

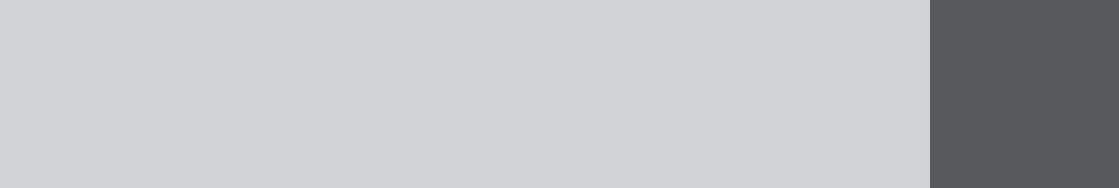
# SolarMax MT-Serie

6MT2/8MT2/10MT2/13MT2/15MT2/13MT3/15MT3

Gerätedokumentation ■ Instruction manual ■ Documentation d'appareil  
■ Documentación del dispositivo ■ Documentazione dell'apparecchio



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# 1 About this instruction manual

This instruction manual contains a description of the SolarMax MT series string inverters. It furthermore tells you how to install, commission, and operate the inverters.

Familiarise yourself with the inverter functions and characteristics before you begin the installation work. Carefully read the safety instructions in this instruction manual in particular, ignoring the safety instructions can result in serious injuries or death.




## 1.1 Target group

This instruction manual is written for the operator of the PV plant and the responsible qualified electrician.

## 1.2 Where to keep this manual

The plant operator must ensure that this instruction manual is available to those responsible for the plant 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 all times ([www.solarmax.com](http://www.solarmax.com)).

## 1.3 Symbols used

Symbol	Description
	<b>DANGER</b> This symbol indicates that ignoring this instruction may directly lead to serious injury or death.
	<b>CAUTION</b> This symbol indicates that ignoring this instruction may lead to damage to your inverter or your PV plant.
	<b>NOTE</b> This symbol indicates information which is especially important for operating the inverter.

## 2 Safety instructions

The MT series solar inverters have been designed and tested according to the latest technological advances and the currently valid product safety standards. However, ignoring the safety instructions contained in this instruction manual may endanger the user, a third party, or property. The qualified electrician and the operator of the PV plant can minimise these risks by following the safety instructions at all times.



### **DANGER**

- Only qualified electricians who have already completely read and understood this instruction manual in advance may install SolarMax inverters.
- The photovoltaic generator supplies direct current to the inverter when the PV modules are exposed to sunlight.
- The inverters must remain closed at all times during operation.
- The responsible electrician shall be responsible for complying with the applicable local installation and safety regulations.
- Ignoring the installation and safety instructions shall forfeit any and all warranty and liability claims.













### 2.1 Appropriate use

The SolarMax MT series string inverters are designed exclusively to convert the direct current generated by PV modules into grid-compliant alternating current.

The inverters may only be used in combination with PV modules which comply with the IEC 61730 standard.

Any other use is contrary to the purpose for which the inverters were designed. Sputnik Engineering accepts no liability for damages resulting from using inverters for purposes other than this. Any modifications to the inverter performed by the plant operator or the fitter without any review or approval by Sputnik Engineering are prohibited.

## 2.2 Symbols on the inverter

Symbol	Description
	Protective conductor connection
	DC disconnect Q1 position OFF - In this position the DC disconnect Q1 is off (open)
	DC disconnect Q1 position ON - In this position the DC disconnect Q1 is on (closed)
	Risk of death through high voltages! Only qualified electricians may perform work on the inverter.
	Careful - hot surfaces!
	Risk of death due to high voltages! De-energize the inverter. Proceed to wait for 5 minutes before opening the inverter.
	Only qualified electricians may perform work on the inverter.
	Read the operating instructions - Please read and follow the 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 EMC Directive 2004/108/EC and the Low Voltage Directive 2006/95/EC.
	GS mark - The inverter complies with the relevant requirements of the German Product Safety Act.
	C-Tick - compliance with the Australian EMC regulations
	Do not dispose of the inverter and its accessory components in the household waste.



### 3 Description

The SolarMax MT series string inverters convert the direct current (DC) of a photovoltaic generator into grid-compliant alternating current (AC). In this, the current is inverted by a two-phase, transformerless circuit type. The connection and synchronous feed of the inverted current into the public power grid are permanently three-phase.

The inverter is operated completely automatically and depends on the power supplied by the photovoltaic modules. If there is enough power, the inverter starts mains operation and feeds the existing output into the power grid. If there is not enough power available from the PV generator, the inverter disconnects from the grid and shuts down.

The two (SolarMax 6MT2/8MT2/10MT2/13MT2/15MT2) and/or three (SolarMax 13MT3/15MT3) independent MPP trackers adapt to a changed energy supply from the PV generator with the help of two digital signal processors within seconds. The completely digital current form regulation ensures an outstanding quality of the fed-in current and, as a result, extremely negligible grid feedback.

During mains operation the integrated grid monitoring permanently checks various parameters of the AC grid; in this, the set limit values depend on the installation site selected. An integrated AC/DC sensitive leakage current sensor monitors the stray and leakage currents at the generator end during operation. If values exceed or fall short of the set limit values, the inverter disconnects from the grid within a pre-set time. Reconnection is attempted after a defined period of time.

A graphics display with three buttons permits comfortable operation of the inverter and reading out all important operating data. The integrated data logger allows for recording the most important operating parameters of the most recent 31 days, 12 months, and 10 years.

The built-in temperature sensor monitors the temperature inside the casing; the heat is dissipated to the outside by the cooling fins on the back of the inverter. The heat exchange with the ambient air is actively supported by two controlled fans producing a horizontal air flow. If the temperature inside the casing becomes excessive, the inverter gradually reduces its output power.

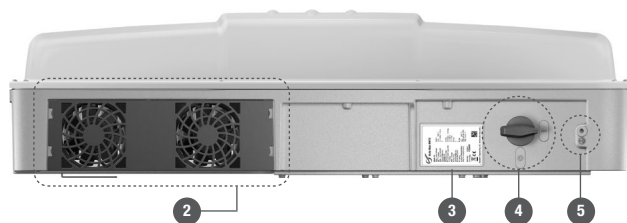
### 3.1 Views of the unit

#### Front view



- 1 Graphics display with status LED and three buttons

#### Side view left



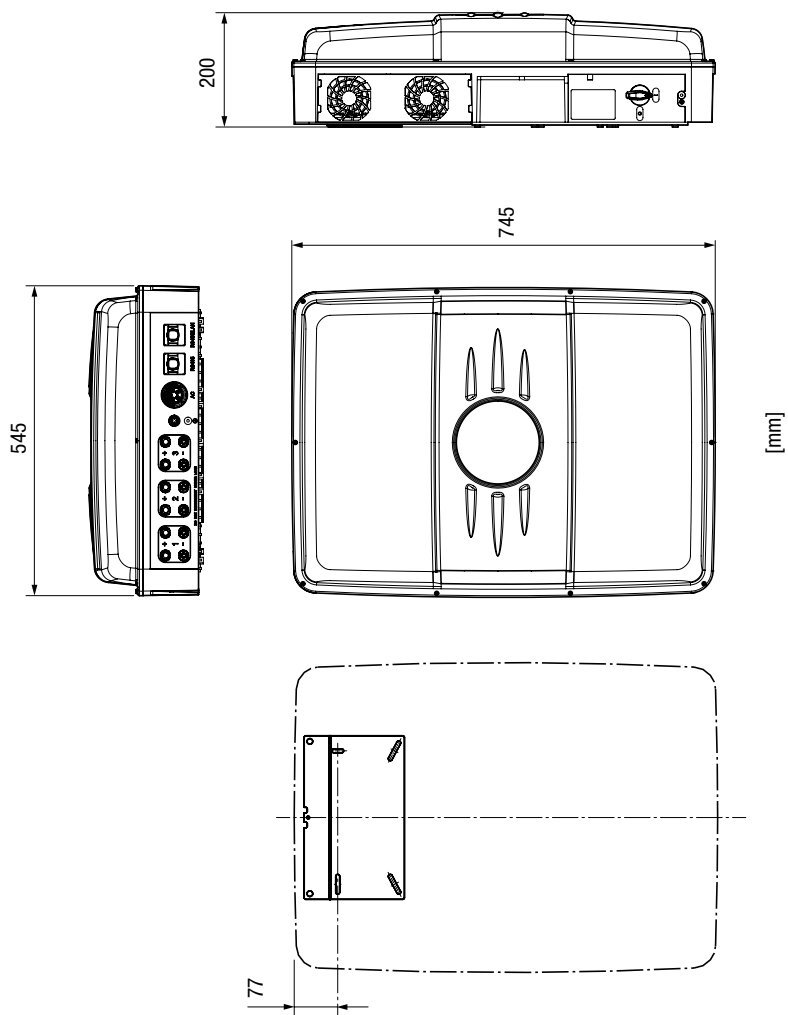
- 2 Fan cover (air intake)  
3 Name plate  
4 DC disconnect Q1  
5 Connection option for external protective conductor

#### Side view right

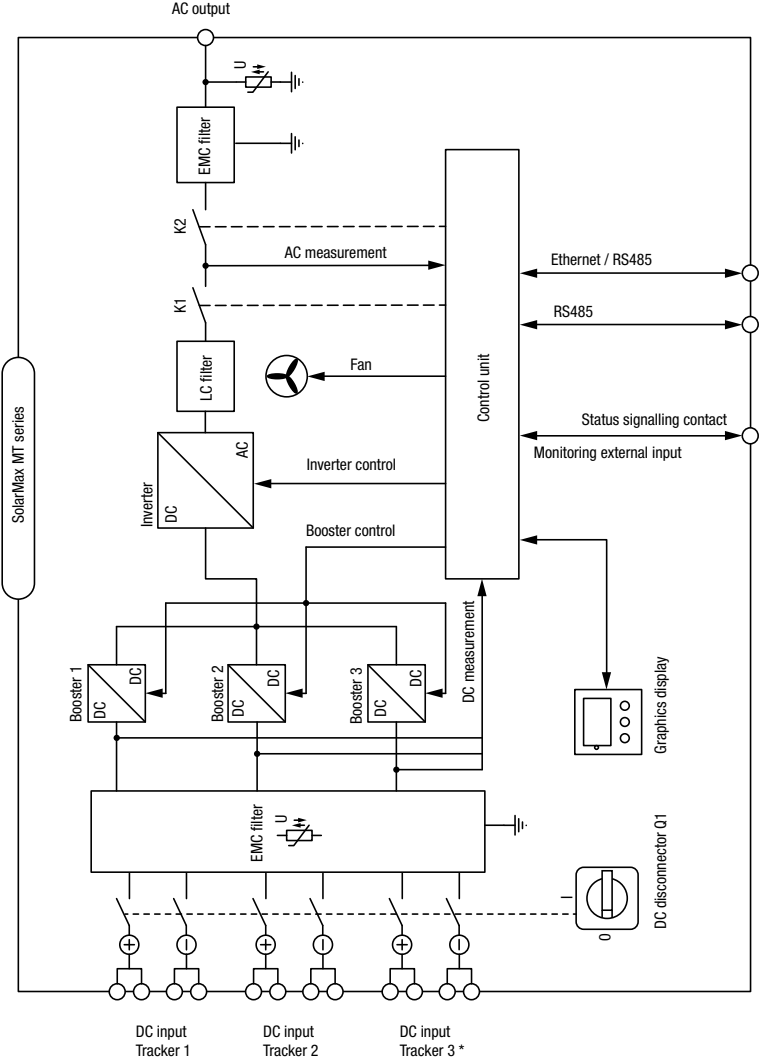


- 6 Fan cover (air outlet)

## 3.2 Dimensions



### 3.3 Block circuit diagram



\* Tracker 3 only SolarMax 13MT3 / 15MT3

## 4 Installation

### 4.1 Transport and storage

During transport, attention must be paid to the following aspects:

- During transport and any interim storage period, you must ensure that the local ambient conditions (temperature and humidity) are always within the limit values specified in the technical data. Any longer term, unattended, and unprotected interim storage of the inverter in the open must be avoided.
- Since this is a two-section package, you must absolutely ensure that the top and the bottom of the package are glued together when the inverter is returned or forwarded.

### 4.2 Siting

Choosing a suitable location for the inverter is decisive for its operating safety as well as its expected service life and efficiency.

When you select an installation site for the inverter please follow these instructions:



#### **DANGER**

- The inverter and all feed lines must be installed out of reach of children or pets (especially rodents).
- Do not store any highly inflammable liquids near the inverter and do not expose the inverter to any highly inflammable gases or vapours.
- The installation base must be firm and non-combustible.



#### **CAUTION**

- The casing of the SolarMax MT series inverter complies with protection class IP65. Thus, it can be installed outdoors, but the stated IP protection is only ensured if the included AC connector, an appropriate DC connector (MultiContact series 4) and the recommended RJ45 communications connectors are used.
- When installing outdoors do not expose the inverter to direct sunlight.



#### CAUTION

- The inverter must be installed in a location protected from rain and snow.
- When installing several inverters next to each other, you must observe a distance of 0.5 metres between the inverters. This distance prevents the mutual thermal influence due to the hot exhaust air of the ventilation systems.
- The ventilation inlet and the ventilation outlet must never be covered. Free air circulation is absolutely necessary to permit the inverter to function properly.
- The installation location must meet the requirements related to electromagnetic emissions (EN 61000-6-4).



#### NOTE

- For easy installation of the DC and AC supply lines you should design a freely accessible area of approx. 0.5 metres in height below the inverter.
- Make sure there is sufficient ventilation if the inverter is installed inside a building or plant room. Maximum useful life requires that the ambient temperature is never higher than 30°C.
- Due to possible noise emissions, we do not recommend installation in or near residential rooms or workplaces.
- The ambient air should be dust-free to avoid excessive dirt on the heat sink and fans. Rooms with heavy concentrations of dust (e.g. in cabinetmaking or metal workshops, hay storage buildings) are not suitable installation locations.

### 4.3 Lightning protection

The requirements for appropriate lightning protection for a PV plant depend on many different factors (plant size, how the cables are run, the modules used, the surroundings, etc). A project-specific protection concept must be developed by a qualified person.

## 4.4 Scope of delivery

- Inverter
- AC connector
- Installation plate for wall installation
- Instruction manual and quick guide
- Accessory kit (installation material for wall installation and earth connection)

## 4.5 Installation

The inverter can be installed easily using the included installation plate and installation material on a level installation base. You will find more information about how to properly install the inverter in the quick guide included in the delivery.

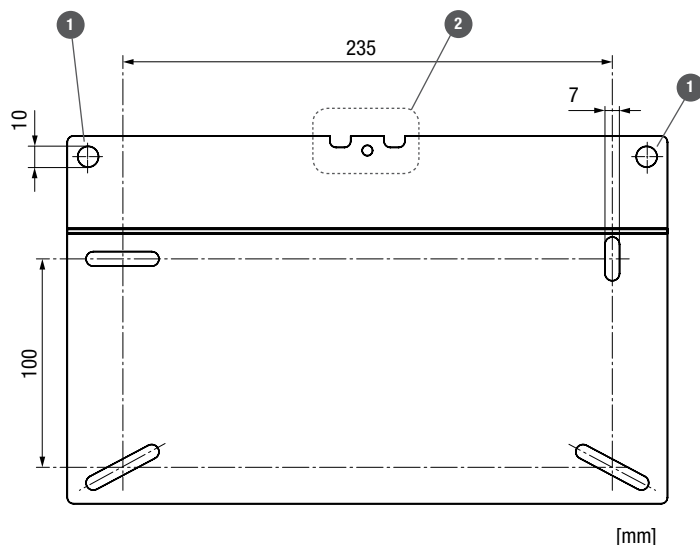
1. Drill four holes, Ø 8mm in diameter and with a depth of 60mm (drill hole pattern shown in the figure “Installation plate”; page 72).
2. Insert the dowels.
3. Attach the installation plate using the four 6 x 50 screws and washers.
4. Mount the inverter carefully from above into the holder.



### NOTE

As soon as the inverter is completely mounted, you can secure it additionally with the included splint or a padlock (not included in the delivery).

## Installation plate



For the other measurements see Section 3.2.

- ① Holes for padlock (against theft)
- ② Recesses for lock with splint

## 4.6 Electrical connection

The MT series inverters have the following connection options:





No.	Connection	SM8MT2 / SM6MT2	SM10MT2 / SM13MT2 / SM15MT2	SM13MT3 / SM15MT3
1 - 3	DC	1 x 2 / 1 x 1 strings MC4	2 x 2 strings MC4	3 x 2 strings MC4
4	External protective conductor	2 x thread M6		
5	Status signalling contact	M12 plug with potential-free switch contact		
6	AC	5-pole Amphenol plug-in connector		
7	Communication	2 x RJ45 (sealed tight by protective caps)		



### DANGER

- Before you start the installation work, make sure that all the provided DC and AC feed lines to the inverter are de-energised. The installation work must be performed by a qualified electrician who adheres to the recognised rules of electrical installations and personal health and safety regulations.
- All the feed lines to the inverter must be appropriate for the expected voltages, currents, and ambient conditions (temperature, UV load, etc.).
- Make sure that all lines are laid tension-free.



### CAUTION

- The inverter must be installed in a suitable location (see Section 4.2).
- Make sure that all the lines into the inverter are laid so as to avoid earth leakage or short circuits.

## 4.6.1 Integrated overvoltage protection

The MT series inverters have integrated surge arresters (varistors) on both the DC and AC ends.

- On the DC end, each MPP tracker has a surge arrester from the plus and minus pole to the earth. The surge arresters comply with requirement class C as defined in VDE 0675-6 or type 2 as defined in EN 61643-11.
- On the AC end, each grid phase (L1/L2/L3) has a surge arrester to the earth. The surge arresters comply with requirement class D as defined in VDE 0675-6 or type 3 as defined in EN 61643-11.

### 4.6.2 AC connection



#### CAUTION

- The MT series inverters must be connected to a mains connection point meeting at least the requirements of overvoltage category 3.

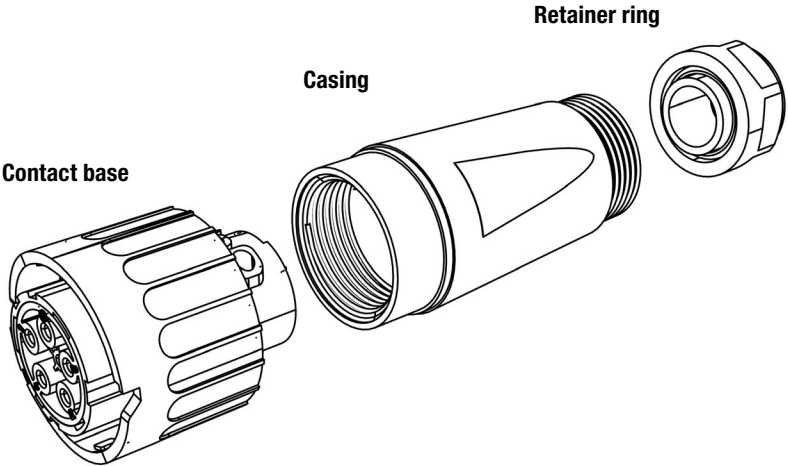
#### Mains fuses and cable cross-sections

The following table contains information about the recommended mains fuses and the minimum required line cross-sections necessary for the AC feed line:

	SM8MT2 / SM6MT2	SM10MT2	SM13MT2/ SM13MT3	SM15MT2/ SM15MT3
Mains fuses (C characteristic)	16 A	20 A	25 A	25 A
Minimum line cross-section AC and protective conductor	2.5 mm <sup>2</sup>	4 mm <sup>2</sup>	4 mm <sup>2</sup>	4 mm <sup>2</sup>

#### Confectioning the AC connector

The AC feed line is connected to the inverter using the included Amphenol AC connector:



- The AC connector must be connected using a flexible cable as described in EN 60309-2/VDE 0623.
- The permissible cable diameter is 11 to 20mm.
- Cable strands with a maximum cross-section of 6mm<sup>2</sup> can be connected.

### Procedure

1. If the cable diameter is > 16mm, remove the blue inlay from the retainer ring.
2. Slide the retainer ring and the casing over the cable.
3. Press the appropriate ferrules on the stripped strands.
4. Connect the individual cores one after another to the contact base:
  - Phase L1 to the screw terminal with the number 1
  - Phase L2 to the screw terminal with the number 2
  - Phase L3 to the screw terminal with the number 3
  - Neutral conductor N to the screw terminal with the number 4
  - Protective conductor PE to the screw terminal with the earth symbol
  - Tightening torque: 0.7 Nm
5. Check that each individual core is securely connected.
6. Screw the casing onto the contact base.
  - Tightening torque: 1-2 Nm
7. Screw the retainer ring onto the casing.
  - Tightening torque: 5 Nm

The AC feed line can now be connected with a twisting movement to the AC connection of the inverter (bayonet connector with locking pin). As soon as the correct position is reached, the connector slips onto the AC connection. The inverter is now firmly connected to the AC grid.



### DANGER

- Connect the protective conductor as carefully as possible.



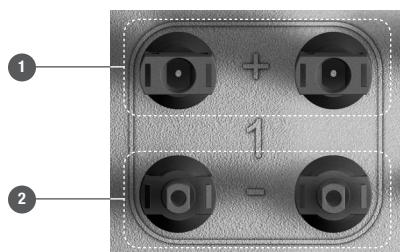
### CAUTION

- As soon as the bayonet connector has slipped in, the AC connection can only be re-opened using a tool (slotted screwdriver size 2).
- Open the AC connection carefully by pressing down the locking pin on the contact insulator and turning the AC connector counter-clockwise to break the connection.

### 4.6.3 DC connection

The inverters are quipped with 2 (SolarMax 6MT2 / 8MT2 /10MT2 / 13MT2 / 15MT2) resp. 3 (SolarMax 13MT3 / 15MT3) MPP trackers. Each tracker has two plus and minus poles for the connection of two strings per tracker input. A string can be connected at tracker 2 of each of the inverters SM6MT2 and SM8MT2.

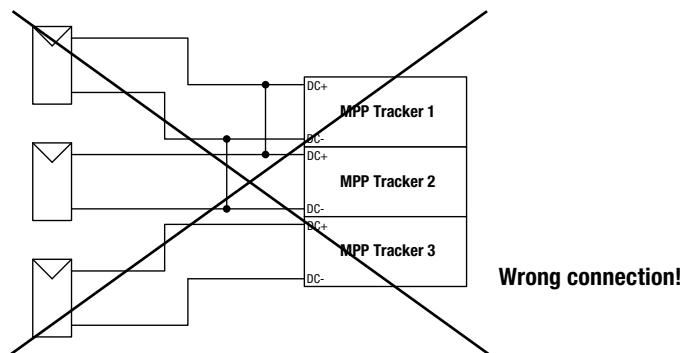
#### Detailed view of DC connections



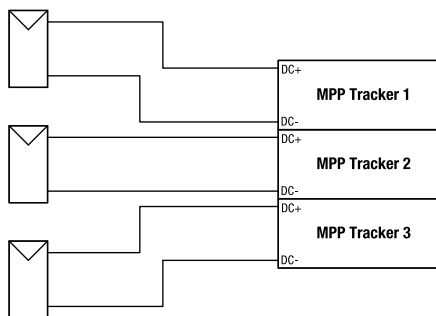
- ① Plus connections
- ② Minus connections

The position of the plus and minus connections is identical for all DC inputs (1 to 3).

Trackers 1 to 3 operate independently of each other, thus enabling simultaneous connection of strings with different characteristics (orientation, dimensioning, module type) to a shared inverter. The plus and minus connections of different trackers must not be connected to each other:



The plus and minus feed lines for trackers 1 to 3 must be run to the inverter separately from each other:



**Correct connection!**

en



#### CAUTION

- Use only connectors from the MC4 series made by MultiContact for connecting the DC feed lines to the inverter.
- Due to the transformerless circuit type of the MT series inverters, the plus or minus pole of the PV generator must not be earthed under any circumstances. Otherwise, the isolation monitoring in the inverter prevents a mains connection.
- Select cable cross-sections for the DC feed lines corresponding to your plant configuration and in conformance with the valid local installation regulations.
- Remember that the shared plus and minus pole of a string must always be connected to the same tracker.
- The position of the DC disconnecter Q1 must be "0" (Off).

### 4.6.4 Status signalling contact

The status signalling contact enables remote retrieval of the operating status of the inverter. The status signalling contact is located in the connection area of the inverter, see Section 4.6. A suitable M12 mating connector to connect to the status signalling contact can be ordered from the SolarMax Service Centre.

Remote retrieval of the operating status can be configured, see Section 6.8.2.

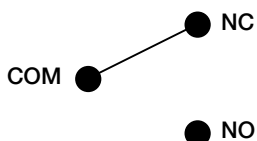
#### Connecting conditions

- $V_{Max}$  250VAC / 30VDC
- $I_{Max}$  1.5A

## Pinout

Contact	Description
1	NO (normally open: open when idle)
2	COM
3	NC (normally closed: closed when idle)
4	Not used

### Contact diagram (idle)



## 4.6.5 Monitoring external input

PV plants connected to the grid in Germany with an output of more than 30kVA require a external grid and plant protection.

If the “Monitoring external input” function is activated, the grid relays of the inverter can be used as interconnection circuit breakers of the central G/P protection. The function is activated during initial start-up (see Section 5.2) or subsequently using the service software MaxTalk 2 Pro. Remote retrieval of the operating status, as described in Section 4.6.4, is no longer possible when monitoring of the external input is activated.

### Functionality

The contacts 1 and 4 of the status signalling contact are used to monitor the external input. When there is phase voltage between contact 1 and contact 4, the grid relays K1 and K2 are closed (see Section 3.3). If phase voltage is not present between contacts 1 and 4, the grid relays are open and the inverter disconnects from the grid.

Contact 1 / contact 4	Grid relays K1 and K2
Phase voltage (L1, L2, or L3) present	closed
no phase voltage present	open

### Connecting conditions

See Section „4.6.4 Status signalling contact“

## Pinout

Contact	Description
1	Phase (L1, L2 or L3)
2	Not used
3	Not used
4	Neutral conductor N

### 4.6.6 Communications sockets

The SolarMax MT series inverters have two RJ45 sockets for data communication within a MaxComm network:

- The left-hand RJ45 socket is only an RS485 interface. The RS485 interface is used for connections to other SolarMax inverters or accessories with MaxComm interface.
- The right-hand RJ45 socket can be used both as an RS485 and as an Ethernet interface; the desired function can be toggled in the “Settings” menu. The Ethernet interface is used for connecting an inverter directly to a PC or to MaxWeb xp. However, if both sockets are configured as RS485 interfaces, a network containing several RS485 nodes can be set up.



#### NOTE

If the RJ45 sockets are used and the inverter is exposed to the weather, please use products from the VARIOSUB-RJ45 range with IP67 protection class from Phoenix Contact. This ensures that the installation meets the requirements of IP65.

- RJ45 plug-in connector, 8-pin (item no. 1658493)
- Available from [www.phoenixcontact.com](http://www.phoenixcontact.com).

### 4.6.7 External protective conductor

The inverter's stray current to earth can reach values of more than 3.5mA (AC) or 10mA (DC) during operation. In accordance with IEC/EN 62109-1, a second protective conductor must therefore be connected. This can be connected to one of the two M6 threaded connections (see Section 4.6).

#### Connecting conditions

- Minimum conductor cross-section: 10 mm<sup>2</sup>
- M6 screw tightening torque: 10.0 Nm

### 4.6.8 External residual-current device (RCD)

The SolarMax MT series inverters have an integrated AC/DC sensitive fault current sensor. This sensor is able to distinguish between the operational capacitive stray currents (caused by capacities of the PV modules to the earth) and fault currents (caused by touching a pole of the PV generator). The inverter disconnects immediately from the grid as soon as an exceedance of the absolute limit value (300 mA, important in relation to fire protection) or a sudden increase in the DC-end fault current (30 mA, important to protect against personal injury) has been detected.



#### NOTE

When selecting an additional external residual-current device (RCD), you must remember that during operation the fault currents can be as high as several 10 mA per inverter. That is why the rated differential current of an external RCD must be at least 100 mA, for very large PV power plants with several MT series inverters it may also be necessary to use a 300 mA RCD. Since the MT series inverters are designed not to cause direct current fault currents on the AC end, an external type A RCD can be used.



## 5 Commissioning

### 5.1 Switching on and off

All SolarMax inverters work completely automatically. When the PV generator supplies enough power, the inverter switches on and then starts mains feed operation. At night, or when the DC end is shut down, the inverter is disconnected from the grid. Operating the inverter and the ability to communicate via the interfaces are only possible when the inverter is switched on.

en

#### 5.1.1 Switching on

1. Switch on the DC disconnecter Q1
  - The inverter switches on; after a couple of seconds, the graphics display is activated (assuming there is enough power coming from the PV generator)
2. Switch on the external AC disconnecter
  - The inverter switches to mains feed operation after roughly 30 seconds

#### 5.1.2 Switching off



#### **DANGER**

The DC-end MC connectors may only be disconnected from the inverter if the DC disconnecter (Q1) is open. If the disconnecter is not open, disconnecting the DC feed lines during operation can result in dangerous arcs.

1. Switch off external AC disconnecter (optional)
  - The inverter is disconnected from the grid
2. Switch off the DC disconnecter Q1
  - The inverter shuts off after a few seconds

## 5.2 Initial start-up

When the inverter is started up for the first time, initial setup starts automatically. This procedure must only be carried out once during initial start-up. You can find information on the operation of the graphics display in Section 6.

### 5.2.1 Requirements

- Correctly connected DC supplies (AC connection is not required)
- Sufficient solar irradiation

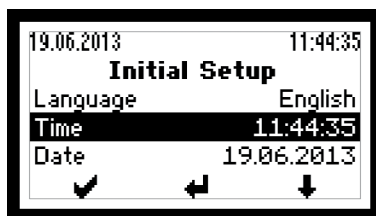


#### NOTE

- Entering the country incorrectly may lead to problems regarding inverter operation and to the withdrawal of the operating license by the respective grid operator.
- You can restart initial start-up on the graphics display by pressing **X** at any time.
- Thoroughly read the manual before starting initial start-up. Contact your grid operator or the SolarMax Service Centre if you have any doubt regarding the settings you must select.



### 5.2.2 Procedure

1. Switch on the inverter as described in section 5.1.1. The “Initial setup” menu will be displayed:



2. Select the display language from the “Language” menu.
3. If necessary, update the time and the date.
  - The inverter saves the date entered as the initial start-up date.
  - The “Country” menu will be displayed:



4. Select the correct country setting.
  - Press  to confirm your entry.
  - Depending on the country setting selected, additional menus may be displayed (see Section 5.2.3).
  - The “Confirmation” menu is then displayed.
5. Check the data in the “Confirmation” menu.
6. To complete initial start-up, press .
  - The main menu will then be displayed (see Section 6.4).
  - Should commissioning be taking place in Italy, the auto-test must be carried out after the initial start-up (see Section 6.10).

## 5.2.3 Description of country-specific menus

Depending on the country setting, additional menus will be displayed during initial start-up. This section describes these menus.

### Country setting “Belgium”

Menu	Setting	Description
Plant type	≤ 10 kVA	The maximum plant system rating is 10 kVA.
	> 10 kVA	The plant system rating is higher than 10 kVA.

### Country setting “Denmark”

Menu	Setting	Description
Plant type	≤ 13.8 kVA	The maximum plant system rating is 13.8 kVA.
	> 13.8 kVA – ≤ 30 kVA	The plant system rating is higher than 13.8 kVA and/or does not exceed 30 kVA.
	> 30 kVA	The plant system rating is higher than 30 kVA.

### Country setting “Germany”

Menu	Setting	Description
Grid connection	Medium voltage	The inverter is connected to the medium-voltage mains.
	Low voltage	The inverter is connected to the low-voltage mains.
Plant type <sup>1)</sup>	< 13.8kVA	The plant system rating is lower than 13.8 kVA.
	13.8–30kVA	The plant system rating is between 13.8 kVA and 30kVA.
	> 30 kVA	The plant system rating is higher than 30 kVA. An external grid monitoring and remote shut-down will be used.
	VDE 0126-1-1	Required setting if the inverter is commissioned within a PV plant connected to the grid before 1 January 2012. Note: The setting “VDE 0126-1-1” is inadmissible for PV plants connected to the grid after 31 December 2011.
Monit. ext. input <sup>2)</sup>	Inactive	The “Monitoring external input” function is switched off. The status signalling contact can be used for remote retrieval of the inverter’s operating status. Description see Section 4.6.4.
	On	The status signalling contact is configured for monitoring an external input. The grid relays of the inverter are used as interconnection circuit breakers of the central grid and plant protection. Description see Section 4.6.5.
cosφ(Pac)	Inactive	No reactive power feed-in (cosφ=1)
	On	Standardised reactive power feed-in

1) The menu is only displayed at the “Low-voltage” grid connection.

2) The menu is only displayed with plant types “> 30 kVA”.

### Country setting “Great Britain”

Menu	Setting	Description
Standard	G83/2	Inverter settings in accordance with grid connection G83/2.
	G59/2	Inverter settings in accordance with grid connection G59/2.

### Country setting “Italy”

Menu	Setting	Description
Grid connection	Medium voltage	The inverter is connected to the medium-voltage mains.
	Low voltage	The inverter is connected to the low-voltage mains.

Menu	Setting	Description
Standard <sup>3)</sup>	Guida Connessioni	Required setting if the inverter is commissioned within a PV plant connected to the grid before 1 July 2012.
	CEI 0-21	Required setting if the inverter is commissioned within a PV plant connected to the grid after 30 June 2012.

3) The menu is only displayed at the "Low-voltage" grid connection.

### Country setting "Spain"

Menu	Setting	Description
Standard	RD 1699	The inverter is connected to the low-voltage grid.
	RD 1699 & PO 12.3 - Large PV Systems	The inverter is connected to the low-voltage grid. The FRT function is activated.
	RD 661 & PO 12.3	The inverter is connected to the medium-voltage grid. The FRT function is activated.

## 5.3 Configuration of the data communication interfaces

In order to use the RS485 and Ethernet communications interfaces, you must enter the following settings in the “Settings” menu (see Section 6.8):

### Device address

If you connect several inverters into one network, you must assign each device its own address.



#### NOTE

You can assign addresses between 1 and 249. It is very important to remember to give a unique address to each individual device in the network!

When connecting to a LAN network, the following settings are required in addition to the device address:

### Ethernet

If you want to operate the right RJ45 communications socket on the terminal block as an Ethernet interface, enter “on” at this point.

### IP

If you want to access your inverter from a local area network (LAN), enter an unassigned IP address from your LAN here.

### Netmask

Please enter the pertinent subnet mask for your IP address here.

### TCP Port

Enter the desired TCP port for communications with the inverter. Remember that the TCP port must be greater than 1023 since this range is reserved for predefined applications (referred to as “well known services”).



#### NOTE

You will find more details about data communication in the technical information “MaxComm network”. This document can be downloaded from our website at: [www.solarmax.com; downloads/data communication/MaxComm](http://www.solarmax.com/downloads/data%20communication/MaxComm).

## 6 Operation








### 6.1 Graphics display

The graphics display on the front of the inverter shows the inverter's system variables, status information, and failure messages. The display allows you to learn the current device status, access the integrated data logger, and enter various settings for the inverter. Navigate the various menus using the three buttons under the display.

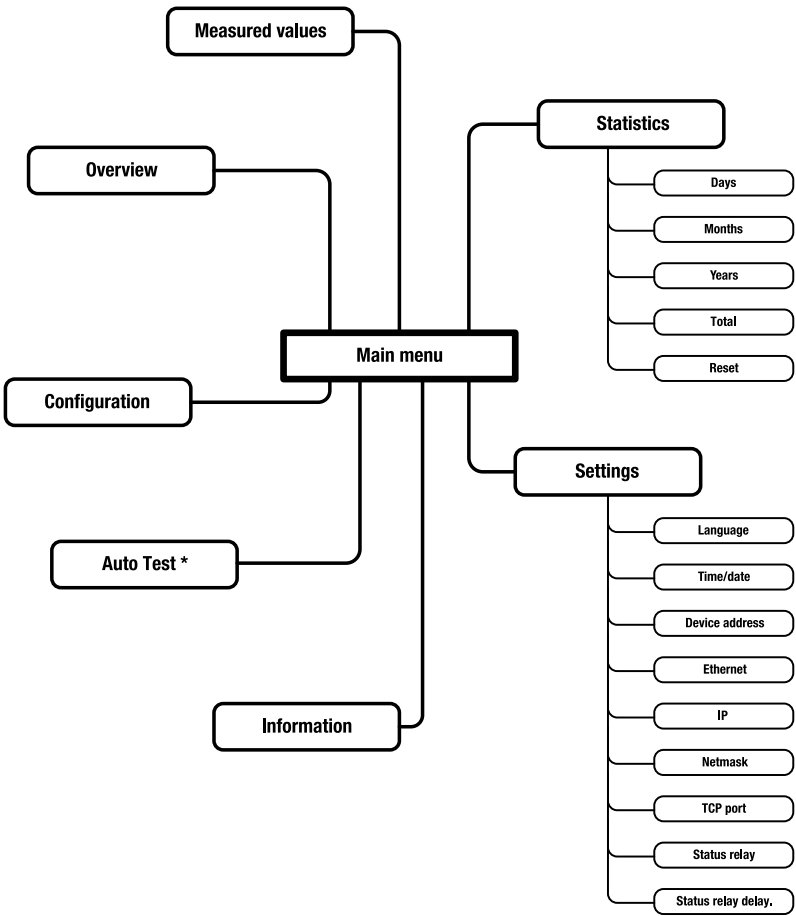
The display is backlit to improve readability when lighting is poor. Activate the backlight by pressing any of the buttons. The backlight remains active for 180 seconds after the buttons were last used.

#### Menu button symbols

With the help of the symbols shown here you can navigate the various menus and functions visible in the display. The current button function may change from one menu to the next and corresponds to the symbol appearing directly over the button in each case:

Symbol	Function
	Scroll up, increase number, or next element
	Scroll down, or previous element
	Back to higher level menu
	Select next number
	Display selected sub-menu or confirm changes
	Launch edit mode for selection
	Abort

# 6.2 Menu structure

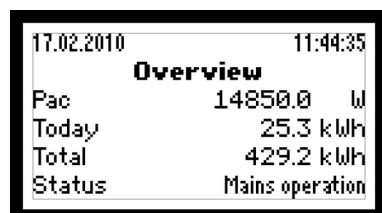


\* only for country setting “Italy”.

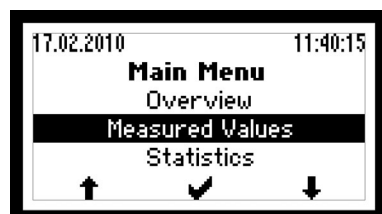


### 6.3 Overview

If none of the three buttons is pushed for 120 seconds, the display returns automatically to the Overview menu showing the three most important values as well as the current operating status.



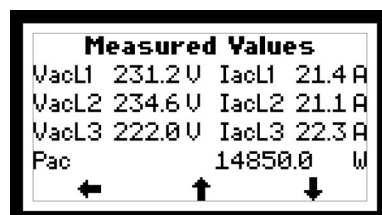
### 6.4 Main menu



The Main menu provides access to other menu levels. Use the arrow keys **↑** and **↓** to select the desired menu. Click **✓** to confirm your selection.

### 6.5 Measured values

The current inverter measured values can be accessed in the “Measured values” menu.



Use the arrow buttons **↑** and **↓** to navigate the measured values. Press the left button **←** to return to the Main menu.



## NOTE

The inverter measured values are not suitable for billing purposes or calculating efficiency. The measuring error may amount to up to  $\pm 5\%$  depending on the measured value. Only the measured values of a calibrated electricity meter are decisive for billing purposes.



The following measured values can be accessed:


Measured value	Description
Vdc1 / Vdc2 / Vdc3	DC input voltages trackers 1, 2, and 3
Idc1 / Idc2 / Idc3	DC input currents trackers 1, 2, and 3
Pdc	Input power
Pdc1 / Pdc2 / Pdc3	Input power trackers 1, 2, and 3
VacL1 / VacL2 / VacL3	Mains voltage phases L1, L2, and L3 (voltage to neutral)
IacL1 / IacL2 / IacL3	AC feed-in current phases L1, L2, and L3
Pac	Active output power
Q	Reactive power (+: overexcited / -: underexcited)
S	Apparent output power
cos $\phi$	Power factor (OEX: overexcited / UEX: underexcited)
Frequency	Mains frequency
Temperature	Temperature of the heat sinks
Fan	Operating conditions of the fans (on/off)

## 6.6 Statistics

In the Statistics menu you can access the inverter's internal data logger. The accessible statistics are for the most recent 31 days, 12 months or 10 years. The "Total" sub-menu contains the accumulated yield and operating data since initial start-up of the inverter.

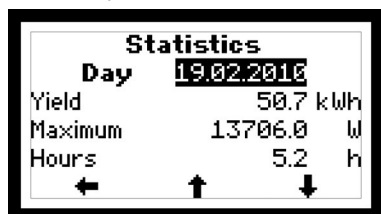





Use the  button to highlight a statistic category. Select a category by pressing the  button.

Press the left button  to return to the Main menu.

### 6.6.1 Daily statistics

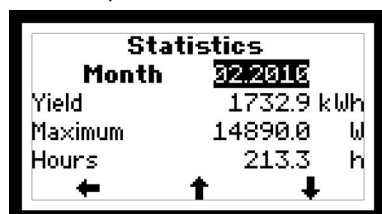
This menu provides access to the data from the most recent 31 days.






Use the buttons  and  to select a daily statistic. Press the left button  to return to the Statistics menu.

## 6.6.2 Monthly statistics

This menu provides access to the data from the most recent 12 months.






Use the  and  buttons to select a monthly statistic. Press the left button  to return to the Statistics menu.

## 6.6.3 Yearly statistics

This menu provides access to the data from the most recent 10 years.




Use the  and  buttons to select a yearly statistic. Press the left button  to return to the Statistics menu.

## 6.6.4 Total

This menu lists the total yield and the total number of operating hours of the inverter since initial start-up.



Press the left button  to return to the Statistics menu.

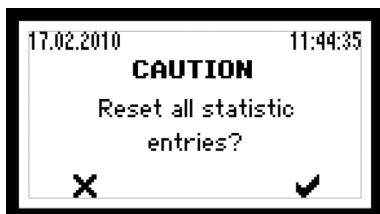
### 6.6.5 Reset



In this menu you can delete all the entries in the Statistics menu.



#### NOTE

Once deleted this data is irretrievably lost!



Press the  button to confirm the deletion of all the statistics entries. Use the  button to enter the Statistics menu without deleting the statistics entries.

## 6.7 Configuration

All available operating parameters and advanced functions of the inverter are listed in the “Configuration” menu. The settings displayed for the limit values and the functions depend on the country selected during initial start-up.



#### NOTE

MaxTalk 2 Pro, the extension to the standard MaxTalk 2 software, allows authorised skilled workers to individually adjust the operating parameters. The required “MT series parameter configuration using MaxTalk 2 Pro” instruction manual can be found on our website [www.solarmax.com](http://www.solarmax.com) (Downloads area). You can request MaxTalk 2 Pro from the SolarMax Service Centre. The contact details can be found overleaf.

Function / Parameter	Description	Unit
Country	Country setting selected during initial start-up	-
Plant type	Plant type selected during initial start-up	-
Standard	Grid connection selected during initial start-up	
Vac min 1	Minimum admissible mains voltage (first limit)	V
t Vac min 1	Release time for minimum admissible mains voltage	ms
Vac max 1	Maximum admissible mains voltage (first limit)	V

Function / Parameter	Description	Unit
t Vac max 1	Release time for maximum admissible mains voltage	ms
Vac min 2	Minimum admissible mains voltage (second limit)	V
t Vac min 2	Release time for minimum admissible mains voltage	ms
Vac max 2	Maximum admissible mains voltage (second limit)	V
t Vac max 2	Release time for maximum admissible mains voltage	ms
Vac 10 min max	Maximum admissible average value of the mains voltage over the last 10 minutes	V
Iac mean max	Maximum admissible DC share of the fed-in mains current	A
f min 1	Minimum admissible mains frequency (first limit)	Hz
t f min 1	Release time for minimum admissible mains frequency	ms
f max 1	Maximum admissible mains frequency (first limit)	Hz
t f max 1	Release time for maximum admissible mains frequency	ms
f min 2	Minimum admissible mains frequency (second limit)	Hz
t f min 2	Release time for minimum admissible mains frequency	ms
f max 2	Maximum admissible mains frequency (second limit)	Hz
t f max 2	Release time for maximum admissible mains frequency	ms
df/dt max	Maximum admissible change of the mains frequency	Hz/s
Ierr max	Maximum admissible leakage current (effective value) on the DC end	mA
<b>Island detection</b>	Immediate grid disconnection when island operation detected (Anti-Islanding)	Inactive/ on
<b>Monit. ext. input</b>	The status signalling contact is configured for monitoring an external input.	Inactive/ on
Restart delay	Delay time before grid reconnection upon previous failure-related grid disconnection.	s
Pac progression	Maximum increase of the effective power during grid reconnection upon previous failure-related grid disconnection.	%/min
Soft Start	Maximum increase of the effective power at grid connection. This gradient, if activated, is always effective, as opposed to "Pac Progression" (even during restart in the morning).	W/s
<b>Mains check</b>	Additional mains check before connecting to the grid	Inactive/ on
- Vac MC max	Maximum admissible mains voltage	V
- Vac MC min	Minimum admissible mains voltage	V

Function / Parameter	Description	Unit
- f MC max	Maximum admissible mains frequency	Hz
- f MC min	Minimum admissible mains frequency	Hz
- t MC Monitoring	Duration of the mains check	s
<b>P(f)-Mode</b>	Frequency-dependent power reduction	Inactive/ on
- f start	Starting frequency	Hz
- f stop	Stop frequency	Hz
- P(f) MC f max	Maximum admissible mains frequency	Hz
- P(f) MC f min	Minimum admissible mains frequency	Hz
- P(f) MC Vac max	Maximum admissible mains voltage	V
- P(f) MC Vac min	Minimum admissible mains voltage	V
- P(f) MC t monitoring	Duration of mains check in P(f) mode	s
- Reduction	Reduction gradient	%/Hz
- Re-increase	Increase gradient to the maximum possible power output (in % of rated output power $P_{ac\ nom/min}$ )	%/min
<b>P(V)-Mode</b>	Output reduction dependent on grid voltage	Inactive/ on
- Vac threshold	Limit of grid voltage (average value)	V
- Pac reduction	Reduction gradient (% of $P_{ac\ nom/min}$ )	%/min
- Pac recovery	Increase gradient to the maximum possible power output (% of $P_{ac\ nom/min}$ )	%/min
- Monitoring time	Monitoring time	s
<b>Q-Mode</b>	Reactive power mode: inactive ( $\cos\varphi = 1$ ), $\cos\varphi$ , $\cos\varphi(Pac)$ , Q, Q(Vac) mode 1 or Q(Vac) mode 2	-
- Vac Lock	Grid voltage-dependent on/off switch for the reactive power modes $\cos\varphi$ and $\cos\varphi(Pac)$ .	Inactive/ on
- Vac Lock-In High	Value at which the reactive power mode is switched on. Upper value at which the reactive power mode "Q(Vac) mode 2" is switched on.	V
- Vac Lock-Out Low	Value at which the reactive power mode is deactivated ( $\cos\varphi = 1$ ). Lower value at which the reactive power mode "Q(Vac) mode 2" is switched off.	V
- QR 1	Fixed reactive power in reactive power mode "Q(Vac) mode 2" (when grid voltage is too high; in % of $P_{ac\ nom}$ )	%
- Vac Lock-Out High	Upper value at which the reactive power mode Q(Vac) mode 2" is deactivated ( $\cos\varphi = 1$ ).	V

Function / Parameter	Description	Unit
- Vac Lock-In Low	Lower value at which the reactive power mode "Q(Vac) mode 2" is activated.	V
- QR 2	Fixed reactive power in reactive power mode "Q(Vac) mode 2" (when grid voltage is too low; in % of Pac nom)	%
- <b>Pac Lock</b>	Active power-dependent on/off switch for the reactive power modes $\cos\phi$ and Q.	Inactive/ on
- Pac Lock-In	Value at which the reactive power mode is activated.	W
- Pac Lock-Out	Value at which the reactive power mode is deactivated ( $\cos\phi = 1$ ).	W
<b>FRT</b>	Fault ride through function for dynamic grid support	Inactive/ on
- K-Factor	Reactive current static factor for voltage support with reactive current during mains drops	-
Iac max	Maximum admissible mains current (per phase)	A
Pac max	Maximum effective power to be fed	W
S max	Maximum apparent power to be fed.	VA

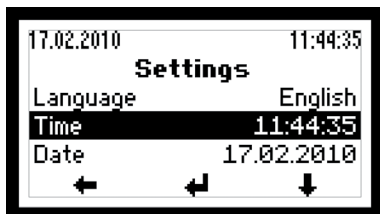
## 6.8 Settings



This menu can be used to set different communication parameters and monitoring functions. All settings can also be implemented with MaxTalk.

Parameter	Description
Language	Selection of the display language (German, English, French, Italian, or Spanish). The display language can be selected independently of the selected specific country settings.
Time	Setting the internal clock
Date	Setting the displayed date
Device address	Definition of the device address between 1 and 249. If you connect several inverters and accessory components to become one MaxComm communication network, each device within the network must have an individual address.
IP	Configuration of the Ethernet interface. Details see Section 5.3.
Netmask	
TCP Port	
Status relay delay	Setting the switching delay of the status signalling contact
Pinst tot	Rated output of the PV generator (entry only possible in MaxTalk).







## 6.8.1 Implementing the settings



Use the  button to select a parameter. Press the  button to select a highlighted parameter and switch into the editing mode to change it.

In the editing mode each individual number is changed.

- Example: Using the  button, the highlighted number can be increased. After editing this number, use the  button to go to the next number which in turn can be increased using the  button.

Press the left button  to return to the Main menu.

## 6.8.2 Status relay

The functions of the status signalling contact can be adjusted. There are four different functional settings.




Setting	Description
Off	The status signalling contact is always open.
Mains	When the inverter starts mains operation, the status signalling contact closes immediately and remains closed as long as the inverter is feeding in. If the inverter is no longer feeding into the grid, the status signalling contact opens after the adjustable delay time has expired.
Error	If a warning, failure, or device error occurs with the inverter, the status signalling contact closes after the adjustable delay time has expired (the events are listed in 10.2 "Diagnosis & measures"). The status signalling contact opens immediately when the error is no longer present.
On	This setting is designed for controlling an external motorised AC disconnect, for example. When the inverter is switched on (sufficiently high DC input voltage), the status signalling contact closes. The status signalling contact will only re-open when the inverter is switched off (DC input voltage too low).

The monitoring electronics are supplied by the PV generator, in other words during the night and when the DC end is switched off, the status signalling contact is open.

## 6.9 Information

This menu contains the following information:

- Device type
- Serial number
- Firmware version
- Status message and two-digit number code (if a device error occurs)
- Warning (alternating display if several warnings are active at the same time)
- Date of initial start-up
- Accumulated operating hours
- Date
- Time

Use the  and  keys to move through the menu. Press the left button  to return to the Main menu.

## 6.10 Auto Test according to DK 5940

During mains operation, the Auto Test procedure according to DK 5940 (only for country setting “Italy”) varies the trigger threshold for AC voltage and frequency monitoring linearly with a ramp of  $\leq 0.05\text{Hz/s}$  and/or  $\leq 0.05\text{Vn/s}$  ( $V_n = 230\text{Vac}$ ). This way, at some point during the test, the threshold will coincide with the current measured value, leading to triggering of the monitoring intervention. After each test step the values of the trigger thresholds, delay times, current measured frequency and AC voltage values, and the standard threshold trigger value are displayed.

### 6.10.1 Start Auto Test

The Auto Test can be activated only if there is sufficient irradiance, the inverter is connected to the grid, and is in feed mode.

1. Wait until the inverter has connected to the grid.
2. Select the “Auto Test” menu item in the Main menu.
3. Answer the question whether the Auto Test should be executed with YES.
4. The Auto Test now runs automatically.



#### NOTE

If an error occurs during the test or the irradiance is too low, the Auto Test is aborted and the message “Auto Test aborted” appears in the display together with an associated error message.

## 6.10.2 Procedure

### Maximum voltage

- The set voltage monitoring threshold Vac max is displayed.
- The threshold value is decremented linearly until it reaches the current mains voltage value and grid monitoring is triggered.
- The trigger value, the trigger time, the current value, and the default value of voltage monitoring (Vac max) are displayed.

### Minimum voltage

- The set voltage monitoring threshold Vac min is displayed.
- The threshold value is incremented linearly until it reaches the current mains voltage value and grid monitoring is triggered.
- The trigger value, the trigger time, the current value, and the default value of voltage monitoring (Vac min) are displayed.

### Maximum frequency

- The set frequency monitoring threshold f max is displayed.
- The threshold value is decremented linearly until it reaches the current mains frequency value and grid monitoring is triggered.
- The trigger value, the trigger time, the current value, and the default value of frequency monitoring (f max) are displayed.

### Minimum frequency

- The set frequency monitoring threshold f min is displayed.
- The threshold value is incremented linearly until it reaches the current mains frequency value and grid monitoring is triggered.
- The trigger value, the trigger time, the current value, and the default value of frequency monitoring (f min) are displayed.

After the Auto Test is complete, the inverter returns to normal operation.

# 7 Operating status

## 7.1 Status messages and status LED

The status message in the graphics display describes the current operating status of the inverter. Each inverter status message belongs to one of the five possible operating statuses. The status LED always displays one of these operating statuses through a variety of colours. In addition to the status messages, the inverter can also display warnings. Warnings result from device errors or external failures which, however, do not affect the mains operation of the inverter. Losses of yield are possible, however.

Warnings have no relation to the operating status and are displayed on the graphics display alternately with the current status message.

The status messages of the “Failure”, “Error”, and “Blocked” operating statuses, as well as the warnings, usually require certain measures to be taken, see Section 8.2.

LED status	Operating status	Description
Off	-	Inverter is switched off → grid disconnection
Flashing green ---	Booting	Inverter starts → grid disconnection
Green —	Mains operation	Grid feed-in (normal operation)
Flashing orange ---	-	Warning → no grid disconnection
Orange —	Failure	External failure → grid disconnection
Red —	Error	Internal device error → grid disconnection
Flashing red ---	Blocked	Inverter is blocked → grid disconnection

## 7.2 Booting



Status message	Description
Irradiance too low	The solar irradiation or rather the available output is too low for mains operation.
Startup...	The inverter checks the internal hardware and software components before connecting to the grid.
Restart delay	The inverter has disconnected itself from the grid and is delaying re-connection to the grid.

### 7.3 Mains operation

Status message	Description
Mains operation	The inverter has been switched to the grid and is feeding power into the grid.
Maximum power	The inverter limits the output power to the maximum permissible level. Limiting the power can occur when the PV generator has been oversized or in the event of high irradiation.
Idc limitation	The inverter limits the DC input current to the maximum permissible value. This can occur if the PV generator was designed so that the current in the MPP is higher than the maximum permissible DC current of the inverter.
Iac limitation	The inverter limits the fed-in mains current to the maximum permissible value. This can occur in response to major fluctuations in irradiation, low mains voltage or due to an over-dimensioned PV generator.
Restart limitation	The inverter increases the active power after the conclusion of an external limitation with a defined progression (Pac progression and/or Soft Start).
Frequency limitation	The inverter temporarily limits the active power due to an active frequency-dependent reduction in power - P(f) mode.
External limitation	The output power of the inverter is limited by a remote command.

### 7.4 Communications activity

The communications activity of the inverter is displayed via two different symbols on the graphics display.

Symbol	Description
	This symbol is displayed when the inverter sends or receives data (via RS485 or Ethernet).
	This symbol appears when there is an Ethernet connection (corresponds with the "Link" display on network cards).

## 8 Troubleshooting

Sputnik Engineering delivers only SolarMax inverters which have stood up to our extensive quality testing regime. Moreover, each inverter is subjected to several hours of endurance testing under full-load conditions.

If, despite this, your PV plant suffers a failure or an error we recommend these procedures:



### **DANGER**

Work on the PV plant must be performed by qualified electricians only.

1. Check whether the inverter and PV generator have been installed correctly. Check the cable connections using the instructions and information contained in the “Installation” section of this manual.
2. Determine the cause of the failure by checking the message in the graphics display. Section 10.2 “Diagnosis & measures” explains possible ways of correcting failures.

If you cannot correct the failure using the recommended measures, or you are not sure what sort of error is involved, please contact our SolarMax Service Centre.

### 8.1 SolarMax Service Center

If you have technical questions or difficulties, our Service Center would be happy to help you. If you have questions about failures, please provide us with the following details:

- Device type
- Serial number S/N
- Installation location
- Information about the failure you are experiencing (status message, etc.)

#### **Availability**

The contact details of the SolarMax Service Center can be found on the back of this instruction manual.

Sputnik Engineering AG  
Länggasse 85  
CH-2504 Biel-Bienne

## 8.2 Diagnosis & measures

The following tables describe possible measures for remedying failures. If the measures suggested do not correct the failure, please contact the SolarMax Service Centre immediately.

### 8.2.1 General troubleshooting

	Cause	Steps
The display remains blank	DC disconnecter Q1 is switched off.	Switch on DC disconnecter Q1.
	Irradiation too low.	Wait until the irradiation is sufficient.
	Strings disconnected.	Check PV generator and correct disconnection.
	Internal failure.	Notify the SolarMax Service Centre.
	The PV generator is connected incorrectly (plus and minus connections have been mixed up).	Connect the PV generator properly.

### 8.2.2 Warnings

Warning	Cause	Measure
Failure fan	A fan is defective or dirty.	Contact the SolarMax Service Centre.
Temperature limitation	The feed-in power has been temporarily reduced to limit the temperature of the inverter.	Clean the fan grids and improve ventilation in the operations room.
Failure temp. sensor	A temperature sensor in the inverter has failed.	Contact the SolarMax Service Centre.
Burst error	The inverter disconnected from the grid five times or more on the same day. The warning is displayed for the remainder of the day. The error counter will be reset when the system is restarted in the morning.	Check your plant's status logger in MaxWeb xp (if present) or check the grid parameters. If this happens repeatedly, contact our SolarMax Service Centre.

Warning	Cause	Measure
RTC error	The RTC (real-time clock) in the inverter is malfunctioning, the date and time have been reset.	If this problem happens frequently, contact the SolarMax Service Centre. Set the time and date correctly.
Flash error	A flash error has occurred. Inverter mains operation continues to be guaranteed.	Contact the SolarMax Service Centre.
Firmware mismatch	The firmware versions of the inverter controllers do not match.	Contact the SolarMax Service Centre.

### 8.2.3 Failures

Status message	Cause	Measure
Vdc too high (VDC3, VDC2, VDC1)	The DC input voltage at the specified inverter DC connection is too high.	Switch off the DC disconnect Q1 immediately and disconnect the PV generator from the inverter. Check the dimensioning of the PV generator.
No mains No mains BP	There is no mains voltage or the AC supply has been interrupted.	Check the AC supply.
Mains error Mains error BP	The grid has been switched off.	If this problem continues to occur, contact the responsible grid operator.
Frequency too high Frequency too high BP	The mains frequency is outside of the f max 1 or f max 2 limit values.	
Frequency too low Frequency too low BP	The mains frequency is outside of the f min 1 or f min 2 limit values.	
Vac too high (L1 L2 L3) Vac too high BP (L1 L2 L3)	The mains voltage at the specified phase is outside of the Vac max 1 or Vac max 2 limit values.	
Vac too low (L1 L2 L3) Vac too low BP (L1 L2 L3)	The mains voltage at the specified phase is outside of the Vac min 1 or Vac min 2 limit values.	



Status message	Cause	Measure
Vac 10min too high (L1 L2 L3) Vac 10min too high BP (L1 L2 L3)	The maximum 10-minute average value of the mains voltage (Vac 10 min max.) at the specified phase is too high.	If this problem continues to occur, contact the responsible grid operator.
df/dt too high	The change in the mains frequency per second has exceeded the maximum admissible value df/dt max.	
Insulation fault DC Insulation fault DC BP	The insulation resistance of the PV generator against earth is too low.	Check the PV generator.
Ierr too high Ierr too high BP	The DC leakage current has exceeded the admissible absolute limit value Ierr max.	
Ierr step too high Ierr step too high BP	The DC leakage current has exceeded the admissible step value.	
L and N interchanged	A phase and the neutral conductor are incorrectly connected (interchanged).	Connect the AC supplies correctly.
Error DC polarity	One or more DC connections are connected incorrectly (incorrect polarity).	Connect the DC supplies correctly.
Error ext. input 1	The external grid monitoring and/or remote shutdown has disconnected the inverter from the grid.	If this problem continues to occur, contact the responsible grid operator.

## 8.2.4 Error

Status message	Cause	Measure
Device error (+ error code)	An internal error has occurred in the inverter.	Check the two-digit error code displayed and contact the SolarMax Service Centre.

## 8.2.5 Blockings

Status message	Cause	Measure
External blocking	There is a 0% command from MaxRemote (coming from the grid operator).	None. Wait until the grid operator suspends the blocking of the inverter via MaxRemote.

Status message	Cause	Measure
Program Firmware	The inverter firmware is currently being updated.	The inverter automatically resumes mains operation once the firmware update is complete.

## 9 Maintenance

SolarMax inverters are basically maintenance-free. However, in order to ensure perfect operation over the course of several years, in addition to regular controls of the operating and yield data via the inverter display or remote monitoring, we also recommend performing the simple maintenance work described below at regular intervals. The maintenance intervals must be set keeping the ambient conditions in mind (especially exposure to dust).

The following checks can be performed by the plant operator. If you discover problems while performing these checks, contact the electrician in charge of maintenance or our SolarMax Service Centre.

- Functional check of the inverter using the graphics display
- On-site check of visible traces of wear and tear (damage, rain, snow, rodents, etc.)
- Cleaning and check of plant room
- Cleaning the fan screens

## 10 Disposal

Please dispose of the inverter at the end of its service life in compliance with the disposal regulations then valid where it is installed. You can also return the inverter at your own cost for professional disposal to Sputnik Engineering.

# 11 Technical data

		6MT2	8MT2	10MT2
Input values	MPP voltage range <sup>1)</sup>	340... 750 V	300... 750 V	290... 750 V
	Minimum DC voltage	250 V	250 V	250 V
	Maximum DC voltage	900 V	900 V	900 V
	Maximum DC current	1 x 9 A / 1 x 9 A	1 x 18 A / 1 x 9 A	2 x 18 A
	Maximum DC short-circuit current	1 x 9 A / 1 x 9 A	1 x 18 A / 1 x 9 A	2 x 18 A
	Number of MPP trackers	2	2	2
	Max. PV generator output per MPP tracker	MPPT1: 7'500 W MPPT2: 4'500 W	MPPT1: 9'000 W MPPT2: 4'500 W	9'000 W
	String connections	1 x 2 / 1 x 1	1 x 2 / 1 x 1	2 x 2
	Connection type	MC 4	MC 4	MC 4
Output values	Rated output power at $\cos\phi = 1$	6'000 W	8'000 W	10'000 W
	Maximum apparent output power	6'000 VA	8'000 VA	10'000 VA
	Nominal mains voltage	3 x 400 V	3 x 400 V	3 x 400 V
	Maximum AC current	3 x 9 A	3 x 12 A	3 x 16 A
	Maximum AC short-circuit current	42 A <sub>peak</sub>	42 A <sub>peak</sub>	42 A <sub>peak</sub>
	Mains nominal frequency / range	50 Hz / 45 Hz...55 Hz		
	Power factor $\cos\phi$	Adjustable from 0.8 overexcited to 0.8 underexcited		
	Distortion factor at rated output power	< 3 %		
	Connection type	Connector (locking)		
	Grid connection	Three-phase (3 / N / PE)		
	Power input at night	0 W		
Efficiency	Max. efficiency	98.0 %		
	European efficiency	97.5 %		
Ambient conditions	Protection type	IP65		
	Ambient temperature range (at rated output power)	-20 °C...+60 °C (-20 °C...+50 °C)		
	Relative humidity	0...98 % (no condensation)		
	Maximum altitude above sea level	2000 m (without derating)		
Configuration	Display	Graphic LC display with backlight and status LED		
	Circuit type	two-stage, transformerless		
	Data logger	Data logger for energy yield, peak output, and operating duration for the last 31 days, 12 months and 10 years		
	Fault current monitoring	Internal, AC/DC sensitive		
	Casing	Aluminium, cover powder-coated		
	Overvoltage conductor DC	Requirement class C (VDE 0675-6) and/or type 2 (EN 61643-11)		
	Overvoltage conductor AC	Requirement class D (VDE 0675-6) and/or type 3 (EN 61643-11)		

		6MT2	8MT2	10MT2
Standards & guidelines <sup>2)</sup>	EMC	EN 61000-3-2 / EN 61000-3-3 / EN 61000-3-11 / EN 61000-3-12 / EN 61000-6-2 / EN 61000-6-3		
	Grid connection	VDE-AR-N 4105 / VDE 0126-1-1 / BDEW MS-Richtlinie <sup>3)</sup> / CEI 0-21 / RD 661 / RD 1699 / G59/2 / G83/2 <sup>4)</sup> / PPC Guide / C10/11 / EN 50438 <sup>5)</sup> / AS 4777		
	Device safety	Bureau Veritas GS "Certified safety" in accordance with IEC/EN 62109-1/-2 / AS 3100		
Interfaces	Data communication	RS485 / Ethernet		
	Status signalling contact	M12 connector with relay as N/C contact / N/O contact		
	Connection of external grid monitoring	M12 connector		
Weight & dimensions	Weight	39 kg	39 kg	39 kg
	Dimensions in mm (W x H x D)	550 x 750 x 200		
Warranty	Standard 5 years / extension to 10, 15, 20, or 25 years possible			

		13MT2	15MT2	13MT3	15MT3
<b>Input values</b>	MPP voltage range <sup>1)</sup>	370... 750 V	430... 750 V	280... 750 V	320... 750 V
	Minimum DC voltage	250 V	250 V	250 V	250 V
	Maximum DC voltage	900 V	900 V	900 V	900 V
	Maximum DC current	2 x 18 A	2 x 18 A	3 x 16 A	3 x 16 A
	Maximum DC short-circuit current	2 x 18 A	2 x 18 A	3 x 16 A	3 x 16 A
	Number of MPP trackers	2	2	3	3
	Max. PV generator output per MPP tracker	9'000 W	9'000 W	9'000 W	9'000 W
	String connections	2 x 2	2 x 2	3 x 2	3 x 2
	Connection type	MC 4	MC 4	MC 4	MC4
<b>Output values</b>	Rated output power at $\cos\phi = 1$	13'000 W	15'000 W	13'000 W	15'000 W
	Maximum apparent output power	13'000 VA	15'000 VA	13'000 VA	15'000 VA
	Nominal mains voltage	3 x 400 V	3 x 400 V	3 x 400 V	3 x 400V
	Maximum AC current	3 x 20 A	3 x 22 A	3 x 20 A	3 x 22 A
	Maximum AC short-circuit current	42 A <sub>peak</sub>	42 A <sub>peak</sub>	42 A <sub>peak</sub>	42 A <sub>peak</sub>
	Mains nominal frequency / range	50 Hz / 45 Hz...55 Hz			
	Power factor $\cos\phi$	Adjustable from 0.8 overexcited to 0.8 underexcited			
	Distortion factor at rated output power	< 3 %			
	Connection type	Connector (locking)			
	Grid connection	Three-phase (3 / N / PE)			
	Power input at night	0 W			
	Efficiency				
	Max. efficiency	98.0 %			
	European efficiency	97.5 %			

		13MT2	15MT2	13MT3	15MT3
Ambient conditions	Protection type	IP65			
	Ambient temperature range (at rated output power)	−20 °C...+60 °C (−20 °C...+50 °C)			
	Relative humidity	0...98 % (no condensation)			
	Maximum altitude above sea level	2000 m (without derating)			
Configuration	Display	Graphic LC display with backlight and status LED			
	Circuit type	two-stage, transformerless			
	Data logger	Data logger for energy yield, peak output, and operating duration for the last 31 days, 12 months and 10 years			
	Fault current monitoring	Internal, AC/DC sensitive			
	Casing	Aluminium, cover powder-coated			
	Overvoltage conductor DC	Requirement class C (VDE 0675-6) and/or type 2 (EN 61643-11)			
	Overvoltage conductor AC	Requirement class D (VDE 0675-6) and/or type 3 (EN 61643-11)			
Standards & guidelines <sup>2)</sup>	EMC	EN 61000-3-2 / EN 61000-3-3 / EN 61000-3-11 / EN 61000-3-12 / EN 61000-6-2 / EN 61000-6-3			
	Grid connection	VDE-AR-N 4105 / VDE 0126-1-1 / BDEW MS-Richtlinie <sup>3)</sup> / CEI 0-21 / RD 661 / RD 1699 / G59/2 / G83/2 <sup>4)</sup> / PPC Guide / C10/11 / EN 50438 <sup>5)</sup> / AS 4777			
	Device safety	Bureau Veritas GS "Certified safety" in accordance with IEC/EN 62109-1/-2 / AS 3100			
Interfaces	Data communication	RS485 / Ethernet			
	Status signalling contact	M12 connector with relay as N/C contact / N/O contact			
	Connection of external grid monitoring	M12 connector			
Weight & dimensions	Weight	39 kg	39 kg	42 kg	42 kg
	Dimensions in mm (W x H x D)	550 x 750 x 200			
Warranty	Standard 5 years / extension to 10, 15, 20, or 25 years possible				

1) for AC rated power output

2) certifications and conformities can be found and downloaded at [www.solarmax.com](http://www.solarmax.com)

3) not available for SolarMax 6MT2 and 8MT2

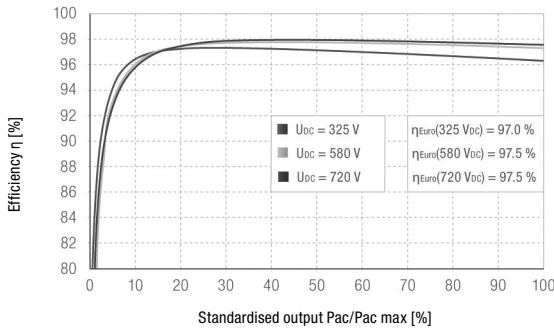
4) only the inverters SolarMax 8MT2 and 10MT2

5) Portugal and Sweden

## 11.1 Country-specific settings

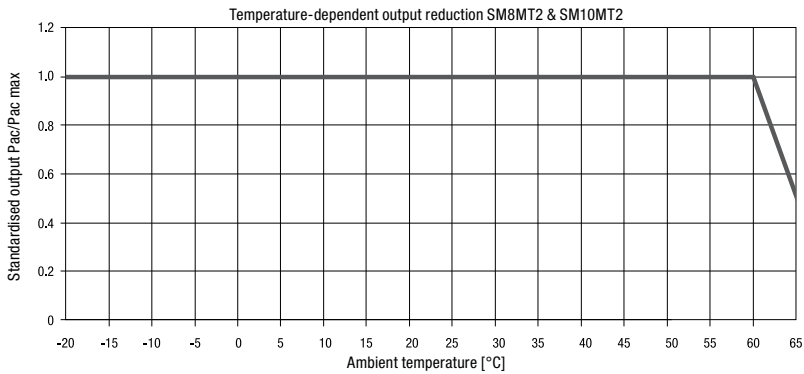
The factory's default settings for different countries can be viewed in the technical information "Country-specific functions and parameters - Factory settings". This document can be downloaded from our website at: [www.solarmax.com](http://www.solarmax.com); Downloads/String inverters/MT series/Manuals.

## 11.2 Efficiency curve SolarMax 15MT3

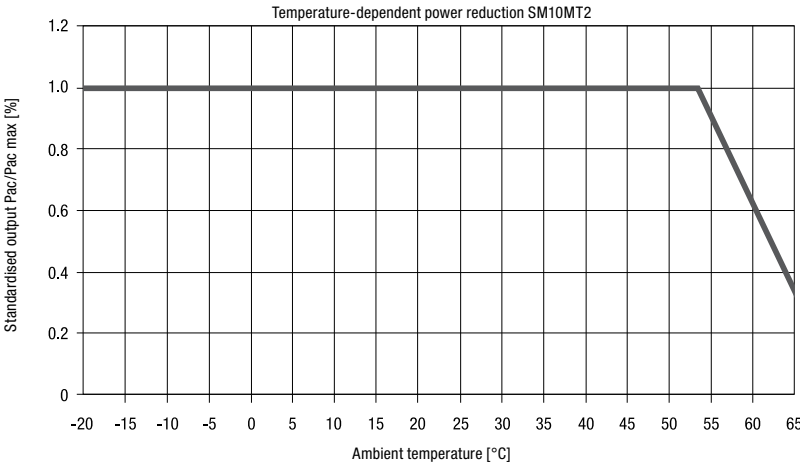


## 11.3 Temperature-dependent output reduction (power derating)

### SM8MT2 & SM10MT2

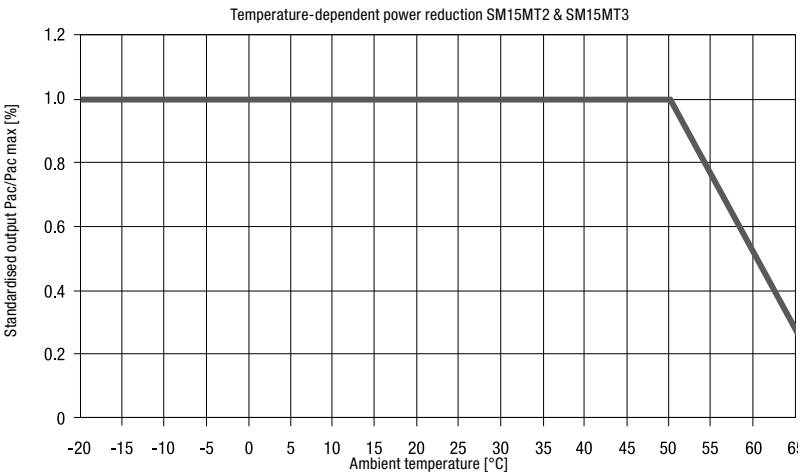


SM13MT2 & SM13MT3



en

SM15MT2 & SM15MT3



## 12 Accessories and options

Accessory/option	Description
MaxTalk 2	Free communication and service software for local monitoring of the PV plant.
MaxTalk 2 Pro	Professional version of MaxTalk for the configuration of inverters. The required "SolarMax MT series - Parameter configuration using MaxTalk 2 Pro" operating manual can be downloaded from our website; <a href="http://www.solarmax.com">www.solarmax.com</a> ("Downloads" area).
MaxWeb xp	MaxWeb xp is a data logger, monitoring unit, and web server in one. For all those who want to have their PV plant monitored and checked reliably and professionally, MaxWeb xp is the ideal solution.
MaxWeb Portal	The MaxWeb Portal is the ideal complement to the MaxWeb xp data logger. When using the MaxWeb Portal, you can access the data of your PV plant from anywhere on the Internet. The MaxWeb Portal provides a wide variety of graphic and chart display options for the evaluation of your PV plant's operating parameters.
MaxMonitoring	Using the free MaxMonitoring software, you can display the performance data of your photovoltaic system at any time from home. MaxMonitoring is available for PC, MacOS and Linux and also as an app for Android and iOS.
MaxMeteo	Unit recording irradiation data and cell temperature of PV modules
MaxCount	Unit recording meter figures with S0 interface
MaxDesign	Free software for determining the size of PV plants.

You can find further information on our website at [www.solarmax.com](http://www.solarmax.com).



# 13 Warranty

Sputnik Engineering AG (hereafter SPUTNIK) guarantees full function and lack of defects of its technical devices for a warranty period as specified below for each type of device. Such warranty period can be extended by means of a warranty extension, subject to the conditions named below.

This manufacturer's warranty exists next to the seller's warranty (if any) as prescribed by law. As far as identical with regards to the content, the rights under this manufacturer's warranty supersede any rights under the seller's warranty. Please contact the seller with regard to any claims based on the seller's warranty.

## 1. Warranty Period (Basic)

- Central inverters and accessories: 24 months from the date of purchase, but at maximum 30 months after dispatch of the device by SPUTNIK.
- String inverters: 60 months from the date of purchase, but at maximum 72 months after dispatch of the device by SPUTNIK.

If in individual cases SPUTNIK has agreed in writing to a different warranty period, such arrangement supersedes the above provisions.

## 2. Scope of Manufacturer's Warranty

In case of defect or malfunction of a device within the manufacturer's warranty period, and upon fulfillment of the conditions for warranty claims named hereafter, the device will be repaired or replaced by SPUTNIK-service personnel within a reasonable time, in either case free of charge, unless this is impossible or disproportionate. SPUTNIK may decide at its own discretion whether a device will be repaired or replaced.

- Replacement: Exchange of device free of charge. SPUTNIK's separate conditions for exchange of devices apply: This warranty covers the free delivery of an equivalent replacement device. Further, your installer is entitled to claim a flat rate compensation for the replacement work from SPUTNIK. Please do not hesitate to ask us about the current amount of such flat rate compensation.
- Repair: Repair of device free of charge. This warranty covers costs for material, work and travel by SPUTNIK personnel or by personnel authorized by SPUTNIK.

Please be aware that the performances of SPUTNIK under this warranty are only free of charge in countries approved by SPUTNIK. Please contact your seller for details. A current list of approved countries can be found on our homepage. Repair and replacement outside of the approved countries are only possible after prior consultation of and approval by SPUTNIK. In such case, travel and shipment costs are borne by the customer.

Any further claims, especially claims for compensation of damages resulting directly or indirectly from the defect or claims for replacement of further costs in connection with the installation and removal of devices or claims for loss of profits are not covered by this warranty.

### **3. Extent of Repair and Replacement**

SPUTNIK will maintain repair material and stock of each type of device during the warranty period only at its own reasonable discretion. In case repair materials for a certain type of inverter and/or an identical replacement device are not in stock anymore, the following applies:

- SPUTNIK is allowed to replace the defective inverter with a comparable device of the same or superior performance. The costs (time and material) for technical adjustments necessary for the installation of such comparable devices are covered by this warranty only up to a limited amount; any flat rate compensation owed by SPUTNIK for the replacement is deductible. Please do not hesitate to ask us about the currently applicable amount. The exchange and connection of peripheral devices due to possible non-compatibility with the replacement device or other necessary adjustments to the surrounding installations of the device (including power lines, ventilation and safety installations) are not covered by this warranty. However, SPUTNIK shall within the bounds of reasonability do its best to minimize the effort of such adaptation work.
- In case repair materials are not available with reasonable efforts anymore, SPUTNIK is allowed to replace the inverter, subject to the conditions mentioned in the paragraph above.

### **4. Warranty Period in Case of Repair/Replacement**

In case of repair or replacement of devices under this warranty, the repaired respectively replaced device will inherit the remaining warranty time of the original device.

### **5. Exclusion of Warranty**

Especially in the following cases, this manufacturer's warranty does not apply:

- Transport damage;
- Technical intrusions, modifications or repairs of the devices not authorized by SPUTNIK;
- Use of devices for purposes they are not intended for, incorrect or unreasonable manipulation, incorrect or unreasonable installation;
- Failure to observe the manufacturer's operating, installation and maintenance directions;
- Inadequate environmental conditions (e.g. insufficient ventilation of the device; humidity etc.);
- Superior force (e.g. lightning strike, overvoltage, floods, fire, etc.).

### **6. Handling of Warranty Cases**

For the processing of warranty cases, use of SPUTNIK's hotline is mandatory. The handling of warranty cases must take place in accordance with the instructions provided by the hotline.

The hotline number for your country can be found on SPUTNIK's homepage. Please hold the serial number, article description, a short description of the defect and the purchase receipt ready for transmission to the hotline.

Any repair action taken by the buyer or third parties without authorization by SPUTNIK will not be compensated.

In case these terms on the handling of warranty cases are not respected, SPUTNIK may refuse its warranty performances.

## 7. Suspension of Warranty

Sputnik reserves its right to suspend this manufacturer's warranty temporarily or definitely in case a specific installation does not allow a correct functioning of the inverters (e.g. in case of one of the circumstances listed in cipher 5).

The suspension of the warranty can be lifted upon approval by SPUTNIK. Such approval must be issued by SPUTNIK in writing, confirming that the warranty has again become effective.

## 8. Warranty Extension

The warranty period can be extended through purchase of a warranty extension within the time limits mentioned hereafter. For certain types of devices, such warranty extensions can also be purchased only for a limited scope of warranty performances. The purchase of a warranty extension will be confirmed by SPUTNIK in form of a warranty certificate (including serial number of affected product). In case of replacement of a device, the serial number in such warranty certificate remains unchanged, without any influence on the validity of the warranty extension.

### a) Time limits

String inverters: The extension of the basic warranty can be ordered within 60 months after purchase, but the latest within 72 months after dispatch of the device by SPUTNIK.

Central Inverters: The extension of the basic warranty can be ordered within 3 months after purchase, but the latest within 12 months after dispatch by SPUTNIK.

### b) Extent

Full warranty extension – FULL (available for central inverters and string inverters): A full warranty extension includes all the warranty performances as described in the manufacturer's basic warranty terms.

Limited warranty extension– LIMITED (available only for central inverters):

A limited warranty extension covers only the costs for the material required for the repair. The costs for travelling, labor and other expenses are not covered and will be invoiced on a time and expenses basis by SPUTNIK.

### c) Effectiveness of Warranty Extension

It is a mandatory requirement for the warranty extension to provide the completely filled out application form to SPUTNIK. The warranty extension becomes effective only after written confirmation and provision of the warranty certificate by SPUTNIK.

## 9. After Expiration of Warranty Period

The costs for repair or replacement of devices after expiration of the warranty period are invoiced by SPUTNIK on a time and material basis. SPUTNIK will maintain repair and replacement capabilities beyond the warranty time only at its own discretion.

## 10. Applicable Law, Jurisdiction

Only Swiss Law applies. The exclusive place of jurisdiction lies in Biel/Bienne, Switzerland.  
(v2013/05)

## SolarMax Service Center:

[hotline@solarmax.com](mailto:hotline@solarmax.com)

[www.solarmax.com/service](http://www.solarmax.com/service)