# High Frequency on/off hybrid solar inverter

## PH1800 PLUS SERIES (2KW-5.5KW)

MUST
Solar Inverter
MUST
Solar Inverter

PH1800 Plus series hybrid solar inverter, it can realize self-consumption and feed-in to the grid from solar energy with best solution according to your setting. During the daytime solar power can run your home appliances and if there is extra solar power it will feed-in to the grid or you can choose to save them on the battery to backup when power failure or nighttime.

# Features

- Rated Power 2KW-5.5KW
- Pure sine wave output
- Self-consumption and Feed-in to the grid
- Programmable supply priority for PV, Battery or Grid
- User-adjustable battery charging current suits different types of batteries
- Programmable multiple operation modes: Grid-tie, off-grid and grid-tie with backup
- Multiple communication for USB, RS-485, Modbus
- Monitoring software & Wifi Kit for real-time status display and control
- Parallel operation up to 3 units

Rated power
2kw-5.5kw

Battery Voltage
24VDC/48VDC

MAX charging current
140A

WIFI remote
monitoring

Multi Protection

High frequency above
93% high efficiency

Wide AC input
90-280V

Lead-acid/Lithium Battery
Optional

# Appearance

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MUST
Solar Inverter

MUST
Solar Inverter
PV+
PV-
DC+
DC-
INPUT BREAKER

**(2KW-3KW)**

MUST
Solar Inverter
AC INPUT
AC OUTPUT
INPUT BREAKER
DC+
DC−
PV+
PV−
ON
OFF

(3KW-5.5KW)

## Inside Structures

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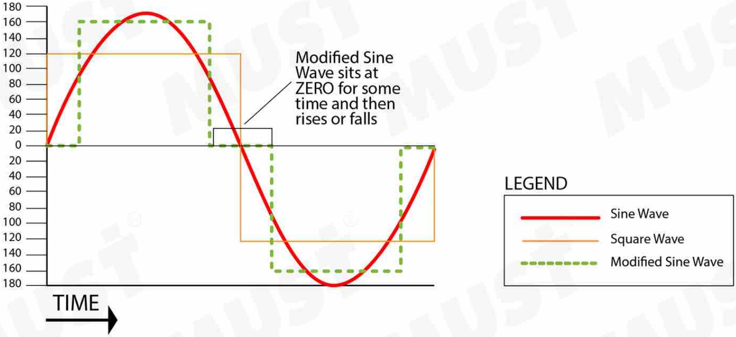
Solar Inverter

MUST®

# PRODUCT FEATURES

SMART & INTELLIGENT FEATURES



## Pure Sine Wave Output

The electrical waveform output of PH1800 is a pure sine wave, which has the same quality as utility and/or domestic power. This type of waveform is suitable for most all electrical devices, appliances and tools. This pure sine wave unit provides more capabilities than modified sine wave inverters, because it is a cleaner form of power. The pure sine wave also effectively reduces the noise produced while using appliances.

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WiFi-RTU
8000-10633-00
PN:01417310199145
Wi-Fi RTU
RS-232
SolarMust

## Wifi communication

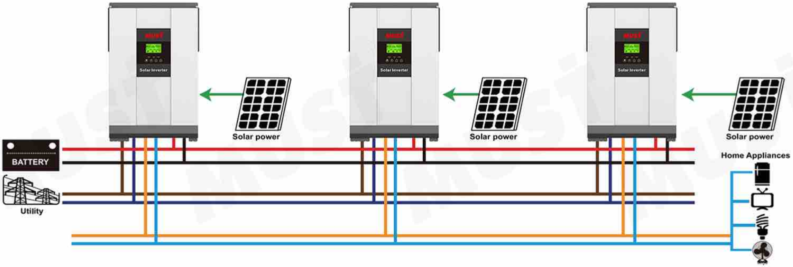
you can download this app on your cellphone and monitor the whole system, you will know know how much electricity the system generate and sell to utility.

Android

IOS

MUST MUST MUST MUST

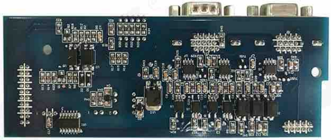
Communication cable
Communication cable


Solar Inverter
Solar Inverter
Solar Inverter
Solar power
Solar power
Solar power
BATTERY
Utility
Home Appliances

## 3-5.5KW Parallel function

Customer can use 2pcs or 3 pcs inverters to expand the system capacity. Maximum 3pcs parallel to single phase or three phase.

Parallel kit picture as below:



## Charging algorithm

3-Step (Flooded Battery, AGM/Gel/Lithium Battery),4-Step(LI)

### Charging algorithm for lead acid battery

### Charging algorithm for Lithium battery

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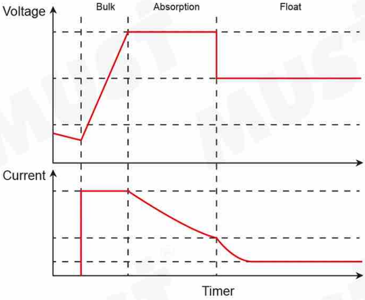
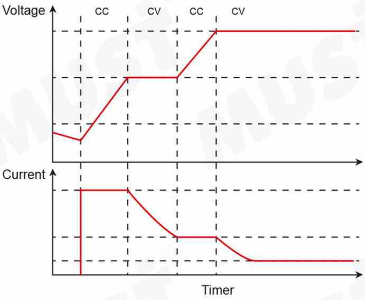




| JOINT UTILITY AND SOLAR CHARGING | | |
|---|---|---|
| Inverter model | 2KW-3KW 24VDC | 3KW-5.5KW 48VDC |
| MPPT CHARGER | | |
| Max Charging Current | 140A | 140A |
| Default Charging Current | 80A | 80A |

1358 x 722
erMonitor
Sp1800
Data
AppParamters
PortSetting
Themes
Login
Help
Ports
☑ COM22-Scan
☑ COM26-Working
Id:4

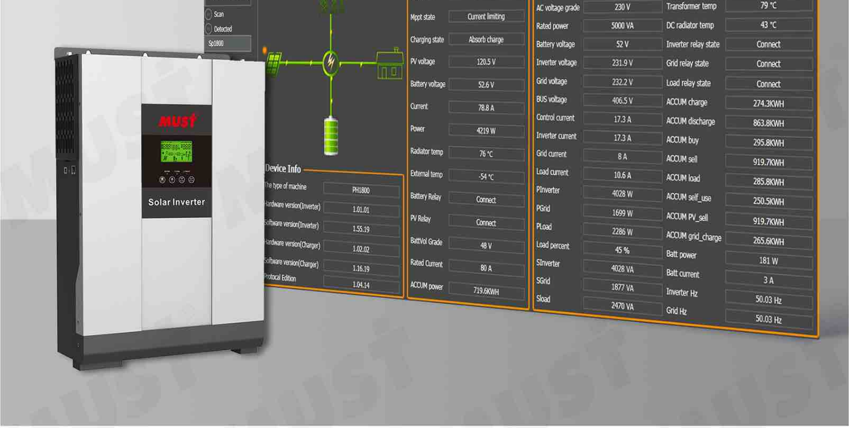
Charger message

Work state: Work Mode

Inverter message

Work state: Grid-Tie

AC radiator temp: 44 °C


MUST
Solar Inverter
Scan
Detected
Sp1800

Device Info

|  |  |
|---|---|
| The type of machine | PH1800 |
| ardware version(Inverter) | 1.01.01 |
| oftware version(Inverter) | 1.55.19 |
| ardware version(Charger) | 1.02.02 |
| oftware version(Charger) | 1.16.19 |
| Protocal Edition | 1.04.14 |

|  |  |
|---|---|
| Mppt state | Current limiting |
| Charging state | Absorb charge |
| PV voltage | 120.5 V |
| Battery voltage | 52.6 V |
| Current | 78.8 A |
| Power | 4219 W |
| Radiator temp | 76 °C |
| External temp | -54 °C |
| Battery Relay | Connect |
| PV Relay | Connect |
| BattVol Grade | 48 V |
| Rated Current | 80 A |
| ACCUM power | 719.6KWH |

|  |  |
|---|---|
| AC voltage grade | 230 V |
| Rated power | 5000 VA |
| Battery voltage | 52 V |
| Inverter voltage | 231.9 V |
| Grid voltage | 232.2 V |
| BUS voltage | 406.5 V |
| Control current | 17.3 A |
| Inverter current | 17.3 A |
| Grid current | 8 A |
| Load current | 10.6 A |
| PInverter | 4028 W |
| PGrid | 1699 W |
| PLoad | 2286 W |
| Load percent | 45 % |
| SInverter | 4028 VA |
| SGrid | 1877 VA |
| Sload | 2470 VA |

|  |  |
|---|---|
| Transformer temp | 79 °C |
| DC radiator temp | 43 °C |
| Inverter relay state | Connect |
| Grid relay state | Connect |
| Load relay state | Connect |
| ACCUM charge | 274.3KWH |
| ACCUM discharge | 863.8KWH |
| ACCUM buy | 295.8KWH |
| ACCUM sell | 919.7KWH |
| ACCUM load | 285.8KWH |
| ACCUM self_use | 250.5KWH |
| ACCUM PV_sell | 919.7KWH |
| ACCUM grid_charge | 265.6KWH |
| Batt power | 181 W |
| Batt current | 3 A |
| Inverter Hz | 50.03 Hz |
| Grid Hz | 50.03 Hz |

## USB/RS485 monitoring

You can connect inverter with PC with communication cable and monitor the inverter woking status and all inverter parameter, you even can set these parameters such as AC voltage, battery voltage, charge current, working mode etc

## Easy to read all working modes and parameters in LCD

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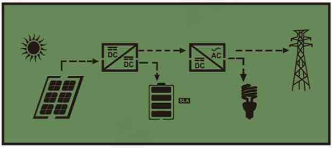
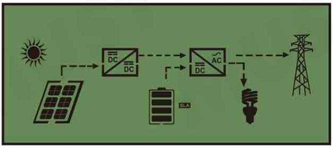
INPUT PV BATT TEMP
OUTPUT GRID INV LOAD
CHARGING
AC/INV
CHG
FAULT
MENU
UP
DOWN
ENTER

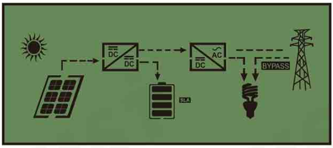
## Sell state

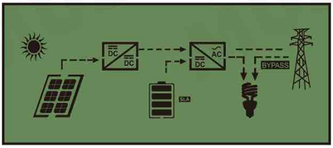
Note:

*Sell mode: The system generates electricity when the sun shines, supplying power to your home and sending any excess power back tothe grid.


DC
DC
AC
DC
SLA

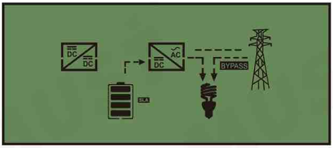

DC
DC
AC
DC
SLA


DC
DC
AC
DC
BYPASS
SLA


DC
DC
AC
DC
BYPASS
SLA

## Match load state

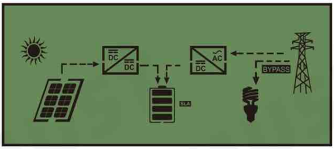
Note: DC power produced from your solar array is converted by the inverter into AC power, which is then sent to your main electrical panel to be used by your household appliances. Any

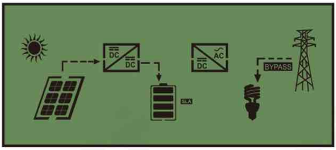

DC
DC
AC
DC
BYPASS
SLA

excess power generated is not sold back to the grid, but stored in battery.

## Charge state

PV energy and grid can charge batteries.


DC
DC
AC
DC
BYPASS
SLA

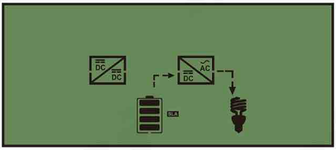

DC
DC
AC
DC
BYPASS
SLA

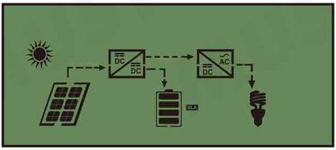
## Bypass state

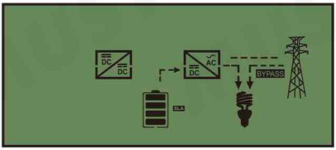
Error are caused by inside circuit error or external reasons such as over temperature, output short circuited and so on.

## Off-Grid state

The inverter will provide output power from battery and PV power.


DC
DC
AC
DC
SLA


DC
DC
AC
DC
SLA


DC
DC
AC
DC
BYPASS
SLA

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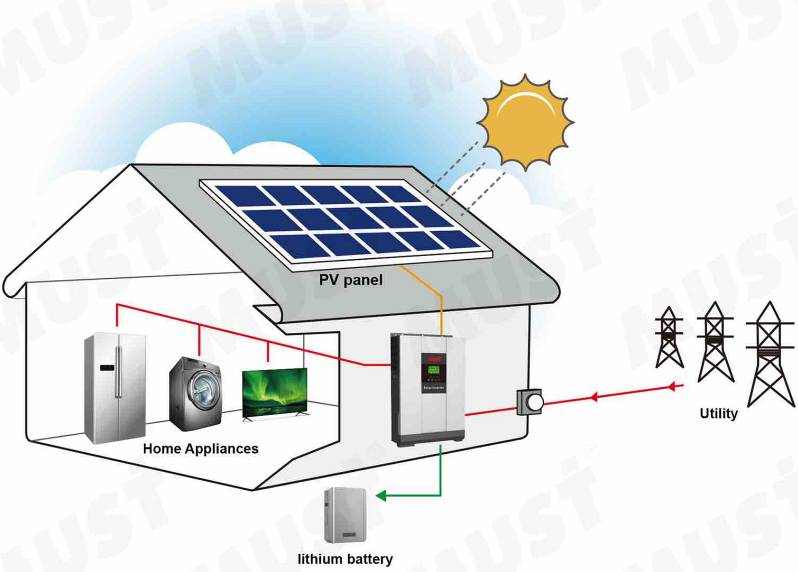
# PH1800 series intelligent working mode

Grid-Tie with Battery Back-UpGrid tie with backup system is intelligent to run your house, it generates electricity when the sun is shining, and supplies power to your house while selling any excess power back to the utility to reduce your electric bill. However, the PV energy system continues to operate during a grid outage. The batteries provide quiet, uninterrupted back-up power for loads such as refrigerators, lights, pumps, and computers,  while your PV array continues to produce power and charge the batteries during the day. When the grid is restored, the inverter/chargers help recharge the batteries to their full state of charge while the grid powers all AC loads. Once the batteries are recharged, the system returns to normal operation.

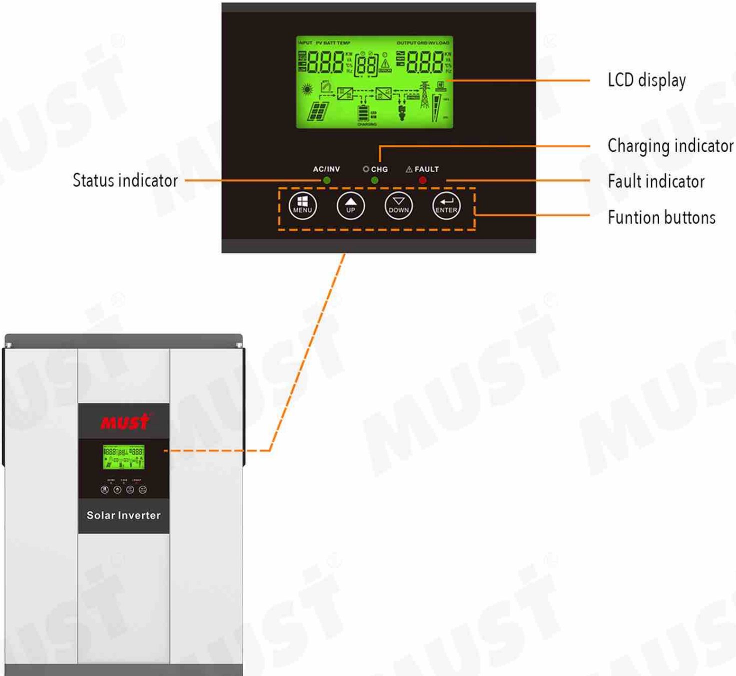

PV panel
Home Appliances
Utility
lithium battery

MUST

# PRODUCT DETAILS

MUST HELP YOU CONTROL EVERY DETAIL

Details reflect quality


INPUT PV BATT TEMP
OUTPUT GRID INV LOAD
CHARGING
LCD display
Charging indicator
Status indicator
AC/INV
CHG
FAULT
Fault indicator
MENU
UP
DOWN
ENTER
Funtion buttons
MUST
Solar Inverter

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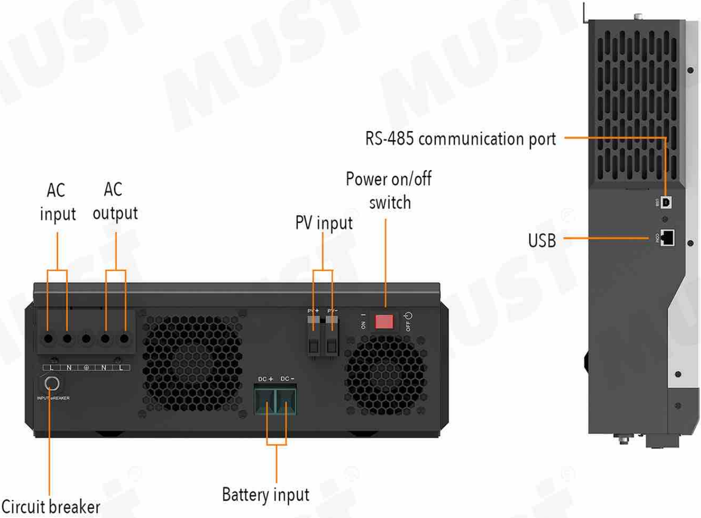
RS-485 communication port
Power on/off switch
AC input
AC output
PV input
USB
PV+
PV−
ON
OFF
L
N
N
L
INPUT BREAKER
DC +
DC −
Circuit breaker
Battery input

**(2KW-3KW)**

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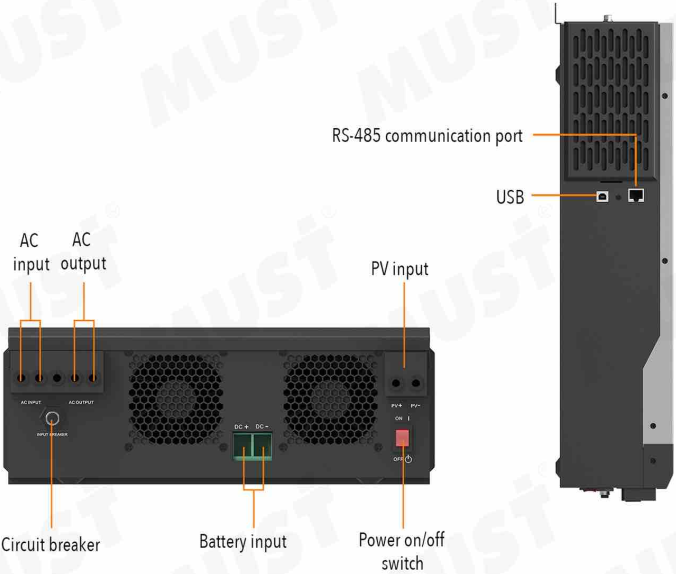
RS-485 communication port
USB
AC input
AC output
PV input
AC INPUT
AC OUTPUT
INPUT BREAKER
DC +
DC −
PV+
PV−
ON
OFF
Circuit breaker
Battery input
Power on/off switch

**(3KW-5.5KW)**

# INVERTER SYSTEM CONNECTION

INVERTER + SOLAR PANELS + GRID + APPLICATION LOADS

SOLAR PANELS

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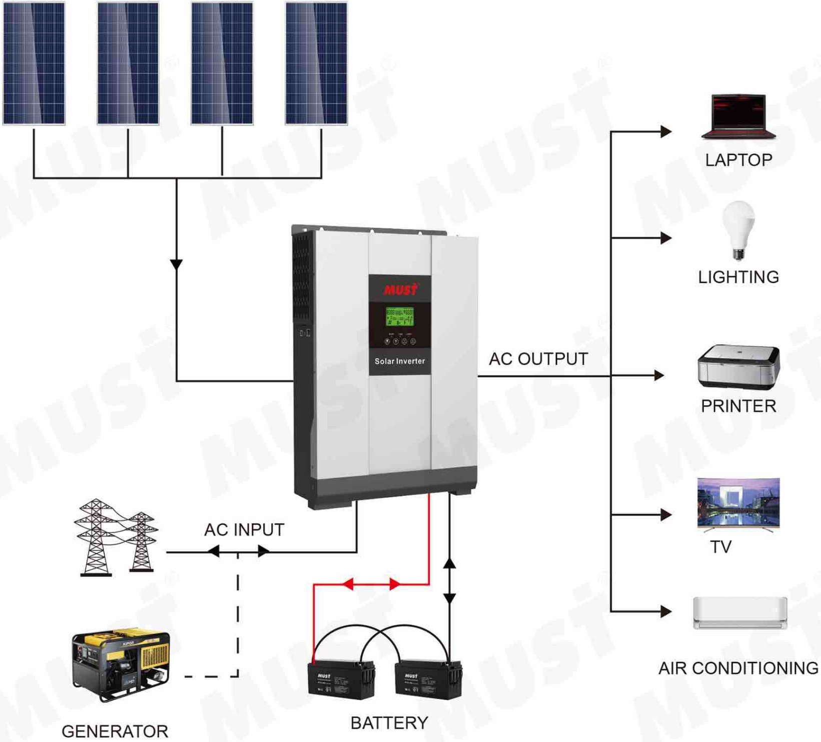
MUST
Solar Inverter
LAPTOP
LIGHTING
AC OUTPUT
PRINTER
TV
AIR CONDITIONING
AC INPUT
GENERATOR
BATTERY

# PRODUCT PARAMETERS

MAKE SURE EACH PARAMETER IS TRUE

MUST

# Learn more about the product

| MODEL | | PH18-2024 Plus | PH18-3024 Plus | PH18-3048 Plus | PH18-4048 Plus | PH18-5048 Plus | PH18-5548 Plus |
|---|---|---|---|---|---|---|---|
| Nominal Battery System Voltage | | 24VDC | | 48VDC | | | |
| INVERTER OUTPUT | Rated Power | 2000W | 3000W | 3000W | 4000W | 5000W | 5500W |
| | Surge Power | 4000W | 6000W | 6000W | 8000W | 10000W | 11000W |
| | Waveform | Pure Sine Wave | | | | | |
| | AC Voltage Regulation (Batt. Mode) | 220VAC~240VAC(setting) | | | | | |
| | Electric Current | 8.7A | 13A | | 17.4A | 21.7A | 23.9A |
| | Inverter Efficiency(Peak) | 93% | | | | | |
| | Transfer Time | 10ms(For For Personal Computers) 20ms( For Other Home Appliance) | | | | | |
| AC INPUT | Voltage | 230VAC | | | | | |
| | Selectable Voltage Range | 170~280VAC(For Personal Computers), 90~280VAC(For Home Appliances), 184~253VAC(VDE4105) | | | | | |
| | Frequency Range | 50Hz/60Hz (Auto Sensing) | | | | | |
| BATTERY | Normal Voltage | 24VDC | | 48VDC | | | |
| | Floating Charge Voltage | 27.4VDC | | 54.8VDC | | | |
| | Overcharge Protection | 30VDC | | 60VDC | | | |
| SOLAR CHARGER & AC CHARGER | Maximum PV Array Open Circuit Voltage | 145VDC | | | | | |
| | PV Array MPPT Voltage Range | 30~130VDC | | 64~130VDC | | | |
| | Standby Power Consumption | 2W | | | | | |
| | Maximum PV Array Power | 2000W | | 4000W | | | |
| | Maximum Solar Charge Current | 80A | | | | | |
| | Maximum Efficiency | 98% | | | | | |
| | Maximum AC Charge Current | 60A | | | | | |
| | Maximum Charge Current | 140A | | | | | |
| MECHANICAL SPECIFICATIONS | Machine Dimensions (W*H*D) | 272*355*100 mm | | | 297.5*468*125 mm | | |
| | Net Weight(KG) | 7.4 | | | 14 | | |
| | Package Dimensions(W*H*D) | 485*393*251 | | | 638*395*241 | | |
| | Gross Weight(KG) | 9.5 | | | 16.4 | | |

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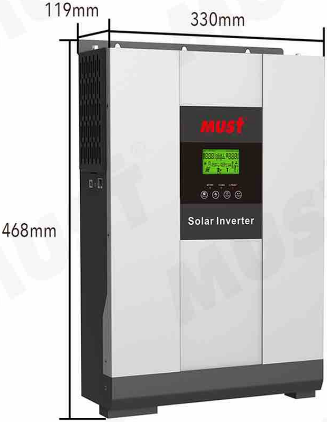
| | | |
|---|---|---|
| OTHER | Humidity | 5% to 95% Relative Humidity (Non-condensing) |
| | Operating Temperature | 0°C ~55°C |
| | Storage Temperature | -15°C ~60°C |

## Size


119mm
330mm
468mm
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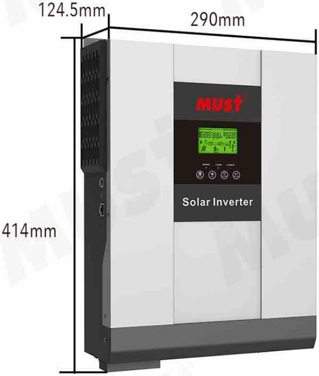
Solar Inverter

(3-5.5KW)


124.5mm
290mm
414mm
MUST
Solar Inverter

(2-3KW)

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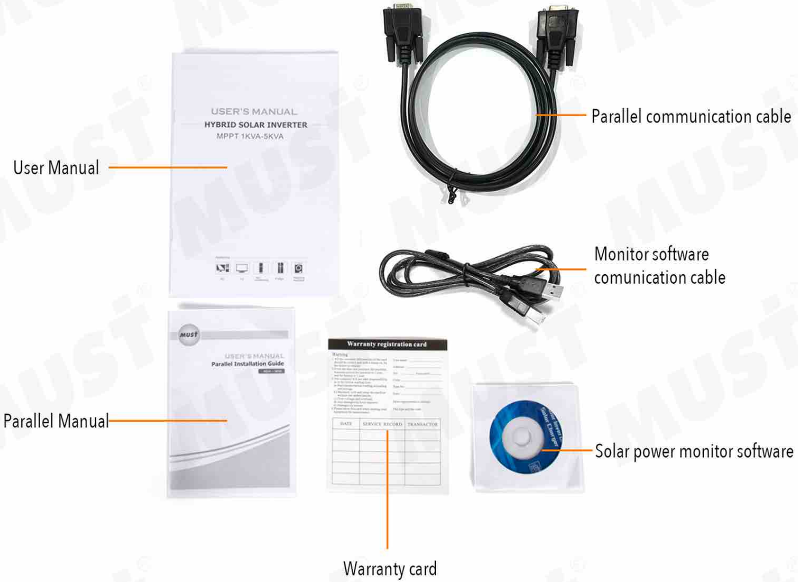
# Package


USER'S MANUAL
HYBRID SOLAR INVERTER
MPPT 1KVA-5KVA
User Manual
Parallel communication cable
Monitor software comunication cable
USER'S MANUAL
Parallel Installation Guide
Parallel Manual
Warranty registration card
DATE
SERVICE RECORD
TRANSACTOR
Solar power monitor software
Warranty card

| COLOR BOX DIMENSION | |
|---|---|
| 2KW-3KW：540*395*241MM | 4KW-5.5KW：638*295*241MM |

| LOADING | | |
|---|---|---|
| 20GP | 40GP | 40HQ |
| 450pcs / 500pcs | 900pcs / 1000pcs | 1100pcs / 1300pcs |

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MUST
Solar Inverter
Green Energy Advocates
USER'S MANUAL
Warranty registration card

Packaging

## Applicable appliances

| ELECTRONIC PRODUCT | APPLIANCE | ELECTRONIC PRODUCT | APPLIANCE | ELECTRONIC PRODUCT | APPLIANCE |
|---|---|---|---|---|---|
| LED LIGHT | ✓ | WASHING MACHINE | ✓ | ELECTRIC IRON | ✓ |
| INCANDESCENT LAMP | ✓ | HAND MILL | ✓ | HOT WATER BOTTLE | ✓ |
| FAN | ✓ | HAND DRILL | ✓ | DRYER | ✓ |

MUST

|  |  |  |  |  |  |
|---|---|---|---|---|---|
| DESKTOP PC | ✓ | IMPACT DRILL | ✓ | PROJECTOR | ✓ |
| LAPTOP | ✓ | SUBMERSIBLE PUMP | ✓ | AIR DUCT | ✓ |
| ELECTIRC COOKER | ✓ | AIR-CONDITIONING FAN | ✓ | PRINTER | ✓ |
| TV | ✓ | CRT TV | ✓ | VACUUM CLEANER | ✓ |
| REFRIGERATOR | ✓ | SOYMILK MACHINE | ✓ | DIGITAL PRODUCT | ✓ |

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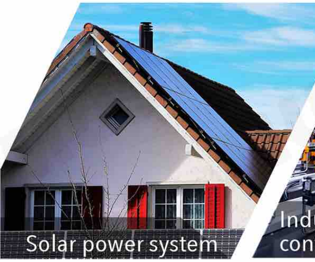
# PRACTICAL APPLICATION

## APPLICABLE PLACE

CCTV

Shop / Supermarket

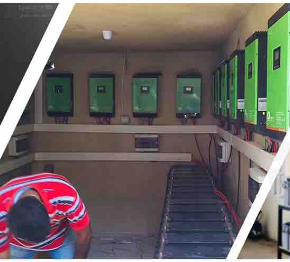
Office


Solar power system

Industrial intellectual control system

Ventilation systems

## PROJECT REFERENCE



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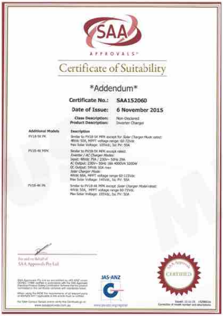
# PROFESSIONAL CERTIFICATION

CE IEC EMS SAA ISO9001

High quality and high standard



APPROVALS

Certificate of Suitability

*Addendum*

**Certificate No.:** SAA152060

**Date of Issue:** 6 November 2015

**Class Description:** Non-Declared

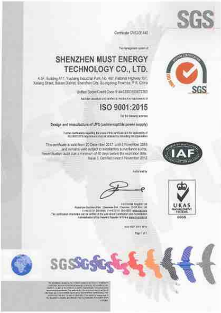
**Product Description:** Inverter Charger

| Additional Models | Description |
|---|---|
| PV18-5K PK | Similar to PV18-5K MPK except for *Solar Charger Mode rated:*<br>48Vdc 50A, MPPT voltage range: 60-72Vdc<br>Max Solar Voltage: 105Vdc; Isc PV: 50A |
| PV18-4K MPK | Similar to PV18-5K MPK except rated:<br>*Inverter / AC Charger Modes:*<br>Input: 48Vdc 75A / 230V~ 50Hz 29A<br>AC Output: 230V~ 50Hz 18A 4000VA 3200W<br>DC Output: 54Vdc 60A max<br>*Solar Charger Mode:*<br>48Vdc 60A, MPPT voltage range 60-115Vdc<br>Max Solar Voltage: 145Vdc; Isc PV: 55A |
| PV18-4K PK | Similar to PV18-4K MPK except *Solar Charger Mode rated:*<br>48Vdc 50A, MPPT voltage range 60-72Vdc<br>Max Solar Voltage: 105Vdc; Isc PV: 50A |

For and on Behalf of
SAA Approvals Pty Ltd

JAS-ANZ

CERTIFIED



SGS

Certificate CN12/31440

SHENZHEN MUST ENERGY TECHNOLOGY CO., LTD.

4-5F, Building A11, Yusheng Industrial Park, No. 467, National Highway 107, Xixiang Street, Baoan District, Shenzhen City, Guangdong Province, P.R. China

ISO 9001:2015

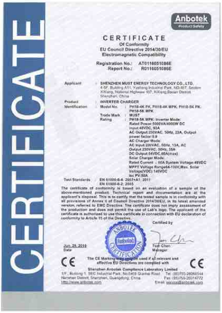
Design and manufacture of UPS (uninterruptible power supply)

This certificate is valid from 20 December 2017 until 6 November 2018 and remains valid subject to satisfactory surveillance audits. Recertification audit due a minimum of 60 days before the expiration date. Issue 5. Certified since 6 November 2012

IAF

UKAS MANAGEMENT SYSTEMS
0005

Page 1 of 1



CERTIFICATE

Anbotek Product Safety

**CERTIFICATE**
**Of Conformity**
**EU Council Directive 2014/30/EU**
**Electromagnetic Compatibility**

**Registration No.:** AT0116051086E
**Report No.:** R0116051086E

Applicant : **SHENZHEN MUST ENERGY TECHNOLOGY CO., LTD.**
4-5F, Building A11, Yusheng Industrial Park, NO.467, Section XiXiang, National Highway 107, XiXiang,Baoan District, Shenzhen, China

Product : **INVERTER CHARGER**
Identification : Model No. : PH18-4K PK, PH18-4K MPK, PH18-5K PK, PH18-5K MPK
Trade Mark : MUST
Rating : PH18-5K MPK: Inverter Mode:
Rated Power:5000VA/4000W DC
Input:48VDC, 93A
AC Output:230VAC, 50Hz, 22A, Output power factor:0.8
AC Charger Mode:
AC Input:230VAC, 50Hz, 13A, AC Output:230VAC, 50Hz, 35A
DC Output:54VDC,60A(max)
Solar Charger Mode:
Rated Current : 60A System Voltage:48VDC
MPPT Voltage Range64-130V,Max. Solar Voltage(VOC) 145VDC
Isc PV:50A

Test Standards : EN 61000-6-4: 2007+A1: 2011
EN 61000-6-2: 2005

The certificate of conformity is based on an evaluation of a sample of the above-mentioned product. Technical report and documentation are at the applicant's disposal. This is to certify that the tested sample is in conformity with all provisions of Annex II of Council Directive 2014/30/EU, in its latest amended version, referred to EMC Directive. The certificate does not imply assessment of the production and does not permit the use of Lab's logo. The applicant of the certificate is authorized to use this certificate in connection with EU declaration of conformity to Article 15 of the Directive.

Jun. 29, 2016
Date

Certified by
Tom Chen
Manager

CE

The CE Marking may only be used if all relevant and effective EU Directives are complied with

CE

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TEST REPORT

Have quality inspection to use with confidence

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APPLICATION FOR TEST REPORT
On Behalf of
SHENZHEN MUST ENERGY TECHNOLOGY CO.,LTD
INVERTER CHARGER
Model: PH18-4K PK, PH18-4K MPK, PH18-5K PK, PH18-5K MPK

**Prepared For** : SHENZHEN MUST ENERGY TECHNOLOGY CO.,LTD
4-5F, Building A11, Yusheng Industrial Park, NO.467,
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District, Shenzhen, China

**Prepared By** : Shenzhen Anbotek Compliance Laboratory Limited
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Date of Test: May. 31, 2016 to Jun. 29, 2016
Date of Report: Jun. 29, 2016
Report Number: R0116051087S-M1

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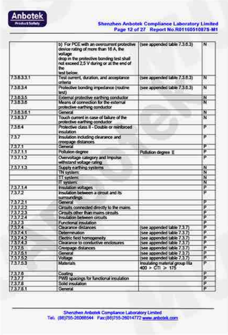

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| | | | |
|---|---|---|---|
| | b) For PCE with an overcurrent protective device rating of more than 16 A, the voltage drop in the protective bonding test shall not exceed 2,5 V during or at the end of the test below. | (see appended table 7.3.6.3) | N |
| 7.3.6.3.3.1 | Test current, duration, and acceptance criteria | (see appended table 7.3.6.3) | N |
| 7.3.6.3.4 | Protective bonding impedance (routine test) | (see appended table 7.3.6.3) | N |
| 7.3.6.3.5 | External protective earthing conductor | | N |
| 7.3.6.3.6 | Means of connection for the external protective earthing conductor | | N |
| 7.3.6.3.6.1 | General | | N |
| 7.3.6.3.7 | Touch current in case of failure of the protective earthing conductor | | N |
| 7.3.6.4 | Protective class II - Double or reinforced insulation | | P |
| 7.3.7 | Insulation including clearance and creepage distances | | P |
| 7.3.7.1 | General | | P |
| 7.3.7.1.1 | Pollution degree | Pollution degree II | P |
| 7.3.7.1.2 | Overvoltage category and impulse withstand voltage rating | | P |
| 7.3.7.1.3 | Supply earthing systems | | N |
| | TN system: | | N |
| | TT system: | | N |
| | IT system: | | N |
| 7.3.7.1.4 | Insulation voltages | | P |
| 7.3.7.2 | Insulation between a circuit and its surroundings | | P |
| 7.3.7.2.1 | General | | P |
| 7.3.7.2.2 | Circuits connected directly to the mains | | P |
| 7.3.7.2.3 | Circuits other than mains circuits | | P |
| 7.3.7.2.4 | Insulation between circuits | | P |
| 7.3.7.3 | Functional insulation | | P |
| 7.3.7.4 | Clearance distances | (see appended table 7.3.7) | P |
| 7.3.7.4.1 | Determination | (see appended table 7.3.7) | P |
| 7.3.7.4.2 | Electric field homogeneity | (see appended table 7.3.7) | P |
| 7.3.7.4.3 | Clearance to conductive enclosures | (see appended table 7.3.7) | P |
| 7.3.7.5 | Creepage distances | (see appended table 7.3.7) | P |
| 7.3.7.5.1 | General | (see appended table 7.3.7) | P |
| 7.3.7.5.2 | Voltage | (see appended table 7.3.7) | P |
| 7.3.7.5.3 | Materials | Insulating material group IIIa<br>400 > CTI ≥ 175 | P |
| 7.3.7.6 | Coating | | P |
| 7.3.7.7 | PWB spacings for functional insulation | | P |
| 7.3.7.8 | Solid insulation | | P |
| 7.3.7.8.1 | General | | P |

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Photo 7

Photo 8

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SHENZHEN MUST ENERGY TECHNOLOGY CO.,LTD.