# FUM-1215CBPH / FUM-2407CBPH

# FUM-1230CBPH / FUM-2415CBPH

# FUM-1260CBPH / FUM-2430CBPH

## Multistage battery charger

## User manual



### Design Features

- PFC function (except FUM-1215CBPH and FUM-2407CBPH).
- Sleeping mode function.
- Wide input voltage (universal) range operation (except FUM-1215CBPH and FUM-2407CBPH).
- LCD remote control.
- Battery temperature sensor function.
- Tri-LED color indicator for different charge stage.
- Adjustable charging mode switch for different lead-acid battery types.
- Prevent the battery overcharging, and extend the battery life.
- For recovery of the aging (sulfated) battery.

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# 1. Important safety instructions

WARNING

Before installing and using the charger, read all instructions and cautionary marking on the charger, the batteries and all appropriate sections of this guide.

**General safety precautions**

Do not expose the charger to rain, snow, spray, or bilge water. To reduce risk of fire hazards, do not cover or obstruct the ventilation openings. Do not install the inverter in a zero-clearance compartment. Overheating may result.

The charger is designed to be permanently connected to your AC and DC electrical systems.

Never use chagers at a location where there is a danger of gas or dust explosions.

Use only attachments recommended or sold by the manufacturer. Doing otherwise may result in a risk of fire, electric shock or injury to persons.

Do not disassemble the charger. Attempting to service the unit yourself may result in a risk of electric shcok of fire. Internal capacitors remain charged after all power is disconnected.

The charger must be provided with an equipment-grounding conductor connected to the AC input groung.

To reduce the risk of electrical shock, disconnect both AC and DC power from the charger before attempting any maintenance or cleaning or working on any circuits connected to the charger. Turning off controls will not reduce this risk.

Do not operate the charger if it has received a sharp blow, been dropped, or otherwise damaged in any.

To avoid a risk of fire and electric shock make sure that existing wiring is in good electrical conditions and the wire size is not undersized. Do not operate the inverter with damage or substandard wiring.

# 2. Installation location; physical requirements for installation

**IMPORTANT**

This product is best mounted in a horintal position. If unit is mounted in a vertical position the cooling fan must be at botton of the unit.

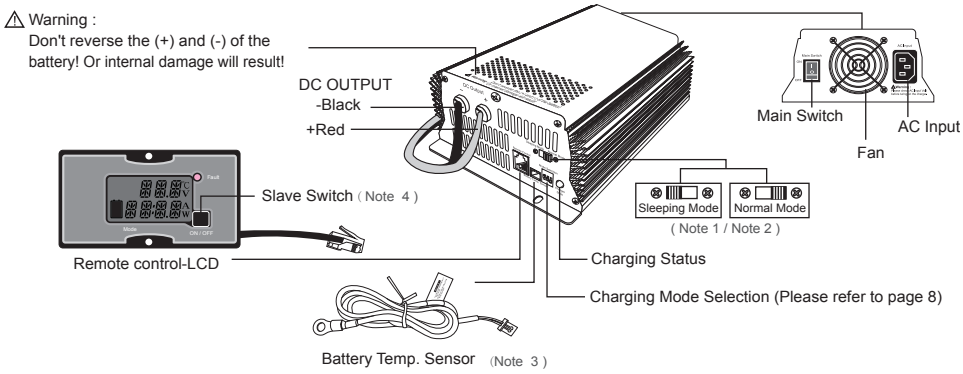
| Condition | Description |
|---|---|
| Clean | Do not expose the charger to metal filings or any other form of conductive contamination. The presence of conductive contamination can cause damage and void your warranty. |
| Cool | For best performance, the ambient air temperature should be between -15°C (5°F) and 45°C (113°F) – the cooler the better. At higher ambient temperatures, the output current will be automatically reduced to protect the charger from high internal temperatures. |
| Dry | The unit is intended for use in a dry location. Do not allow water or other fluids to drip or splash on the charger. Do not mount the charger in an area subject to rain, spray or splashing bilge water. |

| Condition | Description |
|---|---|
| Safe | This battery charger is Ignition Protected, so it can be installed in areas containing gasoline tanks or fittings which usually require Ignition Protected equipment. It is safest not to install electrical equipment in these areas. |
| Ventilated | Allow at least 10 cm (4 inches) of clearance around all sides of the charger for air flow. Ensure that the ventilation openings on the unit are not obstructed. If mounting in a compartment, ventilate the compartment with louvres or cut-outs to prevent overheating. |
| Close to AC junction box | Avoid the use of extended wire lengths if possible. |
| Close to batteries | Avoid excessive cable lengths and use the recommended wire lengths and sizes. Undersized or overly long cables may affect charging accuracy. |

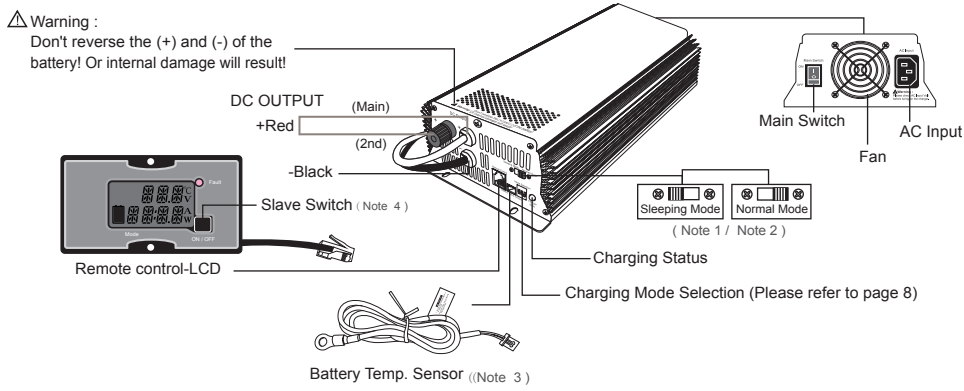
## 3. Charger overview

⚠ Warning : Damage caused by wrong positive (+) and negative (-) connection is not covered by the warranty.

**FUM-1215CBPH; FUM-2407CBPH // FUM-1230CBPH; FUM-2415CBPH**



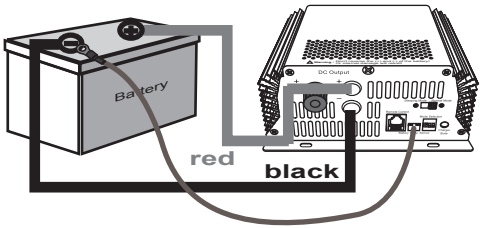

**FUM-1260CBPH; FUM-2430CBPH**



Note 1: Sleeping mode: Fan would stop and the charger working sound would be smaller, so the output current would be 5A (12V spec.) or 2.5A (24V spec.) only.

Note 2: Normal mode: The charger would work as it maximum capacity according to its specifications. Fan would run if it is necessary.

Note 3: Battery temperature sensor: To detect the battery temperature while charging please connect wire sensor to the battery negative (-) terminal.




⚠ DON'T connect the sensor to the battery positive (+) terminal. It may damage the sensor and charger.

⚠ WARNING: damage caused by wrong sensor cable connection is not covered by the warranty.

Note 4: The slave switch of the remote control just cuts out the output. If you want to turn off the charger completely, please switch off main switch of charger body.

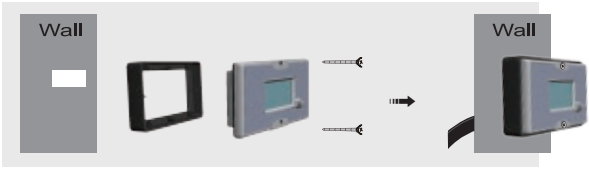
**Mounting Bracket – optional accessory**

Bracket hast two parts: rear and frame.

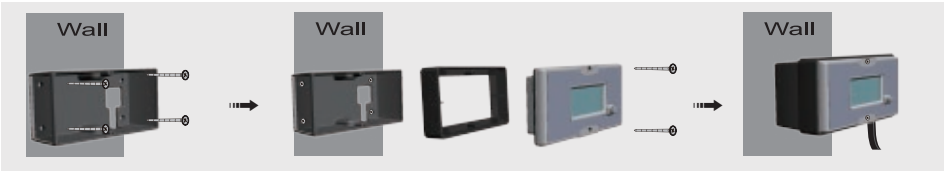
FRONT VIEW

Rear Frame

1. With the frame only, it must be a hole in the wall.




2. With both frame and rear, user just can screw the bracket on the wall. It is not necessary a hole in the wall.

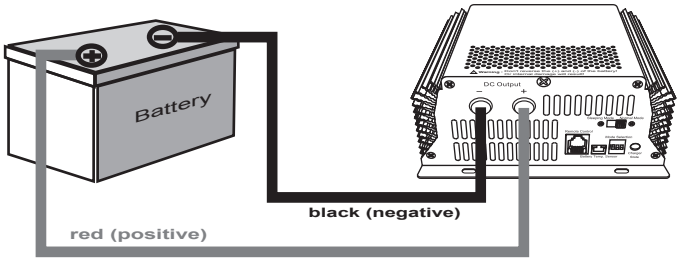


**ISOLATED DESIGN**

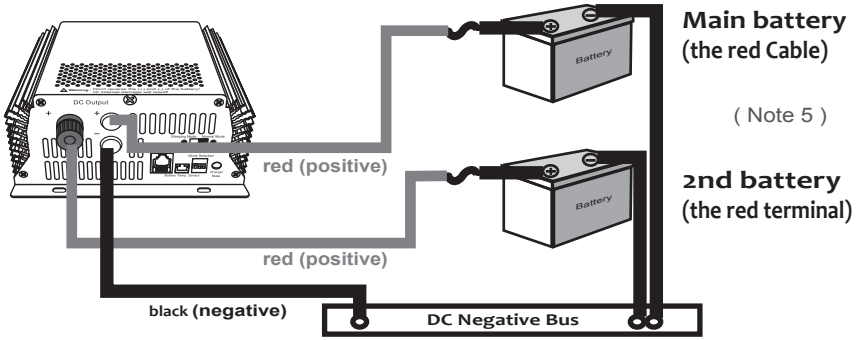
The DC battery charging circuits of this charger are galvanically isolated by a transformer from the AC power circuits. This feature reduces the risk of electric shock.

## 4. Installation diagrams.

Before charging, read the instructions; for indoor use only. Disconnect the supply before making or breaking the connection to the battery.




**FUM-1215CBPH; FUM-2407CBPH // FUM-1230CBPH; FUM-2415CBPH**




**FUM-1260CBPH; FUM-2430CBPH**

Note 5: Please connect the main battery cable prior to 2nd battery terminal if you just have 1 battery.

⚠ WARNING

Explosive gases.

Prevent flames and sparks.

Provide adequate ventilation during charge.

Include a warning against recharging non-rechargeable batteries.

If the supply cord is damaged, it must be replaced by a special cord or assembly available from the manufacturer or its service agent.

⚠ Explosive gas precautions

1. The charger has been approved as Ignition Protected. They may be installed in areas containing gasoline tanks and fittings which require Ignition Protected equipment. It is safest not to install electrical equipment in these areas.
2. To reduce the risk of battery explosion, follow these instructions and those published by the battery manufacturer and the manufacturer of the equipment in which the battery is installed.

## 5. Warranty

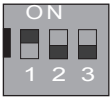
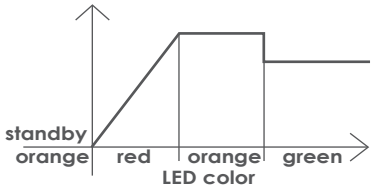
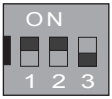
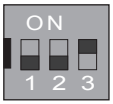
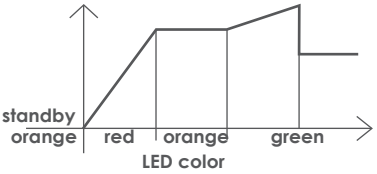
We offer 12 months warranty from the date of purchase, as stated in invoice or purchasing proof, and will repair or replace any defective power invertir.

This limited warranty is void if the unit is abused, modified, installed improperly, if the housing has been removed, if the serial number is missing, or if the original identification markings have been defaced, altered, or removed

The supplier is not liable for any incidental, consequential or other damages arising from the use, cost of removal, installation, or troubleshooting of the customer's electrical systems. Repair or replacement are your sole remedies and shall not be liable for damages, whether direct, incidental, special or consequential, even though cause by negligence or other fault.

This is only warranty and the company makes no other warranties, express or implied, including warranties of merchantability and fitness for a particular purpose.

## 6. Charging voltage graph

<table>
<tr><td> 
</td><td>Mode 1<br>(100)</td><td>Suitable for recharging lead storage battery</td><td rowspan="2"> 
</td></tr>
<tr><td> 
</td><td>Mode 2<br>(120)</td><td>Suitable for recharging gel storage battery</td></tr>
<tr><td> 
</td><td>Mode 3<br>(003)</td><td>Suitable for recharging lead storage battery, which is in good condition (no sulfated situation) and completely disconnected from the devices it runs, because this mode has the additional stage, the battery may reach voltage too high for them. And the limited current delivered by the battery charger. This is not able to provide power for devices, and simultaneously charge the battery.</td><td> 
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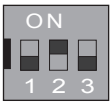
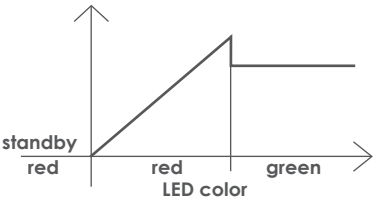
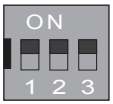
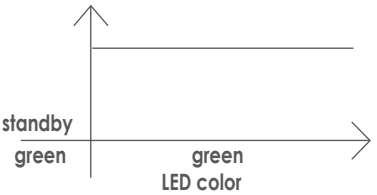
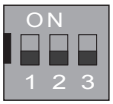
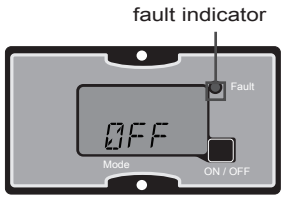
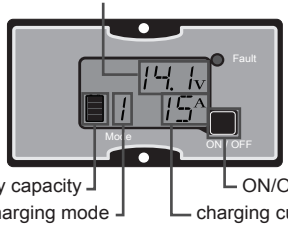
<tr><td rowspan="2"> 
</td><td>Mode 4<br>(020)</td><td>Suitable for recovery sulfated gel battery, i.e. diacharged batteries unused for long periods or the battery that never recharges completely. This mode should be applied with the battery completely disconnected from the devices it runs.</td><td rowspan="2"> 
</td></tr>
<tr><td>Mode 5<br>(023)</td><td>Suitable for recovery sulfated lead storage battery, i.e. diacharged batteries unused for long periods or the battery that never recharges completely. This mode should be applied with the battery completely disconnected from the devices it runs.</td></tr>
<tr><td> 
</td><td>Mode 6<br>(123)</td><td>DC power supply 12.2V (for 12V spec.) / 24.5V (for 24V spec)</td><td rowspan="2"> 
</td></tr>
<tr><td> 
</td><td>Mode 7<br>(000)</td><td>DC power supply 13.5V (for 12V spec.) / 27V (for 24V spec)</td></tr>
</table>

## 7. Charger LCD remote control



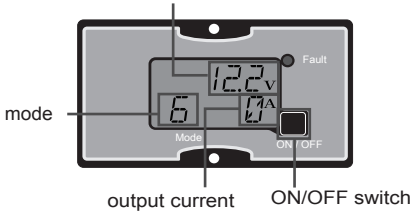

1. OFF


2. Mode 1 ~ 5, no battery connected.



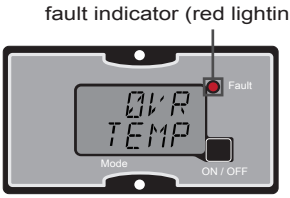

3. Mode 1 ~ 5 while charging.


4. Mode 1~ 5, float stage display.

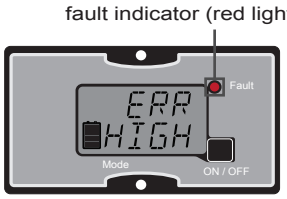



5. Mode 6 ~ 7: power supply mode.

**** If overload, the output volt would go down gradually, according to the load current. ****




6. Over temperature protection.




7. High battery volt protection.

## 8. Technical specifications

| Model | FUM-1215CBPH | | | | | | | FUM-2407CBPH | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INPUT | | | | | | | | | | | | | | |
| Voltage range | 180~240VAC | | | | | | | | | | | | | |
| Frequency range | 45 ~ 65 Hz | | | | | | | | | | | | | |
| Efficiency | ≥ 85% | | | | | | | | | | | | | |
| Power factor | 0.5 at full load (±5%) | | | | | | | | | | | | | |
| Input socket | IEC plug | | | | | | | | | | | | | |
| OUTPUT | | | | | | | | | | | | | | |
| Mode selection | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M1 | M2 | M3 | M4 | M5 | M6 | M7 |
| Bulk stage | 14.7V 15A | | | 14.1V 1A | 14.7V 1A | 12.2V 15A | 13.5V 15A | 29.4V 7A | | | 28.2V 0.5A | 29.4V 0.5A | 25.4V 7A | 27V 7A |
| Absorption stage (I) | 14.7V 15~0A | 14.1V 15~0A | 14.1V 15~0A | 14.1V 1~0A | 14.7V 1~0A | 12.2V 15A | 13.5V 15A | 29.4V 7~0A | 28.2V 7~0A | 28.2V 7~0A | 28.2V 0.5~0A | 29.4V 0.5~0A | 24.5V 7A | 27V 7A |
| Absorption stage (II) | --- | --- | 14.7V 1A max. | --- | --- | --- | --- | --- | --- | 29.4V 0.5A max | --- | --- | --- | --- |
| Float stage | 13.5V 1A max. | | | | | 12.2V 15A | 13.5V 15A | 27V 0.5A max. | | | | | 24.5V 7A | 27V 7A |
| Max. current | 15A | | | | | | | 7A | | | | | | |
| Continous current | 15A | | | | | | | 7A | | | | | | |
| Recommended battery capacity | 45 ~ 150 Ah (12V) | | | | | --- | | 30 ~ 90 Ah (24V) | | | | | --- | |
| Leakage current from battery | < 1mA | | | | | --- | | < 1mA | | | | | --- | |
| Sleeping mode function | Yes, (5A current output only) | | | | | --- | | Yes, (2.5A current output only) | | | | | --- | |
| PROTECTION | | | | | | | | | | | | | | |
| Overtemperature | 55 ± 5 ºC (131 ± 9 ºF) | | | | | | | | | | | | | |
| Overload | Yes | | | | | | | | | | | | | |
| Output short-circuit | Yes | | | | | | | | | | | | | |
| Microprocessor check | Yes | | | | | | | | | | | | | |
| ENVIRONMENT | | | | | | | | | | | | | | |
| Working temperature | -15 ~ +45 ºC (5 ~ 113 ºF) | | | | | | | | | | | | | |
| Working humidity | 20 ~ 90 % RH non-condensing | | | | | | | | | | | | | |
| Storage conditions | -30 ~ +70 ºC (-22 ~ 158 ºF), 10 ~ 95% RH | | | | | | | | | | | | | |
| Temperature coefficient | ± 0.05 %/ºC (0 ~ 50 ºC / 32 ~ 122 ºF) | | | | | | | | | | | | | |
| OTHER | | | | | | | | | | | | | | |
| Remote control | Yes | | | | | | | | | | | | | |
| Dimension | 213 x 142 x 72 mm (L x W x H) | | | | | | | | | | | | | |
| Weight | 1.9 Kgs. | | | | | | | | | | | | | |

Tolerance for specifications: ±0.5V for 12V spec.; ±1V for 24V spec.; ±10% for current data.

Specifications subject to change without notice

| Model | FUM-1230CBP | | | | | | | FUM-2415CBP | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INPUT | | | | | | | | | | | | | | |
| Voltage range | 100~240VAC | | | | | | | | | | | | | |
| Frequency range | 45 ~ 65 Hz | | | | | | | | | | | | | |
| Efficiency | ≥ 85% | | | | | | | | | | | | | |
| Power factor | 1.0 at full load (±5%) | | | | | | | | | | | | | |
| Input socket | IEC plug | | | | | | | | | | | | | |
| OUTPUT | | | | | | | | | | | | | | |
| Mode selection | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M1 | M2 | M3 | M4 | M5 | M6 | M7 |
| Bulk stage | 14.7V 30A | | | 14.1V 2A | 14.7V 2A | 12.2V 30A | 13.5V 30A | 29.4V 15A | | | 28.2V 1A | 29.4V 1A | 25.4V 15A | 27V 15A |
| Absorption stage (I) | 14.7V 30~0A | 14.1V 30~0A | 14.1V 30~0A | 14.1V 2~0A | 14.7V 2~0A | 12.2V 30A | 13.5V 30A | 29.4V 15~0A | 28.2V 15~0A | 28.2V 15~0A | 28.2V 1~0A | 29.4V 1~0A | 24.5V 15A | 27V 15A |
| Absorption stage (II) | --- | --- | 14.7V 2A max. | --- | --- | --- | --- | --- | --- | 29.4V 1A max | --- | --- | --- | --- |
| Float stage | 13.5V 2A max. | | | | | 12.2V 30A | 13.5V 30A | 27V 1A max. | | | | | 24.5V 15A | 27V 15A |
| Max. current | 30A | | | | | | | 15A | | | | | | |
| Continous current | 30A | | | | | | | 15A | | | | | | |
| Recommended battery capacity | 75 ~ 250 Ah (12V) | | | | | --- | | 45 ~ 150 Ah (24V) | | | | | --- | |
| Leakage current from battery | < 1mA | | | | | --- | | < 1mA | | | | | --- | |
| Sleeping mode function | Yes, (5A current output only) | | | | | --- | | Yes, (2.5A current output only) | | | | | --- | |
| PROTECTION | | | | | | | | | | | | | | |
| Overtemperature | 55 ± 5 ºC (131 ± 9 ºF) | | | | | | | | | | | | | |
| Overload | Yes | | | | | | | | | | | | | |
| Output short-circuit | Yes | | | | | | | | | | | | | |
| Microprocessor check | Yes | | | | | | | | | | | | | |
| ENVIRONMENT | | | | | | | | | | | | | | |
| Working temperature | -15 ~ +45 ºC (5 ~ 113 ºF) | | | | | | | | | | | | | |
| Working humidity | 20 ~ 90 % RH non-condensing | | | | | | | | | | | | | |
| Storage conditions | -30 ~ +70 ºC (-22 ~ 158 ºF), 10 ~ 95% RH | | | | | | | | | | | | | |
| Temperature coefficient | ± 0.05 %/ºC (0 ~ 50 ºC / 32 ~ 122 ºF) | | | | | | | | | | | | | |
| OTHER | | | | | | | | | | | | | | |
| Remote control | Yes | | | | | | | | | | | | | |
| Dimension | 252 x 142 x 72 mm (L x W x H) | | | | | | | | | | | | | |
| Weight | 2.5 Kgs. | | | | | | | | | | | | | |

Tolerance for specifications: ±0.5V for 12V spec.; ±1V for 24V spec.; ±10% for current data.

Specifications subject to change without notice

| Model | FUM-1260CBP | | | | | | | FUM-2430CBP | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INPUT | | | | | | | | | | | | | | |
| Voltage range | 100~240VAC | | | | | | | | | | | | | |
| Frequency range | 45 ~ 65 Hz | | | | | | | | | | | | | |
| Efficiency | ≥ 85% | | | | | | | | | | | | | |
| Power factor | 1.0 at full load (±5%) | | | | | | | | | | | | | |
| Input socket | IEC plug | | | | | | | | | | | | | |
| OUTPUT | | | | | | | | | | | | | | |
| Mode selection | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M1 | M2 | M3 | M4 | M5 | M6 | M7 |
| Bulk stage | 14.7V 60A | | | 14.1V 2A | 14.7V 2A | 12.2V 60A | 13.5V 60A | 29.4V 30A | | | 28.2V 1A | 29.4V 1A | 25.4V 30A | 27V 30A |
| Absorption stage (I) | 14.7V 60~0A | 14.1V 60~0A | 14.1V 60~0A | 14.1V 2~0A | 14.7V 2~0A | 12.2V 60A | 13.5V 60A | 29.4V 30~0A | 28.2V 30~0A | 28.2V 30~0A | 28.2V 1~0A | 29.4V 1~0A | 24.5V 30A | 27V 30A |
| Absorption stage (II) | --- | --- | 14.7V 4A max. | --- | --- | --- | --- | --- | --- | 29.4V 1A max | --- | --- | --- | --- |
| Float stage | 13.5V 2A max. | | | | | 12.2V 60A | 13.5V 60A | 27V 1A max. | | | | | 24.5V 30A | 27V 30A |
| Max. current | 60A | | | | | | | 30A | | | | | | |
| Continous current | 60A | | | | | | | 30A | | | | | | |
| Recommended battery capacity | 180 ~ 600 Ah (12V) | | | | | --- | | 90 ~ 300 Ah (24V) | | | | | --- | |
| Leakage current from battery | < 1mA | | | | | --- | | < 1mA | | | | | --- | |
| Sleeping mode function | Yes, (5A current output only) | | | | | --- | | Yes, (2.5A current output only) | | | | | --- | |
| PROTECTION | | | | | | | | | | | | | | |
| Overtemperature | 55 ± 5 ºC (131 ± 9 ºF) | | | | | | | | | | | | | |
| Overload | Yes | | | | | | | | | | | | | |
| Output short-circuit | Yes | | | | | | | | | | | | | |
| Microprocessor check | Yes | | | | | | | | | | | | | |
| ENVIRONMENT | | | | | | | | | | | | | | |
| Working temperature | -15 ~ +45 ºC (5 ~ 113 ºF) | | | | | | | | | | | | | |
| Working humidity | 20 ~ 90 % RH non-condensing | | | | | | | | | | | | | |
| Storage conditions | -30 ~ +70 ºC (-22 ~ 158 ºF), 10 ~ 95% RH | | | | | | | | | | | | | |
| Temperature coefficient | ± 0.05 %/ºC (0 ~ 50 ºC / 32 ~ 122 ºF) | | | | | | | | | | | | | |
| OTHER | | | | | | | | | | | | | | |
| Remote control | Yes | | | | | | | | | | | | | |
| Dimension | 335 x 142 x 72 mm (L x W x H) | | | | | | | | | | | | | |
| Weight | 3.5 Kgs. | | | | | | | | | | | | | |

Tolerance for specifications: ±0.5V for 12V spec.; ±1V for 24V spec.; ±10% for current data.

Specifications subject to change without notice

## 9. Charging and discharging formulae

**Charging time**

Formula: Charging time will depend on the capacity oy your battery and on how deeply is discharged. The following equation calculates an approximate charging time:

$$\text{Charging time} = \frac{\text{CAP x DOD}}{\text{CC x 80\%}}$$

Where:

Charging time: battery recharge time in hours.

CAP: Battery capacity in ampere-hours

DOD: Battery depth of discharge in per cent. A fully discharged battery has a 100% DOD.

CC: Charge current, the rated current output of the charger in amperes

80%: Typical charging efficiency fo lead-acid batteries.

Example: A group size battery rated at 100 amp-hours is 40% discarged, that is it has a DOD = 40. Carging time with a FUM-1215CBPH is calculated as follows:

$$\text{Charging time} = \frac{\text{100Ah x 40\%}}{\text{15A x 80\%}} = 3.3 \text{ hours}$$

**Discharging time**

To achieve 50% cycling you should calculate your amp-hour consumption between charging cycles and use a battery bank with twice that capoacity. To calculate Amp-hour consumption, fisrt look at the rating plate on your AC appliance or tools.

Each appliance or toll will be rated in either AC amps or AC watt or AC VA(volt-amperes) apparent power.

Use one of the following to calculate the DC amp-hour draw for a 12V system.

(AC amps x 18.3) x 1.1 x hours of operation = DC amp-hours.

(AC watts/12) x 1.1 x hours of operation = DC amp-hours.

(AC VA/12) x 1.1 x hours of operation = DC amp-hours.

In all formulas, 1.1 is the factor for inverter/charger efficiency.

Calculate the above for every AC appliance or tool you intend to use on your inverter. This will give you the total number of amp-hours used between recharges. Size your battery bank using this number as a guideline. A good rule to follow is to size the battery bank about two times mlarger than your total amp-hour load requirement. Plan on recharging when 50% discharged. Many electrical motors have momentary starting requirements weel above their operational rating. Start up watts are listed where apprpiate. Individual styles and brands of appliance may vary.

NOTICE: Lead-acid battery is recommended for inverter/charger models, also the $LiFePO_4$ batteries.