


SOLARMAX SHT

50 SHT / 60 SHT

Instruction Manual





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1 Notes on the manual

1.1 Scope

The scope of this manual is to provide detailed instructions about the installation, operation, maintenance and troubleshooting procedures for the following SOLARMAX inverters:

50SHT / 60SHT

1.2 Target groups

This instruction manual is intended for the operator of the plant and the installer of the PV power plant. Before any action is taken, the user must first read the safety instructions to protect himself from the hazards deriving from using devices operating at high voltages.

Electrical connection an installation may only be carried out by trained electricians (e.g. electricians, electric systems technicians, electrical mechanics, and industrial electronics technicians).

1.3 Where to keep this manual

The plant operator must ensure that this instruction manual is available to the relevant persons at all times. If this original document is lost, an up-to-date version of this instruction manual can be downloaded from our website at any time (www.solarmax.com).

1.4 Symbols used

The following safety instructions and general information are used within this instruction manual.



DANGER!

Non-observance of these safety instructions results in serious injuries or death.



WARNING!

Non-observance of these safety instructions may result in serious injuries or death.



CAUTION!

Non-observance of these safety instructions may result in minor or extensive injuries.



ATTENTION!

Non-observance of these safety instructions may result in material damage.



Note

Notes contain additional information or facilitate operation of the inverter.

2 Safety

2.1 Intended use

SOLARMAX HT series inverters are designed exclusively for the conversion of the direct current generated by PV modules into alternating current which conforms to the parameters of the public grid. Any other use is contrary to the intended use.

Inverters of the SHT series may only be used in combination with PV modules which comply with the IEC 61730 standard. Inverters of the SHT series may only be connected to Class II PV generators.

2.2 Safety instructions

**DANGER!****Fatal electric shock hazard!**

In daylight the PV generator supplies the inverter with a dangerously high DC voltage.

- Make sure that all electrical input conductors to the inverter are de-energized before starting any work on the inverter or the input conductors.

**DANGER!****Fatal electric shock hazard!**

Components within the inverter are charged with a high voltage.

- Never open the inverter while it is in operation.

**WARNING!****Risk of injury from electric arc!**

Removing the DC connectors when live can lead to dangerous electric arcs.

- Switch off the DC disconnecter at the inverter before removing the DC connectors.

**WARNING!**

Fire hazard caused by inappropriate repair attempts!

- The inverter does not contain any replaceable components. Defective inverters must be returned to the SOLARMAX Service Center for repair or disposed of in accordance with the instructions in this manual.

**CAUTION!****The inverter can become very hot during operation.**

- Do not touch the heatsink and the side surfaces during or soon after the use.

2.3 Symbols

Symbol	Description
	Life threatening hazard due to high voltage. Only qualified personnel may perform work on the inverter.
	Attention: hot surfaces!
	Life threatening hazard due to high voltage in the inverter! Disconnect the voltage from the inverter. Wait 10 minutes before opening the inverter.
	Warning! Non-observance of the safety instruction may cause serious injuries.
	Read and follow the operating instructions supplied with the inverter. Do not remove any symbols on the inverter. Replace damaged symbols.
	CE marking. The inverter complies with the requirements of the European directives regarding the Electromagnetic compatibility and the electric safety.
	Do not dispose of the inverter and its accessory components in the household waste.
	Do not open the inverter and do not make modifications or holes of any type. In case these instructions are not observed, then SOLARMAX does not assume any liabilities for damages to persons or properties.

3 Description

3.1 Identification

The inverter can be identified on the basis of the information provided on the nameplate. The nameplate is on the right side of the inverter. The following image shows the nameplate of the 60SHT model:

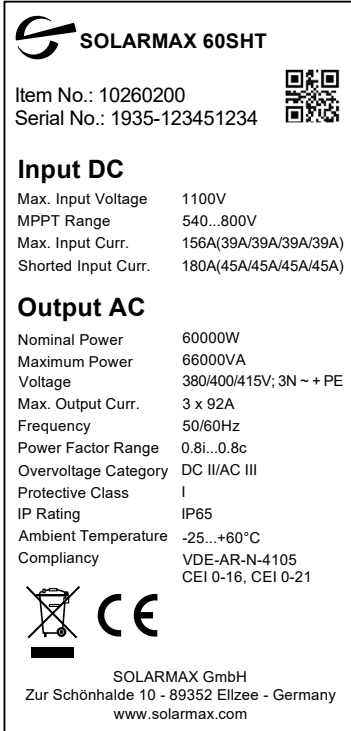


Fig. 1: Label of SOLARMAX 60SHT

3.2 Function

The SOLARMAX SHT Series inverters have the following characteristics that provide high efficiency and high reliability:

- Wide input DC range, allowing maximum flexibility in the configuration of the PV generator.
- Wide Maximum Power Point (MPP) tracking operating interval, ensuring high energy harvesting even in sub-optimal weather conditions.
- The high MPP accuracy and the high efficiency of the power electronic circuits minimize the operating losses.

- Quad MPP tracker for optimum energy yield
- Protection class IP65, suitable for outdoor use

Additionally, in the SHT Series inverters integrate the following protection devices:

- Internal overvoltage
- DC insulation monitoring
- Ground fault protection
- Grid monitoring
- Current leakage protection
- DC current monitoring protection
- DC disconnecter integrated
- Reverse DC polarity protection

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3.3 Front panel

3.3.1 LED indicators

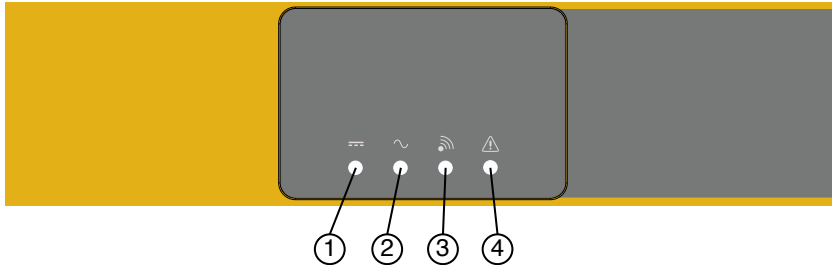


Fig. 2: Status indicators on the front panel of the SHT inverters

LED	Description	Status	
1	PV indicator	Blink	PV voltage not OK
		ON	PV voltage OK
2	Grid indicator	Blink	Grid voltage absent or out of range. It is not possible to connect the inverter to the grid.
		ON, with blinks every 30sec	Normal operation. The LED is normally ON, but every 30sec it blinks according to the current power level vs. the nominal power. 1 blink = <20% of nominal power 2 blinks = 20% to 40% 3 blinks = 40% to 60% 4 blinks = 60% to 80% 5 blinks = 80% to 100%
3	Communication indicator	Blink	Data communication underway
		OFF	No communication
4	Warning indicator	ON / blink	A warning occurred. Refer to the error table.
		OFF	No warning.

The following table shows the status of the LED indicators in case of a warning/ alarm:

Warning/Alarm	Alarm Code	PV indicator	Grid indicator	Comm. indicator	Warning indicator
Normal status		●	● ★	○	○
Startup phase		●	○	○	○
Communication active		○	○	★	○
PV normal		●	○	○	○
Grid over voltage	A0	○	★	○	○
Grid under voltage	A1				
No grid	A2				
Grid over frequency	A3				
Grid under frequency	A4				
Grid unbalanced	A6	★	○	○	○
PV over voltage	B0				
PV under voltage	B4				
Weak irradiance	B5	○	○	○	○
PV strings abnormal	B3				
Inverter overtemperature	C5	○	○	○	★
Internal fan abnormal	C8				
Insulation resistance abnormal	B1	●	○	○	●
Leakage current abnormal	B2	○	●	○	●
PV polarity reversed	B7	○	○	●	●
Control power abnormal	C0	○	★	○	●
DC bias current abnormal	C2	★	●	★	●
Inverter relay abnormal	C3	○	●	●	●
Leakage current HCT abnormal	C6	●	●	○	●
System fault	C7	★	★	★	●
DC link voltage unbalance	C9	●	○	●	●
DC link over voltage	CA	○	●	★	●
Internal communication fault	CB	○	○	★	●
Software version incompatibility	CC	★	●	○	●
EEPROM fault	CD	★	○	●	●
Sampling inconsistency	CE	★	●	●	●
Inverter circuit abnormal	CF	●	●	●	●
Boost circuit abnormal	CG	★	○	○	●

Legende:

● LED ON ○ LED OFF ★ LED Blink ○ keep original status

3.3.2 Display

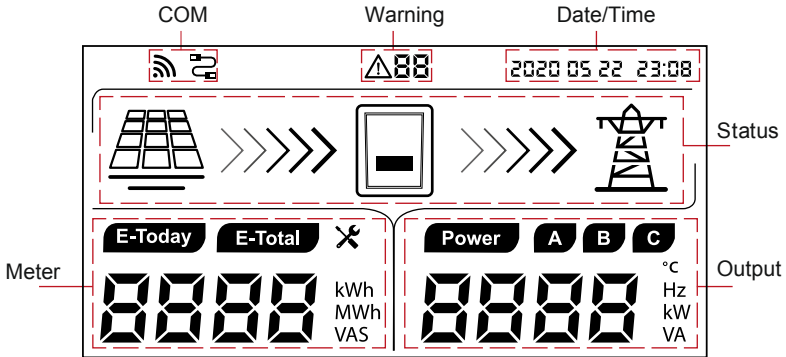








Fig. 3: Display of SHT inverters

Display	Description	
COM		This symbol is displayed when the SHT is transmitting data via WLAN. If this communication interface is not used, the character is no longer displayed after about 10 s.
		This character is displayed when the SHT is transmitting data via the RS485 interface. If this communication interface is not used, the character is no longer displayed after about 10 s.
Warning		This character is displayed when the SHT device reports a warning. For a list of alarm codes, see the table on page 10 .
Date/Time		If there is an external connection and the time zone is correctly set on the SHT, the time and date are automatically synchronised.
Status		The sign symbolizes the PV generator. If the inverter is in operation, the MPPT voltage is displayed in the "Energy meter" area.
		The sign symbolizes the flow of energy. If the inverter is in operation, this symbol is displayed, otherwise the symbol is not visible.
		The symbol symbolizes the power grid. If the voltage and frequency of the power supply system are within the normal range, this symbol is displayed, otherwise it links. If there is no voltage, the symbol is not displayed.

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Display	Description	
Energy meter	Normal operation	Normal status today and total energy, MPPT voltage and current are showed in turn.
	Standby	Before the inverter starts up, the display appears as shown in Fig. 3
	Any Status	If parameters are changed via the MaxLink app, the display keeps for about 5 seconds.
Output	Normal status	Output power, grid voltage and current are showed in turn.

3.4 Connections in the lower part

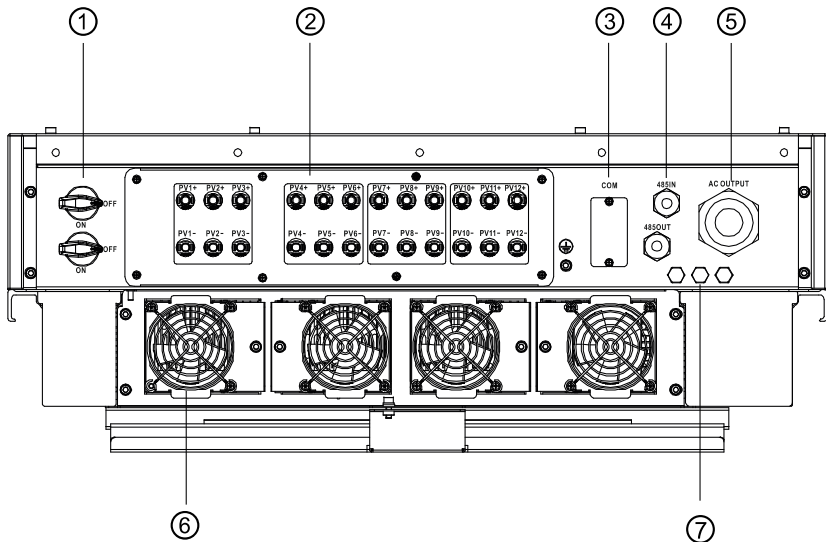


Fig. 4: Connections in the lower part

Position	Description
1	DC Isolation switch
2	PV Strings terminal
3	Communication interface
4	RS485 interface
5	AC output terminal
6	Fan
7	Vent valve

4 Installation



CAUTION!
The inverter is a heavy device!

- To prevent personal injury or device damage, arrange two people to move the inverter and handle with care.

4.1 Package contents

When the inverter is delivered check and report any damage on the box that may affect its contents. Verify the presence of all the parts listed below and that the inverter does not show any visible damage. Contact immediately the dealer in case of any parts missing or damaged.

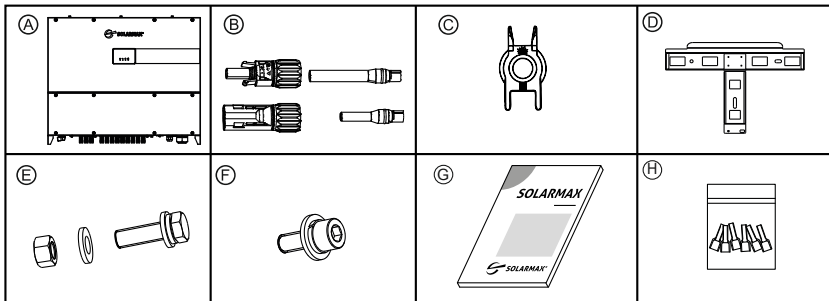


Fig. 5: Scope of delivery of SHT inverters

Part	Quantity	Description
A	1	Inverter
B	2	DC connector
C	1	PV connector unplugging tool
D	1	Mounting bracket
E	3 pairs	Screws and dowels
F	1	M6 screw
G	1	This manual
H	1	Ferrules

4.2 Selecting the installation location



DANGER!

Fatal fire or explosion hazard!

The inverter is an electrical device with heat generation and the possibility of sparking.

- Install the inverter in an environment that is free of flammable gases and fluids
- Never install the inverter near combustible materials. The installation base must be non-combustible.
- Follow the local fire safety regulations.

Select the installation site according to the following indications:

- The inverter is protected to IP65 and can be installed indoors or outdoors. Select a dry location protected from water and snow
- Install the inverter in an easily accessible location, so that the maintenance work can be carried out easily
- Do not install the inverter in a place where personnel are likely to come into contact with its enclosure and heat sinks because these parts are extremely hot during operation.
- Do not expose the inverter to direct sunlight
- Never install one inverter above another (this would reduce the cooling effect)
- The environmental temperature in the installation site must be between -25°C and +45°C
- Make sure there is a good air circulation. An insufficient air circulation may reduce the performance and the lifetime of the components inside the inverter.
- Maintain the following minimum installation distances:

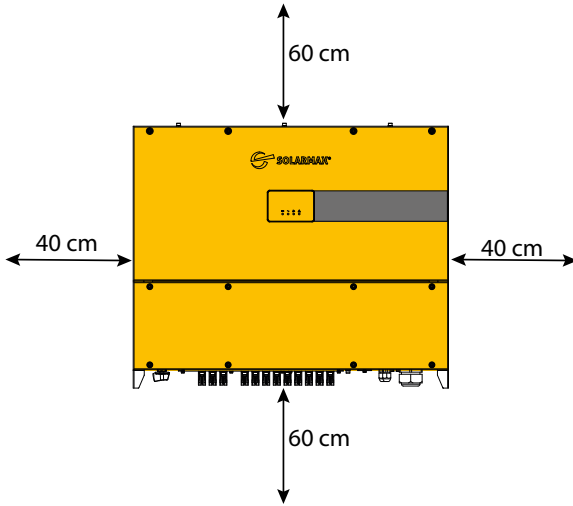


Fig. 6: Minimum installation distances of SHT inverters

- Install the inverter in vertical position with maximum backward inclination of 15°.

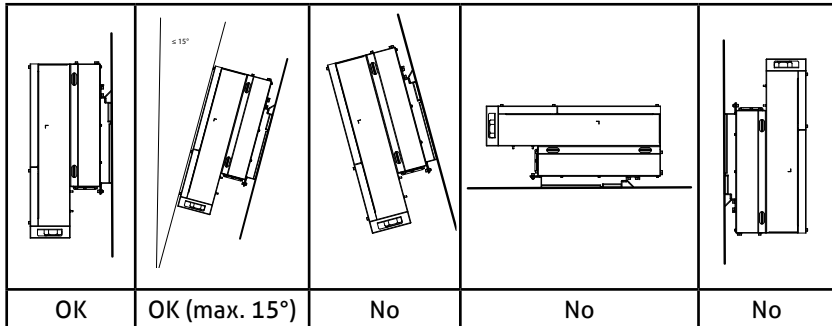


Fig. 7: Mounting position of the SHT inverter

- Make sure the installation base is robust enough to sustain the weight of the inverter.

4.3 Mounting the inverter



NOTE

The SHT series inverters should be mounted on a mounting system or substructure. A mounting system is not included. All commercially available mounting systems are suitable which guarantee permissible mounting.

The inverter is attached to the wall or to a mounting system using a mounting plate. The mounting plate and the mounting material are included in the scope of delivery. The following installation instructions apply to wall mounting of the inverter

1. Mark the three drilling holes on the wall using the mounting bracket provided with the inverter.

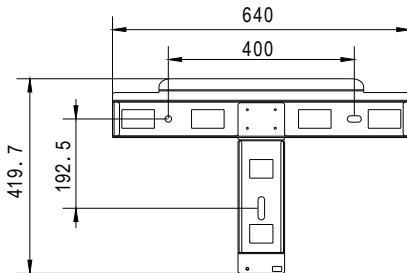


Fig. 8: Mounting the mounting bracket

2. Drill the holes. Insert the dowels, position the bracket and insert the screws to lock it. Alternatively, you can fix the supplied mounting plate of the inverter to a mounting system with the corresponding screws.
3. Mount the inverter on the mounting bracket and tighten the inverter with rear panel using screws as shown in the following figure:

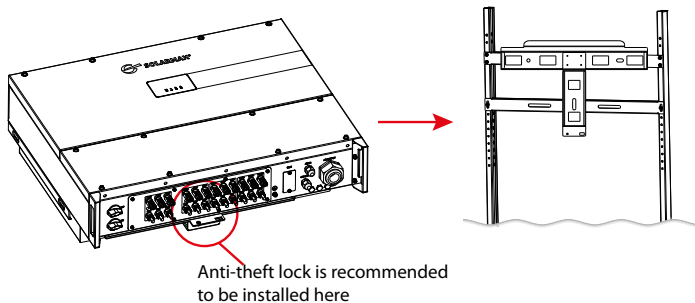


Fig. 9: Tightening the inverter

4. Ensure that the three supporting points on the rear side of the inverter align with the three holes of the mounting bracket.
5. Ensure that the inverter is well fixed and that the inverter is locked on the support and an anti-theft lock is installed.

5 Electrical Connection

5.1 Safety



DANGER!

Fatal electric shock hazard!

In daylight the PV generator supplies the inverter with a dangerously high DC voltage.

- Respect all the valid national standards and regulations concerning safety and prevention.
- This inverter will be connected directly to a high voltage photovoltaic generator. The installation must be carried out by qualified personnel observing the local and national standards and regulations.
- The PV generator voltages are very high. NEVER plug or unplug the DC connectors when the inverter is turned on, otherwise dangerous electric arcs could develop.



NOTE

Follow the applicable standards and regulations to implement the electrical connections, in particular for the section of the conductors, the fuses, and the Protective Earth (PE) connection.

5.2 Connecting the inverter to the mains

5.2.1 Integrated RCD and RCM

The SHT Series inverters are equipped with integrated RCD (Residual Current Device) and RCM (Residual Current Monitor) according to VDE 0126-1-1. The sensor measures the residual current and compares it to the pre-set value, disconnecting automatically the inverter from the AC grid by means of the integrated RCD in case the value exceeds it.

If you add an external RCD breaker you can use a type A device with at least 100mA rated fault current (300mA in case of PV plants with large leakage capacities).

5.2.2 Connection instructions for AC Output Cables



ATTENTION!

An independent three-phase circuit breaker must be installed on the AC side of each inverter. Do not install one circuit breaker for multiple inverters!



ATTENTION!

Install a model B leakage current protection switch with no less than 600 mA current. Do not share neutral wire when B leakage current protection switch is installed or else a power grid trip may occur.

AC output cables requirements

For AC power cables outdoor multi copper-cores cables are recommended. For the specification of these cables see the following table:

Terminal	Kabeltyp	Cross-sectional area (mm ²) Range	Recommended OT terminals	Notes
AC terminal	5-core outdoor special cable	30 ... 50	OT35 ... 50-8	The distance between AC terminal and grid-connection is no more than 200 m
	4-core outdoor special cable			
Protection Ground (PE)	multi-core outdoor special cable	30 ... 50	OT35 ... 50-8	Terminal connection

Connection of Protection Ground (PGND) Cables

1. Remove the external isolation of the cable to free wires for a length of 120 mm. Remove the isolation of the individual wires for the length of the OT terminal as shown in the figure below.

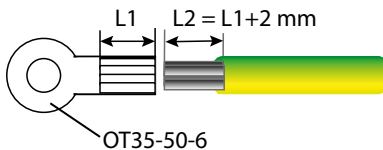


Fig. 10: Removing the isolation of the AC cable

2. Insert the exposed core wires into the crimp area of the OT terminal and crimp them using hydraulic pliers.
3. Remove the ground screws from the ground points, secure the PE cable using the ground bolts and tighten the bolts (torque 3 Nm) as shown in the following figure.

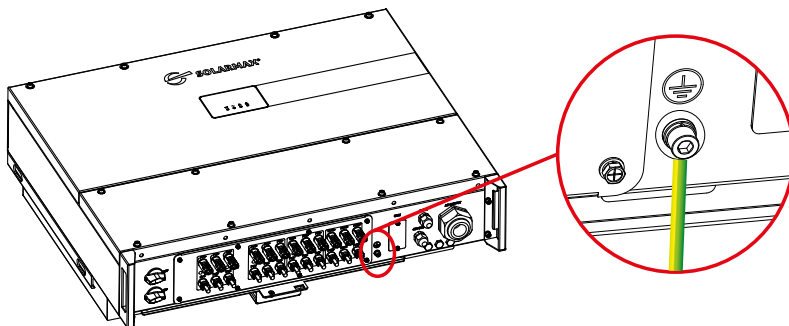


Fig. 11: Securing the PE cable



NOTE

The PE wire must be well grounded to ensure that impedance between Neutral and Earth wire be less than 10 Ω.

Connection of AC Output Cable

In the lower part of the front of the inverter there is an covered AC wiring area.

1. Remove the screws and the cover of the covered AC wiring area:

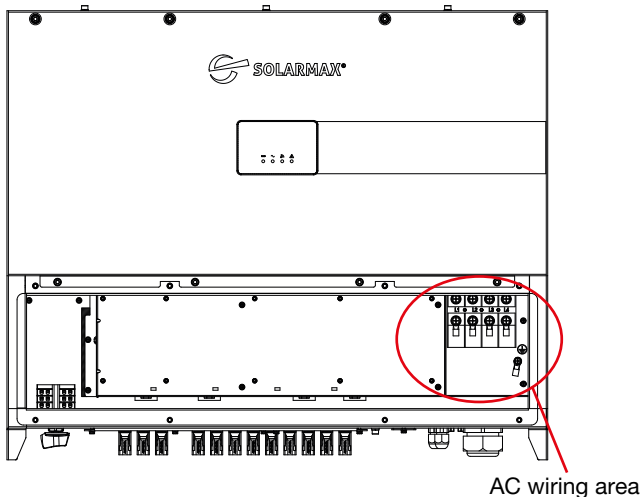


Fig. 12: Removing the cover of the AC wiring area

2. Remove an appropriate length of the jacket and insulation layer from the AC output cable.
3. Insert the exposed core wires into the crimp area of the OT terminal, wrap the wire crimp area with heat shrink tubing or insulation tape and crimp them using hydraulic pliers.

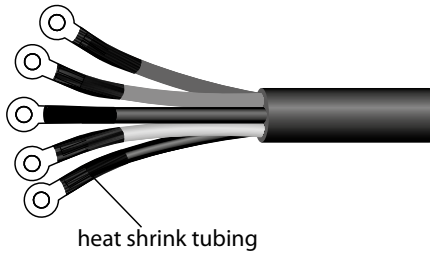


Fig. 13: Connecting the OT terminals to the AC cable

4. Loosen the locking cap from the AC output waterproof cable connector at the bottom of the inverter and remove the plug from the locking cap.
5. Route the AC output power cable into the locking cap and the AC output connector at the inverter bottom and connect the AC cable to L1, L2, L3, N and PE on the AC terminal block, tighten them using screws driver (torque 12 Nm).

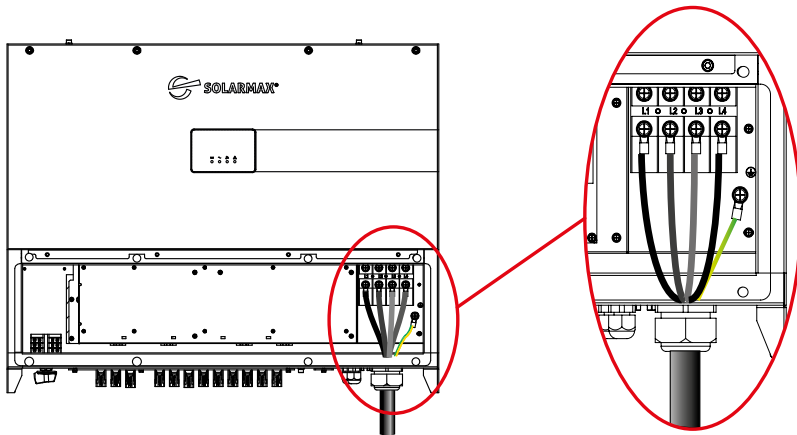


Fig. 14: Connecting AC Cables


6. Tighten the locking cap on the AC output waterproof cable connector (torque 12 Nm).
7. Replace the cover of the AC wiring area and tighten the according four screws on the cover (torque 3 Nm).





ATTENTION!

For operation convince and safety the inverter requires multi-stranded wire and crimping terminals with proper crimping tool before wiring. To avoid potential risk a overcurrent protection device (125 A / 400 VAC) is recommended to add on the output terminal.

5.2.3 Connecting the inverter to the PV generator

 **DANGER!**
Fatal electric shock hazard!
 In daylight the PV generator supplies the inverter with a dangerously high DC voltage.

- The PV generator voltages are very high. NEVER plug or unplug the DC connectors when the inverter is turned on, otherwise dangerous electric arcs could develop.

  **DANGER!**
Fatal electric shock hazard!
 Components within the inverter are charged with a high voltage.

- Before attempting any action on the DC connections, make sure that the DC switch is switched off
- Wait 10 minutes to rule out any residual risks
- Do not connect either PV generator pole to ground. Make sure that positive and negative poles are free floating to earth potential.

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PV input assignment

One or more cable pairs arrive from the PV system for connection to the inverter. The following table describes possible pin assignments:

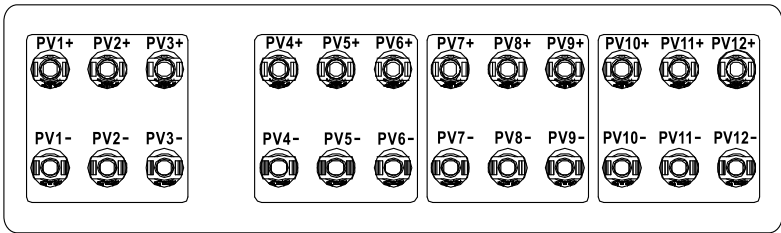


Fig. 15: Route connection for the installation of PV strings

Number of cable pairs	Number of input route	Inverter type
1	All	All types
2	PV1 and PV4	All types
3	PV1, PV4 and PV7	All types
4	PV1, PV4 and PV7, PV10	All types
5	PV1, PV2, PV4, PV7 and PV10	All types
6	PV1, PV2, PV4, PV5, PV7 and PV10	All types

7	PV1, PV2, PV4, PV5, PV7, PV8 and PV10	All types
8	PV1, PV2, PV4, PV5, PV7, PV8, PV10 and PV11	All types
9	PV1, PV2, PV3, PV4, PV5, PV7, PV8, PV10 and PV11	All types
10	PV1, PV2, PV3, PV4, PV5, PV6, PV7, PV8, PV10 and PV11	All types
11	PV1, PV2, PV3, PV4, PV5, PV6, PV7, PV8, PV9, PV10 and PV11	Only for SHT60
12	PV1, PV2, PV3, PV4, PV5, PV6, PV7, PV8, PV9, PV10, PV11 and PV12	Only for SHT60

Connectors of PV string cables

Ensure that cables of the proper type are being used to connect the inverter to the PV generator. In particular, PVC and H07RN-F non-tinned cables are NOT recommended.

The PV cables must be terminated with the Amphenol H4 (MC4 compatible) provided with the inverter.

If different types of connectors are used, or if different installation tools and procedures are used, then it may not be possible to ensure safety and technical performance.

The following Connectors are recommended for PV strings:

- Positive pole connector (+), female: Amphenol H4CFC4 S

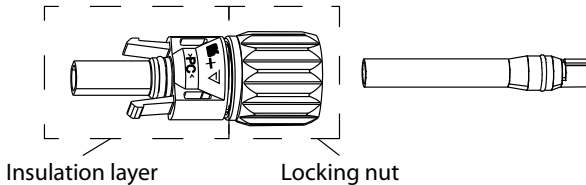


Fig. 16: Positive pole female connector

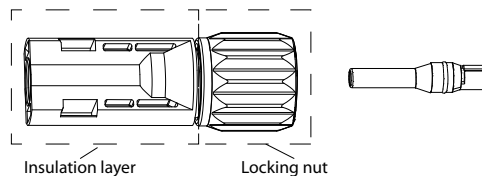


Fig. 17: Negative pole male connector



DANGER!

Fatal electric shock hazard!

In daylight the PV generator supplies the inverter with a dangerously high DC voltage.

- The PV generator voltages are very high. NEVER plug or unplug the DC connectors when the inverter is turned on, otherwise dangerous electric arcs could develop.

Connection of PV input cable

1. Cut the cable isolation for a length of 8 ... 10 mm. Crimp the cable into the metallic terminals provided, observing the correct polarity (red cable goes in the terminal of the female positive pole connector; black cable goes in the terminal of the male negative pole connector).

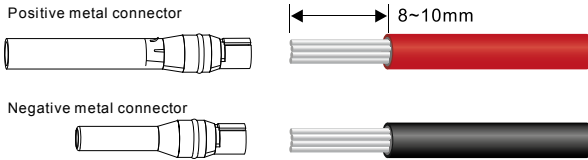


Fig. 18: Connecting the DC cable to the connector

2. Insert the terminals in the corresponding plastic enclosures and lock them in position by pushing them until the metal tabs are engaged with a "click".

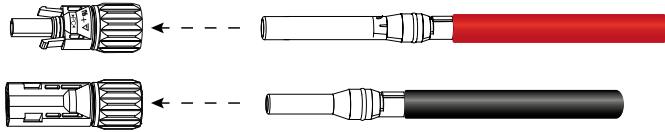


Fig. 19: Connecting the assembled connector to the corresponding plastic enclosures

3. Lock the cable glands with an appropriate torque (see figure below).

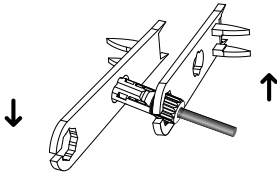


Fig. 20: Locking the cable glands

4. Check with a voltmeter of proper scale that the polarities and the DC voltage values are correct.

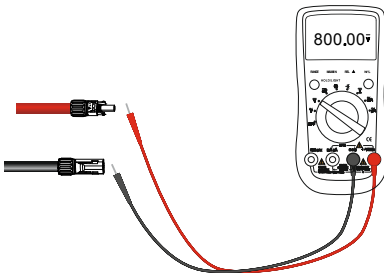


Fig. 21: Checking DC voltage values with a voltmeter

5. Insert the connectors into the respective counterparts located at the bottom of the inverter and push them until they are locked by a "click" of the plastic side tabs.

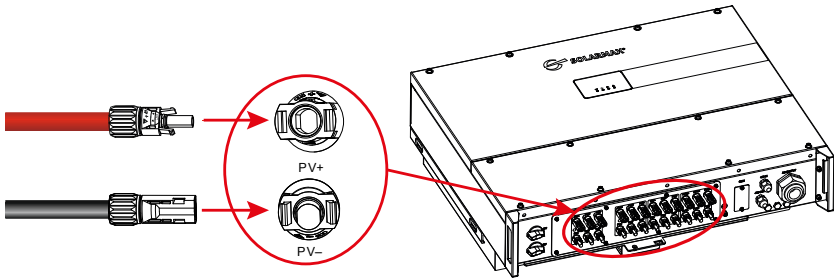


Fig. 22: Connecting the assembled cable to the SHT inverter

6. After connecting the PV strings, ensure that all connectors are in position by checking for resistance when a slight pull is applied.

5.3 Communication interface

WIFI

WIFI module implements communication with cloud server through wireless network to monitor PV inverter's data status. For more details, refer to WIFI product application manual.

RS485

RS485 switching module monitors PV inverter's data status through collecting and uploading data to Cloud server. For the RS485 communication mode of multiple inverter see the following figure:

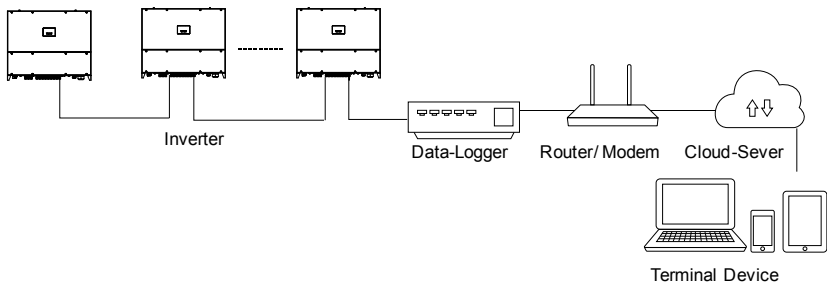


Fig. 23: RS485 communication of mutple inverter

6 Commissioning

Follow these steps to start up the inverter:

1. Switch ON the DC isolation switch on the lower part of the inverter (see [Fig. 4](#)).
2. Switch on the external switch of the AC feed line connecting the inverter to the grid.
3. Observe the status of LED indicators on the inverter according to the table escribed in [Section 3.3](#).

When the LED ndicators indicate a successful grid connection, the inverter is connected and ready for operation.

Powering OFF the inverter

To take the inverter out of operation, carry out the following steps:

1. Switch off the circuit breaker at AC terminal.
2. Switch OFF the DC isolation switch on the lower part of the inverter (see [Fig. 4](#)).



DANGER!

Fatal electric shock hazard!

Components within the inverter are charged with a high voltage

- Life threatening hazard due to high voltage in the inverter! Disconnect the voltage from the inverter. Wait 10 minutes before opening the inverter.

7 Configuration

7.1 Installation of MaxLink App

The inverter is provided with the basic configuration to operate in the country where it was sold. In case of operation in a different country, or if changes to other parameters are needed, a communication connection to the inverter must be established.

In addition, to change settings and to connect the inverter to a Local Area Network (LAN) for monitoring purposes it is necessary to establish such communication link. The App MaxLink is available on Play Store (for Android systems) as well as on Apple Store (for iOS systems).

The communication connection to the MaxLink App operates via WLAN.

7.2 Connecting the inverter via WLAN

When the inverter is switched on, it generates a local WLAN network access point.

Any mobile device (smartphone, tablet) can connect to the Access Point. The name of the WiFi network (SSID name) is given by the model name followed by the serial number of the inverter. For instance "60SHT_1913-326200". The connection is password protected. The password is "12345678".

To establish a wireless communication-link between your mobile device and the inverter see the following steps:

1. To connect the mobile device to the Access Point of the inverter select "Settings --> WiFi" on your mobile device.
2. After the connection between the mobile device and the access point of the inverter, start the App MaxLink. Select "Local Setting" (see [Fig. 24](#)). , start the App MaxLink. A list of a inverters available for communication is shown
3. Select the inverter and click on it.

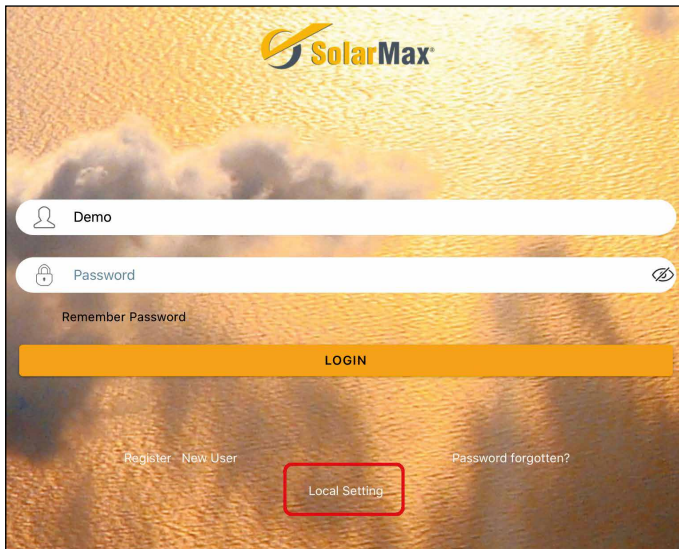


Fig. 24: Start menu at the mobile device for inverter configuration

The MaxLinkApp establishes the communication with the inverter and downloads the data. Data are displayed on the screen.

Inverter is not available at the App MaxLink

If connected inverters are not displayed on your mobile device, follow the steps below to display the inverter data on MaxLink:

- Make sure inverter is switched on
- Make sure no other phone is currently connected to the inverter WiFi.
- Go to your phone's "Setting --> WLAN" and select the inverter WiFi access point (the SSID name shows the inverter serial number, the password is 12345678).

If you have observed all the above points, select the „Connect to inverter“ button in the Start menu of the MaxLink app again to obtain a list of all available inverters.

7.3 Configuration of the inverter

See the following steps for the configuration of the inverter, e.g. national standards, power factor, derated power:

1. Select in the lower left corner of the App MaxLink the button „Setting“ to get the selection menu of the local device (see the following figure).

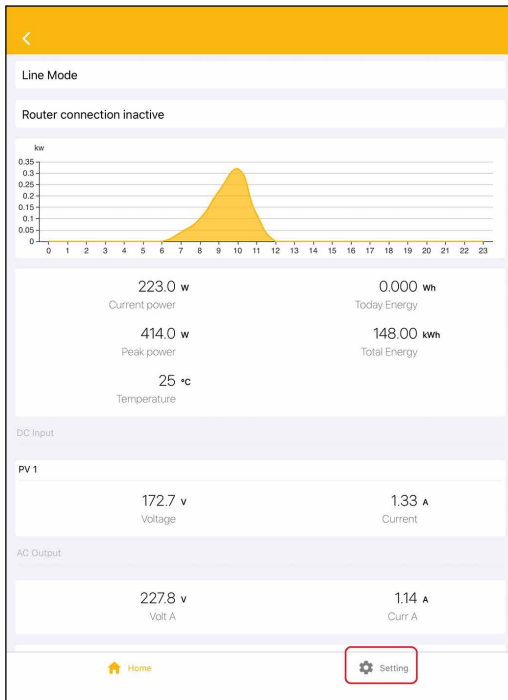


Fig. 25: Overview of the MaxLink App

2. Select „Setting“ in the selection menu (see the following figure).

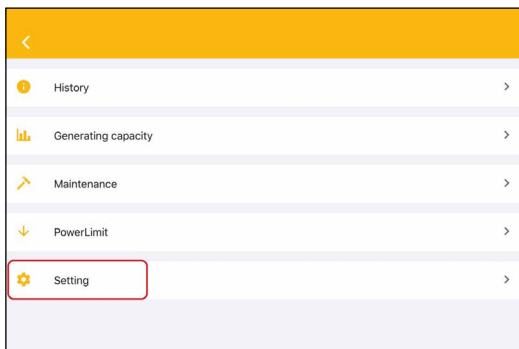


Fig. 26: App MaxLink selection menu

3. Select the button „Change user“ to get the access menu (see the following figure).

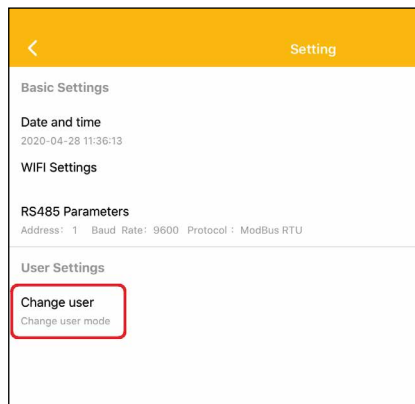


Fig. 27: App MaxLink Settings

4. Enter the administrator password to change inverter data. Use the password "admin" (see the following figure).
5. Select button „Login as Administrator“.

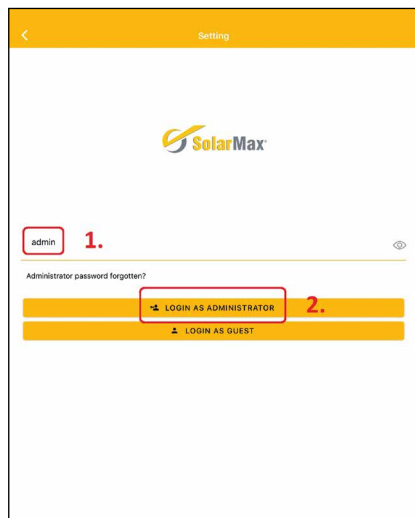


Fig. 28: Login to the inverter

6. If the login was successful, you can change settings, e.g. national standards, power factor or power derating (see the following figure).

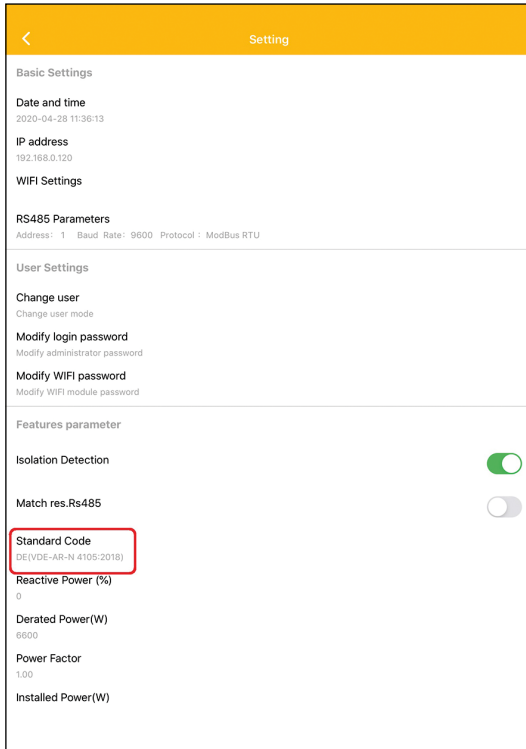



Fig. 29: App MaxLink inverter settings



CAUTION! Inverter settings have to be conform to the specifications of the local energy provider

- To change the inverter settings select the selection field „Standard Code“. The following selection menu for standard codes will appear.

Standard Code
DE (VDE 0126-1-1/A1)
DE (VDE-AR-N 4105:2011)
IT (CEI 0-21)
PT (EN50438)
ES (RD1699/RD413)
IT (CEI 0-21 ACEA)
DE(VDE-AR-N 4105:2018)
EU(EN50549-1:2019)
DE (VDE 4110:2018)
EU(EN50549-2:2019)
Cancel

Fig. 30: Standard code inverter settings

8. Select the standard code of your local energy provider.

8 Troubleshooting

8.1 Troubleshooting measures

In case of abnormal behaviour consult the following table to find the cause and try to reset the proper operating conditions.

If the proposed measures do not eliminate the fault, contact the SOLARMAX Service Centre.

Alarm	Troubleshooting measures
Grid over voltage Grid under voltage Grid over frequency Grid under frequency	<ul style="list-style-type: none"> ● If the alarm occurs accidentally, possibly the power grid is abnormal accidentally. No extra action is needed. ● If the alarm occurs repeatedly, contact the local power station. After receiving approval of the local power bureau, revise the electrical protection parameters setting on the inverter through SE Touch APP. ● If the alarm persists for a long time, check whether the AC circuit breaker / AC terminals is disconnected or not, or if the grid has a power outage.
PV over voltage	<ul style="list-style-type: none"> ● Check the number of PV modules and adjust it if need.
PV under voltage	<ul style="list-style-type: none"> ● When sunlight intensity weakens, PV modules voltage decreases. No action is needed. ● If such phenomena occur when sunlight intensity does not weaken, check if there is short circuit, open circuit etc. in the PV strings.
Insulation resistance abnormal	<ul style="list-style-type: none"> ● Check the insulation resistance against the ground for the PV strings. If a short circuit has occurred, rectify the fault. ● If the insulation resistance against the ground is less than the default value in a rainy environment, set Insulation resistance protection on SE Touch.
Residual current abnormal	<ul style="list-style-type: none"> ● 1. If the alarm occurs accidentally, possibly the external circuits are abnormal accidentally. The inverter automatically recovers to the normal operating status after the fault is rectified. ● 2. If the alarm occurs repeatedly or lasts a long time, check whether the insulation resistance against the ground of PC strings is too low.
PV strings abnormal	<ul style="list-style-type: none"> ● Check whether the PV string is shielded. ● If the PV string is clean and not shielded, check whether the PV modules are aging or deteriorated.
PV strings reverse	<ul style="list-style-type: none"> ● Check whether the cables of PV strings are correctly connected. If they are connected reversely, reconnect the cables.
BUS under voltage BUS over voltage Inverter module fault Boost circuit abnormal	<ul style="list-style-type: none"> ● If the alarm occurs occasionally, the inverter can automatically recover to the normal operating status after the fault is rectified. ● If the alarm occurs repeatedly, contact your dealer for technical support.
EEPROM fault	<ul style="list-style-type: none"> ● Replace the monitoring board
Zero power and yellow alarm light illuminating in remote monitoring system	<ul style="list-style-type: none"> ● If modem or other data logger is used, please reboot it; if it still does not work after rebooting, contact your dealer.

Alarm	Troubleshooting measures
remote monitor displays zero power generation	<ul style="list-style-type: none"> ● If modem or other data logger is used, please reboot it; if it still does not work after rebooting, contact your dealer.
remote monitor displays no output voltage	<ul style="list-style-type: none"> ● Check if DC switch is damaged, and if not, switch it to ON. If it still doesn't work, contact your dealer.
Inverter off grid	<ul style="list-style-type: none"> ● Wait till power is restored; ● Turn DC switch to ON, and if DC switch trips a lot contact your dealer.

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8.2 SOLARMAX Service Center

If you have technical questions or difficulties, our Service Center will be happy to help you. We need the following information from you:

- Device type
- Serial number S/N
- Installation location
- Information on the present failure (status message, etc.)

Availability

The contact details of the SOLARMAX Service Center can be found overleaf or at www.solarmax.com.

SOLARMAX GmbH
Zur Schönhalde 10
D-89352 Ellzee

9 Technical Data

		50SHT	60SHT	
Input values	MPP voltage range	200...960 V		
	MPP voltage range at nominal power	540 V ... 800 V		
	Maximum DC voltage	1100 V		
	Maximum DC voltage for startup	250 V		
	Minimum DC voltage for shutdown	200 V		
	Maximum DC current	130 A (39 A / 39 A / 26 A / 26 A)	156 A (39 A / 39 A / 39 A / 39 A)	
	Maximum DC short circuit current	150 A (45 A / 45 A / 30 A / 30 A)	180 A (45 A / 45 A / 45 A / 45 A)	
	Number of MPP trackers	4		
	Maximum PV output per MPPT ¹⁾	MPPT 1 & 2: 28 000 W / MPPT 3 & 4: 18 500 W	MPPT 1 & 4: 28 000 W	
	Number of string connections	10 (3/3/2/2)	12 (3/3/3/3)	
	Connection type	Amphenol H4 (type MC4)		
	Output values	Rated output power	50 000 W	60 000 W
Maximum apparent output power ¹⁾		55 000 VA	66 000 VA	
Maximum AC current ¹⁾		3*83 A	3*92 A	
Mains nominal voltage range		400 V (3L+N+PE)		
Mains voltage range		277 V ... 520 V		
Mains frequency		50 Hz / 60 Hz		
Mains nominal frequency range		45...55 Hz / 55...65 Hz		
Power factor cosφ		adjustable from 0.8 overexcited to 0.8 underexcited		
Distortion factor at rated output power		< 3 %		
Connection type		Connector		
Power input at night		<1 W		
Efficiency		Max. efficiency	98.3 %	
		Europ. Efficiency	98.0 %	
Environment	Protection class	IP 65		
	Ambient temperature range (for rated power output)	-25 to +60 °C		
	Relative humidity	0 ... 100 % (not condensing)		
	Cooling	Fan cooling		
	Max. operating level above sea level	4 000 m (> 2 000 m derating)		
	Audible noise emissions	< 65 dB (measurement at 1 m)		

		50SHT	60SHT
Configuration	Display	Wireless & App + LED	
	Inverter topology	transformerless	
	DC disconnecter	integrated	
	DC polarity inversion protection	integrated	
	Residual Current Monitoring Unit (RCMU)	integrated	
	Grid protection interface	integrated	
	Protection class	I (IEC 62103)	
	Overvoltage category	DC Type II / AC Type III	
Standards & guidelines	CE-compliant	yes ¹⁾	
	EMC	EN 61000-6-2 / EN 61000-6-4	
	Grid connection	EN50549-1, EN50549-2, VDE-AR-N 4105, IEC61727, IEC 62116, IEC 62109-1, IEC 62109-2	
	Device safety	IEC 62109-1, IEC 62109-2	
Interfaces	Data communication	Wifi, RS485	
Weight & dimensions	Weight	83 kg	
	Dimensions (W x H x D)	855 x 710 x 285 mm	
Warranty		5 years / 10 years (optional)	
¹⁾ With VDE 4110 the rated power of the 60SHT is 57 500 W and the maximum apperent power 63 250 W.			

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10 Disposal

Dispose of the inverters in accordance with the disposal regulations for electrical equipment applicable at the installation site.

11 Warranty

SOLARMAX GmbH (hereafter SOLARMAX) guarantees the correct function and absence of defects of your SOLARMAX tools for a particular, device-specific duration of guarantee. This duration of guarantee can be prolonged by an extension of guarantee according to these Terms of Guarantee.

This manufacturer's guarantee exists in addition to legal warranty obligations of the vendor. In case of a content overlap, the claim under the manufacturer's guarantee takes precedence, to the extent permitted by law, over the claim from warranty.

For the assertion of warranty claims please contact your vendor.

1. Basic Guarantee BASIC

The services of the Basic Guarantee are only provided free of charge in countries released by SOLARMAX at the time of installation. Please clarify this with your dealer. You will find a current list of these countries in the appendix or on our homepage. On request we are happy to send you this list.

a) Duration of Guarantee BASIC

MaxStorage:

- 120 months from date of purchase, but max. 126 months after delivery of the device by SOLARMAX

String Inverters:

- 60 months starting from purchase date, but max. 72 months after delivery of the device by SOLARMAX

Central Inverters:

- Series C/S/TS/TS-SV: 24 months from purchase date, but max. 30 months after delivery of device by SOLARMAX
- Series RX: 60 months from purchase date, but max. 66 months after delivery of device by SOLARMAX

Accessories:

- 24 months from purchase date, but max. 30 months after delivery of device by SOLARMAX
- Junction-Box 32HT2: 60 months from purchase date, but 72 months after delivery of device by SOLARMAX

Deviating written confirmation from SOLARMAX have priority.

b) Scope of Guarantee BASIC

If a device shows a defect or malfunction within the duration of guarantee and if the conditions for the assertion of warranty as defined below are met, the device or device parts will be repaired or replaced by SOLARMAX free of charge at its discretion within an appropriate period of time, as shown below, provided that this is not disproportionate or impossible.

Free Replacement: This contains the provision of equivalent replacement devices or parts, which can be dispatched step by step against return of the defect devices or device parts or can be also delivered by order. The equipment must be shipped in its original packaging or equivalent. Battery shipments may only be sent in the original packaging. Replacement devices are in perfect refurbished condition or new condition and become the property of the buyer, step by step against the replaced device,

which becomes the property of SOLARMAX. Should the part or device to be exchanged not have been returned to SOLARMAX within two weeks of delivery of the part or replacement device, SOLARMAX will invoice the additional costs for the part or device supplied.

Free On-Site-Replacement: This contains material cost as well as labor and travel expenses of SOLARMAX staff or staff authorized by SOLARMAX, insofar as it was sent to the operation site by SOLARMAX.

Further requirements MaxStorage:

The battery is considered defective if its remaining capacity is less than 80% of its nominal capacity.

SOLARMAX has the right to optimize the operation of the plant at any time in accordance with the warranty, i.e. to qualitatively modify key data and functions for operation and life support and adjust system and battery performance or battery discharge depth to optimise battery life by remote maintenance and control means.

Further-reaching claims, especially claiming the replacement of direct and indirect damages, founded by the defect of the device or cost incurred by the implementation and removal or lost profit, are not covered by this guarantee.

2. Assurance of Repair and Replacement

SOLARMAX will provide repair material and replacement devices during the duration of guarantee in its discretion. If repair material or replacement devices for particular devices are not available anymore, the following applies:

SOLARMAX is authorized to install the device, which needs to be replaced, with a comparable device with an equivalent or higher performance. Necessary technical adjustments of the replacement device for the installation of such a replacement device are covered by the guarantee for expenditure of time and material to the extent of up to 10% of the list price of the replacement device. Not covered by the guarantee are, if need be, a required replacement and a connection of peripheral devices as well as, if need be, required adjustments of surrounding devices of an inverter (such as supply cord, ventilation and safety devices).

SOLARMAX does its level best to minimize the extent of adjustment.

If there is no replacement material available at a reasonable expense, SOLARMAX is authorized to replace the defect device. In this case the above mentioned terms of replacement are applicable.

3. Duration of Guarantee for Device Repair / Device Replacement

In case of repair or replacement of devices within the scope of the guarantee, the remaining duration of guarantee of the original device applies to the repaired / replaced device.

4. Exclusion of Guarantee Services

Especially in following cases the guarantee claim is cancelled:

- In the event of transport damage or external influences
- In the event of interference, changes, repairs by non-SOLARMAX-authorized staff or on one's own
- In the event of inappropriate use, incorrect operation and installation
- If a copy of the invoice for the purchase of the device is not submitted
- If the type plate located on the device is unreadable
- In the event of neglecting operating, installation and maintenance instructions

- In the event of non-compliant surrounding conditions (such as lack of ventilation, humidity, dust pollution, etc.)
- In the event of higher force (such as lightning, overvoltage, water damage, fire etc.)
- Not covered by the guarantee are wear parts, especially fuses and overvoltage protection
- For MaxStorage: if the device has not been kept under constant remote monitoring and control by SOLARMAX via the SOLARMAX Internet portal with permanent Internet connection or no completed and signed setup report in accordance with the SOLARMAX sample has been sent to SOLARMAX within two weeks of installation of the device or the equipment has not been operated in a temperature environment between 0 and 40 degrees Centigrade or the equipment has not been operated with a source of power other than a photovoltaic system or the device has been used with batteries other than those approved by SOLARMAX.

5. Assertion of Guarantee

For the assertion of the guarantee the SOLARMAX hotline must be contacted by phone or in written form and their instructions must be followed carefully. You will find the Hotline number for your country on our homepage.

Please hold the series number, the article description, a short description of the defect and the purchase receipt ready.

Transactions in order to solve guarantee cases carried out by the buyer without the coordination with and approval by SOLAR MAX will not be compensated.

In case of neglecting this procedure SOLARMAX reserves the right to decline the delivery of of the guarantee service.

6. Exclusion of Guarantee

SOLARMAX reserves the right to temporarily or finally exclude the guarantee, if the parameters of the plant do not allow a proper function of the devices (e.g. in the event of a parameter as set out in number 4). The exclusion of guarantee can be cancelled in accordance with SOLARMAX.

Therefore it is necessary to have a written confirmation by SOLARMAX, in order to restart the guarantee terms.

7. Guarantee Extension

For devices with the Basic Guarantee BASIC the duration of guarantee can be prolonged by purchasing a guarantee extension within the following time periods. An extension for specific devices can be purchased on the basis of limited services. The extensions being available per device can be found on our homepage. The purchase of a guarantee extension will be confirmed by SOLARMAX with a Guarantee Certificate (Series Number of Product).

In case of a replacement this certificate will not be adjusted to the new series number. In this way the guarantee extension stays unaffected.

a) Time Limit for entry into Guarantee Extension

String Inverter P-,TP-, MT-, HT- Series / Junction-Box 32HT2: The extension of the guarantee can be purchased within 60 months starting from purchase date, but within max. 72 months after delivery of the device by SOLARMAX.

String Inverter of SP-,SMT-, SHT-Series: An extension of the warranty can be applied for within 6 months of delivery of the device by SOLARMAX.

Central Inverters: The extension of the guarantee can be purchased within 3 months starting from purchase date, but max. 12 months after delivery of the device by SOLARMAX

b) Scope of the Guarantee Extension

The Scope of the Guarantee Extension contains all services of the Basic Guarantee BASIC.

c) Conclusion of a Guarantee Extension

In order to purchase a Guarantee Extension, it is necessary to fully complete and hand in a Guarantee Extension form.

The Guarantee Extension is completed with a written confirmation by SOLARMAX, the receipt of the Guarantee Certificate and the payment by the customer.

Deviating written confirmation from SOLARMAX have priority.

8. Conditions after the Extension of the Guarantee

The cost for repair and replacement after the extension of the guarantee period will be charged at cost. SOLARMAX ensures the repair and replacement ability beyond the guarantee period at its own discretion.

9. Applicable Law, Place of Jurisdiction

The Law of the Federal Republic of Germany is applicable, Place of Jurisdiction shall exclusively be Augsburg / Germany, as far as this is permitted by law.

Appendix Country List:

Austria, Belgium, Bulgaria, Czech Republic, Denmark, France, Germany, Greece, Italy, Liechtenstein, Luxembourg, Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom

(Issued 09/2020 – subject to modifications)

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SOLARMAX Service Center

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