offgridtec
autarkic energy for everyday

Inverter/charger

User Manual

Models:

IC-12/800/30/20 **Art.Nr.: 1-01-013695**

Important Safety Instructions

Please reserve this manual for future review.

Please reserve this manual for future review. This manual contains all instructions about safety, installation, and operation for the inverter/charger.

- Read all the instructions and warnings carefully in the manual before installation.
- Non-safety voltage exists inside the inverter/charger; users must not dismantle it by themself, contact professional maintenance personnel of our company for maintenance.
- Keep the inverter/charger out the reach of children.
- Do not place the inverter/charger in a damp, oily, inflammable, and explosive or severe environment with a large amount of dust accumulation.
- The utility input and AC output have high voltage; please don't touch wire connections.
- Install the inverter/charger in well-ventilated places. Its shell may produce heat during operation.
- It is suggested to install appropriate external fuses/breakers.
- Make sure to switch off all connections with the PV array and the fuse/breakers close to the battery before inverter/charger installation and adjustment.
- Make sure all connections remain tight to avoid excessive heat from a loose connection.
- It's an off-grid inverter/charger, not for an on-grid system.
- This inverter/charger can only be used singly. Parallel or series connections will damage the devices.

Explanation of symbols： To enable users to use the product efficiently and ensure personal and property safety, please read related literature accompanying the following symbols.

TIPs: Indicates any practical advice for reference.

IMPORTANT: Indicates a critical tip during the operation, if ignored, may cause the device to run in error.

CAUTION: Indicates potential hazards, if not avoided, may cause the device damaged.

WARNING: Indicates the danger of electric shock, if not avoided, would cause casualties.

WARNING HOT SURFACE: Indicates the risk of high temperature, if not avoided, would cause scalds.

Read the user manual carefully before any operation.

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1. General Information

1.1 Overview

Offgridtec IC-Series is a new energy storage inverter/charger that integrates utility charging, solar charging, and AC output. The high-performance multi-core chip in the product with the advanced control algorithm brings intelligent management of the system.

As a reliable industrial standard equipment, IC has quick response speed and excellent high transfer efficiency.

Intelligent adjustment of total charging current from both solar and utility, automatic adjustment is realized via different working modes selection, which ensures to provide power energy supply maximally.

The PV charging module adopts the up-to-date optimized MPPT tracking technology; it can quickly track the PV array's maximum power point in any environment. The MPPT tracking speed and energy transfer efficiency are quite high. The PV and AC charge current can be adjusted manually, which can meet the total charge current limit function. PV & utility charge current ratio distribution. Full electronic protection functions are available.

With a fully digital double closed-loop control, the AC-DC charging unit has extremely high response speed and stability. A wide AC input voltage and charge current limitation can be set. This module has complete protection functions at input and output.

The DC-AC inverter module is based on full digital and intelligent design. It adopts the advanced SPWM technology, outputs the pure sine wave, and converts 24/48VDC to 220/230VAC, suitable for AC loads of household appliances, electric tools, commercial units, electronic audio, and video devices, etc.

With the Utility by-pass charging function, the utility module can provide a power supply to load directly and charge the battery simultaneously. Under utility charge status, the user can choose by-pass mode or inverter output mode. I-series provides multiple power supply modes, such as solar and utility, to maximize the use of green energy while ensuring electricity supply.

The display module is key for communication. The 4.2 inch LCD presents system status and real-time data; the user can set work parameters easily by four buttons.

Features：

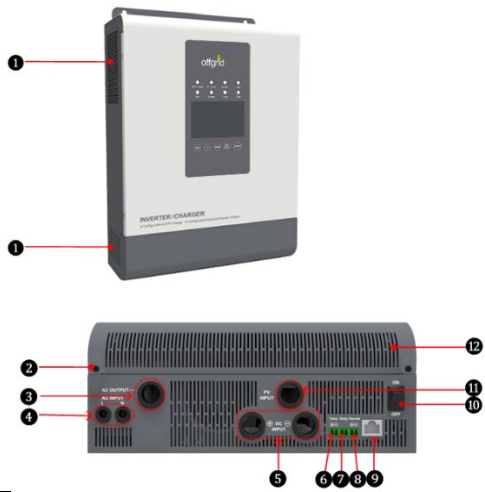
- Full intelligent digital energy storage equipment
- Adjustment function of Utility & Solar charging ratio to meet various applications
- Advanced MPPT tracking technology, Max. tracking efficiency 99.5 %, Max. conversion efficiency 98.5 %
- Advanced all-digital control AC-DC charging modules to realize wide voltage input, high efficiency, and high stability
- Advanced SPWM technology to ensure maximum efficiency up to 95 %, and full load efficiency up to 93 %
- High output voltage stability: when full load working in the working voltage range of battery, output voltage
- 220V/230V±5%①, frequency 50/60±0.1 Hz; voltage& frequency optional
- Advanced voltage, current, and power multi-loop control makes the DC-AC unit has good dynamic response capability, high resistance to surge power, and high operational reliability
- With the function of Utility & Solar charging ratio selection, and total charging current setting
- Four charging modes: Utility priority, Solar priority, Utility & Solar and Solar only
- Two output modes: Battery and Utility
- Utility charging and inverter output can work at the same time, which avoids the impact of the unstable

Utility voltage on the load

- Rich set of options: charging current, battery type, battery voltage threshold, etc.
- AC output one-key control, which can switch Utility or inverter output on and off, keeping the output of mode can make it convenient while wiring and maintaining on electric-distributions, reducing the standby loss
- Support cold start and soft start
- RS485 isolated communication interface with 5V 200mA output, it is easy to access communication devices such as WIFI module
- PC or mobile phone APP can be used for remote monitoring, management, and setting to meet various remote use of users
- Optional backlight and buzzer warning selection via PC software
- With PV reverse polarity, Charging power limit, short circuit, battery reverse polarity protection
- With Utility input/AC output over-voltage, battery low voltage, power limit, over-current, and short circuit protections
- With battery low/over voltage protection and temperature compensation etc.
- With internal over-temperature protection and intelligent start-stop function of the fan
- A variety of accessories can be selected according to the user's requirements

① in battery discharging mode Output tolerance is 220V -6%~+5% or 230V -10%~+5% with 12V battery input

1.2 Characteristics



❶	Ventilation	❼	Relay interface
❷	M4 Screw (2 pcs)	❽	Remote interface
❸	AC output terminals	❾	RS485 interface(5VDC/200mA)

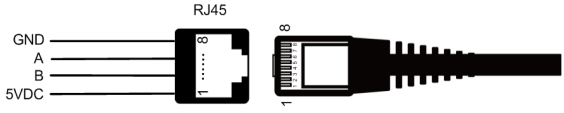
❹	Utility input terminals	❿	Inverter/charger switch
❺	Battery input terminals	⓫	PV input terminals
❻	RTS★ interface	⓬	Terminals cover

Temperature Sensor

（Model:RT-MF58R47K3.81A）

★ Connect the temperature sensor, the inverter/charger is compensated according to the ambient temperature.

- **RS485 Interface**



RJ45 interface pin define is shown below：

Pins	Define	Pins	Define
1	5VDC	5	RS-485-A
2	5VDC	6	RS-485-A
3	RS-485-B	7	GND
4	RS-485-B	8	GND

1.3 Schematic Diagram for Connections

❶Utility power supply and ❷Battery power supply can not be carried out simultaneously.

Confirm the AC load power compatible with the power of the inverter/charger. AC load selected exceeding the maximum output power of the inverter/charger is prohibited.

2. Installation Instructions

2.1 General Installation Notes

- Please read the entire installation instructions to get familiar with the installation steps before installation.
- Be very careful when installing the batteries, especially flooded lead-acid batteries. Please wear eye protection and have fresh water available to wash and clean if any battery acid contact.
- Keep the battery away from any metal objects, which may cause a short circuit of the battery.
- Explosive acid battery gases may come out from the battery during charging, so make sure ventilation condition is good.
- Ventilation is highly recommended if mounted in an enclosure. Never install the inverter/charger in a sealed enclosure with flooded batteries! Battery fumes from vented batteries will corrode and destroy the inverter/charger circuits.
- The lead-acid battery is only recommended. For other kinds, please refer to the battery manufacturer.
- Loose connections and corroded wires may result in high heat that can melt wire insulation, burn surrounding materials, or even cause a fire. Ensure tight connections and use cable clamps to secure cables and prevent them from swaying in motion.
- Select the system cables according to 5A/mm^2 or less current density following Article 690 of the National Electrical Code, NFPA 70.
- For outdoor installation, keep out of the direct sunshine and rain infiltration.
- High voltage still exists inside the inverter/charger after switching off the power switch. Do not turn on or touch the internal units and conduct the associated operation only after discharging the electric capacity.
- Do not place the inverter/charger in a damp, oily, inflammable, and explosive or severe environment with a large amount of dust accumulation.
- Prohibit reverse connection at DC input end; otherwise, it may damage the equipment, or unpredictable danger will occur.
- The utility input and AC output are of high voltage, do not touch the wire connection.

2.2 Wire Size& breaker

The wiring and installation methods must follow all national and local electrical code requirements.

➢ **Recommended wire and circuit breaker of PV**

Model	PV wire size	Breaker
IC-12/800/30/20	10mm^2/8AWG	2P—63A

NOTE: When the PV modules are connected in series, the PV array's open-circuit voltage must not exceed the max. PV input voltage at 25℃ environment temperature.

➢ **Recommended wire of Utility**

Model	Utility wire size
IC-12/800/30/20	2.5mm²/14AWG

NOTE: The utility input has the circuit breaker already, and there is no need to add any more.

➢ **Recommended wire and circuit breaker of battery**

Model	Battery wire size	Breaker
IC-12/800/30/20	16mm²/6AWG	2P—100A

NOTE: Type of circuit breaker is selected based on the inverter's non-independent connection at the battery end where there is no anther inverter connected.

➢ **Recommended wire and circuit breaker for AC output**

Model	AC wire size	Breaker
IC-12/800/30/20	2.5mm²/14AWG	2P—10A

- The wire size is only for reference. Suppose a long-distance exists between the PV array and the inverter/charger or between the inverter/charger and the battery. In that case, larger wires shall be used to reduce the voltage drop and improve the system performance.
- The above wire and the circuit breaker size are recommended only; please choose the appropriate wire and circuit breaker according to the practical situation.

NOTE：The cable lugs refer to the cardboard in the package.

2.3 Mounting

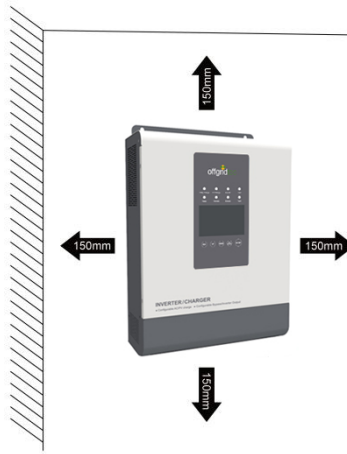


Figure2-1 Mounting

Installation steps：

Step1：Determination of Installation Location and heat-dissipation Space

When installing the inverter/charger, ensure enough air flowing through the heat sink. Please leave at least 150mm clearance away from the upper and lower edges. Please see Figure 2-1: Mounting.

WARNING: Risk of explosion!
Never install the inverter/charger with flooded batteries in a sealed enclosure! Do not install the device in a confined area where battery gas can accumulate.

Step 2：Take down the terminal protective cover

Step 3：Wiring

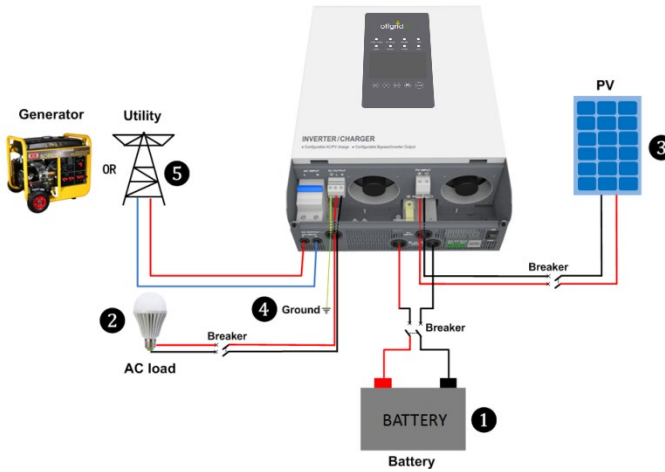


Figure 2-3Wring Diagram

Connect the system in order of battery → load → PV array →Ground→Utility following Figure 2-3: Wiring Diagram. Disconnect the system in reverse order.

- Danger, High-voltage! Utility input, AC output, and PV array will produce dangerous voltage. Ensure to disconnect the circuit breaker/ fuse before wiring.
- Do not turn on the circuit breaker/ fuse when wiring, and at the same time, ensure that the wiring of "+," "-" are correctly connected.
- A circuit breaker must be installed at the battery end. For selection, refer to Section 2.3, "Wire and Circuit Breaker."

If the inverter/charger is to be used in an area with frequent lightning strikes, installing an external surge arrester at the PV input is recommended.

➢ **Grounding**

A grounding connection must be made when the utility is connected to the inverter/charger. The inverter/charger has a dedicated grounding terminal, as shown in Fig. 2-3, and the grounding must be reliable. The grounding wire has to stay consistent with Recommended wire for AC output. The grounding point shall be as close as possible to the inverter/charger; the grounding wire shall be as short as possible.

➢ **AC output, Ground, and PV wiring terminal use way:**

① When wiring, do not close the circuit breaker. It is necessary to use a slotted screwdriver to unscrew the screws for connecting their corresponding wires.

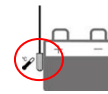
② When removing the wirings, first the integrated machine must stop working. Then the screws shall be unscrewed by using a slotted screwdriver to dismantle their corresponding wires.

Step 4： Install the terminal protective cover

Step 5：Connect accessory

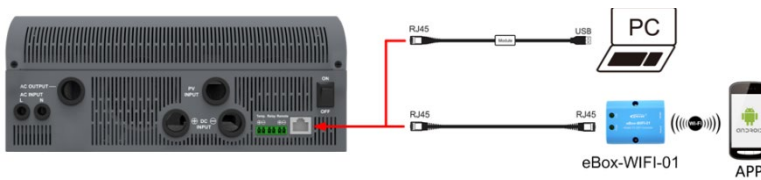
- Connect the remote temperature sensor cable (model: RTS300R47K3.81A)

Connect one end of the remote temperature sensor cable to the interface⑥ and place the other end close to the battery.



Connect the temperature sensor, the inverter/charger is compensated according to the ambient temperature.

- Connect the remote temperature sensor cable (model: RTS300R47K3.81A)
- **Connect the accessories, monitor the system status, and set the parameters via PC software or APP software.**



(1)PC software
www.offgridtec.com——Inverter Monitor

(2)Mobile APP software (Android)

Search for Offgridtec

Step 6：Recheck if the wire connection is correct

Step 7：Power on the inverter/charger

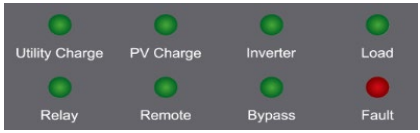
①Turn on the circuit breaker at the battery end.
②Switch on the switch, then the inverter indicator is on.
③Turn on the breaker of PV array and Utility.
④Turn on the AC load when the AC output is normal.

- When supplying power for different AC loads, it is recommended to turn on the load with a large impulse current. And then turn on the load with a smaller impulse current after the load output is stable.
- If the inverter/charger is not operating properly or the LCD or the indicator shows an abnormality, please refer to 5 "Troubleshooting" or contact our after-sales personnel

NOTE：The installation steps and accessory list also refer to the cardboard in the package.

3. Interface Instruction

3.1 Indicator

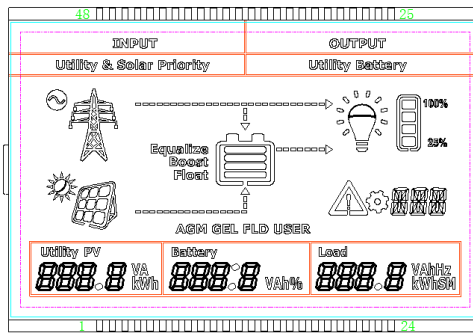


Indicator	Color	Status	Instruction
	Green	OFF	No utility input
		On Solid	Utility connection normal but no charging
		Slowly Flashing(0.5Hz)	Utility charging
		Fast Flashing(2.5Hz)	Utility charge module fault
	Green	OFF	No PV input
		On Solid	PV connection normal but no charging
		Slowly Flashing(0.5Hz)	PV charging
		Fast Flashing(2.5Hz)	PV charge module fault
	Green	OFF	Inverter turns off
		On Solid	Inverter turns on By-pass
		Slowly Flashing(0.5Hz)	Inverter output
		Fast Flashing(2.5Hz)	Inverter fault
	Green	OFF	No-load output
		On Solid	Load output
	Green	OFF	Relay turns off
		On Solid	Relay turn on
	Green	OFF	Input voltage(3.3～12VDC)
		On Solid	No Input voltage
	Green	OFF	Inverter output
		Slowly Flashing(0.5Hz)	Utility output
	Red	OFF	Device normal
		On Solid	Device fault

3.2 Buttons

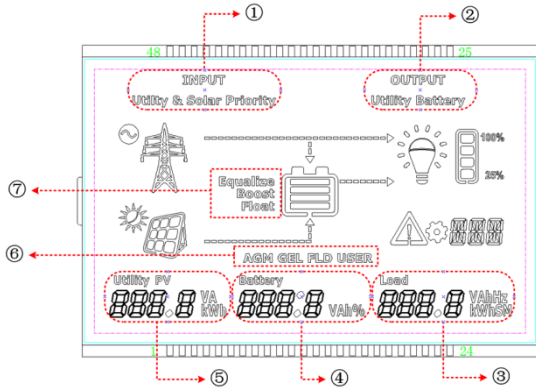
Operation	Instruction
Press the ESC button	Exit the current interface
Press the ESC button and hold on 2s	Clear the faults
Press the UP / DOWN button	Browse interface：Up/Down
	Setting interface：Up/Down
Press the SET/ ENTER button	Switch to "Browse Parameter Column" Confirm the setting parameters
Press the SET/ ENTER button and hold on 2s	Switch the" Real-Time Interface" over to "Set Browse Interface"
	Switch the "Set Browse Interface" over to "Parameter Setting Interface"
Press the AC OUT button and hold on 2s	Inverter ON/OFF

3.3 Real-time interface



Icon	instruction	Icon	instruction
	Utility connecting and input		PV connecting and input
	No Utility connecting Utility connecting but no input		No PV connecting PV connecting but no input

	Load ON		Load OFF
100% 25%	Load power 8～25%	100% 25%	Load power 25～50%
100% 25%	Load power 50～75%	100% 25%	Load power 75～100%



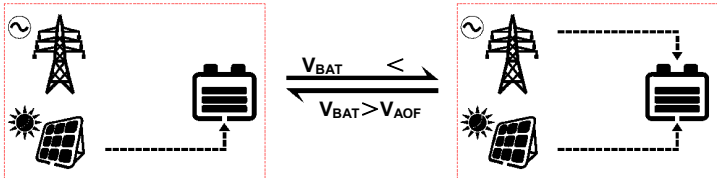
Item	Setting	Content
①	INPUT	Solar priority Utility priority Utility & solar Solar
②	OUTPUT	Battery Utility
③	Load	AC output voltage AC output current AC output power AC output frequency
④	Battery	Battery voltage Max. charging current (PV charging current+ Utility charging current) Battery temperature Battery SOC
⑤	PV	PV input voltage PV charging current PV charging power PV charge energy

	Utility	Utility input voltage Utility charging current Utility charging power Utility charge energy
⑥	Battery Type	AGM GEL FLD USER
⑦	Battery charging stage	Float Boost Equalize (28th each month)

① **INPUT**

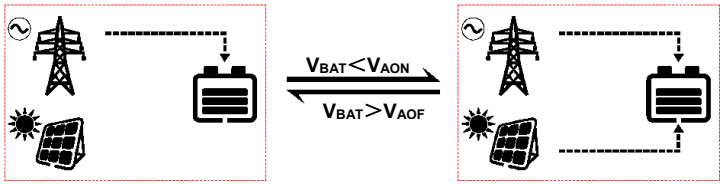
★Solar priority(Default)

The battery is charged in solar priority mode. When the battery voltage is lower than "Auxiliary Module ON Voltage(V_{AON})," the utility starts charging. When the battery voltage reaches "Auxiliary Module OFF Voltage(V_{AOF})," the utility stops charging.

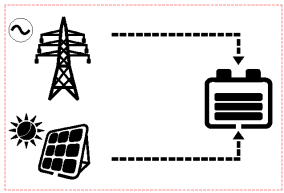


★Utility priority

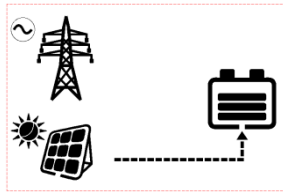
The battery is charged in utility priority mode. When the battery voltage is lower than the "Auxiliary Module ON Voltage (V_{AON})," the solar starts charging the battery. And when the battery voltage reaches the "Auxiliary Module OFF Voltage (V_{AOF})," the solar stops charging.



★Utility &solar
Utility &solar charge the battery

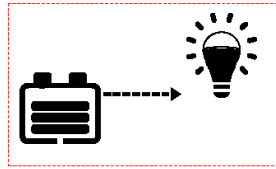


★Solar
Solar charge the battery

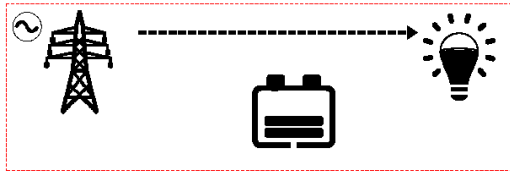


② **OUTPUT**

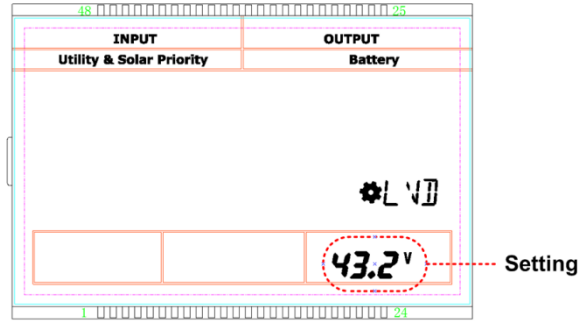
★Battery



★Utility(Default)



3.4 Setting interface



1) Common interface for common user

Operation:

Step1: Press the SET/ ENTER button and hold on 2s at the real-time interface to go to the common interface.

Step2: Press the SET/ ENTER button and hold on 2s at the setting parameter interface and choose the parameters.

Step3: Press the SET/ ENTER button to set the parameter and press this button again for confirmation.

Step4: Press the ESC button to exit the setting interface.

Setting:

Item	LCD	Instruction	Default	Range

1	BTP	Battery type	AGM	AGM GEL FLD USER
2	CSP	Charge source priority	Solar priority	Solar priority Utility priority Utility & solar Solar
3	OSP	Output source priority	Battery	Battery Utility
4	TMU	Temperature unit	℃	℃/℉
5	BLT	Backlight time	30S	30S/60S/100S(Always-on)
6	BAS	Buzzer alarm switch	ON	ON/ OFF
7	LVD	Low voltage disconnect voltage	10.8V★	User 10.5～11.3V★ step size 0.1V★
8	LVR	Low voltage reconnect voltage	12.5V★	User 12.0～13.0V★ step size 0.1V★

★The voltage parameter is at 25℃, 12V system, and twice in 24V system, quadruple in 48V system.

When the output mode is battery priority, the battery voltage is lower than the low-voltage disconnect voltage (adjustable). The system switch to the utility power supply for the load.

2) Advanced interface for engineers

Operation:

Step1: Press the UP + DOWN button and hold on 2s under the real-time interface.

Step2: Press the SET/ ENTER button and hold on 2s under the setting parameter interface.

Step3: Press the SET/ ENTER button to enter the parameter.

Step4: Press the ESC button to exit the setting interface.

Setting:

Item	LCD	Instruction	Default	Range
9	BCT	Boost Charging Time	30min	30/60/120/180min
10	BCV	Boost Charging Voltage	AGM:14.4V★ GEL:14.2V★ FLD:14.6V★ USER:14.4V★	User 12.5～14.8V★ Step size 0.1V★
11	BVR	Boost Voltage Reconnect	13.2V★	User: 12.5～14.0V★ Step size 0.1V★
12	FCV	Float Charging Voltage	13.8V★	User: 13.0～14.0V★ Step size 0.1V★
13	OVR	Over Voltage Reconnect Voltage	15.0V★	User: 14.5～15.5V★ Step size 0.1V★

14	OVD	Over Voltage Disconnect Voltage	16.0V★	User: 15.5～16.1V★ Step size 0.1V★
15	AOF	Auxiliary module OFF voltage	14.0V★	User: 12.0～14.8V★ Step size 0.1V★
16	AON	Auxiliary module ON voltage	12.0V★	
17	DON	Dry contact ON voltage	11.1V★	User: 10.8～12.0V★ Step size 0.1V★
18	DOF	Dry contact OFF voltage	12.0V★	User:12.0～13.25V★ Step size 0.1V★
19	MCC	Max. charging current	60.0A◆	15.0～60.0A◆
20	PSM	Power saving mode	OFF	ON/OFF
21	CF.A	Clear fault	OFF	ON/OFF
22	QCL	Clear the accumulated energy	OFF	ON/OFF
23	TBC	Total battery capacity	600AH	100～4000AH Step size 100AH
23	VER	Software version	U-1.0	—

★The voltage parameter is at 25℃, 12V system, and twice in 24V system, quadruple in 48V system.

The following rules must be observed when modifying the parameter values in User for lead-acid battery.

I. Over Voltage Disconnect Voltage > Charging Limit Voltage ≥ Equalize Charging Voltage ≥ Boost Charging Voltage ≥ Float Charging Voltage > Boost Reconnect Charging Voltage.

II. Over Voltage Disconnect Voltage > Over Voltage Reconnect Voltage

III. Low Voltage Reconnect Voltage > Low Voltage Disconnect Voltage ≥ Discharging Limit Voltage.

IV. Under Voltage Warning Reconnect Voltage > Under Voltage Warning Voltage ≥ Discharging Limit Voltage.

V. Boost Reconnect Charging voltage >Low Voltage Reconnect Voltage.

◆For the inverter/charger of different power, the current setting range is not the same; see Technical Parameters for details.

NOTE：

15/16：Stop/restore auxiliary module charging voltage

Only when the charging mode is Solar priority or Utility priority will the auxiliary module charging voltage be effective.

20：Power saving mode

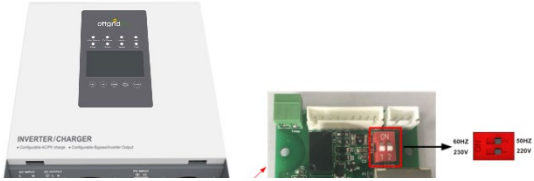
When the switch is on the "Saving" side, the inverter will enter into the Saving Mode. It will shut off the output if the load value is less the 70W. Then restart and detect the power of the load again after 10s. If the load is more than 70W, the inverter will turn on the output. Otherwise, it will shut off output. It cycles like this. So please don't use the saving mode if the load is smaller than 70W.

21：Clear the faults

In a short circuit or overload caused to AC output, the fault can be cleared out.

3.5 Other function

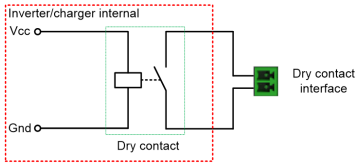
1) Output Voltage & frequency switch



- When Switch 1 is in "ON," the output voltage is selected as 230VAC, and on the contrary as 220VAC;
- When Switch 2 is in "ON," the output frequency is selected as 60Hz, and on the contrary, like 50Hz.

If the output frequency or voltage of the inverter/charger is to be reset; it is required to turn off the inverter/charger and power on the unit after setting.

2） Dry contact interface



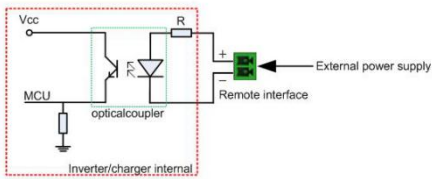
Working principle: When the battery voltage reaches the dry contact ON voltage (DON), the dry contact is connected, for its coil is energized. The dry contact can drive resistive loads of no more than 125VAC /1A, 30VDC/1A.

3） Remote interface

Remote interface input voltage (3.3~12V)

(1) The input voltage Vi is within 2.5~ 10s, the AC output state is reversed (when the AC is formerly in the output state, now it is in the no-output state; when the AC is formerly in the no-output state, now it is in output state;)

(2) The input voltage Vi is greater than 10s; the AC is in the output state all the time till the input voltage Vi disappears.



If it is to change the range of input voltage, it can be realized by changing R's resistance value.

4. Protection

Protection	Instruction				
PV limit Current	When the charging current of the PV array exceeds its rated current, it will be charged at the rated current. **NOTE: When the PV modules are in series, ensure that the PV array's open-circuit voltage does not exceed the "maximum PV open-circuit voltage." Otherwise, the IC-12 may be damaged.**				
PV short circuit	When PV is not charging and short circuit, the inverter/charger is not damaged.				
PV Reverse Polarity	Fully protect against PV reverse polarity, correct the wire connection to resume normal operation. **NOTE: The IC-12 will be damaged when the PV array straight polarity and the PV array's actual operating power are 1.5 times greater than the rated charge power!**				
Night Reverse Charging	Prevent the battery from discharging through the PV module at night.				
Utility input overvoltage	When the utility voltage exceeds 280V, it will stop utility charging/discharging.				
Utility input under-voltage	When the utility voltage is less than 160V, it will stop utility charging/discharging.				
Battery overvoltage	When the battery voltage reaches the set point of Over Voltage Disconnect Voltage, the inverter/charger will stop charging the battery to protect the battery from being overcharged to break down.				
Battery Over Discharge	When the battery voltage reaches the Low Voltage Disconnect Voltage set point, the inverter/charger will stop discharging the battery to protect the battery from being over-discharged to break down.				
Load output Short Circuit	It will immediately close the output in the occurrence of a short-circuit. Hereafter the output is automatically recovered in time delay (the first time delay for 5s, the second time delay for 10s, the third time delay for 15s).				
Load output Overload	Overload	1.2	1.5	1.8	2.0
	Continuance	15min.	30S	10S	5S
	Recover 3 times	The first time delay for 5s, the second time delay for 10s, the third time delay for 15s			
Device overheating	The inverter/charger will stop charging/discharging when the internal temperature is too high and will restore charging/discharging when the temperature is recovered to normal.				

5. Troubleshooting

5.1 Fault

Module	Code	Fault	battery frame blink	indicator	Buzzer	Fault indicator
Battery	BLV	Battery low voltage	Flashing	—	—	—
	BOV	Battery over voltage			Alarm	On Solid
	BOD	Battery over-discharge				
	NVE	Nominal voltage error				
	LTP	Low temperature				
PV charging module	OTP	Over-temperature (PV charge module)	—	PV charge Fast Flashing		
	CFA	Communication Fault Alarm				
Utility charging module	IOV	Input overvoltage		Utility Fast Flashing		
	ILV	Input low voltage				
	OTP	over temperature (Utility charge module)				
	CFA	Communication Fault Alarm				
Inverter output module	OVA	Output voltage abnormal		inverter Fast Flashing		
	OSC	Output short circuit				
	OOL	Output overload				
	OTP	Over-temperature				
	CFA	Communication fault alarm				

5.2 Troubleshooting

Fault	Troubleshooting
Battery over voltage	Check if battery voltage too high and disconnect solar modules.
Battery over-discharge	When the battery voltage resume to or above LVR point (low voltage reconnect voltage), or change the battery by other ways
Battery overheating	The inverter/charger will automatically turn the system off. But while the battery temperature declines to be below overheating recovery temperature value, the inverter/charger will work normally.
Device overheating	The inverter/charger will automatically turn the system off. But while the device temperature declines to be below overheating recovery temperature value, the inverter/charger will work normally.
Output overload	①Please reduce the number of AC loads. ②Restart the device or CFA of setting interface change to ON.
Output short circuit	①Check carefully loads connection, clear the fault. ②Restart the device CFA of setting interface change to ON.

6. Maintenance

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

- Make sure the inverter/charger is firmly installed in a clean and dry ambient.
- Make sure no block on airflow around the inverter/charger. Clear up any dirt and fragments on the radiator.
- Check all the naked wires to make sure insulation is not damaged for serious solarization. Frictional wear, dryness, insects or rats, etc. Repair or replace some wires if necessary.
- Tighten all the terminals. Inspect for loose, broken, or burnt wire connections.
- Check and confirm that LED is consistent with required. Pay attention to any troubleshooting or error indication. Take corrective action if necessary.
- 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.
- Check for dirt, nesting insects, and corrosion. If so, clear up in time.
- Check and confirm that the lightning arrester is in good condition. Replace a new one in time to avoid damaging the inverter/charger and even other equipment.

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

2）This warranty does not apply under the following conditions:

- Damage from improper use or use in an unsuitable environment.
- PV or load current, voltage, or power exceeds the rated value of the inverter/charger.
- The inverter/charger's working temperature exceeds the limit working environment temperature.
- User disassembly or attempted to repair the inverter/charger without permission.
- The inverter/charger is damaged due to natural elements such as lighting.
- The inverter/charger is damaged during transportation and shipment.
- In addition, the warranty does not apply to consequential damages

7. Technical Specifications

Item	IC-12/800/20/20
Nominal battery voltage	12VDC
Battery input voltage range	10.8～16VDC
Continuous output power	800W
Output power (15min.)	1000W
Overload power(5s)	1600W
Max. surge power	2000W
Output voltage range	220V -6%~+5% / 230V -10%~+5%
Output frequency	50/60±0.1Hz
Output mode	Single-phase
Output wave	Pure Sine Wave
Load power factor	0.2-1（VA≤continuous output power）
Distortion THD	≤3% (12V or 24V resistive load)
Max. efficiency	91%
Transfer time	20mS (resistive load)
Utility charging	
Utility input voltage range	160VAC～280VAC (Working voltage range) 170VAC～270VAC (Utility starting voltage range)
Max. utility charge current	20A
Solar charging	
Max. PV open circuit voltage	60V★ 46V◆
Max. PV input power	390W
Max. PV charging current	30A
Equalization voltage	14.6V
Boost voltage	14.4V
Float voltage	13.8V

Tracking efficiency	≤99.5%
Charging conversion efficiency	≤98%
Temperature compensate coefficient	-3mV/℃/2V (Default)
Others	
No load consumption	≤1.2A
Enclosure	IP30
Relative humidity	< 95% (N.C.)
Working environment temperature	-20℃～50℃（full input and output with no derating）
Altitude	＜5000m (Derating to operate according to IEC62040 at a height exceeding 1000m)
Mechanical Parameters	
Dimension (H x W x L)	386×300×126mm
Mounting dimension	230mm
Mounting hole size	Φ8mm
Weight	7.3kg

★At minimum operating environment temperature

◆At 25℃ environment temperature

Any changes without prior notice! Version number: V2.1

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