# CUTTING E⚡GE
## P O W E R

# CEP400
## MPPT Charge Controller

# User Manual
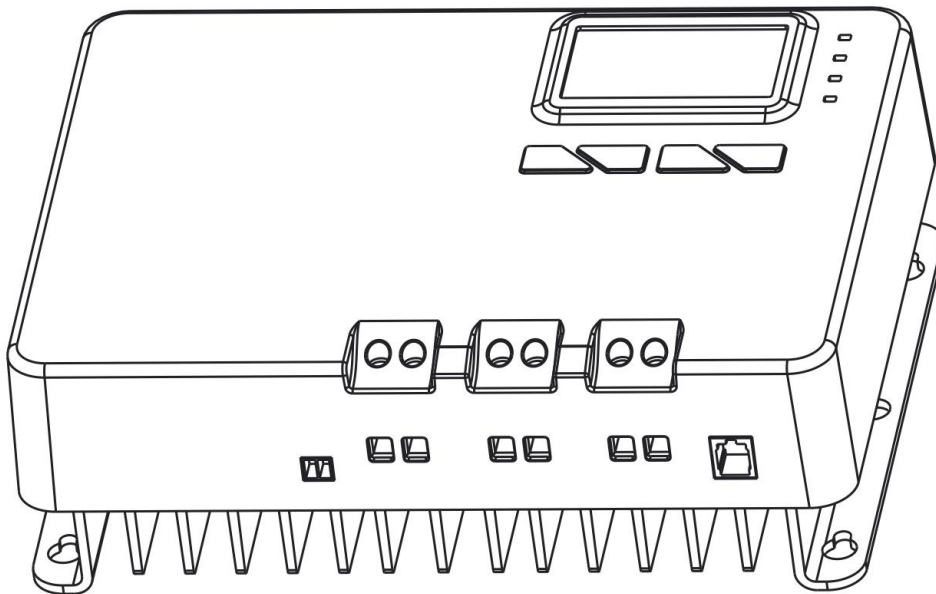
# 1. Warnings and Tools Icon Chart

| Icons | Name | Description |
|---|---|---|
| | High Voltage | High voltage device.<br>Installation should be performed by an electrician. |
| | High Temperature | This device will produce heat.<br>Mount device away from other items. |
| | Environmental Hazard | Electronic Equipment. Do not put in landfill. |
| | Wire Cutter | A wire cutter is needed for cutting and stripping wires prior to connection. |
| | Multimeter | A multimeter is needed for testing equipment and verifying polarity of cables. |
| | Anti-static Glove | Anti-static gloves are recommended to prevent controller damage caused by static electricity. |
| | Electrical Tape | Electrical tape is recommended to safely insulate spliced or bare wires. |
| | Screwdriver | A common size screwdriver is needed to attach wires to the controller. |

# 2. Safety Tips

- Review this manual thoroughly before attempting installation.
- Beware of any nearby electrical equipment that may interfere with installing this device.
- Solar panels can generate high voltages and currents, make sure your solar panels are completely covered from sunlight during installation. It is recommended that installation be performed by a qualified electrician.
- Connecting wires to this device can generate sparks, please wear proper insulation gear while installing this device.
- To avoid damage to the battery or controller, use proper fuses in wiring. Please do not hesitate to contact the professions if you need help with fuse sizing.
- Always keep children away from this device.
- Be certain to use the correct gauge of wire, see below for a table of recommended wire size for various current loads.

| Solar Input Current | 5A | 10A | 20A | 30A | 40A | 60A |
|---|---|---|---|---|---|---|
| Wire Cross Section Area (mm$^2$) | 1.5 | 2.5 | 5 | 8 | 10 | 12 |
| Wire AWG | 12 | 12 | 10 | 10 | 10 | 8 |

# 3. Product Features

Thank you for choosing our products. This MPPT solar charge controller is a device for solar charge regulation and direct current output load control. This device is mainly used in small and medium sized off-grid solar power systems.

These MPPT charge controllers have features as follows:

- By continuously checking solar panel power output changes, the controllers employ multiple MPPT charge algorithms in combination to boost charging efficiency in different weather and temperature conditions.
- Built-in buffer, allows max 25% exceeding rated power input.
- Charging modes available for most common deep-cycle battery types in the market, including AGM (sealed lead acid batteries), GEL, Flooded, and Lithium.
- Auto recognition of 12V/24V battery system voltage by M2440N model; auto recognition of 12V/24V/36V/48V battery system voltage by M4860N model. Lithium battery excluded from this feature.
- Supports recording of system running data including power generated and power utilized for up to 300 days, compatible with monitoring App through IOS and Android.
- Provides multiple load control mode options for light based, time based and manually adjusted scenarios. Low no-load loss.
- Industrial grade design with reverse polarity protection for solar panels, battery and load.
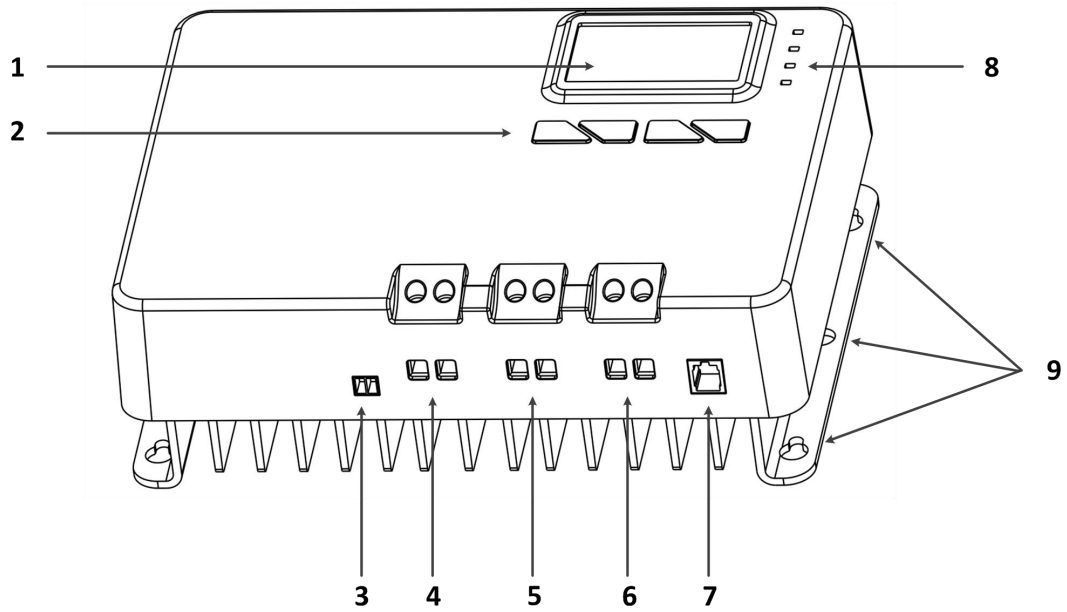
PVChargePro

Google Play Store
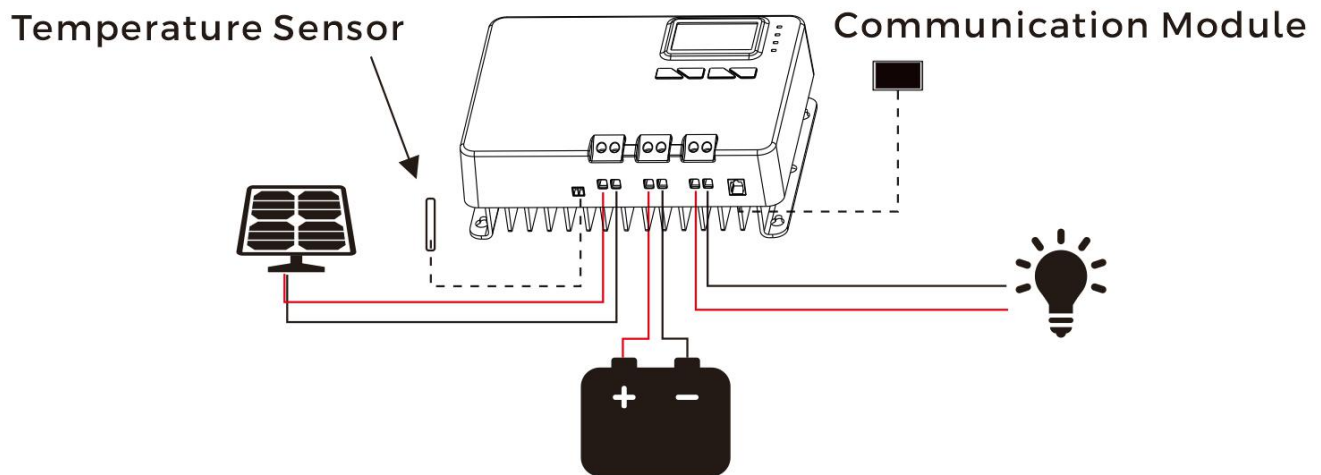
Everyone

PVChargePro 4+

iOS

★★★☆ 3.5 • 4 Ratings

Free

# 4. Device Diagram



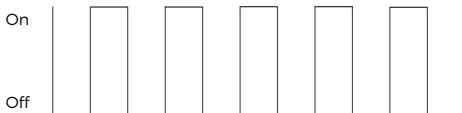| # | Description | # | Description |
|---|---|---|---|
| 1 | LCD Display Screen | 6 | DC Load Terminals |
| 2 | Function Key ([SET], [UP], [DOWN], [ESC]) | 7 | RS485 Communication Port |
| 3 | External Temperature Sensor Terminal | 8 | LED Indicator (PV, BAT, LOAD, FAULT) |
| 4 | Solar Terminals | 9 | Installation Mounting Holes |
| 5 | Battery Terminals | | |

# 6. Wire Connection Sequences



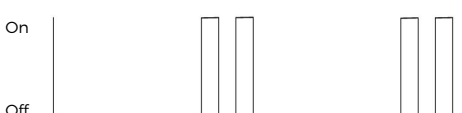2.  Make sure your solar panels are fully covered to prevent electrical shock.
    Connect the positive solar array output wire followed by the negative solar array output wire.
3.  Connect DC load wires to the DC load output (if applicable).
4.  Connect the external temperature sensor to its terminal shown above.
5.  Connect the mobile application module to the communication port (if applicable).

# 7. LED Light Signal Interpretation Chart

| LED Name | LED Display | Signal Indication |
|----------|-------------|-------------------|
| PV | Off | Solar Input Not Charging<br>*PV LED is generally off during nighttime.* |
| | Double Flash | Solar Input Charge Detected |
| | Single Flash | Solar Input Reverse Polarity |
| | Steady On | MPPT Charge Mode |
| | Fast Flash | Equalize or Boost Charge Mode |
| | Slow Flash | Float Mode |
| BATTERY | Single Flash | Battery Input Reverse Polarity |
| | Fast Flash | Battery Over Voltage |
| | Slow Fast | Battery Over Discharged |
| | Steady On | Battery On |
| LOAD | Off | No DC Load Connected/Load Off |
| | Fast Flash | DC Load Short Circuit |
| | Steady On | DC Load On |
| FAULT | Off | No Errors |
| | Steady On | System Error – Check Error Code |

Check the Fault light to spot if a system error may be present.

# 8. LED Flash Rhythm Chart

| Flash Status | Indication | Description |
|---|---|---|
| **Steady On** | | LED light on. |
| **Off** | | LED light off. |
| **Fast Flash** | | LED light blinks at frequency of 2Hz (twice every second). |
| **Slow Flash** | | LED light blinks at frequency of 0.5Hz (once every two seconds). |
| **Single Flash** | | LED light blinks for 0.1 second after every 2 seconds. |
| **Double Flash** | | LED light blinks for 0.1 second twice after every 4 seconds. |

# 9. LCD Display Interface Overview

Active Functions

Charge Status

Display Unit
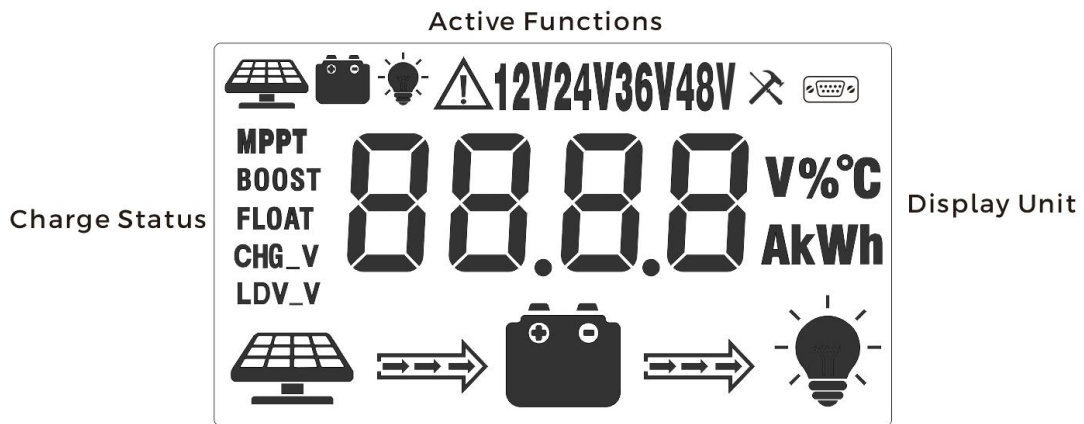
# 10. LED Display Interface

| Display Section | Display Layout |
|---|---|
| **Charge Status** | |
| **Charge Mode & Parameter** | |
| **Active Functions** | |

# 11.Status Information

| Status Icon | Indication | Status | Description |
|---|---|---|---|
|  | Solar Charge Indication | Flowing | Solar Power Charging Battery |
| | | Off | Solar Power Not Charging Battery |
|  | DC Load Indication | Flowing | DC Load Drawing Power |
| | | Off | DC Load Off |
| **MPPT** **BOOST** **FLOAT** | Charge Mode | Steady On | MPPT Charge Mode |
| | | | Boost Charge Mode |
| | | | Float Charge Mode |
| | | Off | Not Charging |
| **CHG_V** | Voltage Setting | On | Setting Charge Voltage |
| | | Off | Charge Voltage Has Been Set |
| **LDV_V** | Over Discharge Volt Settings | On | Setting Discharge Voltage |
| | | Off | Discharge Voltage Has Been Set |
|  | Solar Icon | Steady On | Daylight Detected |
| | | Off | No Daylight Detected |
| | | Fast Flash | Solar System Over Voltage |
|  | Battery Icon | Steady On | Battery Connected and Functional |
| | | Off | No Battery Connection |
| | | Fast Flash | Battery Over-Discharged |
|  | Load Status | Flash | DC Load Short Circuit or Over-Load |
| | | ON | Load On |
| | | OFF | Load Off |

# 12. Key Functionality Chart

| Function Key | System Mode | Input | Input Function |
|---|---|---|---|
| ⚙ | View Mode | Short Press | Enter SET mode |
| ▲ | View Mode | Short Press | View Previous Page |
| ▼ | View Mode | Short Press | View Next Page |
| ↩ | View Mode | Short Press | DC Load On/Off (Manual Control Program Only) |

| Function Key | System Mode | Input | Input Function |
|---|---|---|---|
| ⚙ | Set Mode | Long Press | Save Data & Exit SET Mode |
| | | Short Press | Next Setting |
| ▲ | Set Mode | Short Press | Increase Parameter Value |
| ▼ | Set Mode | Short Press | Decrease Parameter Value |
| ↩ | Set Mode | Short Press | Exit SET Mode Without Saving |

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# 13. LED Display Rules & Cycles

Pre start-up display cycle when the MPPT controller turns on, this usually last several seconds while controller detects operating environment.
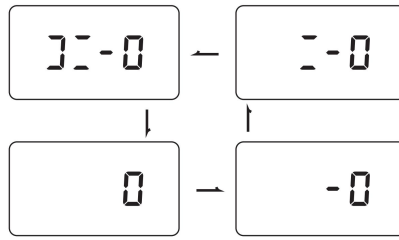


LED Screen Display Cycle
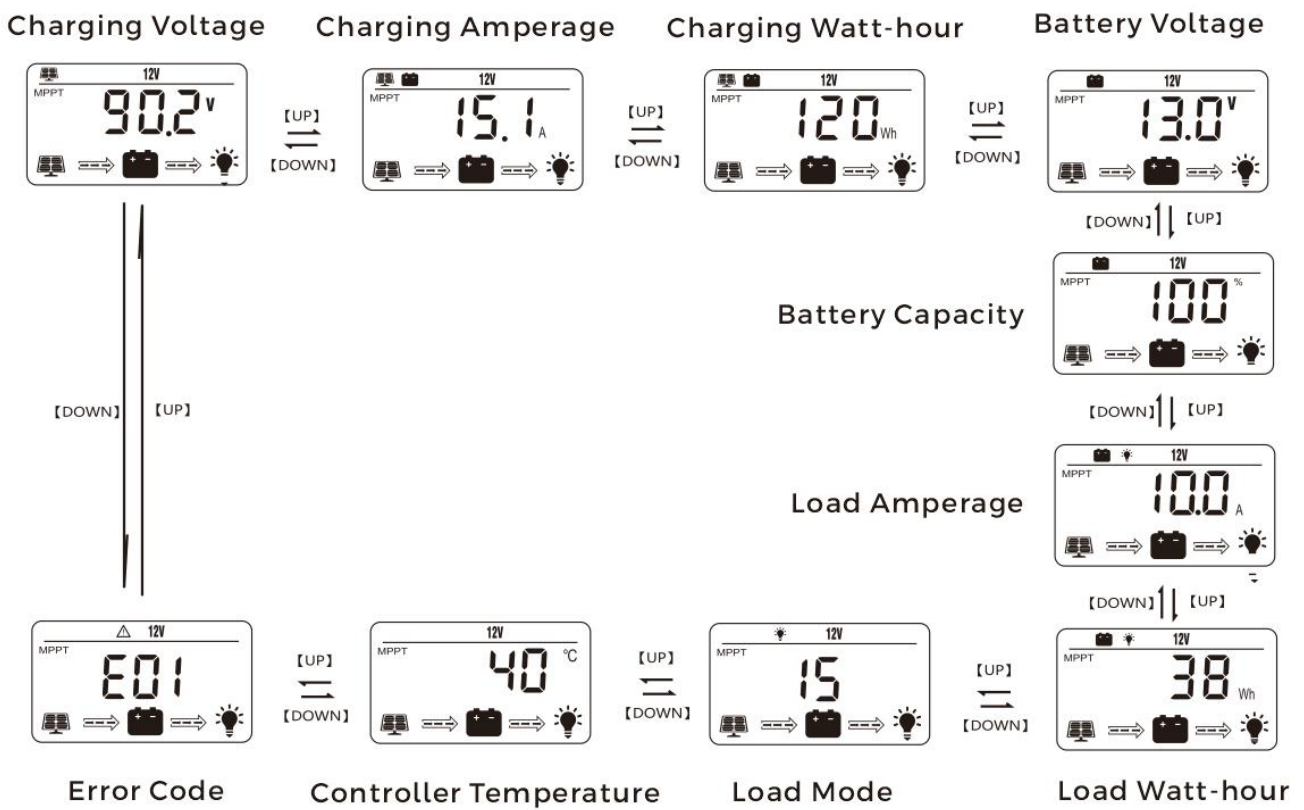


- The information pages in the screen will be automatically turning to the next page every 5 seconds and keep lasting. The user also can use up and down keys to cycle through different pages.
- The error code page will be displayed when an error is detected.

### Setting Battery Mode

Enter SET mode by pressing the Setting key in any view page other than Load Mode.

Use the up and down arrow keys to select battery mode, then long press Setting key to save.
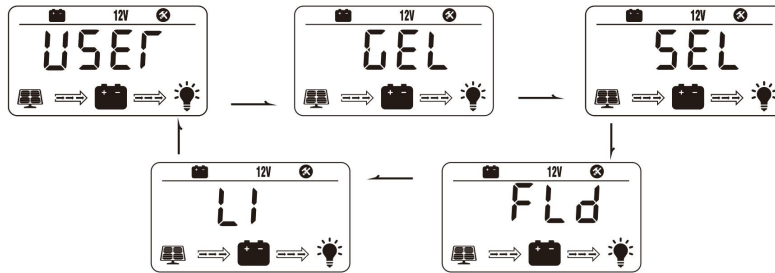


| Abbreviations | Battery Types | Description |
|:---:|:---|:---|
| FLD | Flooded Battery | Auto-recognition with default parameters set for each type of batteries. |
| SEL | Sealed/AGM Battery | |
| GEL | Gel Battery | |
| LI | Lithium Battery | Some parameters can be customized. |
| Use | Advanced User Mode | Most parameters can be customized. |

## Special Cutting Edge Power Lithium Batteries programming:

If Cutting Edge Power lithium batteries are installed by the factory, we will program these settings for you.

In Lithium mode, short press the Setting key again to cycle through each parameter view. Use the up and down arrow key to adjust parameter value, then long press Setting key to save.

For Battery Type: **Cutting Edge Power Lithium 3S 12V Batteries only:**
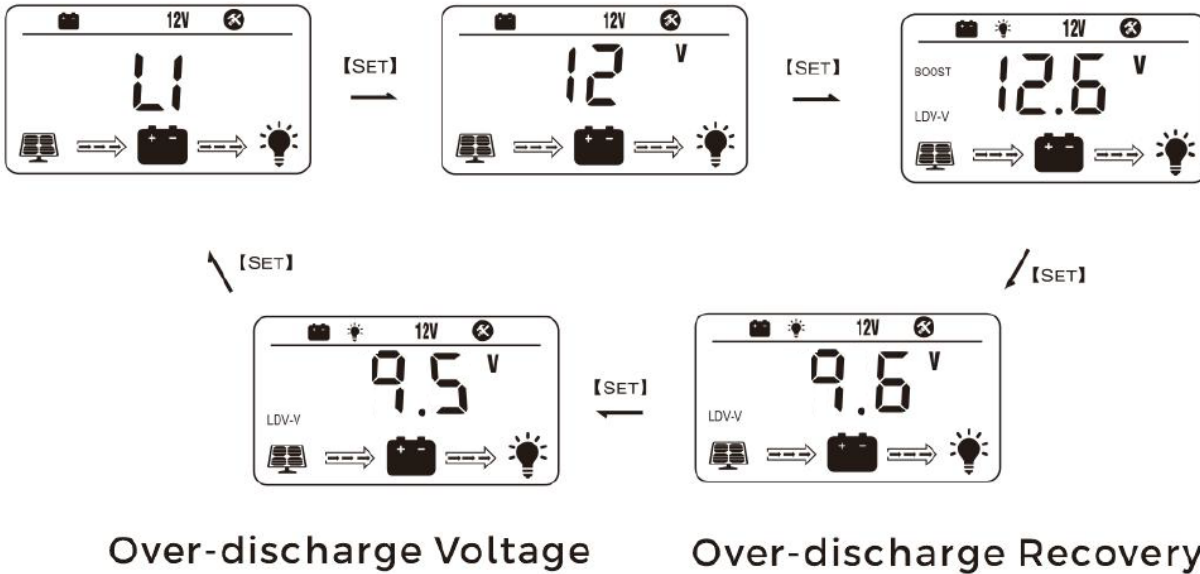
Advanced Battery Settings (Lighting Control mode)

Enter Load SET Mode by pressing the Setting key in Load Mode view only.

Use the arrow key to cycle through load modes before long pressing SET to save and exit. Short pressing SET will exit without saving.

**Load Mode View**          **Setting Load Mode**
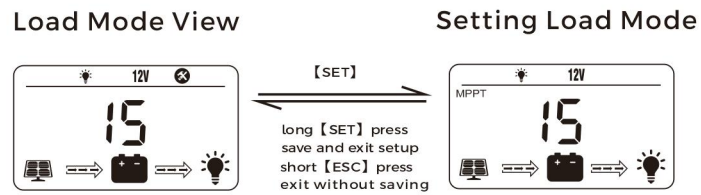


| Mode | Definition | Description |
|------|-----------|-------------|
| 0 | Daylight Auto-Control | DC load turns on when daylight is detected. |
| 1~14 | Daylight On/Timer Off | DC load turns on when daylight is detected.<br>DC load turns off according to timer. |
| 15 | Manual Mode | DC load turns on/off by pressing the Return key. |
| 16 | Testing Mode | DC load turns on and off in a quick succession. |
| 17 | Always On | DC load stays on. |

# 14. Error Code Chart

| Code | Error | Description & Quick Troubleshoot |
|---|---|---|
| E00 | No Error | No action needed. |
| E01 | Battery Over-discharged | Battery voltage is too low.<br>DC load will be turned off until battery re-charges to recovery voltage. |
| E02 | Battery Over-voltage | Battery voltage has exceeded controller limit.<br>Check battery bank voltage for compatibility with controller. |
| E04 | Load Short Circuit | DC load short circuit. |
| E05 | Load Overload | DC load power draw exceeds controller capability.<br>Reduce load size or upgrade to a higher load capacity controller. |
| E06 | Overheating | Controller exceeds operating temperature limit.<br>Ensure the controller is placed in a well-ventilated cool, dry place. |
| E08 | Solar Over-amperage | Solar array amperage exceeds controller rated input amperage.<br>Decrease the amperage of solar panels connected to the controller or upgrade to a higher rated controller. |
| E10 | Solar Over-voltage | Solar array voltage exceeds controller rated input voltage.<br>Decrease the voltage of solar panels connected to the controller. |
| E13 | Solar Reverse Polarity | Solar array input wires connected with reverse polarity.<br>Disconnect and re-connect with correct wire polarity. |
| E14 | Battery Reverse Polarity | Battery connection wires connected with reverse polarity.<br>Disconnect and re-connect with correct wire polarity. |

*Please contact professions for technical support on additional troubleshooting.

# Controller Specification

The variable "n" is adopted as a multiplying factor when calculating parameter voltages, the rule for "n" is listed as: if battery system voltage is 12V, n=1; 24V, n=2; 36V, n=3; 48V, n=4.

For example, the equalize charge voltage for a 12V FLD (Flooded) battery bank is 14.8V*1=14.8V. The equalizing charge voltage for a 24V FLD (Flooded) battery bank is 14.8V*2=29.6V.

| Parameter | Value | |
|---|---|---|
| Model No. | CEP400 | |
| Battery System Voltage | 12V/24V<br>Auto (FLD/GEL/SLD)<br>Manual (Li/User) | |
| No-load Loss | 12ma (12V), 10ma (24V) | |
| Max Solar Input Voltage | <100Voc | |
| Rated Solar Charge Current | 40A | |
| Max Solar Input Power | 600W/12V<br>1200W/24V | |
| Light Control Voltage | 5V*n | |
| Light Control Delay Time | 10s | |
| Max Load Output Current | 20A | |
| Operating Temperature | -35℃ ~ +45℃ | |
| IP Protection | IP32 | IP32 |
| Net Weight | 2.0 kg | 3.0 kg |
| Communication Port | RS485 | |
| Operating Altitude | ≤ 3000 meters | |
| Controller Dimension | 245*180*82.5 mm | 280*210*90 mm |

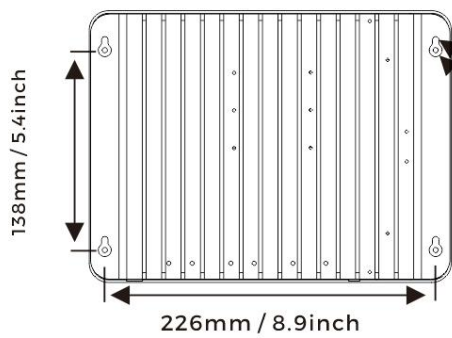| Parameter | Battery Parameters | | | | |
|---|---|---|---|---|---|
| Battery Types | FLD | SEL | GEL(default) | USER(adjustable) | LI (adjustable) |
| Equalize Charge Voltage | 14.8V*n | 14.6V*n | -- | Default | -- |
| Boost Charge Voltage | 14.6V*n | 14.4V*n | 14.2V*n | Default: GEL | Default: 14.2V*n |
| Float Charge Voltage | 13.8V*n | | | Default: GEL | -- |
| Boost Charge Recovery Voltage | 13.2V*n | | | Default: GEL | -- |
| Over-discharge Recovery Voltage | 12.6V*n | | | Default: GEL | -- |
| Over-discharge Voltage | 11.1V*n | | | Default: GEL | Default: 11.1V*n |
| AutoTemperature Compensation | -3mV/2V/℃ | | | Default: GEL | -- |

# 15. Product Dimension

245mm / 9.7inch

180mm / 7.1inch
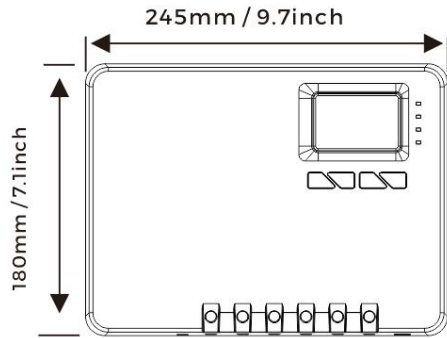
Product Dimension: 245*180*82.5mm / 9.7*7.1*3.3inch

Installation Area Dimension: 226*138mm / 8.9*5.4inch

Installation Hole Size: φ5mm&φ10mm / φ0.2inch & φ0.4inch

Connection Socket Size: 7.5*7.5mm / 0.3*0.3inch

138mm / 5.4inch

4*φ5mm / 4*φ0.2inch

4*φ10mm / 4*φ0.4inch

82.54mm / 3.3inch

226mm / 8.9inch