



HF/PFC On-board battery charger

User Manual

Model :Charger 1. 5KW/2KW/3LW/4KW/6KW/8KW



- ✧ **Please read this instruction carefully before installation**
- ✧ **Please refer to qualified personnel for installation**
- ✧ **Connection mode should strictly comply with the instructions**

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HF/PFC On-board battery charger (Applicable to Lithium battery charger)



It offers the information of the on-board charger series from our company including their installation, usage, maintenance and some cautions in application, pls read carefully

1.Feature Overview

The charger is applicable for various lithium batteries like LiFePO₄, LiMn₂O₄ etc., It features light weight, small volume, stable performance, high efficiency and reliable security etc.,

The charger is widely used for battery-charging cycles in electric vehicles such as electric forklift, golf cars, electric trucks, electric tour bus, electric yacht, cleaning machines, or Uninterruptible Power Supply (UPS), Solar energy, wind power dynamo and electric communication system on the railway etc.

2.Protection Features

1. **Thermal Self-Protection:** When the internal temperature of the charger exceeds 75 ° C, the charging current will reduce automatically. If it exceeds 85 ° C, the charger will shutdown protectively. When the internal temperature drops, it will resume charging automatically.

2. **Short-circuit Protection:** When the charger encounters unexpected short-circuit, it will automatically stop to output. When fault removes, the charger will re-start in 10 seconds.

3. **Reverse Connection Protection:** When the battery is polarity reversed, the charger will cut off the connection between the internal circuit and the battery, and refuses to start. It can avoid any destroy.

4. **Input Low-voltage & Over-voltage Protection:** When the AC input Voltage is lower than 85V or higher than 265V, the charger will shutdown protectively and automatically resume working with the voltage is normal again.

3.Advantages

- ✧ Internal integrated PFC.No pollution to electric network,avoid shocking on electric network from heavy current
- ✧ Wide input range :AC85V-AC265V available for worldwide requirements,convenient for electric-network fluctuation and electric car exportation

- ✧ High efficiency above 93%
- ✧ Intelligent temperature compensation function in the charging process, preventing the damage to battery caused by charge-off or charge due, greatly extending the lifespan of the battery
- ✧ Fully-sealed and waterproof ,protection class IP46, Shock resistance treatment inside makes vibration-proof level up to SAEJ1378 that can fully meet the standard of automobile appliance usage
- ✧ Available for various kinds of batteries like lead-acid liFePo4 battery etc., Flexible and programmable of the charging mode and preset in 10 unique algorithms ,equipped with CAN communication interface to realize real-time communication with BMS

4.Attention

(1) Battery safety information

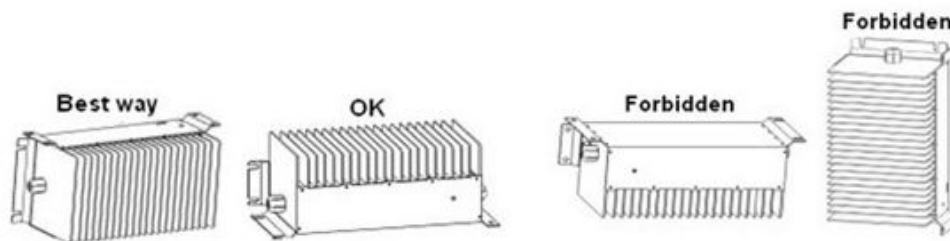
Pls keep batteries away from fire, flammable or explosive items when the lithium batteries are normally charging and ensure the air flows smoothly, Don't charge the batteries that were damaged or not rechargeable, pls contact the battery supplier for further information of battery's basic performance and requirements

(2) Electrical safety information

In order to prevent an electric shock, pls make sure that the charger has grounding cord and meets local regulations and laws. pls do not change the AC adapters or connectors, Don't touch the uninsulated output interface portion or uninsulated battery terminals pls do not arbitrarily inset or pull the power cord during charging. Don't open or disassemble charger to avoid the electric shock. In case that the AC supply cord, DC cord, DC cord or communication cord is damaged or the charger is in a severe deformation by external forces, pls immediately replace it or contact the technician or suppliers, Underage person mustn't engage in any charging operation

5. Installation& Safety Instructions

(1) The most satisfactory is in stalled vertically and keep radiator in vertical position. Leave 10cm above around the radiator ensure the airflow, Never make the radiator face down, otherwise it easily leads to too high temperature inside and affect the charging process



- (2) Ensure all vents are not obstructed to prevent overheating. Don't put the battery charger near any heat source. pls keep enough space to assure ventilation and the cable socket access easily
- (3) Ensure alternating power supply voltage and current match with the allowable input voltage and current of the charger, pls approach retailer or local power supply bureau for enquiry
- (4) For safely and electromagnetic compatibility, the battery charger is equipped with 3-prong plug and suitable for sockets with grounding
- (5) If the AC power line needs to be extended, make sure that it can afford the maximum input current and has the appropriate length
- (6) The voltage-drop between the charger and connection wire of the battery should be less than 1% of the battery voltage as possible, otherwise, it may affect the effect of charging

process ,Meanwhile ,the diameter of the wire should satisfy the output current value

(7) In the process of compensation for the battery voltage,the temperature sensor should be placed the area where has the highest temperature,such as the central region between the two batteries

(8) If the battery is not working properly or damaged ,pls pull the power connectors and the charger interface from the socket,the contact with retails

(9) Pls don't disassemble the charger yourself,it may cause electric shock or their injuries.

(10) In order to avoid damaging the power cord,don't put any object on the line and place the line where it will not be stepped on,if the cord is frayed or damaged ,replace it immediately

III Technical Target

AC Input Voltage Range	AC85V~AC265V
AC Input Frequency	45~65 Hz
AC Power Factor	≥0.98
Full Load Efficiency	≥93%
Mechanical Shock & Vibration Resistance Level	Conformance to SAEJ1378 Standard
Environmental Enclosure	IP46
Operating Temperature	-40℃~+55℃ (-104℉~+131℉)
Storage Temperature	-40℃~+100℃ (-104℉~+212℉)
Charging Control	Via CAN bus or ENABLE

6.LED Label

It is the important symbol to evaluate whether the charger works normally

LED Indicator

Red-Green flash (one second interval)	Battery Disconnected
Red Flash (three seconds interval)	Repair Battery
Red Flash (one second interval)	<80% Charge Indicator
Yellow flash (one second interval)	>80% Charge Indicator
Green flash (one second interval)	100% Charge Indicator



Alarms

	LED Flashing Sequence (One Cycle)	Indication
1	RG _ _ _ _ _	Wrong Battery
2	RGR _ _ _ _ _	Overcharged
3	RGRG _ _ _ _ _	Battery Overheated
4	RGRGR _ _ _ _ _	Incorrect AC Input Voltage
5	RGRGRG _ _ _ _ _	External Thermal Sensor Fault
6	RGRGRGR _ _ _ _ _	Communication Interface Fault
7	GR _ _ _ _ _	Charger Overheated
8	GRG _ _ _ _ _	Charger Relay Fault : Repair
9	GRGR _ _ _ _ _	Charger Fault: Repair

Note:

1. R—red G—green
2. " _ " denotes one second pause
3. Above LED flashing sequence is one cycle; the LED will flash repeatedly if the fault has not been removed.

Solutions

- ▲ **Wrong Battery:** Verify the battery voltage range matching with charger or inspect the battery for damage.
- ▲ **Overcharged:** Confirm the battery capacity and the selected curve are matched or if the battery is defective.
- ▲ **Battery Overheated:** Check the temperature at the external thermal sensor. If overheated, the charger will start the battery protection.
- ▲ **Incorrect AC Input Voltage:** Check that the AC input voltage is in accordance with the requirement.
- ▲ **External Thermal Sensor Fault:** Ensure connect the thermal sensor correctly.
- ▲ **Communication Interface Fault:** Make sure the communication have been correctly connected or if it is damaged.
- ▲ **Charger Overheated:** Check if the ambient temperature is too high or the ventilation is smooth.
- ▲ **Charger Relay Fault:** Repair.
- ▲ **Charger itself failure:** Repair.

7.Connection Instruction for control Interface

I. Charger's Communication Connector



SP1312/S❖

PIN	Description
1	ENABLE:
2	GND:
3	+12V: +12V internal power supply 12V (Load≤50mA)
4	LED - Red
5	LED - Green
6	RX: Serial Communication Receiver (for charger)
7	TX: Serial Communication Sender (for charger)

II. Security Tips



1. Do not allow the lead from any PIN to contact the battery positive or negative.
2. Never attempt to connect any two wires from the SP1312 connector that not be connected.
3. Applied power supply or load above 50mA to +12V PIN3 is forbidden.
4. Internal impedance of PIN1 (ENABLE) is 10K with allowable range 0~16V. Please connect a series resistance of 10 K when controlling by an external 24V supply. (Refer to manufacturer first)

III. Charger's Connection Instruction for Control Interface

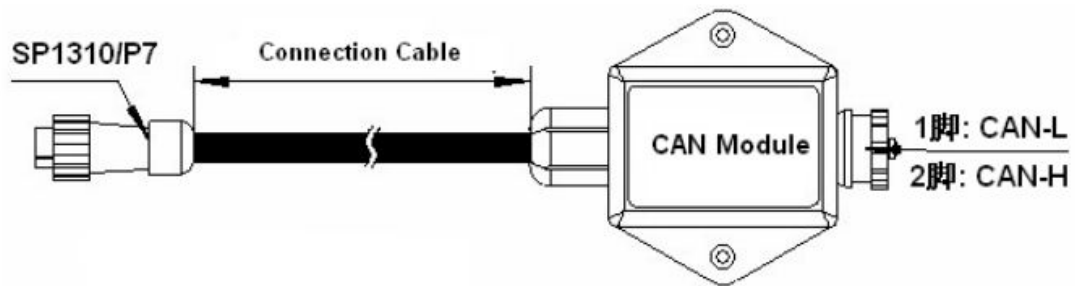
BMS Category		Mode of Connection	Brief Description
BMS with CAN communication function	Control mode No 1#	CAN communication Module (Model: TC-619B V3.1)	BMS controls the charging process by the commands sent from CANbus
Battery protector board or BMS without CAN communication function	Control mode No 2#	Relay control	Use normally open contacts of relay to control the charging enable wires. Closed=Enable, Open=Disable
		Optocoupler device control	Use optoelectronic coupled devices to control the charging enable wires.
		2-5V control	Use 2-5V (dividing by resistance) controlling the charging enable wires and stop charging and be able to set up the output current from 0% to 100% for the charger.

◆ Control mode No 1# : USING THE CAN COMMUNICATION CONTROL

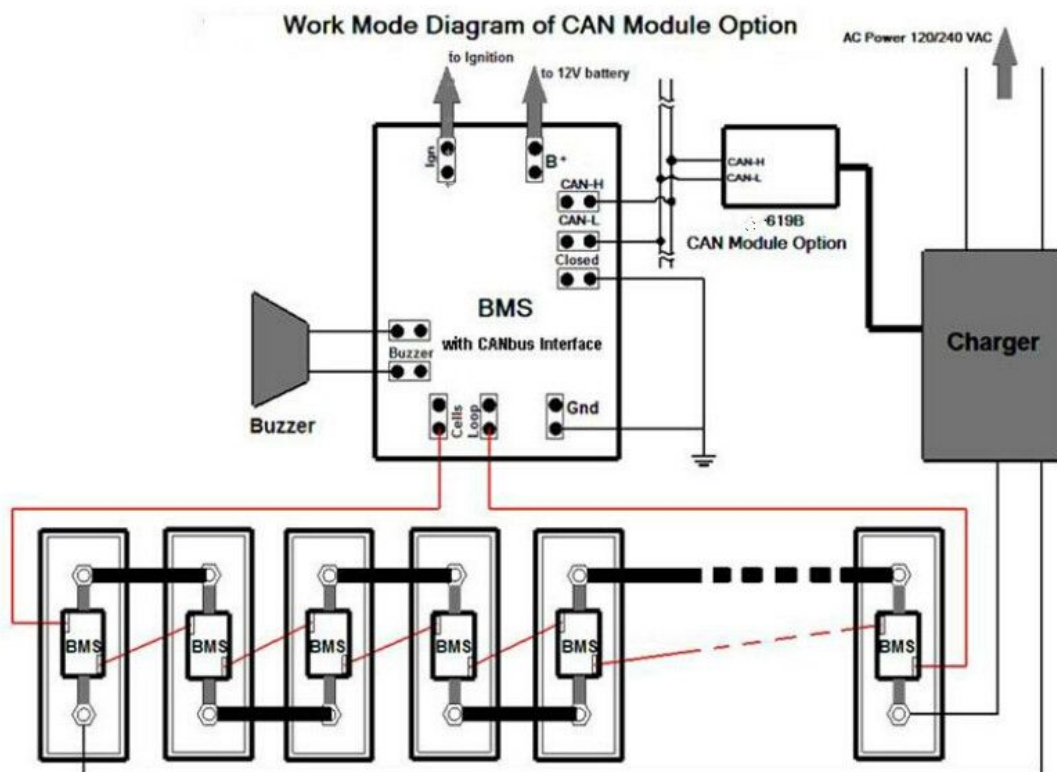


1. The charger can be controlled by CAN communication when the BMS has functionality. The CAN communication module is required (TC-619B V3.1) and can be connected with the BMS CANbus.
 2. The customer should specify "CAN communication" protocol when ordering. Specified CAN ID, CAN module type and CAN communication protocol supported are set up before delivery.
 3. A Standard CAN module with cable length 225mm and the mating connector can be provided.
- PIN 1 connects to CAN-L, PIN 3 connects to CAN-H. See below.

4. -619B V3.1 CAN communication module's interface Diagram



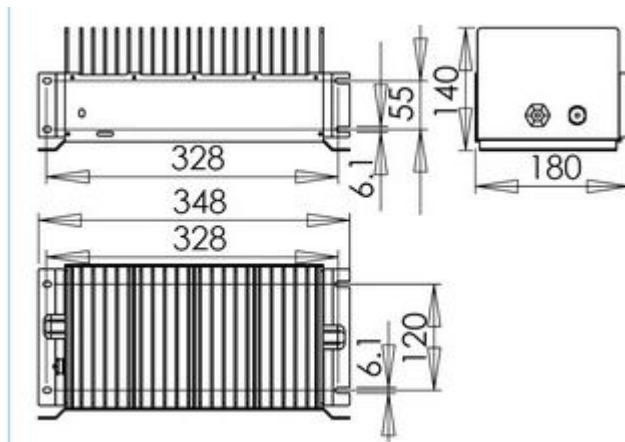
5. SCHEMATIC



HF/PFC 1.5KW ON-BOARD CHARGER

Lead acid Battery charger	Lithium Battery charger	Output voltage Nominal	Output voltage Maximum	Output current Maximum
GWCH-24-40	GWCH-H34.6-40	24V	34.6V	40A
GWCH-36-33	GWCH-H51.1-33	36V	51.1V	33A
GWCH-48-25	GWCH-H65-25	48V	65V	25A
GWCH-60-20	GWCH-H34.6-40	60V	89.8V	20A
GWCH-72-16	GWCH-H34.6-40	72V	103.8V	16A
GWCH-84-14	GWCH-H34.6-40	84V	114V	14A
GWCH-96-12	GWCH-H34.6-40	96V	130V	12A
GWCH-120-10	GWCH-H34.6-40	120V	161V	10A
GWCH-144-08	GWCH-H34.6-40	144V	203V	8A
GWCH-156-08	GWCH-H34.6-40	156V	217V	8A
GWCH-192-6.2	GWCH-H34.6-40	192V	258V	6.2A
GWCH-240-05	GWCH-H34.6-40	240V	320V	5A

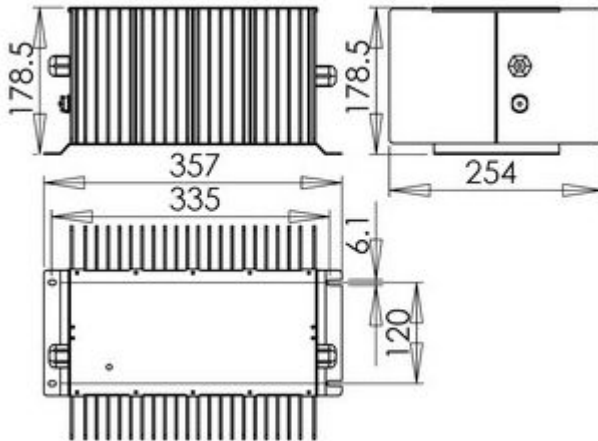
Note: Model of the Lithium battery charger will be marked in response to the actual maximum voltage for the Lithium battery pack.

Installation Dimension(mm)

HF/PFC 2KW ON-BOARD CHARGER

Lead acid Battery charger	Lithium Battery charger	Output voltage Nominal	Output voltage Maximum	Output current Maximum
GWCH-48-35	GWCH-H66-35	48V	66V	35A
GWCH-60-30	GWCH-H82.6-30	60V	82.6V	30A
GWCH-72-25	GWCH-H96.2-25	72V	96.2V	25A
GWCH-84-21	GWCH-H112-21	84V	112V	21A
GWCH-96-18	GWCH-H130-18	96V	130V	18A
GWCH-108-16	GWCH-H144.7-16	108V	144.7V	16A
GWCH-120-15	GWCH-H168-15	120V	168V	15A
GWCH-144-12	GWCH-H192-12	144V	192V	12A
GWCH-156-11	GWCH-H208-11	156V	208V	11A
GWCH-168-10	GWCH-H233.3-10	168V	233.3V	10A
GWCH-180-09	GWCH-H243-09	180V	243V	9A
GWCH-192-09	GWCH-H258-09	192V	258V	9A
GWCH-216-08	GWCH-H289.5-08	216V	289.5V	8A
GWCH-240-7.2	GWCH-H337-7.2	240V	337V	7.2A
GWCH-288-06	GWCH-H389-06	288V	389V	6A
GWCH-312-5.5	GWCH-H417-5.5	312V	417V	5.5A

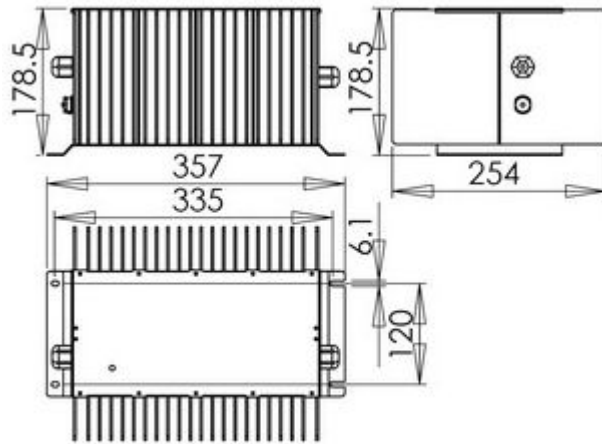
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Installation Dimension(mm)

HF/PFC 3KW ON-BOARD CHARGER

Lead acid Battery charger	Lithium Battery charger	Output voltage Nominal	Output voltage Maximum	Output current Maximum
GWCH-24-80	GWCH-H34.6-80	24V	34.6V	80A
GWCH-36-66	GWCH-H51.1-66	36V	51.1V	66A
GWCH-48-50	GWCH-H65-50	48V	65V	50A
GWCH-60-40	GWCH-H89.8-40	60V	89.8V	40A
GWCH-72-32	GWCH-H103.8-32	72V	103.8V	32A
GWCH-84-28	GWCH-H114-28	84V	114V	28A
GWCH-96-24	GWCH-H130-24	96V	130V	24A
GWCH-120-20	GWCH-H161-20	120V	161V	20A
GWCH-144-16	GWCH-H203-16	144V	203V	16A
GWCH-156-16	GWCH-H217-16	156V	217V	16A
GWCH-192-12.4	GWCH-H258-12.4	192V	258V	12.4A
GWCH-240-10	GWCH-H320-10	240V	320V	10A

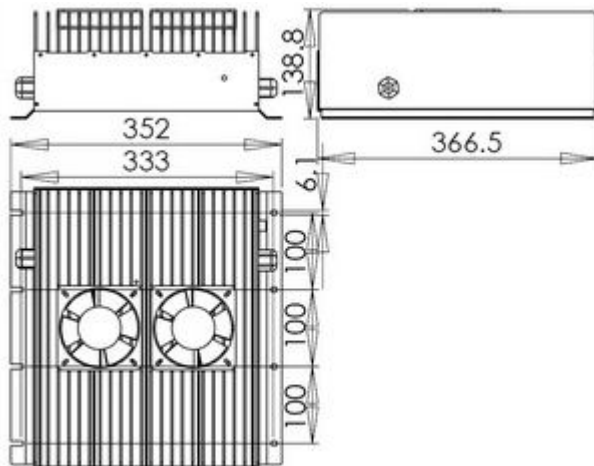
Note: Model of the Lithium battery charger will be marked in response to the actual maximum voltage for the Lithium battery pack.

Installation Dimension(mm)

HF/PFC 4KW ON-BOARD CHARGER

Lead acid Battery charger	Lithium Battery charger	Output voltage Nominal	Output voltage Maximum	Output current Maximum
GWCH-48-70	GWCH-H66-70	48V	66V	70A
GWCH-60-60	GWCH-H82.6-60	60V	82.6V	60A
GWCH-72-50	GWCH-H96.2-50	72V	96.2V	50A
GWCH-84-42	GWCH-H112-42	84V	112V	42A
GWCH-96-36	GWCH-H130-36	96V	130V	36A
GWCH-108-32	GWCH-H144.7-32	108V	144.7V	32A
GWCH-120-30	GWCH-H168-30	120V	168V	30A
GWCH-144-24	GWCH-H192-24	144V	192V	24A
GWCH-156-22	GWCH-H208-22	156V	208V	22A
GWCH-168-20	GWCH-H233.3-20	168V	233.3V	20A
GWCH-180-18	GWCH-H243-18	180V	243V	18A
GWCH-192-18	GWCH-H258-18	192V	258V	18A
GWCH-216-16	GWCH-H289.5-16	216V	289.5V	16A
GWCH-240-14.2	GWCH-H337-14.4	240V	337V	14.2A
GWCH-288-12	GWCH-H389-12	288V	389V	12A
GWCH-312-11	GWCH-H417-511	312V	417V	11A

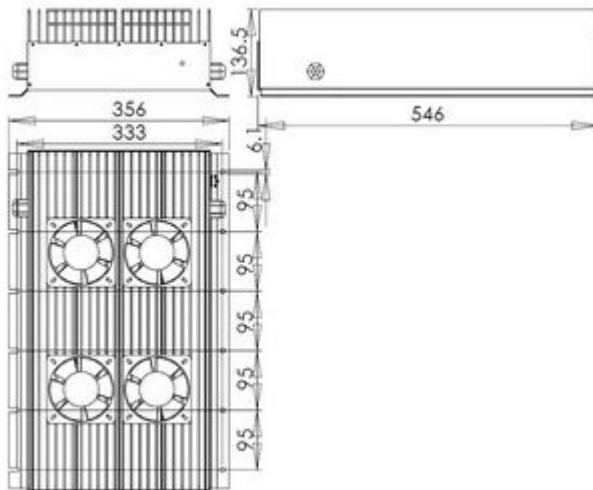
Note: Model of the Lithium battery charger will be marked in response to the actual maximum voltage for the Lithium battery pack.

Installation Dimension(mm)

HF/PFC 6KW ON-BOARD CHARGER

Lead acid Battery charger	Lithium Battery charger	Output voltage Nominal	Output voltage Maximum	Output current Maximum
GWCH-48-105	GWCH-H66-105	48V	66V	105A
GWCH-60-90	GWCH-H82.6-90	60V	82.6V	90A
GWCH-72-75	GWCH-H96.2-75	72V	96.2V	75A
GWCH-84-63	GWCH-H112-63	84V	112V	63A
GWCH-96-54	GWCH-H130-54	96V	130V	54A
GWCH-108-48	GWCH-H144.7-48	108V	114.7V	48A
GWCH-120-45	GWCH-H168-45	120V	168V	45A
GWCH-144-36	GWCH-H192-36	144V	192V	36A
GWCH-156-33	GWCH-H208-33	156V	208V	33A
GWCH-180-27	GWCH-H233.3-30	180V	233.3V	30A
GWCH-192-27	GWCH-H243-27	192V	243V	27A
GWCH-216-24	GWCH-H289.5-24	216V	289V	24A
GWCH-240-21.6	GWCH-H337-21.6	240V	337v	21.6A
GWCH-288-18	GWCH-H389-18	288V	389v	18A
GWCH-312-16.5	GWCH-H417-16.5	312V	417v	16.5A

Note: Model of the Lithium battery charger will be marked in response to the actual maximum voltage for the Lithium battery pack.

Installation Dimension(mm)

HF/PFC 8KW ON-BOARD CHARGER

Lead acid Battery charger	Lithium Battery charger	Output voltage Nominal	Output voltage Maximum	Output current Maximum
GWCH-48-140	GWCH-H66-140	48V	66V	140A
GWCH-60-120	GWCH-H82.6-120	60V	82.6V	120A
GWCH-72-100	GWCH-H96.2-100	72V	96.2V	100A
GWCH-84-84	GWCH-H112-84	84V	112V	84A
GWCH-96-72	GWCH-H130-72	96V	130V	72A
GWCH-108-64	GWCH-H144.7-64	108V	144.7V	64A
GWCH-120-60	GWCH-H168-60	120V	168V	60A
GWCH-144-48	GWCH-H192-48	144V	192V	48A
GWCH-156-44	GWCH-H208-44	156V	208V	44A
GWCH-168-40	GWCH-H233.3-40	168V	233.3V	40A
GWCH-180-36	GWCH-H243-36	180V	243V	36A
GWCH-192-36	GWCH-H258-36	192V	258V	36A
GWCH-216-32	GWCH-H289.5-32	216V	289.5V	32A
GWCH-240-28.8	GWCH-H337-28.8	240V	337V	28.8A
GWCH-288-24	GWCH-H389-24	288V	389V	24A
GWCH-312-22	GWCH-H417-22	312V	417V	22A

Note: Model of the Lithium battery charger will be marked in response to the actual maximum voltage for the Lithium battery pack.

Installation Dimension(mm)