



USER'S AND INSTALLATION MANUAL / GEBUIKERS- EN INSTALLATIEHANDLEIDING
BEDIENUNGS- UND INSTALLATIONSANLEITUNG / MANUEL UTILISATEURS ET D'INSTALLATION
MANUAL DEL USUARIO Y DE INSTALACIÓN / MANUALE DI USO E MANUTENZIONE

Sunmaster

XS4300/ XS3200/ XS2000

Grid connected solar inverter



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OVERVIEW

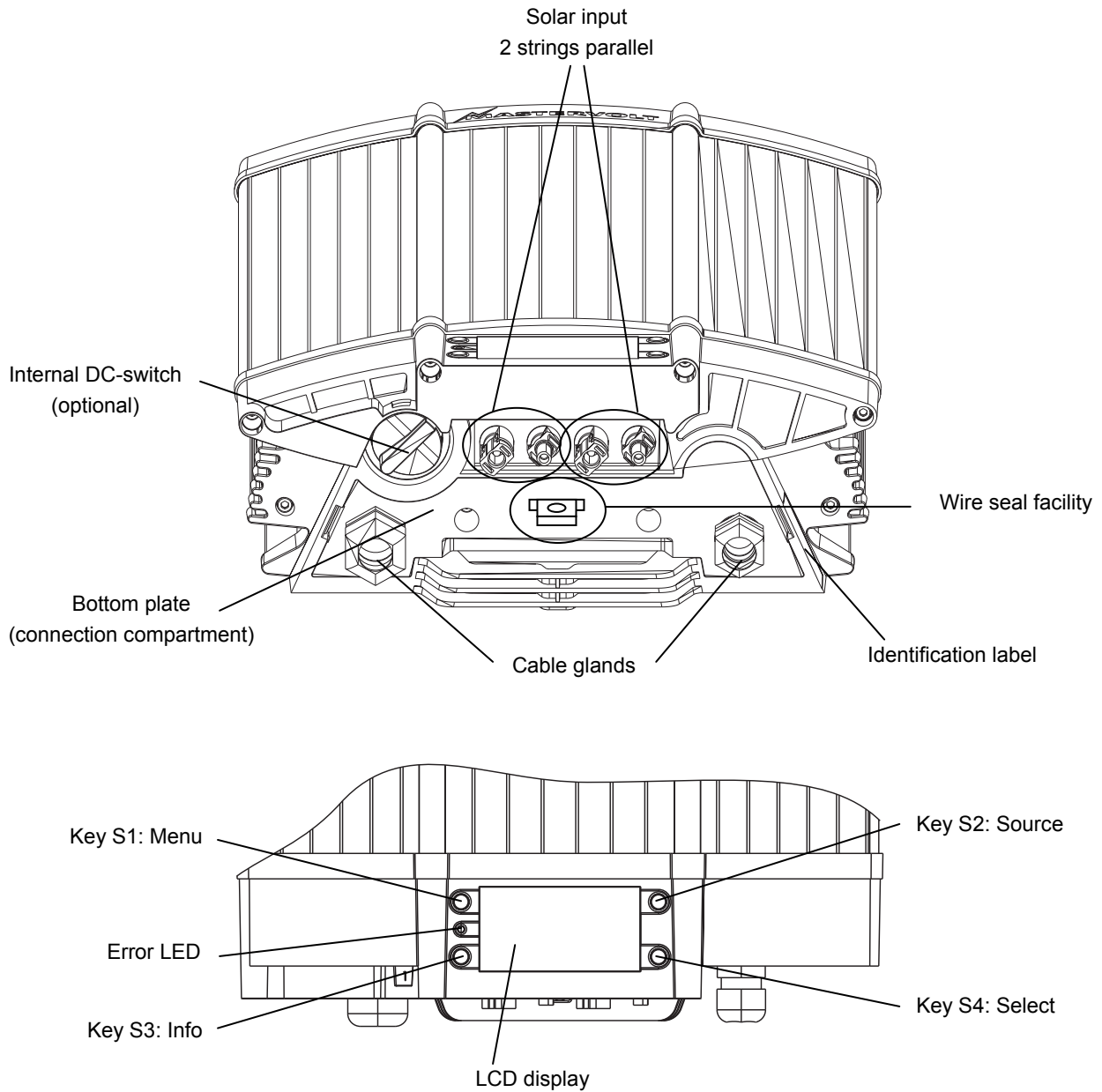


Figure 0-1: overview of the Mastervolt Sunmaster XS 4300/ 3200/2000.

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1 GENERAL INFORMATION

1.1 PRODUCT DESCRIPTION

Congratulations for choosing the Mastervolt Sunmaster XS4300, the Sunmaster XS3200 or the Sunmaster XS2000, further referred to as "Sunmaster". The Sunmaster is a grid connected solar inverter, used for the feed back into the utility grid of power generated by photovoltaic modules.

Depending on the application and in order to meet the local applicable regulations, the Sunmaster can be ordered in several models. See chapter 3.2 for an overview of the available models.

The Sunmaster is not suitable for stand-alone use (i.e. use without public grid).

1.2 USE OF THIS MANUAL

Copyright © 2011 Mastervolt. All rights reserved.

Reproduction, transfer, distribution or storage of part or all of the contents in this document in any form without the prior written permission of Mastervolt is prohibited. This manual serves as a guideline for the safe and effective installation of the Sunmaster:

- For the electrician this manual gives directions for the installation, operation and commissioning.
- For the end-user this manual gives directions for the operation, maintenance and possible correction of minor malfunctions of the Sunmaster.
- Every person who works with the apparatus should be familiar with the contents of this manual, and must carefully follow the instructions contained herein.
- Store the manual in a user accessible place.

This English manual has 32 pages.

1.3 VALIDITY OF THIS MANUAL

All the specifications, provisions and instructions contained in this manual apply solely to the Mastervolt-delivered standard versions of the Sunmaster (Refer to chapter 3.2).

1.4 GUARANTEE SPECIFICATIONS

Mastervolt assures the product guarantee of the Sunmaster during five years after your purchase, on the condition that all instructions and warnings given in this manual are taken into account during installation and operation.

Among other things, this means that installation is carried out by a qualified electrician, that installation and maintenance are executed according to the stated instructions and correct working sequence and that no changes or repairs may have been performed on the Sunmaster other than by Mastervolt.

The warranty is limited to the costs of repair and/or replacement of the product by Mastervolt only. Costs for installation labour or shipping of the defective parts are not covered by this warranty.

For making an appeal on warranty you can directly contact your supplier, stating your complaint, application, date of purchase and part number / serial number

1.5 LIABILITY

Mastervolt accepts no liability for:

- consequential damage due to use of the Sunmaster;
- possible errors in the manuals and the results thereof.

1.6 CHANGES TO THE SUNMASTER

Changes on the Sunmaster may be carried out only after the written permission of Mastervolt

1.7 IDENTIFICATION LABEL

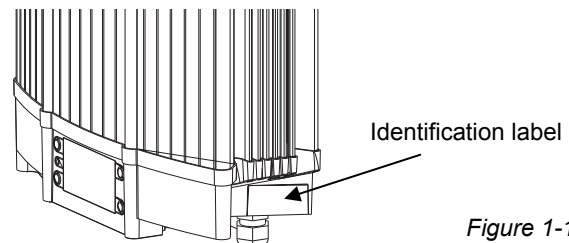


Figure 1-1

See figure 1-1 for location. Important technical information required for service, maintenance & secondary delivery of parts can be derived from the identification label.



CAUTION!

Never remove the identification label.

2 SAFETY GUIDELINES AND WARNINGS

2.1 WARNINGS AND SYMBOLS

Safety instructions and warnings are marked in this manual by the following pictograms:



A procedure, circumstance, etc which deserves extra attention.



CAUTION!

Special information, commands and prohibitions in order to prevent damage.



WARNING

A WARNING refers to possible injury to the user or installer or significant material damage to the Sunmaster if the installer / user does not (carefully) follow the stated procedures.

2.2 USE FOR INTENDED PURPOSE

The Sunmaster is constructed as per the applicable safety-technical guidelines. Use the Sunmaster only in installations that meet the following qualifications:

- in permanent installations;
- connected to a separate, grounded AC group, to which no other electrical equipment is connected;
- the electrical installation must meet the applicable regulations and standards, must be carried out correctly and must be in a good condition.
- according to the technical specifications as stated in chapter 7.1.



WARNING

Never use the Sunmaster in situations where there is danger of gas or dust explosion or potentially flammable products!

Use of the Sunmaster other than as mentioned under § 2.2 is not considered to be consistent with the intended purpose. Mastervolt is not liable for any damage resulting from the above.

2.3 ORGANISATIONAL MEASURES

The installer / user must always:

- have access to this manual;
- be familiar with the contents of this manual. This applies particularly to Chapter 2, Safety Guidelines & Warning.

2.4 INSTALLATION, MAINTENANCE AND REPAIR

As lethal voltages exist, allow installation, maintenance and repair of the Sunmaster and changes in your electrical system to be carried out by qualified electricians only.

Connections and safety features must be executed according to the locally applicable regulations.

In case of decommissioning and/or demounting follow the instructions as stated in chapter 4.4.

If such are required, use only original spare parts.

2.5 WARNING OF SPECIAL DANGERS

- Not only AC-grid voltage, but DC voltages up to 600V may exist in the Sunmaster as well
- The voltages present at the grid and solar side of the Sunmaster are not safe to touch and cannot be switched off at the solar side. Depending on local applicable regulations the use of an internal or external DC switch may be obligatory.
- Do not work on the Sunmaster and/or the electrical installation if it is still connected to the solar panels and/or AC-grid.
- Only allow changes in your electrical system to be carried out by qualified electricians

3 BEFORE YOU START

3.1 UNPACKING

In addition to the Sunmaster the delivery includes:

- A mounting bracket to mount the Sunmaster to a wall
- This user's and installation manual.

After unpacking, check the contents for possible damage. Do not use the product if it is damaged. If in doubt, contact your supplier.

3.2 COUNTRY SELECTION

The Sunmaster is equipped with an anti-islanding device that ensures the switch off in case of grid failure. European countries maintain different regulations with regard to the grid interface of solar inverters. The common islanding device is the QNS, which switches off the inverter if the grid voltage or frequency is out of range. In some countries like Germany the ENS device (VDE-V-0126-1-1 compliant) is compulsory.

Because of these different regulations the Sunmaster must be configured at first installation. See section 4.3.2.

Furthermore the Sunmaster can be supplied with or without internal DC switch which is used to disconnect the photovoltaic modules from the inverter, as required in buildings by the international standard IEC60364-7-712.

Check from the part number on the type number plate whether the Sunmaster is appropriate to be used for the intended application (refer to table 1).

Part number	Description	DC switch
131004300	XS4300 IP44 ENS	No
131014300	XS4300 IP44 ENS SW	Yes
131003200	XS3200 IP44 ENS	No
131013200	XS3200 IP44 ENS SW	Yes
131002000	XS2000 IP44 ENS	No
131012000	XS2000 IP44 ENS SW	Yes

Table 1

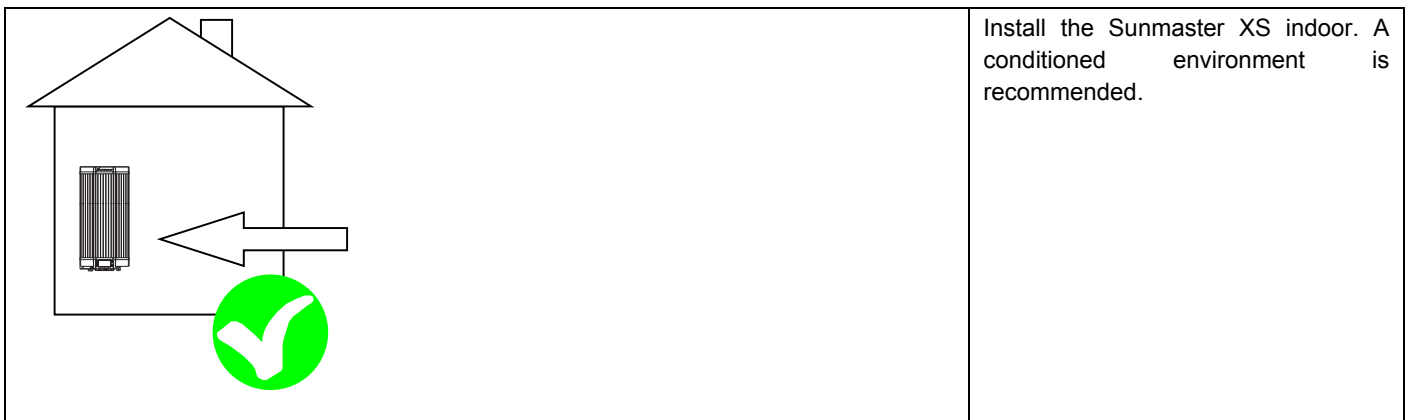


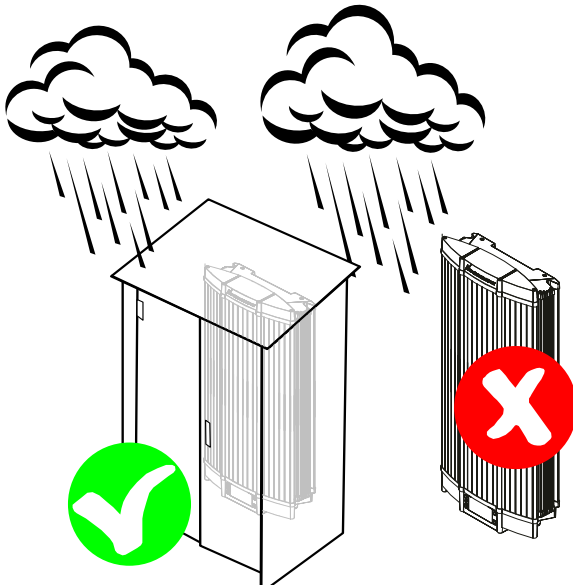
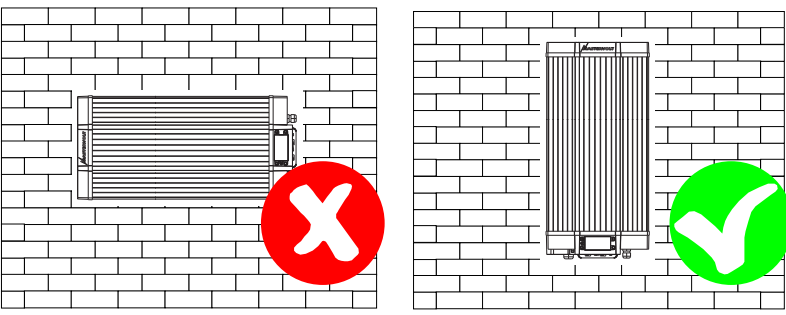
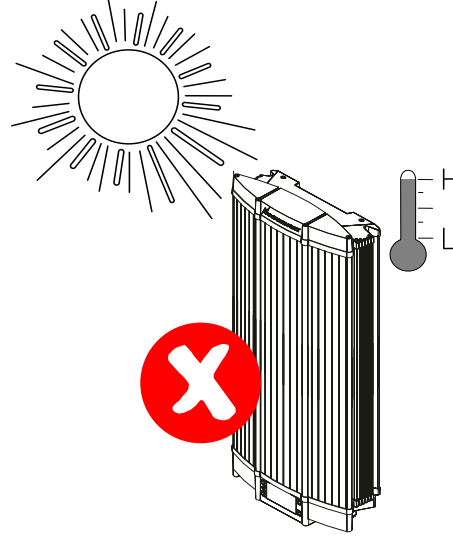
WARNING

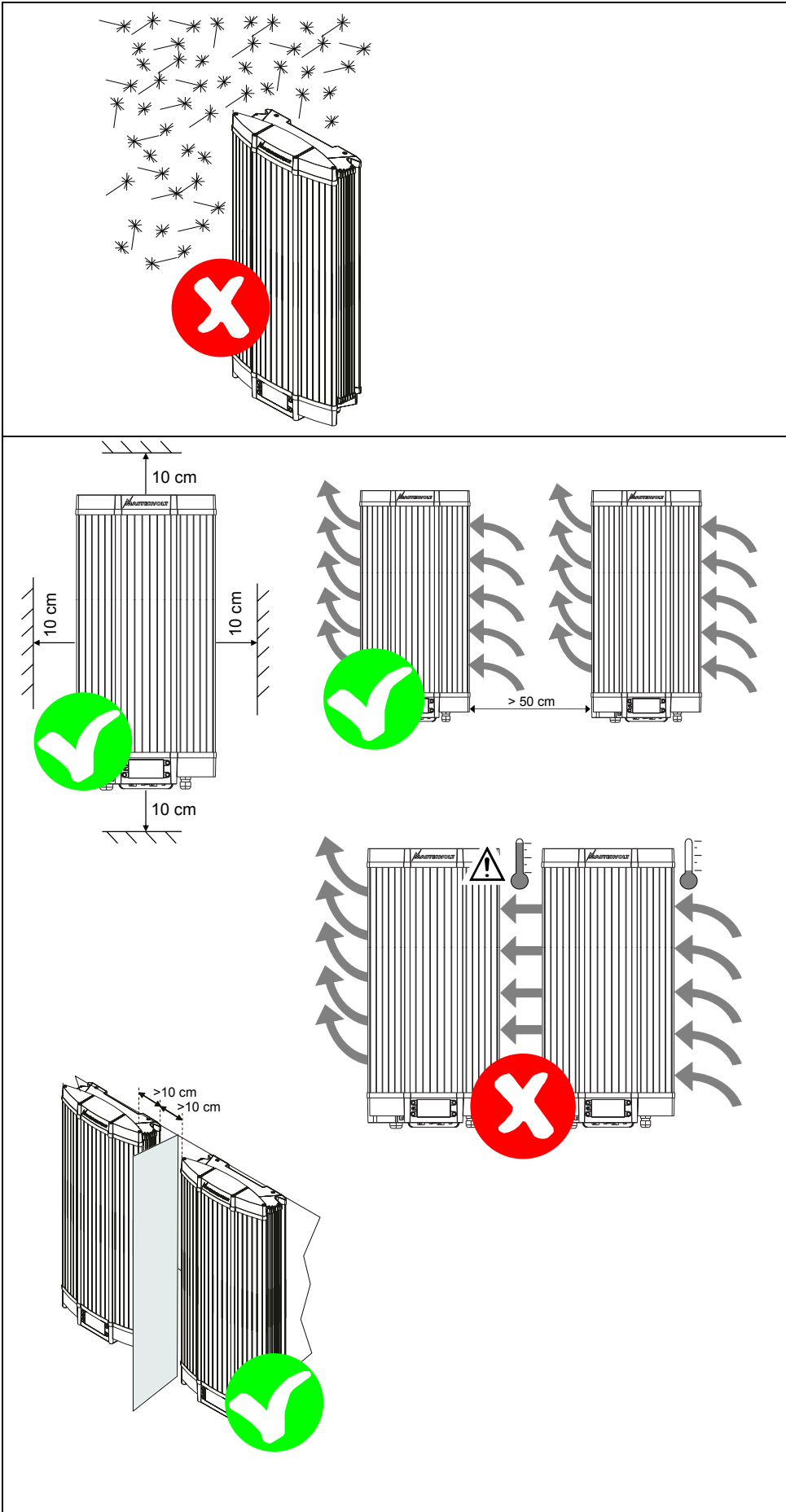
Never use the Sunmaster for a non-intended application!

3.3 INSTALLATION ENVIRONMENT

- Ambient temperature: -20 ... 60°C; (power derating above 45°C).
- Installation in an indoor, conditioned or unconditioned environment (See the table below for more instructions)
- No objects must be located within a distance of 10 cm around the Sunmaster (figure 3).
- Make sure that the hot air that is generated during operation will be discharged by forced ventilation when installing the Sunmaster in a closed section.
- Keep at least 50 cm in between the inverters when several Sunmasters are installed next to each other (figure 5). If this is not possible, adequate measures must be taken to avoid one inverter heating up the other (figure 4).
- If the Sunmaster is installed in the immediate vicinity of living areas, take into account that the Sunmaster can produce a slight noise level when operating.
- Mount the Sunmaster vertically on a solid wall.
- Readability of the display is optimal when looking at the display from an equal or lower position.



	<p>Never expose the Sunmaster to direct weather conditions such as rain, snow or wind. Install the Sunmaster in a sheltered environment.</p>
	<p>Mount the Sunmaster vertically, on a solid wall.</p>
	<p>Do not expose the Sunmaster to direct sunlight or other heat sources.</p>



Do not expose the Sunmaster to humid or dusty environments

Keep 10 cm clearance around the Sunmaster. When installed next to each other, keep at least 50 cm clearance. If this is not possible, take measures to avoid one inverter heating up the other.

3.4 AC WIRING

The Sunmaster may only be used in a permanent installation, connected to a separate AC distribution group, to which no other electrical equipment is connected.

The cabling between the junction box or electric cable duct and the Sunmaster must be double insulated. Use an appropriate AC-wire diameter, so that the single wire resistance between the Sunmaster and the AC distribution will not exceed 0.25 Ohm. Directive: up to 25 meters length, choose a wire diameter of 3 x 4mm². Choose a larger wire size for lengths above 25 meter.

3.5 GROUNDING

The Sunmaster must be provided with an equipment-grounding conductor to the AC-output ground terminal.

Grounding and all other wiring must comply with local codes and ordinances.

Grounding of the solar array is not necessary thanks to the galvanic isolation between the DC-input and the AC output of the Sunmaster.

3.6 SPECIFICATIONS OF THE SOLAR SYSTEM

The solar system should meet the following specifications:

- Maximum open circuit string voltage at lowest possible temperature of the PV modules and maximum PV power connected to the inverter:

Model Sunmaster	Max voltage	Max power
XS4300	550Vdc max	4600Wp
XS3200	600Vdc max	3500Wp
XS2000	450Vdc max	2100Wp

- Double insulated PV-wiring
- All cables of the string should have double insulation and must be fitted with pre-assembled MultiContact connectors (Ø4mm)
- If two or more strings are connected to the same Sunmaster, both string lengths must be equal.



CAUTION!

Do not install the Sunmaster if the solar-system does not comply with the above mentioned stipulations.

3.7 DC SWITCH

Depending on local applicable regulations the use of a DC switch between the PV modules and the inverter may be mandatory.

For example international standard IEC60364-7-712 prescribes a DC switch in solar electric installations in buildings. For this reason Mastervolt offers several models of the Sunmaster with integrated DC-switch. See chapter 3.2 to check if your Sunmaster is equipped with such a DC-switch.

If your Sunmaster is not equipped with a DC-switch, an external DC-Switch can be applied. Single and double

output types are available rated 600 Volts and 25A. See chapter 8 for ordering information.

3.8 PV MODULES AND STRINGS

The solar or DC side of the system consists of several photovoltaic (solar) modules, further mentioned as "PV modules". The PV-modules are connected in series to form a so called "string". These strings consist of a plus (+) and a minus (-) connection which can be connected directly to the Sunmaster.

The string voltage should be equal to the open circuit voltage (Voc) per PV module (refer to the specifications of the PV-module), multiplied by the number of PV-modules in each string. Depending on the solar irradiation and temperature, this value should be equal to 70-95% of the calculated string voltage.

The Sunmaster is equipped with a single MPP tracker and two parallel string connections, see figure 3-1.

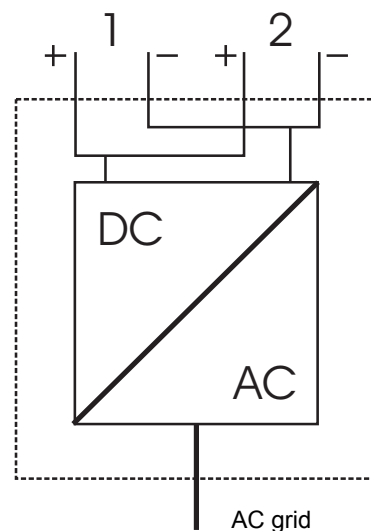


Figure 3-1

3.8.1 Connection of two strings (standard)

Two strings can be connected to the Sunmaster directly. See section 3.6 for the maximum power connected to each Solar-input. The total input power must be distributed equally over both Solar-inputs as much as possible. See figure 3-2.

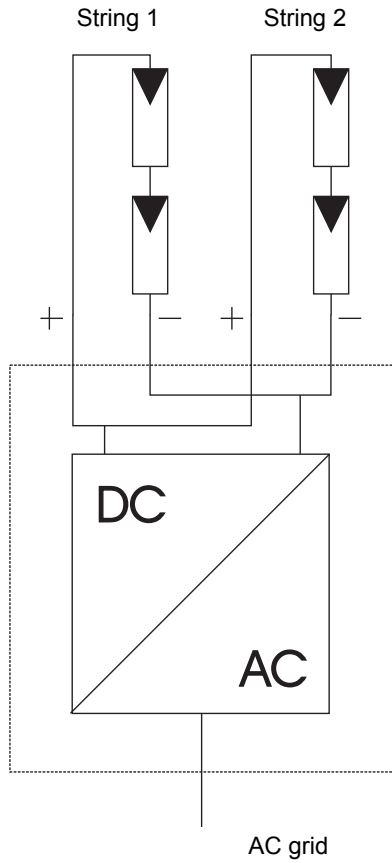


Figure 3-2



Figure 3-3: Y-adapter

3.8.2 Connection of more than two strings (option)

In case more than two strings should be connected to the Sunmaster, Multicontact Y-adapters may be used to combine the strings (see figure 3-3 and ordering information chapter 8). The strings connected to the same Solar-input should exist of an equal number of identical PV-modules. See figure 3-4.

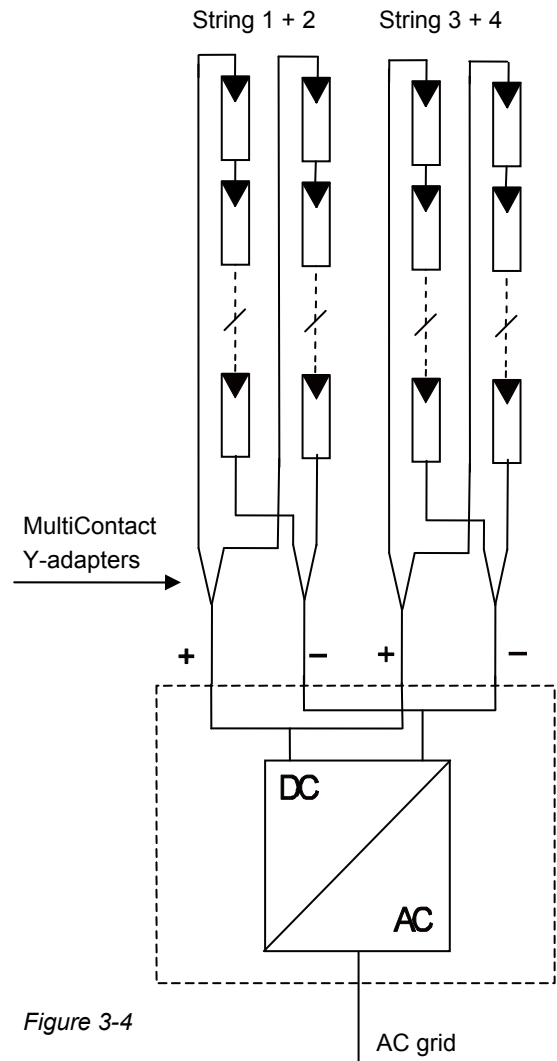


Figure 3-4

3.9 GENERAL SAFETY AND INSTALLATION PRECAUTIONS

**WARNING**

Be sure that all wiring is disconnected from any power source during the entire installation.

**CAUTION!**

- Short circuiting or reversing polarity may lead to damage to the Sunmaster, the cabling and/or the terminal connections.
- Follow all steps of the installation instructions in order of succession as described.
- The DC switch, if installed, must stay in the OFF-position during the entire installation.

3.10 THINGS YOU NEED FOR INSTALLATION

Make sure you have all the parts you need to install the Sunmaster:

- The Sunmaster + mounting bracket (included).
- Four screws (with plugs) to mount the Sunmaster. Maximum diameter: 5 mm. Use mounting materials which are suitable to carry the weight of the Sunmaster
- Hexagonal socket wrench # 4 to open the connection compartment of the Sunmaster.
- Flat blade screw driver.
- Masterbus communication cables.
- RS485 communication cables.

4 INSTALLATION

4.1 INSTALLATION STEP BY STEP



CAUTION!

Read chapters 2 and 3 prior to installation.

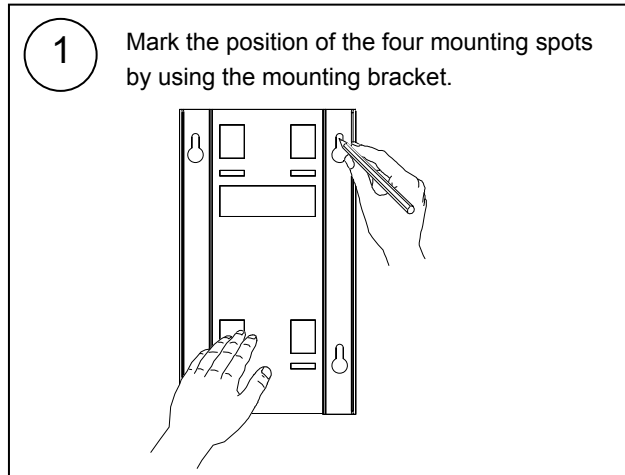


Figure 4-1

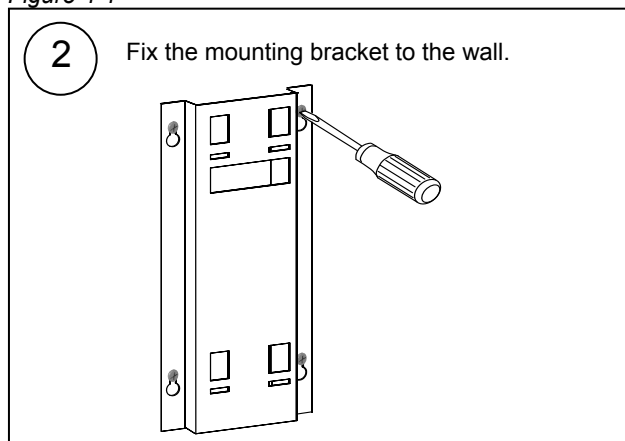


Figure 4-2

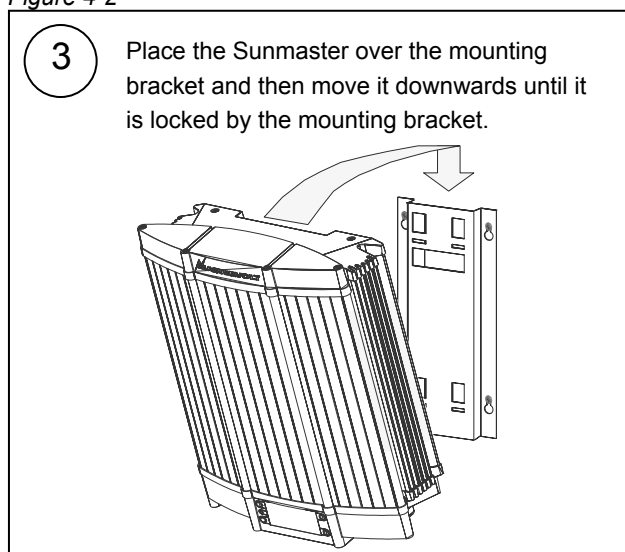


Figure 4-3

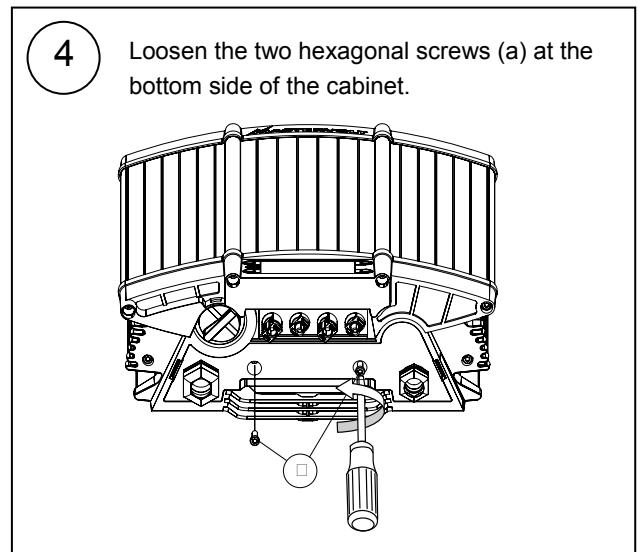


Figure 4-4

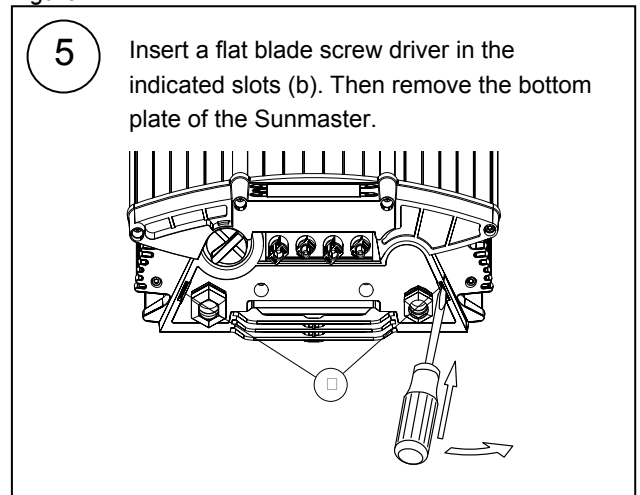


Figure 4-5

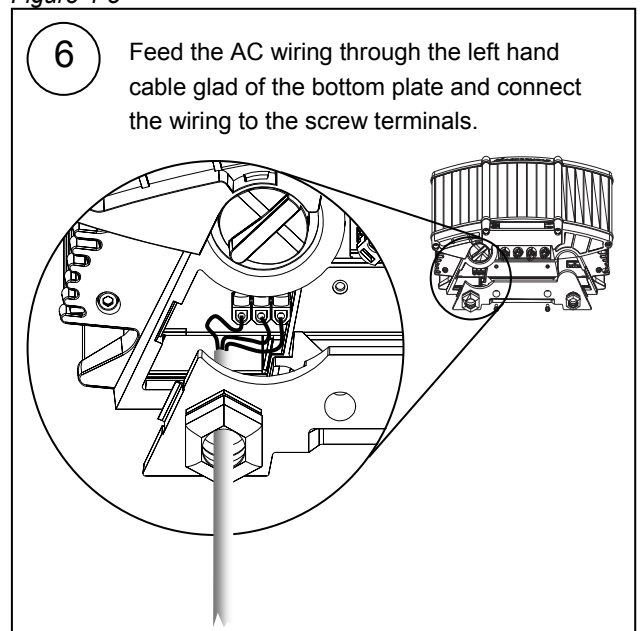


Figure 4-6

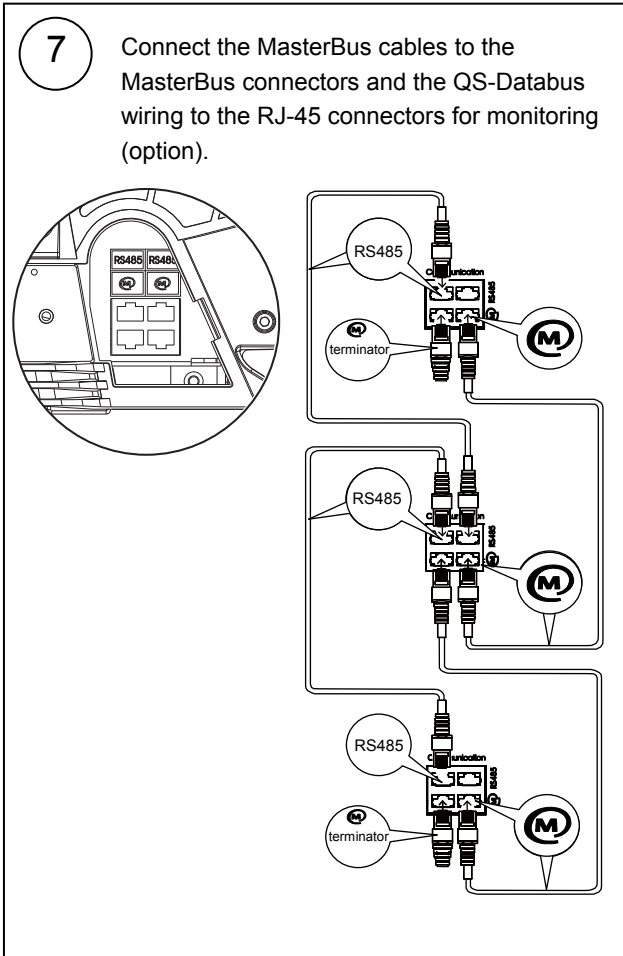


Figure 4-7

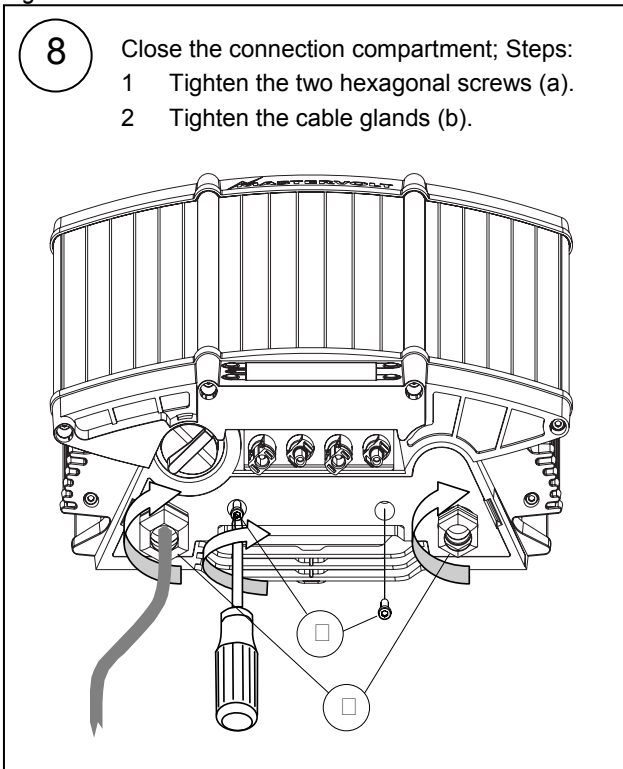


Figure 4-8

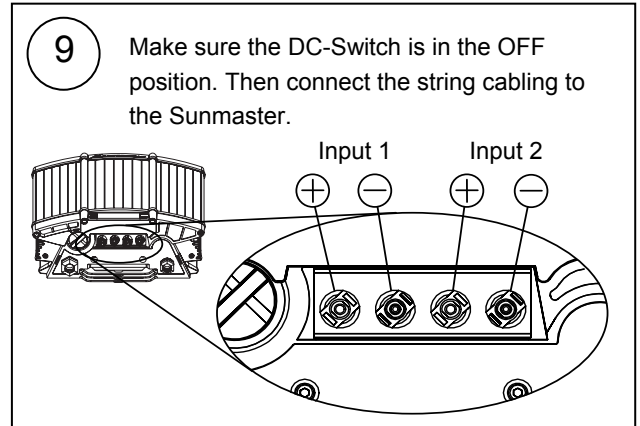


Figure 4-9

4.2 USE IN ITALY

In Italy ENEL may require sealing parts of the AC wiring.

All Sunmasters are equipped with a wire seal facility. Figure 2 shows where this is located. A detailed view is shown in figure 4-10.

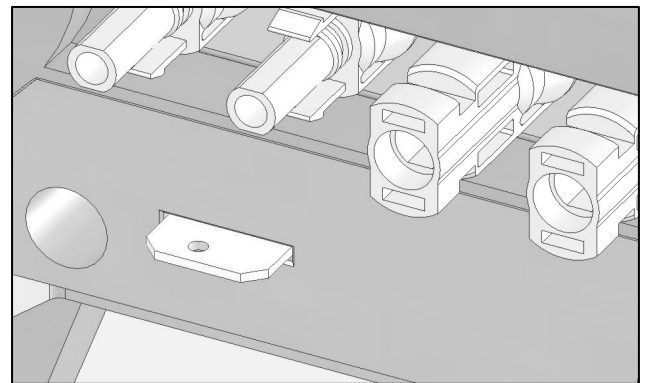


Figure 4-10: Detailed view of wire seal facility

4.3 COMMISSIONING AFTER INSTALLATION

To check the correct operation of the Sunmaster, commissioning should be carried out during daytime only

4.3.1 Switching on

Follow the steps described below to switch on the Sunmaster:

- 1 Check whether the DC-switch of the solar array is still in the OFF position (or "O"-position).
- 2 Switch on the AC grid.
- 3 Move the DC-switch of the solar array to the ON position (or "I"-position).

If connection has been made correctly and solar irradiation is sufficient, the Sunmaster will switch on automatically. This may take a few seconds.

- 4 At first commissioning the country code must be selected. See section 4.3.2.

4.3.2 Country code selection

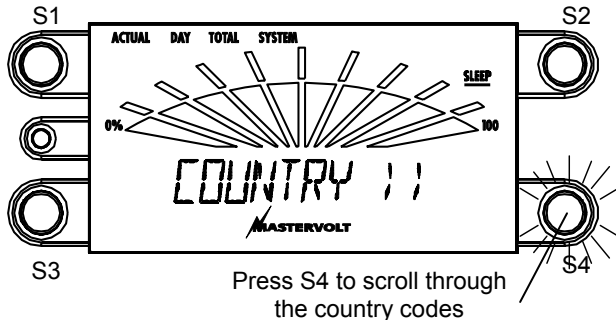
Follow the steps below to configure the Sunmaster in accordance with the local regulations for grid connection (example: Italy).



CAUTION!

NEVER connect the Sunmaster to a utility grid other than selected.

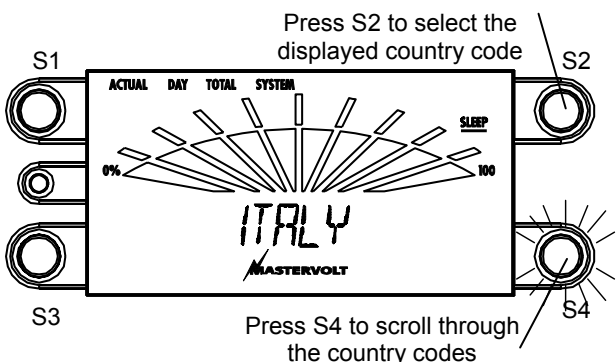
- 1 After commissioning the following message is displayed.



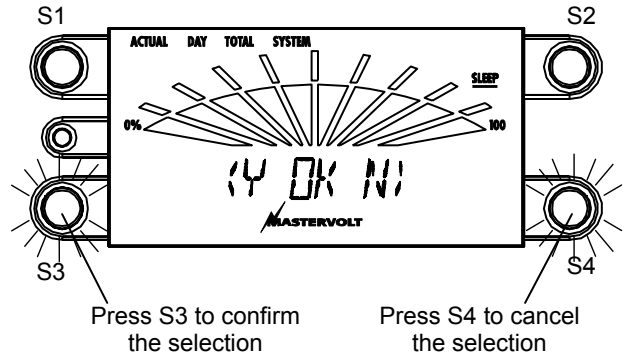
- 2 Select the applicable country code from the table.

Country code	Norm	Use Allowed in
GERMANY 1P, limited to 4.600 W	ENS	Germany, Austria, Belgium
GERMANY 3P	ENS	Germany, Austria, Belgium
SPAIN	QNS	Spain
ITALY	ENS	Italy
UK	QNS	United Kingdom
FRANCE	ENS	France
AUSTRALIA	QNS	Australia
GREECE	QNS	Greece
HOLLAND	QNS	Netherlands, rest of Europe
USA 240V	QNS	USA (Split Phase 240V)
USA 208V	QNS	USA (ThreePhase 208V)
KOREA	QNS	South Korea
TAIWAN	QNS	Taiwan

- 3 Press S4 to scroll through the country codes.
- 4 If the correct country code is shown, press S2 to select



- 5 Confirm your selection by pressing S3 (or cancel by pressing S4).



If a wrong country code was entered, you can start the procedure over again by pressing S2 and S4 simultaneously during 3 seconds.

- 6 Now the Sunmaster switches on. See chapter 0 for operation instructions.



If you selected GERMANY 3P, the three inverters switch on/ off together and only when the three are MasterBus connected. See section 4.1, reference (7) for MasterBus connection of three inverters. In 3 phase configuration, the 3-PH block function is important, see section 5.3.5 and 5.3.8.

4.4 DE-COMMISSIONING

If it is necessary to de-commission the Sunmaster, follow the instructions in order of succession as described below:



CAUTION!

Follow below mentioned instructions in order of succession as described.

- 1 Cut off the grid voltage by switching off AC distribution switch in the meter cupboard.
- 2 If such is applied, move the DC switch to the OFF-position.
- 3 Disconnect the MultiContact connectors from the Sunmaster.
- 4 Remove the bottom plate of the Sunmaster and disconnect the AC wiring.

Now the Sunmaster can be demounted in a safe way.

5 OPERATION

5.1 GENERAL

After installation and commissioning the Sunmaster will switch on automatically if solar irradiation is sufficient. The Sunmaster operates automatically: there is no need for user action. If the irradiation of the PV-modules is insufficient, for instance at night, the Sunmaster switches off automatically. When switched off, the display does not show any information.

The Sunmaster has no ON/OFF switch; In the event of decommissioning, refer to section 4.4.



CAUTION!

Never disconnect the MultiContact plugs during operation of the Sunmaster. Not complying with this instruction may cause a spark or an electric arc. Should an arc develop, both plug and socket of the Sunmaster must be replaced.

5.2 FORCED COOLING

For an optimum internal temperature control the Sunmaster is provided with a cooling fan. The cooling fan starts running slowly at inverter start up. As internal temperature rises, the cooling fan will increase its speed. This is a normal effect which has a positive contribution to the efficiency and lifetime of the Sunmaster.

5.3 LCD-DISPLAY

The Sunmaster is standard provided with an integrated LCD-display at the front side of the cabinet (figure 23).

This display makes it possible to monitor the performance of your PV-system. It shows the following information:

- Daily energy revenues over the past 30 days
- Actual Solar power, voltage and current.
- Actual AC power, voltage, current and frequency.
- Actual inverter temperature, total energy revenue, total working hours.
- Inverter status and diagnostics.

The LCD screen is operated by means of four keys: S1, S2, S3 and S4. See figure 5-1.

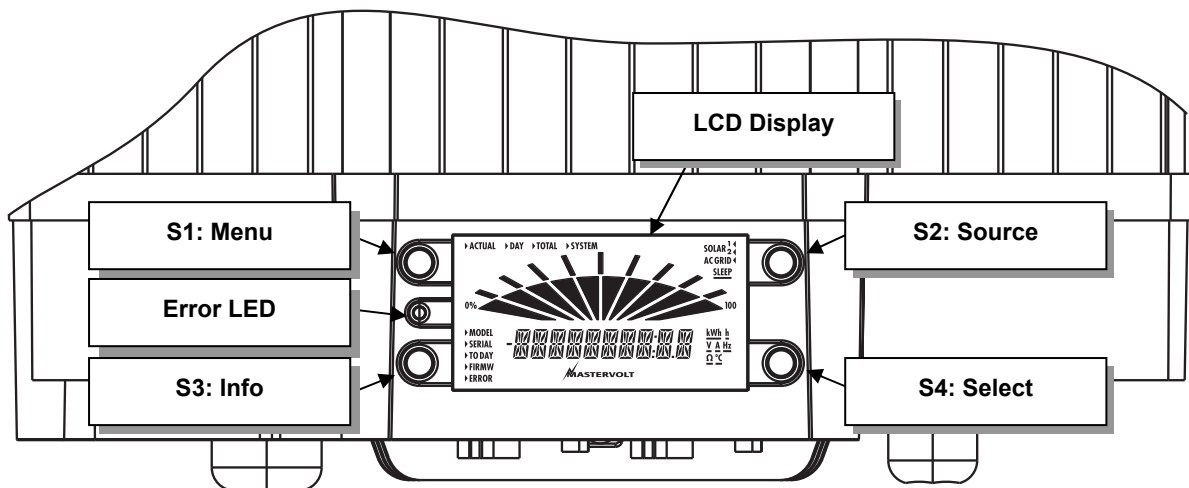


Figure 5-1: Operation of the LCD-display

See figure 5-2. This screen is shown after start-up. Also if no key was touched for 60 seconds, the display returns to this screen. It shows:

- Actual solar power by means of a 0-100% bar
- Energy generated today.

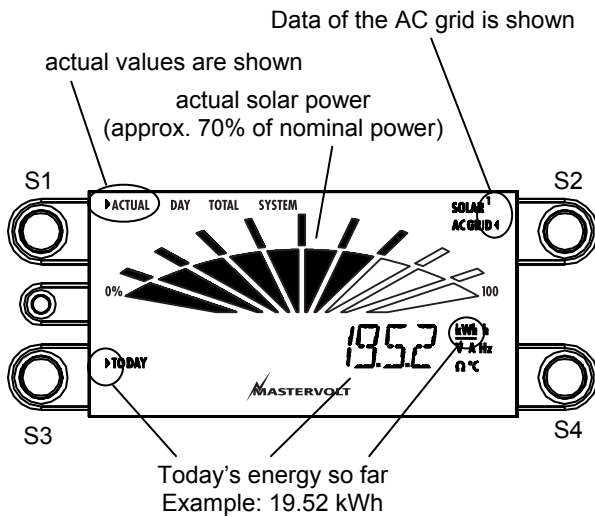


Figure 5-2: initial screen (displayed values may differ)

By pressing **S1: Menu** you can toggle between:

► ACTUAL	Read out of measurements at this moment; see chapter 5.3.1
► DAY	Showing the historical data of today and 1...30 days ago; see chapter 5.3.2
► TOTAL	This shows the total energy revenue at the Solar input and the AC-output; see chapter 5.3.3.
► SYSTEM	Used to display system information about the Sunmaster; see chapter 5.3.4.

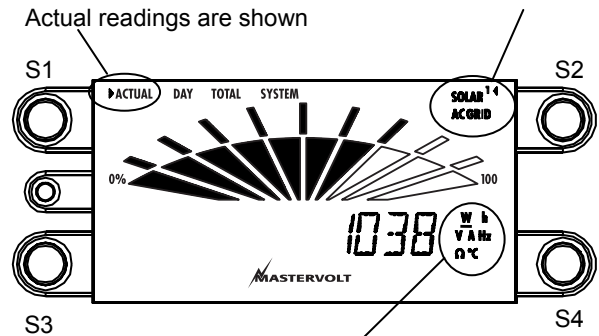
5.3.1 Actual readings

When [►ACTUAL] is highlighted at the LCD-display, actual readings of the Sunmaster are shown (figure 5-3).

By pressing **S2: Source** you can toggle between:

SOLAR 1 ◀	Data measured at DC-input "SOLAR1"
AC GRID ◀	Data measured at the AC-output of the Sunmaster

Press **S2: Source** to toggle between
SOLAR 1
AC GRID



Press **S4: Select** to toggle between
[W], [V], [A], [Hz], [Ω], [°C] and [kWh]

Figure 5-3: Actual readings

Press **S4: Select** to navigate through the actual data. The table below explains the meaning of the displayed data:

	Selected source = AC GRID	Selected source = SOLAR1
W	Power supplied to the AC grid	Solar power supplied to the Sunmaster by the PV-strings
V	AC grid voltage	DC Voltage from the PV-string
A	AC current supplied to the AC grid	DC current from the PV-string
Hz	AC grid frequency	n/a
Ω	AC grid impedance*	n/a
°C	Internal temperature of the inverter	Internal temperature of the inverter
kWh	Energy generated today	n/a

* ENS-models only (see chapter 3.2), else 0.00 is shown.

5.3.2 Historical data

When [▶DAY] is highlighted at the left upper corner of the LCD-display, the daily performance of your Sunmaster during the last 30 days is shown. See figure 5-4.

Press **S4: Select** to switch between [kWh] and [h]:

kWh	Here the total energy yield of the selected day is shown.
h	This value indicates the operating hours of the selected day

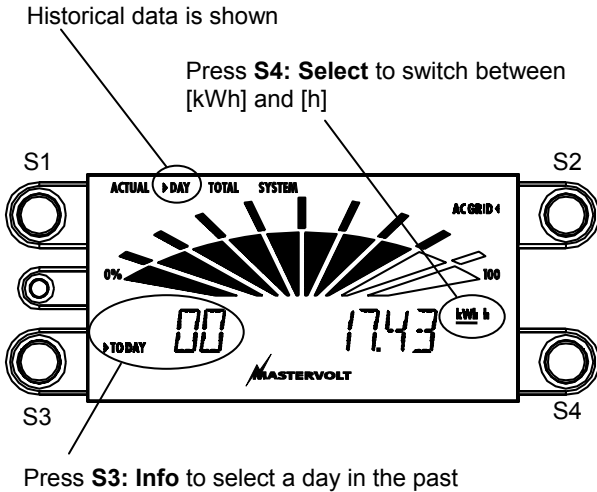


Figure 5-4: Historical data

Operation of **S3: Info**:

Press shortly	One day back in the past.
Press and hold	Scrolling days forward.

Examples:

- ▶TODAY 00 Shows today's data
- ▶ DAY -01 Shows yesterday's data
- ▶ DAY -07 Shows data from one week ago

5.3.3 Total energy revenues

When [▶TOTAL] is highlighted at the upper side of the LCD-display, the total performance since commissioning of the Sunmaster is displayed. See figure 5-5.

By pressing **S2: Source** you can toggle between:

SOLAR 1 ◀	Total performance of DC-input "SOLAR1" is displayed
AC GRID ◀	Total performance at the AC-output of the Sunmaster is displayed

Press **S2: Source** to toggle between
SOLAR 1
AC GRID

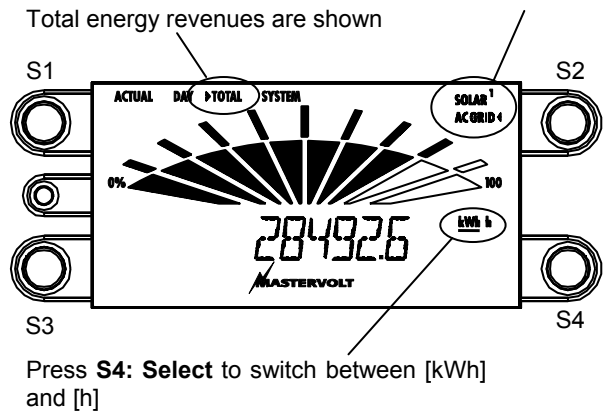


Figure 5-5: Total energy revenue

Press **S4: Select** to switch between [kWh] and [h]:

kWh	Here the total energy yield of the selected source is displayed.
h	This value represents the total operating hours of the selected input.

5.3.4 System information

When [►SYSTEM] is highlighted at the upper side of the LCD-display, several system information of the Sunmaster can be displayed. See figure 5-6.

If you *press and hold for 3 seconds S2: Source* you can toggle the Sleep mode on / off:

SLEEP Sleep mode is on: the back light of the display will go off when no key was touched for 60 seconds.

SLEEP Sleep mode is off: the back light of the display will stay illuminated.

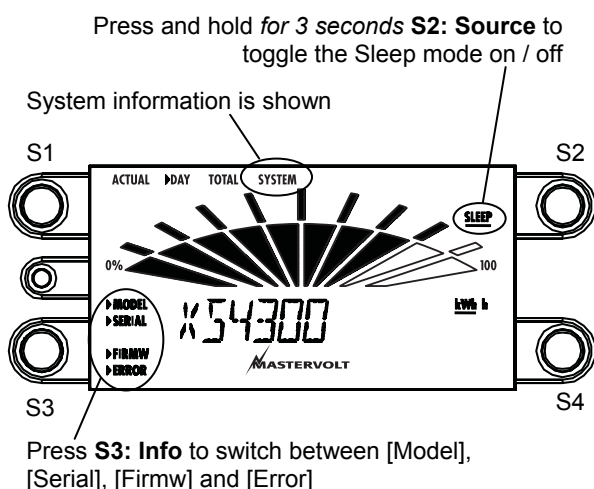


Figure 5-6: System information

Press **S3: Info** to switch between [Model], [Serial], [Firmw] and [Error]:


► MODEL	Shows the model of the Sunmaster i.e. "XS4300", "XS3200" or "XS2000".
► SERIAL	Serial number is displayed. Example: RN07A003.
► FIRMW	Display switches between the firmware of the inverter ("XS") and the display ("DS").
► ERROR	In case of a system failure, the cause of the failure is displayed. See section 5.3.6.


5.3.5 Settings

On the display, three settings can be done:
Backlight On/Off,
Isolation detection On/Off
3 PH block On/ Off (see section 5.3.8).

For settings, press S1 and S2 for 5 seconds. S3 and S4 enable scrolling through the settings, S2 confirms the setting you selected.

5.3.6 Failures

 As long as the ERROR LED isn't illuminated, no failure is detected: the Sunmaster is operating normally!

 If the irradiation of the PV-modules is insufficient, for instance at night, the Sunmaster switches off automatically and the display does not show any information. This is a normal situation!

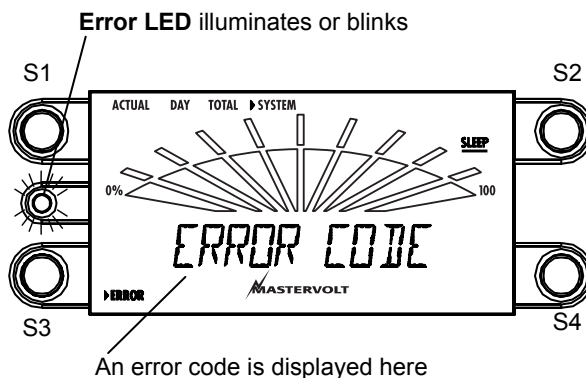


Figure 5-7: representation of a failure

The operation of the Sunmaster is controlled and checked by a microprocessor. If an error occurs, it is detected by the apparatus itself: the red ERROR LED illuminates or blinks. The cause of error is displayed by means of an error code. See figure 5-7. Refer to chapter 6 for explanation of the error codes.

5.3.7 Power limitation

In some cases a power limitation function must be activated on the inverter. The XS inverter power limitation function can be activated via a datalogger like the DataControl Pro and Premium II. These dataloggers are connected by means of the RS485 network. If the grid operator activates the power limitation function, the inverters will limit their power to the power percentage set. The display shows "PM" and the percentage to which the power is limited. For instance PM 80 means, the power is 80% of its maximum now. If no power limitation command has been received for over 10 minutes, the inverters return to normal operation.

5.3.8 3-Phase block

This function is a security measure, demanded by some grid operators. If three inverters are connected in a 3-phase configuration, they must either all provide energy to the grid or none. If inverter 1 fails to provide energy to the grid, inverters 2 and 3 halt as well.

Figure 5-8 shows the display sequence when the first phase fails and starts up again.

5.4 MAINTENANCE

No specific maintenance to the Sunmaster is required. Examine your electrical installation on a regular base, at least once a year. Defects such as loose connections, burnt wiring etc. must be corrected immediately. If necessary, use a soft clean cloth to clean cabinet of the Sunmaster. Never use any liquids, acids and/or scourers.

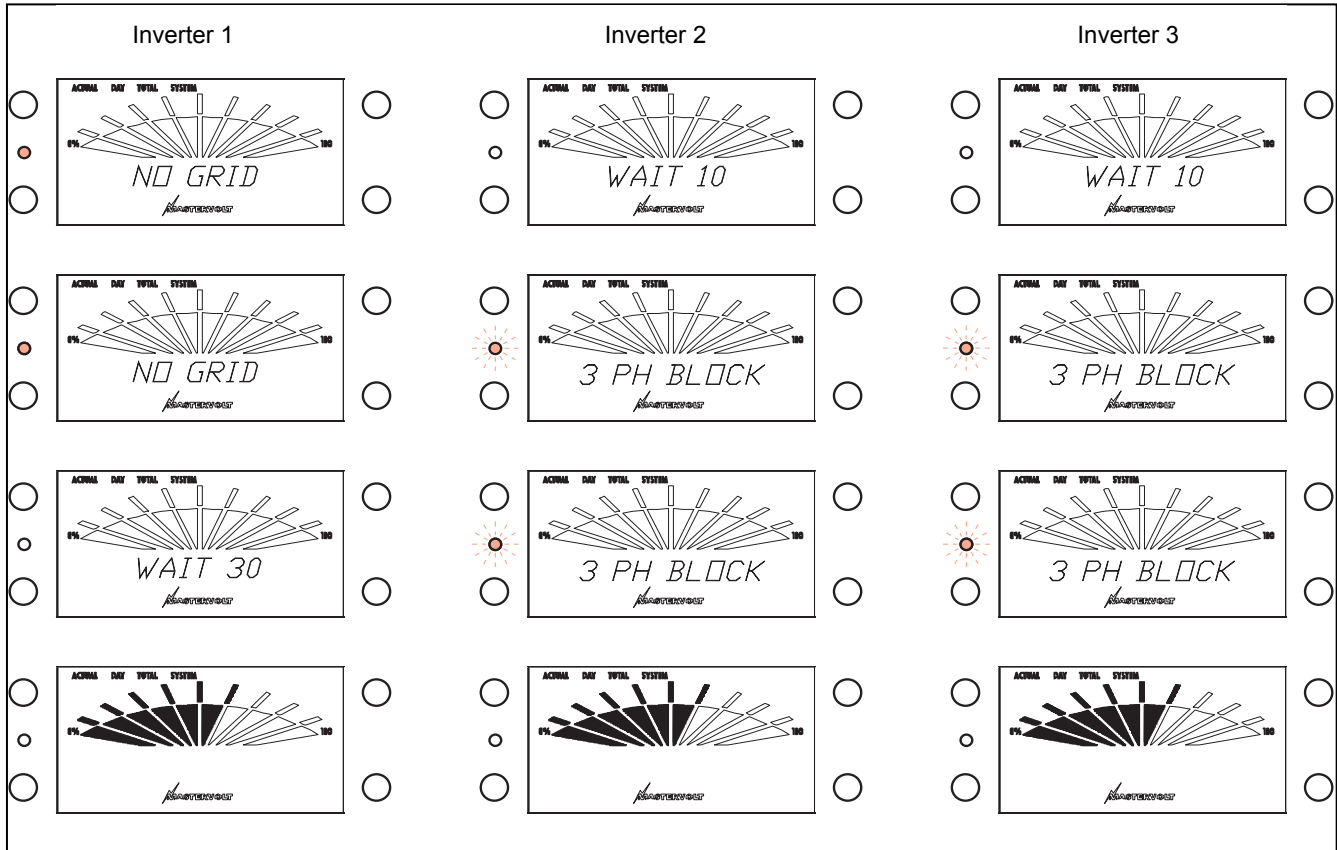


Figure 5-8: 3 Phase Block function

6 TROUBLE SHOOTING

Consult an installer, if you cannot solve the problem by means of the table below.

Error LED	Error Code	Meaning	What to do?
Off	NONE	No error	Nothing; the inverter is working normally
Off		Insufficient irradiation	Nothing. Irradiation of the PV modules is insufficient (for instance during night time)
Off		No power from the PV modules	Consult an installer if the display does not show any information during daytime. The wiring between the PV modules and the Sunmaster might be defective.
Off	WAIT 0:00	Start-up	Nothing. After the Sunmaster was (re)connected to the AC grid, it checks the quality of the AC grid before it starts operating normally. This may take up to 5 minutes.
Off	SOL1 LOW	Voltage of the Solar input is low	Nothing; normal condition during sunrise and sunset. Consult an installer if the problem remains while irradiation of the PV modules is sufficient.
Off	COUNTRY (or any name of a country)	(Text is blinking) Country code has not been selected yet	Select the correct country code. See section 4.3.2.
On	TEMP HI	Internal temperature of the inverter is high	Maybe the air flow of the Sunmaster is obstructed. See chapter 3.3 for installation guidelines. If the problem remains, consult an installer
On	SOL1 HIGH	Voltage of the Solar input is high.	Contact your supplier.
On	NO GRID	No connection to the AC-grid	Check the connection to the AC-grid. Check the fuse in the meter cupboard.
On	ENS OFF	ENS fault	Error created by a grid safety device. The grid quality is outside normal limits. Check the grid connection (for instance too thin or too long AC wiring). Consult an installer
On	G83 OFF	G83 fault	
On	VAC LOW	AC voltage low	Voltage of the AC grid is too low. Consult an installer.
On	VAC HIGH	AC voltage high	Voltage of the AC grid is too high. Consult an installer.
On	FAC LOW	AC frequency low	Frequency of the AC grid is too low. Consult an installer.
On	FAC HIGH	AC frequency high	Frequency of the AC grid is too high. Consult an installer.
On	INSULATION	Insulation failure	Leak current between PV modules and grounding. Consult an installer.
Fast blinking	NTC FAIL	Defective device in the Sunmaster	Write down the exact error text. Consult an installer for replacement of the Sunmaster.
Fast blinking	EF I2C FAIL		
Fast blinking	ENS FAIL		
Fast blinking	CB I2C FAIL		
Fast blinking	HW VAC FAC		
Fast blinking	HW RELAY		
Fast blinking	HW ERROR 1-9		

7 SPECIFICATIONS

7.1 TECHNICAL SPECIFICATIONS

GENERAL SPECIFICATIONS			
Article number	See chapter 3.2		
Typical string length	5-9 modules (72 cells), 7-12 modules (54 cells) or 10-18 modules (36 cells)		
Operating temperature	-20°C to 60°C (fully protected against over temperature)		
Storage temperature	-20°C to 70°C		
Relative humidity	max. 95%; PCB has anti-moisture coating		
Protection degree	IP44 for unconditioned indoor use		
Safety class	class I		
Galvanic isolation	class II		
MTBF	187.000 hours		
Dimensions	See chapter 7.2.		
Weight	10 kg (22 lbs)		
SOLAR INPUT (DC)			
	Sunmaster XS4300	Sunmaster XS3200	Sunmaster XS2000
Nominal power at 45°C ambient*	3488W DC	2651W DC	1590W DC
Maximum power	3663W DC	2784W DC	1670W DC
Recommended PV power range	2900 – 4350Wp	2200 – 3300Wp	1300 – 2000Wp
# MPP trackers	1 MPP tracker (dynamic)	1 MPP tracker (dynamic)	1 MPP tracker (dynamic)
MPP voltage range at nominal power	230-440V DC	180-480V DC	145-360V DC
MPP efficiency	99,9% (Fraunhofer algorithm)	99,9% (Fraunhofer algorithm)	99,9% (Fraunhofer algorithm)
Operating voltage range	100 – 550V DC	100 – 600V DC	100 – 450V DC
Rated current	15A	15A	11A
Start-up power	7W	7W	5W
String connections	2 parallel	2 parallel	2 parallel
DC connectors	2 sets of Multi Contact (4 mm) connectors	2 sets of Multi Contact (4 mm) connectors	2 sets of Multi Contact (4 mm) connectors
GRID OUTPUT (AC)			
	Sunmaster XS4300	Sunmaster XS3200	Sunmaster XS2000
Nominal power at 45°C ambient*	3300W	2500W	1500W
Maximum power	3465W **	2625W	1575W
Voltage*	230V AC single phase (184-265V country dependent)	230V AC single phase (184-265V country dependent)	230V AC single phase (184-265V country dependent)
Rated current	15A	11A	7A
Fuse	6.3x32 mm. 250V/30A T (ceramic)	6.3x32 mm. 250V/20A T (ceramic)	6.3x32 mm. 250V/20A T (ceramic)
Frequency*	45 – 65Hz, country dependent	45 – 65Hz, country dependent	45 – 65Hz, country dependent
Power factor	> 0.99 at full power	> 0.99 at full power	> 0.99 at full power
Stand-by power	< 0.5W	< 0.5W	< 0.5W
EU efficiency	94.6% @ 370V	94.3% @ 400V	94.4% @ 300V
Maximum efficiency	95.6%	95.4%	95.7%
AC connections	PG-13.5 gland and screw terminals 2.5 - 4 mm ²	PG-13.5 gland and screw terminals 2.5 - 4 mm ²	PG-13.5 gland and screw terminals 2.5 - 4 mm ²

* Depending on country settings, see section 4.3.2

** Belgian version max 3330W

SAFETY DEVICES	
General	Galvanic separation between DC and AC side, by means of a class II transformer
Island protection*	Mastervolt Digital ENS - VDE 0126 -1-1 compliant
Reclosure time*	10-300 sec
Temperature protection	Power derating above 75°C internal temperature, switch off at 90°C
DC side	Earth fault (switch off); over-voltage (switch off); polarity (short circuit); overcurrent (limiting by voltage shift-up); DC transients; (varistor and buffer capacitor); overload (temperature controlled power derating)
AC side	Current limiting; over- and under-voltage (switch off); over- and under-frequency (switch off); short circuit (ceramic fuse); transients/surge (varistors)
MONITORING	
Indicator	Backlit display with indication of power and diagnostic messages
External communication	2 galvanic isolated RS485 databus connections
External communication	2 galvanic isolated MasterBus connections
Monitoring (optional)	Masterlog (PC Software). Free download from www.mastervolt.com
Monitoring (optional)	PC-Link (connect the databus to the PC)
Monitoring (optional)	Data Control Premium II: datalogger for up to 6 inverters with local, remote or internet monitoring
Monitoring (optional)	Data Control Professional: PV system control over the Internet, for up to 20 inverters
REGULATIONS & DIRECTIVES	
CE Conformity	Yes
EMC Directive	EMC 89/336/EEG
Emission	EN 55022 Class B
Harmonics	EN 61000-3-2,
Dips, variations, flicker	EN 61000-4-11 and -3-3
Immunity	EN 55024
	EN 61000-4-2 and -3
	EN 61000-4-4, -4-5 and -4-6
LV directive	2006/95/EC
Electrical safety	EN 60950-1
National grid interface req.*	VDE 0126-1-1 / DK5940 / RD1663-2000 / K SC 8536 / G83-1 compliant

* Depending on country settings, see section 4.3.2

7.2 OUTLINE DRAWINGS

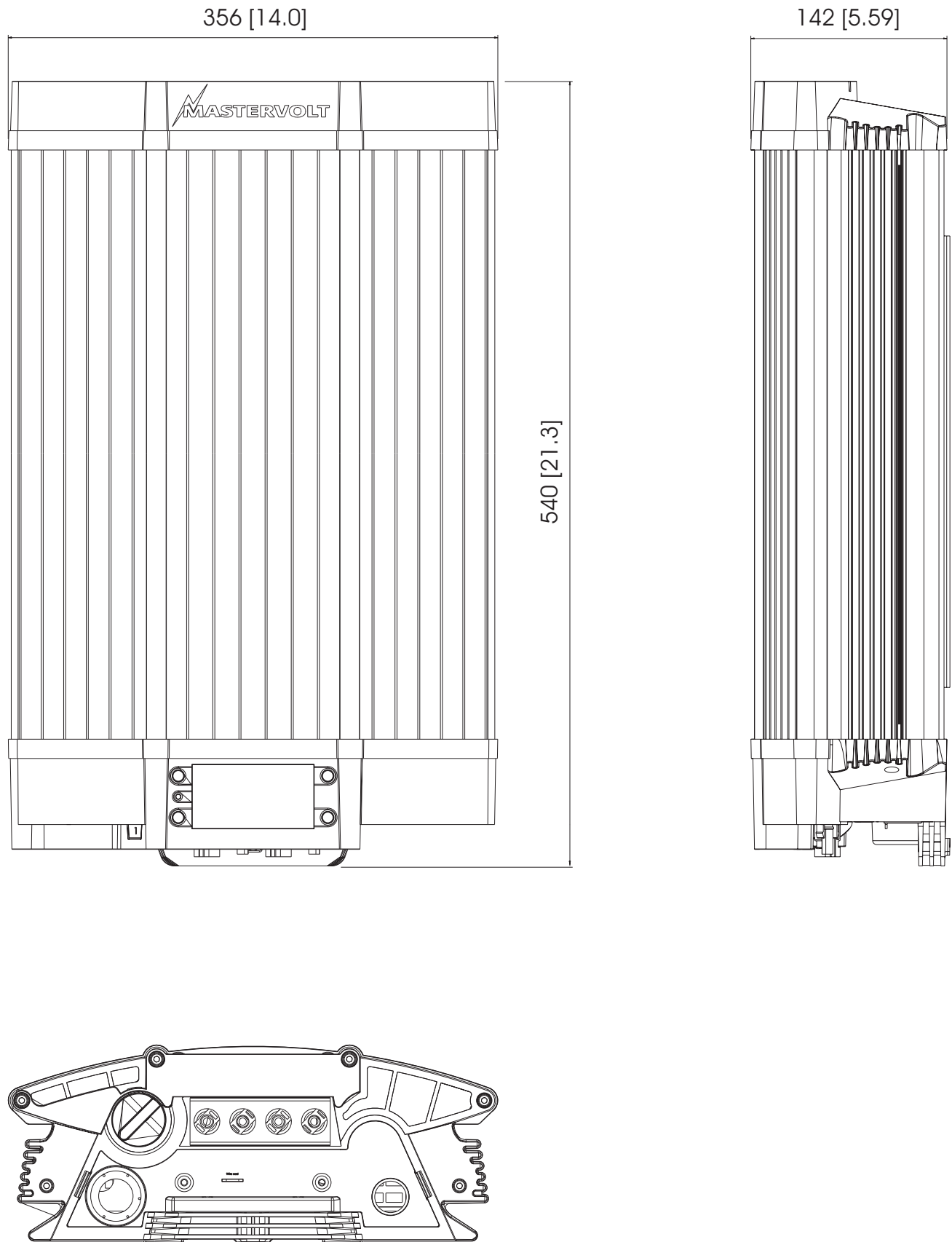


Figure 7-1 Dimensions in mm (inch) of the Sunmaster XS4300, XS3200, XS2000

8 ORDERING INFORMATION

Part number	Description
130362900	Set of two Multicontact Y-adapters PV-AZS4 (positive) and PV-AZB4 (negative)
130360700	Adapter cable (from MC1 to MC2 positive)
130360800	Adapter cable (from MC1 to MC2 negative)
130394000	Masterlog– Free software package to monitor your photovoltaic (PV) system using your PC or notebook. Use of PC Link is compulsory.
130391010	PC Link, RS485/232 converter
130391020	PC Link Industrial, RS485/RS232 converter for the connection of more than 10 Sunmasters or for cable lengths of more than 100 meters.
130391040	PC Link Industrial, RS485/USB converter for the connection of more than 10 Sunmasters or for cable lengths of more than 100 meters.
130397000	Data Control 'Premium' II local – Datalogger to monitor up to 6 Sunmaster inverters locally
130397100	Data Control 'Premium' II remote – Datalogger to monitor up to 6 Sunmaster inverters over the Internet
130397200	Data Control 'Pro' Analogue – Datalogger to monitor up to 20 Sunmaster inverters locally or over the Internet
130397210	Data Control 'Pro' ISDN – Datalogger to monitor up to 20 Sunmaster inverters locally or over the Internet
130397220	Data Control 'Pro' GSM – Datalogger to monitor up to 20 Sunmaster inverters locally or over the Internet
130397230	Data Control 'Pro' Ethernet – Datalogger to monitor up to 20 Sunmaster inverters locally or over the Internet
130010905	Modular communication cable, cross wired, 8 pole, 1 meter / 3 ft
130010906	Modular communication cable, cross wired, 8 pole, 5 meter / 16 ft
130010910	Modular communication cable, cross wired, 8 pole, 10 meter / 33 ft
130010915	Modular communication cable, cross wired, 8 pole, 15 meter / 49 ft
120107000	Complete set to assemble modular communication cables. Delivery includes: 100 meter modular cable, 100 pcs. modular jacks and crimping tool

Mastervolt can offer a wide range of products for both grid connected and independent autonomous electrical installations, See our website www.mastervolt.com for an extensive overview of all our products.

9 ITALY SELF TEST

GENERAL

The Italy Self Test is meant to check the upper and lower limits of the AC voltage and AC frequency at which the inverter will disconnect from the grid.

To enter the Italy self test, select the "System/ Model" menu in the display. See figure 9-1.

If the model is ITALY, press the lower two buttons for 3 seconds. The screen should stay in the "Model" mode. You will enter the Italy test menu.


The text ITALY TEST will be blinking, press the lower right button to confirm.

First the Uac High Off limit is shown.

During the self test, four tests are done in this sequence:

- UH (high off limit AC voltage);
- UL (low off limit AC voltage);
- FH (high off limit AC frequency);
- FL (low off limit AC frequency).

After each test the user has to confirm the test result before the inverter starts the reclosure count down and reconnects to the grid.

 The standard reclosure time of 300 sec has been reduced to 10 sec to shorten the testing time. This is not an error.

After the last test and after reconnecting to the grid the inverter will continue in normal operation.

The test accuracy is better than 1V/ 0.1Hz if grid voltage and frequency are stable.

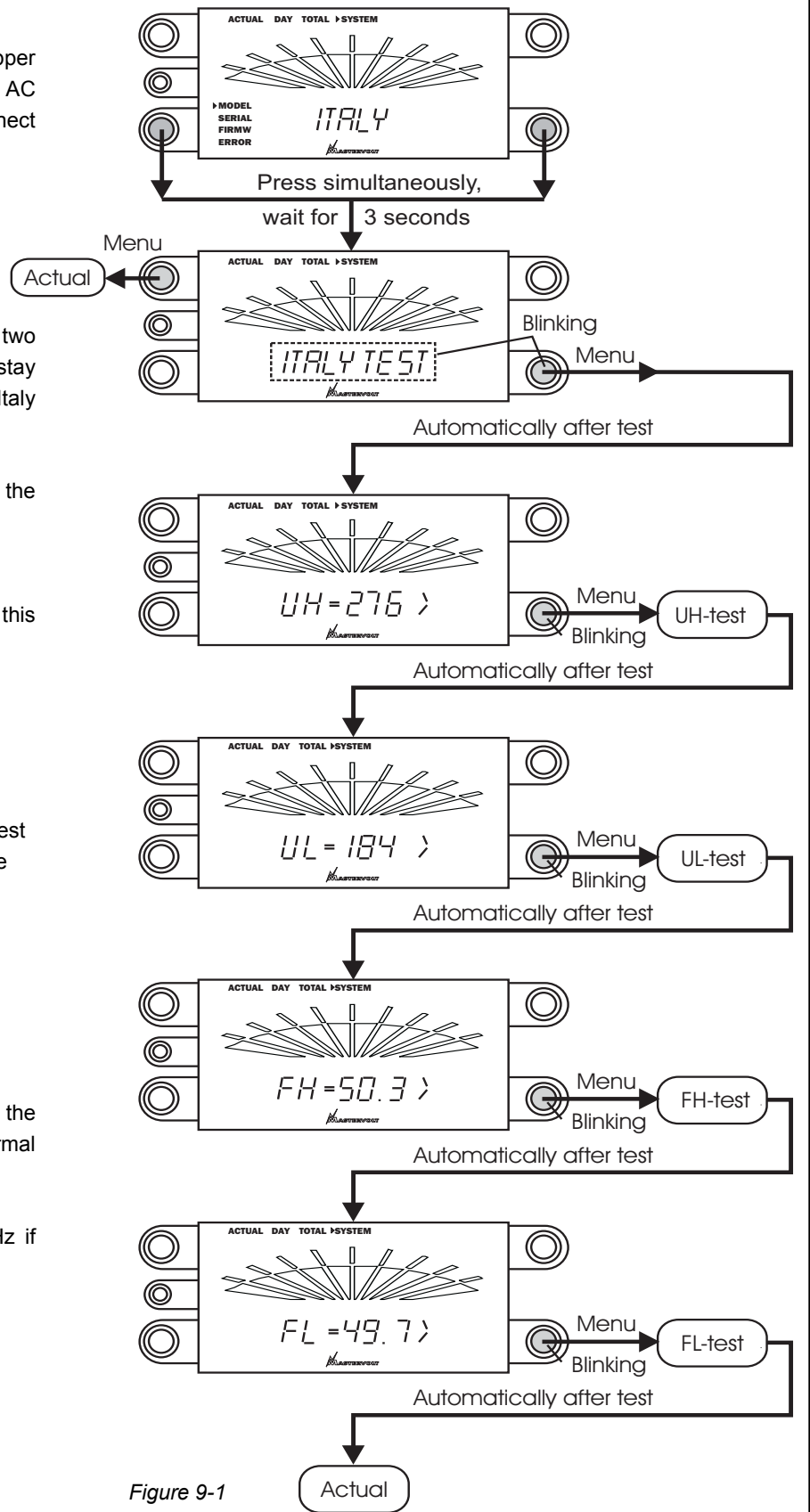


Figure 9-1

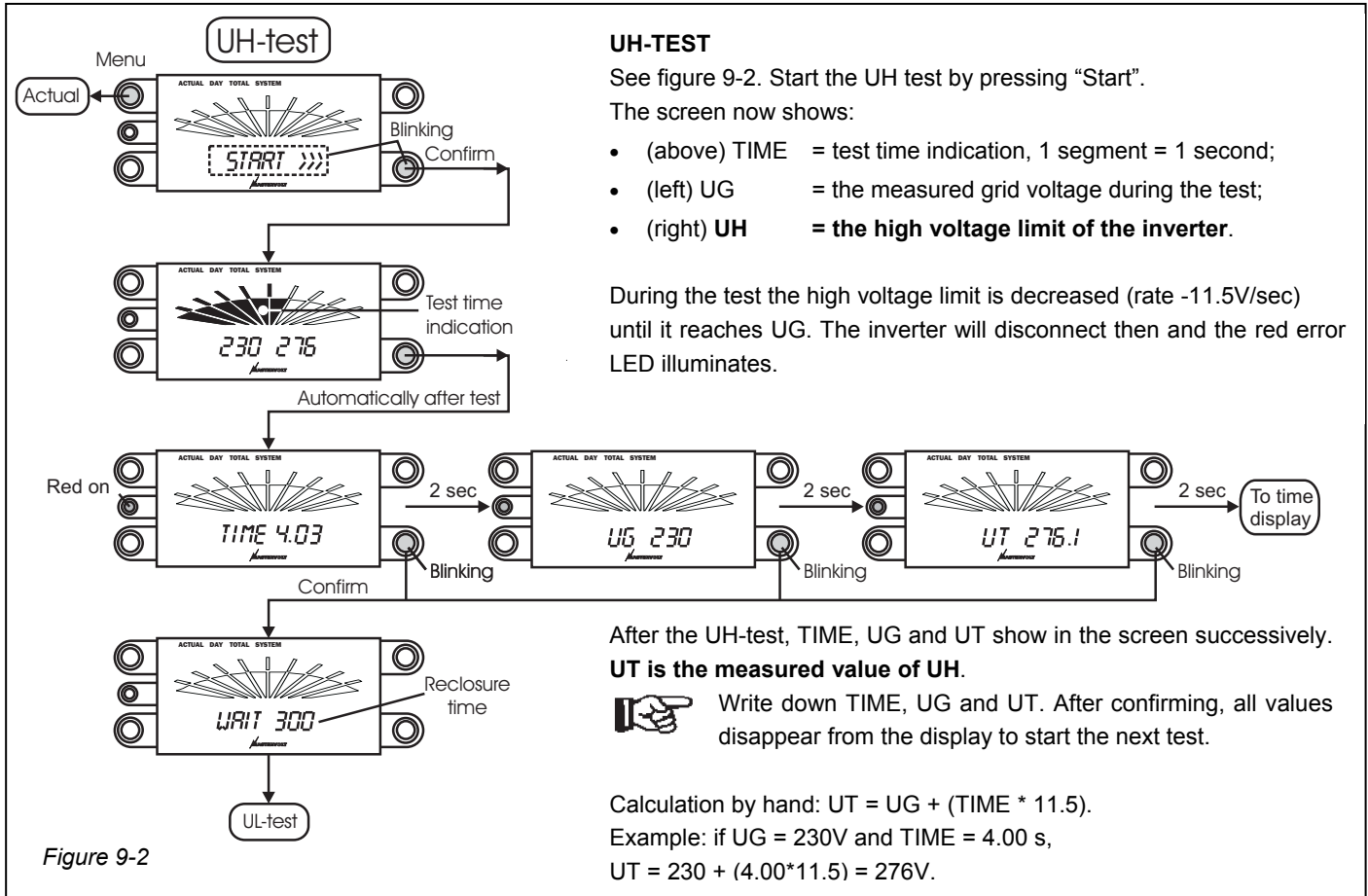


Figure 9-2

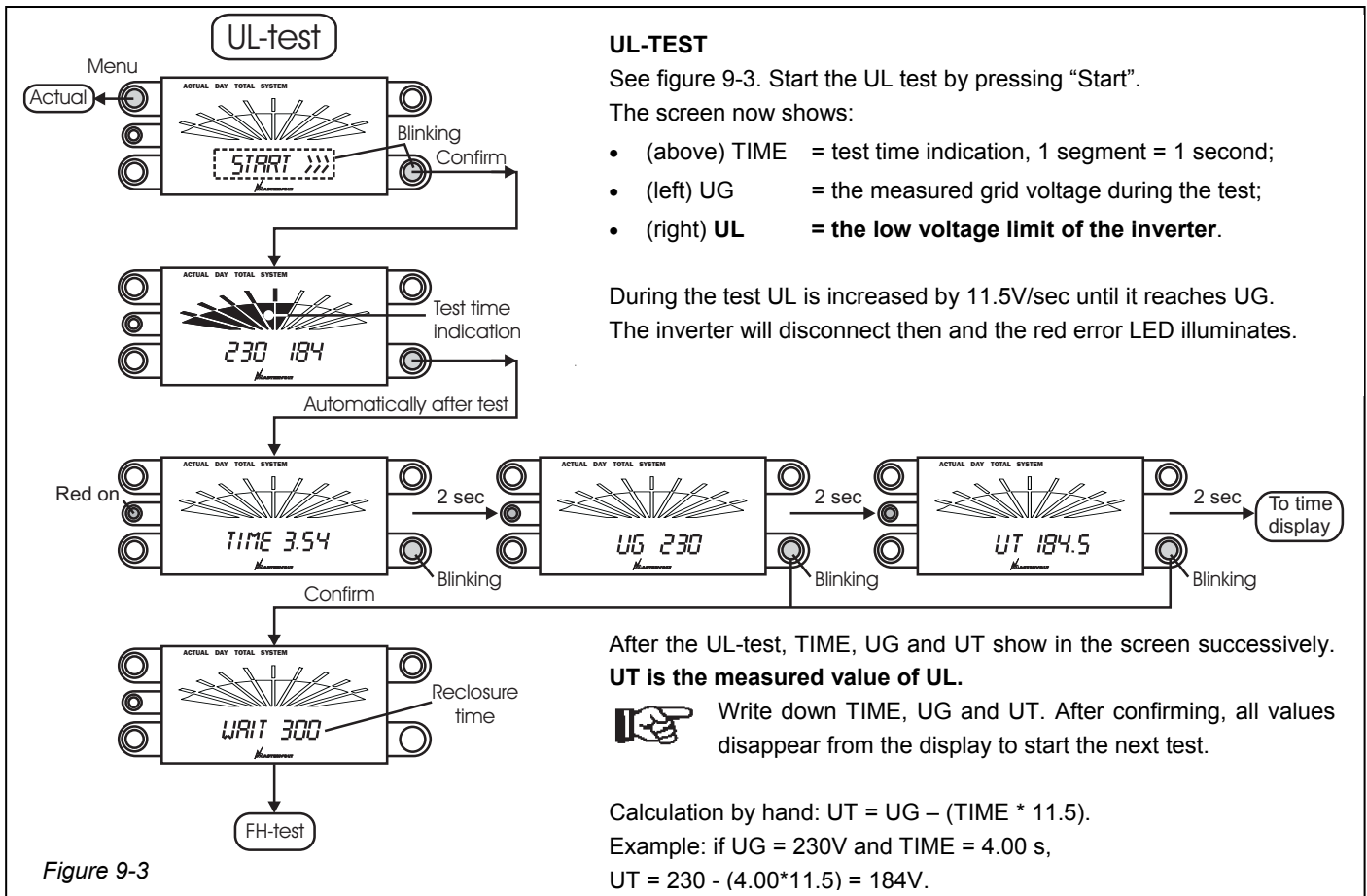
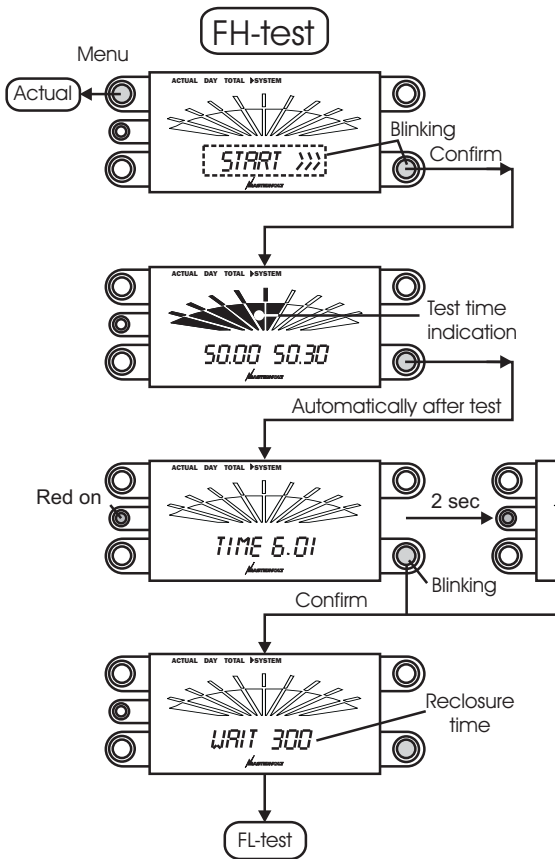


Figure 9-3



FH-TEST

See figure 9-4. Start the FH test by pressing "Start".
The screen now shows:

- (above) TIME = test time indication, 1 segment = 1 second;
- (left) FG = the measured grid frequency during the test;
- (right) FH = the high frequency limit of the inverter.

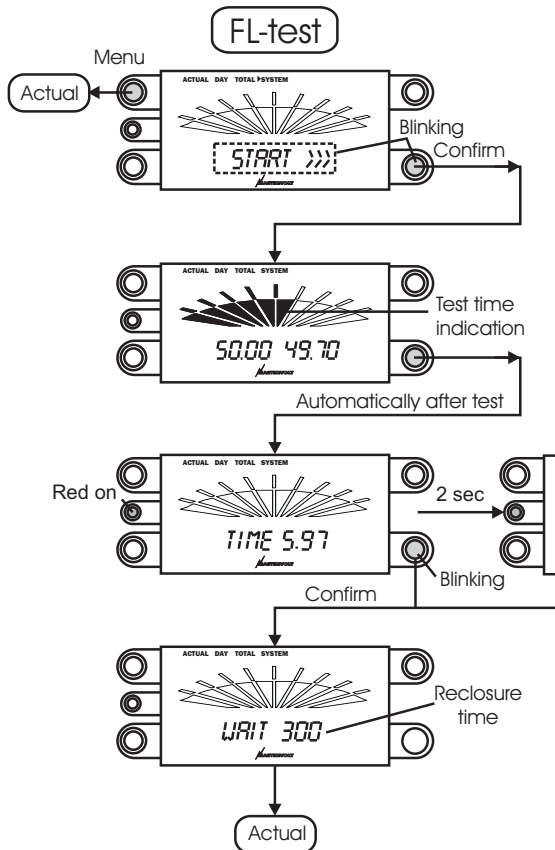
During the test FH is decreased by a rate of -0.05 Hz/sec until it reaches FG. The inverter will disconnect then and the red error LED illuminates.

After the FH-test, TIME, FG and FT show in the screen successively.
FT is the measured value of FH.

Write down TIME, FG and FT. After confirming, all values disappear from the display to start the next test.

Calculation by hand: $FT = FG + (TIME * 0.05)$
Example: if FG = 50.00 Hz and TIME = 6.00 s,
the result is $50.00 + (6.00 * 0.05) = 50.30$ Hz.

Figure 9-4



FL-TEST

See figure 9-5. Start the FL test by pressing "Start".
The screen now shows:

- (above) TIME = test time indication, 1 segment = 1 second;
- (left) FG = the measured grid frequency during the test;
- (right) FL = the low frequency limit of the inverter.

During the test FL is increased by 0.05 Hz/sec until it reaches FG. The inverter will disconnect then and the red error LED illuminates.

After the FL-test, TIME, FG and FT show in the screen successively.
FT is the measured value of FL.

Write down TIME, FG and FT. After confirming, all values disappear from the display to start the next test.

Calculation by hand: $FT = FG - (TIME * 0.05)$
Example: if FG = 50.00 Hz and TIME = 6.00 s,
the result is $50.00 - (6.00 * 0.05) = 49.70$ Hz.

Figure 9-5

10 CERTIFICATES

10.1 CERTIFICATE OF VDE-0126 CONFORMITY



**BUREAU
VERITAS**

**Bureau Veritas Consumer
Products Services
Germany GmbH**
Businesspark A96
86842 Tuerkheim
Germany
+49 (0) 8245 98810-0
cps-tuerkheim@de.bureauveritas.com

Certificate of compliance

Applicant: **Mastervolt International B.V.**
Snijdersbergweg 93
1105 AN Amsterdam
The Netherlands

Product: **Automatic disconnection device between a generator
and the public low-voltage grid**

Model: **XS4300, XS3200, XS2000, XL3301**

Use in accordance with regulations:
Automatic disconnection device with single-phase mains surveillance in accordance with DIN V VDE V 0126-1-1:2006-02 for photovoltaic systems with a single-phase parallel coupling via an inverter in the public mains supply. The automatic disconnection device is an integral part of the aforementioned inverter. This serves as a replacement for the disconnection device with insulating function which the distribution network provider can access at any time.

Applied rules and standards:
DIN V VDE V 0126-1-1 (VDE V 0126-1-1):2006-02 and „Generator at the public low-voltage grid, 4th edition 2001, guideline for connection and parallel operation of generators in the public low-voltage grid“ with VDN additions (2005) from the German Electricity Association (VDEW) and Association of network operator (VDN).

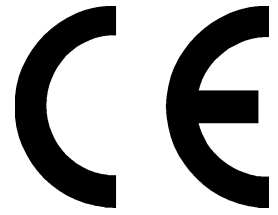
The safety concept of an aforementioned representative product corresponds at the time of issue of this certificate to the valid safety specifications for the specified use in accordance with regulations.

Report number: 08TH0004-VDE0126
Certificate number: U11-202
Date of issue: 2011-03-15 **Valid until:** 2014-03-15


 Achim Hänchen

10.2 EC DECLARATION OF CONFORMITY

Manufacturer Mastervolt
Address Snijdersbergweg 93
1105 AN Amsterdam
The Netherlands



Herewith declares that:

Product: Sunmaster XS4300, Sunmaster XS3200, Sunmaster XS2000

is CE-marked and complies with the following standards:

EMC Directive	EMC 89/336/EEG
Emission	EN 55022 Class B
Harmonics	EN 61000-3-2,
Dips, variations, flicker	EN 61000-4-11 and -3-3
Immunity	EN 55024
	EN 61000-4-2 and -3
	EN 61000-4-4, -4-5 and -4-6
LV directive	2006/95/EC
Electrical safety	EN 60950-1

Amsterdam, 18-10-2011

MASTERVOLT INTERNATIONAL B.V.

A handwritten signature in black ink, appearing to be 'D.R. Bassie', with a long horizontal line extending to the right.

Ing. D.R. Bassie
Product Manager Solar

10.3 AS4777 CERTIFICATE OF COMPLIANCE



Bureau Veritas Consumer
Product Services GmbH
Businesspark A96
86842 Türkheim
Germany
+ 49 (0) 8245 96810-0
cps-tuerkheim@de.bureauveritas.com

Certificate of compliance

Applicant: Mastervolt International B.V.
Snijdersbergweg 93
1105 AN Amsterdam
Netherlands

Product: Automatic disconnection device between a generator
and the public low-voltage grid

Model: XS 6500, XS 4300, XS 3200, XS 2000

Use in accordance with regulations:

Automatic disconnection device with single-phase mains surveillance in accordance with AS 4777.2:2005 and AS 4777.3:2005 for photovoltaic systems with a single-phase parallel coupling via an inverter in the public mains supply. The automatic disconnection device is an integral part of the aforementioned inverter.

Applied rules and standards :

AS 4777.2:2005 Grid connection of energy systems via inverters, Part 2: Inverter requirements
AS 4777.3:2005 Grid connection of energy systems via inverters, Part 3: Grid protection requirements
AS/NZS 3100:2002 Approval and test specification - General requirements for electrical equipment

The safety concept of an aforementioned representative product corresponds at the time of issue of this certificate of valid safety specifications for the specified use in accordance with regulations.

Report number: 09TH0202-AS4777
09TH0202-AS3100

Certificate nummer: U09-241

Date of issue: 2009-10-22 **Valid until:** 2012-10-22



Andreas Aufmuth



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Email : info@mastervolt.com