MPPT solar controller

User Manual

Preface

Thank you very much for using the IGE-MT series MPPT controller.

In order to fully utilize the performance of this product and ensure the safety of users and equipment, please read this manual carefully before installation and use.

For the convenience of daily inspection, maintenance, and understanding of the causes and countermeasures of abnormalities in the inverter in the future, please keep this manual properly.

If there are any difficulties or special requirements during use, please feel free to contact our product distributor or directly contact our technical service center.

The content of this manual is subject to change without prior notice.

Catalogue

Precautions

The safe operation of this product depends on proper transportation, installation, operation, and maintenance. Before carrying out these tasks, please be sure to pay attention to the relevant safety tips. The safety related warnings in this manual are as follows:

⎓	DC value
	Before any operation on the inverter, read the instruction manual
 5minutes	To avoid electric shock, please disconnect the machine from the PV end, BAT and LOAD ends for at least 5 minutes before allowing contact with the wire parts of the machine's output and input ends
	Warning: During machine operation, the temperature of its metal casing may be very high

◆ **Purchase inspection**

Warning
1. If the inverter is found to be damaged or missing spare parts, it cannot be installed, otherwise accidents may occur.

◆ **install**

Warning
1. To ensure good convective cooling effect, leave at least 20 centimeters of space in the top, bottom, left, and right directions. 2. Try to install ventilation or air exchange devices indoors, and it is strictly prohibited to install them in direct sunlight. 3. During installation, do not let drilling residues fall into the controller's heat sink or fan to prevent affecting heat dissipation.

◆ **wiring**

danger
1. Wiring work must be carried out by qualified electrical professionals, otherwise it may cause electric shock or fire. 2. Before wiring, please confirm that the input power has been cut off, otherwise it may cause electric shock or fire. 3. The grounding terminal must be reliably grounded, otherwise there is a risk of the inverter casing being electrified. 4. The selection of photovoltaic arrays, batteries, loads, and inverters should be reasonable, otherwise it may damage the equipment.

Warning
1. Please tighten the terminals with the specified torque, otherwise there is a risk of fire. 2. Do notconnect capacitors or LC/RC noise filters with phase advance at the output terminal of the controller.

◆ **run**

danger
1. Only after confirming the correct wiring can the power be turned on, otherwise it may damage the inverter or cause a fire. 2. Do not change the wiring during power on, otherwise there is a risk of electric shock.

Warning
1. Before initial operation, pleaseadjust some control parameters according to the instructions in the manual. Do not change the control parameters of the controller at will, otherwise it may cause equipment damage. 2. Duringoperation, the temperature of the controller is high. Do not touch it for a long time, otherwise there is a risk of burns or electric shock. 3. Under the conditionof altitudeexceeding 2000 meters, the controller should be de rated and the output voltage should be reduced by approximately 10% for every 1000 meters increase in altitude.

◆ **other**

danger
1. Maintenance and inspection must be carried out by qualified electrical professionals. 2. Do not disassemble the controller when it is powered on. Wait for at least 5 minutes after turning off the power before performing maintenance and inspection to prevent residual voltage on the electrolytic capacitor in the main circuit from causing personal injury. 3. It is absolutely forbidden to modify the inverter by oneself, otherwise it may cause personal injury or equipment damage. 4. When dealingwith scrapped controls, please treat the controller as industrial waste. Internal electrolytic capacitors may explode during incineration, and some components may produce harmful and toxic gases during combustion.

Chapter 1 Product Introduction

1.1 Application and System Introduction of MPPT Controller

The MPPT controllercan detectthe power generation ofphotovoltaic panelsin real time and track the maximum power point, allowing the system to charge the battery at maximum power output. Simultaneously supplying power to DC loads is commonly used in off grid photovoltaic energy storage systems, coordinating the work of solar panels, batteries, and loads, and is the core control component of off grid photovoltaic energy storage systems.

This product adopts LCD dynamic display of operating status, operating parameters, control parameters, historical parameters, etc.

The MPPT solar controller adopts the standard Modbus communication protocol, which facilitates users to expand, view and modify various parameters of the system by themselves. It has comprehensive electronic fault self-test function and powerful protection function, which can minimize the damage of product components caused by installation errors and system failures.

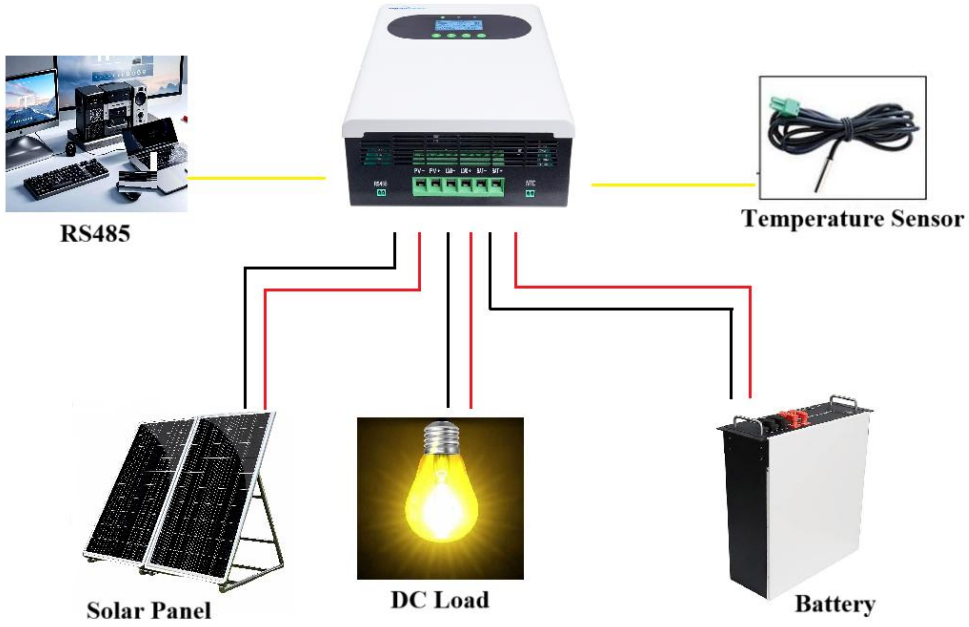

Figure 1 MPPT Controller Application System Diagram

1.2 Product Features and Functions

◆Combining multiple tracking algorithms can quickly and accurately track the optimal operating point of the I-V curve.

◆Equipped with a maximum powertracking algorithm, it can significantly improve the energy utilization efficiency of photovoltaic systems, with MPPT tracking efficiency reaching up to 99.9%. The highest conversion efficiency is as high as 98.5%.

◆ Supports differenttypes of battery charging programs such as lead-acid batteries, colloidal batteries, lithium iron phosphate batteries, ternary lithium batteries, and user-defined ones.

◆ It has a current limiting charging mode. When the power of the solar panel is too high and the charging current is greater than the rated current, the controller automatically reduces the charging power to operate at the rated charging current.

◆ Support automatic recognition of battery voltage.

◆ Equipped with fault LED indication and LCD display of abnormal information, it is convenient for users to determine system faults.

◆Equipped with LCD screen display function, it can view device operation data and status, and also support controller parameter changes.

◆Support standard Modbus protocol to meet communication needs in different occasions.

◆ Equipped with an over temperature protection mechanism, when the temperature exceeds the set value of the device, the charging current decreases linearly with the temperature and the discharge is turned off, thereby reducing the temperature rise of the controller and avoiding high-temperature damage to the controller.

◆ It has temperature compensationfunction, automatically adjusts charging and discharging parameters, and improves the service life of the battery. Equipped with battery over temperature protection function, external battery temperature exceeding the set value will shut down charging and discharging to prevent equipment damage caused by high temperature.

◆ TVS lightning protection

1.3 Introduction to Charging Function

MPPTcontroller, as acharging stage, isnot just a single charging stage. It generally includes constant current (fast charging) charging, balanced charging, float charging, and other charging methods to jointly complete the charging of the battery. A complete charging process curve is shown in the following figure:

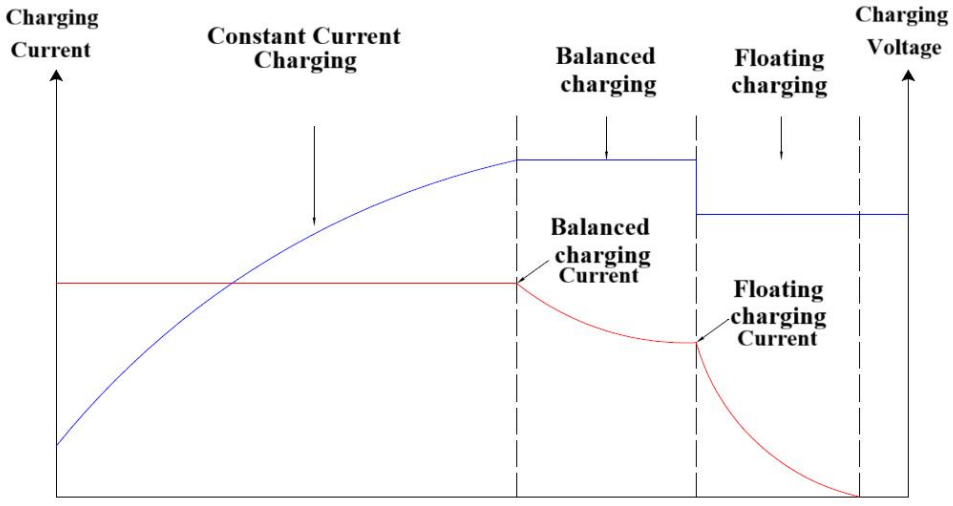

Figure 2

Constant current charging

During the fast charging phase,ifthe battery voltage has not yet reached the set value for full charge voltage (i.e. balanced charging/boost voltage), the controller will perform MPPT charging to provide the maximum solar power to charge the battery. After the battery voltage reaches the preset value, constant voltage charging will be performed.

Balanced charging

When thebattery voltage reaches the set value of the equilibrium voltage, the controller will perform constant voltage charging, and this process will no longer involve MPPT charging. At the same time, the charging current will gradually decrease over time; Customers can also adjust the preset voltage point according to their actual needs. When the duration reaches the set value, the system will switch to float charging.

⚠Attention

1) When the system is unable to continuously stabilize the battery voltage at a constant level due to installation environment or load operation,

2)The time to enter the float charging state will be affected.

⚠Dangerous explosion risk!

Balanced open lead-acid batteries can produce explosive gases, and the battery compartment must be well ventilated.

⚠Attention

Balanced charging can increase the battery voltage to a level that may damage sensitive DC loads. It is necessary to verify that the allowable input voltage for all loads in the system is greater than the set value for balanced charging of the battery.

⚠Attention

Overcharging and excessive gas release may damage the battery plates and cause the active substances on the battery plates to detach.Excessive or prolonged balanced charging may cause damage. Please carefully review the specific requirements for the batteries used in the system.Some types of batteries benefit from regular balanced charging, which can agitate the electrolyte, balance the battery voltage, and complete chemical reactions Should. Balanced charging increasesthe battery voltage above the standard replenishment voltage, causing the battery electrolyte to vaporize. It is not recommended to set an excessively high average charging voltage to avoid excessive gas release or battery overheating.

Floating charging

Floating charging is a process in which the controller reduces the charging current after the continuous charging phase to lower the battery voltage and maintain it at the set floating charging voltage. During the float charging stage, the battery is charged very weakly to ensure that it remains fully charged. During the float charging phase, the load can obtain nearly all of the solar energy generated. If the load exceeds the amount of electricity that solar energy can provide, the controller will not be able to maintain the battery voltage at the float level.

Chapter 2 Controller Installation

2.1 Installation location selection

◆ Installed on a solid surface.

◆The optimal working environment should be between -20 ℃ and 60 ℃.

◆ Do not install the charging controller in places directly exposed to sunlight or rainwater to avoid equipment damage caused by overheating or getting wet.

◆Do not install on highly flammable materials; Do not install in areas with potential explosion hazards.

2.2 Installation precautions

◆**A**void placing metal objects around the battery to prevent short circuits;

◆**D**uring battery charging, acidic gases may be generated. Ensure good ventilation around the environment

◆**P**lease follow the safety recommendations of the battery manufacturer.

◆Input and output lines should be distinguished to prevent misconnection; The positive and negative poles of the battery should be correct, and the battery voltage should be consistent with the machine label paper.

◆The installation of equipment should be operated by professionals or assisted by local distributors.

◆Please follow the safety recommendations of the battery manufacturer.

◆ Grounding the controller's grounding terminal.

◆Virtual connection points and corroded wires may cause significant heating, melting of the wire insulation layer, burning of surrounding materials, and even fire hazards. Therefore, it is important to ensure that all connection heads are tightened and wires are securely fastened with zip ties to avoid loose connections caused by wire shaking during mobile applications.

2.3 Controller wiring

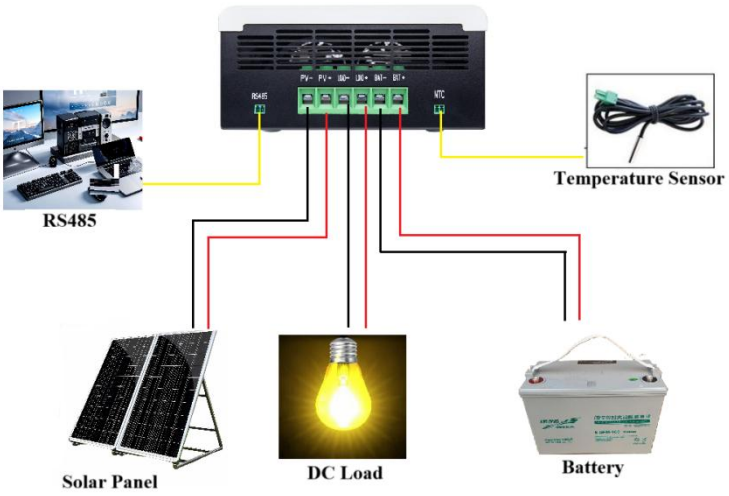

Figure 3 Controller Wiring Diagram

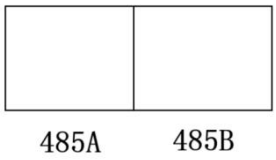

Figure 4 RS485 Communication Wiring Diagram

We strongly recommend installing fuses or circuit breakers at the photovoltaic array end, load end, and battery end to prevent the risk of electric shock

There is a risk of electric shock when the wiring is stopped or accidentally operated, and it is necessary to ensure that the fuse or circuit breaker is in the disconnected state before wiring.

High voltage! solar panel arrays may generate high open circuit voltage. Before wiring, disconnect the circuit breaker or fuse, and be careful during the wiring process.

Warning: If the positive and negative terminals of the battery and the wires connected to them are short circuited, it may cause a fire or explosion. Please be careful when operating. Please connect the battery first, then the battery board, and finally the load. When wiring, please follow the connection method of "+" pole first, then "-" pole.

Warning: When the controller is in normal charging state, disconnecting the battery connection will have a certain impact on the DC load of the controller, and in severe cases, it may damage the load.

Attention: 1) If an inverter is connected to the system, please directly connect the inverter to the battery and do not connect it to the load end of the controller.

2) The controller defaults the battery temperature to a fixed value of 25 ℃ without connecting a temperature sensor.

Chapter3 Controller Operation Instructions

3.1 Description

Figure 5 Schematic diagram of controller panel

serial number	name	serial number	name
1	Return button (BACK)	2	Up button (UP)
3	Down button (DOWN)	4	Set/Confirm button (ENTER)
5	Solar panel indicator light (PV)	6	DC outputindicator light (DOD)
7	Malfunction indicator light		

3.2 Interface Description

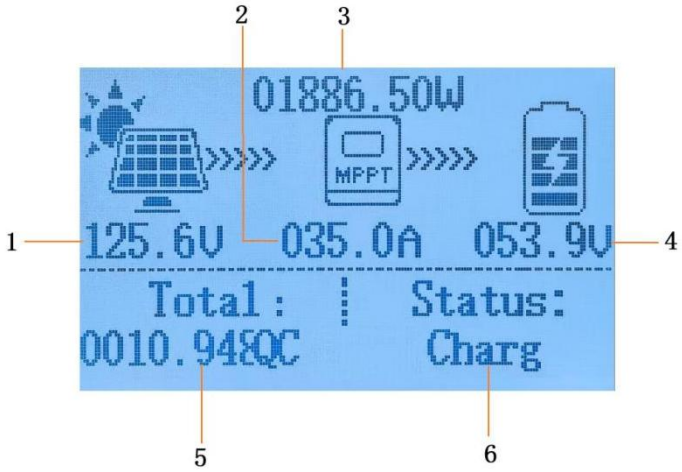

Figure 6 Schematic diagram of the interface

serial number	Instructions	serial number	Instructions
1	Solar panel voltage	2	charging current
3	charging power	4	battery voltage
5	Total power generation of solar panels	6	system status

3.3 Parameter Setting Instructions

3.3.1DC output setting

In the default main interface state, long press theSET button for 3 seconds to enter the settings interface; Press the UP or DOWN button to select the DC output setting. Short press the SET button to enter the DC output setting interface. Press the UP or DOWN button to select whether to turn on or off the DC output. press the SET button for 3 seconds to confirm the modification. The setting process is shown in the following figure:

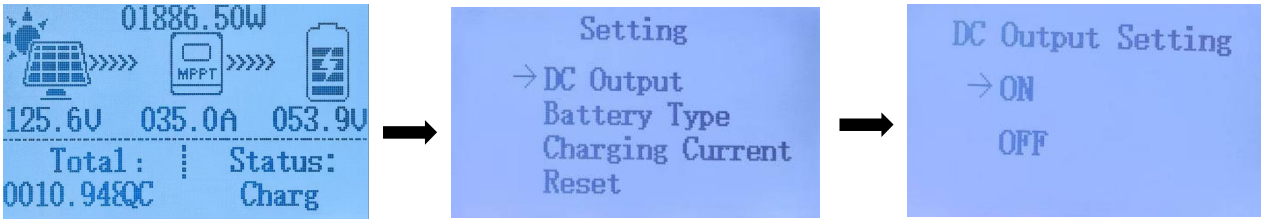

Figure 7 Flow Chart of DC Output Setting

3.3.2 Battery Type Settings

Before leaving the factory, the controller is set to lead-acid battery and automatically recognize battery voltage by default. The selection of various battery parameters is as follows, please choose according to the system configuration.

Battery Type	Parameter Settings
lead-acid battery	Automatic recognition/12V/24V/36V/48V/60V/72V/84V/96V
colloid battery	12V/24V/36V/48V/60V/72V/84V/96V
lithium iron phosphate	3.2V * N string (N=2~45)
Ternary Lithium Battery	3.7V * N string (N=2~45)
user-defined	Floating charge voltage, average charge voltage, discharge limit

Battery Type and Parameter Setting Options Explanation Table

3.3.3Steps for setting battery types

In the default main interface state, pressthe SET button for 3 seconds to enter the settings interface; Press the UP or DOWN button to select the battery type setting, short press the SET button to enter the battery type setting interface; Press the UP or DOWN key to select the battery type based on the system; Press the SET button again to enter settings; After setting up, press the SET button for 3 seconds to confirm the modification.

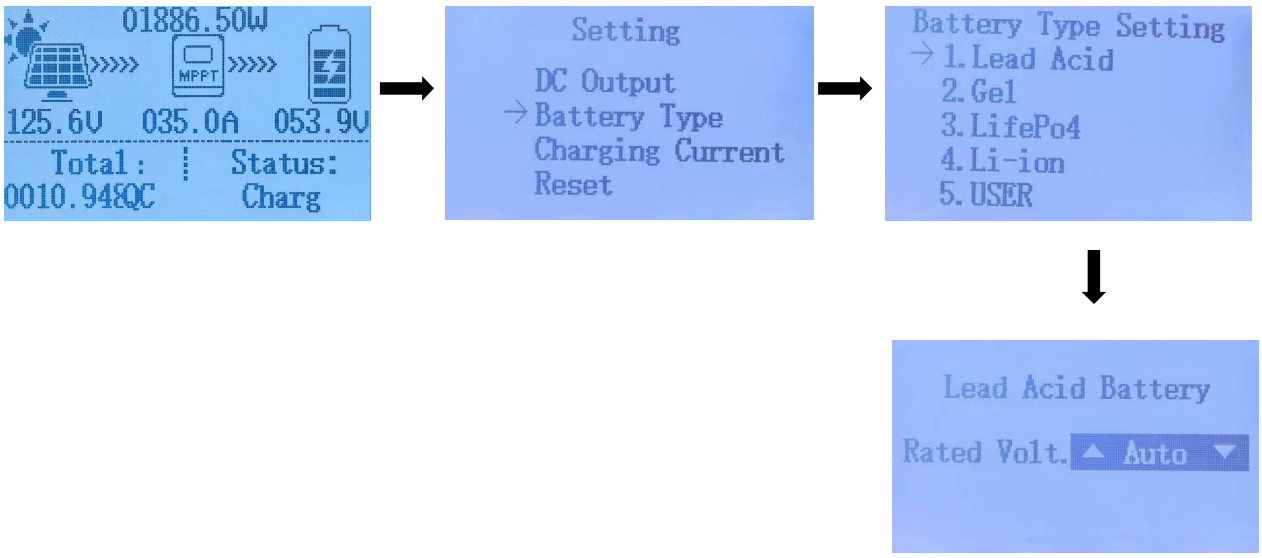

Figure 8 Battery Type Setting Process Diagram

Parameter adjustment interface for various types of batteries (as shown in step 4 of flowchart 8)

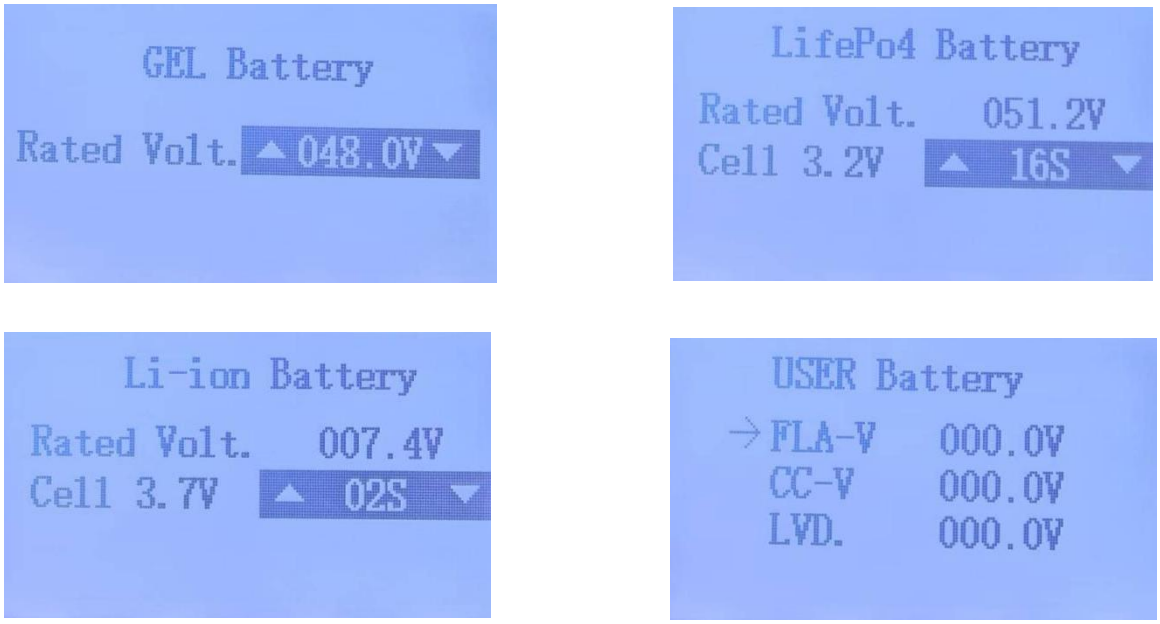

Figure 9 Interface diagram for parameter settings of various battery types

Note: Refer to Figure 8 for the process of setting up various types of batteries. For adjusting battery parameters, refer to the optional parameters in the option table. Lead acid batteries are generally automatically recognized by default, and corresponding battery voltages can also be set. Colloidal batteries are set to corresponding battery voltages, while lithium iron phosphate batteries and ternary lithium batteries are set to corresponding cell numbers (voltage can refer to the voltage of the lithium battery pack).

Other settings are customized. If necessary, strictly follow the requirements of the battery manufacturer to avoid battery and equipment damage.

3.3.4Charging current setting steps

In the default main interface state, press the SET button for 3 seconds for 3 seconds to enter the settings interface; Press the UP or DOWN button to select the charging current setting, press the SET button to enter the charging current setting interface; Press the UP or DOWN button to adjust the charging current; Long press the UP or DOWN key to quickly adjust parameters, short press to adjust the precision parameter settings, and then press the SET button for 3 seconds to confirm the modifications.

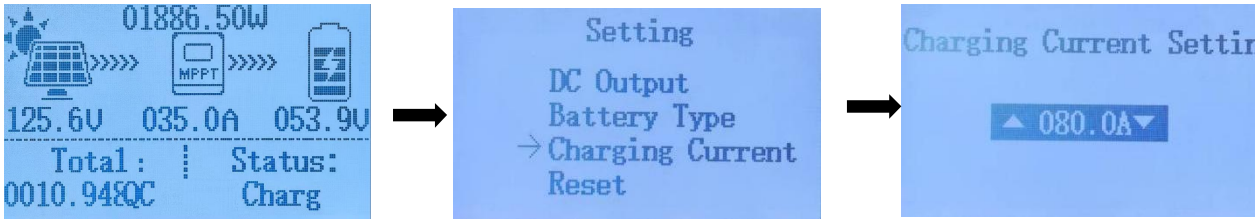

Figure 10 Battery current setting flowchart

3.3.5Steps for restoring factory settings

In the default main interface state, press the SET button for 3 seconds to enter the settings interface; Press the UP or DOWN button, select 'Restore Factory Settings, press the SET button for 3 seconds to enter the' Restore Factory Settings' interface; Press the UP or DOWN key, select to restore factory parameters (default lead-acid battery, automatic recognition) or reset power generation, and switch languages; After setting up, press the SET button for 3 seconds to confirm the modification.

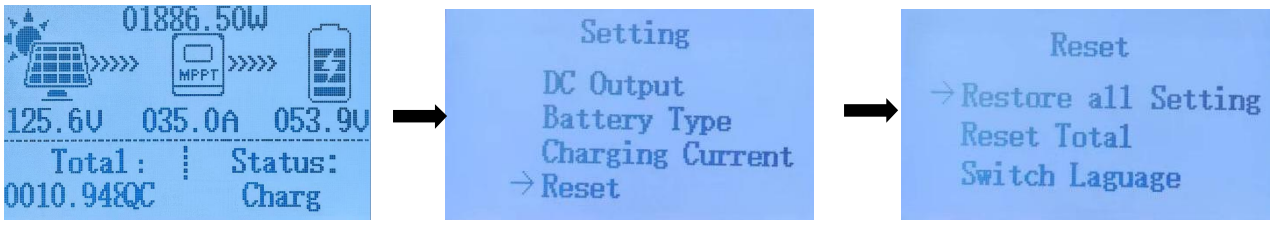

Figure 11 Battery current setting flowchart

Chapter4 Controller Faults and Handling Methods

Fault phenomenon	Possible reasons	Solution measures
The machine is connected to the battery, but the LCD does not display 示	Battery reversed or electrified Pool damage	Check the circuit or replace the power 池
Fault indicator lights up, LCD displays DC load overcurrent	DC load exceeds rated current	Reduce DC load power
Fault indicator lights up, LCD displays Module overheating	Internal overheating of the machine	Wait for the machine to cool down before connecting Photovoltaic board
Fault indicator lights up, LCD displays High photovoltaic input	High voltage of photovoltaic panel	Check the voltage of the photovoltaic panel Is it too high
Fault indicator lights up, LCD displays Low photovoltaic input	Low voltage of photovoltaic panel	Check the voltage of the photovoltaic panel Is it too low
Photovoltaic panel connected, but not displayed Photovoltaic panel voltage	Inverted connection or abnormal wiring of photovoltaic panels	Check the circuit

Chapter5 Technical Parameters of Controller

Model		IGE-MT-40A	IGE-MT-60A	IGE-MT-80A	IGE-MT-100A
PV Input Parameters					
Max.input voltage		150V.dc	150V.dc	200V.dc	200V.dc
Start voltage		≥12V			
DC output Parameters					
Rated charging current		40A	60A	80A	100A
Rated load current		20A	30A	40A	40A
Max.output power	12V	480W	720W	960W	1200W
	24V	960W	1440W	1920W	2400W
	48V	1920W	2880W	3840W	4800W
	60V	2400W	3600W	4800W	6000W
	72V	2880W	4320W	5760W	7200W
	96V	/	/	7680W	9600W
Applicable battery types		Lead acid batteries, colloidal batteries, lithium iron phosphate, ternary lithium, custom			
Charging method		Three stagecharging: constant charging, equalization charging, float charging			

Basic Parameters				
Efficiency	≥97%	≥97%	≥97.2%	≥97.5%
Empty consumption	2-4W			
System charging voltage	Automatic recognition/manual adjustment			
Cooling method	Smart fan			
Load control mode	Normally open or normally closed mode			
display mode	LCD			
language	English			
Communication method	RS485			
protection function	DC overload protection, input/output overvoltage protection, anti reverse connection protection, high temperature protection			
Additional features	Lithium battery activation function, charging temperature compensation function			
Working environment temp	-20℃~50℃			
Product dimensions	295*206*95		348.5*222*105mm	
Package dimensions	355*280*170		420*300*185mm	
Gross weight	3kg	3.5kg	4.5kg	5kg

Note: The above parameters are for reference only. Our company may modify the parameters according to the actual needs of the product. Printed materials may not be able to be changed in a timely manner, and the actual product shall prevail.

warranty

Warranty Policy:

Warranty period: We provide IGE-MT series MPPT controller with a 12-month warranty period.

Warranty period starts from the date of receiving the goods from our dealer.

Warranty evidence: Product serial number and local distributor's shipping invoice

Attention: If the customer does notprovide the shipping invoice and other documents, we will use one month after the factory delivery date as the starting time for the warranty period.

Scope: Any damage that occurs during the warranty period will be evaluated and determined by the dealer and us to determine its scope.