

DC to DC Battery Charger

12V 100A (DMT12100)

24V 50A (DMT2450)

Owner's Manual

KISAESM

For safe and optimum performance, the **KISAE 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

DMT12100 DC to DC Battery Charger, 12V 100A

DMT2450 DC to DC Battery Charger, 24V 50A

Document Part Number

MU DMT12100 Rev A.3

Service Contact Information

Email: info@kisaetechnology.com

Phone : 1 877 897-5778

Web : www.kisaepower.com

FCC and CE EMC 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 and comply with the limits for CE EMC. 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.
- 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.

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 químicos, incluyendo el ftalato de bis (2-etilhexilo) (DEHP) conocido por el estado de California como causante de cáncer, defectos de nacimiento, u otros daños reproductivos. Para obtener más información, entre a www.p65warnings.ca.gov

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IMPORTANT SAFETY INFORMATION

This section contains important safety information for the **KISAE 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.
- The **DMT2450** unit is designed for use on **24V House Battery System** only. Do not use it with House Battery System with different voltages for example **12V House Battery System**.

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.
- 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.

1. INTRODUCTION

Thank you for purchasing the **KISAE 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, boat, 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

Model	Maximum Output Rating CH1	Alternator Input Voltage CH3	Maximum Solar Input CH2
DMT12100	12V 100A (12V Battery Bank System)	12V Alternator System only	55Voc, 80A maximum
DMT2450	24V 50A (24V Battery Bank System)		

- External Display with cable
- Owner's manual

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 its built-in Maximum Power Point Tracking (MPPT) Solar Controller. Depending on the unit's setting, when Alternator and/or Solar inputs are available, the house battery will be charged from either the Solar input or the Alternator input whether the ignition start signal is available or not. The process to choose either alternator or solar is prioritized by custom setting and both functions are controlled from within the unit itself without the need for external relays. See more detail in the **"House Battery Charging Mechanism Setting"** section on page 7.

During normal operation the DC to DC Battery Charger will do a full charge cycle of the House Battery Bank. User may choose either GEL, AGM, Flooded, Custom Programmable or Lithium battery setting. Once the float stage is reached, the charger transitions to a power supply mode to support any on-board DC loads. The house battery will start a new charge cycle when the house battery drops to below the user selectable Recharge voltage.

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 House Battery Bank permanently. With multiple input sources, you can be assured of charging your batteries whenever the vehicle alternator is running or when the sun is shining on your solar array.

Per battery manufacturer 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 (as per the setting) until the battery reaches its final charging voltage, known as its absorption voltage. In this step, around 80% of the battery is recovered.

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

Stage 3 – Float: 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, and supports any additional loads connected to the battery (such as DC lighting and refrigerators). This stage allows the charger to be used as a DC power supply.

A full recharge cycle will occur when the House Battery Bank voltage drops to below the user selectable set values.

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 need to be set by the user. It also requires the user to set the charger termination current ("L" setting) to pass from Absorption to Float stage. Once the user defined charge voltage is reached, the charger will start reducing the current output and the charging

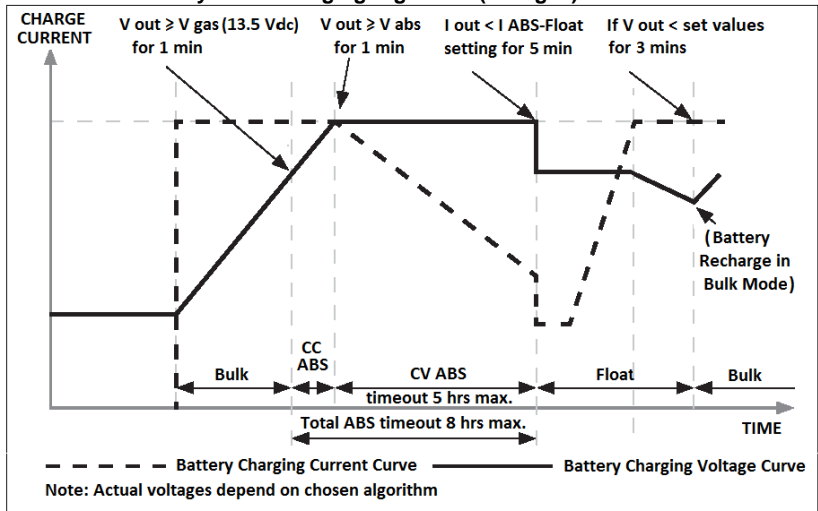
process will terminate when the charging current drops to the set termination (“L”) current. This can take anywhere between 3 to 25 minutes, depending on the capacity (size) of the battery bank and its initial state of charge. The unit will then act as a power supply to support additional loads connected to the battery.

A full recharge cycle will occur when the House Battery Bank voltage drops to below the user selectable set values.

Smart Charging Feature

The DC to DC Battery Charger will regulate its output based on the loads connected to your House Battery Bank. This function is important to maintain the life of your battery banks as some other battery chargers mistake loads for discharge and continue to keep the batteries in the bulk or absorption stage for extended periods of time, causing damage to the battery bank.

House Battery Bank Charging Algorithm (3 stages)



Note: For DMT2450, all the voltage rating on the above graph are doubled

House Battery Bank (CH1) Charging and Restart (recharging) Voltage Setting

WARNING: FIRE HAZARD. When choosing the Lithium Battery type, you can set to a wide range of charge/float voltages. Please consult the battery manufacturer for the values. Using the wrong voltage setting may overcharge and damage the battery and may cause a fire.

DMT12100 Charging Voltage Setting (See Note 1 for DMT2450)			
Battery Type	Bulk/Absorption	Float	Restart Voltage (Note 2)
GEL	14.4V	13.7V	12.5-13.5V (0.1V step)
AGM	14.6V	13.6V	12.5-13.4V (0.1V step)
Flooded (Note 3)	14.4V	13.3V	12.5-13.1V (0.1V step)
Lithium (Note 4)	13.9-14.6V (0.1V step)	13.7-14.4V (0.1V step)	13.5-14.2V (0.1V step)
Program - Custom Settings (Note 5)	13.8-14.8V (0.1V step)	13.0-14.6V (0.1V step)	12.8-14.4V (0.1V step)

Note 1: For DMT2450, all the voltage ratings on the above chart are doubled.

Note 2: The House Battery Bank will automatically start the full recharge cycle again when the battery bank terminal voltage drops to the restart voltage (the Restart voltage can only be set to a maximum of 0.2V below the Float voltage).

Note 3: Battery Equalization setting is available on Flooded battery setting only. Equalized voltage is set to 15.5V on 12V battery bank system and 31.0V on 24V battery bank system. See more details on "Procedure to Equalize the Flooded Battery" on page 12.

For Concorde™ branded batteries (Lifeline, Sun Xtender) use flooded setting and consult supplier for equalization recommendations.

Note 4: The Charging Voltage and Float voltage section for Lithium battery are user selectable. Consult the Lithium battery manufacturer for the maximum allowable charging voltage and the float stage voltage after the battery is fully charged. The Float voltage and Restart Voltage can only be set to at least 0.3V below the Bulk/ Absorption voltage and the Float voltage respectively.

Note 5: This setting is for special batteries that require unique charging voltage settings. Consult the battery manufacturer for the maximum allowable voltage setting before use. Using the wrong voltage setting may overcharge and damage the battery and may cause fire. The Float voltage and Restart Voltage can only be set to at least 0.2V below the Bulk/ Absorption voltage and the Float voltage respectively.

GEL/AGM/Flooded/Program Type House Battery Bank Current Setting

The Bulk/Absorption (Bulk/Abs) and Absorption-Float (Abs-Float) Stage current settings are based on the House Battery Bank size. Typically, and for maximum lifespan of the sealed and non-sealed lead acid battery banks, it is recommended the maximum Bulk/Abs ("h") current setting should not be more than 1/5 of its total capacity in Ah (e.g. select 40A or lower when a 200Ah battery bank is used).

DMT12100 (12V House Battery Bank), DMT2450 (24V House Battery Bank)				
Battery Bank Size used (Min) in Ah	100	200	300	500 or higher
Recommended Bulk/Abs ("h") Max.	20	40	60	100

Once the Bulk/Abs ("h") current is selected, the Abs-Float Stage ("L") current can be selected. It is recommended to select 1/10 of the Bulk/Abs current as the Abs-Float stage current setting.

DMT12100 - Available Current Setting (A)										
Bulk/Abs ("h")	10	20	30	40	50	60	70	80	90	100
Abs-Float ("L")	1/1.5/2	1/1.5/2	1/1.5/3	2/3/4	2/4/5	3/4/6	3/5/7	4/6/8	4/6/9	5/7/10
DMT2450 - Available Current Setting (A)										
Bulk/Abs ("h")	5	10	15	20	25	30	35	40	45	50
Abs-Float ("L")	0.3/0.5/1	0.3/0.5/1	0.3/0.5/1.5	1/1.5/2	1/2/3	1.5/2/3	2/3/4	2/3/4	2/3/5	3/4/5

Note: If a DC load is always ON and connected to the battery bank, a higher Absorption-Float charging current is recommended. If in doubt about the "L" setting, use the highest available current setting for battery protection. The Absorption-Float current can be selected to determine when to start passing to the Float stage (with 3 stages setting) or to terminate the charging process (with 2 stages setting).

Once the House battery reaches the Float stage, the DC Output current available from the charger is limited to the Abs-Float current setting.

Lithium Type House Battery Bank Current Setting:

WARNING: FIRE HAZARD. When choosing the Lithium Battery type, you can set to a wide range of charging currents. Please consult the Lithium battery manufacturer for the maximum allowable charging current. Using charging current higher than the allowable charging current may result in damaging the battery and may cause a fire.

The Charging Current and Termination Current are user selectable and are based on battery bank size. Consult the Lithium battery manufacturer for the maximum allowable charging current before setting the Charge Current ("h"). The Termination Current ("L") can be selected to determine when to start passing to the Float stage.

The Bulk stage on a Lithium battery is also named Constant Current (CC) Stage and the Absorption Stage on a Lithium battery is also named Constant Voltage (CV) Stage.

DMT12100 - Available Current Setting (A)										
Charge Current ("h")	10	20	30	40	50	60	70	80	90	100
Termination Current ("L")	1/1.5/2	1/1.5/2	1/1.5/3	2/3/4	2/4/5	3/4/6	3/5/7	4/6/8	4/6/9	5/7/10
DMT2450 - Available Current Setting (A)										
Charge Current ("h")	5	10	15	20	25	30	35	40	45	50
Termination Current ("L")	0.3/0.5/1	0.3/0.5/1	0.3/0.5/1.5	1/1.5/2	1/2/3	1.5/2	2/3/4	2/3/4	2/3/5	3/4/5

Note: If a DC load is always ON and connected to the battery bank, a higher Termination Current is recommended. If in doubt about the "L" setting, use the highest available current setting for battery protection.

Once the House battery reaches the Float stage, the DC Output current available from the charger is limited to the Abs-Float current setting.

House Battery Charging Mechanism Setting

There are 5 user selectable settings. Select the right setting based on the scenario listed below:

P1 (Solar Priority): The unit house battery will be charged from Solar Input (CH2) as priority and Alternator Input (CH3) as second priority. If Solar Input is not available, the house battery will switch to charge from Alternator Input if available and in operating range.

P2 (Alternator only): The unit house battery will be charged from Alternator Input (CH3) only. The house battery will not be charged from Solar Input under any conditions.

P3 (Solar only): The unit house battery will be charged from Solar Input (CH2) only. The house battery will not be charged from Alternator Input under any conditions.

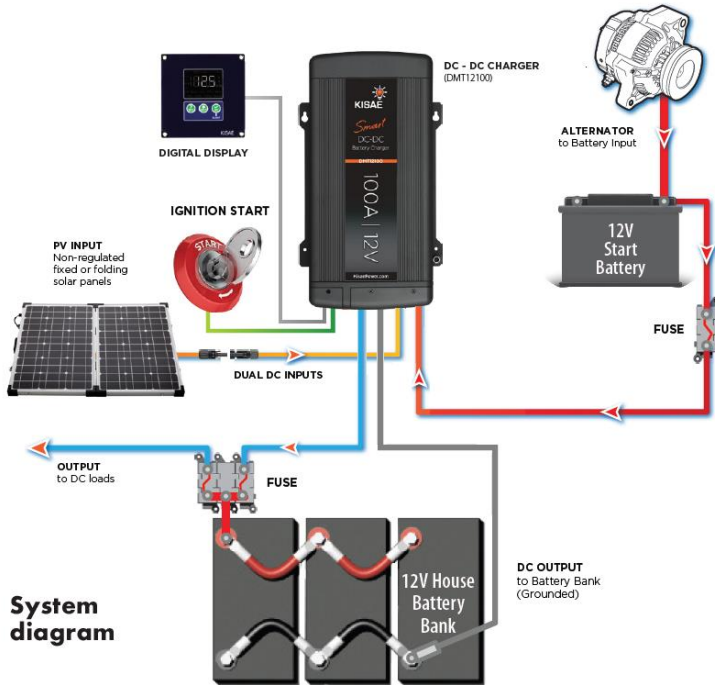
P4 (Alternator Priority with Ignition start signal): The unit house battery will be charged from Alternator Input (CH3) when it is in operating range and an ignition start signal is provided. If ignition start signal is not provided or if Alternator Input is out of operating range, the house battery will switch to charge from Solar Input if it is available and in operating range.

P5 (Alternator Priority without Ignition start signal): The unit house battery will be charged from Alternator Input (CH3) when it is in operating range. When Alternator Input is not available, the house battery will switch to charge from Solar Input if it is available and in operating range.

Priority Setting	Solar Input	Alternator Input	Ignition Start Port	Charging Mode
P1 (Solar Priority)	In range	In or Out of range	With or Without Signal	Solar
	Out of range	In range		Alternator
P2 (Alternator Only)	In or Out of range	In range	With or Without Signal	Alternator
		Out of range		No Charge
P3 (Solar Only)	In range	In or Out of range	With or Without Signal	Solar
	Out of range			No Charge
P4 (Alternator Priority with Ignition Start signal)	In or out of range	In range	High Signal	Alternator
	In range		No Signal	Solar
	Out of range	Out of range	With or Without Signal	No Charge
	In range			Solar
P5 (Alternator Priority without Ignition Start signal)	In or out of range	In range	With or Without Signal	Alternator
	In range	Out of range		Solar
	Out of range			No Charge

4. INSTALLING THE CHARGER

Unit System Diagram



Note: This diagram is for reference use 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.

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.

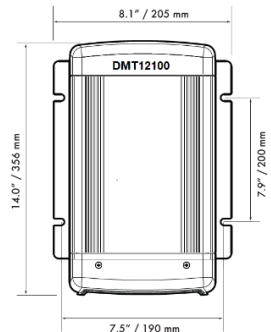
CAUTION: Before beginning your unit installation, please consider the following:

- 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.

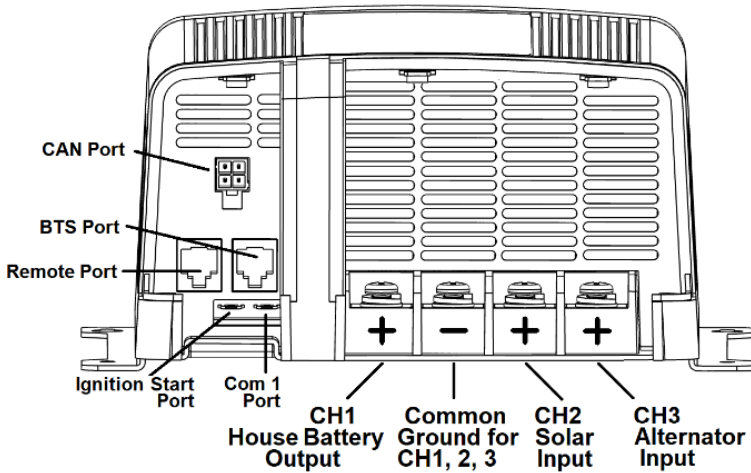
Mounting the Charger:

- Choose an appropriate mounting location.
- For installation 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 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.



Wiring the Charger:



DC Inputs and Output Wiring (CH3, CH2, CH1 and Common Ground):

WARNING: The DC wiring used must be of an appropriate size. An individual over-current protection device such as a fuse or circuit breaker 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 to withstand the short circuit current available from the connected battery bank. Both devices must match the size of the DC wiring.

Recommended Cable Length, Size and Fuse Protection:

- Use the following chart to determine the recommended fuse and wire size connection for Alternator Input (CH3) and House Battery Output (CH1) based on < 5ft wire length.

Unit Connection	Fuse/Circuit Breaker size	Wire Size
CH 1 House Battery Bank	120 A	AWG #4, 25mm ²
CH 3 Alternator Input	120 A	AWG #4, 25mm ²

Note: Keep the connection between the House Battery bank and CH1 as short as possible.

- Use the following chart to determine the recommended fuse and wire size connection for Solar Input (CH2) based on < 20 ft wire length and solar panel size configuration.

Solar Panel Size	Fuse/Circuit Breaker and Wire Size					
	1 panel	2 panels	3 panels	4 panels	5 panels	6 panels
12V 200W	15A, 10AWG	30A, 6AWG	40A, 6AWG	50A, 4AWG	60A, 4AWG	80A, 2AWG
24V 200W	10A, 10AWG	15A, 10AWG	30A, 6AWG	30A, 6AWG	40A, 6AWG	50A, 4AWG
12V 400W	30A, 6AWG	50A, 4AWG	80A, 2AWG	N.A.	N.A.	N.A.
24V 400W	15A, 10AWG	30A, 6AWG	50A, 4AWG	N.A.	N.A.	N.A.

Note: The solar panel size listed on the chart above is for reference only. The fuse size, cable length and wire gauges vary with the solar panel size accordingly. Please consult the solar panel manufacturer for wiring details. The rule of thumb for selecting a fuse, is to add 10-15% to the total short circuit current the solar panel can provide. The wire size will be based on the fuse used.

- Detach the plastic cover of the DC wiring compartment by removing the two screws on its top.
- Connect the CH1 “+” terminal in series to one of the over-current protection devices, the disconnection device, and finally to the “+” terminal of the House Battery bank.
- Connect the unit’s “Common Ground” port to the negative terminal of the House Battery Bank.
- Connect the vehicle’s alternator or the starter battery’s positive terminal to the unit’s CH3 “+” port and the negative terminal to the unit’s ‘Common Ground’ port.
- Connect the solar array’s positive terminals to the unit’s CH2 “+” port and the negative terminal to the unit’s “Common Ground” port.
- Tighten all the bolts of the charger terminals to 4.0-5.0 N-m (35-45 lb-in) of torque. Do not overtighten as this may result in damage to the charger.
- Replace the plastic cover to its original position and secure the two screws on its top.

Note: Negative wires of CH3, CH2, CH1 are connected at “Common Ground” port of the unit.

Remote Port Connection

- Connect the provided display to the “**Remote**” port on the unit through the provided RJ12 cable and connect the other end of the RJ12 cable to the “Com 1” port at the back of the remote.

Battery Temperature Sensor (BTS) Port Connection

- To install the Battery Temperature Sensor (BTS) sold separately, simply connect the RJ12 plug from the sensor to the ‘BTS’ port on the unit.
- Connect the other end the temperature sensor (ring terminals/lug) to the negative terminal of the main house battery bank.

Ignition Start Port Connection

There are two functions used with this Ignition Start Port:

- 1) Use as a unit ON function:

When unit is OFF, the positive rising edge on a >8V voltage signal will turn ON the unit. After the unit is turned ON, the unit will remain ON even if the >8V signal is removed. The unit can be turned OFF by either using the Power Switch on the display or when the unit goes to shutdown mode when it senses both CH2 and CH3 input are out of operating range or not available.

- 2) Use the signal to enable the use of CH3 Alternator Port to charge the House battery:

This function is used on P4 setting only. This ignition start port is recommended to be connected to the Ignition Start signal of the vehicle to enable the use of the Alternator Input as the House battery charging source. With a > 8V signal provided to the Ignition Start Port of the unit, it will trigger ON the Alternator charging function of the unit. Removing the signal will turn OFF the Alternator charging function of the unit. For unit operation with P4 setting, see more details in “**House Battery Charging Mechanism Setting**” on page 7.

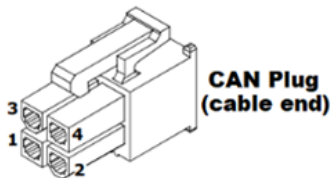
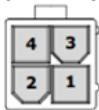
Com 1 Port Connection (Use with P2L setting only)

- A high signal (>8V with 17V max) connected to Com 1 port will use the low voltage setting (“P2L”) for the Alternator Input.
- No connection to Com 1 port will use the high voltage setting (“P2H”) for the Alternator Input.

CAN Port Connection (optional)

Communication port for use with CAN BUS communication system.

CAN Connector (on unit)



Pin	Designation
1	Not Connected
2	CAN Low
3	CAN High
4	Not Connected

5. UNIT OPERATION

Unit ON/OFF

There are three ways to turn ON the unit:

- Using the unit 'On/Off' switch located on the "Remote" panel:
Press and hold the 'On/Off' switch for a second to turn ON the charger. When the charger is not in use, press and hold the 'On/Off' switch again to turn unit OFF.
- Using the Ignition Start Port:
The unit can also be turned ON by using the positive rising edge on a > 8V voltage signal provided to the Ignition start signal. After the unit is turned ON, the unit will remain ON even if the signal is removed.
- Using the Solar Input Port (CH2):
The unit can also be turned ON by providing a > 20V signal to the solar input port (CH2).

There are two ways to turn OFF the unit:

- Using the unit 'On/Off' switch located on the "Remote" panel:
Press and hold the 'On/Off switch for a second to turn OFF the charger. The unit 'On/Off' switch is not a main power switch to disconnect the connections between the DC Inputs and DC Output of the unit. It is recommended to turn the unit OFF when the charger is not in use to avoid the sustaining current draw from either the house battery or the alternator battery.
- Using the Automatic Turn OFF function:
The unit will automatically turn OFF when it senses both CH2 and CH3 input are out of operating range or not available. The unit will first turn OFF the charging process and the display will turn OFF in 3 minutes and the unit will shutdown.

Understanding the Charging Mechanism

The charger is powered by the battery connected to House Battery (CH1) or the Alternator Input (CH3) or the Solar Input (CH2). The unit requires a minimum of 8Vdc from any of the three channels to operate. The unit display will turn off automatically after 3 minutes to save power when the Alternator and Solar Input channels (CH3 and CH2) are not connected or out of the operating range. After the unit is turned off, pressing and holding the 'On/Off' switch for a second is required to turn the unit on again. The unit can also be turned ON by providing a >8V signal to the Ignition Start port or reconnecting to a solar panel with 20V or higher.

Operating from an Alternator/Starter Input (CH3)

Normal Operation	Alternator/Starter Input (CH3)
Input Voltage Range	10.5V – 16.0V
Normal Start-Up Voltage P2H setting (Note A)	12.7 – 13.7V
Normal Under Voltage Recovery Voltage (Note A)	0.4V below Normal Start-Up Voltage
Low Start-Up Voltage P2L setting (Note B)	11.7 – 12.7V
Low Under Voltage Recovery Voltage (Note B)	0.4V below Normal Start-Up Voltage
De-rated Voltage (with load) (Note C)	11.5V
Under Voltage Shutdown (with load) (Note C)	10.5V
Over Voltage Shutdown and Recovery	16.0V / 15.5V
CH3 Input Reset Voltage (Note D)	< 8V
Maximum Input Current (CH3)	100A
Alternator Input Under Voltage Error Code	E04 (Note E)

Note A: When the battery is charging through CH3 with normal operation (COM_1 is not connected to high voltage) P2H voltage setting is in use. If the CH3 voltage is lower than the Normal Under Voltage Recovery Voltage, the charger will charge for 3 minutes, then rest for 5 seconds to verify the CH3 Input terminal voltage. During the 5 seconds rest period, if the measured voltage is greater than Normal Under Voltage Recovery Voltage, the unit will continue the charging cycle through CH3. If the measured voltage on CH3 is smaller than the Normal Under Voltage Recovery Voltage the unit will stop charging from CH3 and will switch to charge from CH2 with P4 or P5 setting and when CH2 is in operating range.

Also, during the 3 minutes charging process, if the measured terminal voltage drops below the De-Rated Voltage de-rate voltage (11.5V) the charger will start to de-rate 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 measured terminal voltage continues to drop below the Under-Voltage Shutdown Voltage (10.5V), the charging process will be terminated, and the unit will switch back to charge from CH2 with P4 or P5 setting and when CH2 is in operating range. It will only switch back to charge from CH3 if the CH3 voltage returns to the Normal Start-Up Voltage.

Note B: same function as in Note A but with COM_1 connected to a high signal, the Low Start-Up Voltage P2L and Low Under Voltage Recovery Voltage setting is in use.

Note C: During the 3 minutes charging process, if the measured terminal voltage drops to below the De-Rated Voltage (with Load) voltage, the charger will start to de-rate the charging current. This function is used to compensate for the use of long or thin cable between the Input Battery System and the unit. If the voltage continues to drop to below the Under-Voltage Shutdown (with load) limit, the charging process will terminate. The unit will switch back to charge from Solar Input (CH2) if installed. It will only switch back to CH3 if the CH3 voltage returns to the Normal or Low Start-Up voltage range.

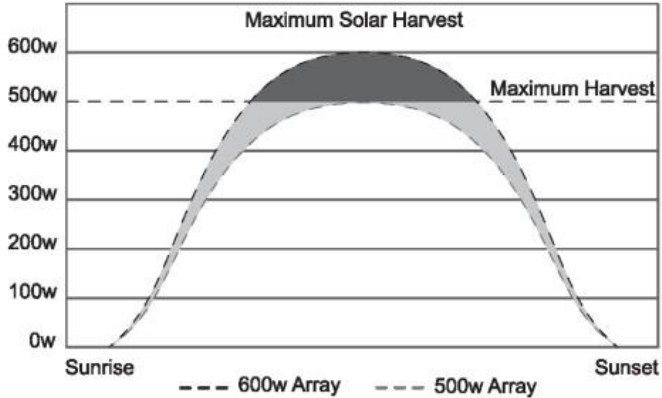
Note D: The CH3 DC Input only accepts 12V alternator system only.

Note E: When CH3 DC Input falls below the operating range, display will show error code E04 for around 30 seconds and unit will then shut down if no other DC input source is available.

Operating from a PV Solar Array/ Panel (CH2)

Normal Operation	PV Solar Array/Panel (CH2)
PV Input Voltage Range	14.5 - 55V
PV Input Under Voltage Shutdown	< 14.5V
PV Input Under Voltage Recovery	15.0V
PV Input Over Voltage Shutdown	> 55.0V
PV Input Over Voltage Recovery	≤ 48.0V
PV Charging Mechanism	MPPT type (approx. 97% efficiency)
Maximum Input Current	80A (*Note)

***Note:** The charger limits the input current of CH2 to 80A maximum. If a 12V solar panel is used, the maximum solar input power is around 1600W. 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. We suggest a total maximum overdrive of 20% (total 2000w). The extra solar panel power can compensate for cloudy (or intermittent sunny) days, so as to harvest more solar energy.



Note: Above chart is based on the use of 12V 600W solar panel array.

Trickle Charge Alternator battery (CH3) by Solar Power (CH2) with P3 Setting 'trC'

The trickle charge function uses CH2 (Solar Power) to trickle charge CH3 (Alternator battery) with rating 13.5V 3A. To activate this function, go to the unit setup menu and set 'trC' function to ON. This function works with P3 setting only. See House Battery Settings on page 7. When this function is ON, fan will run at low speed.

Reset or Kick-start latched Lithium Battery 'rSt'

The unit also comes with a unique startup charging mechanism to reset or kick-start a Lithium battery that has been latched off by the internal BMS inside the Lithium battery. This function can also be used to kick-start a heavily discharged SLA battery. To activate this function, go to unit setting menu and set the battery type to Lithium and set the 'rSt' function to ON. It will provide 12V 1A charging current to House battery for 30 seconds providing there is any voltage present at the battery terminals. When the kick-start process is finished this function will turn off automatically and the unit will go back to normal operation. If the Lithium battery is still in latched condition, check the Lithium battery and retry the startup charging mechanism again or consult the battery manufacturer on how to restart a latched Lithium battery.

Understanding the use of Com_1 port

The COM_1 port is used to select the use of 'P2H' (high voltage setting) or 'P2L' (low voltage setting) setting for Alternator CH3 Input Start-Up voltage. No connection on COM_1 port result in the use of the 'P2H' threshold setting. Connecting a high signal (minimum 8V, maximum 17V) to COM_1 port will result in the use of the 'P2L' setting. For normal operation, use P2H threshold. Under some conditions such as the unit being installed far away from the Alternator, a low Start-Up threshold P2L is required. This setting is also designed to be used for vehicles fitted with "Smart Alternators".

Understanding the Silent Mode

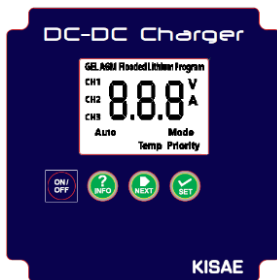
Silent Mode is in used when a quiet environment is required. When this function is activated, the 'Auto' icon on the display will turn ON. The fan speed will be reduced to 20% of the normal operation and the charging current will be reduced to a maximum of 25A. Pressing and holding the 'SET' button for more than 3 seconds will activate this function and the function will be active for 12 hours. Pressing and holding the 'SET' button again for 3 seconds will manually turn OFF the 'Silent' mode.

Understanding the Remote Display icons during normal operation

Digital Display	
Display	LCD Digital Display with back lighting
Display Info for CH1:	Battery Voltage, Charging Current, Charging Status
Display Info for CH2:	PV Solar Array/Panel Input Voltage
Display Info for CH3:	Alternator/Start Battery Input Voltage
Fault/Warning	Error code E01-12, Warning A01-02
'CH3' Icon Flashing	10.5<CH3<16V and the House battery is charging from other DC source
'CH3' Icon Solid	Battery is charging from CH3
'CH2' Icon Flashing	14.5V < CH2 < 55V and the House battery is charging from other DC source
'CH2' Icon Solid	Battery is charging from CH2

- During normal operation, the display shows alternately the House Battery Bank voltage (V), the charging current (A) and charging status ('bul' = Bulk, 'Abs' = Absorption, 'Flo' = Float and 'Ful' = Full) of the CH1 output. When the 'INFO' button is pressed once, it displays the other channel's (CH2, CH3) Input voltage for 3 seconds. If CH2 or CH3 is not connected to any input source, it will show 0V and/or error code. It will then return to normal display.
- CH3 icon flashing indicates the House battery is charging from CH2. CH3 is in operating range and is in standby mode. It will change to charge from CH3 with icon changing to solid when CH2 is not available.
- CH2 icon flashing indicates the House battery is charging from CH3. CH2 is in operating range and is in standby mode. It will change to charge from CH2 with icon changing to solid when CH3 is not available.
- The display will remain ON when either one or both CH2 & CH3 inputs are available and either one of the channels is charging the House battery. The display will turn off automatically to save power if both CH2 and CH3 are not available for a while.
- CH1 is off and CH2 and Ch3 are flashing indicates the trickle charge mechanism is in progress.

Understanding the Function Key Icons on Display



CH1 - Display is showing the House Battery Bank info (charging voltage, current and status)

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

V – The numerical value showing on the display is in voltage (V)

A – The numerical value showing on the display is in current (A)

Auto – 'Silent Mode' is activated. More details in 'Button Functions' on Page 14.


Priority – The charging function is set to either P1, 4 or 5.

Mode - Charging mode setting (only displayed during unit setting)




Temp - Temperature setting (only displayed during unit setting)

Understanding the Digital Display Function

Digital Display	
buL	House battery is being charged and is in Bulk charging stage
Abs	House battery is being charged and is in Absorption charging stage
Ful	House battery is fully charged (with Lithium battery type setting)
Flo	House battery is fully charged (with GEL, FLOODED, AGM, Program battery type setting)
Eq	Flashing: Equalization process is in progress Solid: Equalization process is selected and is waiting for the process to start.
trC	Flashing in unit setting mode. Waiting for the 'SET' command to turn ON or OFF the trickle charge function. Solid in unit normal operation mode indicates the trickle charge process is in progress
rSt	Flashing in unit setting mode. Waiting for the 'SET' command to turn ON or OFF the Reset or Kickstart function. Solid in unit normal operation mode indicates the Reset/Kickstart battery function is in progress.
P2L	Selection on Alternator start up voltage with COM_1 Port set to high
P2H	Selection on Alternator start up voltage with COM_1 Port with no connection
bUL v	Bulk / Absorption Voltage setting on Lithium & Program battery type in unit setting mode
Flo v	Float Voltage setting on Lithium & Program battery type in unit setting mode
h_A	Maximum Charging current setting
L_A	Exit to Float stage current setting
rEC	Selection on house battery recharge voltage
nor Temp	Select normal temperature as house battery temperature (no charging voltage compensation)
hi Temp	Select high temperature as house battery temperature (with charging voltage compensation)
Lo Temp	Select low temperature as house battery temperature (with charging voltage compensation)
u_	Main unit code revision
r_	Display Panel code revision

- During the charging process, the display shows 'CH1' charging voltage, current, and status repeatedly, and 'CH2' or 'CH3' are solid to indicate the recent active input source. If the other input channel ('CH3' or 'CH2' respectively) is available and its voltage is above its corresponding 'Start-Up' voltage threshold, the icon will be flashing.
- When  'INFO' button is pressed once during the charging process, 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 mode automatically and shows the CH1 information again.
- When the House Battery Bank (CH1) is fully charged, the display shows 'CH1' together with a cycle sequence of its voltage, current, and charging status ('Flo'=Float for GEL, AGM, Flooded and Program battery type or it will show 'Ful' (Full) on the display for Lithium battery type).
- The selected 'battery type' icon remains on most of the time when the display is ON
- The 'Priority' icon turns ON when P1-P5 is selected (see page 7). It will switch the House battery to be charged from either CH2 or CH3 depending on the setting or the status. For more details, read "House Battery Charging Mechanism Setting" on page 7.

Button Functions

On/Off	Press and hold "On/Off button on the display or on the main unit to turn unit ON or OFF. (Note 1)
	<ul style="list-style-type: none"> • During normal charging operation, press once to change the display to show CH2 and CH3 voltage. • Press and hold for more than 3 sec. to enter or exit the unit Setup Mode. When it is in the Setup menu, press and hold again for 3 seconds or wait for about 10-15 sec without pushing any button to exit unit setup mode. • When both CH2 and CH3 are not available or out of operating range, display will turn OFF automatically, pressing and holding this button for more than 3 seconds, will temporary trigger the display showing the sequence of all the three channels voltages, all the icons, the software revision numbers.
	<ul style="list-style-type: none"> • During the unit setup process, this button is used to confirm (save) the setting and continue to the next one. Note: The selected setting will quickly flash 3 times to acknowledge the setting. • Equalization Mode: With "Flooded" battery type setting, anytime the display is ON for whatever reason (except during the setting menu), press and hold the "NEXT" and "SET" buttons together for more than 5 sec. to enable the equalization mode in the CH1 (House Battery). The display will temporarily show "Eq" and the "Flooded" icon.
	<ul style="list-style-type: none"> • During the charger Setup Mode, this button is used to change to the next setting of a specific parameter. • 'Silent' (Fan) mode: Anytime that the display is ON for whatever reason (except during the setting menu), press and hold this button for more than 3 seconds to force the fan to run at low speed. The "Auto" icon will turn ON. The charger current will reduce to about 25A or less. This function will automatically run for about 12 hours.
<p>Note 1: If both CH2 and CH3 are not available, the unit will automatically turn off after 3 minutes to avoid power draining from the house battery. During this 3-minute period, the display will show E08 and E09 to indicate the solar and the alternator input is not available.</p> <p>General Note: Every time the "INFO", "NEXT" and/or "SET" buttons are pressed, the back light will illuminate and automatically turn off after 60 seconds.</p>	

Custom Setting Your Charger

Use the "INFO", "SET", and "NEXT" push buttons to enter the setup mode and its setting menu, select the setting of a specific parameter, and save & advance to the next parameter, respectively. Refer to the detailed explanation in the table above.

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

The Three-Stage Charging (Mode 3) consists of Bulk, Absorption and Float stages. During the Bulk stage, the house battery (on CH 1) accepts the maximum constant current from the charger as per the setting. 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 the selectable recharge voltage ('rEC' voltage).

The Two-Stage Charging (Mode 2) has only Bulk and Absorption charging stages. Charger will terminate battery charging once it reaches the Absorption to Float ("L") current setting. The charger will automatically restart the full charging cycle if it senses the battery bank is discharged to selectable recharge voltage ('rEC' voltage).

Manual Battery Temperature Compensation Setting

There are three manual battery temperature settings on the unit ('Lo', 'nor' and 'hi'). Select the proper setting based on the room temperature as per the following table. The unit is able to make a more accurate and automatic temperature compensation when the optional Battery Temperature Sensor (BTS) is connected to it. See more details in the next section. If using Lithium batteries, always set the manual room temperature to "nor" (Normal).

Temperature Setting	Existing Battery Room 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, AGM (always for Lithium)	0V
			0V
High (hi)	< 30°C	GEL, Flooded	-0.270V
		AGM	-0.210V

Automatic Battery Temperature Compensation using the BTS

The Battery Temperature Sensor (BTS) is an optional accessory for the charger to protect your battery and provide better charging voltage accuracy, by making small adjustments on the charging voltage, based on the temperature measured directly on the battery. No special setting is required. The unit automatically detects when the sensor is plugged into its corresponding "BTS" jack port located in the DC wiring compartment, and overrides the manual temperature setting (i.e. "Lo", "Nor", and "Hi"). It is highly recommended to be installed on the house battery bank negative terminal.

With this optional feature, the charging voltage is automatically adjusted according to the following table.

Measured Battery Temperature	Automatic 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

Additionally, the BTS allows the triggering of the E07 and A02 messages corresponding to the battery over-temperature shutdown and alarm, respectively.

When the optional BTS is in use with Lithium Battery setting, there is no voltage compensation on the charging voltage. The unit will shutdown the charging process when it senses the battery temperature falls to below 0°C or above 60°C. It will resume the battery charging process automatically when it senses the Lithium battery temperature rising to above 5°C or dropping to below 55°C.

Procedure to Set or View Charger Setting

Follow the procedure or sequence in Appendix 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 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 vehicle may not provide enough time 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, please consult www.kisaepower.com.

Before setting the equalization mode, please be sure the battery is a flooded battery type. When the battery equalization is enabled, the charger will automatically fully charge the battery bank and will then follow with the equalization process. Follow the instructions or consult the battery manufacturer on how to check the battery electrolyte level during the equalization period.

Use the following procedure to setup the charger for battery equalization. With "Flooded" battery type setting, press and hold both the "NEXT" and "SET" push buttons together for more than 5 seconds to force the charger to go into equalization setting mode and the word 'Eq' will show on the display. Press and hold the "NEXT" and "SET" push buttons together again to start the equalization process and words 'Eq' on the display will start to flash. As the charger cannot determine when to terminate the equalization process, a 30-minute time-out section is set, and the equalization process will terminate. This is used as a safety feature and the equalization process can re-activate again if a longer time is required after checking batteries manually. Pressing and holding the 'INFO' push button for more than 5 seconds during the 30 minutes time-out section will also terminate the equalization process manually and the charger will resume back to normal operation.

Understanding the Protection Features

De-rating Charging Current: When the charger's internal temperature is above 60°C, the maximum charger current will de-rate to 1/2 of the value, and the A01 warning code is displayed. The charger will recover automatically back to maximum charging current when its internal temperature drops to below 58°C.

Over Temperature Shutdown: When the charger's internal temperature is above 65°C, the charger will shut down and E06 error code is displayed. It will recover automatically when its internal temperature drops to below 40°C.

Understanding the Display and Error Warning 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.

Display Code	
bUL	<p>The charger is in Bulk Charging Stage 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 quickly as possible.</p>
Abs	<p>The Charger is in Absorption Charging Stage Absorption charge: With the charger voltage held steady, the remaining 20% battery capacity is replaced with the charger allowing the current to taper off as the battery approaches full charge.</p>
Flo	<p>The Charger is in Float Charging Stage (GEL, AGM, Flooded, Program setting) Float Charge: In the float stage the charger voltage is lowered and held at a constant and safe predetermined level (on GEL, AGM, Flooded battery setting) or a selectable level (on Program setting). 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.</p>
FuL	<p>The Charger is in Full Charge Stage (Lithium setting) Full Charge: In the full stage the charger voltage is lowered and held at a selectable 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.</p>
CHE	<p>CH3 Input Voltage Check This is displayed for 5 sec. every 3 minutes when charging from the CH3 Start-Battery/Alternator input. During this 5 sec. checking period, the CH3 is internally disconnected to check its voltage and to decide if it meets the corresponding Under-Voltage-Recovery-Voltage (there are two possible ones), so to continue charging or not. See Note A on page 11 for more details.</p>

Warning Code	
A01	<p>Over Temperature Warning When the charger's internal temperature is > 60°C, the unit will show 'A01'. If the ventilation of the unit is not improved, it will lead to 'E06- Unit Over Temperature Shutdown'. The 'A01' warning code will disappear when the internal temperature drops to < 58°C.</p> <ul style="list-style-type: none"> • Check if there is an object blocking the air ventilation of the unit. • Check if the fan is working. • Make sure the unit has good ventilation.
A02	<p>BTS High Temperature Warning When the battery temperature sensor is > 58°C, the display will show 'A02'. If the ventilation of the battery environment is not improved and the temperature continuously rises, it will lead to 'E07- BTS Over Temperature Shutdown'. The 'A02' warning code will disappear when the measured temperature drops to < 56°C.</p> <ul style="list-style-type: none"> • Check the batteries and the charging current. The charging current may be set too high. • Make sure the batteries have good ventilation.

Error Code	
E01	CH3 Input Voltage >16v when unit starts. <ul style="list-style-type: none"> • Check CH3 Alternator voltage.
E02	CH3 Input Voltage <10.5v when unit starts. <ul style="list-style-type: none"> • Check CH3 Alternator system or connection from alternator to CH3. • Check if your alternator is running properly. • Check if the battery cable from the Start Battery is properly sized to avoid excessive voltage drop. • Make sure there are not any loose terminals or blown fuses. CH3 Input Voltage falls below P2L or P2H selected values during operation. <ul style="list-style-type: none"> • Check P2L or P2H set values.
E03	CH2 High Input Voltage Shutdown The input from the CH2 Solar input has gone above 55V. This error will clear once the input drops below 52V. 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 55Voc. • If having panels in series for 24V nominal, make sure its voltage in open circuit (Voc) does not exceed 55V when having maximum sunlight condition. Otherwise, consider connecting the solar panels in parallel (i.e. + to + and - to -) for a 12V nominal panel array.
E04	CH2 Input Voltage < 14.5v when unit starts <ul style="list-style-type: none"> • Check Solar panel voltage or check connection to solar panel. CH2 Input Voltage < 16.5v when charging is in progress <ul style="list-style-type: none"> • Check Solar panel voltage or check connection to solar panel. • Check that you are not in a low light/non- direct sunlight situation i.e. early morning /late afternoon, or even at night. • This may also happen if your solar panels are inside of a shed with a skylight or outside under Flood Lights.
E05	CH1 High Input Voltage Shutdown This means the unit has detected that the CH1 Main/House battery has gone above 16.0V on DMT12100 or 32V on DMT2450. This error will clear once the input has dropped below 15.5V on DMT12100 or 31V on DMT2450. This may be due to charging from another charging source (i.e. another solar controller or AC battery charger) with either an excessively high voltage regulation setting or a malfunction.
E06	Over Temperature Shutdown When the charger's internal temperature rises above 65°C, the charger will shutdown. It will recover automatically when the environmental temperature drops below 40°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 This means the Battery Temp Sensor has detected that the batteries are too hot > 60°C and have shut down to not over charge the batteries. The unit will return back to normal charging once the battery temperature sensor is < 56°C. If this occurs, check the temperature of the batteries. <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. • Check the batteries and the charging current. The charging current may be set too high. • If the Batteries/Terminals are still cool or only warm, you may have a bad temp sensor. Unplug the temp sensor and contact KISAE.
E08	CH2 Solar Input < 13.0v when unit starts. Check solar panel connection
E09	CH3 Alternator Input < 7.0v when unit starts. Check alternator connection
E10	CH1 Output is short circuited. Check the house battery connected to CH1 of the unit
E11	CH2/3 has Input connected but no house battery connected to CH1. Check house battery
E12	Lithium Battery is in low temperature. Check House battery.

6. SPECIFICATIONS

Note: Specifications are subject to change without notices.

Output Rating	DMT12100	DMT2450
Output Current (Maximum)	100A	50A
Output Voltage	12V Nominal	24V
Output Power (Maximum)	1400W	
Charger DC Output- House Battery (CH1):		
Selectable Battery Type	GEL, AGM, Flooded, Lithium, Program	
Bulk /Float Voltage Range	GEL: 14.4 / 13.7 Vdc	28.8 / 27.4 Vdc
	AGM: 14.6 / 13.6 Vdc	29.2 / 27.2 Vdc
	Flooded: 14.4 / 13.3 Vdc	28.8 / 26.6 Vdc
	Lithium: 13.9 - 14.6 Vdc	27.8 - 29.2 Vdc
	Program: 13.8 - 14.8 Vdc	27.6 - 29.6 Vdc
Restart Voltage (GEL, AGM, Flooded, Program)	12.5 – (Float V - 0.2V) Vdc	25.0 – (Float V - 0.2V) Vdc
Restart Voltage (Lithium)	13.5 – 14.2 Vdc	27.0 – 28.4 Vdc
Charger Current (User Selectable)	10 - 100A (10A steps)	10 - 50A (5A steps)
Equalized Voltage (Flooded Battery only)	15.5 Vdc	31.0 Vdc
Equalized Charging Current	10% of Bulk Current Setting	
Charging Control	GEL, AGM Flooded, Program Mode: Two or Three Stages Lithium: Three Stages only	
DC Output Bank	Single	
Current draw from CH1 with unit ON	< 600mA	
Current draw from CH1 with Unit OFF	< 1 mA	
Battery Temperature Setting	Low / Normal / High (automatically overridden by optional BTS)	
Efficiency	95%	
Minimum Operating Voltage	8.0 Vdc	16.0 Vdc
DC Solar Input – Solar Array (CH2- Solar):		
Input Voltage	14.5 – 55 Vdc	
Maximum Solar Input Current	80A	
Maximum Solar Input Power	1200W max (12V 200W 3P2S or 6P or 24V 200W 6P1S)	
DC Alternator Input – Alternator/ Start Battery (CH3- Alternator/Start):		
Input Voltage Range	10.5 – 16.0 Vdc	21 – 32 Vdc
P2L (COM 1 is connected to +12V or +24V)	11.7 – 12.7 Vdc	23.4 – 25.4 Vdc
P2H (COM 1 has no connection)	12.7 – 13.7 Vdc	25.4 – 27.4 Vdc
Maximum Input Current (as per max. setting)	100A	
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:		
DMT12100	7.1 lb., 14.0x8.1x3.8 inches (3.23 Kg, 356x205x97 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, E-Mark	

Accessories:

Remote Panel DMTRM1202

Optional Accessory:

Battery Temperature Sensor BTS-10K

7. WARRANTY

Two 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 two years 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 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 two years 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

Appendix Unit Setting

Display 'INFO', 'NEXT', 'SET' push button function in 'Unit Setting Mode':

- Use **INFO** button to enter or exit 'Unit setting mode'.
- Use **NEXT** button to confirm the selected values/function and proceed to the next setting.
- Use **SET** button to toggle between different set values/function.

Procedure to enter 'Unit Setting' mode

- 1) Press and hold **INFO** button for 3 seconds to enter unit setting mode.
- 2) Display shows priority setting '**Priority 1**' – '**Priority 5**'.

Setting 1: Battery Charging Mechanism Setting ('Priority 1 - 5')

Selectable Priority Type Setting:

Priority 1 (Solar Priority)

Priority 2 (Alternator only)

Priority 3 (Solar only)

Priority 4 (Alternator Priority with Ignition Start Signal)

Priority 5 (Alternator Priority without Ignition Start Signal)

- 3) Use **SET** button to select between '**Priority 1 - 5**' priority function.
- 4) Use **NEXT** to confirm the selected priority function and it will automatically enter the battery type selection.
- 5) Use the following setting 2 to select individual setting for different battery types.

For GEL, AGM, FLOODED Battery Type

Display shows the selected battery type and the related bulk charge voltage.

(GEL 14.4v, AGM 14.6v, FLOODED 14.4v)

Setting 2: Alternator Input Low Start-Up Voltage Setting ('P2L')

Selectable Voltage: **11.5 to 12.7 V (0.1V steps)**

Setting 3: Alternator Input Normal Start-Up Voltage Setting ('P2H')

Selectable Voltage: **12.7 to 13.7 V (0.1V steps)**

Setting 4: Maximum Charging Current Setting ('hxxA' or '100A') xx is the selected values:

Selectable Values: **h10A, h20A, h30A, h40A, h50A, h60A, h70A, h80A, h90A, 100A**

Setting 5: ABS to Float Stage Current Setting ('L xxA'):

The selectable values are dependent on the selected '**hxxA or 100A**' current values. See chart below:

Maximum Charging Current from Setting 4	Selectable Current (A)		
100A	L5 A	L7 A	L10 A
h90A	L4 A	L6 A	L9 A
h80A	L4 A	L6 A	L8 A
h70A	L3 A	L5 A	L7 A
h60A	L3 A	L4 A	L6 A
h50A	L2 A	L4 A	L5 A
h40A	L2 A	L3 A	L4 A
h30A	L1 A	L1.5 A	L3 A
h20A	L1 A	L1.5 A	L2 A
h10A	L1 A	L1.5 A	L2 A

Setting 6: Battery Recharge Voltage Setting ('rEC v')

Selectable Voltage for GEL Type: **12.5 – 13.5v (0.1v steps)**

Selectable Voltage for AGM Type: **12.5 – 13.4v (0.1v steps)**

Selectable Voltage for Flooded Type: **12.5 – 13.1v (0.1v steps)**

Setting 7: Three or Two Stage Charging Setting ('2' or '3' Mode)

Selectable Mode: **Mode 2** (2-Stage), **Mode 3** (3-Stage)

Setting 8: Temperature Setting ('Temp'):

Selectable temperature: '**Lo**' (low), '**nor**' (normal), '**hi**' (high)

Setting 9: Trickle Charge Alternator Battery Setting ('trC')

Selectable setting: '**ON**', '**OFF**'

For LITHIUM Battery Type

Display shows the Lithium battery type and the selected bulk charge voltage. (e.g. Lithium 14.4v)

Setting 2: Alternator Input Low Start-Up Voltage Setting ('P2L')

Selectable Voltage: 11.5 to 12.7 V (0.1V steps)

Setting 3: Alternator Input Normal Start-Up Voltage Setting ('P2H')

Selectable Voltage: 12.7 to 13.7 V (0.1V steps)

Setting 4: Bulk Voltage (CV) Setting ('bUL xx.xv')

Selectable Voltage: 13.9 to 14.6 V (0.1V steps)

Setting 5: Float Voltage Setting ('Flo xx.xv')

Selectable Voltage: 13.7 to Bulk Voltage – 0.2v (0.1v steps) Maximum 14.4 V

Setting 6: Maximum Charging Current Setting ('hxxA' or '100A') xx is the selected values:

Selectable Values: h10A, h20A, h30A, h40A, h50A, h60A, h70A, h80A, h90A, 100A

Setting 7: ABS to Float Stage Current Setting ('L xxA'):

The selectable values are depending on the selected 'hxxA or 100A' current values. See chart below:

Maximum Charging Current from Setting 6	Selectable Current (A)		
	L5 A	L7 A	L10 A
100A	L5 A	L7 A	L10 A
h90A	L4 A	L6 A	L9 A
h80A	L4 A	L6 A	L8 A
h70A	L3 A	L5 A	L7 A
h60A	L3 A	L4 A	L6 A
h50A	L2 A	L4 A	L5 A
h40A	L2 A	L3 A	L4 A
h30A	L1 A	L1.5 A	L3 A
h20A	L1 A	L1.5 A	L2 A
h10A	L1 A	L1.5 A	L2 A

Setting 8: Battery Recharge Voltage Setting ('rEC v')

Selectable Voltage: 12.5 to Float Voltage – 0.2v (0.1v steps)

Setting 9: Trickle Charge Alternator Battery Setting ('trC')

Selectable setting: 'ON', 'OFF'

Setting 10: Restart a latched Lithium Battery or a dead SLA battery Setting ('rSt')

Selectable setting: 'ON', 'OFF'

For **Program Battery Type**

Display shows the **Program** battery type and the selected bulk charge voltage. (e.g. **Program 14.2v**)

Setting 3: Alternator Input Low Start-Up Voltage Setting ('P2L')

Selectable Voltage: **11.5 to 12.7 V (0.1V steps)**

Setting 4: Alternator Input Normal Start-Up Voltage Setting ('P2H')

Selectable Voltage: **12.7 to 13.7 V (0.1V steps)**

Setting 5: Bulk Voltage (CV) Setting ('bUL xx.xv')

Selectable Voltage: **13.8 to 14.8 V (0.1V steps)**

Setting 6: Float Voltage Setting ('Flo xx.xv')

Selectable Voltage: **13.0 to Bulk Voltage – 0.2v (0.1v steps) Maximum 14.6v**

Setting 7: Maximum Charging Current Setting ('hxxA' or '100A') xx is the selected values:

Selectable Values: **h10A, h20A, h30A, h40A, h50A, h60A, h70A, h80A, h90A, 100A**

Setting 8: ABS to Float Stage Current Setting ('L xxA'):

The selectable values are depending on the selected '**hxxA or 100A**' current values. See chart below:

Maximum Charging Current from Setting 4	Selectable Current (A)		
100A	L5 A	L7 A	L10 A
h90A	L4 A	L6 A	L9 A
h80A	L4 A	L6 A	L8 A
h70A	L3 A	L5 A	L7 A
h60A	L3A	L4 A	L6 A
h50A	L2 A	L4 A	L5 A
h40A	L2 A	L3 A	L4 A
h30A	L1 A	L1.5 A	L3 A
h20A	L1 A	L1.5 A	L2 A
h10A	L1 A	L1.5 A	L2 A

Setting 9: Three or Two Stage Charging Setting ('2' or '3' Mode)

Selectable Mode: **Mode 2** (2-Stage), **Mode 3** (3-Stage)

Setting 10: Battery Recharge Voltage Setting ('rEC v')

Selectable Voltage: **12.8 to Float Voltage -0.2v (0.1v steps) Maximum 14.4v**

Setting 11: Trickle Charge Alternator Battery Setting ('trC')

Selectable setting: '**ON**', '**OFF**'

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