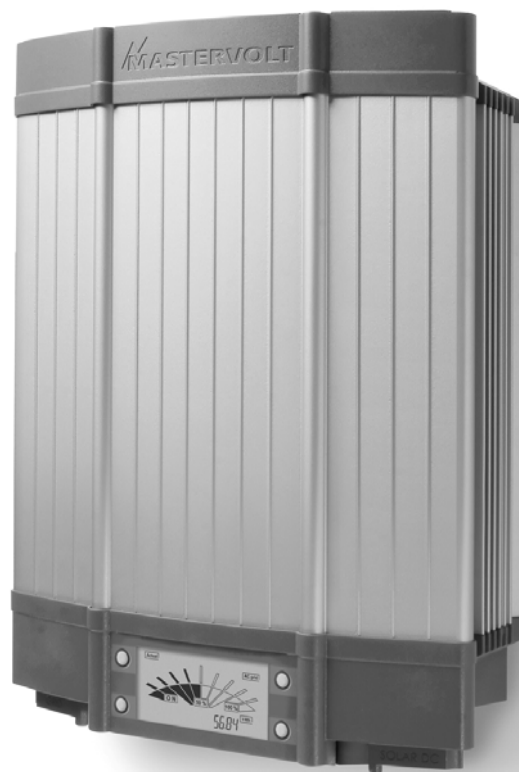




USER'S AND INSTALLATION MANUAL / GEBRUIKERS- EN INSTALLATIEHANDLEIDING
BEDIENUNGS- UND INSTALLATIONSANLEITUNG / MANUEL UTILISATEURS ET D'INSTALLATION
MANUAL DEL USUARIO Y DE INSTALACIÓN / MANUALE DI USO E MANUTENZIONE

Sunmaster QS2000 IP44

Grid connected solar inverter



MASTERVOLT
Snijdersbergweg 93,
1105 AN Amsterdam
The Netherlands
Tel.: +31-20-3422100
Fax.: +31-20-6971006
www.mastervolt.com

ENGLISH:	PAGE 1
NEDERLANDS:	PAGINA 25
DEUTSCH:	SEITE 49
FRANÇAIS:	PAGINA 73
CASTELLANO:	PÁGINA 97
ITALIANO:	PÁGINA 121

v 1.0 August 2007

OVERVIEW

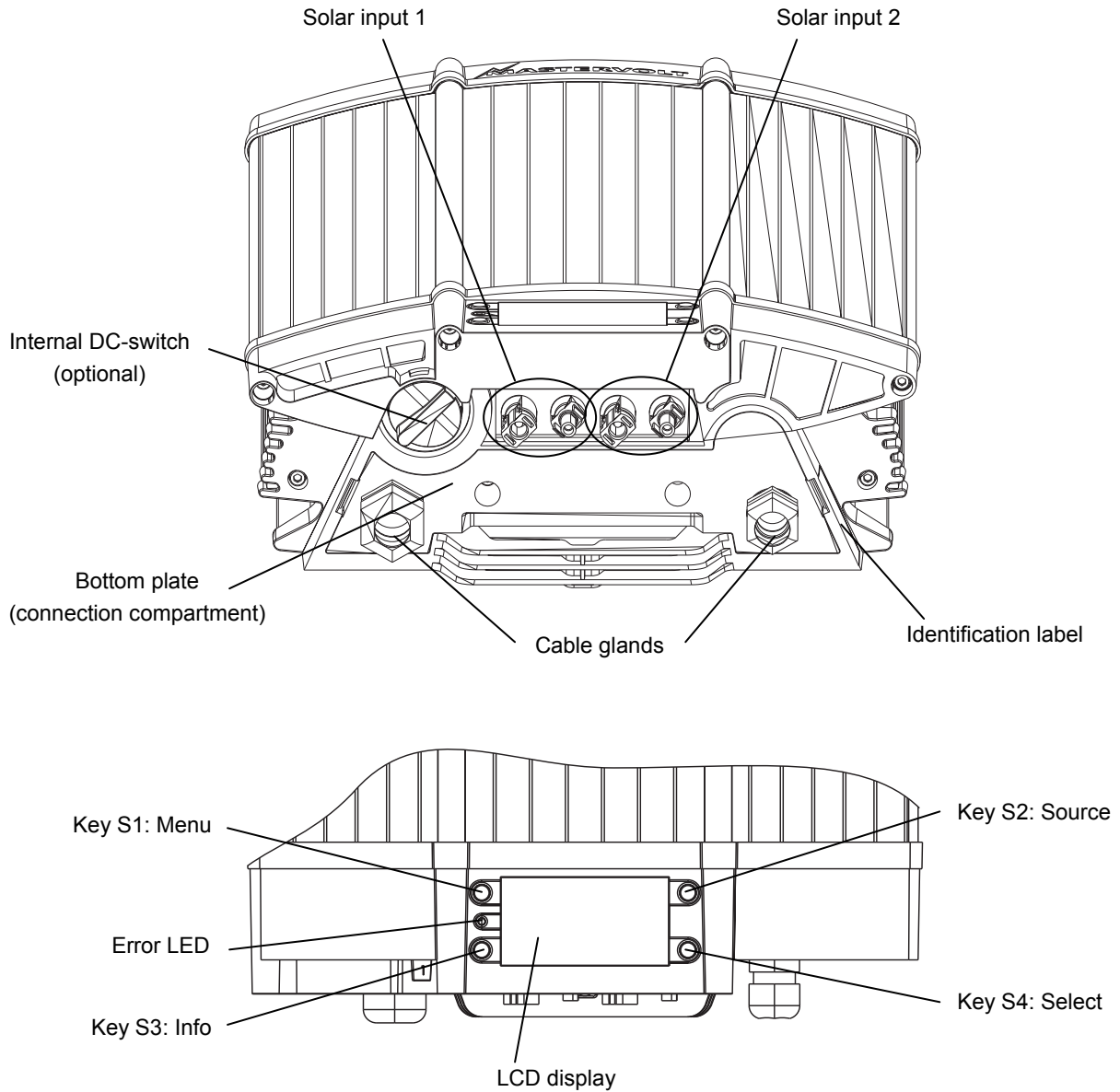


Figure 1: overview of the Mastervolt Sunmaster QS2000 IP44

CONTENTS:

v 1.0. August 2007

1	GENERAL INFORMATION.....	4
1.1	Product description.....	4
1.2	Use of this manual.....	4
1.3	Validity of this manual	4
1.4	Guarantee specifications.....	4
1.5	Liability	4
1.6	Changes to the Sunmaster.....	4
1.7	Identification label.....	4

2	SAFETY GUIDELINES AND WARNINGS	5
2.1	Warnings and symbols	5
2.2	Use for intended purpose	5
2.3	Organisational measures	5
2.4	Installation, maintenance and repair	5
2.5	Warning of special dangers	5
3	BEFORE YOU START	6
3.1	Unpacking	6
3.2	Apparatus version	6
3.3	Installation environment	7
3.4	AC Wiring	8
3.5	Grounding	8
3.6	Specifications of the Solar system	8
3.7	DC Switch	8
3.8	PV modules and strings	8
3.8.1	Connection of one string only (standard)	9
3.8.2	Connection of two strings (standard)	9
3.8.3	Connection of more than two strings (option)	10
3.9	General safety and installation precautions	10
3.10	Things you need for installation	10
4	INSTALLATION	11
4.1	Installation step by step	11
4.2	Commissioning after installation	12
4.3	De-commissioning	12
5	OPERATION	13
5.1	General	13
5.2	Forced Cooling	13
5.3	LCD-display	13
5.3.1	Actual readings	14
5.3.2	Historical data	15
5.3.3	Total energy revenues	15
5.3.4	System information	16
5.3.5	Failures	16
5.4	Maintenance	16
6	TROUBLE SHOOTING	17
7	SPECIFICATIONS	18
7.1	Technical specifications	18
7.2	Outline drawings	20
8	ORDERING INFORMATION	21
9	CERTIFICATES	22
9.1	EC declaration of conformity	22
9.2	Certificate of VDE-0126 conformity	23

1 GENERAL INFORMATION

1.1 PRODUCT DESCRIPTION

Congratulations for choosing the Mastervolt Sunmaster QS2000 IP44, 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

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 24 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

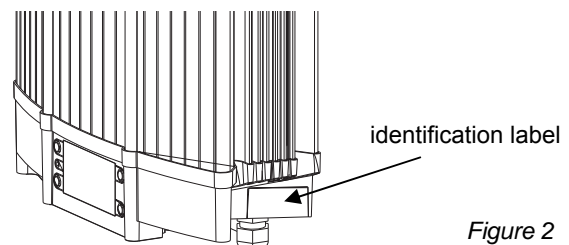


Figure 2

See figure 2 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 4.3.

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 450V 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 is damaged. If in doubt, contact your supplier.

3.2 APPARATUS VERSION

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 anti-islanding devices and grid connection of distributed generation in general. 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) which also measures the grid impedance, is compulsory.

Mastervolt provides both versions of the Sunmaster. These versions are available as several variants, suited to locally regulations.

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)



WARNING

Never use the Sunmaster for a non-intended application!

Part number	Description	DC switch	Allowed to be used in:
130802000	Sunmaster QS2000 IP44 EUR	No	Europe, except the countries mentioned below:
130802030	Sunmaster QS2000 IP44 ENS	No	Germany, Belgium, France, Austria
130802040	Sunmaster QS2000 IP44 KOR	No	South Korea
130802050	Sunmaster QS2000 IP44 ESP	No	Spain
130802060	Sunmaster QS2000 IP44 GBR	No	Great Britain
130802070	Sunmaster QS2000 IP44 ITA	No	Italy
130802080	Sunmaster QS2000 IP44 GRC	No	Greece
130812000	Sunmaster QS2000 IP44 EUR SW	Yes	Europe, except the countries mentioned below:
130812030	Sunmaster QS2000 IP44 ENS SW	Yes	Germany, Belgium, France, Austria
130812040	Sunmaster QS2000 IP44 KOR SW	Yes	South Korea
130812050	Sunmaster QS2000 IP44 ESP SW	Yes	Spain
130812060	Sunmaster QS2000 IP44 GBR SW	Yes	Great Britain
130812070	Sunmaster QS2000 IP44 ITA SW	Yes	Italy
130812080	Sunmaster QS2000 IP44 GRC SW	Yes	Greece

Table 1

3.3 INSTALLATION ENVIRONMENT

The Sunmaster can be mounted in the AC distribution cabinet or in the vicinity of the solar panels. Obey the following stipulations during installation:

- The Sunmaster is designed for both indoor and outdoor use, according to safety class IP44. Among others this means that the Sunmaster should not be exposed to direct weather conditions such as rain or snow. Therefore the Sunmaster should at least be installed under a canopy roof for protection against rain.
- Do not install the Sunmaster in dusty environments
- Ambient temperature: -20 ... 50°C; (power derating above 45°C)
- No objects must be located within a distance of 10 cm around the Sunmaster (figure 3).
- Make sure that the hot air that is developed 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 (refer to section 7.1).
- 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.

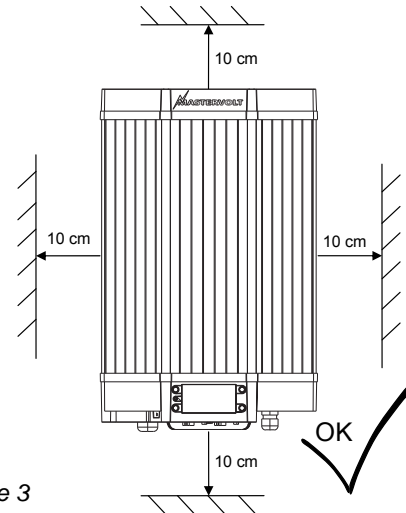


Figure 3

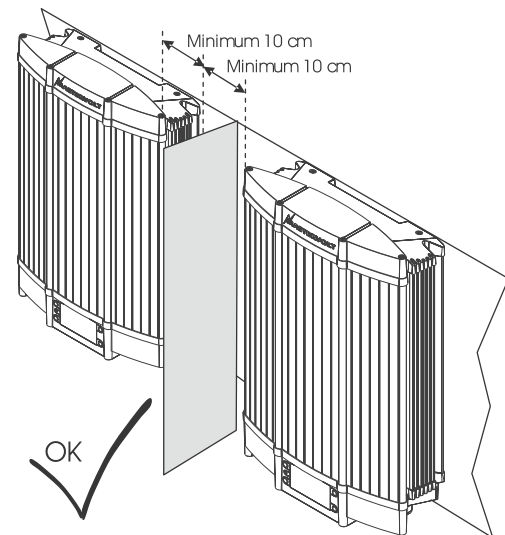


Figure 4

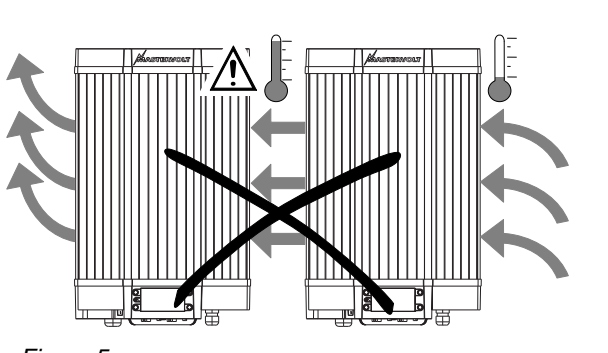
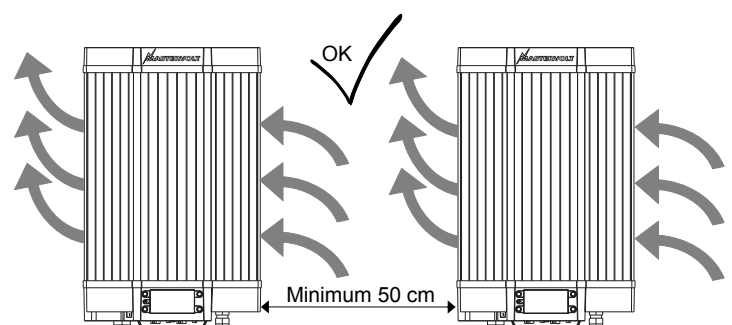


Figure 5



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 2.5 mm². 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 may not exceed 450V.
- Double isolated PV-wiring
- All cables of the string should have double insulation and must be fitted with pre-assembled MultiContact connectors (Ø4mm)
- The maximum power connected to the Sunmaster may not exceed 2100Wp
- If two or more strings are connected to the Sunmaster (see section 3.8.2 and 3.8.3), the string lengths must be equal (maximum voltage deviation: 5%).



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, this value should be equal to 70-95% of the calculated string voltage.

The Sunmaster consists of one inverter that has two string connections which are internally connected in parallel. These two string connections are indicated as "STRING 1" and "STRING 2". Refer to figure 6.

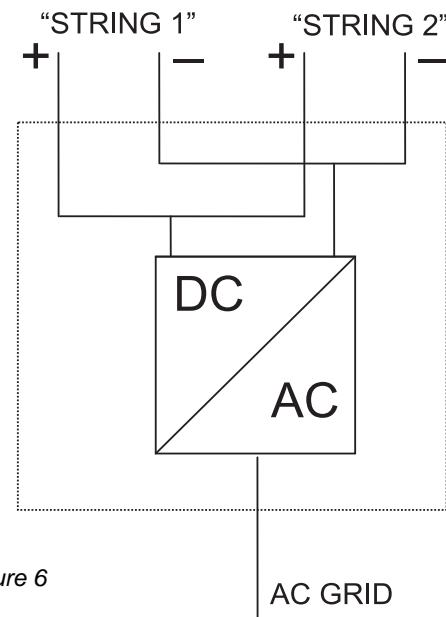


Figure 6

3.8.1 Connection of one string only (standard)

See figure 7. One string can be connected to the Sunmaster directly. Connect the string to either "STRING 1" or "STRING 2". Note that the maximum power connected to the Sunmaster may not exceed 2100Wp.

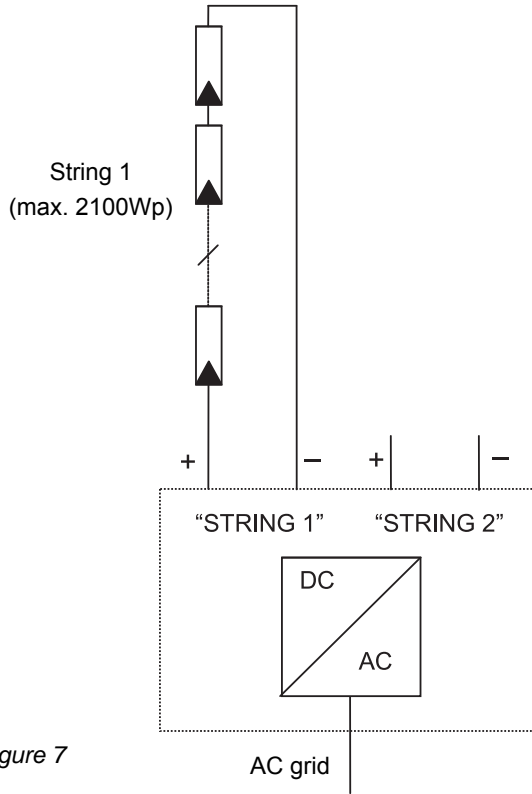


Figure 7

3.8.2 Connection of two strings (standard)

See figure 8. When two strings are used, one should be connected to "STRING 1", the other to "STRING 2". Each string should exist of an equal number of identical PV-modules.

Note that the total input power may not exceed 2100Wp.

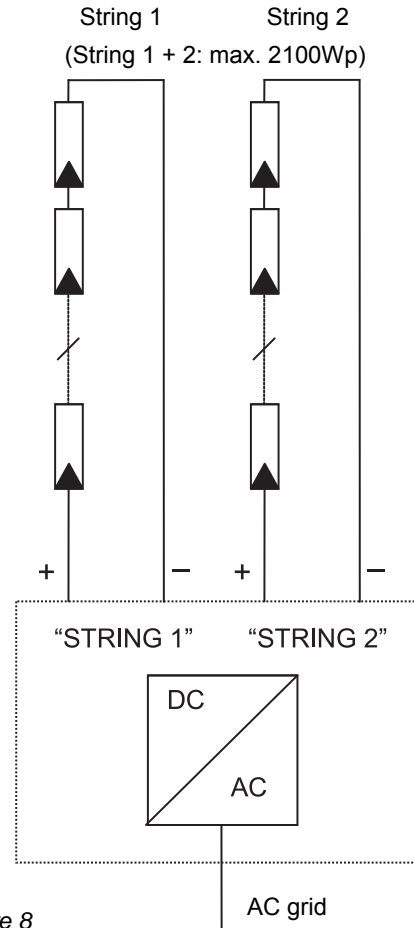


Figure 8

3.8.3 Connection of more than two strings (option)

See figure 9. If more than one string is connected to the same string connection, Multicontact Y-adapters must be used to combine the strings (see ordering information). All strings should exist of an equal number of identical PV-modules. Note that the maximum power connected to the Sunmaster may not exceed 2100Wp.

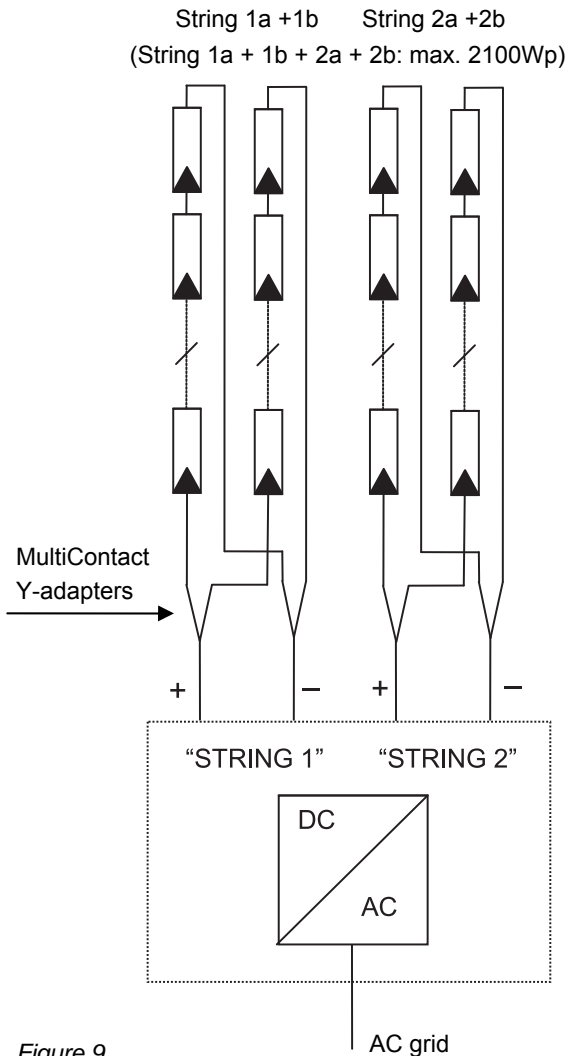


Figure 9

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.
- If such is applied, the DC switch 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
- Phillips screwdriver nr. 2 to open the connection compartment of the Sunmaster
- Flat blade screw driver

4 INSTALLATION

4.1 INSTALLATION STEP BY STEP



CAUTION!

Read chapters 2 and 3 prior to installation

1 Mark the position of the four mounting spots by using the mounting bracket

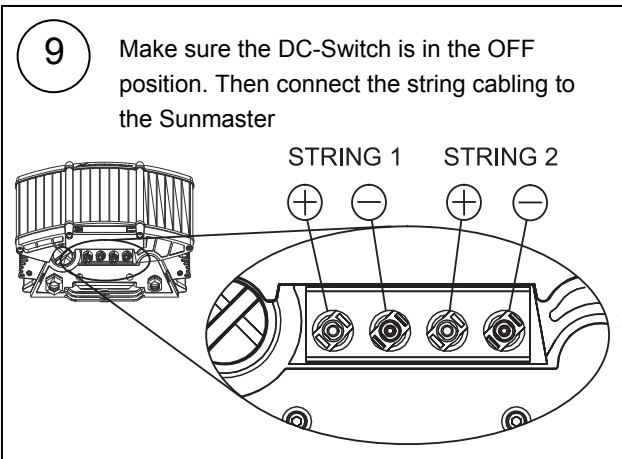
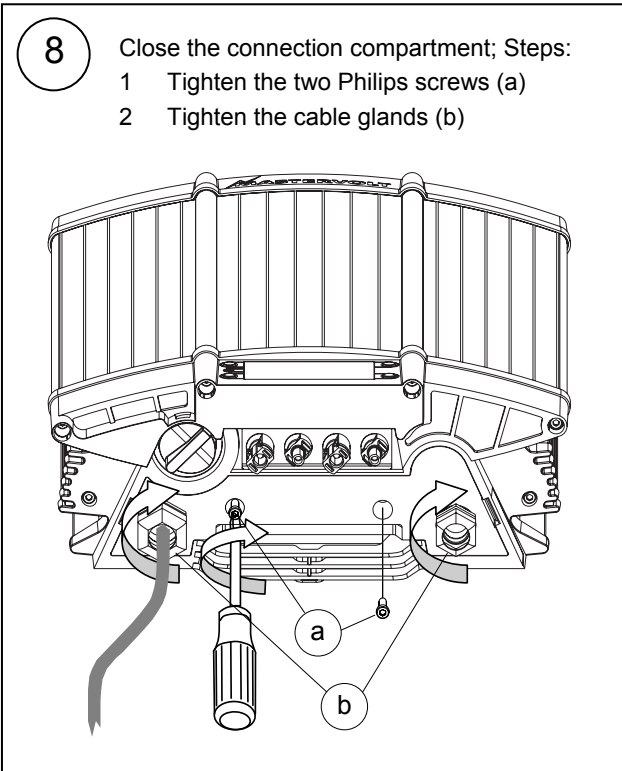
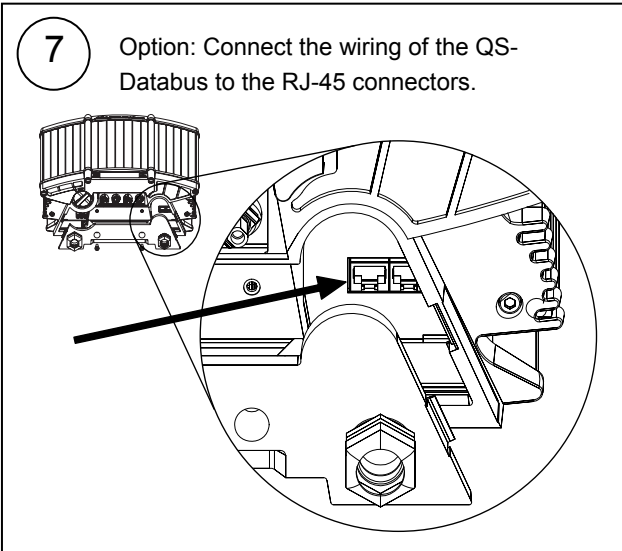
2 Fix the mounting bracket to the wall

3 Place the Sunmaster over the mounting bracket and then move it downwards until it is locked by the mounting bracket

4 Loosen the two Phillips screws (a) at the bottom side of the cabinet

5 Insert a flat blade screw driver in the indicated slots (b). Then remove the bottom plate of the Sunmaster

6 Feed the AC wiring through the left hand cable gland of the bottom plate and connect the wiring to the screw terminals



4.2 COMMISSIONING AFTER INSTALLATION

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.

4.3 DE-COMMISSIONING

If it is necessary to put the Sunmaster out of operation, 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 the Sunmaster will switch on automatically if solar irradiation is sufficient. The Sunmaster operates automatically: there is no need for adjustment or operation. 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 chapter 4.3.



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. Depending on circumstances, the cooling fan starts running slowly at approximately 50% of the nominal power. 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 10).

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-display is operated by means of four keys: S1, S2, S3 and S4. See figure 10.

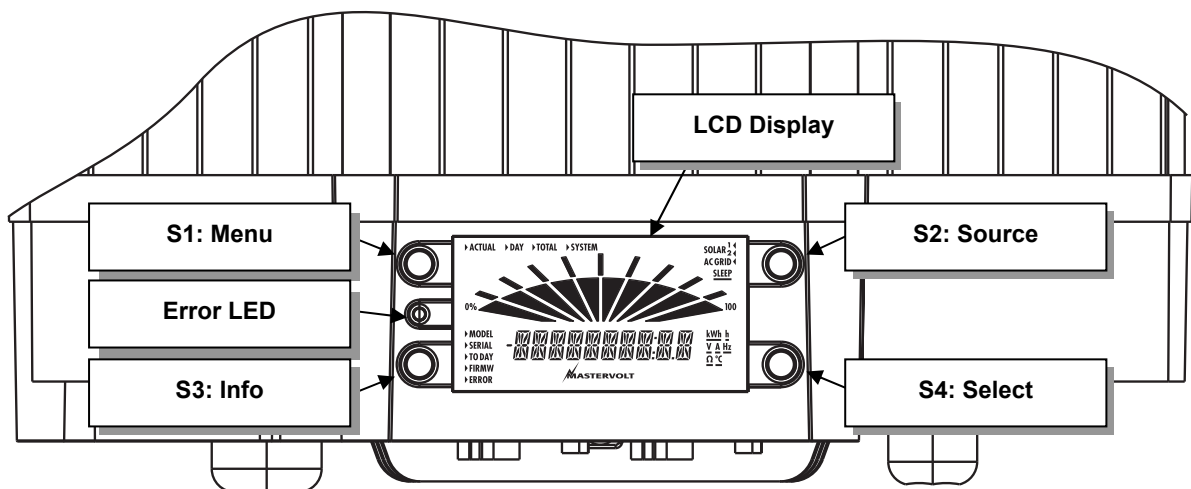


Figure 10: operation of the LCD-display

See figure 11. 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

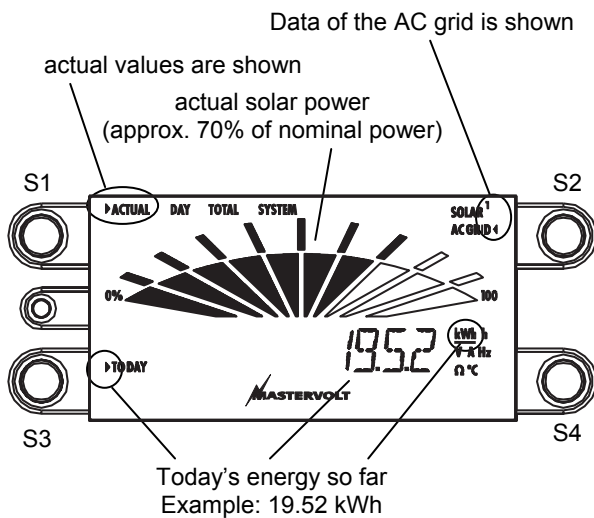


Figure 11: initial screen (displayed values may differ)

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 two Solar inputs 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 (figure12).

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

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

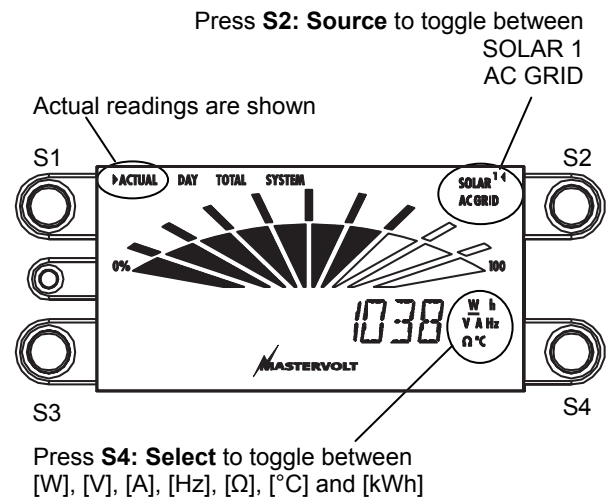


Figure 12: Actual readings

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 13

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

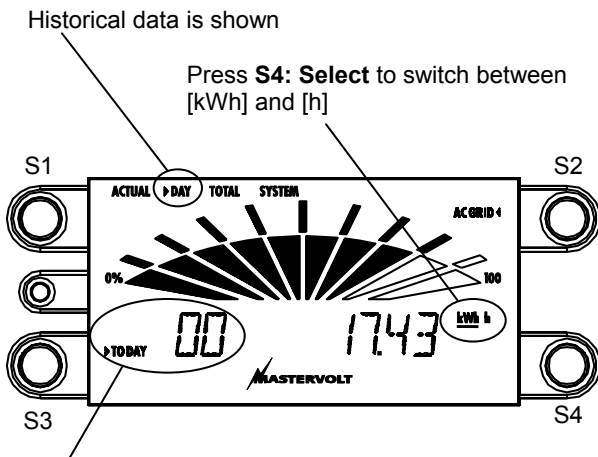


Figure 13: Historical data

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 14.

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

SOLAR 1 ◀ Total performance at the DC-input of the Sunmaster 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

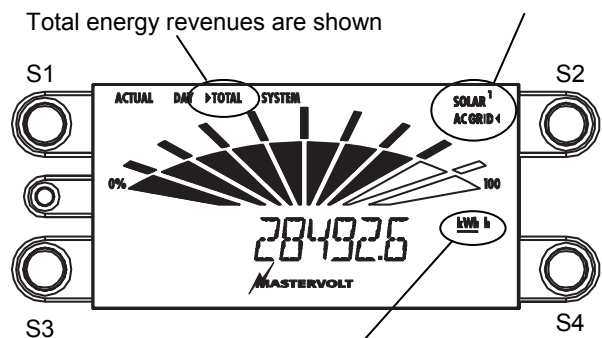


Figure 14: Total energy revenue

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 15.

If you *press and hold* **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.

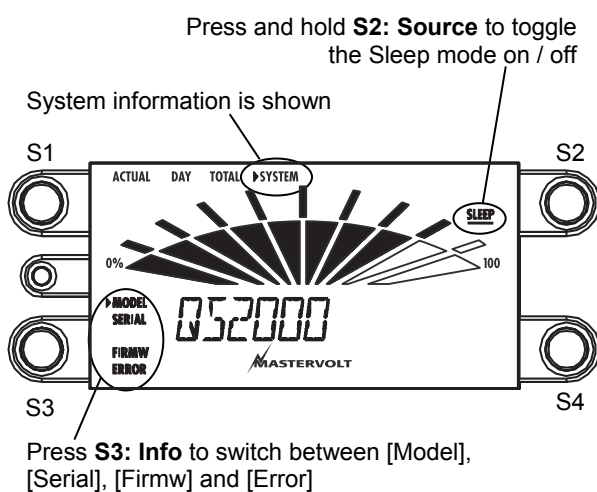




Figure 15: System information

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

► MODEL	Shows the model of the Sunmaster i.e. "QS2000"
► SERIAL	Serial number is displayed. Example: RN07A003
► FIRMW	Display switches between the firmware of the inverter ("QS") and the display ("DS")
► ERROR	In case of a system failure, the cause of the failure is displayed. See chapter 5.3.5

5.3.5 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!

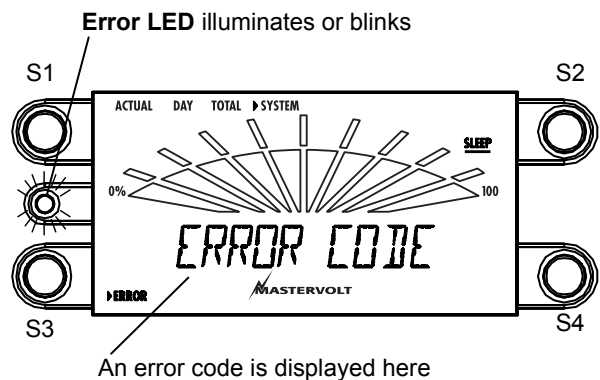


Figure 16: representation of a failure

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 16. Refer to chapter 6 for explanation of the error codes.

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.

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 string is too low	Nothing; normal condition during sunrise and sunset. Consult an installer if the problem remains while irradiation of the PV modules is sufficient.
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 string is too 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	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		

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 50°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
Safety class	class I
Galvanic isolation	class II
MTBF	165.000 hours
Dimensions	See chapter 7.2.
Weight	7 kg
SOLAR INPUT (DC) Sunmaster QS2000 IP44	
Nominal power	1700W DC
Maximum power	1800W DC
PV power range	1200-2100Wp
MPP tracker	1 MPP tracker (dynamic)
MPP voltage range	100-380V DC
Maximum voltage	450V DC
Rated current	7.5A
Start-up power	2W
String connections	2
DC connections	MC2 (4 mm type)
GRID OUTPUT (AC) Sunmaster QS2000 IP44	
Nominal power at 40°C ambient	1600W AC
Maximum power	1725W AC
Voltage	230V AC (184-276V*)
Nominal current	7A
Fuse	5x20 mm. 250V/10A T
Frequency	50 Hz (49.7 – 50.3 Hz*)
Power factor	0.99
Stand-by power	0W
EU efficiency	94%
Maximum efficiency	95%
AC connections	M25 gland and screw terminals 2.5 - 4 mm2

* model dependent

SAFETY DEVICES

General	galvanic separation between DC and AC side, by means of a class II transformer
Island protection	Mastervolt ENS - VDE 0126 -1-1 compliant
Reclosure time	10-300 sec. (programmable)
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 QS databus connections
Monitoring (optional)	QS Data Control Basic (PC Software). Free download from www.mastervolt.com
Monitoring (optional)	QS PC-Link (connect the QS-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

REGULATIONS & DIRECTIVES

EMC directive	EMC 89/336/EEG
Emission	EN 50081-1, EN 55011, EN 55014, EN 55022, VDE 0871 class B
Harmonics	EN 61000-3-2, IEEE929
Immunity	EN 50082-2
Flicker	EN 61000-3-3
LV directive	73/23/EEG
Safety	EN 60950
ENS	VDE 0126-1-1

7.2 OUTLINE DRAWINGS

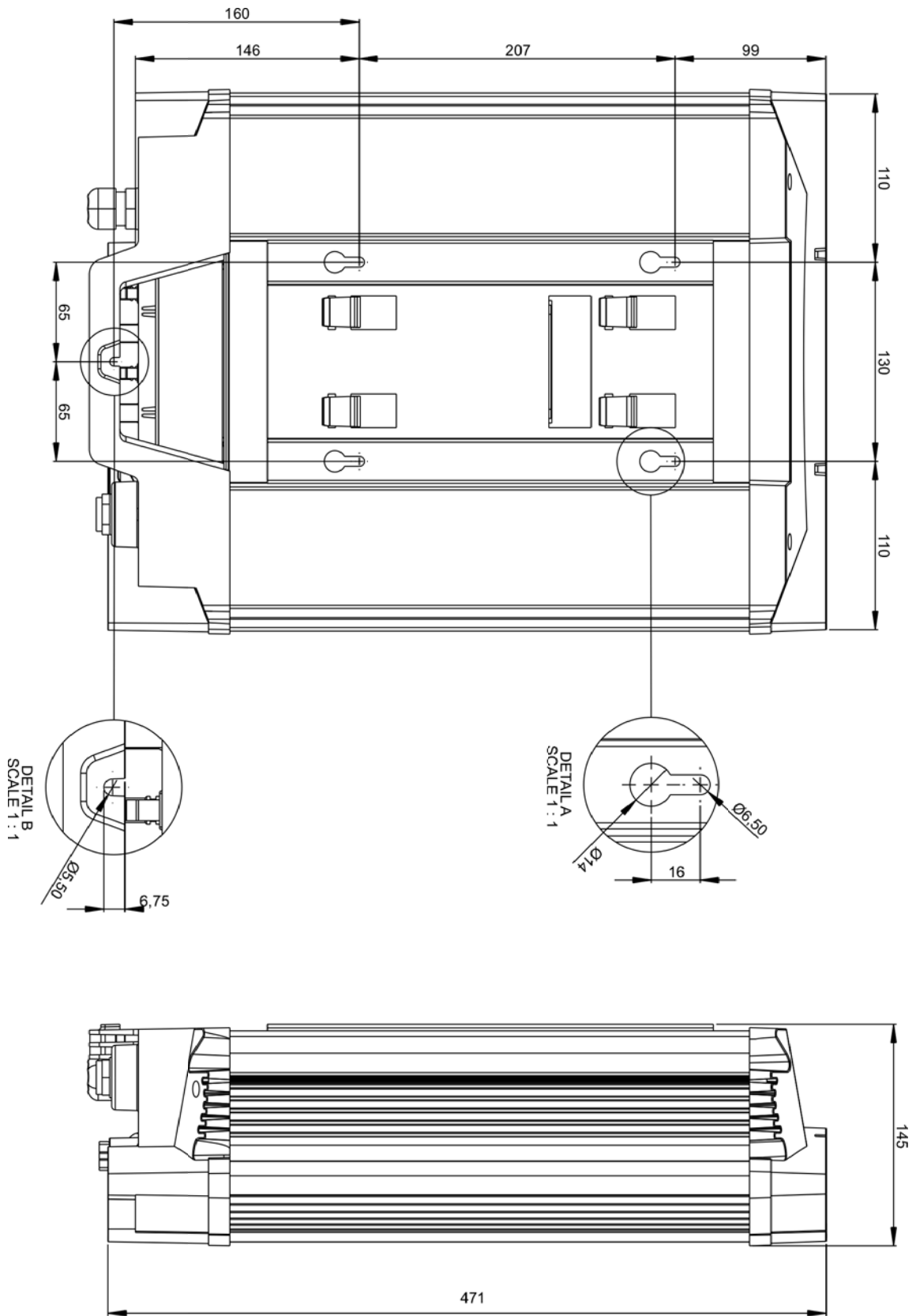


Figure 17: Outline drawings of the Sunmaster QS2000

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)
130346000	External DC Switch / Single Input. Features: 4 String connections, 1 output to inverter.
130394000	QS Data Control 'Basic' – Free software package to monitor your photovoltaic (PV) system using your PC or notebook. Use of QS PC Link is compulsory.
130391010	QS PC Link, RS485/232 converter
130391020	QS PC Link Industrial, RS485/232 converter for the connection of more than 10 Sunmasters or for cable lengths of more than 100 meters.
130391040	QS PC-Link Industrial, RS485/USB converter for the connection of more than 10 Sunmasters or for cable lengths of more than 100 meters.
130396000	QS Data Control 'Premium' II local – Datalogger to monitor up to 6 Sunmaster inverters locally
130396100	QS Data Control 'Premium' II remote – Datalogger to monitor up to 6 Sunmaster inverters over the Internet
130396200	QS Data Control 'Pro' Analogue – Datalogger to monitor up to 20 Sunmaster inverters locally or over the Internet
130396210	QS Data Control 'Pro' ISDN – Datalogger to monitor up to 20 Sunmaster inverters locally or over the Internet
130396220	QS Data Control 'Pro' GSM – Datalogger to monitor up to 20 Sunmaster inverters locally or over the Internet
130396230	QS 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 offers 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 CERTIFICATES

9.1 EC DECLARATION OF CONFIRMITY

Manufacturer Mastervolt
Address Snijdersbergweg 93
1105 AN Amsterdam
The Netherlands



Herewith declares that:

Product: Sunmaster QS2000 – IP44

is CE-marked and complies with the following standards:

EMC directive:	EMC 89/336/EEG
Emission:	EN 50081-1 EN 55011 class B (VDE 0875-11) EN 55014-1 EN 55022 VDE 0871 class B
Harmonics:	EN 61000-3-2 IEEE 929
Flicker:	EN 61000-3-3
Electro static discharges (ESD):	EN 61000-6-1 / EN50082-1
Radiated Immunity:	EN 61000-6-1 / EN50082-1
Electrical fast transients (EFT):	EN 61000-6-1 / EN50082-1
Conducted immunity:	EN 61000-6-1 / EN50082-1
LV directive:	LV 73/23 EEC
Electrical safety :	EN 60950
ENS:	DIN VDE 0126

Amsterdam,



P.F. Kenninck,
General Manager MASTERVOLT

9.2 CERTIFICATE OF VDE-0126 CONFIRMITY

Fachausschuss Elektrotechnik
 der Berufsgenossenschaftlichen Zentrale
 für Sicherheit und Gesundheit – BGZ
 des Hauptverbandes der gewerblichen Berufsgenossenschaften



BG
 Federführung:
 Berufsgenossenschaft
 der Feinmechanik
 und Elektrotechnik

Fachausschuss Elektrotechnik, Postfach 51 05 80, 50941 Köln

Mastervolt
 Snijderbergweg 93
 1105 AN Amsterdam
 The Netherlands

Ihre Zeichen/Nachricht vom	Unser Zeichen (Bitte stets angeben)	Bearbeiter	☎ (02 21) 37 78-	Datum
	UB.010.17	PI/Ow	6312	23.01.2007

Unbedenklichkeitsbescheinigung

Erzeugnis: Selbsttätig wirkende Schaltstelle (ENS)

Typ: ENS 25

Bestimmungsgemäße Verwendung:

Selbsttätig wirkende, dem VNB unzugängliche Schaltstelle als Sicherheitsschnittstelle zwischen einer Eigenerzeugungsanlage und dem Niederspannungsnetz. Gleichwertiger Ersatz für eine jederzeit dem VNB zugängliche Schaltstelle mit Trennfunktion.
 Die Schaltstelle ist integraler Bestandteil der netzgetrennten Photovoltaik-Wechselrichter:

QS 1200, QS 2000, QS 3200, QS 3200 Max-I, QS 6400, QS 6400 Max-I
 QS 2000 IP44, QS 3500 IP44, QS 3500 Max-I IP44

Prüfgrundlage:

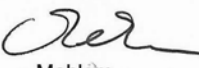
DIN V VDE V 0126-1-1(2006-02) "Selbsttätige Schaltstelle zwischen einer netzparallelen Erzeugungsanlage und dem öffentlichen Niederspannungsnetz"

Das am 14.09.1995 geprüfte und am 22.01.2007 nachgeprüfte Sicherheitskonzept des o.g. Erzeugnisses, entspricht den zum Zeitpunkt der Ausstellung dieser Bescheinigung geltenden sicherheitstechnischen Anforderungen für die aufgeführte bestimmungsgemäße Verwendung.

Die Unbedenklichkeitsbescheinigung wird spätestens

31.12.2011

ungültig.


 - Mehlem -
 Leiter der Prüf- und
 Zertifizierungsstelle



Snijdersbergweg 93, 1105 AN Amsterdam, The Netherlands

Tel : + 31-20-3422100

Fax : + 31-20-6971006

Email : info@mastervolt.com