EPsolar

iTracer Series

—— Maximum Power Point Tracking

Solar Charge Controller

OPERATION MANUAL

Thank you very much for selecting our product!

This manual offers important information and suggestion about installation, use and troubleshooting, etc. Please read this manual carefully before using the product and pay attention to the safety recommendations in it.

iTracer Series

—— Maximum Power Point Tracking Solar Charge Controller

Models:

IT3415ND/IT4415ND/IT6415ND

Final interpretation right of the manual belongs to EPsolar.
Any changes without prior notice!

Contents

1.0 Important Safety Information

This manual contains important safety, installation and operating instructions for the iTracer Series MPPT solar controller. Save these instructions.

The following symbols are used throughout this manual to indicate potentially dangerous conditions or mark important safety instructions.

WARNING: Indicates a potentially dangerous condition. Use extreme caution when performing this task.

CAUTION: Indicates a critical procedure for safe and proper operation of the controller.

NOTE: Indicates a procedure or function that is important for safe and proper operation of the controller.

General Safety Information

- Read all of the instructions and cautions in the manual before installation.
- There are no user serviceable parts inside the controller. Do not disassemble or attempt to repair the controller.
- Mount the controller indoors. Prevent exposure to the elements and do not allow water to enter the controller.
- Install iTracer controller in well ventilated places, the iTracer controller heatsink may become very hot during operation.
- Install external fuses/breakers as required.
- Disconnect the solar module, load and fuse/breakers near to battery before installing or adjusting the controller.
- Power connections must remain tight to avoid excessive heating from a loose connection.

2.0 General Information

2.1 Overview

Thank you for selecting the iTracer Series MPPT solar controller. The controller is a high-end industrial class product based on multiphase synchronous rectification technology and has the features of high efficiency and reliability. The features are listed below:

- 12V/24V/36V/48V Voltage DC systems.
- Smart tracking algorithm that finds and maintains operation at the solar array peak power point with the tracking efficiency as high as 99.7%.
- Multiphase synchronous rectification technology ensures peak conversion efficiency is up to 98.7%.
- High effective conversion efficiency at small power charging with multiphase power decentralized control and improves the generated energy.
- Double processors architecture with high speed and performance improves the response speed and optimizes the performance of the system.
- Multiphase control technology, optimizes charging current smoothness, reduces ripple and improves the system generating efficiency.
- Excellent EMC design.
- Excellent heat dissipation. Using the integration of cast aluminum radiator shell, the controller can be natural cooling.
- 128*64 dot-matrix LCD intuitively displays data and state, 6 buttons combinations for easy operation.
- RS-232, CAN, RS-485 ports via the open standard Modbus protocol are supported to meet different occasion of demand.
- Support 4 charging preprogram options: Sealed, Gel, Flooded and User-defined.
- Several load control methods are supported to convenient for different demand.
- Protection: Over temperature, over charging, PV and load short, PV (battery) revered, PV reverse current protect at night, over current protection.
- Actual Power Display and record function make convenience to check the datum every day, every month and every year.
- Log function: work logs and alarm logs are all recorded.
- Firmware update: convenience to after-service and maintenance service.

The controller features a built-in fuzzy control algorithm that maximizes the energy from the solar module(s) and charge the battery.

The battery charging process has been optimized for long battery life and improved system performance. The comprehensive self-diagnostics and electronic protection

functions can prevent damage from installation mistakes or system faults.
Please take the time to read this operation's manual and become familiar with the controller. This will help you make full use of all the functions and improve your PV system.

2.2 Models & Parameters

Maximum 150 Volt dc systems******

RS-232, RS-485 and CAN port

IT3415ND

- ✓ Rated charge/discharge current 30A
- ✓ PV input Max.Power 1600W
- ✓ 12V/24V/36V/48V system voltage and auto work *

IT4415ND

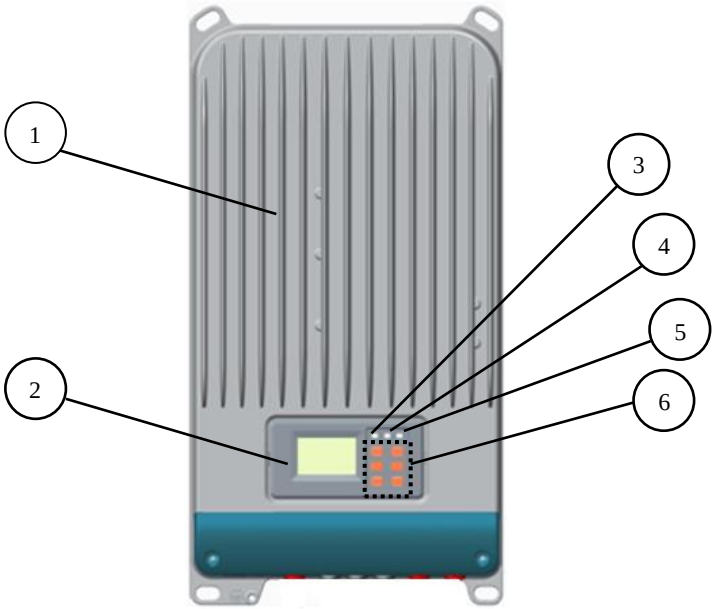
- ✓ Rated charge/discharge current 45A
- ✓ PV input Max.Power 2400W
- ✓ 12V/24V/36V/48V system voltage and auto work *

IT6415ND

- ✓ Rated charge/discharge current 60A
- ✓ PV input Max.Power 3200W
- ✓ 12V/24V/36V/48V system voltage and auto work *

** The "auto work" setting allows the controller to detect the system voltage automatically on start up.*
*** Array voltage should never exceed maximum PV input voltage. Refer to the solar module documentation to determine the highest expected array Voc (open circuit voltage) as defined by the lowest expected ambient temperature for the system location.*

2.3 Characteristics



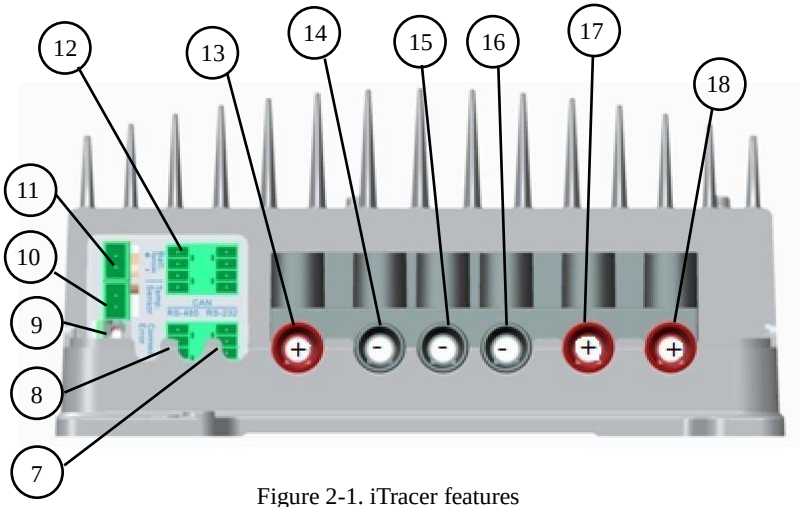


Figure 2-1. iTracer features

1 – Heat Sink

Aluminum heat sink to dissipate controller heat.

2 – LCD

Display the status and data.

3 – Battery LED indicator

Three states of battery LED indicator show charging status.

4 – Charging LED indicator

Indicate that the battery is charging or not.

5 – Fault LED indicator

Indicate that controller faults.

6 – Buttons

Browse or modify all parameters.

7 – RS-232 port

Monitor controller by PC and update controller software.

8 – RS-485 port

Monitor controller by PC and update controller software.

9 –RTC battery

Power to RTC, battery model is CR2032.

10 – Remote Temperature Sensor port(MC1.5-5.08-2L)

Connection for a RTS (Remote Temperature Sensor, optional) to remotely monitor battery temperature.

11 – Remote Battery Voltage Sensor port(MC1.5-5.08-2L)

Connection for RBVS (Remote Battery Voltage Sensor) to provide accurate battery voltage measurement.

12 – CAN bus port(MC1.5-3.81-4L)

Communicate with other CAN BUS devices via our company custom protocol.

13 – Solar Positive Terminal ⊕

Power connection for Solar Positive Terminal ⊕.

14 –Solar Negative Terminal ⊖

Power connection for Solar Negative terminal ⊖.

15 –Load Negative Terminal ⊖

Power connection for Load Negative terminal ⊖.

16 –Battery Negative Terminal ⊖

Power connection for Battery Negative terminal ⊖.

17 –Battery Positive Terminal ⊕

Power connection for Battery Positive Terminal ⊕.

18 –Load Positive Terminal ⊕

Load connection for Load Positive Terminal ⊕.

2.4 Accessories

Remote Temperature Sensor (Model:RTS300R10K5.08A)

Acquiring of battery temperature for undertaking temperature compensation of control parameters, the standard length of the cable is 3m (length can be customized). The RTS300R10K5.08A connects to the MC1.5-5.08-2L port (10^{th}) on the controller.

Note: unplug the RTS, the temperature of battery will be set to a fixed value 25 ℃.

USB To RS-485 converter (Model:CC-USB-RS485-150U-3.81)

the USB To RS-485 converter is used to monitor each controller on the network using EPsolar Station PC software and update the firmware. The length of cable is 1.5m. The CC-USB-RS485-150U-3.81 connects to the MC1.5-5.08-2L port (8^{th}) on the controller.

3.0 Installation Instructions

3.1 General Installation Notes

- Read through the entire installation section first before beginning installation.
- Be very careful when working with batteries. Wear eye protection. Have fresh water available to wash and clean any contact with battery acid.
- Use insulated tools and avoids placing metal objects near the batteries.
- Explosive battery gases may be present during charging. So well ventilation of battery box is recommended.
- Avoid direct sunlight and do not install in locations where water can enter the controller.
- Ventilation is highly recommended if mounted in an enclosure. Never install the iTracer in a sealed enclosure with flooded batteries! Battery fumes from vented batteries will corrode and destroy the iTracer circuits.
- Loose power connections and/or corroded wires may result in resistive connections that melt wire insulation, burn surrounding materials, or even cause fire. Ensure tight connections and use cable clamps to secure cables and prevent them from swaying in mobile applications.
- Gel, Sealed or Flooded batteries are recommended, other kinds please refer to the battery manufacturer.
- Battery connection may be wired to one battery or a bank of batteries. The following instructions refer to a singular battery, but it is implied that the battery connection can be made to either one battery or a group of batteries in a battery bank.
- Multiple same models of controllers can be installed in parallel on the same battery bank to achieve higher charging current. Each controller must have its own solar module(s).
- Select the system cables according to $3A/mm^2$ or less current density.

3.2 Mounting

NOTE: The iTracer controller requires at least 150mm of clearance above and below for proper air flow. Ventilation is highly recommended if mounted in an enclosure.

WARNING: Risk of explosion! Never install the iTracer in a sealed enclose with flooded batteries! Do not install in a confined area where battery gas can accumulate.

Step1: Choose a Mounting Location

Place the iTracer controller on a vertical surface protected from direct sunlight, high temperatures, and water.

Step2: Check for Clearance

Place the iTracer in the location where it will be mounted. Verify sufficient room to run wires and sufficient room above and below the controller for air flow.

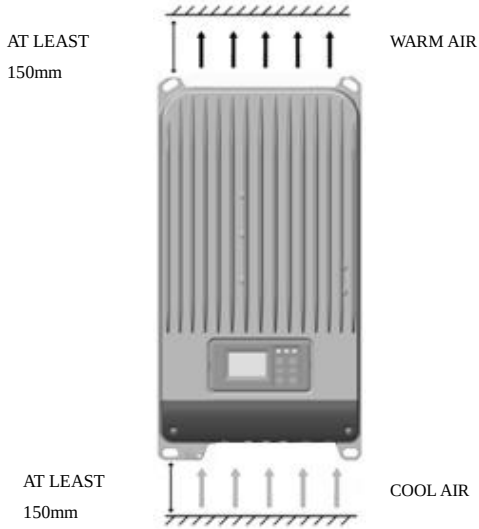


Figure3-1 Required mounting clearance for air

Step3:Mark Holes

Mark the four (4) mounting hole locations on the mounting surface.

Step 4: Drill Holes

Remove the controller and drill four sizeable holes at the marked locations.

Step 5: Secure the Controller

Place the controller on the surface and align the mounting holes with the drilled holes in step 4. Secure the controller in place using the mounting screws.

3.3 Wiring

NOTE: A recommended connection order has been provided for maximum safety during installation.

NOTE: Do not entangle all wiring together. Communication cable and power wires should be as far as possible to avoid interfering communication signal transmission.

NOTE: The iTracer is a negative ground controller. Any negative connection of solar, load or battery can be earth grounded as required.

CAUTION: For mobile applications, be very certain that all wirings are connected securely. Use cable clamps to prevent cables from swaying when the vehicle is in motion. Unsecured cables create loose and resistive connections which may lead to excessive heating and/or fire.

Step 1: Remote Temperature Sensor Connection (RTS300R10K5.08A)

CAUTION: The controller will perform temperature compensation for charging parameters according to the device temperature.

CAUTION: Equipment Damage! Never place the temperature sensor inside a battery. Both the RTS300R10K5.08A and the battery will be damaged.

The included remote temperature sensor RTS300R10K5.08A is recommended for effective temperature compensated charging. Connect the RTS300R10K5.08A to the10th port (MC1.5-5.08-2L) on the controller (see figure 2-1). The cable standard length is 3 meters and could be customized. There is no polarity, so either wire (+ or -)

can be connected to either screw terminal. No damage will result if connect the RTS300R10K5.08A to the remote battery voltage sense port, but the connection will not be recognized.

Step 2: Remote Battery Voltage Sensor Connection

NOTE: When connecting Remote Battery Voltage Sensor, please pay attention to '+' and '-' (see figure 2-1).

CAUTION: Be careful when installation. Please never plug the voltage sensor wires into to the RTS300R10K5.08A terminals (10th Port). This will cause an alarm or damage the controller.

The voltage at the battery terminals on the controller may differ slightly from the real battery voltage due to connection and cable resistance. The remote battery voltage sensor will enable the controller to detect the battery voltage more exactly and avoid voltage deviation. The battery voltage sensor connection is not required to operate the controller, but it is recommended for the best performance.

The voltage sensor wires should be cut into the length as required. The wire size can range from 0.25 to 1.0 mm^2 (24 to 16 AWG). Maximum length is 3m. Connect the remote battery voltage sensor wires to the 11th port (MC1.5-5.08-2L) on the controller (see figure 2-1). A twin-cord cable is recommended but not required.

Please be careful to '+' and '-' when connecting. No damage will result if the polarity is reversed, but the controller can't read a reversed sensor voltage. Plugging the voltage sensor wires into to the RTS300R10K5.08A terminals (10th Port) will cause an alarm or damage the controller

Step 3: Communicate Connection

WARNING: Shock Hazard! Should not be any communication cables and power lines intertwined. Separate them as far as possible to void electric shock.

There are three kinds of communication: RS-232, RS-485 and CAN BUS. Please use

matching communication cables and make sure the cables are connected firmly during data transmitting: the below features are supported with communication interface:

1) Monitor each controller on the network using EPsolar Station PC software; update the firmware;
2) Communicate with other module(s) made by EPsolar company with CAN bus;

- **RS-232, RS-485 Connection:**

The series port on iTracer controller is a standard 3.81-4P port. See figure 2.1 for the port location. The RS-232 port is 7th port and the RS-485 port is 8th port on the controller.

- **CAN connection:**

The CAN bus port is a standard MC1.5-3.81-4L connector. Refer to 12th port on the controller in the figure 2-1.

Step 4: Connect the Power Wires

CAUTION: Risk of electric shock! Use fuses or breakers in solar, load and battery circuits is recommended, and make them keep OFF state before connection.

WARNING: Risk of electric shock! Exercise caution when handling solar wiring. The solar PV array can produce open-circuit voltages in excess of 100 Vdc when in sunlight. Pay more attention for it.

WARNING: Risk of explosion or fire! Never short circuit battery Positive (+) and negative (-) or cables. Pay more attention for it

- **Battery Connection**

Connecting a fuse in series through battery positive (+) in the circuit and the battery circuit fuse must be 1.25 to 2 times of the rated current. Keep OFF before connection. Connect battery positive (+) and negative (-) to battery terminals on the controller in the figure 2-1. Please pay much attention to '+' and '-'.

- **Solar Module(s) Connection**

Connecting a breaker in series in the solar circuit is recommended, and the breaker must be 1.25 to 2 times of the rated current. Keep OFF before connection. Connect solar positive (+) and negative (-) to solar terminals on the controller in the figure 2-1. Please

pay much attention to '+' and '-'.

Solar array short circuit protection and the reversed polarity connection will trigger automatically.

- **Load Connection**

Connecting a breaker in series in the load circuit is recommended, and the breaker must be 1.25 to 2 times of the rated current. Make it keep OFF state before connection. Connect load positive (+) to 18th port and negative (-) to 15th port on the controller in the figure 2-1. Please pay much attention to '+''-' and confirm the cable is connected tightly and right.

Load short circuit protection and the reversed polarity connection will trigger automatically.

Step 5: Power-Up

NOTE: The controller is only powered by battery, so it will not work when only connecting to solar input.

- Confirm that all connections are correct especially the Solar, Battery and load polarities.
- Turn the battery disconnect switch on first. Observe that the LED's indicate a successful start-up (refer to section 4.0).
- Turn the solar disconnect on. If the solar array is in full sunlight, the charging LED will blink and the controller will begin charging.
- If the battery LED error exists or LCD interface alarms, refer to section 5.0 for troubleshooting.

WARNING: Disconnect the battery will produce interference to the load when the controller is work at charging.

WARNING: Don't do the battery reversed polarity test within 10 minutes after power off.

4.0 Operation

4.1 MPPT Technology

The iTracer utilizes Maximum Power Point Tracking technology to extract maximum power from the solar array. The tracking algorithm is fully automatic and does not require user adjustment. iTracer technology will track the array maximum power point voltage (Vmp) as it varies with weather conditions, ensuring that maximum power is harvested from the array through the course of the day.

Current Boost

In many cases, iTracer MPPT technology will 'boost' the solar charge current. For example, a system may have 8 Amps of solar current flowing into the iTracer and 10 Amps of charge current flowing out to the battery. The iTracer does not create current! Rest assured that the power into the iTracer is the same as the power out of the iTracer. Since power is the product of voltage and current (Volts×Amps), the following is true*:

(1) Power Into the iTracer =Power Out of the iTracer

(2) Volts In×Amps In=Volts Out×Amps Out

* Assuming 100% efficiency. Actually, the losses in wiring and conversion exist.

If the solar module's Vmp is greater than the battery voltage, it follows that the battery current must be proportionally greater than the solar input current so that input and output power are balanced. The greater the difference between the maximum power voltage and battery voltage, the greater the current boost. Current boost can be substantial in systems where the solar array is of a higher nominal voltage than the battery.

An Advantage Over Traditional Controllers

Traditional controllers connect the solar module directly to the battery when recharging. This requires that the solar module operate in a voltage range that is below the module's Vmp. In a 12V system for example, the battery voltage may range from 11 to 15Vdc but

the module's Vmp is typically around 16 or 17V.

Figure 4-1 shows a typical current VS. voltage output curve for a nominal 12V off-grid module.

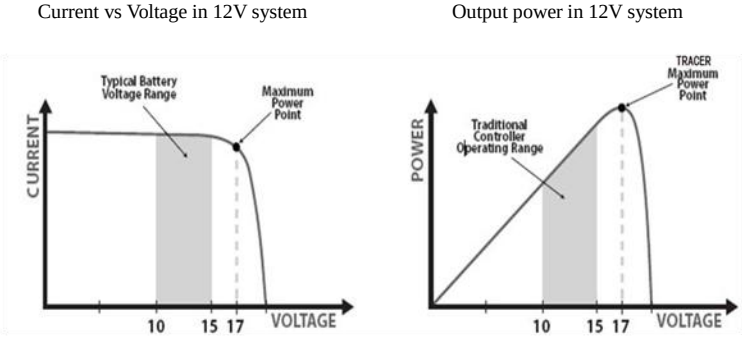


Figure 4-1 Nominal 12V solar module I-V curve and output power graph

The array Vmp is the voltage where the product of current and voltage (Amps×Volts) is greatest, which falls on the 'knee' of the solar module I-V curve as shown in Figure4-1. Because Traditional controllers do not operate at the Vmp of the solar modules(s), energy is wasted that could otherwise be used to charge the battery and power system loads. The greater the difference between battery voltage and the Vmp of the module, the more energy is wasted.

iTracer MPPT technology will always operate at the Vmp resulting in less wasted energy compared to traditional controllers.

Conditions That Limits the Effectiveness of MPPT

The Vmp of a solar module decreases as the temperature of the module increases. In very hot weather, the Vmp may be close or even less than battery voltage. In this situation, there will be very little or no MPPT gain compared to traditional controllers. However, systems with modules of higher nominal voltage than the battery bank will

always have an array Vmp greater than battery voltage. Additionally, the savings in wiring due to reduced solar current make MPPT worthwhile even in hot climates.

4.2 Battery Charging Information

The iTracer has a 4 stages battery charging algorithm for rapid, efficient, and safe battery charging.

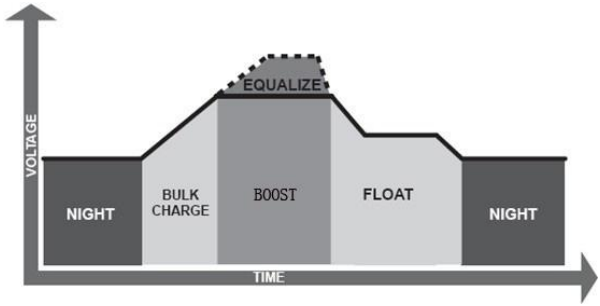


Figura4-2 iTracer charging algorithm

- **Bulk Charge**

In this stage, the battery voltage has not yet reached boost voltage and 100% of available solar power is used to recharge the battery.

- **Boost Charge**

When the battery has recharged to the Boost voltage setpoint, constant-voltage regulation is used to prevent heating and excessive battery gassing. The Boost stage remains for some time and then goes to Float Charge. Every time when the controller is powered on, if it detects neither over discharged nor overvoltage, the charging will enter into boost charging stage.

- **Float Charge**

After the Boost voltage stage, iTracer will reduce the battery voltage to float voltage setpoint. When the battery is fully recharged, there will be no more chemical reactions and all the charge current transmits into heat and gas at this time. Then the iTracer

reduces the voltage to the floating stage, charging with a smaller voltage and current. It will reduce the temperature of battery and prevent the gassing and charge the battery slightly at the same time. The purpose of Float stage is to offset the power consumption caused by self consumption and small loads in the whole system, while maintaining full battery storage capacity.

Once in Float stage, loads can continue to draw power from the battery. In the event that the system load(s) exceed the solar charge current, the controller will no longer be able to maintain the battery at the Float setpoint. Should the battery voltage remain below the Boost Return Voltage; the controller will exit Float stage and return to Bulk charging.

- **Equalize**

WARNING: Risk of explosion!

Equalizing flooded battery would produce explosive gases, so well ventilation of battery box is recommended.

NOTE: Equipment damage!

Equalization may increase battery voltage to the level damaging to sensitive DC loads. Verify that all load allowable input voltages are greater 11% than the equalizing charging set point voltage.

NOTE: Equipment damage!

Over-charging and excessive gas precipitation may damage the battery plates and activate material shedding on them. Too high and equalizing charge or for too long may cause damage. Please carefully review the specific requirements of the battery used in the system.

Certain types of batteries benefit from periodic equalizing charge, which can stir the electrolyte, balance battery voltage and complete chemical reaction. Equalizing charge increases the battery voltage, higher than the standard complement voltage, which gasifies the battery electrolyte.

The controller will equalize the battery on 28th each month. The constant equalization

period is 0~180 minutes. If the equalization isn't accomplished in one-time, the equalization recharge time will be accumulated until the set time is finished. Equalize charge and boost charge are not carried out constantly in a full charge process to avoid too much gas precipitation or overheating of battery.

NOTE: When the sunshine is weak and Charging current is less than 1.5Amps, the controller couldn't fully follow the maximum power tracking. Therefore, don't evaluate in that condition.

4.3 LED Indication

Charging LED

Indicator	Status
Green Blink	Charging
Green OFF	No charging

Battery LED

Indicator	Status
Green ON	Normal
Green slow blink	Full
Orange ON	Under voltage warning
Red ON	Low voltage disconnect
Red Blink	Battery over temperature
Green fast blink	High volt disconnect

Fault LED

Indicator	Status
Red OFF	Normal
Red Blink	Current abnormal
	Overload load short

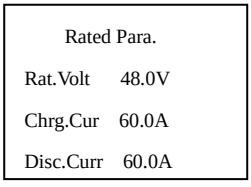
Indicator	Fault Status
Blink（Battery LED in Red）	Work voltage error
Blink(Battery LED in Orange)	Controller over temperature

4.4 LCD Display & Operation

➢ **Initialization**

LCD will paint the picture as shown on the left as soon as it is powered on. It indicates that initialization is normal when the interface goes automatically to the Rated Info interface.

➢ **Rated Info**



Rated info of the controller will be displayed. Monitor interface will be switched after 3 seconds.

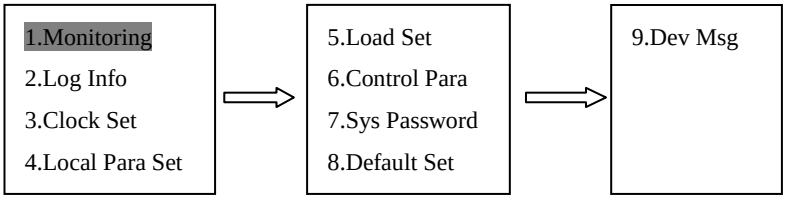
➢ **Main Menu**

Click ESC button to return main menu in any monitoring interface.

There are 9 interfaces for monitoring, as shown in the below picture.

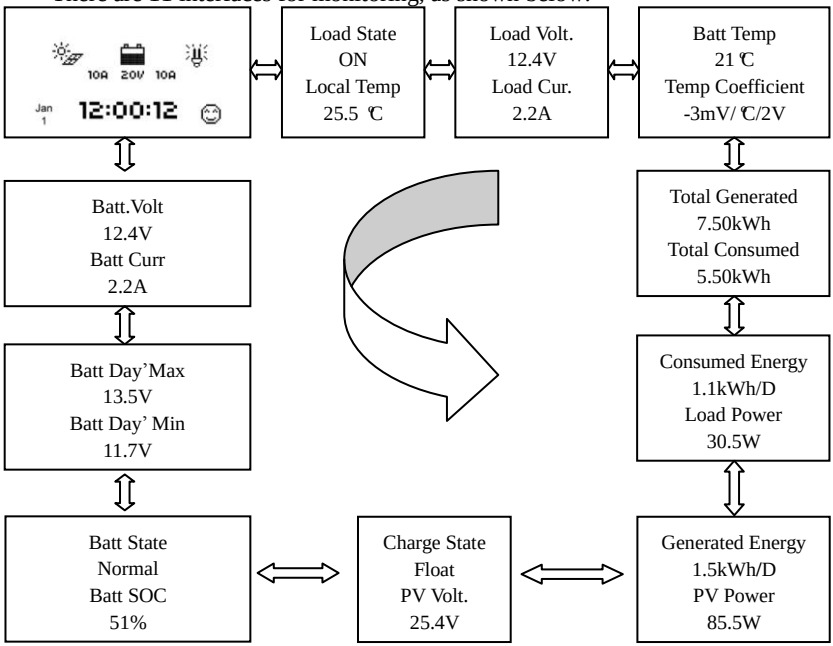
Press ↑ ↓ button to move inverse cursor among 9 menus.

Press OK to enter corresponding interface.



➢ **Monitor**

There are 11 interfaces for monitoring, as shown below:



Press OK to enter the monitoring interface when the inverse cursor point to monitor item.

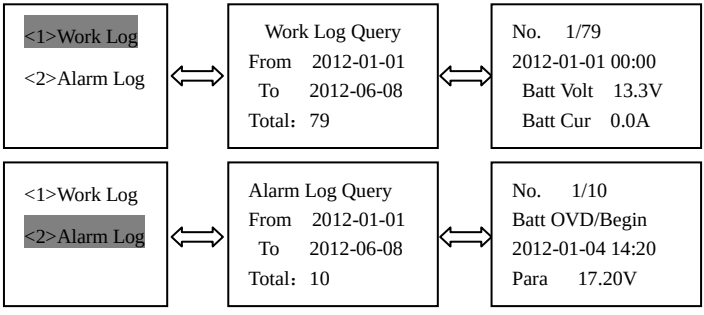
The parameters in monitoring interface are only for browse.

Press ↑ ↓ button to browse the parameters interfaces in turns. There are 5 battery status: Normal, UVW(Under voltage warning), LVD(Low voltage disconnect),

Over Voltage, Over Temperature and 4 charging stages: no charging, equalized, boost, float. The load status has only ON or OFF status.

- **Log Info**

There are two items of log record as shown blew.



Press OK to enter the monitoring interface when the inverse cursor point to monitor item. Press ESC button to exit. Work Log and Alarm Log could be browsed in this interface, the operation is as follows:

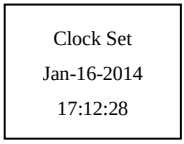
Press OK to enter the Work Log or Alarm Log interface respectively when the item is chosen in inverse. Press OK again to enter the Edit Mode. Use ↑ or ↓ button to move the cursor between the time parameters and data bit. Use + - button to modify the value and set the period of log for browse. When the period is set, press OK to enter the corresponding details.

Log Number, time, the voltage and current of battery are included in every work log item and are shown in the Work Log interface.

warning event sequence number, warning event, start or end time, the fault status and values are all included in every event log item and are shown in the Alarm Log interface.

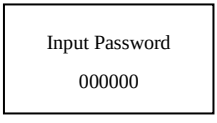
➢ **Clock Set**

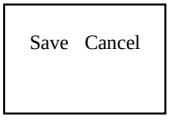
The interface of Clock Set is shown as follow:

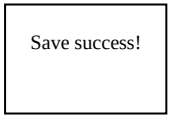


Press OK to enter the Clock Set interface when the inverse cursor point to Clock Set item. Press ESC button to exit.

Date and Time can be adjusted in this interface. Press OK and input the 6 digit user password and then Date and Time could be adjusted. The format of date is YYYY-MM-DD; the one of time is HH-MM-SS. When the set is over, press OK to save or press ESC button to cancel. "save success!" will be promoted if adjusted and save operated successfully.



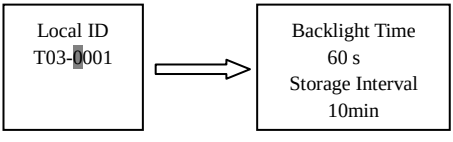




NOTE： The log after the current time will be erased when the clock has be adjusted.

➢ **Device Parameter**

There are 3 interfaces about device parameter as shown blew:



Press OK to enter the Device Parameter interface when the inverse cursor point to Device Para item. Press ESC button to exit.

You should input the user password (see above) before setting the parameters.

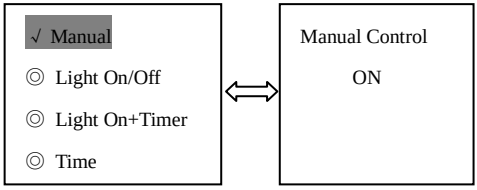
The first interface shows the 4-digit controller's ID in networking and keeps the ID number unique in the networking or PC software or other device(s) couldn't search it.

The 2nd interface shows the backlight time. The range is from 1 to 90 seconds (60seconds default). "–"means that the backlight is never off. The interval log is from 1 to 30 minutes (10minutes default).

➢ **Load Mode**

Press OK to enter the Load Mode interface when the inverse cursor points to Load Mode item. Press ESC button to exit. Load Mode can be set through each menu item respectively.

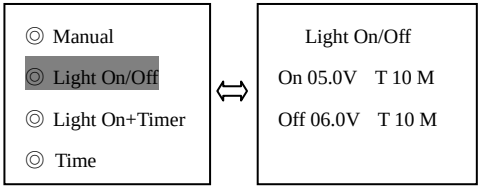
Manual(default)



the default load output can be set ON/OFF in this interface. Parameters in the table below:

Parameter	Detail
ON	The load will open automatically after the controller is initialized. If the battery power is enough and the controller works well, load will keep open
OFF	The load will keep off after the controller is initialized. Only when open load manually, load can be output. If the battery power is enough and the controller works well, load will keep open

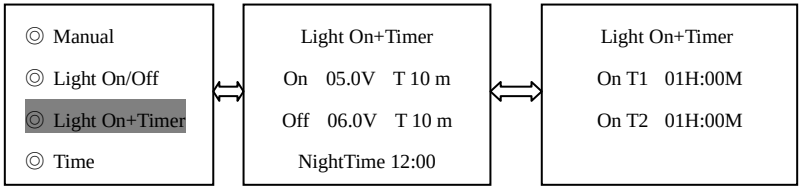
Light On/Off



Load control mode can be set to light control in this interface. Parameters in the table below:

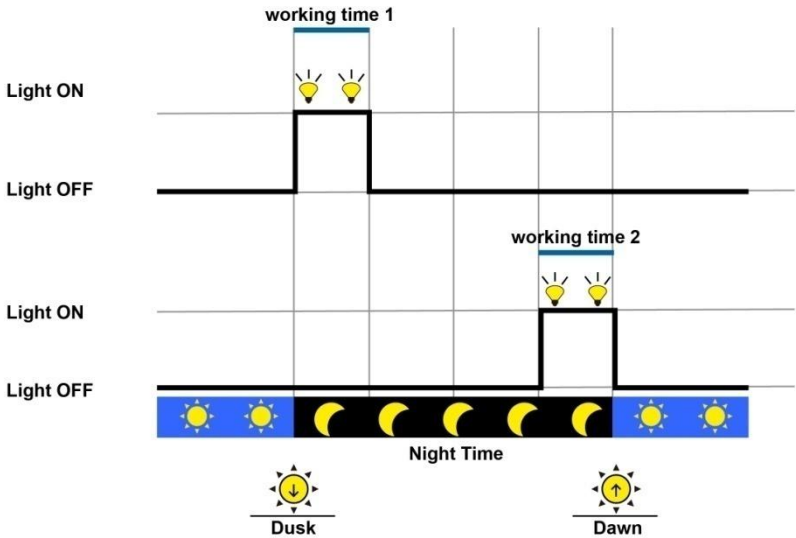
Parameter	Detail
Night Time Threshold Voltage	When solar module voltage goes below the point of NTTV (Night Time Threshold Voltage), the solar controller will recognize the starting voltage and turn on the load after pre-set time delay when the battery power is enough and the controller works well
Day Time Threshold Voltage	When solar module voltage goes above the point of DTTV (Day Time Threshold Voltage), the solar controller will recognize the starting voltage and turn off the load after pre-set time delay
Delay time	Solar energy confirms delay time. If the solar energy meets the condition to the action, it will be execute. The range of delay time value is 0 to 99 minutes

Light On+Timer

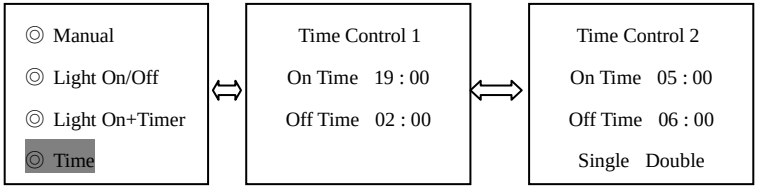


Load control mode can be set to light + time control in this interface. Parameters in the table below:

Parameter	Detail
Working Time 1	The open time of load in the light mode after dusk
Working Time 2	The open time of load in the light mode before dawn
Night time	The controller calculated the total length of the night by self-learning. The time should be more than 3 hours



Time

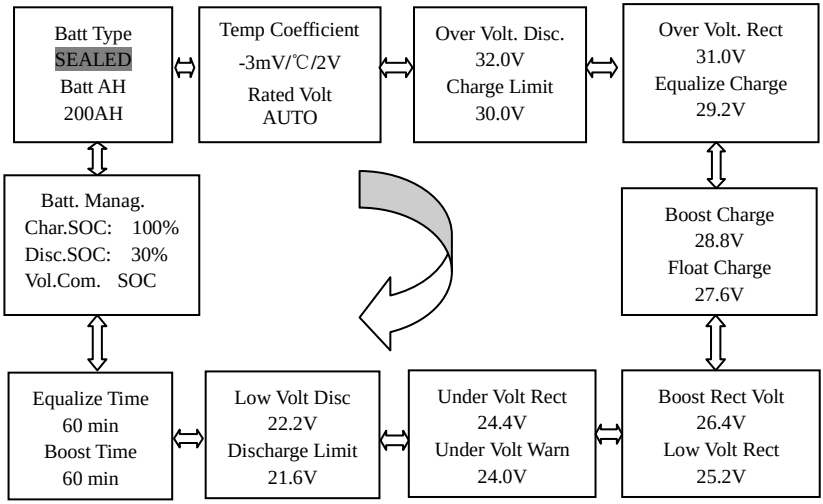


Load control mode can be set to time control in this interface. Parameters in the table below:

Parameter	Detail
Time Control 1	Set the begin and end time 1 of the load output
Time Control 2	Set the begin and end time 2of the load output
Single	The load output according to time1
Double	The load output according to time1 and time2

➢ **Control Parameter**

Press OK to enter the Device Parameter interface when the inverse cursor point to Control Para item. Press ESC button to exit. There are 10 interfaces for 'Control Parameters' as shown below.



You should input the user password(see above) before setting the parameters. In setting mode, all the parameters can be modified. And will immediately effect when saved. The detail and value range of control parameter are shown in the tables below:

Battery Charging Setting

Battery Type	Note
Sealed (default)	Constant value
GEL	Constant value
flooded	Constant value
User	Defined by user

Battery Charging Mode

Charging Mode	Note
Voltage Compensate	Controlled by voltage(default)
SOC	SOC mode, controlled by SOC charging or discharging value

Others

Parameter	Default value	Range
Battery capacity	200Ah	1~9999Ah
Temperature compensate coefficient	-3mV/℃/2V	-9~0mV
Rated system voltage	Auto	Auto/12V/24V/36V/48V
Precent of charging	100%	100% constant value(SOC charging mode)
Precent of discharging	30%	10~80% (SOC charging mode)

Battery Control Parameters

All the coefficient is referred to 25℃, and twice in 24v system rate, triple in 36v system rate and quadruple in 48v system rate.

Battery Type	Gel	Sealed	Flooded	User
High Volt Disconnect	16V	16V	16V	9~17V
Charging limit voltage	15V	15V	15V	9~17V
Over Voltage Reconnect	15V	15V	15V	9~17V
Equalization voltage	——	14.6V	14.8V	9~17V
Boost voltage	14.2V	14.4V	14.6V	9~17V
Float voltage	13.8V	13.8V	13.8V	9~17V
Boost return voltage	13.2V	13.2V	13.2V	9~17V
Low voltage reconnect	12.6V	12.6V	12.6V	9~17V
Under voltage recover	12.2V	12.2V	12.2V	9~17V
Under voltage warning	12V	12V	12V	9~17V
Low voltage disconnect	11.1V	11.1V	11.1V	9~17V
Discharging limits voltage	10.6V	10.6V	10.6V	9~17V
Equalize duration	——	120min	120min	0~180min
Boost duration	120min	120min	120min	10~180min

The following rules must be observed when modify the parameters value in user battery type(factory default value is the same as sealed type):

Rule1: High Volt Disconnect > Charging limit voltage ≥ Equalization voltage ≥ Boost voltage ≥ Float voltage > Boost return voltage;

Rule2: High Volt Disconnect > Over Voltage Reconnect;

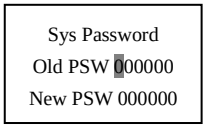
Rule3: Low voltage reconnect > Low voltage disconnect ≥ Charging limit voltage;

Rule4: Under voltage recover > Under voltage warning ≥ Charging limit voltage;

Rule5: Boost return voltage > Low voltage reconnect;

- **Password**

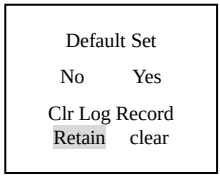
Press OK to enter the Password Set interface when the inverse cursor points to Password Para item. Press ESC button to exit.



Note: The factory default password is "**000000**".

- **Default Set**

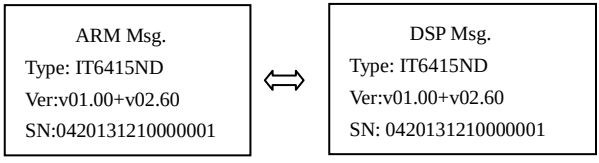
Under the main menu interface, when the inverse cursor to restore the default option, press the OK button to enter to restore the default interface.



Under the main menu interface, when the inverse cursor points to restore the default option, press the OK button to enter to restore the default interface and clear all logs including work log and event log. Note: all parameters will be set to factory default and couldn't be recovery.

- **Device Message**

Under the main menu interface, when the inverse cursor to the Dev Msg, press the OK button to enter to Device Info interface.



The Model, software and hardware version and SN number are shown in this interface.

5.0 Protections, Troubleshooting & Maintenance

5.1 Protections

- **PV Short Circuit**

When PV short circuit occurs, the controller will stop charging. Clear it to resume normal operation.

- **PV Over Voltage**

If PV voltage is larger than maximum input open voltage 150V, PV will remain disconnected and warning until the voltage falls safely below 145V. PV voltage cannot be too high, otherwise it may damage the controller, please verify the PV parameter.

- **PV Over Current**

The iTracer controller will limit battery current to the Maximum Battrery Current rating. An over-sized solar array will not operate at peak power.

- **PV or/and Battery Polarity Reversed**

Fully protection against PV or/and Battery reverse polarity, no damage to the controller will result. Correct the miswire to resume normal operation.

- **Over Temperature Protection**

If the temperature of the controller heat sinks exceeds 85℃, the controller will automatically start the overheating protection and recover below 75℃.

- **Load Over Load**

If the load current exceeds the maximum load current rating 1.05 times, the controller will disconnect the load. Overloading must be cleared up through reducing the load and then press the [-] button.

- **Load Short Circuit**

Fully protected against load wiring short-circuit. Once the load short, the load short protection will start automatically. After five automatic load reconnect attempt, the fault must be cleared by restarting controller or pressing the [-] button .

NOTE: Overload fault and load short fault will be cleared every day, so the faults which aren't caused by hardware can be solved intelligently.

5.2 Troubleshooting

Charging LED indicator off during daytime when sunshine falls on solar modules properly

Solution: Confirm that PV and battery wire connections are correct and tight.

Battery LED indicator green fast blink and LCD displaying 'OVD'

Probable Cause: Battery voltage is larger than over voltage disconnect voltage (OVD).

Solution: Check if battery voltage too high, and disconnect solar modules.

Fault LED indicator blink, LCD displaying 'Current Err'

Probable Cause: Charging current in three phases is unbalanced.

Solution: Disconnect solar modules and restart the iTracer; if the fault still exists, please contact the supplier to make maintenance.

Fault LED indicator blink, LCD displaying 'Over Volt'

Probable Cause: solar modular output is too high.

Solution: Check solar component parameters matching; the controller will disconnect the input if the voltage is over 150v and will Recovery below 145v.

Fault LED indicator blink, LCD displaying 'Over Temp'

Probable Cause: Heat sinks operational temperature is quite high to 85 ℃ or above.

Solution: The controller will automatically stop working. When the temperature is below 75 ℃, the controller will resume to work.

Cannot connect to the controller via RS-485 or RS-232

Probable Cause:RS-485 serial baud rate setting error or serial-USB adapter incorrect configuration.

Solution: Check serial baud rate is set to 115200bps or not and choose the right COM port ;If using a serial-USB adapter, verify that the adapter software is installed and a serial COM port has been mapped.

5.3 Maintenance

The following inspections and maintenance tasks are recommended at least two times per year for best controller performance.

· Check that the controller is securely mounted in a clean and dry environment.
· Check that the air flow and ventilation around the controller is not blocked. Clear all dirt or fragments on the heat sink.
· Check all the naked wires to make sure insulation is not damaged for serious solarization, frictional wear, dryness, insects or rats etc. Maintain or replace the wires if necessary.
· Tighten all the terminals. Inspect for loose, broken, or burnt wire connections.
· Check and confirm that LED or LCD is consistent with required. Pay attention to any troubleshooting or error indication .Take necessary corrective action.
· Confirm that all the system components are ground connected tightly and correctly.
· Confirm that all the terminals have no corrosion, insulation damaged, high temperature or burnt/discolored sign, tighten terminal screws to the suggested torque.
· Inspect for dirt, insects and corrosion, and clear up.
· Check and confirm that lightning arrester is in good condition. Replace a new one in time to avoid damaging of the controller and even other equipments.

Warning：Risk of electric shock!
Make sure that all the power is turned off before above operations, and then follow the corresponding inspections and operations.

6.0 Other instructions

6.1 PC Software

iTracer controller can be connected to a common PC monitoring software by supporting USB communication cable developed by the EPsolar company. Monitoring software can remote single or more controllers to modify the parameters, configure load mode and others in the PV system management (username: administrator, password: 111111 as default). See the specific instructions related software user guide. Software interfaces are shown below:

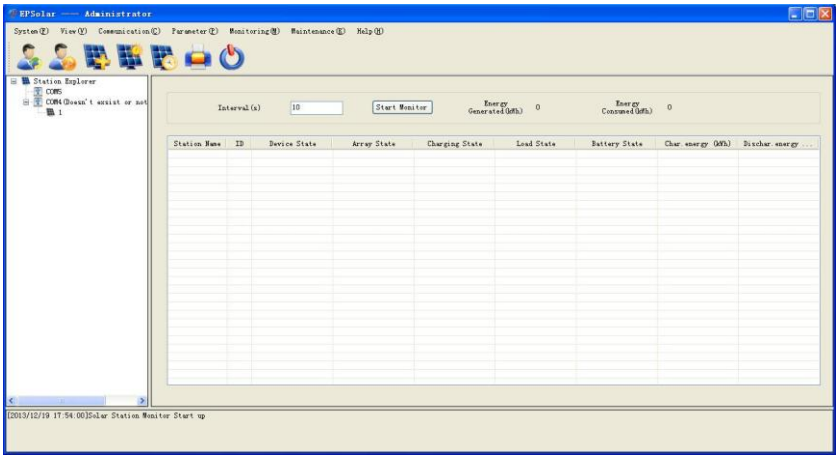


Figure6-1 Globe Monitoring

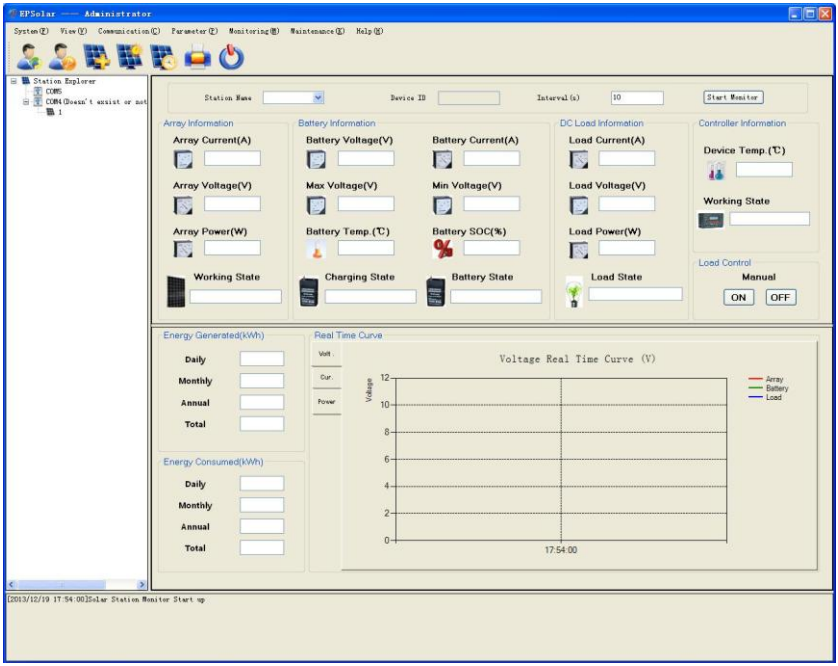


Figure6-2 Real Time Monitoring

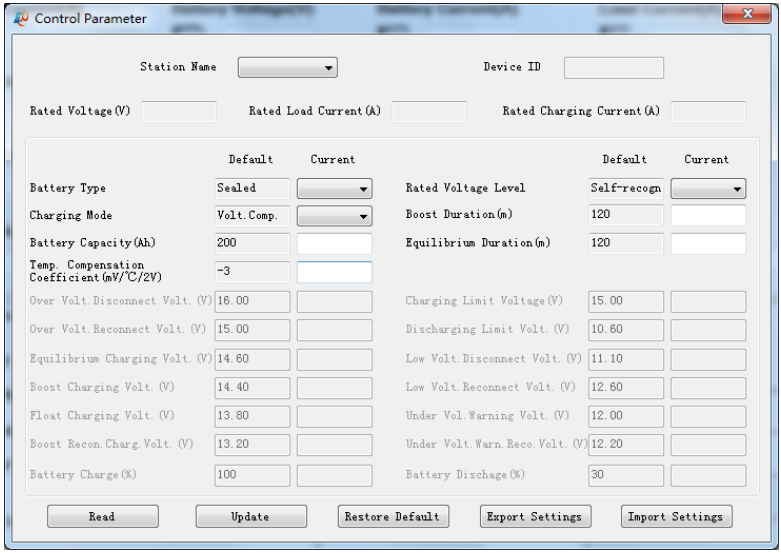


Figure6-3 Control Parameter

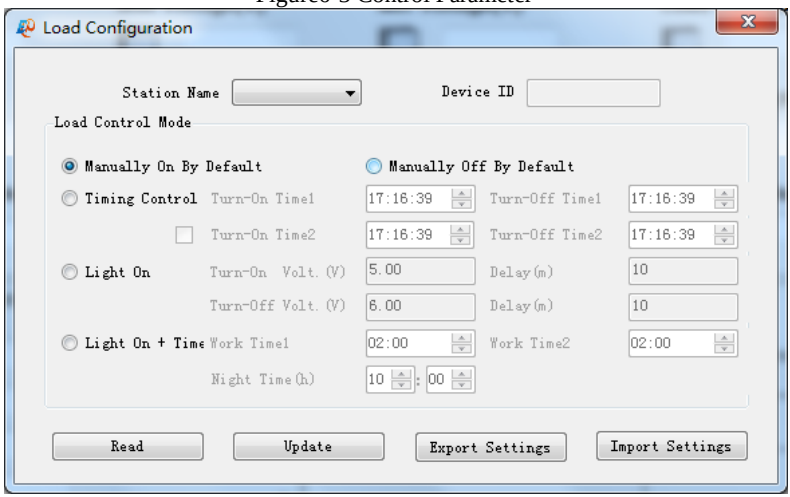


Figure6-4 Load Configuration

7.0 Warranty

The iTracer charge controller is warranted to be free from defects for a period of TWO (2) years from the date of shipment to the original end user.

• Claim Procedure

Before requesting warranty service, check the operation manual to be certain that there is a problem with the controller. Return the defective product to us with shipping charges prepaid if problem cannot be solved. Provide proof of date and place of purchase. To obtain rapid service under this warranty, the returned products must include the model, serial number and detailed reason for the failure, the module type and size, type of batteries and system loads. This information is critical to a rapid disposition of your warranty claim.

If the products failure is caused by customers' misuse or not following the manual, EPsolar won't be responsible for the free maintenance. We will ask for the raw material cost. And please refer to above procedure.

8.0 Specifications

Electrical Parameters

	IT3415ND	T4415ND	IT6415ND
Nominal System Voltage	12Vdc/24Vdc/36Vdc/48Vdc/ Auto		
Nominal Battery Current	30A	45A	60A
Maximum Solar Input Voltage	150Vdc		
Battery Voltage Range	8～72Vdc		
Maximum Input Power			
12V：	400W	600W	800W
24V：	800W	1200W	1600W
36V：	1200W	1800W	2400W
48V：	1600W	2400W	3200W
Self Consumption	1.4～2.2W		
Grounding	Common Negative Grounding		

Mechanical Parameters

	IT3415ND	IT4415ND	IT6415ND
L x W x H			
L：	358mm	382mm	440mm
W：	219mm	231mm	231mm
H：	102mm	107mm	110mm
Net Weight:	3.7kg	4.6kg	5.9kg
Terminal:	$25mm^2$	$35mm^2$	$35mm^2$
Mounting Hole:		Φ10	

Environmental Parameters

LCD Temp	-20℃ ~ +70℃
Ambient Temp	-25℃ ~ +55℃
Storage Temp	-30℃ ~ +85℃
Humidity	95% N.C.
Enclosure	IP20

Protection

Solar input short protection

Solar input reversed polarity protection

Solar input reverse current protect at night

Battery reversed polarity protection

Battery over voltage disconnect protection

Battery over voltage reconnect protection

Battery over temperature disconnect protection

Load short disconnect protection

Load overload disconnect protection

Controller over temperature disconnect protection

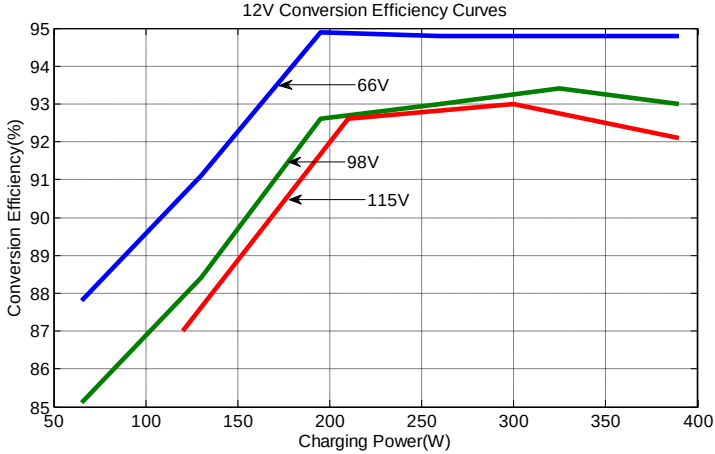
Abbreviation

HVD	High voltage disconnect
LVD	Low voltage disconnect
OVT	over temperature
UVW	Under voltage warning

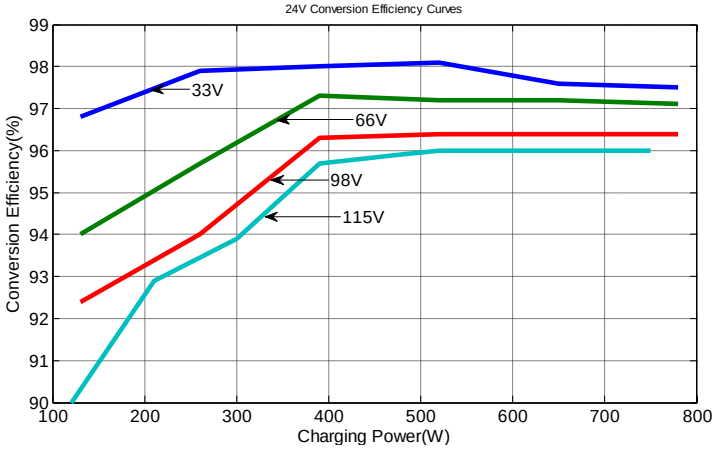
9.0 Conversion Efficiency Curves

Test model: IT3415ND

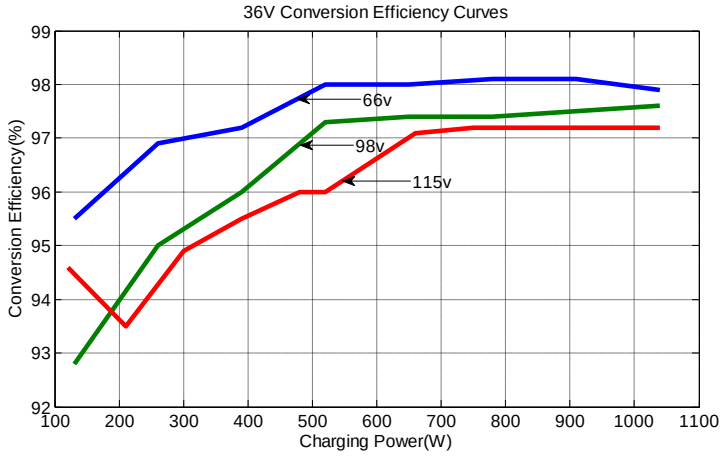
1. Solar MPPT Voltage(66V, 98V, 115V) / System Voltage(12V)



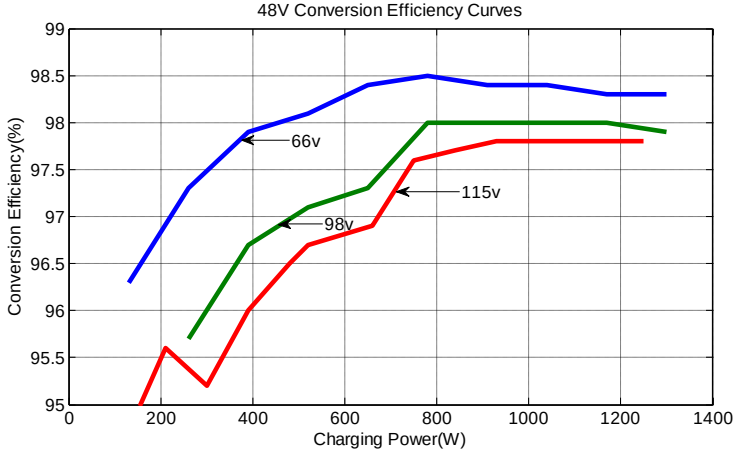
2. Solar MPPT Voltage(33V, 66V, 98V, 115V) / System Voltage(24V)



3. Solar MPPT Voltage(66V, 98V, 115V) / System Voltage(36V)

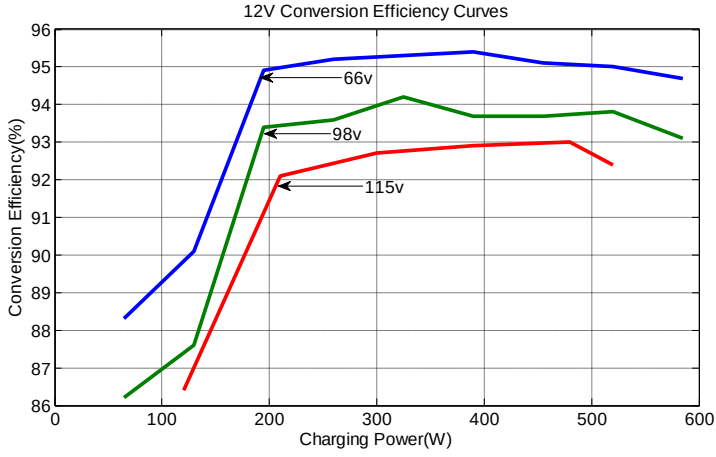


4. Solar MPPT Voltage(17V,34V,68V) / System Voltage(48V)

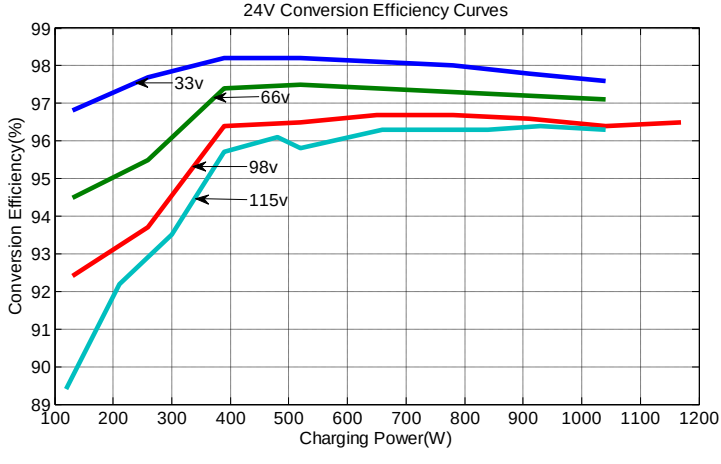


Test model: IT4415ND

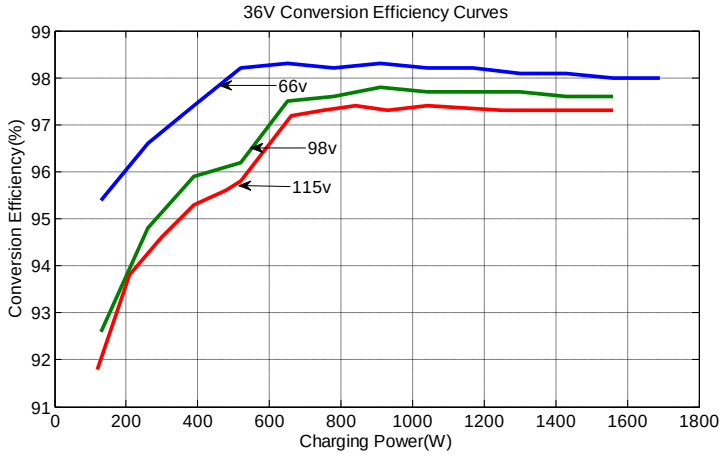
1. Solar MPPT Voltage(66V, 98V, 115V) / System Voltage(12V)



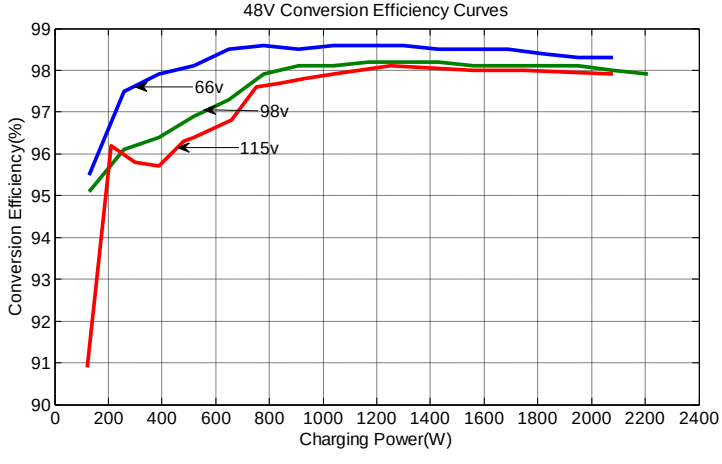
2. Solar MPPT Voltage(33V, 66V, 98V, 115V) / System Voltage(24V)



3. Solar MPPT Voltage(66V, 98V, 115V) / System Voltage(36V)

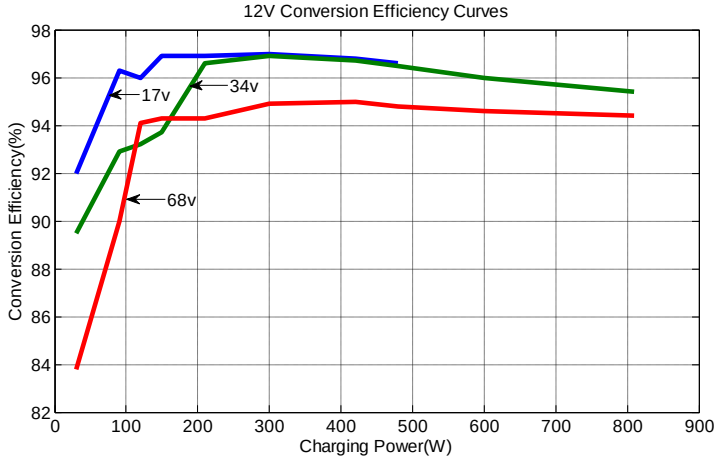


4. Solar MPPT Voltage(66V, 98V, 115V) / System Voltage(48V)

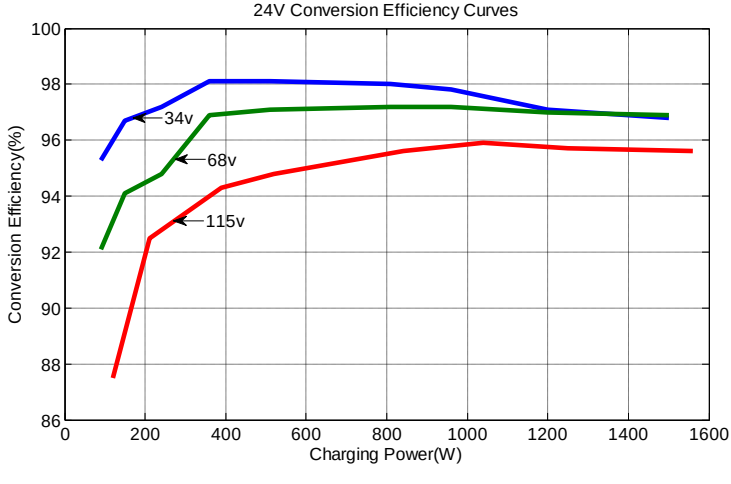


Test model: IT6415ND

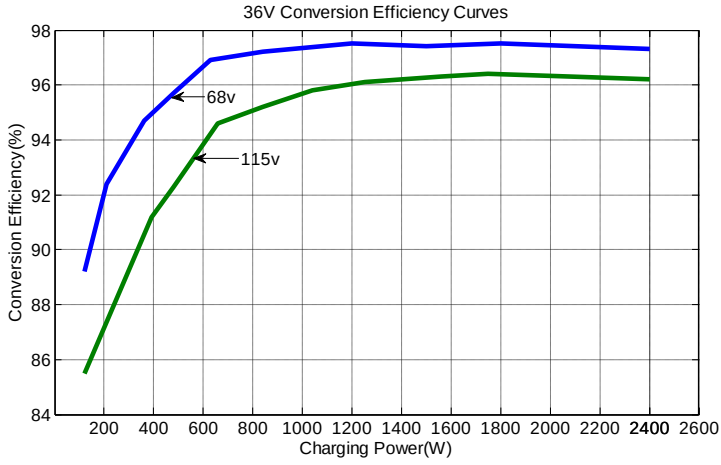
1. Solar MPPT Voltage(17V,34V,68V) / System Voltage(12V)



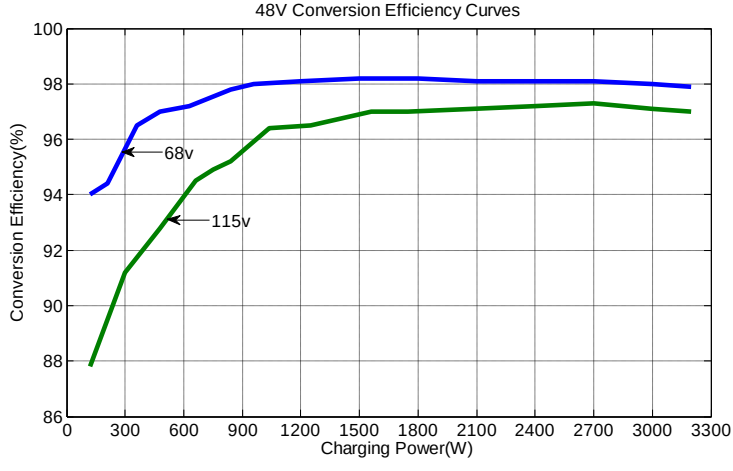
2. Solar MPPT Voltage(34V,68V,115V) / System Voltage(24V)



3. Solar MPPT Voltage(68V,115V) / System Voltage(36V)

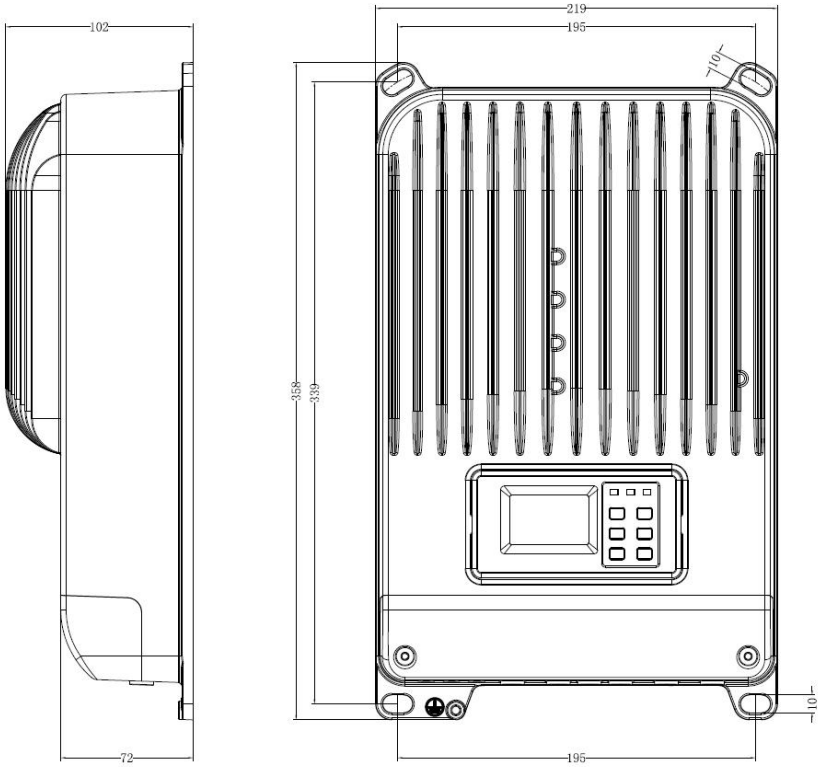


4. Solar MPPT Voltage(68V,115V) / System Voltage(48V)

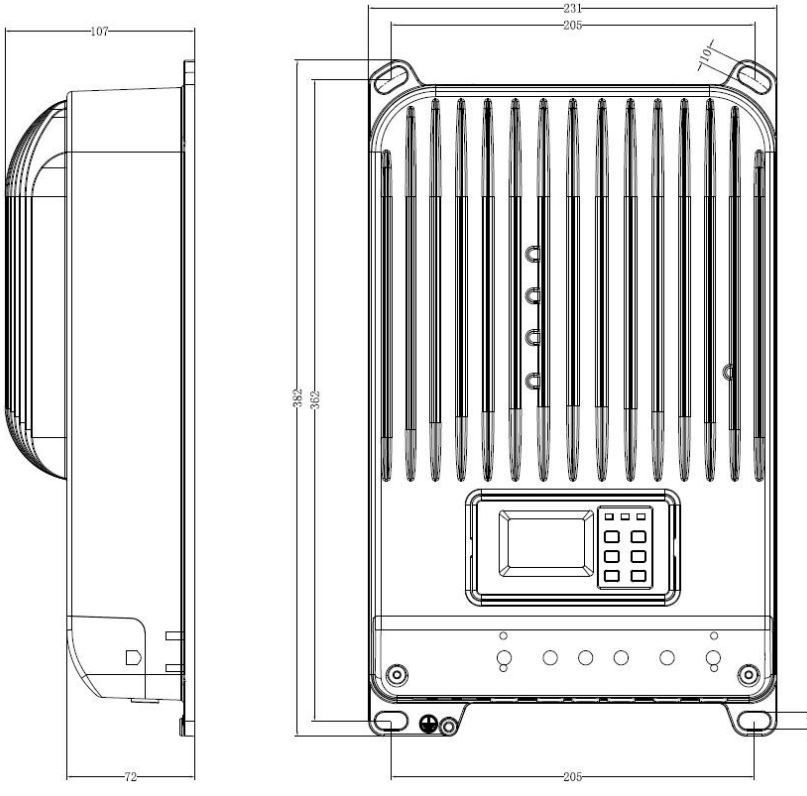


10.0 Dimensions

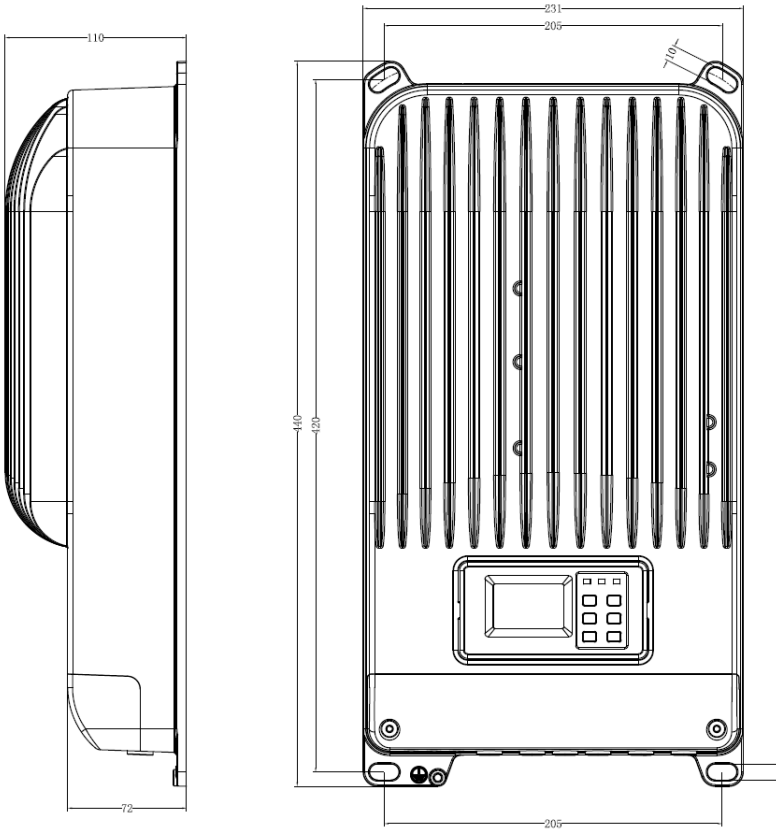
IT3415ND Dimensions（Unit：mm）



IT4415ND Dimensions（Unit：mm）



IT6415ND Dimensions（Unit：mm）



Version：V2.2

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