Pure sine wave high frequency solar inverter

PV1800VPM SERIES (1-5KW)

This is a multi-function inverter/charger, combining functions of inverter, MPPT50A/80A solar charger and battery charger to offer uninterruptible power support with portable size. Its comprehensive LCD display offers user-configurable and easy-accessible button operation such as battery charging current, AC/solar charger priority, and acceptable input voltage based on different applications.

Features

- Rated power 1KW to 5KW
- Pure sine wave output
- Smart LCD setting (Working modes, Charge Current, Charge Voltage, etc).
- Bult in MPPT50A/80A solar charge controller
- Combining solar system, AC utility, and battery power source to supply continuous power
- Overload, short circuit and Deep discharge protection
- Cold start function
- Support USB, RS485 monitoring function with free CD
- WIFI remote monitoring (optional)
- Compatible to generator
- 3KW-5KW support parallel function(optional)

Rated power
1kw-5kw

Battery Voltage
12VDC/24DC/48VDC

MAX charging current
140A

WIFI remote
monitoring

Multi Protection

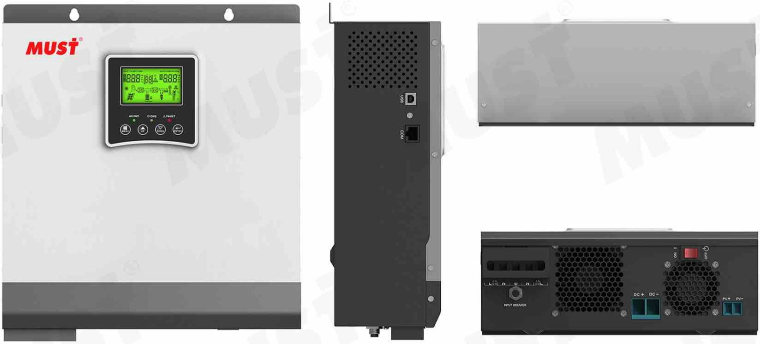
High frequency above
93% high efficiency

Wide AC input
90-280V

Lead-acid/Lithium Battery
Optional

MUST

Appearance


MUST
USB
COM
INPUT BREAKER
DC+
DC−
PV+
PV−
ON
OFF

(1-3KW)

MUST

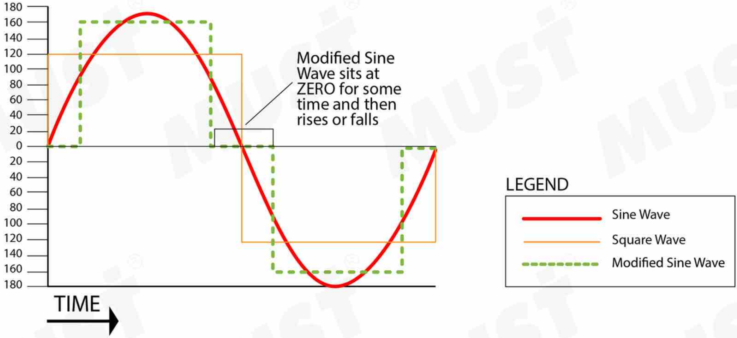
MUST
AC/INV
CHG
FAULT
MENU
UP
DOWN
ENTER
AC INPUT
AC OUTPUT
COM
USB
PV
I ON
OFF
PARALLEL CONNECTION
DC INPUT

(4-5KW)

PRODUCT FEATURES

SMART & INTELLIGENT FEATURES

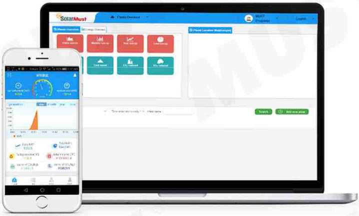
MUST



Pure Sine Wave Output

The electrical waveform output of PV1800VPM is a pure sine wave, which has the same quality as utility and/or domestic power. This type of waveform is suitable for most of 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.

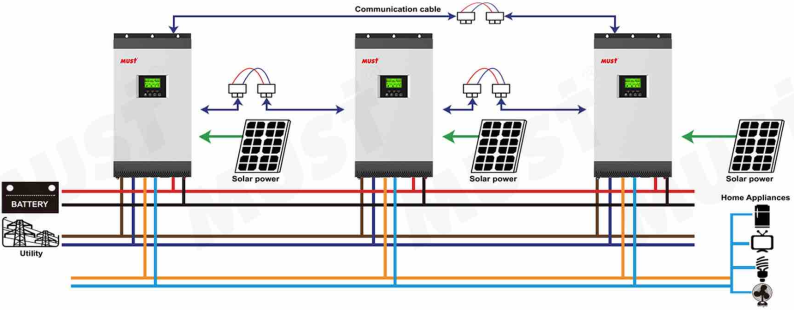
WiFi-RTU
8000-10633-00
Wi-Fi RTU



Wifi communication

MUST

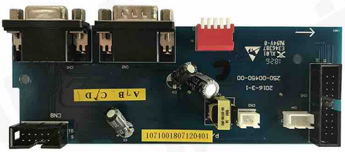
you can download this app on your cellphone and monitor the whole system, you will know how much electricity the system generate .

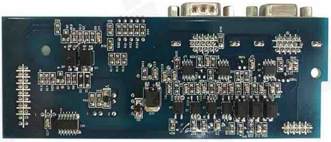

Communication cable
MUST
MUST
MUST
Solar power
Solar power
Solar power
BATTERY
Utility
Home Appliances

4-5KW 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:


A B C D
1071001807120401

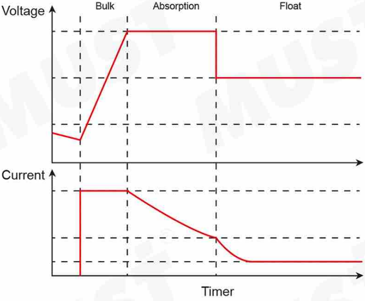


MUST

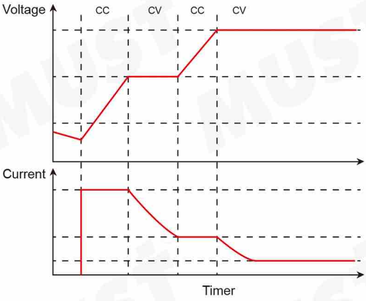
6- Charging algorithm

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

Charging algorithm for lead acid battery

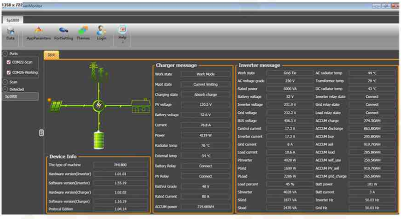


Charging algorithm for Lithium battery



Monitoring system

With USB can connect with computer monitoring the working stage and the data of PV, AC and battery. LCD setting is also available in computer.


1358 x 722
Sp1800
Data
AppParameters
PortSetting
Themes
Login
Help
Ports
COM22-Scan
COM26-Working
Scan
Detected
Sp1800
104

Device Info

The type of machine	PH1800
Hardware version(Inverter)	1.01.01
Software version(Inverter)	1.55.19
Hardware version(Charger)	1.02.02
Software version(Charger)	1.16.19
Protocal Edition	1.04.14

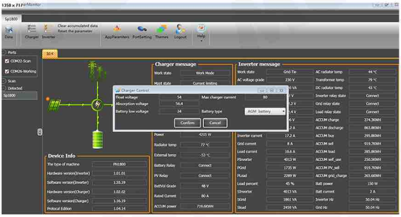
Charger message

Work state	Work Mode
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

Inverter message

Work state	Grid-Tie	AC radiator temp	44 °C
AC voltage grade	230 V	Transformer temp	79 °C
Rated power	5000 VA	DC radiator temp	43 °C
Battery voltage	52 V	Inverter relay state	Connect
Inverter voltage	231.9 V	Grid relay state	Connect
Grid voltage	232.2 V	Load relay state	Connect
BUS voltage	406.5 V	ACCUM charge	274.3KWH
Control current	17.3 A	ACCUM discharge	863.8KWH
Inverter current	17.3 A	ACCUM buy	295.8KWH
Grid current	8 A	ACCUM sell	919.7KWH
Load current	10.6 A	ACCUM load	285.8KWH
PInverter	4028 W	ACCUM self_use	250.5KWH
PGrid	1699 W	ACCUM PV_sell	919.7KWH
PLoad	2286 W	ACCUM grid_charge	265.6KWH
Load percent	45 %	Batt power	181 W
SInverter	4028 VA	Batt current	3 A
SGrid	1877 VA	Inverter Hz	50.03 Hz
SLoad	2470 VA	Grid Hz	50.03 Hz

MUST


1358 × 717
Monitor
Sp1800
Data
Charger
Inverter
Clear accumulated data
Reset the parameter
AppParameters
PortSetting
Themes
Logout
Help
Ports
COM22-Scan
COM26-Working
Scan
Detected
Sp1800

☑ COM22-Scan
☑ COM26-Working

Charger Control

Float voltage	54	Max charger current	80
Absorption voltage	56.4		
Battery low voltage	34	Battery type	AGM battery

Confirm Cancel

Device Info

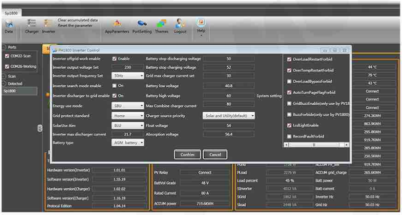
The type of machine	PH1800
Hardware version(Inverter)	1.01.01
Software version(Inverter)	1.55.19
Hardware version(Charger)	1.02.02
Software version(Charger)	1.16.19
Protocal Edition	1.04.14

Charger message

Work state	Work Mode
Mppt state	Current limiting
Power	4205 W
Radiator temp	77 ℃
External temp	-53 ℃
Battery Relay	Connect
PV Relay	Connect
BattVol Grade	48 V
Rated Current	80 A
ACCUM power	719.6KWH

Inverter message

Work state	Grid-Tie	AC radiator temp	44 ℃
AC voltage grade	230 V	Transformer temp	79 ℃
		DC radiator temp	43 ℃
		Inverter relay state	Connect
		Grid relay state	Connect
		Load relay state	Connect
		ACCUM charge	274.3KWH
		ACCUM discharge	863.8KWH
Inverter current	17.2 A	ACCUM buy	295.8KWH
Grid current	8 A	ACCUM sell	919.7KWH
Load current	10.6 A	ACCUM load	285.8KWH
PInverter	4013 W	ACCUM self_use	250.5KWH
PGrid	1735 W	ACCUM PV_sell	919.7KWH
PLoad	2289 W	ACCUM grid_charge	265.6KWH
Load percent	45 %	Batt power	150 W
SInverter	4013 VA	Batt current	2 A
SGrid	1861 VA	Inverter Hz	50.04 Hz
Sload	2459 VA	Grid Hz	50.04 Hz


Sp1800
Data
Charger
Inverter
Clear accumulated data
Reset the parameter
AppParameters
PortSetting
Themes
Logout
Help
Ports
COM22-Scan
COM26-Working
Scan
Detected
Sp1800

PH1800 Inverter Control

Inverter offgrid work enable	☑ Enable	Battery stop discharging voltage	50
Inverter output voltage Set	230	Battery stop charging voltage	52
Inverter output frequency Set	50Hz	Grid max charger current set	30
Inverter search mode enable	☐ On	Battery low voltage	40.8
Inverter discharger to grid enable	☑ On	Battery high voltage	60
Energy use mode	SBU	Max Combine charger current	80
Grid protect standard	Home	Charger source priority	Solar and Utility(default)
SolarUse Aim	BLU	Float voltage	54
Inverter max discharger current	21.7	Absorption voltage	56.4
Battery type	AGM battery		

System setting
- ☑ OverLoadRestartForbid
- ☑ OverTempRestartForbid
- ☐ OverLoadBypassForbid
- ☑ AutoTurnPageFlagForbid
- ☐ GridBuzzEnable(only use by PV18
- ☐ BuzzForbide(only use by PV1800)
- ☑ LcdLightEnable
- ☐ RecordFaultForbid

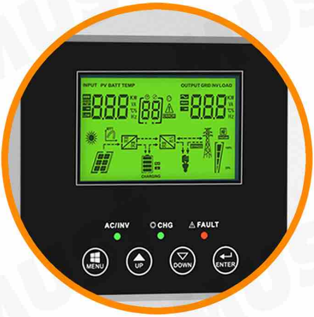
Confirm Cancel

Hardware version(Inverter)	1.01.01
Software version(Inverter)	1.55.19
Hardware version(Charger)	1.02.02
Software version(Charger)	1.16.19
Protocal Edition	1.04.14

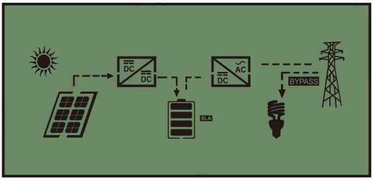
PV Relay	Connect
BattVol Grade	48 V
Rated Current	80 A
ACCUM power	719.6KWH

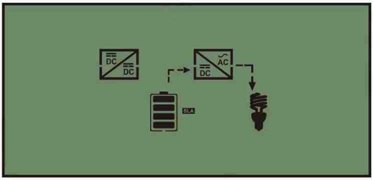
			44 ℃
			79 ℃
			43 ℃
			Connect
			Connect
			Connect
			274.3KWH
			863.9KWH
			295.8KWH
			919.7KWH
			285.8KWH
			250.5KWH
			919.7KWH
PLoad	2276 W	ACCUM grid_charge	265.6KWH
Load percent	45 %	Batt power	50 W
SInverter	4012 VA	Batt current	0 A
SGrid	1862 VA	Inverter Hz	50.03 Hz
Sload	2448 VA	Grid Hz	50.03 Hz

Easy to read all working modes and parameters in LCD


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

MUST


DC
DC
AC
DC
BYPASS
SLA

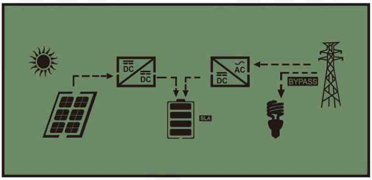

DC
DC
AC
DC
SLA

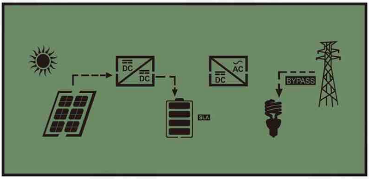
Utility-Tie state

PV energy is charger into the battery and utility provide power to the AC load

Charge state

PV energy and grid can charge batteries.


DC
DC
AC
DC
BYPASS
SLA

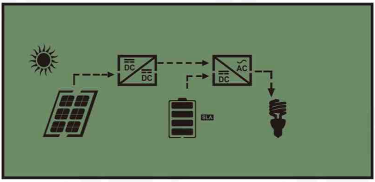

DC
DC
AC
DC
BYPASS
SLA

Bypass state

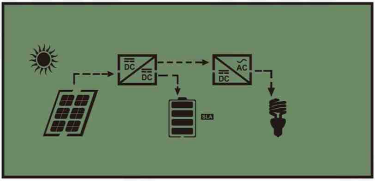
Error are caused by inside circuit error or external reasons such as over temperature, output short circuited and so on.

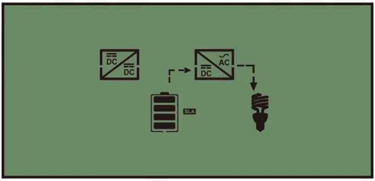
Off-Grid state

The inverter will provide output power from battery and PV power


DC
DC
AC
DC
SLA

MUST

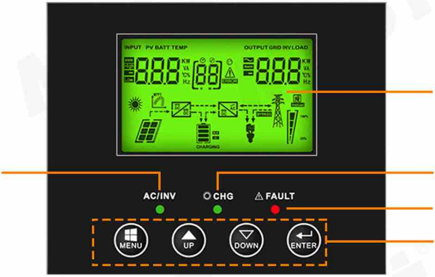

DC
DC
AC
DC
SLA


DC
DC
AC
DC
SLA

PRODUCT DETAILS

MUST HELP YOU CONTROL EVERY DETAIL

Details reflect quality


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

LCD display

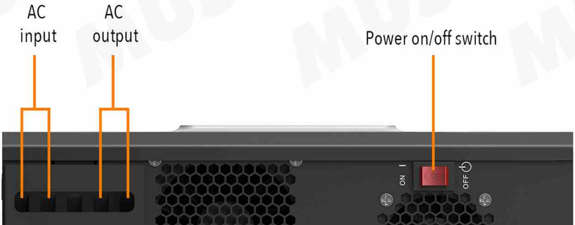
Status indicator

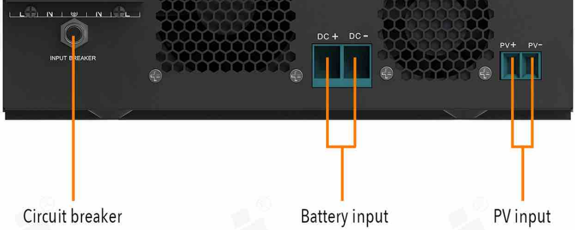
Charging indicator

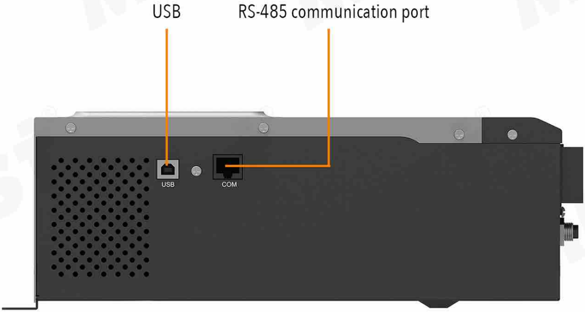
Fault indicator

Function buttons

MUST

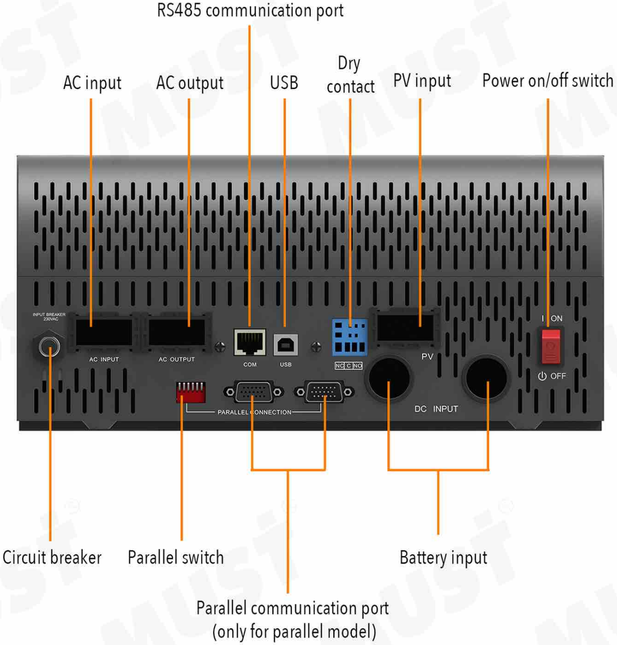

AC
input
AC
output
Power on/off switch
ON
OFF


L
N
N
L
INPUT BREAKER
DC +
DC −
PV+
PV−
Circuit breaker
Battery input
PV input


USB
RS-485 communication port
USB
COM

(1-3 KW)

MUST

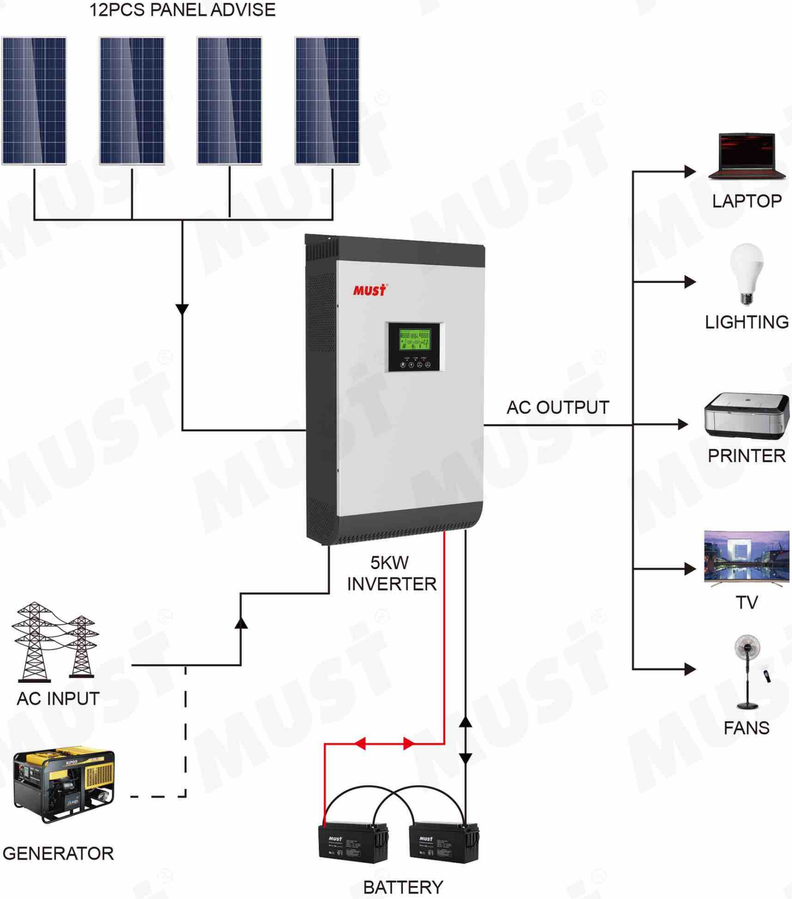

RS485 communication port
AC input
AC output
USB
Dry contact
PV input
Power on/off switch
INPUT BREAKER 230VAC
AC INPUT
AC OUTPUT
COM
USB
NC C NO
PV
I ON
OFF
PARALLEL CONNECTION
DC INPUT
Circuit breaker
Parallel switch
Battery input
Parallel communication port
(only for parallel model)

(4-5 KW)

INVERTER SYSTEM CONNECTION

INVERTER + SOLAR PANELS + GRID + APPLICATION LOADS

MUST


12PCS PANEL ADVISE
MUST
5KW
INVERTER
AC OUTPUT
LAPTOP
LIGHTING
PRINTER
TV
FANS
AC INPUT
GENERATOR
BATTERY

PRODUCT PARAMETERS

MAKE SURE EACH PARAMETER IS TRUE

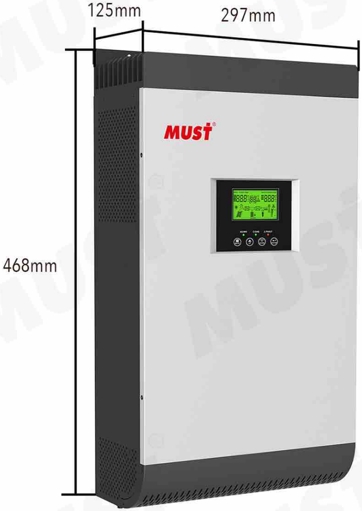
Learn more about the product

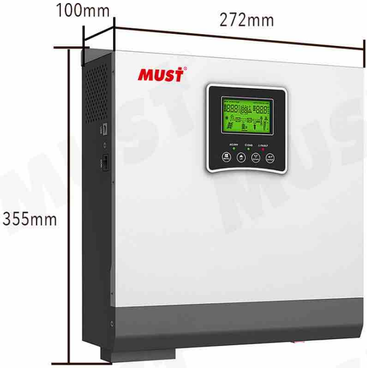
MODEL		PV18-1012 VPM	PV18-2024 VPM	PV18-3024 VPM	PV18-3048 VPM	PV18-4048 VPM	PV18-5048VPM
Default Battery System Voltage		12VDC	24VDC		48VDC		
INVERTER OUTPUT	Rated Power	1000VA / 1000W	2000VA / 2000W	3000VA / 3000W	3000VA / 3000W	4000VA / 4000W	5000VA / 5000W
	Surge Power	2000VA	4000VA	6000VA	6000VA	8000VA	10000VA
	Waveform	Pure sine wave					
	AC Voltage Regulation (Batt. Mode)	220VAC~240VAC(Setting)					
	Inverter Efficiency(Peak)	90%~93%					
	Transfer Time	10ms(For Personal Computers) , 20ms(For Home Appliances)					
AC INPUT	Voltage	230VAC					
	Selectable Voltage Range	170~280VAC(For Personal Computers), 90~280VAC(For Home Appliances), 184~253VAC(VDE)					
	Frequency Range	50Hz/60Hz (Auto sensing)					
BATTERY	Normal voltage	12VDC	24VDC		48VDC		
	Floating Charge Voltage	13.7VDC	27.4VDC		54.8VDC		
	Overcharge Protection	15VDC	30VDC		60VDC		
"SOLAR CHARGER & AC CHARGER"	Maximum PV Array Open Circuit Voltage	60VDC	100VDC		145VDC		
	PV Array MPPT Voltage Range	15~60VDC	30~80VDC		64~130VDC		
	Standby Power Consumption	2W					
	Maximum PV Array Power	625W	1250W		4000W		
	Maximum Solar Charge Current	50A			80A		
	Maximum Efficiency	98%					

MUST

	Maximum AC Charge Current	10A or 20A	20A or 30A	60A
	Maximum ChargeCurrent	70A	80A	140A
MECHANICAL SPECIFICATIONS	Machine Dimensions (W*H*D)(mm)	272*355*100		297.5*468*125
	Package Dimensions (W*H*D)(mm)	485*393*251		638*395*241
	Net Weight(kg)	7.4		14
	Gross Weight(kg)	9.5		16.4
OTHER	Humidity	5% to 95% Relativ Humidity (Non-condensing)		
	Operating Temperature	0°C -55°C		
	Storage Temperature	-15°C -60°C		

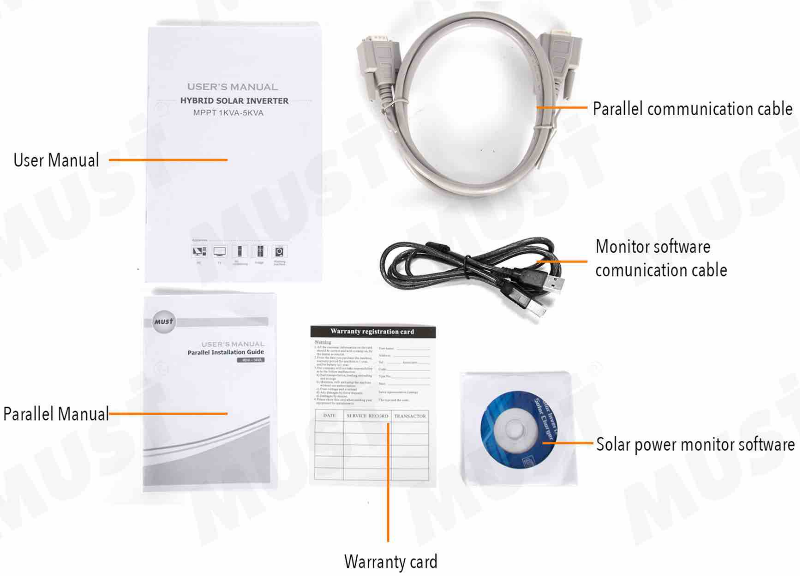
Size


125mm
297mm
468mm
MUST


100mm
272mm
355mm
MUST

(3-5 KW) (1-3 KW)

Package


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

COLOR BOX DIMENSION
476*602*325MM

MUST

MUST
100% PURE SINE WAVE
SOLAR INVERTER
Green Energy Advocates
USER'S MANUAL
HYBRID SOLAR
Warranty registration card
CE

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	✓

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	✓

PRACTICAL APPLICATION

APPLICABLE PLACE

CCTV

MARIVAN
MARIVAN
Shop / Supermarket

Office

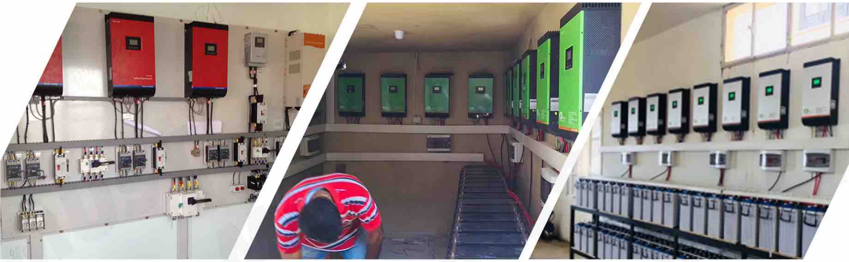
MUST

Solar power system

Industrial intellectual control system

Ventilation systems

PROJECT REFERENCE

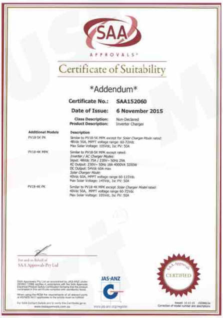


PROFESSIONAL CERTIFICATION

CE FCC SAA ISO9001

High quality and high standard

MUST®



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

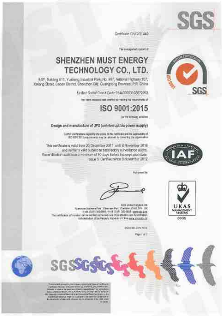
For and on Behalf of
SAA Approvals Pty Ltd

JAS-ANZ

www.jas-anz.org/register

CERTIFIED

Correction of model number and descriptions



SGS

Certificate CN12/01440

The management system of

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

Unified Social Credit Code [illegible]

has been assessed and certified as meeting the requirements of

ISO 9001:2015

For the following activities

Design and manufacture of UPS (uninterruptible power supply)

Further clarifications regarding the scope of this certificate and the applicability of ISO 9001:2015 requirements may be obtained by consulting the organization.

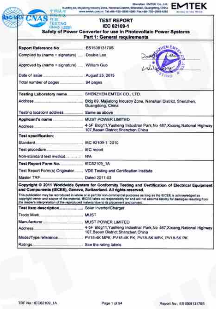
This certificate is valid from 20 December 2017 until 8 November 2018 and remains valid subject to satisfactory surveillance audits. Recertification audit due a minimum of 60 days before the expiration date. Issue 5. Certified since 8 November 2012

Authorised by

IAF

UKAS MANAGEMENT SYSTEMS 0005

Page 1 of 1



Shenzhen EMTEK Co., Ltd.
Building 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China
EMTEK

ilac-MRA CNAS TESTING CNAS L2291

TEST REPORT
IEC 62109-1
Safety of Power Converter for use in Photovoltaic Power Systems
Part 1: General requirements

Report Reference No. : ES150813179S
Compiled by (name + signature) : Double Lee
Approved by (name + signature) : William Guo
Date of issue : August 25, 2015
Total number of pages : 94 pages

Testing Laboratory name : SHENZHEN EMTEK CO., LTD.
Address : Bldg 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China
Testing location/ address : Same as above

Applicant's name : MUST POWER LIMITED
Address : 4-5F Bldg11,Yusheng Industrial Park,No 467,Xixiang,National Highway 107,Baoan District,Shenzhen,China

Test specification:
Standard : IEC 62109-1: 2010
Test procedure : IEC report
Non-standard test method : N/A

Test Report Form No. : IEC62109_1A
Test Report Form(s) Originator : VDE Testing and Certification Institute
Master TRF : Dated 2011-03

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Test item description : Solar Inverter/Charger
Trade Mark : MUST
Manufacturer : MUST POWER LIMITED
Address : 4-5F Bldg11,Yusheng Industrial Park,No 467,Xixiang,National Highway 107,Baoan District,Shenzhen,China
Model/Type reference : PV18-4K MPK, PV18-4K PK, PV18-5K MPK, PV18-5K PK
Ratings : See the rating labels.

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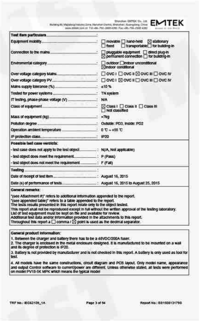
TEST REPORT

Have quality inspection to use with confidence



Shenzhen EMTEK Co., Ltd. EMTEK

Test item particulars :
Equipment mobility : ☐ movable ☐ hand-held ☒ stationary ☐ fixed ☐ transportable ☐ for building-in
Connection to the mains : ☐ pluggable equipment ☐ direct plug-in ☒ permanent connection ☐ for building-in
Enviromental category : ☐ outdoor ☐ indoor unconditional ☒ indoor conditional
Over voltage category Mains : ☐ OVC I ☐ OVC II ☒ OVC III ☐ OVC IV
Over voltage category PV : ☐ OVC I ☒ OVC II ☐ OVC III ☐ OVC IV
Mains supply tolerance (%) : ±10 %
Tested for power systems : TN system
IT testing, phase-phase voltage (V) : N/A
Class of equipment : ☒ Class I ☐ Class II ☐ Class III ☐ Not classified
Mass of equipment (kg) : ≈7kg
Pollution degree : Outside: PD3, Inside: PD2
Operation ambient temperature : 0 ℃ ~ +55 ℃
IP protection class : IP20

Possible test case verdicts:
- test case does not apply to the test object : N(/A, Not applicable)
- test object does meet the requirement : P (Pass)
- test object does not meet the requirement : F (Fail)

Testing :
Date of receipt of test item : August 16, 2015
Date (s) of performance of tests : August 16, 2015 to August 25, 2015

General remarks:

"(see Attachment #)" refers to additional information appended to the report.
"(see appended table)" refers to a table appended to the report.
The tests results presented in this report relate only to the object tested.
This report shall not be reproduced except in full without the written approval of the testing laboratory.
List of test equipment must be kept on file and available for review.
Additional test data and/or information provided in the attachements to this report.
Throughout this report a ☐ comma / ☒ point is used as the decimal separator.

General product information:

1. Between the charger and battery there has to be a 48VDC/200A fuser.
2. The charger is enclosed in the metal enclosure designed. It is manufactured to be mounted on a wall and its degree of protection is IP20.
3. Battery is not provided by manufacturer and is not checked in this report. A battery is only used as tool for test.
4. All models have the same constructions, circuit diagram and PCB layout. Only model name, appearance and output Control software to current/power are different. Unless otherwise stated, all tests were performed on model PV18-5K MPK which means the typical model

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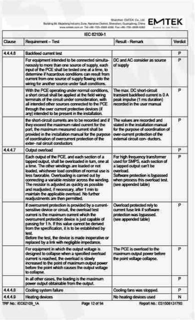

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IEC 62109-1

Clause	Requirement – Test	Result - Remark	Verdict
4.4.4.6	Backfeed current test		P
	For equipment intended to be connected simultaneously to more than one source of supply, each input of the PCE shall be tested one at a time, to determine if hazardous conditions can result from current from one source of supply flowing into the wiring for another source under fault conditions.	DC and AC consider as source of supply	P
	With the PCE operating under normal conditions, a short circuit shall be applied at the field wiring terminals of the circuit under consideration, with all intended other sources connected to the PCE through the over current protective devices (if any) intended to be present in the installation.	The max. DC short-circuit transient backfeed current is 0 A peak impulse (1 ms duration) recorded in the user manual	P
	the short-circuit currents are to be recorded and if they exceed the maximum rated current for the port, the maximum measured current shall be provided in the installation manual for the purpose of coordination of overcurrent protection of the exter- nal circuit conductors	The values are recorded and stated in the installation manual for the purpose of coordination of over-current protection of the external circuit con- ductors.	P
4.4.4.7	Output overload		P
	Each output of the PCE, and each section of a tapped output, shall be overloaded in turn, one at a time. The other windings are loaded or not loaded, whichever load condition of normal use is less favorable. Overloading is carried out by connecting a variable resistor across the winding. The resistor is adjusted as quickly as possible and readjusted, if necessary, after 1 min to maintain the applicable overload. No further readjustments are then permitted.	For high frequency transformer used for SMPS, each section of a tapped output can't be overload. Software protection is bypassed when process this overload test. (see appended table)	P
	If overcurrent protection is provided by a current-sensitive device or circuit, the overload test current is the maximum current which the overcurrent protection device is just capable of passing for 1 h. If this value cannot be derived from the specification, it is to be established by test. Before the test, the device is made inoperative or replaced by a link with negligible impedance.	Overload protected rely to current fuse link if software protection was bypassed. (see appended table)	P
	For equipment in which the output voltage is designed to collapse when a specified overload current is reached, the overload is slowly increased to the point of maximum output power before the point which causes the output voltage to collapse.	The PCE is overload to the maximum output power before the point voltage collapse.	P
	In all other cases, the loading is the maximum power output obtainable from the output.		P
4.4.4.8	Cooling system failure	Cooling fans was stopped.	P
4.4.4.9	Heating devices	No heating devices used	N

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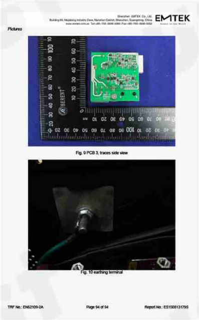

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Pictures

Fig. 9 PCB 3, traces side view

Fig. 10 earthing terminal

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