Installation & Operation Manual

Growatt 7000MTL-S

Growatt 8000MTL-S

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1 Notes on this manual

1.1 Validity

This manual describes the assembly, installation, commissioning and maintenance of the following Growatt Inverter model:
Growatt 7000MTL-S
Growatt 8000MTL-S

This manual does not cover any details concerning equipment connected to the Growatt MTL-S(e.g. PV modules). Information concerning the connected equipment is available from the manufacturer of the equipment.

1.2 Target Group

This manual is for qualified personnel. Qualified personnel have received training and have demonstrated skills and knowledge in the construction and operation of this device. Qualified Personnel are trained to deal with the dangers and hazards involved in installing electric devices.

1.3 Additional information

Find further information on special topics in the download area at www.ginverter.com
The manual and other documents must be stored in a convenient place and be available at all times. We assume no liability for any damage caused by failure to observe these instructions. For possible changes in this manual, GROWATT NEW ENERGY TECHNOLOGY CO.,LTD accepts no responsibilities to inform the users.

1.4 Symbols in this document

1.4.1 Warnings in this document

A warning describes a hazard to equipment or personnel. It calls attention to a procedure or practice, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the Growatt equipment and/or other equipment connected to the Growatt equipment or personal injury.

Symbol	description
 **DANGER**	**DANGER** indicates a hazardous situation which, if not avoided, will result in death or serious injury.
 **WARNING**	**WARNING** indicates a hazardous situation which, if not avoided, could result in death or serious injury.
 **CAUTION**	**CAUTION** indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
 **NOTICE**	**NOTICE** is used to address practices not related to personal injury.
 **Information**	**Information** that you must read and know to ensure optimal operation of the system.

1.4.2 Markings on this product

Symbol	Explanation
	**Electrical voltage!**
	**Risk of fire or explosion !**
	**Risk of burns**
	**Operation after 5 minutes**

	**Point of connection for grounding protection**
	**Direct Current (DC)**
	**Alternating Current (AC)**
	**CE mark.** **The inverter complies with the requirements of the applicable CE guidelines.**
	**The inverter must not be disposed of with the household waste.**

1.5 Glossary

AC
Abbreviation for "Alternating Current"
DC
Abbreviation for "Direct Current"
Energy
Energy is measured in Wh (watt hours), kWh (kilowatt hours) or MWh (megawatt hours). The energy is the power calculated over time. If, for example, your inverter operates at a constant power of 4600 W for half an hour and then at a constant power of 2300 W for another half an hour, it has fed 3450Wh of energy into the power distribution grid within that hour.
Power
Power is measured in W (watts), kW (kilowatts) or MW (megawatts). Power is an instantaneous value. It displays the power your inverter is currently feeding into the power distribution grid.
Power rate
Power rate is the radio of current power feeding into the power distribution grid and

the maximum power of the inverter that can feed into the power distribution grid.

Power Factor

Power factor is the ratio of true power or watts to apparent power or volt amps. They are identical only when current and voltage are in phase than the power factor is 1.0. The power in an ac circuit is very seldom equal to the direct product of the volts and amperes. In order to find the power of a single phase ac circuit the product of volts and amperes must be multiplied by the power factor.

PV

Abbreviation for photovoltaic

wireless communication

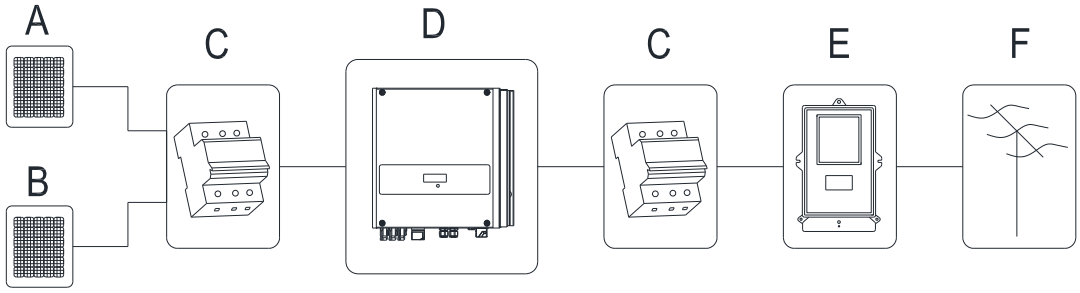
The external wireless communication technology is a radio technology that allows the inverter and other communication products to communicate with each other. The external wireless communication does not require line of sight between the devices and it is selective purchasing.

2 Safety

2.1 Intended Use

The unit converts the DC current generated by the photovoltaic (PV) modules to grid-compliant alternating current and performs single-phase feed-in into the electricity grid. Growatt 7000 MTL-S,Growatt 8000MTL-S inverters are built according to all required safety rules. Nevertheless, improper use may cause lethal hazards for the operator or third parties, or may result in damage to the units and other property.

Principle of a PV plant with this GROWATT XXXXMTL-S single-phase inverter



Position	Description
A/B	PV modules
C	Circuit breaker
D	Growatt Inverter
E	Energy meter
F	Utility grid

The inverter may only be operated with a permanent connection to the public power grid. The inverter is not intended for mobile use. Any other or additional use is not considered the intended use. The manufacturer/supplier is not liable for damage caused by such unintended use. Damage caused by such unintended use is at the sole risk of the operator.

PV modules Capacitive Discharge Currents

PV modules with large capacities relative to earth, such as thin-film PV modules with cells on a metallic substrate, may only be used if their coupling capacity does not exceed **470nF**. During feed-in operation, a leakage current flows from the cells to earth, the size of which depends on the manner in which the PV modules are installed (e.g. foil on metal roof) and on the weather (rain, snow). This "normal" leakage current may not exceed 50mA due to the fact that the inverter would otherwise automatically disconnect from the electricity grid as a protective measure.

2.2 Qualification of skilled person

This grid-tied inverter system operates only when properly connected to the AC -distribution network. Before connecting the Growatt MTL-S to the power distribution grid, contact the local power distribution grid company. This connection must be made only by qualified technical personnel to connect, and only after receiving appropriate approvals, as required by the local authority having jurisdiction.

2.3 Safety instruction

The GROWATT MTL-S Inverters is designed and tested according to international safety requirements（IEC62109-1,CE, AS4777）; however, certain safety precautions must be observed when installing and operating this inverter. Read and follow all instructions, cautions and warnings in this installation manual. If questions arise, please contact Growatt’s technical services at +86 (0)755 2747 1942.

2.4 Assembly Warnings

 **WARNING**	➢ Prior to installation, inspect the unit to ensure absence of any transport or handling damage, which could affect insulation integrity or safety clearances; failure to do so could result in safety hazards. ➢ Assemble the inverter per the instructions in this manual. Use care when choosing installation location and adhere to specified cooling requirements. ➢ Unauthorized removal of necessary protections, improper use, incorrect installation and operation may lead to serious safety and shock hazards and/or equipment damage. ➢ In order to minimize the potential of a shock hazard due to hazardous voltages, cover the entire solar array with dark material prior to connecting the array to any equipment.
 **CAUTION**	➢ Grounding the PV modules：The Growatt MTL-S is a transformerless inverter. Do not ground the DC circuits of the PV modules connected to the Growatt MTL-S. Only ground the mounting frame of the PV modules.If you connect grounded PV modules to the Growatt MTL-S, the error message "PV ISO Low". ➢ Comply with the local requirements for grounding the PV modules and the PV generator. GROWATT recommends connecting the generator frame and other electrically conductive surfaces in a manner which ensures continuous conduction with ground in order to have optimal protection of the system and personnel.

2.5 Electrical Connection Warnings

 **DANGER**	➢ The components in the inverter are live. Touching live components can result in serious injury or death. ● Do not open the inverter except the wire box by qualified persons. ● Electrical installation, repairs and conversions may only be carried out by electrically qualified persons. ● Do not touch damaged inverters. ➢ Danger to life due to high voltages in the inverter ● There is residual voltage in the inverter. The inverter takes 5 minutes to discharge. ● Wait 5 minutes before you open the wire box. ➢ Persons with limited physical or mental abilities may only work with the Growatt inverter following proper instruction and under constant supervision. Children are forbidden to play with the Growatt inverter. Must keep the

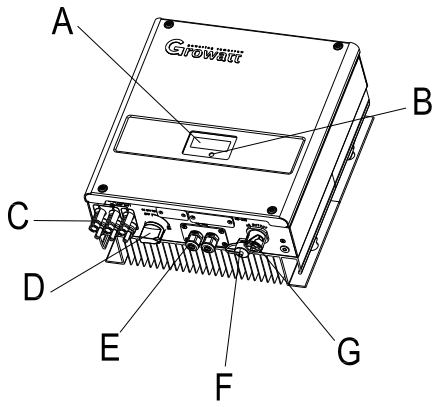
<table>
<tr><td></td><td>Growatt inverter away from children.</td></tr>
<tr><td> 
WARNING</td><td>➢ Make all electrical connections (e.g. conductor termination, fuses, PE connection, etc.) in accordance with prevailing regulations. When working with the inverter powered on, adhere to all prevailing safety regulations to minimize risk of accidents.
➢ Systems with inverters typically require additional control (e.g., switches, disconnects) or protective devices (e.g., fusing circuit breakers) depending upon the prevailing safety rules.</td></tr>
<tr><td> 
CAUTION</td><td>➢ The Growatt Inverter converts DC Current from PV generator into AC current. The inverter is suitable for mounting indoors and outdoors.
➢ You can use the AC current gernerated as follows:<table><tr><td>House grid:</td><td>Energy flows into the house grid. The consumers connected, for example, household devices or lighting, consume the energy. The energy left over is fed into the public grid. When the Growatt is not gernerating any energy, e.g., at night, the consumers which are connected are supplied by the public grid.The Growatt does not have its own energy meter. When energy is fed into the public grid, the energy meter spins backwards.</td></tr><tr><td>Public grid:</td><td>Energy is fed directly into the public grid. The Growatt is connected to a separate energy meter. The energy produced is compensated at a rate depending on the electric power company.</td></tr></table></td></tr>
</table>

2.6 Operation Warnings

 **WARNING**	➢ Ensure all covers and doors are closed and secure during operation. ➢ Although designed to meet all safety requirements, some parts and surfaces of Inverter are still hot during operation. To reduce the risk of injury, do not touch the heat sink at the back of the PV-Inverter or nearby surfaces while Inverter is operating. ➢ Incorrect sizing of the PV plant may result in voltages being present which could destroy the inverter. The inverter display will read the error message "PV voltage High!" ● Turn the rotary switch of the DC Disconnect to the Off position immediately. ● Contact installer.
 **CAUTION**	➢ All operations regarding transport, installation and start-up, including maintenance must be operated by qualified, trained personnel and in compliance with all prevailing codes and regulations. ➢ Anytime the inverter has been disconnected from the power network, use extreme caution as some components can retain charge sufficient to create a shock hazard; to minimize occurrence of such conditions, comply with all corresponding safety symbols and markings present on the unit and in this manual. ➢ In special cases, there may still be interference for the specified application area despite maintaining standardized emission limit values (e.g. when sensitive equipment is located at the setup location or when the setup location is near radio or television receivers).In this case, the operator is obliged to take proper action to rectify the situation. ➢ Do not stay closer than 20 cm to the inverter for any length of time.

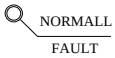
3 Product description

3.1 MTL-S Overview



Position	Description
A	LCD
B	LED
C	PV Input
D	DC Switch
E	RS485 terminal
F	RJ45 connector (only for Australia)
G	AC Output

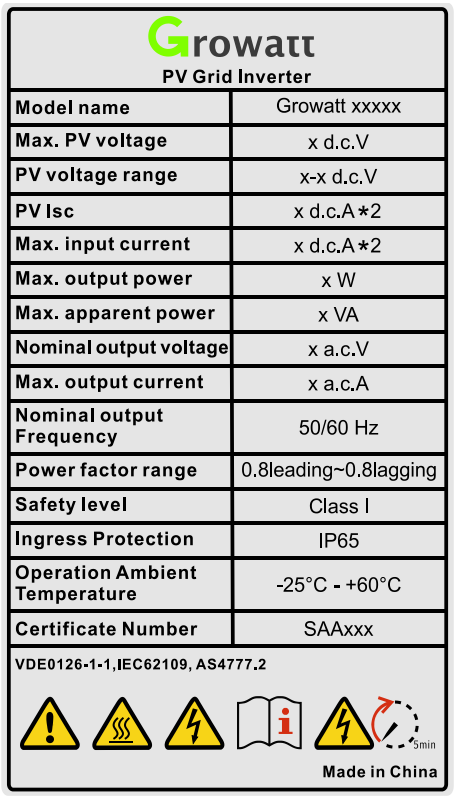
Symbol on the inverter

Symbol	Description	Explanation
	Tap symbol	Setting the display operation by tapping the LCD (see Section 7).
	Inverter status symbol	Indicates inverter operation status

3.2 Type label

The type labels provide a unique identification of the inverter (The type of product,

Device-specific characteristics, Certificates and approvals). The type labels are on the right-hand side of the enclosure.



More detail about the type label as the chart below:

Model Name	Growatt 7000MTL-S	Growatt 8000MTL-S
Max input DC voltage	550V	
Max input DC current	25A/12.5A	
PV voltage range	80V~550V	
AC nominal voltage	230V	
AC grid frequency	50Hz	
Max. apparent power	7000VA	8200VA
AC normal output current	30.4A	35.7A
Power factor	0.8leading…0.8lagging	
Environmental Protection Rating	IP65	
Operation Ambient temperature	25...+60℃ (-13...+ 140° F) with derating above 45° C（113° F）	

3.3 Size and weight

Dimensions and weight

Model	Height (H)	Width (W)	Depth (D)	Weight
Growatt 7000MTL-S	419mm 16.5inch	355mm 14.0inch	185mm 7.2inch	16.8kg
Growatt 8000MTL-S	419mm 16.5inch	355mm 14.0inch	185mm 7.2inch	16.8kg

3.4 Storage of Inverter

If you want to storage the inverter in your warehouse, you should choose an appropriate location to store the inverter.

- The unit must be stored in original package and desiccant must be left in the package.
- The storage temperature should be always between -25℃and +60℃. And the storage relative humidity can achieve to 100%.
- If there are a batch of inverters need to be stored, the maximum layers for original carton is four.
- After long term storage, local installer or service department of GROWATT should perform a comprehensive test before installation

3.5 The advantage of the unit

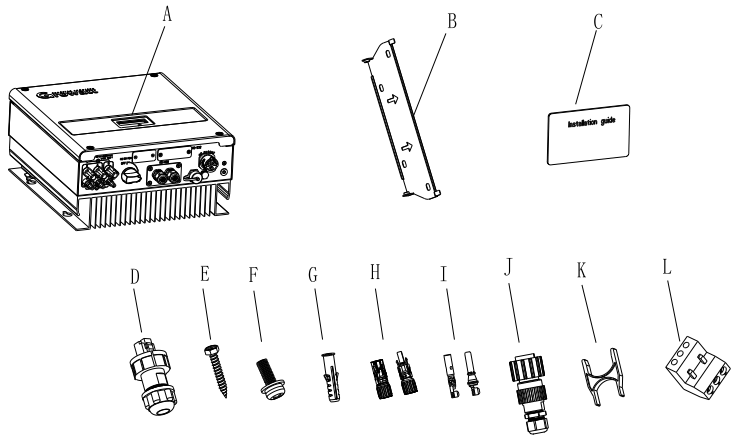
- Maximum efficiency of 98.4%
- Wide input voltage range from 80--550Vdc
- Reactive power regulate
- Integrated DC switch
- Multi MPP controller
- DSP controller
- Sound control
- Multi communication pattern
- Easy installation

4 Unpacking and inspection

The inverter is thoroughly tested and inspected strictly before delivery. Our inverters leave our factory in proper electrical and mechanical condition. Special packaging

ensures safe and careful transportation. However, transport damage may still occur. The shipping company is responsible in such cases. Thoroughly inspect the inverter upon delivery. Immediately notify the responsible shipping company if you discover any damage to the packaging which indicates that the inverter may have been damaged or if you discover any visible damage to the inverter. We will be glad to assist you, if required. When transporting the inverter, the original or equivalent packaging should be used, and the maximum layers for original carton is four, as this ensures safe transport.

After opening the package, please check the contents of the box. It should contain the following, Please check all of the accessories carefully in the carton. If anything missing, contact your dealer at once.



Item	Description	Quantity
A	Inverter	1
B	Mounting frame	1
C	Quick Guide &User manual	1
D	RJ45 connector (only for Australia)	1
E	Mounting screws	6
F	Safety-lock screws	1
G	Mounting frame screws sleeve	6
H	PV+/PV- terminal	3/3
I	PV+/PV- metal terminal	3/3
J	Cable gland for AC connection	1
K	AC connector tool	1
L	RS485 terminal	2

5 Installation

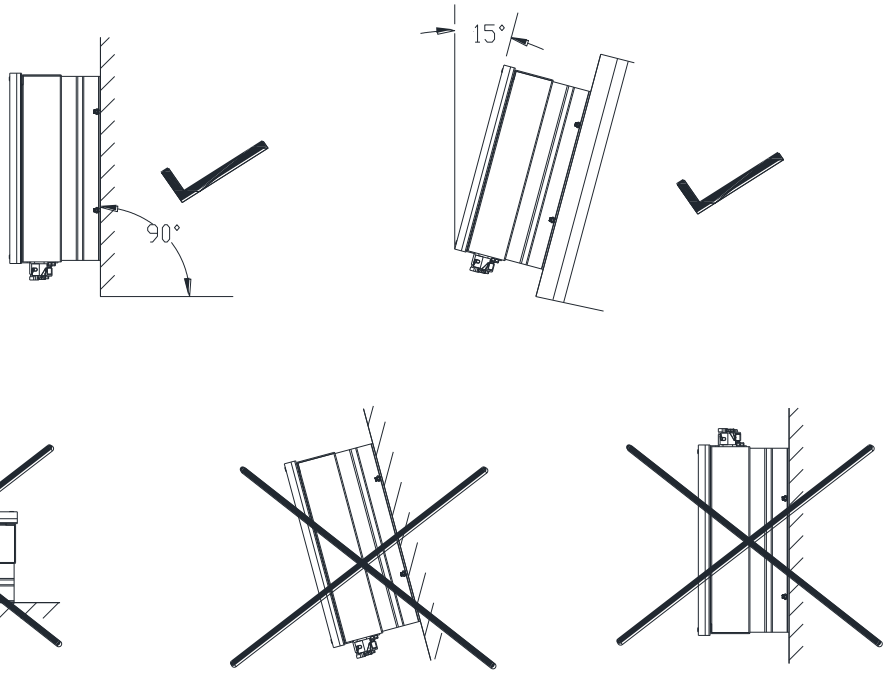
5.1 Safety instructions

	**Danger to life due to fire or explosion** ➢ Despite careful construction, electrical devices can cause fires. ➢ Do not install the inverter on easily flammable materials and where flammable materials are stored.
	**Risk of burns due to hot enclosure parts** Mount the inverter in such a way that it cannot be touched inadvertently.

- All electrical installations shall be done in accordance with the local and national electrical codes. Do not remove the casing. Inverter contains no user serviceable parts. Refer servicing to qualified service personnel. all wiring and electrical installation should be conducted by a qualified service personnel .
- Carefully remove the unit from its packaging and inspect for external damage. If you find any imperfections, please contact your local dealer.
- Be sure that the inverters connect to the ground in order to protect property and personal safety.
- The inverter must only be operated with PV generator. Do not connect any other source of energy to it.
- Both AC and DC voltage sources are terminated inside the PV Inverter. Please disconnect these circuits before servicing.
- This unit is designed to feed power to the public power grid (utility) only. Do not connect this unit to an AC source or generator. Connecting Inverter to external devices could result in serious damage to your equipment.
- When a photovoltaic panel is exposed to light, it generates a DC voltage. When connected to this equipment, a photovoltaic panel will charge the DC link capacitors.
- Energy stored in this equipment's DC link capacitors presents a risk of electric shock. Even after the unit is disconnected from the grid and photovoltaic panels, high voltages may still exist inside the PV-Inverter. Do not remove the casing until at least 5 minutes after disconnecting all power sources.
- Although designed to meet all safety requirements, some parts and surfaces of Inverter are still hot during operation. To reduce the risk of injury, do not touch the heat sink at the back of the PV-Inverter or nearby surfaces while Inverter is operating.

5.2 Selecting the installation location

- This is guidance for installer to choose a suitable installation location, to avoid potential damages to device and operators.
- The installation location must be suitable for the inverter's weight and dimensions for a long period time.
- Select the installation location so that the status display can be easily viewed.
- Do not install the inverter on structures constructed of flammable or thermolabile materials.
- Never install the inverter in environment of little or no air flow, nor dust environment. That may derate the efficiency of the cooling fan of the inverter.
- The Ingress Protection rate is IP65 which means the inverter can be installed outdoors and indoors.
- The humidity of the installation location should be 0~100% without condensation.
- The installation location must be freely and safely to get at all times.
- Vertically installation and make sure the connection of inverter must be downwards. Never install horizontal and avoids forward and sideways tilt.

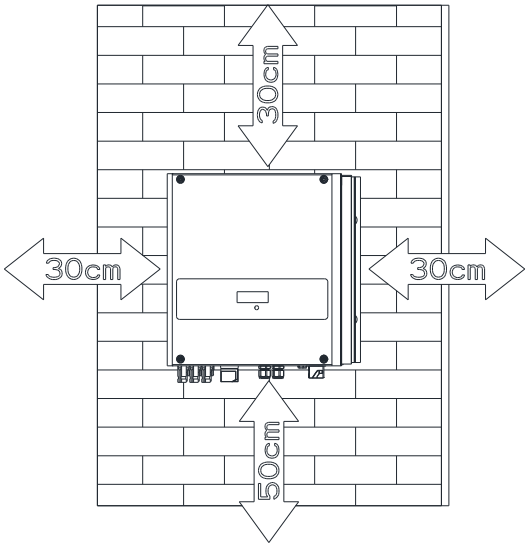


- Be sure that the inverter is out of the children’s reach.
- Don’t put any things on the inverter. Do not cover the inverter.
- Do not install the inverter near television antenna or any other antennas and antenna cables.
- Inverter requires adequate cooling space. Providing better ventilation for the inverter to ensure the heat escape adequately. The ambient temperature

should be below 40 ℃ to ensure optimum operation.

- Do not expose the inverter to direct sunlight, as this can cause excessive heating and thus power reduction.
- Observe the Min. clearances to walls, other inverters, or objects as shown in the diagram:

Direction	Min. clearance (cm)
above	**30**
below	**50**
sides	**30**
front	**30**

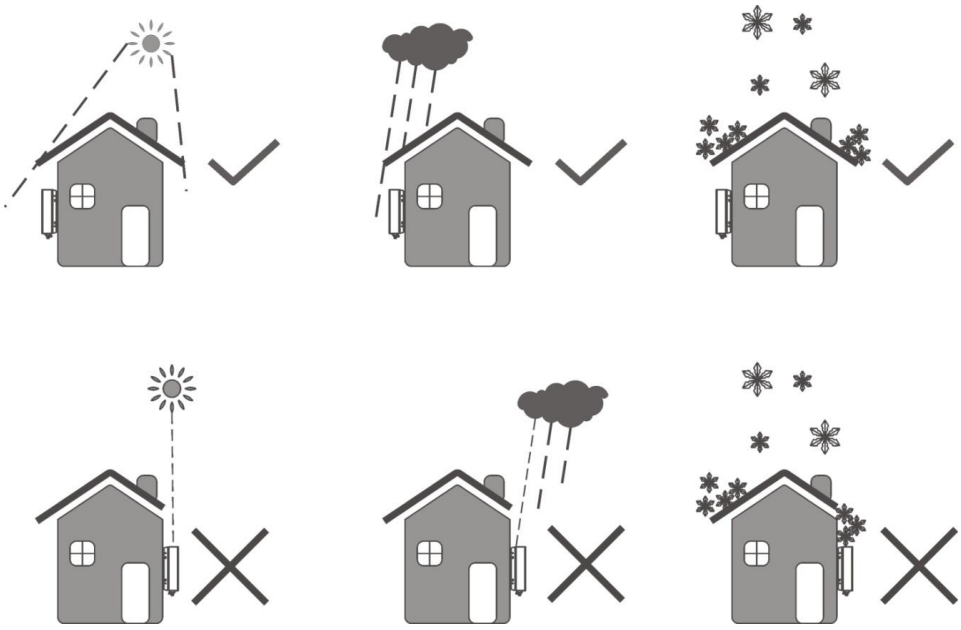


Ambient dimensions of **one inverter**

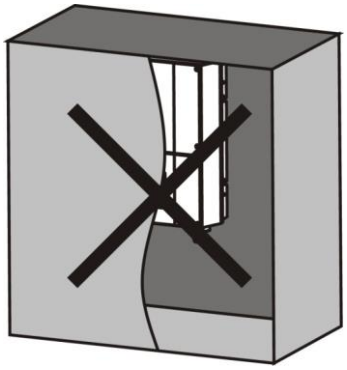
Ambient dimensions of **series inverters**

- There must be sufficient clearance between the individual inverters to ensure that the cooling air of the adjacent inverter is not taken in.
- If necessary, increase the clearance spaces and make sure there is enough fresh air supply to ensure sufficient cooling of the inverters.

The inverter can't install to solarization，drench，firn location. We suggest that the inverters should be installed at the location with some cover or protection。



- Please make sure the inverter is installed at the right place.The inverter can’t install close to trunk。

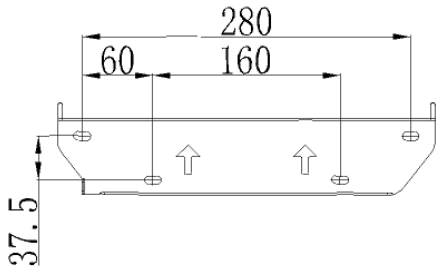


5.3 Mounting the Inverter

5.3.1 Mounting the Bracket

DANGER	**In order to avoid electrical shock or other injury, inspect existing electronic or plumbing installations before drilling holes.**

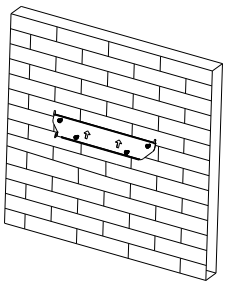
To mount the inverter on the wall, we should mount the bracket to the wall firmly first of all.



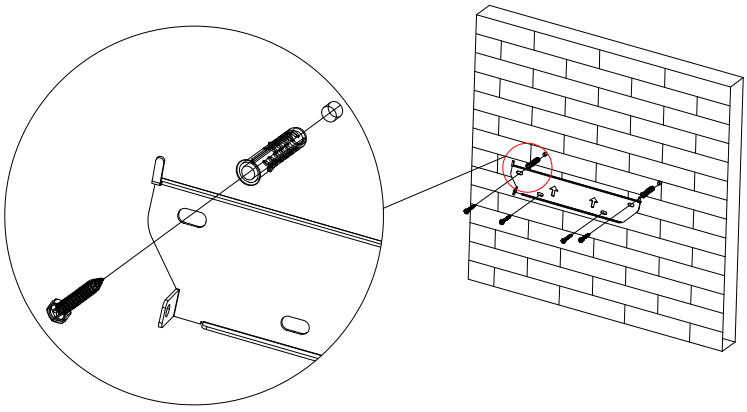
Hint: Data units in mm

Steps:

- Use the bracket as a drilling template and mark the positions where you need to drill holes.
- Drill four holes for screws, fasten the bracket against the wall with screw sleeves.



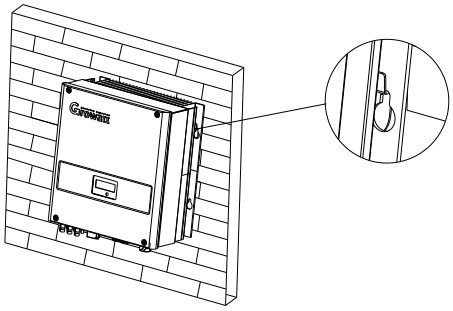
- Fix the mounting frame on the wall as the figures shown below.



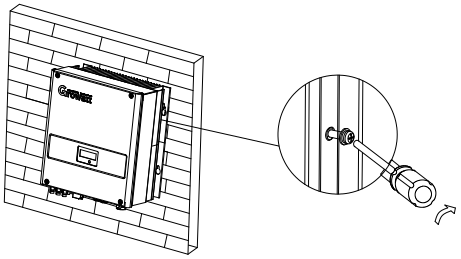
5.3.2 Fixed the inverter on the wall

WARNING	Falling equipment can cause serious or even fatal injury, never mount the inverter on the bracket unless you are sure that the mounting frame is really firmly mounted on the wall after carefully checking.

- Rise up the inverter a little higher than the bracket. Considered the weight of them.During the process please maintain the balance of the inverter.
  Hang the inverter on the bracket through the match hooks on bracket.



- After confirming the inverter is fixed reliably, fasten M6 safety-lock sockets head cap screws on the left and right side firmly to prevent the inverter from being lifted off the bracket.



6 Electrical connection

Decisive Voltage Class (DVC) indicated for ports

Port Name	Class
AC	C
DC	C
DRM	A
RS485&RS232	A

6.1 Safety

	Danger to life due to lethal voltages! High voltages which may cause electric shocks are present in the conductive parts of the inverter. Prior to performing any work on the inverter, disconnect the inverter on the AC and DC sides
 **WARNING**	Danger of damage to electronic components due to electrostatic discharge. Take appropriate ESD precautions when replacing and installing the inverter.

6.2 Wiring AC Output

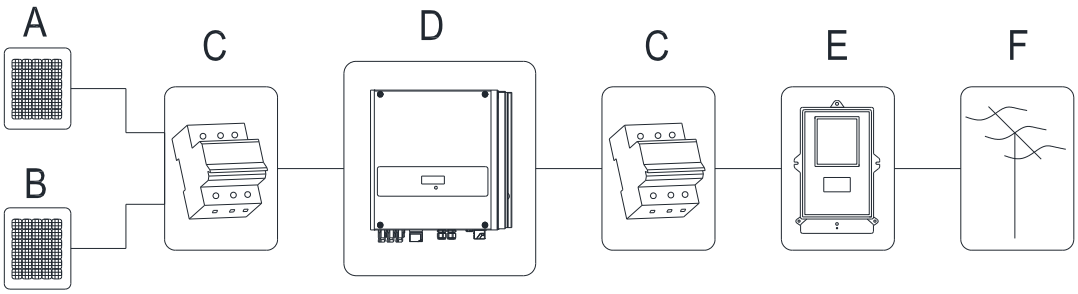
 **WARNING**	➢ You must install a separate single-phase circuit-breaker or other load disconnection unit for each inverter in order to ensure that the inverter can be safely disconnected under load. **NOTE** :The inverter has the function of detecting residual current and protecting the inverter against residual current. If your inverter has to equip a AC breaker which has the function of detecting residual current ,you must choose a AC breaker with the rating residual current more than 300mA.
 **NOTICE**	➢ When using inverter with VDE-AR-N 4105, because the inverter's displacement factor adjust function had to accorded to VDE-AR-N 4105,the PV-inverter system total capacity cannot be over 13.8KVA. ➢ When using inverter with CEI 0-21: if the inverter system total capacity more than3KW and up to 6KW,the displacement factor is adjustable between 0.95leading to 0.95 lagging ,and not need the external SPI.if the inverter system total capacity more than 6KW,,the displacement factor is adjustable between 0.9leading to 0.9 lagging ,and need the external SPI。

You must install a separate single-phase circuit-breaker or other load disconnection unit for each inverter in order to ensure that the inverter can be safely disconnected under load.

We suggest you choice the AC breaker rating current in this table:

Growatt 7000MTL-S	40A/230V
Growatt 8000MTL-S	50A/230V

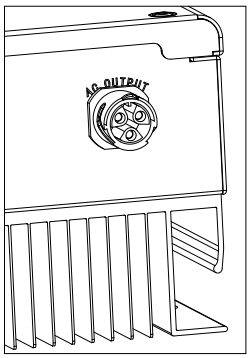
we recommend electrical connection as follows



Position	Description
A/B	PV modules
C	circuit breaker
D	Growatt Inverter
E	Energy meter
F	Utility grid

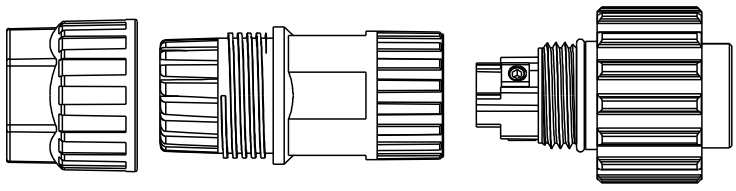
The AC wiring step:

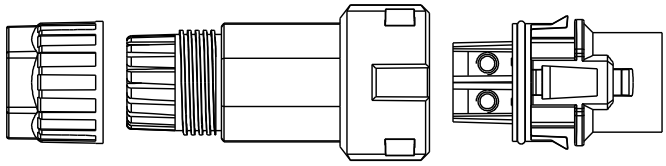
1. The grid connection is made using 3 conductors (L, N, and PE).



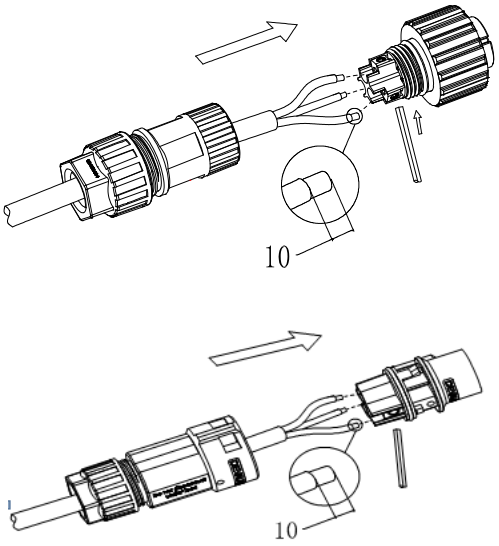
The AC wiring step:

2. Uninstall the parts of the AC connection plug from the accessory bag.

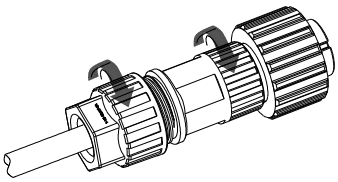


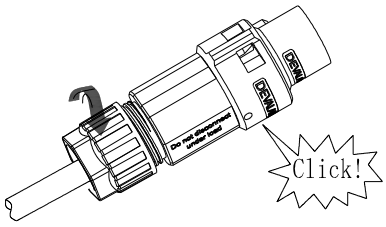


3. Insert the stripped and bared cable through pressure screw, seal ring, threaded sleeve in sequence, insert cables into connection terminal according to polarities indicates on it and tighten the screws firmly. Please try to pull out the wire to make sure the it’s well connected.

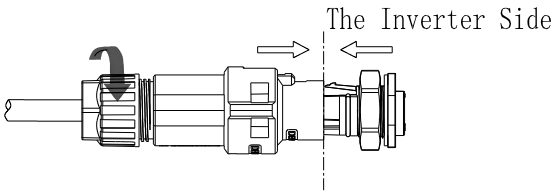


4. Push the threaded sleeve into the socket, Tighten up the cap on the terminal.

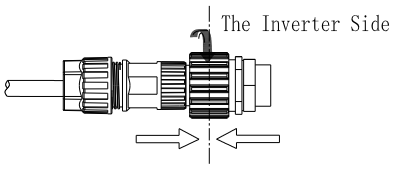




5. Finally, Push or screw the threaded sleeve to connection terminal until both are locked tightly on the inverter.

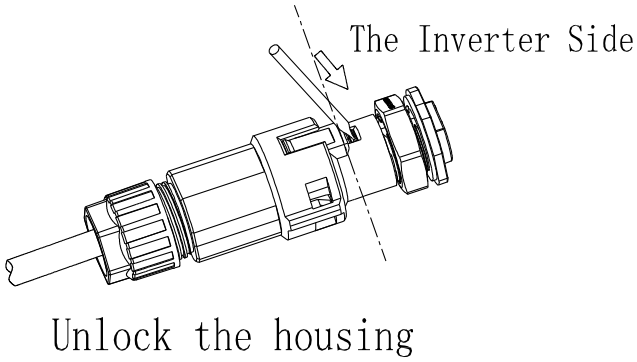


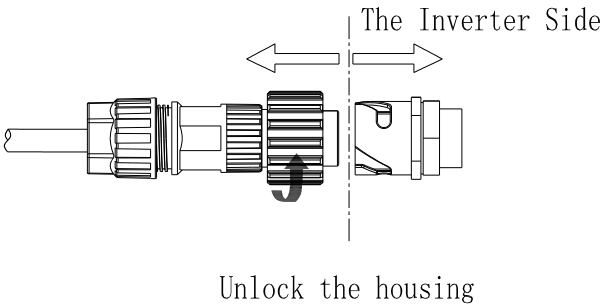
Lock the housing



Lock the housing

5:To remove the AC output terminal, press the bayonet out of the slot with a small screwdriver and pull it out,or unscrew the threaded sleeve,then pull it out.



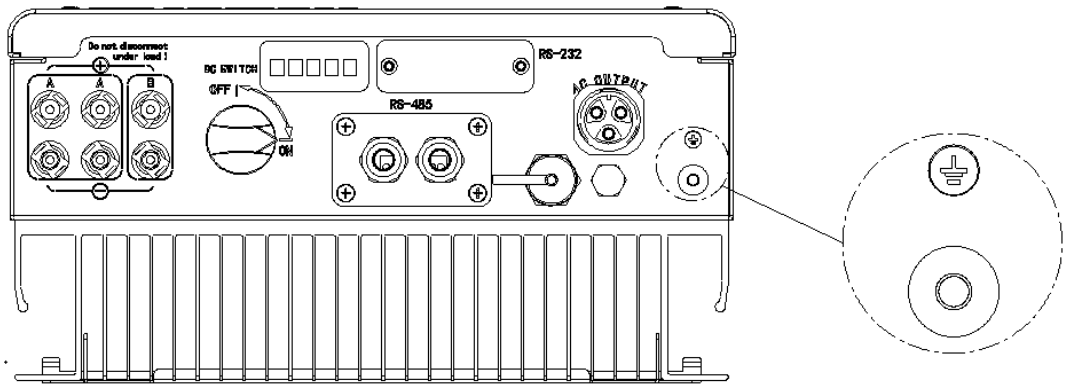


Wire suggestion length：

Conductor cross section	**Max. cable length**	
	Growatt 7000MTL-S	Growatt 8000MTL-S
10AWG	**46m**	**40m**
8AWG	**70m**	**60m**

6.3 Connecting the second protective conductor

If the installation requires,the ground terminal can be used to connect a second protective conductor or as a equipotential bonding.The second protective point is shown below.

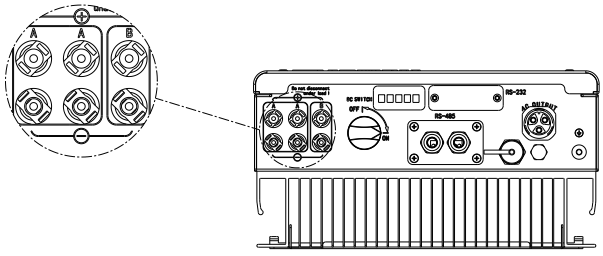


6.4 Connecting the PV Array (DC input)

6.4.1 Conditions for DC Connection

WARNING	The solar modules connected to the inverter must conform to the Class A requirements of the IEC 61730 standard. Please use the same brand male and female PV connectors.

The Growatt MTL-S single-phase inverter has 2 independent input : input A & input B



Suggestions for the PV modules of the connected strings:

- Same type
- Same quantity of PV modules connected in series

CAUTION	If the inverter is not equipped with a DC switch but this is mandatory in the country of installation, install an external DC switch. The following limit values at the DC input of the inverter must not be exceeded:

Types	Max current input A	Max current input B
Growatt 7000MTL-S	25A	12.5A
Growatt 8000MTL-S	25A	12.A

6.4.2 Connecting the PV Array (DC input)

DANGER	**Danger to life due to lethal voltages!** Before connecting the PV array, ensure that the DC switch and AC breaker are disconnect from the inverter. **NEVER** connect or disconnect the DC connectors under load. Make sure the maximum open circuit voltage(Voc) of each PV string is less than the maximum input voltage of the inverter. Check the design of the PV plant. The Max. open circuit voltage, which can occur at solar panels temperature of -10℃, must not exceed the Max. input voltage of the inverter.
WARNING	Improper operation during the wiring process can cause fatal injury to operator or unrecoverable damage to the inverter. Only qualified personnel can perform the wiring work.

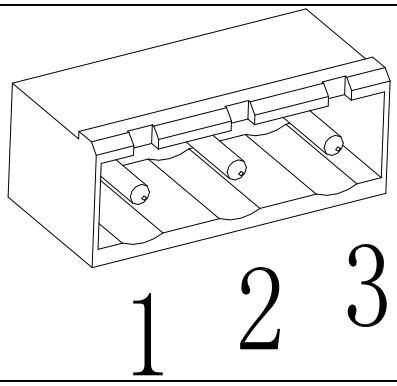
6.5 Grounding the inverter

The inverter must be connected to the AC grounding conductor of the power distribution grid via the ground terminal (PE) ⏚ .

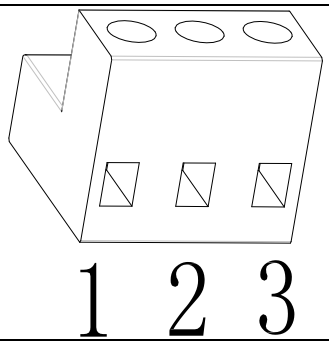
WARNING	Because of the transformerless design, the DC positive pole and DC negative pole of PV arrays are not permitted to be grounded.

6.6 RS485 cable connection

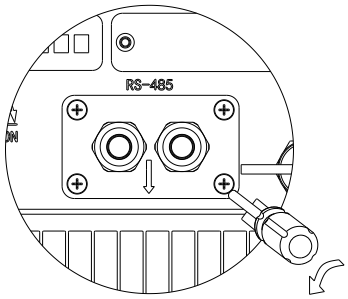
Definitions of RS485 socket (standard) as follows:

Pin1-------- T/R-(B) Pin2-------- Shielding layer or no connection Pin3-------- T/R+(A)	

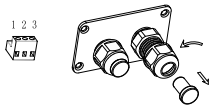
Definitions of RS485 PLUG (standard) as follows:

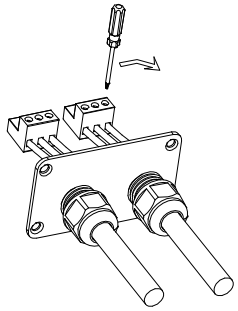
Pin1-------- T/R-(B) Pin2-------- Shielding layer or no connection Pin3-------- T/R+(A)	

1. Please loosen four screws, take down the RS485 waterproof cover from inverter. If you don't choose RS485 as communication method, keep it on the inverter.



2. Slightly loosen the swivel nut, remove the filler-plug from the M16 cable gland.



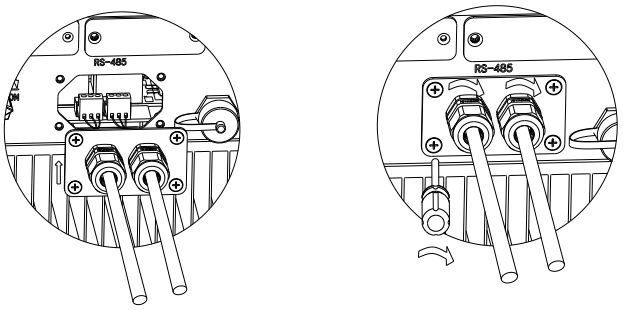


3. Make the cable through the hole of cable gland and put the cable into the RS485 terminals, fix all cables with screwdriver (‘1’to’ T/R-(RS485B)’, ‘3’to’ T/R+(RS485A)’, ‘2’ to the shielding layer or no connection). The type of cable is recommended as STP, FTP,ASTP.

Information

Pull cables outwards to confirm whether they are installed firmly

4. Plug in two terminals. Cover the fix board.



Information

Tighten 4 pcs screws first, then tighten cable gland.

5. Tighten 4pcs screws and cable gland.

6.7 Inverter demand response modes (DRMs,only for Australia)

This series inverter has the function of demand response modes,moreover, We use RJ45 socket as inverter DRED connection.

6.7.1 RJ45 socket pin assignment

Pin	Assignment for inverters capable of both charging and discharging
1	DRM 5
2	DRM 6
3	DRM 7
4	DRM 8
5	RefGen
6	Com/DRM0
7	/
8	/

6.7.2 Method of asserting demand response modes

Mode	RJ45 socket Asserted by shorting pins		Requirement
DRM 0	5	6	Operate the disconnection device
DRM 5	1	5	Do not generate power
DRM 6	2	5	Do not generate at more than 50% of rated power
DRM 7	3	5	Do not generate at more than 75% of rated power AND Sink reactive power if capabie
DRM 8	4	5	Increase power generation (subject to constraints from other active DRMs)

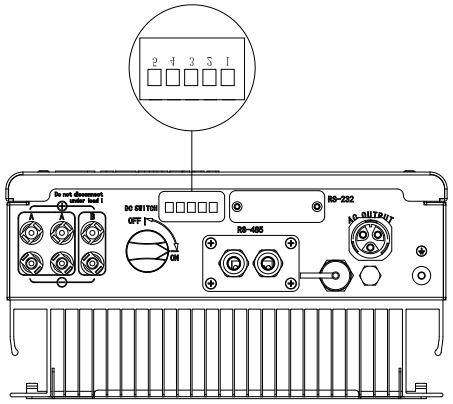
7 Commissioning

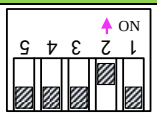
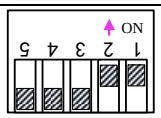
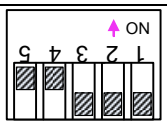
DANGER	Do not disconnect the DC connectors under load.
WARNING	Improper operation during the wiring process can cause fatal injury to operator or unrecoverable damage to the inverter. Only qualified personnel can perform the wiring work.

Requirements：

- ✓ The AC cable is correctly connected.
- ✓ The DC cable is correctly connected.

Step1: Please configure Safety follow the table below (Only for Australia, other countries skip the first step):



DIP switch status	Safety	Model display
	**Queensland**	GT0XXXXXX2
	**AS4777-Australia**	GT0XXXXXX3
	AS4777-New Zealand	GT1XXXXXX8

Step2: Turn on the AC switch between the MTL-S inverter and the power grid.
Step3: Turn on the DC switch at the bottom of the MTL-S inverter, the inverter will start automatically.

7.1 General LCD display

7.1.1 Power on display

When inverter powered on, LCD background will light automatically. Starting-up display sequence, once the PV power is sufficient, inverter displays information as shown in the flow chart as follow:

Module: xxxxxx
SerNo: xxxxxxxxxx
FW Version: x.x.x

Connect in: xxS
Connect : OK
xxxx.xVA xxxx.x W

7.1.2 LCD Display when background light off

After power on information displayed, there will be another 4 interfaces displayed in turn, if there is no knock signal input.

The First Line Of LCD		
STATE	**DISPLAY CONTENT**	REMARK
Wait State	Standby	PV voltage low
	Waiting	Initial waiting
	Connect in xxS	System checking
	Reconnect in xxS	System checking
Inverter State	Connect OK	Connect to Grid
	xxxx.xVA xxxx.x W	Inverter watt at working
Fault State	Error: xxx	System Fault
Auto Test State	Auto Testing	Protection auto test
Program State	Programming	Update Software

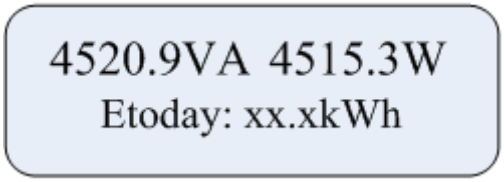
7.1.3 The Second line can change by knock on

The Second Line Of LCD		
CYCLE DISPLAY	DISPLAY TIME/S	REMARK
4520.9VA 4515.3W Model: PDU1M5S1	2	Model number of the inverter
4520.9VA 4515.3W FW Version: AS.1.0	2	Firmware version of the inverter
4520.9VA 4515.3W SerNO: XXXXXXX	2	Serial number, which is also shown on the LCD display.
4520.9VA 4515.3W Etoday : 8.5KWh	4	The energy today
4520.9VA 4515.3W Eall : 08KWH	4	The energy all

4520.9VA 4515.3W Ppv : 2427 / 2447 W	4	PV input watt
4520.9VA 4515.3W PV: 290/292 B: 359	4	The PV and Bus Voltage
4520.9VA 4515.3W AC: 230V F:50.1HZ	4	The grid system
4520.9VA 4515.3W Enable Auto Test	4	Enable auto test function
4520.9VA 4515.3W COM Address: 06	4	Communication Address of the inverter
4520.9VA 4515.3W Zigbee no conn	4	Set Zigbee channal
4520.9VA 4515.3W AC Error Record	4	The last 5dated failure reports
4520.9VA 4515.3W 2012/05/06 09 : 06	4	Set year/month/day/time
4520.9VA 4515.3W Setting...	4	Parameters setting

7.1.4 Connecting messages

When inverter started to connect to grid, the following message will appear on LCD screen.



Connect to gird interface

7.2 Operate by knock

7.2.1 Knock type and definition

The inverter can support three kinds of knock: single knock, double knock and thrice knock. Each kind of knock has different function. Refer to specified definition in Table below：

Knock type	Definition
Single knock	KeyDown
Double knock	KeySet
Thrice knock	KeyEnter&ESC

7.2.2 Light background and check running information

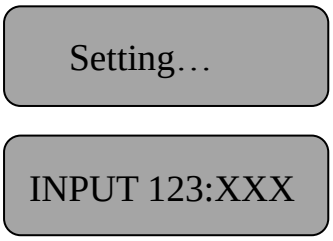
Before light the background, the three types of knock functions are the same: just light the background.

Note： The background light will automatically off if there is no knock detected in 180 seconds.

7.2.3 Set inverter COM address

When communicating with monitoring software or device, the software or device may regard inverter's COM address as communication address (Also may use inverter's serial number as communication address).

Before entering the 'COM Address: xxx' setting interface,you need to enter a password as below:



According to the LCD display,you need to input three numbers: 123.You should finish several steps as below:

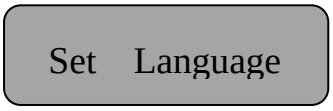
1. When the LCD stays bright, **single knock** to 'Setting…',and then **double knock** to enter 'INPUT 123:xxx'interface.
2. **Double knock** to make the first number flash, **single knock** to change the number, and the first number you need to input is '1'. **Double knock** to enter

the second number while the first number was ‘1’.

3. When the second number is flashing ,**single knock** to change the number,and the second number you need to input is ‘2’. **Double knock** to enter the last number while the first number was ‘2’.
4. When LCD displays ‘INPUT 123:123’, **triple knock** to enter the setting interface.
5. **Single knock** to ‘COM Address: xxx’, and then **double knock** to enter the setting status, **single knock** to change the COM Address. When setting finishes, wait for 30s or **triple knock** to save your setting.

7.2.4 Set inverter display language

1. If you want to set inverter display language, repeat the steps as described in section 7.2.3.
2. When LCD displays ‘INPUT 123:123’, triple knock to enter the setting interface.
3. Single knock to select the language you want, when setting finishes, wait for 30s or triple knock to save your setting.



The inverter provides seven languages: English, German, Spanish, Italian, French,Hungarian and Turkish . The number on Set language interface is sequence number of these seven languages, the sequence number and its corresponding language are showing in Table below：

Language	Sequence Number
Italian	0
English	1
German	2
Spanish	3
French	4
Hungarian	5
Turkish	6

7.2.5 Set inverter time

1. If you want to set inverter time, repeat the steps as described in section 7.2.3.
2. When LCD displays ‘INPUT 123:123’, **triple knock** to enter the setting interface.
3. **Single knock** until LCD displaying ‘xxxx/xx/xx xx:xx’, and then **double knock**

to enter the setting status, the numbers begin to flash. **Single knock** to change the number, each knock makes the flashing number add ‘1’, and **double knock** to shift to next number setting. When setting finishes, wait for 30s or **triple knock** to save your setting.

7.2.6 Inverter faulty messages

When system faulty or inverter error occurred, inverter will display faulty message or error code on its LCD screen.

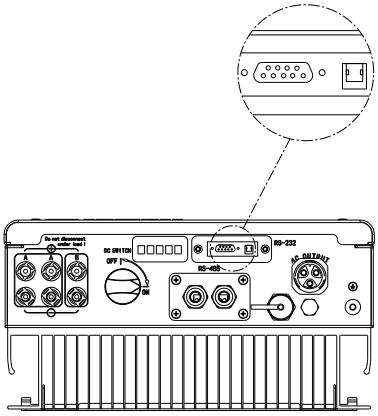
7.2.7 AC Error Record Checking

When the LCD stays bright, single knock to ’AC Error Record’, and then double knock to enter the checking status. Single knock to check each error item, triple knock can exit.

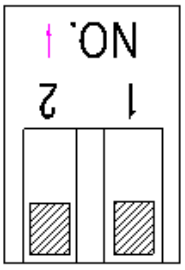
1. If the inverter connects with PV panel arrays and the input voltage is higher than 100Vdc, while the AC grid is not connected yet, LCD will display messages in order as below:
   “Growatt Inverter”-> “NO AC CONNECTION”. The display repeats “NO AC CONNECTION” and the LED will be red.
2. Turn on the AC breaker or close the fuse between inverter and grid, the system will operate normally.
3. Under normal operating conditions, the LCD displays ‘xxxx.xVA xxxx.x W’ at State info, this is the power fed into grid. LED turns green.
4. Finish commissioning.

7.2.8 Communication Type choice

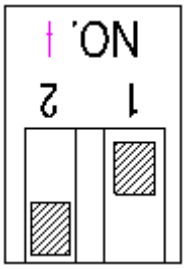
If you select RS232 or External wireless, you must set the 2-PIN switch to different status. The 2-PIN switch is located beside the RS232 interface, as the figure below.



1. when ‘RS232’ is selected, you have to set PIN1 of the switch downward to OFF.



2. When ‘Exter wireless’ is selected, you have to set PIN1 of the switch upward to ON.



7.3 Communications

7.3.1 RS232 (standard)

RS232 could be chosen for GPRS,WiFi Module.

7.3.2 WIFI(Optional)

WIFI,GPRS module can be used as an optional monitoring scheme.

8.Start-Up and shut down the inverter

8.1 Start-Up the inverter

1. Connect the AC breaker of the inverter.
2. Turn on the dc switch, and the inverter will start automatically when the input voltage is higher than 90 V.

8.2 Turn-off the Inverter

 **DANGER**	Do not disconnect the DC connectors under load.

Turn –off the inverter step:

1. Disconect the line circuit breaker from single-phases grid and prevent it from being reactivated.
2. Turn off the dc switch.
3. Check the inverter operating status.
4. Waiting until LED, display have go out, the inverter is shut down.

9 Maintenance and Cleaning

9.1 Checking Heat Dissipation

If the inverter regularly reduces its output power due to high temperature, please improve the heat dissipation condition. Maybe you need to clean the heat sink.

9.2 Cleaning the Inverter

If the inverter is dirty, turn-off the AC breaker and DC switch ,waiting the inverter shut down ,then clean the enclosure lid, the display, and the LEDs using only a wet cloth. Do not use any cleaning agents (e.g. solvents or abrasives).

9.3 Checking the DC Disconnect

Check for externally visible damage and discoloration of the DC Disconnect and the cables at regular intervals.If there is any visible damage to the DC Disconnect, or visible discoloration or damage to the cables, contact the installer.

- Once a year, turn the rotary switch of the DC Disconnect from the On position to the Off position 5 times in succession. This cleans the contacts of the rotary switch and prolongs the electrical endurance of the DC Disconnect.

10 Trouble shooting

Sometimes, the PV inverter does not work normally, we recommend the following solutions for common troubleshooting. The following table can help the technician to understand the problem and take action.

10.1 Warnings(W)

Warnings(W) identify the current status of the Growatt MTL-S. Warnings do not relate to a fault. When a (W) with a number after it appears in the display, it indicates a Warning Code and is usually cleared through an orderly shutdown/re-set or a self corrective action performed by the inverter. See the (W) codes in the following table.

Error message	**Description**	**Suggestion**
No AC Connection	No utility grid connected or utility grid power failure.	1.Check AC wiring 2.Contact Growatt.
AC V Outrange	Utility grid voltage is out of permissible range.	1.Check grid voltage. 2.If the error message still exists despite the grid voltage being within the tolerable range, contact Growatt.
AC F Outrange	Utility grid frequency out of permissible range.	1.Check grid frequency. 2.If the error message is displayed despite the grid frequency being within the tolerable range, contact Growatt.
Over Temperature	Temperature outrange	1. check the inverter operation state 2. If the error message is displayed still,please contact Growatt.
PV Isolation Low	Insulation problem	1.Check if panel enclosure ground properly.

		2.Check if inverter ground properly. 3.Check if the DC breaker gets wet. 4.If the error message is displayed despite the above checking passed, contact Growatt.
Output High DCI	Output current DC offset too high	1.Restart inverter. 2.If error message still exists, contact Growatt.
Residual I High	Leakage current too high	1.Restart inverter. 2.If error message still exists, contact Growatt.
PV Voltage High	The DC input voltage is exceeding the maximum tolerable value.	Disconnect the DC switch immediately.
Warning 100	Fan fault	1.Restart inverter. 2.If error message still exists, contact Growatt.
Auto Test Failed	Auto test didn't passed.	Contact power company， By they decide whether to manually cancel.

Note:If the suggestions do not work, please connect to the Growatt.

10.2 Errors(E)

Errors(E) codes identify a possible equipment failure, fault or incorrect inverter setting or configuration. Any and all attempts to correct or clear a fault must be performed by qualified personnel. Typically, the (E) code can be cleared once the cause or fault is removed. Some of the (E) codes, Error as indicated in the table below, may indicate a fatal error and require you to contact the supplier or the Growatt to replace a new one.

Error code	**Description**	**Suggestion**
Error: 101	Communication fault Slave processor can't receive data from Master processor.	1.Restart inverter 2.If error message still exists, contact Growatt.
Error: 102	Consistent fault. Data received by Master and Slave processor are different. The	1.Restart inverter. 2.If error message appears frequently or error message still exists after replacement, check utility grid.i f you require help, contact Growatt.

	reason can be utility grid voltage or frequency change frequently.	3.If error message still exists, contact Growatt.
Error: 111	PE abnormal	1. Check PE ， to ensure that the PE line contact good. 2. Check the L line and the N line to ensure that they are not reversed. 3. Restart inverter . 4. If error message still exists, contact Growatt.
Error: 116	EEPROM fault	Contact Growatt.
Error: 117	Relay fault	Contact Growatt.
Error: 118	Init model fault	Contact Growatt.
Error: 119	GFCI Device Damage	Contact Growatt.
Error: 120	HCT fault	Contact Growatt.
Error: 121	Communication fault. Master processor can't receive data from Slave processor.	1.Restart the inverter 2.If error message still exists, contact Growatt.
Error: 122	Bus voltage fault	Contact Growatt.

Note： The latest 5 **NS**(Network and System) protection records can be read by LCD or communication software. An interruption of ≤3 Sec to the power supply does not lead to any loss of fault records (according to VDE-AR-N 4105, cl.6.5.1).

11 Manufacturer Warranty

Please refer to the warranty card.

12 Decommissioning

12.1 Dismantling the Inverter

1 Disconnect the inverter as described in section 8 .

2 Remove all connection cables from the inverter.

CAUTION	**Danger of burn injuries due to hot enclosure parts!** Wait 5 minutes before disassembling until the housing has cooled down.

3 Screw off all projecting cable glands.

4 Lift the inverter off the bracket and unscrew the bracket screws.

12.2 Packing the Inverter

If possible, always pack the inverter in its original carton and secure it with tension belts. If it is no longer available, you can also use an equivalent carton. The box must be capable of being closed completely and made to support both the weight and the size of the inverter.

12.3 Storing the Inverter

Store the inverter in a dry place where ambient temperatures are always between -25 ℃ and +60 ℃.

12.4 Disposing of the Inverter

Do not dispose of faulty inverters or accessories together with household waste. Please accordance with the disposal regulations for electronic waste which apply at the installation site at that time. Ensure that the old unit and, where applicable, any accessories are disposed of in a proper manner

13 Technical Data

13.1 Specification

Model / **Specifications**	7000MTL-S	8000MTL-S
Input data(DC)		
Max. recommended PV power(for module STC)	9100W	10500W
Max. DC voltage	550V	
Start voltage	100V	
Nominal voltage	360V	
MPP voltage range	80-550	
No. of MPP trackers	2	

No. of PV strings per MPP trackers	2/1	
Max. input current per MPP trackers	25A/12.5A	
Max. short-circuit current per MPP trackers	32A/16A	
DC overvoltage category	Category II	
Output data(AC)		
AC nominal power	7kW	8.2kW
Max. AC apparent power	7kVA	8.2kVA
Nominal AC voltage/range*	230/160~300V	
AC grid frequency/range	50-60Hz/44-55Hz;54-65Hz	
Max. output current	33.5A	35.7A
Inrush current	<10A	
Max output fault current	70A	
Max output overload protection	40A	50A
Backfeed current	0A	
Power factor(@nominal power)	>0.99	
Adjustable power factor	0.8leading… 0.8lagging	
THDi	<3%	
AC grid connection type	Single phase	
AC overvoltage category	Category III	
Efficiency		
Max. efficiency	98.4%	98.4%
Euro-eta	97.2%	97.2%
Protection devices		
DC reverse-polarity protection	Integrated	
DC switch	Integrated	
DC Surge protection	Type III	
Insulation resistance monitoring	Integrated	
AC surge protection	Type III	
AC short-circuit protection	Integrated	
Ground fault monitoring	Integrated	
Grid monitoring	Integrated	
Anti-islanding protection	Integrated	
Residual-current monitoring unit	Integrated	
General data		
Dimensions (W / H / D) in mm	419*355*185	
Weight	16.8 kg	
Operating temperature range	–25 ℃ ... +60 ℃	
Noise emission (typical)	≤ 25 dB(A)	
Altitude	2000m	
Internal consumption at night	<0.5W	
Topology	transformerless	
Cooling	Natural convection	

Protection degree	IP65
Pollution degree outside the enclosure	3
Pollution degree inside the enclosure	2
Relative humidity	0~100%
DC connection	VP-D4/MC4(Optional)
AC connection	AC connector
Interfaces	
Display	LCD+LED
RS485/RS232	Integrated
WIFI/GPRS/4G/LAN/ RF	Optional
Warranty:5/10 years	Yes/ Optional
Certificates and approvals	
Grid regulation	AS/NZS 4777.2,G99
EMC	EN61000-6-2,EN61000-6-3,EN61000-3-2,EN61000-3-3,EN61000-3-11,EN61000-3-12
Safety	IEC/EN62109-1 ,IEC/EN62109-2

*** The AC Voltage Range may vary depending on specific country grid standard.**
All specifications are subject to change without notice.

13.2 DC connector info

DC connector	VP-D4/MC4(opt)

13.3 Torque

Enclosure lid screws	7kg.cm
Shell and RS232 screws	7kg.cm
AC terminal	6kg.cm
M6 soket head cap screws for securing the enclosure at the bracket	20kg.cm
Additional ground screws	20kg.cm

13.4 Accessories

In the following table you will find the optional accessories for your product. If required, you can order these from GROWATT NEW ENERGY TECHNOLOGY CO.,LTD or your dealer.

Name	Brief description

Shine WIFI-S	WIFI monitor with RS232 interface
Export limitation METER	Eastron SDM230-Modbus(MR00.0008800)

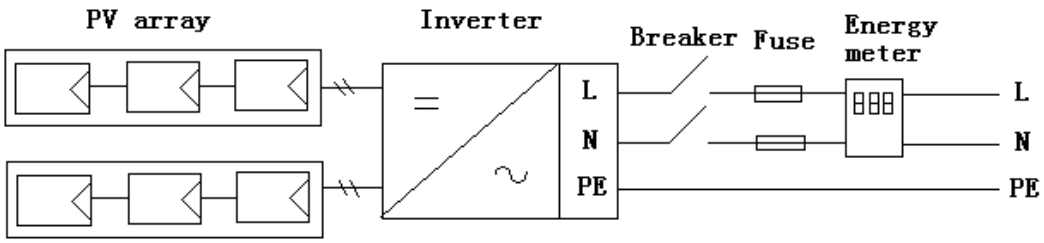
Shipped to a Growatt service centre for repair, or repaired on-site, or exchanged for a replacement device of equivalent value according to model and age.

The warranty shall not cover transportation costs in connection with the return of defective modules . The cost of the installation or reinstallation of the modules shall also be expressly exclude as are all other related logistical and process costs incurred by all parties in relation to this warranty claim.

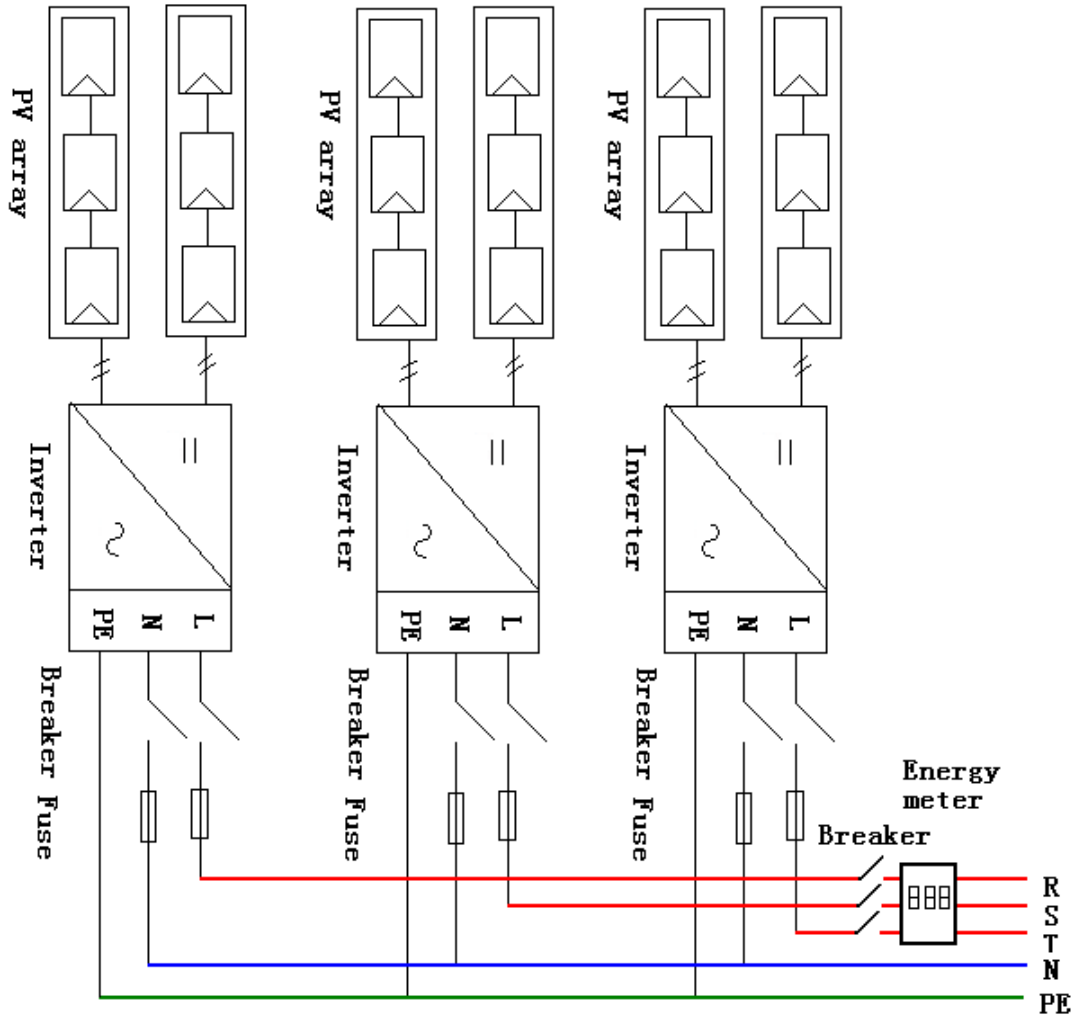
14 PV system installation

Installation with multiple inverters on a single phase system

(A) Single inverter



(B) multi inverter



15 Compliance Certificates

15.1 List

- **Certified countries**

With the appropriate settings, the unit will comply with the requirements specified in the following standards and directives (dated: March/2019):

Model	Certificates
7000-8000MTL-S	CE , AS4777, G99

GROWATT can preset special grid parameters for other countries installation locations according to customer requests after evaluation by GROWATT.

You can make later modifications yourself by changing software parameters with respective communication products (e.g. shinebus or shineNet ect). To change the grid-relevant parameters, you need a personal access code, if you need it ,please contact with GROWATT.

15.2 Download Address

www.ginverter.com

16 Contact

If you have technical problems about our products, contact the GROWATT Serviceline. We need the following information in order to provide you with the necessary assistance:

- Inverter type
- Serial number of the inverter
- Event number or display message of the inverter
- Type and number of PV modules connected
- Optional equipment

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