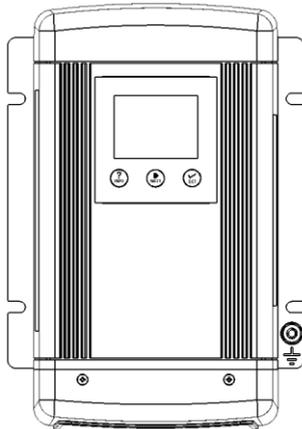


Abso DC to DC Battery Charger

**12V 30A (DMT1230)
12V 50A (DMT1250)**

Owner's Manual



KISAESM

For safe and optimum performance, the **KISAE Abso DC to DC Battery Charger** must be used properly. Carefully read and follow all instructions and guidelines in this manual and give special attention to the **CAUTION** and **WARNING** statements.

PLEASE KEEP THIS MANUAL FOR FUTURE REFERENCE

Disclaimer

While every precaution has been taken to ensure the accuracy of the contents of this guide, **KISAE Technology** assumes no responsibility for errors or omissions. Note as well that specifications and product functionality may change without notice.

Important

Please be sure to read and save the entire manual before using your **KISAE DC to DC Battery Charger**. Misuse may result in damage to the unit and/or cause harm or serious injury.

Product Numbers

DMT1230 *Abso DC to DC Battery Charger 12V 30A*

DMT1250 *Abso DC to DC Battery Charger 12V 50A*

Document Part Number

MU DMT1230 Rev C

Service Contact Information

Email: info@kisaetechnology.com

Phone : 1 877 897-5778

Web : www.kisaepower.com

WARNING: This product can expose you to chemicals, including Di (2-ethylhexyl) phthalate (DEHP) which is known to the State of California to cause cancer, birth defects or other reproductive harm. For more information, go to www.p65warnings.ca.gov

ADVERTENCIA Este producto puede exponerlo a productos químicos, incluidos Di (2-etilhexil) ftalato (DEHP) que el estado de California sabe que causa cáncer, defectos de nacimiento u otros daños reproductivos. Para obtener más información, vaya a www.p65warnings.ca.gov

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IMPORTANT SAFETY INFORMATION

This section contains important safety information for the **KISAE Abso DC to DC Battery Charger**. Each time, before using the unit, READ ALL instructions and cautionary markings on or provided with the unit, and all appropriate sections of this guide. The unit contains no user-serviceable parts. See Warranty section for how to handle product issues.

WARNING: Fire and/or Chemical Burn Hazard!

Do not cover or obstruct any air vent openings and/or install in a zero-clearance compartment.

WARNING: Failure to follow these instructions can result in death or serious injury. Keep away from children!

- When working with electrical equipment or lead acid batteries, have someone nearby in case of an emergency.
- Study and follow all the battery manufacturer's specific precautions when installing, using and servicing the battery connected to the charger.
- Wear eye protection and gloves.
- Avoid touching your eyes while using this unit.
- Keep fresh water and soap on hand in the event battery acid comes in contact with eyes. If this occurs, cleanse right away with soap and water for a minimum of 15 minutes and seek medical attention.
- Batteries produce explosive gases. **DO NOT** smoke or have an open spark or fire near the system.
- Keep unit away from moist or damp areas. Never expose unit to snow, water etc.
- Avoid dropping any metal tool or object on the battery. Doing so could create a spark or short circuit which goes through the battery or another electrical tool that may create an explosion.

WARNING: Explosion hazard!

- Do not use the unit in the vicinity of flammable fumes or gases (such as propane tanks or large engines).
- Avoid covering the ventilation openings. Always operate unit in an open area.
- Prolonged contact to high heat or freezing temperatures will decrease the working life of the unit.

CAUTION:

- This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.
- Children should be supervised to ensure that they do not play with the appliance.
- Do not charge non-rechargeable batteries because of the danger of eruption.
- During charging, batteries should be placed in a ventilated area.
- The battery terminal not connected to the chassis has to be connected first.
- The other connection is to be made to the chassis, remote from the battery and fuel line. The battery charger is then to be connected to the supply mains (household power).
- After charging, disconnect the battery charger from the supply mains. Then remove the chassis connection and then the battery connection.
- Only allow children at least 8 years old to use the battery charger. Give sufficient instruction so that the child is able to use the battery charger in a safe way and explain that it is not a toy and must not be played with.
- Examine the battery charger regularly for damage, especially the cord, plug and enclosure. If the battery charger is damaged, it must not be used until it has been repaired.

FCC INFORMATION

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Re-orient or re-locate the receiving antenna. Re-orient or re-locate
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

LIMITATIONS ON USE

Do not use in connection with life support systems or other medical equipment or devices.

1. INTRODUCTION

Thank you for purchasing the **KISAE Abso DC to DC Battery Charger**. With our state of the art, easy to use design, this product will offer you reliable service for providing a multi-stage, multi-input battery charger to charge the different types of batteries you have installed in either your home, boats, RV caravan, 4WD or commercial vehicle. This manual will explain how to use this unit safely and effectively.

2. PRODUCT DESCRIPTION

The DC to DC Battery Charger includes the items list below:

- Base unit
- Owner's manual

Model	Output Rating
DMT1230	12V 30A
DMT1250	12V 50A

3. UNDERSTANDING THE UNIT

The 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.

During normal operation the DC to DC Battery Charger will do a full charge cycle to float stage on the house battery bank with ability to choose either GEL, AGM, Flooded, Custom Programmable or Lithium. Once float stage is reached the charger transitions to a power supply mode to support any on-board DC loads.

Multi-stage Charging Process – GEL, AGM, Flooded & Program Modes

The DC to DC Battery Charger is a fully automatic, set and forget charger. It is designed to quickly and accurately recharge your deep cycle batteries utilizing charger algorithms that help to maximize the life of your specialized deep cycle batteries.

The DC to DC Battery Charger features multi-stage smart charging technology that enables the charger to be connected to your battery bank permanently. With the input of multiple sources, you can be assured of charging your batteries whenever underway; or when the sun is shining on your solar array.

As dictated by battery manufactures recommendations, deep cycle batteries require a multi-stage charge sequence for perfect, fast and accurate charging. The DC to DC Battery Charger delivers three primary charge stages.

Stage 1 – Bulk or Boost charge: The battery is charged at full rated output current of the charger until the battery reaches its final charging voltage, known as its absorption voltage. In this step, around 80% of the battery is recovered as fast as possible.

Stage 2 – Absorption Charge: With the charger voltage held steady, the remaining 20% is replaced with the charger allowing the current to taper off as the battery approaches full charge.

Stage 3 – Float: Finally, in the float stage the charger voltage is lowered and held at a constant and safe predetermined level. This prevents the battery from being overcharged, yet allows the charger to supply enough current to make up for the self-discharge losses of the battery, while supporting any additional loads connected to the battery (such as DC lighting and refrigerators). This stage allows for the charger to be used as a DC power supply.

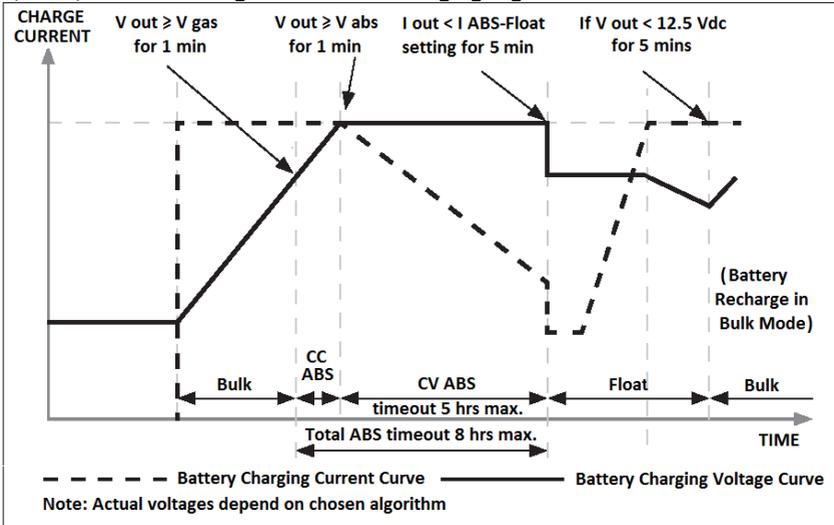
Lithium Charging Process

The DC to DC Battery Charger has a specific charging profile for Lithium batteries. It has its own charging voltage and current settings that needs to be set by the user. It also requires the user to set the charger termination current (“L” setting). Once the user defined charge voltage is reached, the charger will start reducing the current output and the charging process will terminate when the charging current drops to the set termination current. This can take anywhere between 3 to 15 minutes. The unit will then act as a power supply to support additional loads connected to the battery while the DC to DC Battery charger powered from either the vehicle or solar inputs. A Bulk re-start will occur when battery voltage drops below 13.3V DC.

Smart Charging Feature

The DC to DC Battery Charger will regulate its output based on the loads connected to your battery banks. This function is important to maintain the life of your battery banks as some battery chargers mistake loads for discharge and continue to keep the batteries in the bulk or absorption stage for extended periods of time, which will damage the battery bank. The DC to DC Battery Charger has two methods of load-based regulation to ensure your battery charger transitions to float stage when it should do so.

GEL, AGM, Flooded & Program Batteries Charging Algorithm



Battery Charger Voltage

Battery Type	Bulk/Absorption	Float (Note 1)	Equalization
GEL	14.4V	13.7V	N.A.
AGM	14.6V	13.6V	N.A.
Flooded	14.4V	13.3V	15.5V (Note 2)
Lithium (Note 3)	13.9-14.6V (0.1V step)	13.5-14.2V (0.1V step)	N.A.
Program (Custom Settings)	13.8-14.8V (0.1V step)	13.0-13.8V (0.1V step)	N.A.

For Concorde™ branded batteries (lifeline, sun xtender) use flooded setting and consult battery supplier for equalization recommendations.

Note 1: Charger is acting as a power supply with selected constant output voltage and preset maximum output current.

Note 2: Equalization setting can only be used on flooded battery type selection only. See more details on Procedure to Equalize the Flooded Battery

Note 3: Charger will terminate charging when charging current drops to below the set charger termination value.

Battery Bank Size Recommendation

The battery charging current rating is based on the battery size. The battery bank should meet the minimum Ah rating as shown. If a smaller size battery bank is used, set the current rating to a lower value to match with the battery bank size. Normally, the minimum battery bank capacity is based on a C5 rating of the battery for charging.

	DMT1230			
Current Setting ("h")	5A	10A	20A	30A
Battery Bank Size	Min 25Ah	Min 50Ah	Min 100Ah	Min 150Ah

	DMT1250				
Current Setting ("h")	5A	10A	15A	20A	25A
Battery Bank Size	Min 25Ah	Min 50Ah	Min 75Ah	Min 100Ah	Min 125Ah
Current Setting ("h")	30A	35A	40A	45A	50A
Battery Bank Size	Min 150Ah	Min 175Ah	Min 200Ah	Min 225Ah	Min 250Ah

Bulk/Absorption, Absorption(ABS)-Float Stage Current Setting

Once the Bulk/Absorption charging current is selected, the Absorption-Float stage current can be selected. It is recommended to select 1/10 of the Bulk/Absorption charging current as the Absorption-Float current setting.

DMT1230 Available Current Setting					
Bulk/Absorption ("h" setting)	5A	10A	20A	30A	
Absorption-Float ("L" setting)	0.3A / 0.5A / 1A	0.5A / 1A / 2A	1.0A / 2A / 4A	1.5A / 3A / 6A	
DMT1250 Available Current Setting					
Bulk/Absorption ("h" setting)	5A	10A	15A	20A	25A
Absorption Float ("L" setting)	1A/1.5A/2A	1A/1.5A/2A	1A/1.5A/3A	2A/3A/4A	2A/4A/5A
Bulk/Absorption ("h" setting)	30A	35A	40A	45A	50A
Absorption Float ("L" setting)	3A/4A/6A	3A/5A/7A	4A/6A/8A	4A/6A/9A	5A/7A/10A

Note: Use the above table to set the Absorption (ABS)-Float charging current based on the Bulk/Absorption current setting. If a DC load is always ON and connected to the battery bank, a higher Absorption (ABS)-Float charging current is recommended. If in doubt of the "L" setting, use the highest available current setting for battery protection.

Lithium Type Battery Current Setting:

Few charging currents may be selected for Lithium battery charging. Consult the Lithium battery manufacturer for the maximum allowable charging current and select the right current. The Termination Current can be selected to determine when to terminate the charging process.

Note: The battery will start the full recharge cycle again when the battery terminal voltage drops to 13.3Vdc. If a DC load is always ON and connected to the battery bank, a higher Absorption (ABS)-Float charging current is recommended. If in doubt of the "L" setting, use the highest available current setting for battery protection.

DMT1230 Available Lithium Battery Charging Voltage and Available Charging Current Setting					
Lithium Voltage	13.9 – 14.6Vdc (0.1V step)				
Charge Current ("h" setting)	5A	10A	20A	30A	
Termination Current ("L" setting)	0.3A/ 0.5A/1A	0.5A/ 1A/ 2A	1.0A/ 2A/ 4A	1.5A/ 3A/6A	
DMT1250 Available Lithium Battery Charging Voltage and Available Charging Current Setting					
Lithium Voltage	13.9 – 14.6Vdc (0.1V step)				
Charge Current ("h" setting)	5A	10A	15A	20A	25A
Termination Current ("L" setting)	1A/1.5A/2A	1A/1.5A/2A	1A/1.5A/3A	2A/3A/4A	2A/4A/5A
Charge Current ("h" setting)	30A	35A	40A	45A	50A
Termination Current ("L" setting)	3A/4A/6A	3A/5A/7A	4A/6A/8A	4A/6A/9A	5A/7A/10A

4. INSTALLING THE CHARGER

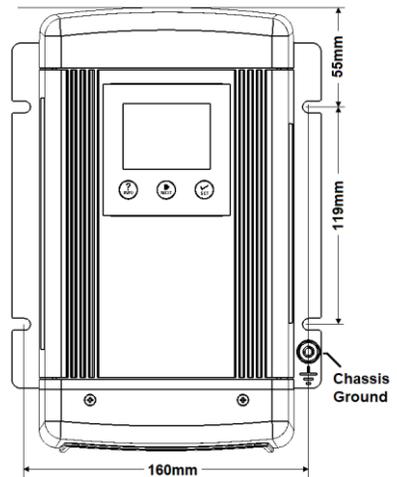
WARNING: KISAE Technology recommends that all wiring be done by a certified technician or electrician to ensure adherence to the applicable electrical safety wiring regulations and installation codes. Failure to follow these instructions can damage the unit and could also result in personal injury or loss of life.

CAUTION: Before beginning your unit Installation, please consider the following:

- The unit should be used or stored in an indoor area away from direct sunlight, heat, moisture or conductive contaminants.
- When placing the unit, allow a minimum of three inches of space around the unit for optimal ventilation.

Mounting the Charger:

- Choose an appropriate mounting location.
- For installing in an indoor location, the unit should be mounted vertically (with the battery terminals facing downwards). This provides the best thermal performance and drip protection. The unit should NOT be mounted upside down.
- For installing in a boat or marine environment, the unit should only be mounted vertically (Battery Terminals facing downwards) to provide adequate drip protection.
- Use the base of the charger as a mounting template to



mark the positions of the fixing screws.

- Drill the 4 fixing holes and place the Charger in position and fasten the unit to the mounting surface.
Note: The charger is designed to be permanently mounted.

5. CONNECTING THE CHARGER

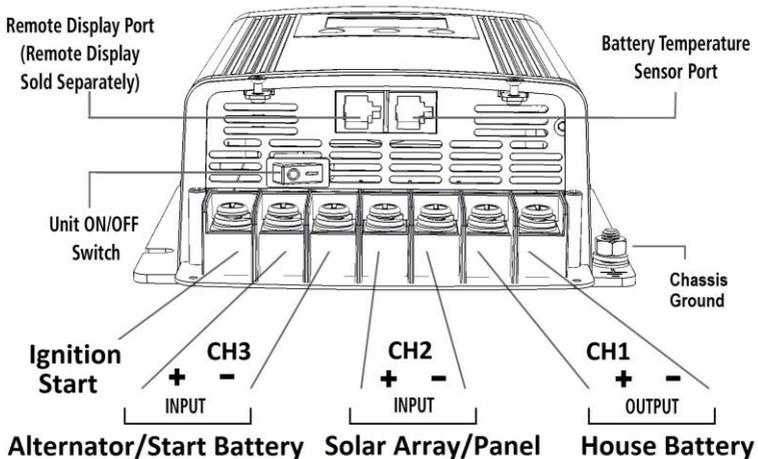
Chassis Ground Connection:

DANGER: The unit chassis has to be grounded properly. Never operate the Charger without proper grounding. Failure to do so will result in death or serious injury. Ground connection to the charger must comply with all local and application-specific codes and ordinances.

- Connect the unit's chassis ground to the common ground point through the ground stud "Chassis Ground" located near one of the unit mounting slots.

DC Inputs and Output Wiring:

WARNING: The DC wiring used must be of appropriate size. An individual over-current protection device usually within 7 inches (17.8cm) of each battery bank is required. A DC disconnect switch is also recommended. Both devices must be rated for DC voltage and current and be rated to withstand the short circuit current available from the connected battery bank. Both devices must match with the size of the DC wiring.



Recommended Cable Length, Size and Fuse Protection:

DC to DC Connection Input	Require Length & Battery Cable Size		
DMT1230 or DMT1250 set to ≤ 30A Output	2 to 5 meters (2)	Up to 10 meters (2)	≥ 10 meters
From Alternator Battery	6-16mm ² @ 12 Vdc or 4-8mm ² @ 24 Vdc	16-35mm ² @ 12 Vdc or 8-16mm ² @ 24 Vdc	Not Recommended
House Battery Connection (2)	16mm ²	Not Recommended	Not Recommended
DC to DC Connection Input	Require Length & Battery Cable Size		
DMT1250 set to ≤ 40A Output	2 to 5 meters (2)	Up to 10 meters (2)	≥ 10 meters
From Alternator Battery	10-25mm ² @ 12 Vdc / 10mm ² @ 24 Vdc	25-50mm ² @ 12 Vdc / 25mm ² @ 24 Vdc	Not Recommended
House Battery Connection (2)	16-25mm ²	Not Recommended	Not Recommended
DC to DC Connection Input	Recommended Fuse Protection		
DMT1250 set to 50A Output	2 to 5 meters (2)	Up to 10 meters (2)	≥ 10 meters
From Alternator Battery	16-25mm ² @ 12 Vdc / 8-10mm ² @ 24 Vdc	35-50mm ² @ 12 Vdc / 16-25mm ² @ 24 Vdc	Not Recommended
House Battery Connection (2)	16-25mm ²	Not Recommended	Not Recommended

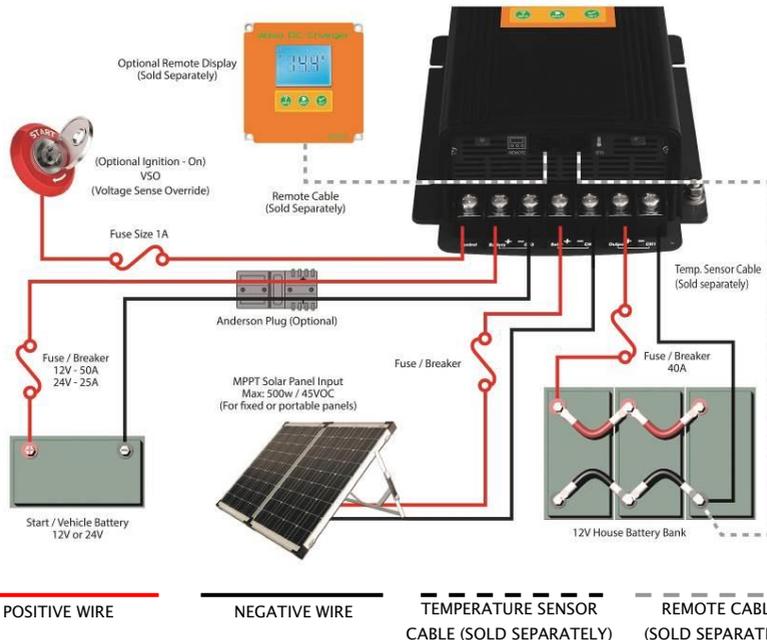
Note: Cable size quoted is one way from battery to device, the suggested cable size is calculated with return run.

- 1) If solar panels are wired in series (increased voltage), then typically 1 x 4mm² cable run per series string is suitable.
- 2) Based on 3% voltage drop

Recommended Fuse Protection	
From Alternator Battery	50 amp (DMT1230) or 70 amp (DMT1250) Fuse or Circuit Breaker no greater than 20cm from source battery PLEASE NOTE: Automatic re-settable circuit breakers are NOT recommended.
From Solar Panels	Fusing recommended no greater than 20cm from input to DC2DC+ Charger. Typically 15amps per solar panel (consult your panel specifications for further details).
House Battery Connection	DMT1230: 40amp Fuse or Circuit Breaker. DMT1250: 60amp Fuse or Circuit Breaker.

- Remove the DC compartment cover by removing the two screws located on the top surface of the unit.
- Keep the connection between the House Battery bank and the charger as short as possible.
- Connect one end of the positive wire (red wire) to the CH1 (House Battery bank) of charger positive terminal with torque 4.0-5.0 N-m (35-45 lb-in) and the other end to the over current protection device, then the DC disconnect device.
- Do not over tighten as this may result in damage to the charger.
- Connect another wire from the DC disconnect device to the House Battery Bank.
- Prepare the negative (black) wire and connect between the CH1 negative terminal of the charger and the negative terminal of the House Battery bank.
- Use the same connection method to make connection on CH2 (Solar Array/Panel) and CH3 (Alternator/Start battery). See more details below on Battery Wiring.
- Place the DC Compartment cover back to the original position and secure the cover using the two screws provided.

Battery Wiring: Connecting the Batteries the Right Way



Note: This diagram is for a reference only. No cables, fuse/breakers, batteries or solar panels are supplied with this unit. Local rules and regulations should be followed when installing this unit.

Battery Temperature Sensor Port Connection (optional BTS sold separately)

- To install the Battery Temperature Sensor (BTS), simply connect the RJ12 plug from the sensor to the RJ12 Temperature Sensor Port located next to the Remote Display Port.
- On the temperature sensor end, simply connect the ring terminals to the negative terminal of the main house battery bank.

NOTE: For lithium battery, the temperature sensor is not required for these applications.

6. UNIT OPERATION

Unit ON/OFF

A Unit ON/OFF switch is located at the DC Input/Output panel of the unit. Switch to ON position to activate the charger and switch to OFF position to turn off the unit when not in used.

Understanding the Charging Mechanism

The Charger is powered by the battery connected to House Battery (CH1) and will also be supplied by CH2 or CH3 if available. The display will turn off to save power when the two Input channels CH2 and CH3 are out of operating range.

Operating from an Alternator/Start Battery (CH3)

Normal Operation	Input Alternator/ Start Battery Source	
	12V Input	24V Input
Input Voltage Range	10.5V – 16.0V	21.0– 32.0V
Normal Start-Up Voltage (Note A)	> 13.2V	> 26.4V
Normal Under Voltage Recovery Voltage (Note A)	> 12.8V	> 25.6V
Ignition Start Terminal	> 10.5V forces CH3 input to the Low Start-Up and Low-Under Voltage recovery settings.	
Low Start-Up Voltage (using Ignition Start Terminal or Manual Over-ride setting) (Note B)	> 12.3V	> 24.6V
Low Under Voltage Recovery Voltage (Note B)	> 12.0V	> 24.0V
De-Rated Voltage (with load) (Note C)	11.5V	23.0V
Under Voltage Shutdown (with load)	10.5V	21V
Over Voltage Shutdown	16.0V	32V
Over Voltage Recovery	15.5V	31V
Input Battery System Reset Voltage (Note C)	< 7V	< 7V
Maximum Input Current DMT1230	DMT1230: 30A DMT1250: 50A	DMT1230: 30A DMT1250: 50A

Note A:

When the battery is charging through CH3 with normal operation (not through Ignition or override setting), the charger will charge for 3 minutes, it will then rest for 5 seconds to verify the Input voltage.

During the 5 seconds rest period, if the measured voltage is > Normal Under Voltage Recovery Voltage (> 12.8Vdc on a 12V system or > 25.6Vdc on a 24V system), the unit will continue the charging cycle through CH3.

If the measured voltage on CH3 is < Normal Under Voltage Recovery Voltage (< 12.8Vdc on a 12V system or < 25.6Vdc on a 24V system), the unit will switch back to charge from CH2 (PV) until CH3 returns to Normal Start-Up Voltage (13.2V on a 12V System and 26.4V on a 24V system).

Also, during the 3 minutes charging process, if the measured terminal voltage drops below the Under Voltage de-rate voltage (11.5V for a 12V system, 23V for a 24V system), the charger will start to de-rated the output current. This function is used to compensate for the use of long or thin wire between the Input Battery System and the unit terminals. If the input voltage continues to drop below the Under-Voltage Shutdown Voltage (10.5V for a 12V system and 21V for a 24V system), the charging process will terminate and the unit will switch back to charge from CH2 (PV). It will only switch back to CH3 if the CH3 voltage returns to 13.2V on a 12V system or 26.4V on a 24V system.

Note B:

When the unit has activated the battery charging process using the Ignition Start terminal or using the Manual Override through the unit setting, the input voltage specification is reduced. It has the same charging process but with the Low Start-Up Voltage set to > 12.3V (from 13.2V) on a 12V system and > 24.6V (from 26.4V) on a 24V system. This feature is designed to be used for vehicles fitted with "Smart Alternators".

If the measured voltage on CH3 is <12.0 Vdc (<24Vdc on a 24V system), the unit will disconnect from the vehicle source and switch back to charge from CH2 (solar if installed) until the CH3 voltage returns to >12.3Vdc on a 12V System (>24.6V on a 24V system).

The Low Under Voltage Recovery Voltage is set to > 12V (from 12.8V) on a 12V system and > 24V (from 26.4V) on a 24V system. During the 5 second rest period, if the input voltage returns above 12V/24V, it will continue the charging process and if the input voltage does not return to > 12V/24V, it will switch back to charge from the Solar - CH2 (if connected) until the Start - CH3 input has returned to the Low Start-Up voltage of 12.3V on a 12V system and 24.6V on a 24V system.

Note C:

During the 3 minutes charging process, if the measured terminal voltage drops to below the Under Voltage de-rated limit (11.5V for a 12V system, 23V for a 24V system), the charger will start to de-rate the charger current. This function is used to compensate for the use of long or thin cable between the Input Battery System and the unit terminals. If the voltage continues to drop to below the Under-Voltage Shutdown limit of (10.5V for a 12V system and 21V for a 24V system), the charging process will terminate and the unit will switch back to charge from CH2 (Solar if installed). It will only switch back to CH3 if the CH3 voltage returns to 13.2V on a 12V system and 26.4V on a 24V system.

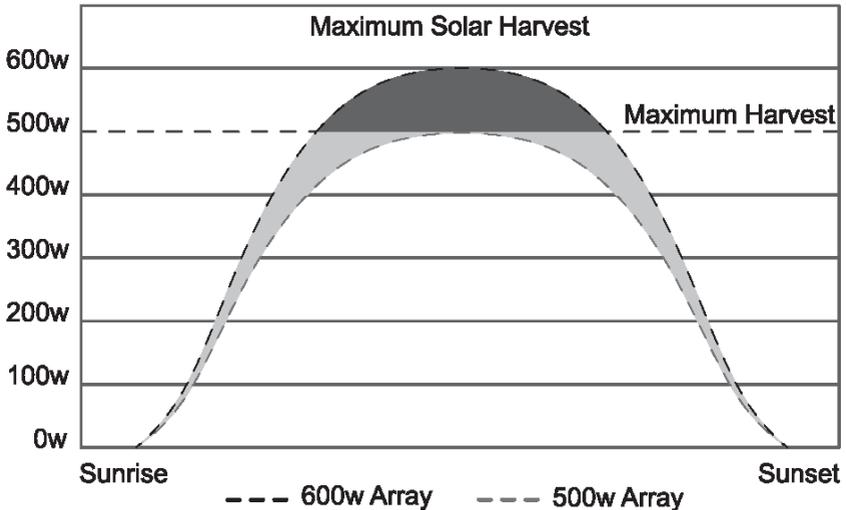
Note D:

The CH3 DC Input (Alternator/Start Battery Input) can accept a 12V or 24V battery with an alternator system. When the unit is first connected, the unit will measure the input voltage. If the voltage is > 17V, it will assume it is connected to a 24V Input Battery/Alternator system. If the voltage detect is < 17V, it will assume it is connected to a 12V Input Battery/Alternator system. Once detected, it will store this into the microprocessor and it will only be erased if the Input battery is disconnected or if the measured Input Voltage drops to < 7Vdc.

DC Input (CH2 – PV Solar Array/ Panel)

PV Input Voltage Range	14.5 - 50V
PV Input Under Voltage Shutdown	< 14.5V
PV Input Under Voltage Recovery	15.0V
PV Input Over Voltage Shutdown	> 50.0V
PV Input Over Voltage Recovery	≤ 48.0V
PV Charging Mechanism	MPPT type (approx. 97% efficiency)
Maximum Input	500W (<i>*Note</i>)

***Note:** The recommended maximum solar wattage input for the Charger is 500w. You can however “overdrive” the MPPT controller. Please note that doing this is partially an economic decision. You can install more power than the controller can use and this will contribute to better power availability. KISAE suggests a total maximum overdrive of 20% (total 600w). On cloudy (or intermittent sunny) days there will be little or no power shaving and the extra power will serve the battery well with more energy harvest earlier and later in the day.



Understanding the Display & Function Keys during normal operation

Display	
Digital Display	LCD with back lighting
Digital Display Info: CH1 CH2 & CH3	Charging Status, Voltage, Current Voltage
Fault/Warning	Error code E01-E08, Warning A01-02
‘CH3’ Icon Flashing	CH3 > 12.0V (12V I/P system), > 24.0V (24V I/P system and not charging from alternator)
‘CH3’ Icon Solid	Charging from CH3 input (Start battery/Alternator)
‘CH2’ Icon Flashing	CH2 > 14.5V and not charging from solar array
‘CH2’ Icon Solid	Charging from CH2 input (solar)

- During normal operation, the display will cycle through and show CH1 battery voltage, charging current and charging stage (‘bul’ – Bulk stage, ‘Abs’ – Absorption stage, ‘Ful – Float stage) alternatively. When the ‘INFO’ key is pressed, it will display the other channel’s battery voltage only
- CH3 icon flashes when the input voltage is above the Flashing Voltage (> 12 on a 12V system or > 24V on a 24V system) and it is not the source to charge the battery. It will change to solid when it becomes the source to charge the battery.

- CH2 icon flashes when the input voltage is above the Flashing Voltage (> 14.5V) and it is not the source to charge the battery. It will change to solid when it becomes the source to charge the battery.
- During normal operation, every time when the 'INFO' button is pressed once, the display will scroll through and show 'CH1', 'CH2 & 'CH3' voltage for 3 seconds and it will return to the normal display automatically. If CH2 or CH3 is not connected, it will show 0V.
- The display will remain ON when either one or both CH2 & CH3 inputs are available. The display will turn OFF if CH2 or CH3 is not available.
- During equalization operation on flooded battery only, the numerical section on the display will show a flashing 'eq' indicating the equalization process is in progress and it will not show the battery voltage or the charging current.

Understanding the Function Key Icons on Display

CH1 - Display is showing the charging battery info (charging status, voltage and current)

CH2 / CH3 - When displayed solid means the power is getting from the related channel and the other channel will be flashing if it is available but not charging.

V - Display is showing the voltage

A - Display is showing the current

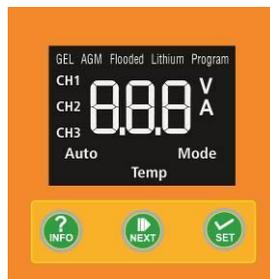
Auto - Unit Silent mode is on

Priority - Unit alternator terminal is High or unit is set to Manual Override mode

Mode - Charging mode setting*

Temp - Temperature setting*

Note *: Will only display when selected setting is active



Digital Display

- During the charging process, the display shows 'CH1' charging status, voltage and current repeatedly, and 'CH2' or 'CH3' is solid to indicate the recent active input source. If the other input channel is available and the voltage is above the 'CH2 and CH3 Flashing Voltage' the icon will be flashing.
- When 'INFO' button is pressed once, the display will change to show CH2 voltage for 3 seconds and CH3 voltage for 3 seconds. The display will then go back to normal automatically and will show the CH1 info.
- When the House Battery (CH1) is fully charged, it will show 'CH1' and 'FLO', voltage and current repeatedly on the display.
- The selected 'battery type' icon is always ON at all times during the whole charging process.
- The 'Priority' Icon turns ON when the 'Ignition Start' terminal is connected to high or the unit is set to 'Manual Override' mode.

Button Functions

	<ul style="list-style-type: none"> • During normal charging operation, press once to change the display to show CH2 and CH3 voltage and press once more to go back to normal display. • During normal charging operation, press and hold for more than 3 seconds to enter Charger Function Setting Menu • When CH2 or CH3 is not available (voltage detected is below the sense voltage), display will turn OFF. Pressing once will temporarily trigger the display and it will automatically cycle through all three channels voltage, the software revision and then turn off.
	<ul style="list-style-type: none"> • During the charger Setup Menu, this button is used to confirm the setting and continue to the next menu. • Manual Override Mode: During normal operation, when the input source is charging from CH2, press and hold for more than 10 seconds to turn mode ON. 'Priority' icon on display will turn ON. This will force the charger from being connected to CH2 and connect it to CH3 (subject to CH3 being within the operating range specified on the spec). If CH3 is not connected or out of override operating range, it will go back to CH2. This setting mode is used when CH2 (Solar) is available but the charging current is too small due to the lack of available of sunlight. Use the same procedure to turn off the 'Manual Override' mode when not required. • Please Note: If Manual Override Mode is used and left on there is a risk of flattening the start battery. The preferred method is to use the automatic override method by connecting the ignition source to the 'ignition start' terminal of the charger. • With Flooded Battery Type setting, press and hold the "NEXT" and "SET" buttons together for

	more than 5 seconds to force the charger into Equalize Mode and it will start equalizing the flooded battery. Please note: the battery has to be set to 'Flooded' battery type in order to have this function activated.
	<ul style="list-style-type: none"> During the charger Setup Menu, this button is used to change to the next available setting. 'Silent' (Fan OFF) mode: During normal operation, Press and hold for more than 3 seconds to force the fan to turn OFF. 'Auto' icon will turn ON. The charger current will reduce to about half the set current. The unit will go back to normal after 12 hours and with icon turns OFF. <p>Note: Every time the "INFO", "NEXT" and/or "SET" buttons are pressed, the back light will illuminate and will automatically turn off after 60 seconds.</p>

Automatic Override Functions

When positive power is applied to the "Ignition" terminal (do not connect to ground), it will force the charger to connect to CH3 as long as CH3 is within the Voltage range > 12.3V or 24.6V on a 24V input.

Programming Your Charger

	Press and hold the key for longer than 3 seconds to enter charger setting mode and show function setting. Once new setting is done, press 'INFO' again for longer than 3 seconds to exit the charger setting mode.
	Press the key once to keep / save the chosen setting and change the display to show the next menu to continue with other settings. Note: The selected setting will quickly flash 3 times to acknowledge the setting.
	Press the key to view other available settings.

Understanding the Three-Stage (Mode 3), Two-Stage (Mode 2) Charging

The Three-Stage Charging (Mode 3) has a Bulk, then Absorption and then Float sequence. During the Bulk stage, the battery accepts the maximum constant current from the charger. In the Absorption stage, the battery voltage is held to constant voltage and the charging current will slowly reduce. In Float stage, the charger continuously produces lower constant float voltage to fully top up and maintain the battery in a fully charged state. The charger will automatically restart the full charging cycle if it senses the battery bank is discharged to lower than 12.9V for lead acid batteries and 13.3V for lithium batteries.

Similar to Three-Stage Charging, the Two-Stage Charging (Mode 2) has only Bulk and Absorption charging stage. Charger will terminate battery charging once it reaches the Absorption to Float setting. The charger will automatically restart the full charging cycle if it senses the battery bank is discharged to lower than 12.9V for lead acid batteries and 13.3V for lithium batteries.

Understanding the Battery Temperature Function

The Battery Temperature Sensor (BTS) is an optional accessory for the charger to protect your battery and provide better charging voltage accuracy. When the battery temperature sensor is used, it is highly recommended to be installed on the main battery bank at the negative terminal. The sensor senses the battery temperature and overrides the manual temperature settings and makes small adjustments to the charging voltage. If using lithium batteries, leave temp setting "NOR" (Normal) and leave temp sensor disconnected.

Battery Temperature Compensation

There are three manual battery temperature settings on the unit ('Lo', 'nor' and 'hi'). See the table below for voltage adjustments for temperature compensation. Based on the environment temperature, set the temperature accordingly. An optional Battery Temperature Sensor (BTS) that is used to connect to the negative battery of the House Battery is available and it will automatically adjust the charging voltage based on the measured temperature on the battery terminal. See more details on the next section.

Temperature Setting	Recommended Battery Temperature	Battery Type	Voltage adjustment from 25°C normal setting
Low (Lo)	< 5°C	GEL, Flooded	+0.675V
		AGM	+0.525V
Normal (Nor)	> 5°C and < 30°C	GEL, Flooded	0V
		AGM	0V
High (Hi)	< 30°C	GEL, Flooded	-0.270V
		AGM	-0.210V

Battery Temperature Sensor - BTS Voltage Adjustment (Optional)

When the optional BTS is in used and connected to the negative terminal of the Battery terminal, the charging voltage will be adjusted based on the measured temperature through the BTS.

Battery Temperature	Battery Charging Voltage Adjustment from 25°C	
	Flooded and GEL type	AGM type
< 25°C	+0.027V / °C	+0.021V / °C
25°C	0V	0V
> 25°C	-0.027V / °C	-0.021V / °C

Note: The above voltage compensation will only work with the optional Battery Temperature Sensor which will override the unit temperatures' (Lo, Nor, Hi) setting. If using lithium batteries, leave temp setting "NOR" (Normal) and leave temp sensor disconnected.

Procedure to Set or View Charger Setting

Follow the procedure or sequence in Appendix A1 and A2 (see back of this manual) to set or view the charger setting.

Procedure to Equalize Flooded Battery

DANGER: Explosion Hazard. The battery generates explosive gases during equalization. Follow all the battery safety precautions listed in the manual.

DANGER: Explosion Hazard and Risk of Battery damage. When using the equalization mode, the user has to be sure the battery connected to the channel is a flooded battery type. Equalizing a non-flooded battery may overcharge the battery and may cause the battery to explode.

CAUTION: Risk of Battery and Equipment damage. Only Flooded lead-acid batteries can be equalized. Consult your battery manufacturer or read the battery manual when you try to equalize your batteries. Disconnect any DC load connected to the battery, as during equalize mode, the charger will produce 15.5V on 12V model, or 31.0V on 24V model, to the batteries. You must monitor the battery-specific gravity throughout the equalization process to determine the end of the equalizing cycle.

Note: The equalization function although included in the unit will rarely be used. To activate, the battery bank must be in float stage, and stage activation is performed manually. A typical drive will not be long enough for the unit function to complete the process. The MPPT Solar function may provide enough time for Equalization, but the best recommendation will be using an AC powered battery charger. KISAE does manufacture a line of smart AC battery chargers.

Before start equalizing the flooded battery, disconnect any DC load connected to the battery, as during equalize mode, the charger will produce 15.5V to the batteries. You must monitor the battery specific gravity throughout the equalization process to determine the end of the equalizing cycle. Before setting the equalization mode, please be sure the battery is a flooded battery type. When the battery equalization has started, the charger will automatically fully charge the battery bank and will then follow with 1 hour of equalization. Check the battery electrolyte level during the equalization period. If necessary, refill with distilled water only. All cells should have similar electrolyte levels. If distilled water is added, batteries must undergo a complete charge cycle. The charger cannot determine when to terminate the equalization of the battery, a one hour time-out is set and this is used as a safety feature to require the user to continually re-activate it as necessary after checking batteries manually. Use the following procedure to setup the charger for battery equalization. With Flooded Battery Type setting, Press and Hold Button "NEXT" and "SET" together for more than 5 seconds to force the charger to go into Equalize mode and it will start equalizing the flooded battery. Please note the battery mode setting has to be set to 'Flooded' battery type in order to have this function activated.

Understanding the Protection Features

De-rating Charging Current: When the charger senses the environmental temperature is above 50°C, the maximum charger current will de-rate to 1/2 of the value (A01 warning code will display). The charger will recover automatically back to maximum charging current when the environmental temperature drops to below 45°C.

Over Temperature Shutdown: When the charger senses the environmental temperature is above 60°C, the charger will shutdown. It will recover automatically when the environmental temperature drops to below 45°C.

Battery Reverse Polarity: When a reverse polarity is connected to the battery bank, "Error Code E08" on the display will appear.

Charging a Flat Battery: The charger is designed to charge batteries with terminal voltage greater than 2.5Vdc. Re-charging a dead battery requires extreme care and attention. It is best to re-

charge using short frequent cycles rather than one long bulk cycle. Battery damage or failure may occur if the battery is discharged so deeply.

Understanding the Display Code

Codes will show on the display when either a function or internal warning / fault, such as high internal temperature or DC out-of-range is detected and the charger may shut down to protect itself until the fault has cleared. See table description below for more information.

Code	Description
bUL	The charger is in Bulk Charging Mode Bulk or Boost charge: The battery is charged at full rated output current of the charger until the battery reaches its final charging voltage, known as its absorption voltage. In this step, approximately 80% of the battery is recovered as fast as possible.
Abs	The Charger is in Absorption Charging Mode Absorption charge: With the charger voltage held steady, the remaining 20% is replaced with the charger allowing the current to taper off as the battery approaches full charge.
FUL	The Charger is in Float Charging & Power Supply Mode Float Charge: Finally, in the float stage the charger voltage is lowered and held at a constant and safe predetermined level. This prevents the battery from being overcharged, yet allows the charger to supply enough current to make up for the self-discharge losses of the battery, while supporting any additional loads connected to the battery (such as DC lighting and refrigerators). This stage allows for the charger to be used as a DC power supply.
CHE	CH3 Input Voltage Check This will display for 5 seconds every 3 minutes while charging from the alternator input (CH3) and is normal operation when the charger is checking the under-voltage recovery limit (see page 10 for details).
E01	CH3 High Input Voltage Shutdown This means the unit has detected the input from the Start/Alternator has gone above 16.0V on a 12V input or 32.0V on a 24V input. This error will clear once the input has dropped below 15.5V on a 12V input or 31.0V on a 24V input.
E02	CH3 Low Input Voltage Shutdown This means the unit has detected that the input from the Start/Alternator has gone below 10.5V on a 12V input or 21.0V on a 24V input. This error will clear once the input has risen above 13.2V on a 12V input or 26.4V on a 24V input. If you have this error: <ul style="list-style-type: none"> • Check the voltage of your Start Battery is above 13.2v on a 12V input or 26.4V on a 24V input. • Check you have not left the "Priority" (Override) feature activated (Manual or Auto) • Check the battery cable from the Start Battery is correctly sized. • Check you don't have a loose terminal or blown fuse.
E03	CH2 High Input Voltage Shutdown This means the unit has detected the input from the solar has gone above 50.0V. This error will clear once the input has dropped below 48.0V. If you have this error: <ul style="list-style-type: none"> • Check the specification of your panels – the Volts Open Circuit (VOC) should not exceed 50VOC • Make sure the solar panels have not been connected in series as this will increase the VOC voltage of the panel array. Please Note: Maximum solar VOC input must not exceed 50VOC or damage to the unit will occur.
E04	CH2 Low Input Voltage Shutdown The unit has detected the input from the Solar Array cannot sustain voltage above 14.5V. If you have this error: <ul style="list-style-type: none"> • Check that you are not in a low light/non- direct sunlight situation i.e. early morning /late afternoon. • This may also happen if your solar panels are inside of a shed with a skylight or outside under Flood Lights. <p>If you find this is happening with your unit when stored, we recommend fitting a DC breaker to the output of the Charger and turning it off when the unit is not in use.</p>
E05	CH1 High Input Voltage Shutdown This means the unit has detected that the Main/House battery has gone above 16.0V. This error will clear once the input has dropped below 15.5V. This may be due to charging from another source. i.e. Another solar controller or AC battery charger.
E06	Over Temperature Shutdown When the charger senses the environmental temperature above 60°C, the charger will lower close down. It will recover automatically when the environmental temperature drops below 45°C. <ul style="list-style-type: none"> • Check to make sure the fan is working. • Make sure the unit has good ventilation.
E07	BTS Over Temperature Shutdown

	<p>This means the Battery Temp Sensor has detected that the batteries are too hot and has shut down to not over charge the batteries.</p> <p>If this occurs, take care and check the temperature of the batteries.</p> <ul style="list-style-type: none"> • If the Batteries are Hot –you may have a dropped cell or faulty battery. Stop all charging and see your local battery shop to get your batteries tested. • If the Batteries/Terminals are still cool or only warm, you may have a bad temp sensor. Unplug the temp sensor and call KISAE.
E08	<p>CH1 Output Short Circuit</p> <p>This means there is a Short Circuit on the DC output to your Main/House battery.</p> <p>If this is displayed, check the following:</p> <ul style="list-style-type: none"> • The output wires are not shorted together. • The output wires are wired correctly and not reverse polarity.
A01	<p>Over Temperature Warning</p> <p>When the charger's internal temperature is > 65°C, the unit will shut down to protect itself. The unit will return back to normal charging once the internal temperature is < 58°C</p> <ul style="list-style-type: none"> • Check to make sure the fan is working. • Make sure the unit has good ventilation.
A02	<p>BTS High Temperature Warning</p> <p>When the battery temperature sensor is > 58°C, the unit will shut down to protect the batteries. The unit will return back to normal charging once the battery temperature sensor is < 56°C.</p> <ul style="list-style-type: none"> • Check to make sure the batteries are not hot. • Make sure the batteries have good ventilation.

7. SPECIFICATIONS

Note: Specifications are subject to change without notices.

Output Rating	DMT1230	DMT1250
Output Current (Maximum)	30A	50A
Output Voltage	12V Nominal	
Output Power	465W	775W
Charger DC Output- House Battery (CH1):		
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/ 10 / 20 / 30A	5-50A with 5A Step
Equalized Voltage (Flooded Battery)	15.5 Vdc	
Equalized Charging Current	10% of Bulk Current Setting	
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	
Battery Temperature Setting	Low / Normal / High	
Efficiency	95%	
DC Input - Solar Array/Panels (CH2- Solar):		
Input Voltage	14.5 – 50 Vdc	
Maximum Solar Input Power	≤ 23V input, 500W (600W allowable) ≥37.5-50V input, 750W (800W allowable)	
DC Input – Alternator/ Start Battery (CH3- Alternator/Start):		
Input Voltage	10.5 – 16.0 Vdc / 21 – 32 Vdc	
Maximum Input Current	30A	
Environmental and Operating Temperature:		
Storage Range	-40° to 70° C (-40° to 158° F)	
Operating Range	-20° to 60° C (-4° to 140° F)	
Humidity	5-95%, RH non-condensing	
Ingress Protection	IP32	
Weight and Dimensions:		
DMT1230, 1250	4.1 lb., 9.5x6.8x2.9 inches (1.85 Kg, 242x172x74 mm)	
Regulatory Compliance:		
Standards/EMC (North America)	Class B according to FCC part15B and ANSI C63.4	
Standards/EMC (European Union)	CE marked for the EMC directive 2004-108-EC Complying with EN55014-1, EN55014-2, EN61000-3-2 and EN61000-3-3 (as equivalent IEC standards series)	

Optional Accessories:

Remote Digital Display	DMTRM01
Battery Temperature Sensor	BTS-10K

8. WARRANTY

One Year Limited Warranty

The limited warranty program is the only one that applies to this unit, and it sets forth all the responsibilities of **KISAE**. There is no other warranty, other than those described herein. Any implied warranty of merchantability of fitness for a particular purpose on this unit is limited in duration to the duration of this warranty.

This unit is warranted, to the original purchaser only, to be free of defects in materials and workmanship for one year from the date of purchase without additional charge. The warranty does not extend to subsequent purchasers or users.

Manufacturer will not be responsible for any amount of damage in excess of the retail purchase price of the unit under any circumstances. Incidental and consequential damages are specifically excluded from coverage under this warranty.

This unit is not intended for commercial use. This warranty does not apply to damage to units from misuse or incorrect installation/connection. Misuse includes wiring or connecting to improper polarity power sources.

RETURN/REPAIR POLICY:

If you are experiencing any problems with your unit, please contact our customer service department at info@kisaetechnology.com or phone 1 877 897-5778 before returning product to retail store. After speaking to a customer service representative, if products are deemed non-working or malfunctioning, the product may be returned to the purchasing store within 30 days of original purchase. Any defective unit that is returned to manufacturer within 30 days of the date of purchase will be replaced free of charge.

If such a unit is returned more than 30 days but less than one year from the purchase date, manufacturer will repair the unit or, at its option, replace it, free of charge. If the unit is repaired, new or reconditioned replacement parts may be used, at manufacturer's option. A unit may be replaced with a new or reconditioned unit of the same or comparable design. The repaired or replaced unit will then be warranted under these terms for the remainder of the warranty period. The customer is responsible for the shipping charges on all returned items.

LIMITATIONS:

This warranty does not cover accessories, such as adapters and batteries, damage or defects result from normal wear and tear (including chips, scratches, abrasions, discoloration or fading due to usage or exposure to sunlight), accidents, damage during shipping to our service facility, alterations, unauthorized use or repair, neglect, misuse, abuse, failure to follow instructions for care and maintenance, fire and flood.

If your problem is not covered by his warranty, contact our Customer Service Department at info@kisaetechnology.com or 1 877 897-5778 for general information if applicable.

Service Contact Information

Email:info@kisaetechnology.com

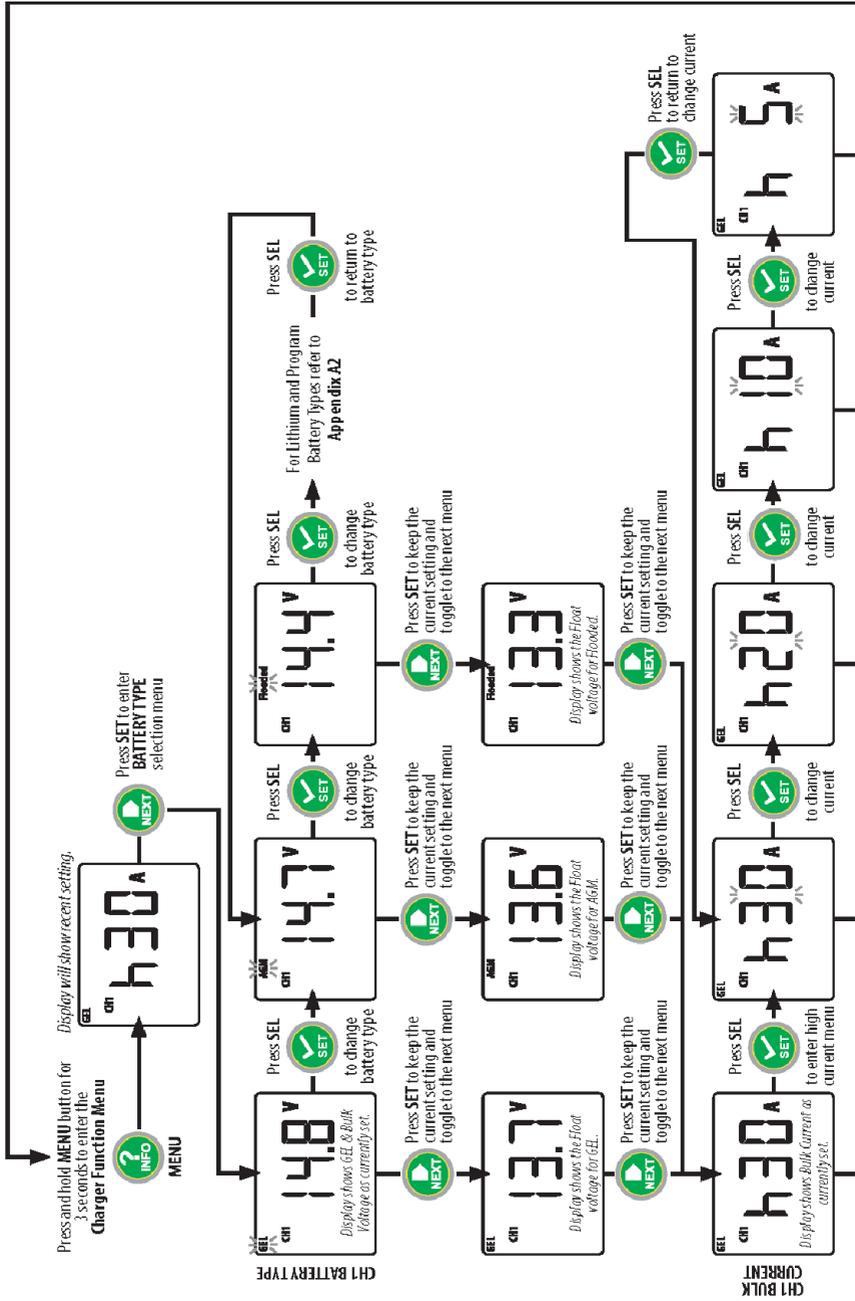
Phone: 1-877-897-5778

www.kisaepower.com

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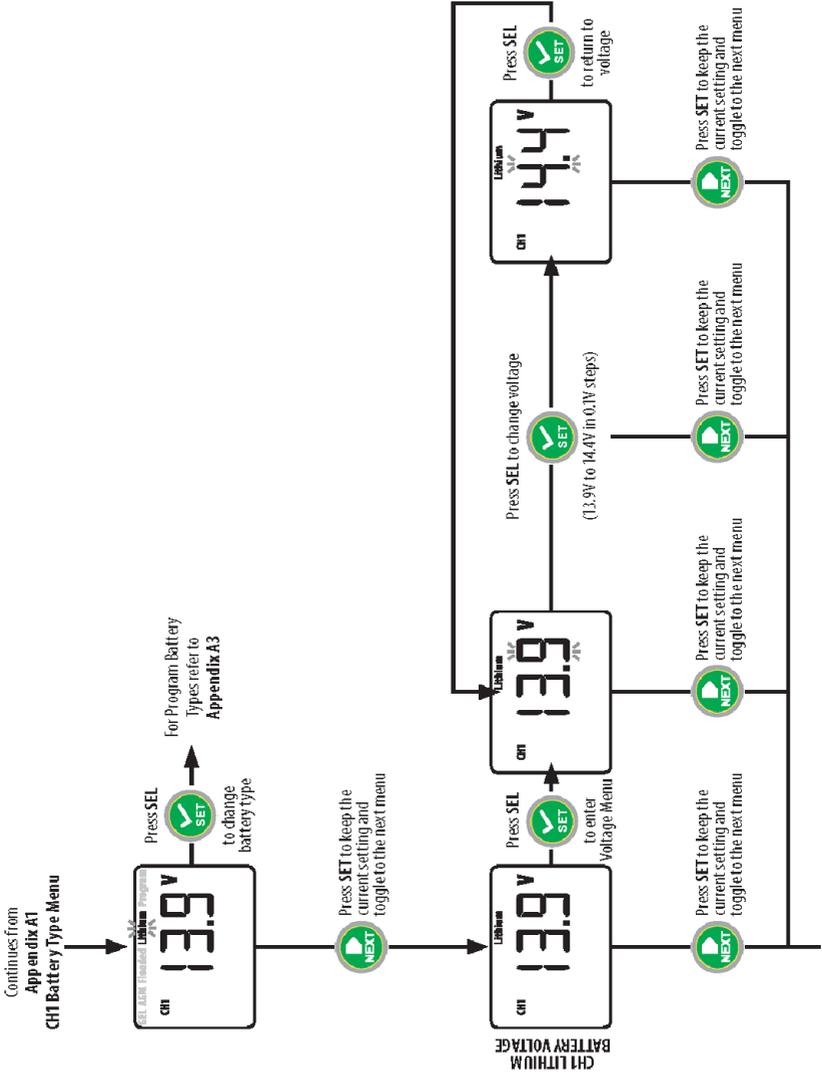
Appendix A1

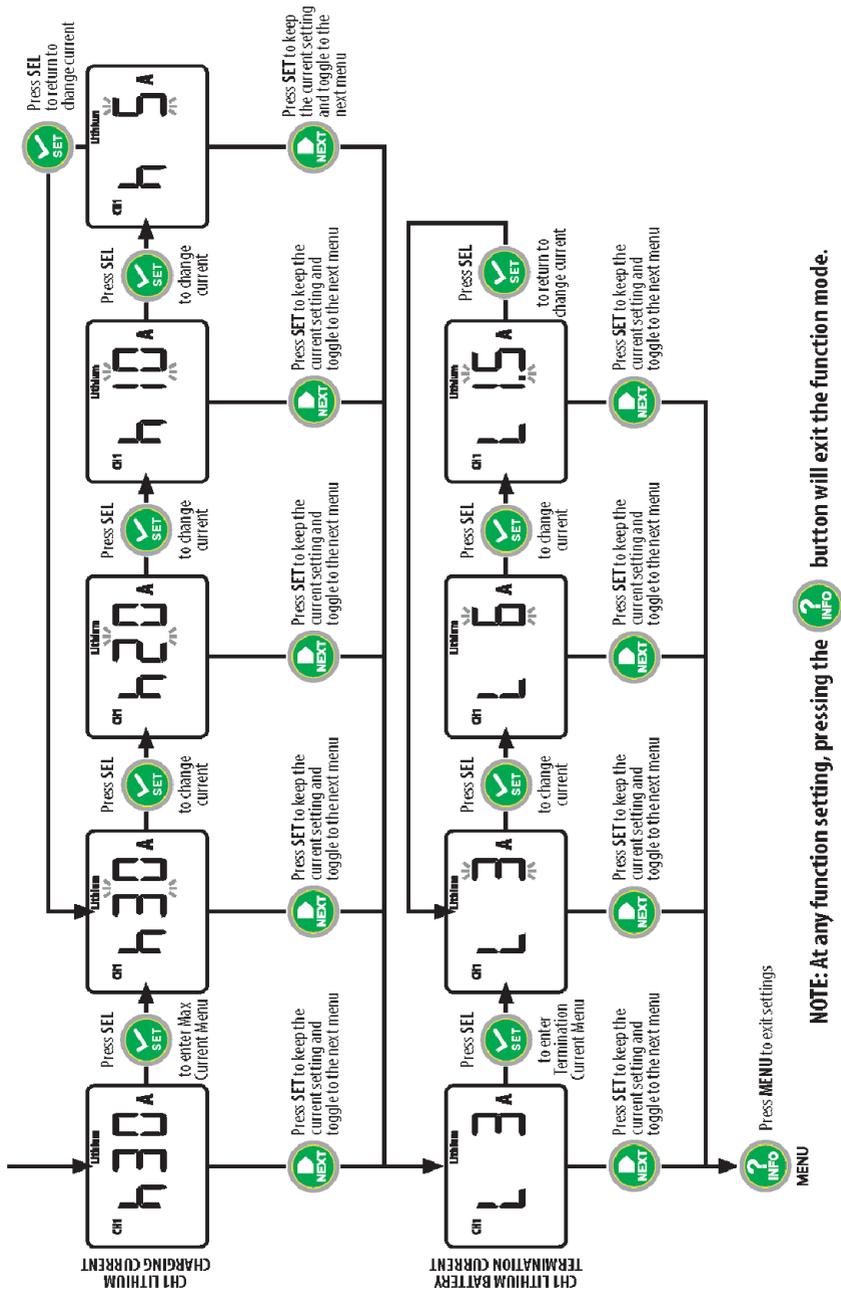
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Appendix A2

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WARNING: FIRE HAZARD

When using the Lithium Battery type setting to set the battery charging parameters, please consult the battery manufacturer on all the voltage and current settings. Using the wrong setting to charge battery may overcharge, damage the battery and may cause a fire.

