A Norm/Closed
NEG: NEGATIVE
LI BATTERY + : LI+
NEGATIVE : NEG
NEGATIVE : NEG
TEMP SENSE - : TMP-
TEMP SENSE + : TMP+
NEGATIVE : NEG
CHARGE DETACH : CD
LOAD DETACH : LD
IGNITION Signal : IG
BOOST + : IB