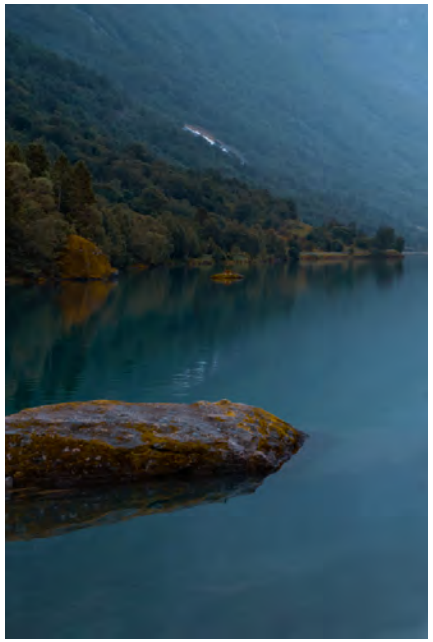
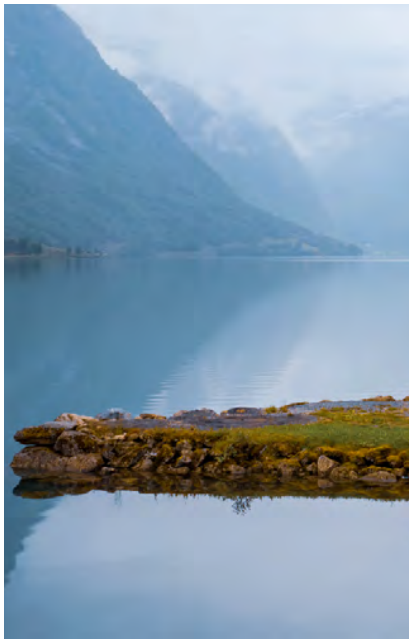
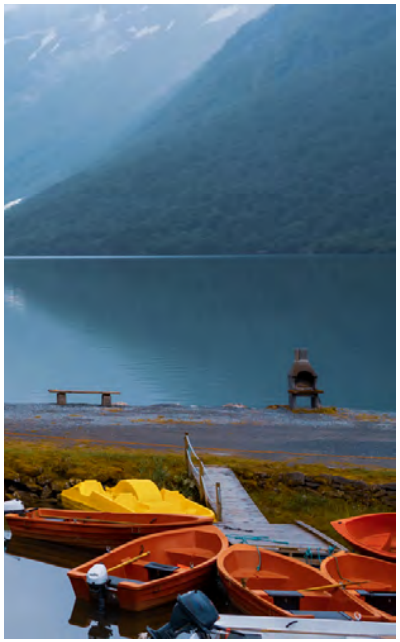
Installer's Guide

MODULE WITH EXTERNAL BMS INSTALLATION KIT

KISAE 3000 WATT



LITHIONICS BATTERY, CLEARWATER, FL 33765 USA | PH: 727.726.4204 | FAX: 727.797.8046 | WEB: LITHIONICSBATTERY.com

Table of Contents

Safety Information

This manual is intended to be used by qualified installers. Although quite detailed, it is meant only as an overall guide to the installation and not to replace the manuals supplied by the original equipment manufacturers.

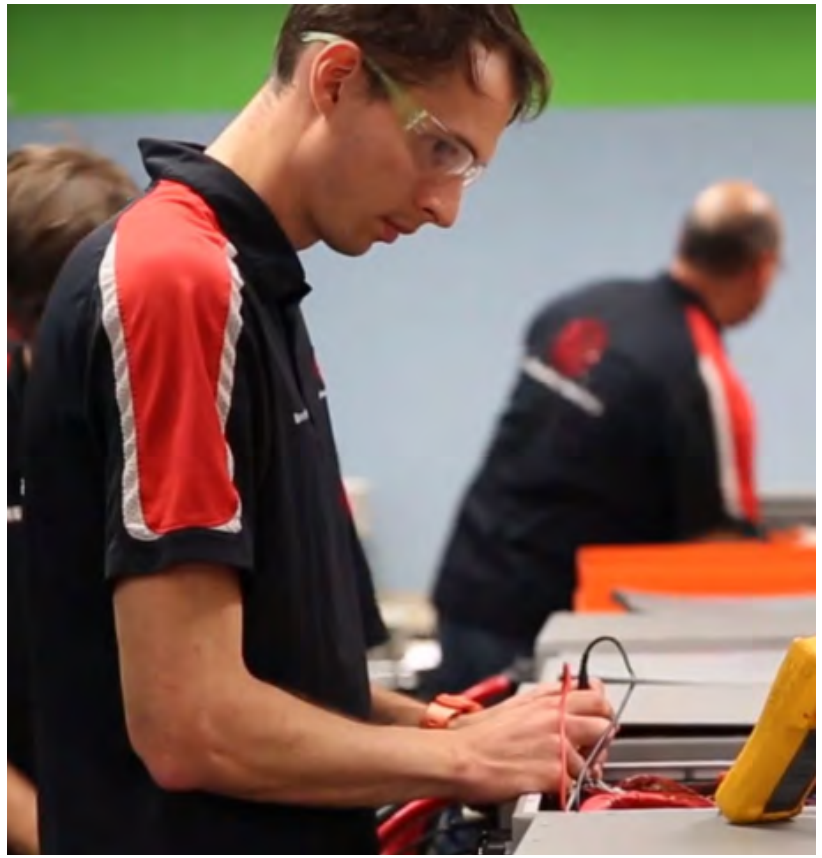
All electrical work should be performed in accordance with local and national electrical codes. Assume that voltage is present at the battery terminals; use insulated tools and gloves while working on the system. Always turn off equipment connected to the battery in addition to turning OFF the power switch on the BMS to isolate it from other electrical circuits before performing any repairs or maintenance on the system. Always use correct wire sizes to connect the system to inverters, chargers or other equipment.

Always use crimped connections to connect to the battery terminals. Read and follow the inverter, charger or other equipment manufacturer's safety precautions prior to connecting the battery to that equipment. Always use charging equipment compatible with Lithium Iron Phosphate battery chemistry.

Links to the installation manuals relevant to this kit are listed at the back of this manual.

Introduction

The Lithionics Module and **External BMS** kit is based on a large format **GT** or **GTX** series lithium ion battery module and a Kisae 3000 watt inverter / charger. This combination is capable of providing enough power to run your AC loads for extended periods of time. The inverter features true sine wave grid quality power and is capable of handling high surge loads.



Wiring Diagrams

- Main Diagram
- Inverter Diagram
- Kisae DMT-1250 Diagram
- BMS/IonGage Diagram

Main Diagram

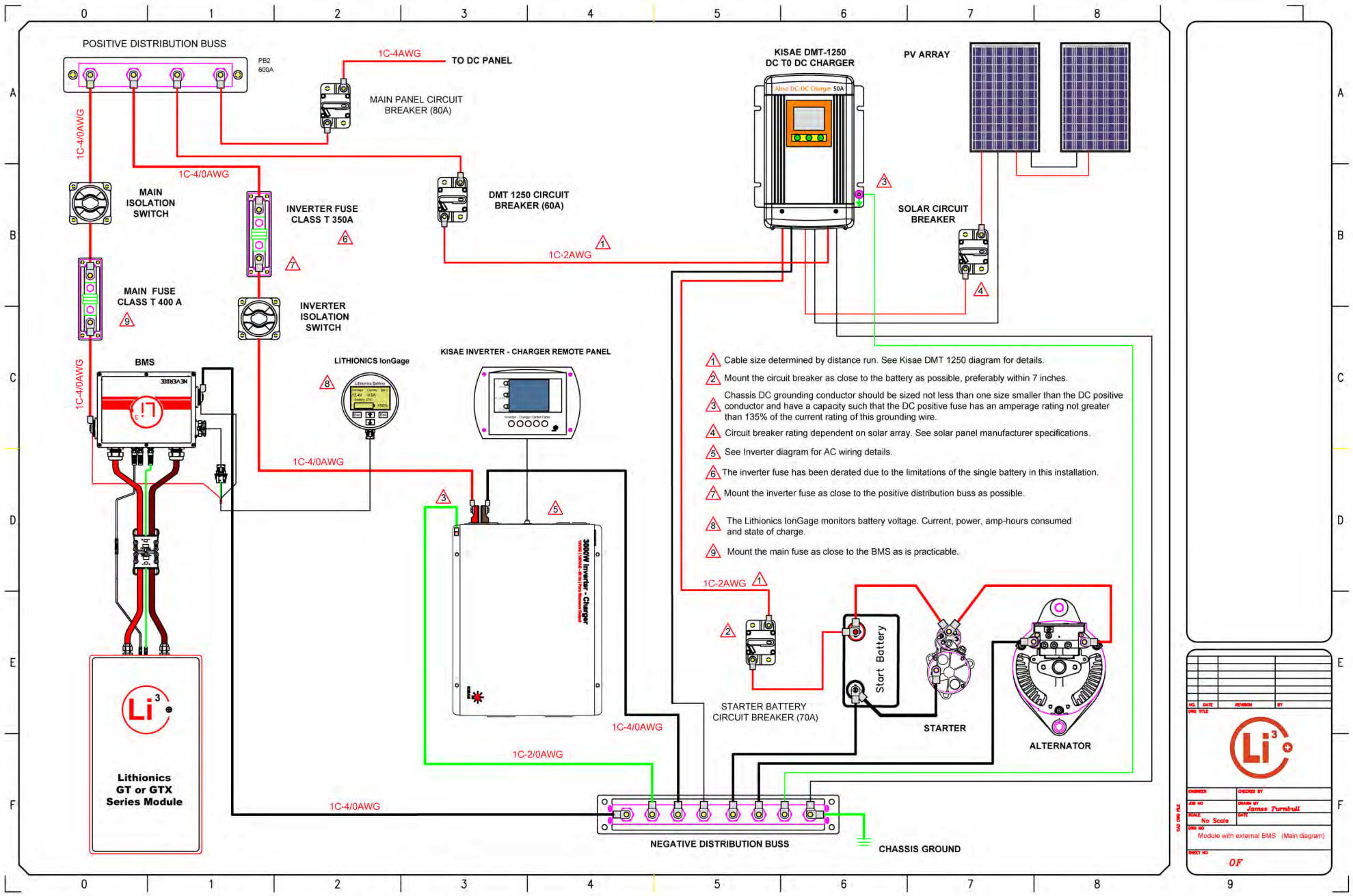
The main diagram depicts the general layout of the system. The 4/0 positive cables are connected to the main positive distribution buss via a 400A class T fuse and an isolation switch. The inverter is connected to the positive distribution buss via a Class T 350A amp fuse and an isolation switch. The Class T fuse block and isolation switch should be mounted as close as possible to the positive distribution buss. The isolation switch allows you to isolate the inverter in case of a malfunction as well as disabling the inverter if you need to work on the AC system. The chassis DC grounding conductor (green) should be sized not less than one size smaller than the DC positive conductor and have a capacity such that the DC positive fuse has an amperage rating not greater than 135% of the current rating of this ground wire. If the positive cable supplying the inverter shorts to ground internally, then the chassis ground cable needs to be able to carry enough current to blow the fuse without melting and possibly causing a fire.

The inverter is controlled by the **Multi-Function Display**. The display is used to provide information about the inverters status and can be used to customize its features.

The **Lithionics IonGage** monitors battery voltage, current, power, amp-hours consumed and state of charge.

The **DMT-1250** charger is connected to the positive distribution buss via a 60A circuit breaker (Ch-1). The PV solar array is connected to the MPPT charger input (Ch-2) via a circuit breaker. Please note that the maximum PV solar array voltage is 45VDC. The alternator / start battery input (Ch-3) is connected to the start battery via a 70A circuit breaker, this circuit breaker must be installed as close to the battery as possible.

MAIN DIAGRAM



Inverter Diagram

The inverter diagram depicts a typical AC installation. The main panel has an output breaker for the non- inverter loads. It is used to power the high power loads that are beyond the inverters capacity such as a water heater or an electric stove. The inverter AC input must be protected by a circuit breaker rated at 30A. Make all connections using proper crimp-on connectors (do not use twist on connectors).

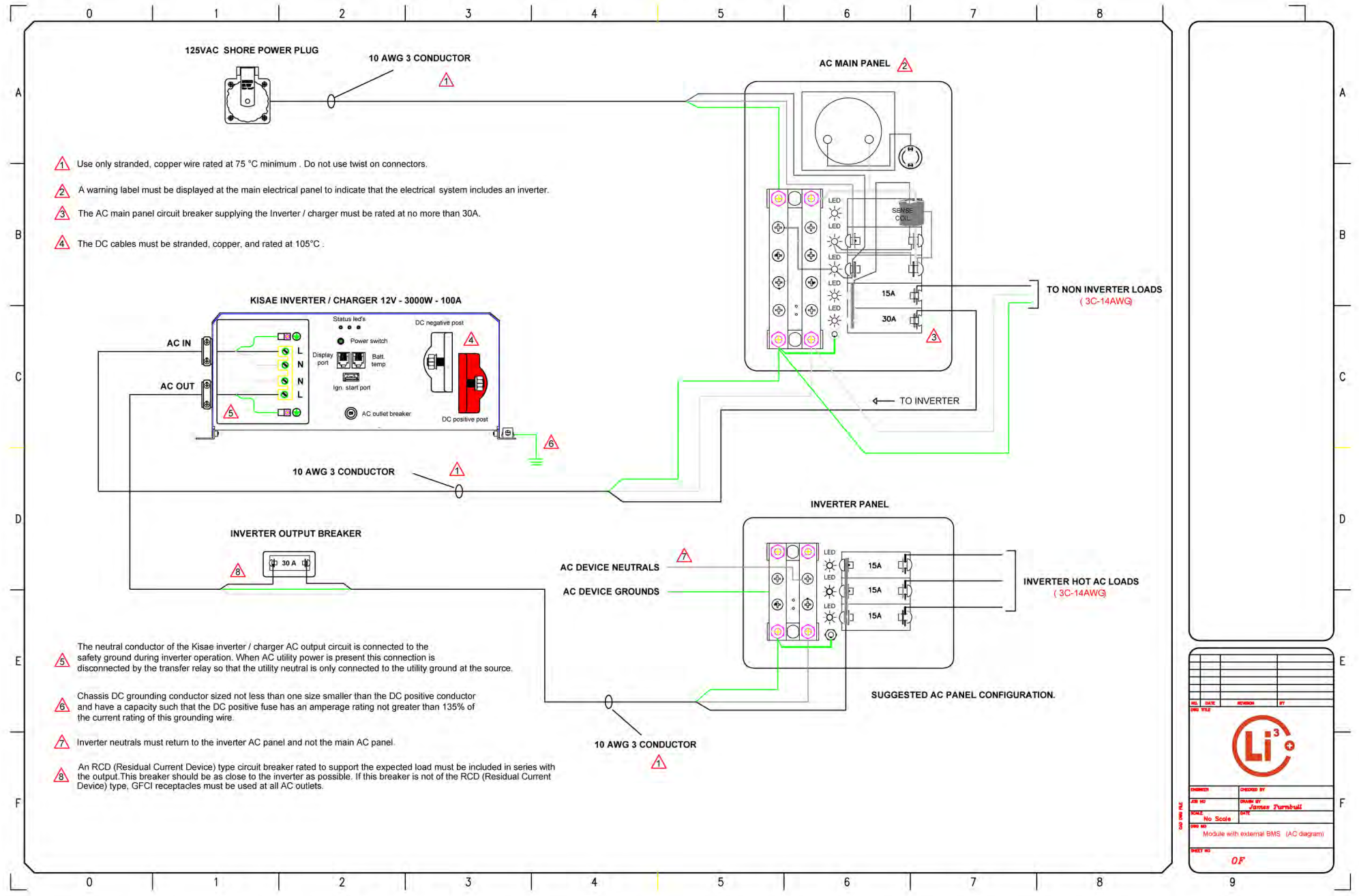
A Residual Current Device (RCD) type circuit breaker rated at 30A must be wired in series with the output. This breaker should be as close to the inverter as possible. If this breaker is not of the RCD type, GFCI receptacles must be used at all AC outlets.

The neutral conductor of the Kisae inverter / charger AC output circuit is connected to the chassis ground during inverter operation. When AC utility power is present this connection is disconnected by the transfer relay so that the utility neutral is only connected to the utility ground at the source. In an RV installation, the inverter chassis must be connected the vehicle chassis ground (via the negative distribution buss). The chassis grounding conductor must be sized not less than one size smaller than the DC positive conductor and have a capacity such that the DC positive fuse has an amperage rating not greater than 135% of the current rating of this grounding wire.

When using an inverter sub panel, the inverter neutral cables must return to the inverter sub panel and not the main AC panel.

A warning label should be installed at the main AC panel to indicate that there is an inverter in the system.

INVERTER DIAGRAM



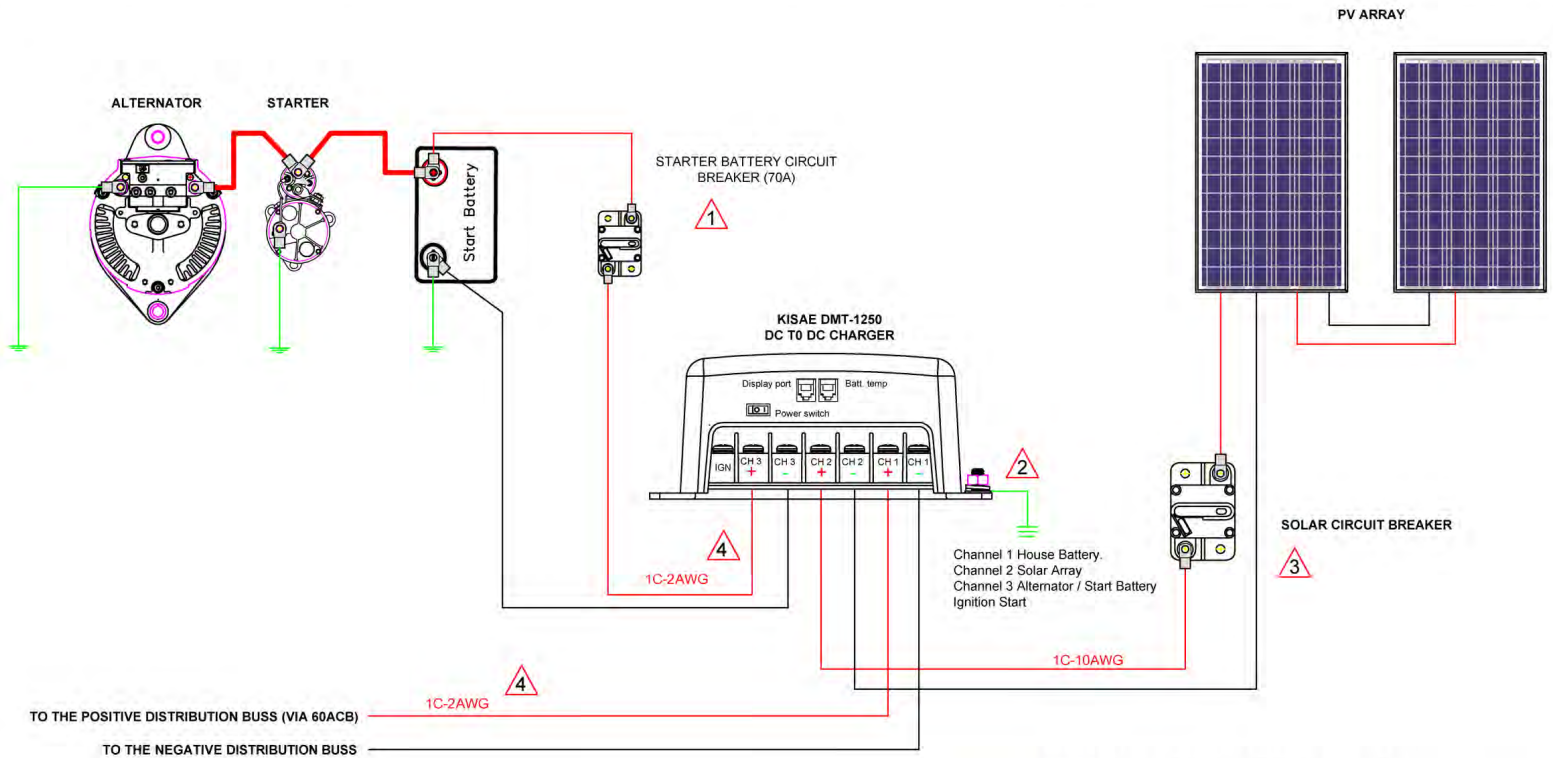
1. Use only stranded, copper wire rated at 75 °C minimum . Do not use twist on connectors.
2. A warning label must be displayed at the main electrical panel to indicate that the electrical system includes an inverter.
3. The AC main panel circuit breaker supplying the Inverter / charger must be rated at no more than 30A.
4. The DC cables must be stranded, copper, and rated at 105°C .
5. The neutral conductor of the Kisae inverter / charger AC output circuit is connected to the safety ground during inverter operation. When AC utility power is present this connection is disconnected by the transfer relay so that the utility neutral is only connected to the utility ground at the source.
6. Chassis DC grounding conductor sized not less than one size smaller than the DC positive conductor and have a capacity such that the DC positive fuse has an amperage rating not greater than 135% of the current rating of this grounding wire.
7. Inverter neutrals must return to the inverter AC panel and not the main AC panel.
8. An RCD (Residual Current Device) type circuit breaker rated to support the expected load must be included in series with the output.This breaker should be as close to the inverter as possible. If this breaker is not of the RCD (Residual Current Device) type, GFCI receptacles must be used at all AC outlets.

Module with external BMS (AC diagram)

Kisae DMT-1250

The **DMT-1250** DC to DC Battery Charger is a fully automatic multi-stage, multi-input battery charger with the ability to charge from either an alternator linked to a battery, or via solar power with the Maximum Power Point Tracking (MPPT) Solar Controller. With two inputs available, the house battery will be charged from either the engine while underway, or via the solar panels when stationary. The process to choose either engine or solar is fully automatic and both functions are controlled from within the unit itself without the need for external relays.

KISAE DMT-1250



1. Mount the circuit breaker as close to the battery as possible, preferably within 7 inches.
2. Chassis DC grounding conductor should be sized not less than one size smaller than the DC positive conductor and have a capacity such that the DC positive fuse has an amperage rating not greater than 135% of the current rating of this grounding wire.
3. Circuit breaker rating dependent on solar array. See solar panel manufacturer specifications.
4.

DC to DC Connection Input	Recommended cable size		
DMT 1250 @ 12VDC 50A	2 to 5 meters	Up to 10 meters	≥ 10 meters
From Alternator Battery	4 -2 AWG	1- 0 AWG	Not Recommended
House Battery Connection	4 -2 AWG	Not Recommended	Not Recommended
Note: Cable size quoted is one way from battery to device, the suggested cable size is calculated with return run			

KISAE DMT-1250 DC T0 DC CHARGER SPECIFICATIONS

Output Rating	DMT1250
Output Current	Maximum 50A
Output Voltage	12V Nominal
Output Power	775W
Charger DC output (CH 1)	
Selectable Battery Type	GEL, AGM, Flooded, Lithium,
Program Charger Voltage Range	13.8 -15.5 Vdc
Float Voltage Range	13.0 -13.8 Vdc
Charger Current	(User Selectable) 5-50A with 5A Steps
Charging Control	Two or Three Stage Selectable (Default 3 stage)
DC Output Bank	Single
Current draw from CH1 with unit ON	< 70 mA
Current draw from CH1 with unit OFF	< 200 uA
Efficiency	95%
DC Input Solar Array/Panels (CH2)	
Input Voltage	14.5 - 45 VDC
Maximum Solar Input Power	≤ 23V input, 500W (600W allowable) ≥37.5 - 45V input, 750W (800W allowable)
DC Input Alternator/ Start Battery (CH3)	
Input Voltage	10.5 - 16.0 VDC
Maximum Input Current	30A

NO.	DATE	REVISION	BY

DWG TITLE

ENGINEER | CHECKED BY

JOB NO | DRAWN BY James Turnbull

SCALE No Scale | DATE

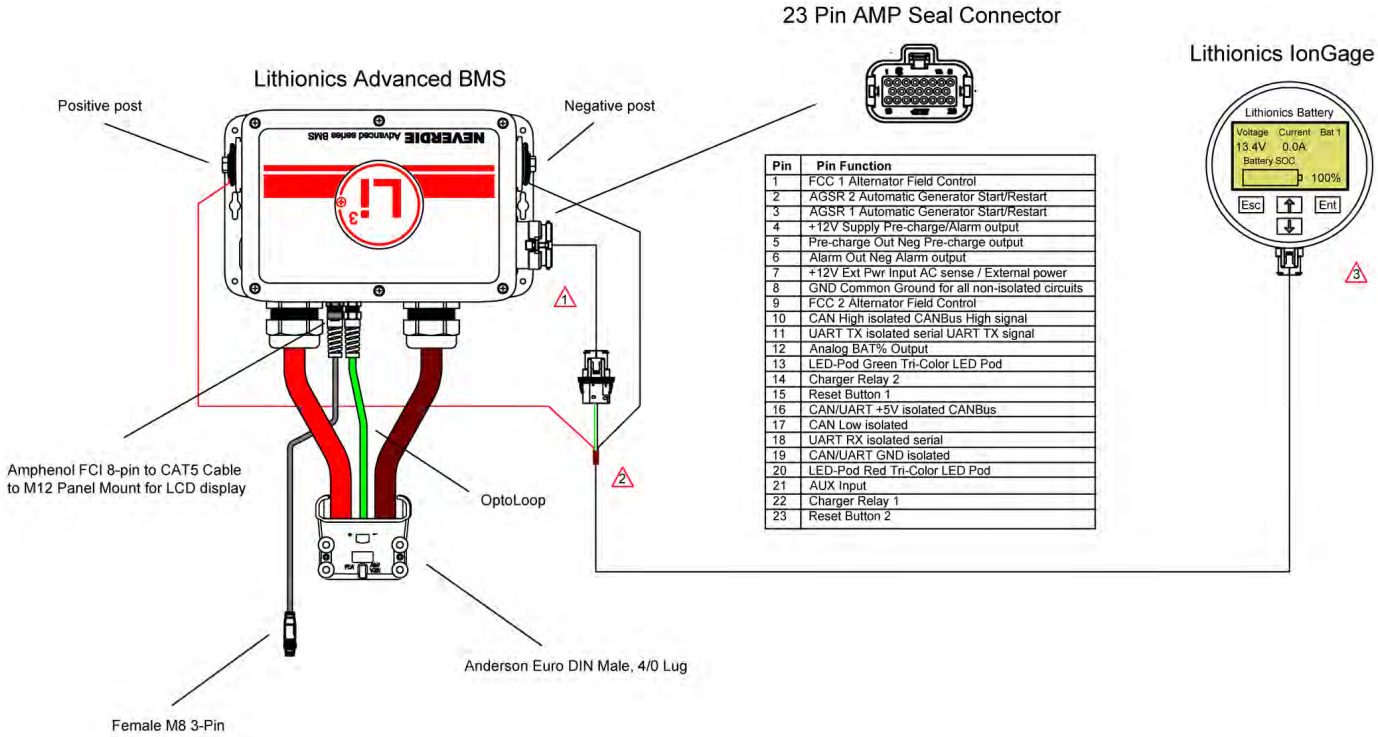
DWG NO Module with external BMS (Solar diagram)

SHEET NO OF

BMS/IonGage Diagram

The Advanced Series BMS includes an integrated SOC Gauge, designed to track battery state of charge (percent of usable energy left in the battery) as well as other useful data parameters. Tracking state of charge is accomplished by a Coulomb counter, based on an internal, high sensitivity hall- effect sensor. The SOC Gauge data will only be correct if the configuration parameters are set correctly, which are pre-set initially by Lithionics Battery, but are user adjustable with supporting hardware. The SOC Gauge will also track and display live amperage (A), live wattage (W), battery voltage (V), temperature (F/C), amp hours (Ah), watt hours (Wh), time remaining (d/h), etc. The meter will be most accurate if the battery is fully charged on a regular basis. If the battery is always partially charged, then the SOC meter reading may drift in the long term and will become less accurate. When the most accurate measurements are required it is recommended to perform a full charge at least weekly.

BMS/IONGAGE DIAGRAM

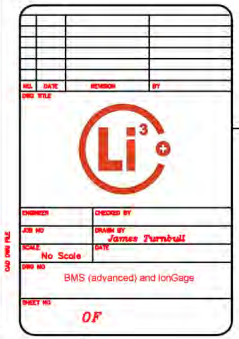


23 Pin AMP Seal Connector

Pin	Pin Function
1	FCC 1 Alternator Field Control
2	AGSR 2 Automatic Generator Start/Restart
3	AGSR 1 Automatic Generator Start/Restart
4	+12V Supply Pre-charge/Alarm output
5	Pre-charge Out Neg Pre-charge output
6	Alarm Out Neg Alarm output
7	+12V Ext Pwr Input AC sense / External power
8	GND Common Ground for all non-isolated circuits
9	FCC 2 Alternator Field Control
10	CAN High isolated CANBus High signal
11	UART TX isolated serial UART TX signal
12	Analog BAT% Output
13	LED-Pod Green Tri-Color LED Pod
14	Charger Relay 2
15	Reset Button 1
16	CAN/UART +5V isolated CANBus
17	CAN Low isolated
18	UART RX isolated serial
19	CAN/UART GND isolated
20	LED-Pod Red Tri-Color LED Pod
21	AUX Input
22	Charger Relay 1
23	Reset Button 2

Lithionics IonGage

1 Corporate/consumer Ampseal cable
2 IonGage Harness (75-521-288)
3 IonGage (51-160)



Parts List

QTY	PART NUMBER	DESCRIPTION	COMMENTS
1	BSS-2104	PowerBar 600A BusBar - Four 3/8"-16 Studs	Blue Sea Systems
1	BSS-2107	PowerBar 600A BusBar - Eight 3/8"-16 Studs	Blue Sea Systems
1	BSS-7140	187-Series Circuit Breaker - Surface Mount 60A	Blue Sea Systems
1	BSS-7141	187-Series Circuit Breaker - Surface Mount 70A	Blue Sea Systems
1	BSS-7136	187-Series Circuit Breaker - Surface Mount 30A	Blue Sea Systems
1	BSS-7142	187-Series Circuit Breaker - Surface Mount 80A	Blue Sea Systems
2	BSS-5502100	Class T Fuse Block with Insulating Cover - 35 to 400A	Blue Sea Systems
1	BSS-5120	Class T Fuse - 350 Amp	Blue Sea Systems
1	BSS-5121	Class T Fuse - 400 Amp	Blue Sea Systems
2	BSS-9003e	E-Series On Off Battery Switch	Blue Sea Systems
1	DMT-1250	Kisae DMT-1250 DC to DC charger	Kisae
1	BIC1230100	Kisae 3000 watt inverter / charger	Kisae
1		Inverter Remote Panel	Kisae
1	51-160	Lithionics IonGage	Lithionics Battery
1	75-521-288	IonGage Harness	Lithionics Battery
1		CORPORATE/CONSUMER AMPSEAL	Lithionics Battery

Battery Installation

Battery Module and NeverDie BMS Unit Environment and Mounting orientation

The Battery Module and BMS Unit should be mounted in an environment that does not receive direct sunlight, pressurized water or road debris. To avoid power interruption, your installation may need to consider controlling the ambient operating temperature. Mount the Battery Module in an upright position, i.e. black lid faces up. Other orientations are NOT permitted and will void the warranty. The BMS Unit can be mounted in any orientation as long as all its features are accessible. Ensure that the BMS Unit is located in close proximity to the Battery Module so that all connectors can be mated securely.

Temperature Sensor Connector

The temperature sensor cable and connector exiting the battery module must be connected to the BMS. Connect the two M8 circular connectors together by first aligning their pins and pressing them together, and then rotate the securing nuts until they stop snugly. Do not use the temperature probe from the inverter-charger manufacturer.

Battery Installation

Main Power Connector

The battery module has a large black female main power connector that must be inserted into the BMS male main power connector. This is the connector with the large 4/0 red and black wires and single small gauge gray cable. Align the connectors and insert them together. Use 2 zip ties to bind the connectors together so that they may not separate during use.

NeverDie BMS Unit Power Terminals

Connect the BMS Unit Power Terminals to your DC bus, both Positive (Red) and negative (Black). Use correctly sized wire conductors for the application. Torque to 80 INCH pounds. Never stack ring terminals or place the stainless-steel washer between the Power Terminal and ring terminal lug.

Pressure Vent

It is recommended to install a ventilation hose onto the pressure vent barb when the Battery Module is in a location with poor ventilation. The hose shall direct the gases to the atmosphere.

Battery Installation

BMS Unit I/O Connector

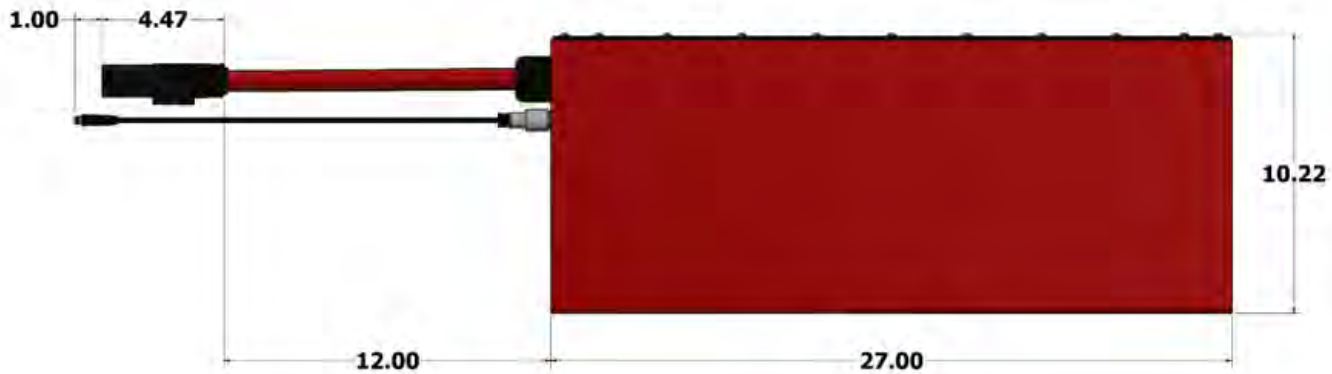
Some systems have a rectangular I/O connector to extend the BMS Unit features remotely such as remote Power/Reset switch, LED indicator, or serial data logging. Be sure to connect the I/O connector if so equipped.

Initial Charge Cycle

Initially the system must be FULLY charged once to calibrate the BMS Unit to the Battery Module.

DO NOT attempt to disassemble the battery, as it could lead to permanent battery damage and voids your battery warranty!!!

A link to the battery installation manual is listed at the back of this manual



System Operation

Powering the System On

Short press the Power switch for 1 second. The switch will illuminate once power is enabled. You may notice an audible “thunk” noise of the internal contactor switching on. Check that there is voltage at the Power Terminals with a voltmeter.

Powering the System Off

Long press the Power switch for 3 seconds. The switch will cease to illuminate once power is disabled. You may notice an audible “thunk” noise of the internal contactor switching off. Check that there is 0V at the output terminals with a voltmeter.

Charging

The charging device(s) connected to the Lithium Battery System must be programmed to the correct parameters for the battery. Charging may be performed at any time the system is powered ON.

NOTE – *The Lithium Battery System will disconnect power if the voltage, amperage, or temperature limits are exceeded during charging. Only use a Lithionics Battery approved charging source. Please contact Lithionics Battery for charger approval.*

System Operation

Initial Charging Cycle

The initial charging cycle is required as it calibrates the NeverDie BMS to the Battery Module for accurate State of Charge percentage monitoring. During the initial charging cycle, the system must reach a voltage level that is equal to the Standard Full Charging Voltage indicated. Enable the charging device(s) so that they may complete a charge cycle. It is recommended to not have any discharge loads active during the initial charging cycle, especially towards the end of charging.

Discharging

Discharging may be performed at any time the system is powered On.

NOTE - *The Lithium Battery System will disconnect power if the voltage, amperage, or temperature limits are exceeded during discharging. This NeverDie feature allows the system to have a "reserve" amount of energy left in the battery. Once the system is discharged to 12.0V or 10% State of Charge, whichever comes first, power will be disabled to leave a "reserve" amount of energy still left in the battery. To enable the remaining reserve energy of the system, short press the Power switch for 1 second.*

NOTE - *Once the reserve range is enabled the battery should be charged as soon as possible.*

WARNING - *If the reserve energy is used and the battery module is left in a deeply discharged state without immediate charging, the battery module will become permanently damaged.*

Equipment Manuals

Please see below the web links for the manufacturer equipment manuals.

Lithionics Battery ***Kisae Inverter*** ***Kisae DMT-1250***