MASTERVOLT

USERS MANUAL / GEBRUIKERSHANDLEIDING
BETRIEBSANLEITUNG / MANUEL D'UTILISATION
MANUAL DE UTILIZACION / INSTRUZIONI PER L'USO

SunWatch 25

Solar monitoring device

CE

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PRODUCT DESCRIPTION AND APPLICATION

The SunWatch 25 visualizes the electrical energy yield of a solar energy system. The SunWatch 25 consists of a measuring unit and a wireless display. The display shows the total energy that is delivered by the solar system in kWh, the avoided greenhouse gas emission in kg CO_2 and the actual power in Watts.

SAFETY INSTRUCTIONS

CAUTION!
Before using the SunWatch 25, read the Safety Instructions

- Use the SunWatch 25 according to the instructions and specifications stated in this manual.
- Connections and safety features must be executed according to the locally applicable regulations.
- Operation of the SunWatch 25 without proper grounding may lead to hazardous situations!
- Never open the measuring unit housing when it is in operation as high voltages may be present inside!

GUARANTEE TERMS

Mastervolt guarantees that this product was built according to the legally applicable standards and stipulations. If you fail to act in accordance with the regulations, instructions and stipulations in this user's manual, damage will occur and/ or the product will not fulfil the specifications. This may mean that the guarantee will become null and void. The guarantee 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 guarantee.
For making an appeal on warranty you can directly contact your supplier, mentioning your complaint, application, date of purchase and part number / serial number. The standard guarantee period for this product is 2 years.

LIABILITY

Mastervolt cannot be held liable for:

- Possible errors in this manual and their consequences.
- Use of this product that is inconsistent with its purpose.

WIRELESS COMMUNICATION
The SunWatch features wireless communication, see figure 1. The measuring device (2) sends all values to the display (1).

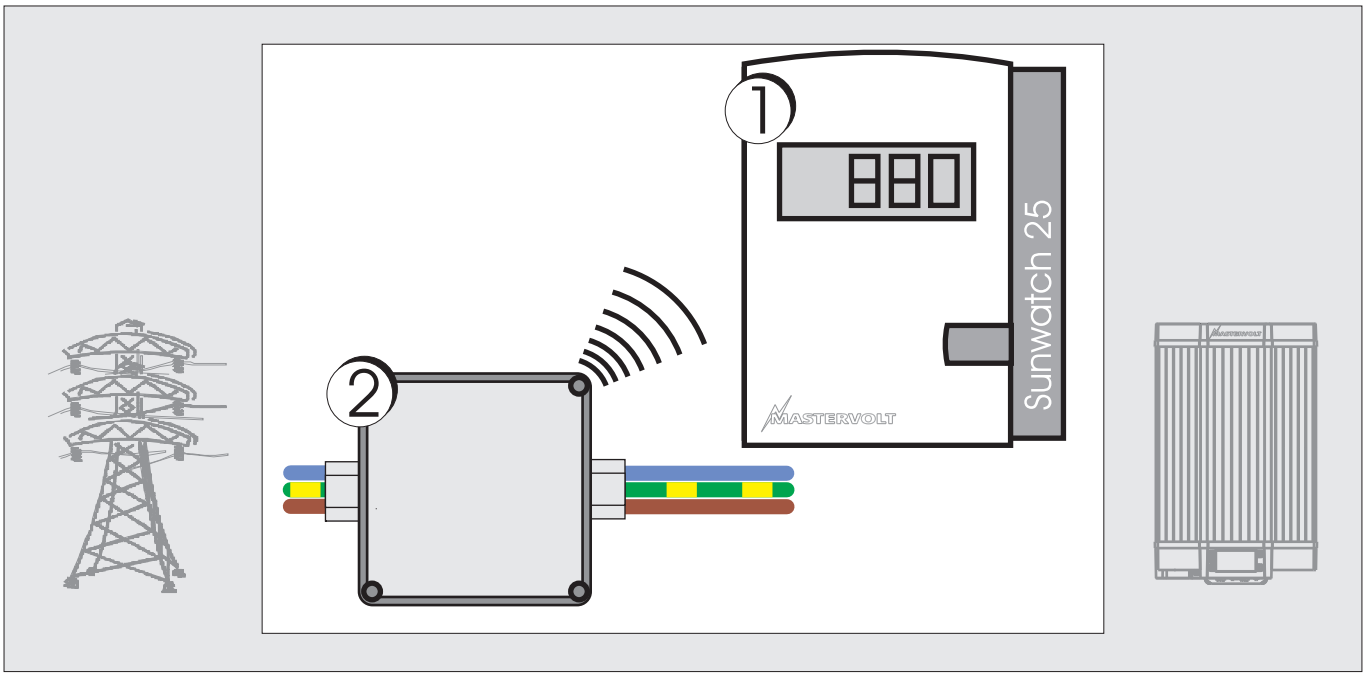


Figure 1: Wireless communication

Communication
At regular intervals, the display transmits to the measuring unit a request for measured values. The measuring unit receives the requests and transmits its measures. The lamp at the bottom of the measuring unit then toggles.
A so called license free frequency band is used for the data communication. This implies other devices may be using the same frequency. If two devices use the same band at the same time, communication is disturbed. This does not damage the devices. If the connection is jammed for some time, the display will show lines instead of the measured values. The display will recover as soon as the band is free again.

Connection quality
The quality of the connection depends on local circumstances. If the link between display and measuring unit is very weak, you will notice the measured values will disappear from the display irregularly. If this happens often, repositioning the measuring unit or the display may help. If after some time a good link seems to weaken, a new wireless device may have been installed in the vicinity or the batteries may have weakened. Weak batteries result in a weak communication. If in doubt about the batteries, replace them to see if this improves the situation.

Broadcasting address
The display and measuring unit both have a communication address. The display broadcasts its address when requesting the measuring unit for data. The measuring unit will normally only respond to the address it is set to.

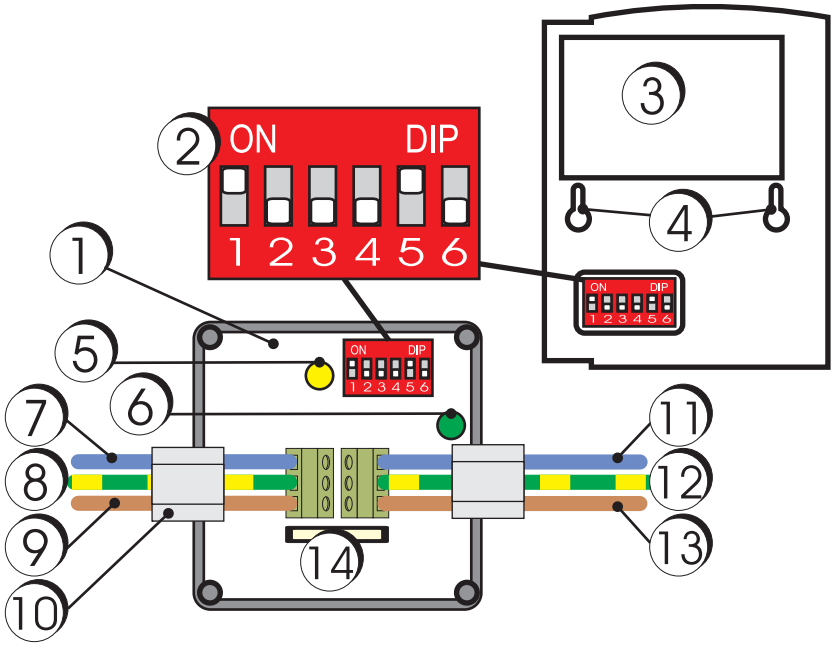
Data storage
Measured values are stored in the measuring unit, not in the display. This means that information is not lost when the batteries of the display are changed or the display is off for some other reason. The measuring unit also retains the measured totals when the power is off.

UNPACKING

The delivery consists of the following parts:

- SunWatch 25 display
- Measuring device for the SunWatch 25
- Four screws, wall plugs and caps.
- This user's manual

After unpacking, check the SunWatch 25 for possible damage. Do not use the SunWatch 25 if it is damaged. If in doubt, contact your supplier.



1. SunWatch measuring device
2. DIP switch for both measuring device and display. See section DIP switches
3. Display back side, battery compartment
4. Display back side, hanging slots
5. Communication LED
6. PV power LED
7. Grid AC Line 230V (output)
8. Grid Protective Earth (output)
9. Grid AC Neutral (output)
10. AC cable grommet (2x)
11. PV AC Neutral (input)
12. PV Protective Earth (input)
13. PV AC Line 230V (input)
14. Shunt

Figure 2: Installation

INSTALLATION

WARNING!
Read the instructions before installing the measuring unit.
This equipment must be installed by qualified technicians!

- Risk of electric shock! Disconnect the mains and switch off the inverter before you connect the wires.
- Make sure that nobody can accidentally switch on the grid or the inverter while you are working.
- Install the SunWatch 25 measuring device in a well-ventilated room protected against rain, vapour, moisture and dust.
- Hang the measuring device to the wall in a vertical position. DIN rail mounting is possible.

A label inside the measuring unit shows where the grid and where the PV inverter must be connected.

- Connect the cables, placing the measuring unit between the solar energy system inverter (input) and the mains (output).
- See figure 2 point 3. Install batteries in the display (2 alkaline 'penlight', AA-size cells). The battery holder shows how the batteries must be placed.
- Fix the display to the wall, using the two screws supplied.

Before closing the measuring unit check the switch setting to avoid having to open the unit again.

WARNING!
When opening the unit after it has been in use, be aware that the shunt, figure 2 point 14, may be very hot.

The LED inside the measuring unit (figure 2 ref 5) blinks when the display and the measuring unit are communicating. If it is either on or off all the time, the DIP switch settings may be wrong. Refer to the section DIP switches for more information.

OPERATION
Switch the solar system on. After a while (about 30 seconds) the display will show the measured values.

Display functions
Select the desired display function by pressing the button (1) on the front of the display unit. If you press the button, the display (2) shows four lines first. These lines point at the quantity (3) that will be shown next on the display:

- kWh
- kg CO_2
- Watt.

Figure 3 shows the kWh display function. Every time you press and release the button, the next display function is selected.

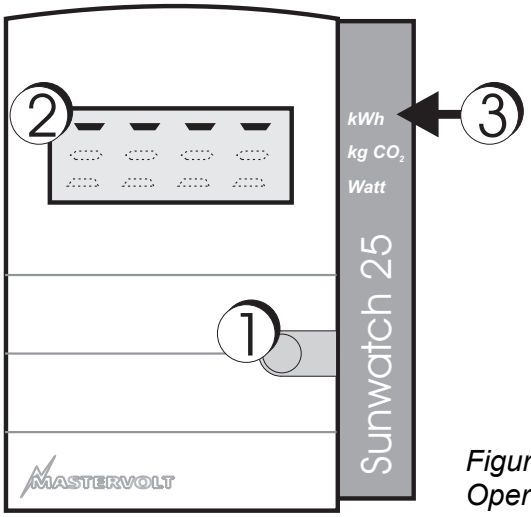


Figure 3: Operation

Another display option is to show the measured kWh, kg CO_2 and Watts in a fixed sequence. This mode is indicated with lines at all three levels. During normal operation, the lines are shown every 10 seconds to leave no misunderstanding about the quantity displayed.
If the lines for kg CO_2 blink and after that the lines for kWh and Watt, the display has lost contact with the measuring device. It shows the measurements as soon as contact has been regained.

Watt, kWh explanation
If your PV system generates approximately 250 Watts, you will notice that the kWh value has increased by one after four hours. This is because 250 Watt x 4 hours = 1000 Wh = 1kWh.
In winter there is very little solar radiation, and the kWh counter will increase very slowly.

Kg CO_2 explanation
Because your PV system generates electrical energy, less energy production is required in the power plant. A power plant produces approximately 0,566 kg CO_2 per kWh. So every kWh generated by your PV system precludes emission of 0,566 kg CO_2 in the air! This is the so called avoided emission.

DIP SWITCHES
If the link is weak (the measured values do not show for several minutes frequently), change the DIP switch settings to try another communication address.
If you use several SunWatch 25's near to each other, you must make sure that all system addresses are different. The display and measuring unit DIP switches show what address is set. See the table.

CAUTION!
The setting of the measuring unit and accompanying display must be the same.

WARNING!
Disconnect the measuring unit before making changes to the switches!

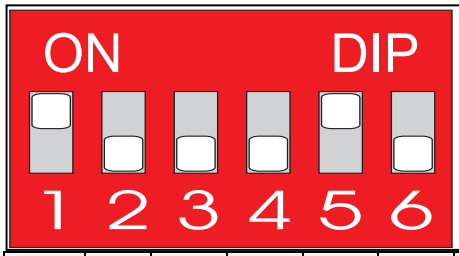


Figure 4: DIP switches. Example shown: Display address 1

Use a pen to operate the 6 DIP switches. Slide the white notch in the desired direction.

1	2	3	4	5	6	At Display:	At Measuring unit:
off	off	off	off	**on**	off	Display address 0	Respond to display with address 0
on	off	off	off	**on**	off	Display address 1	Respond to display with address 1
off	**on**	off	off	**on**	off	Display address 2	Respond to display with address 2
on	**on**	off	off	**on**	off	Display address 3	Respond to display with address 3
off	off	**on**	off	**on**	off	Display address 4	Respond to display with address 4
on	off	**on**	off	**on**	off	Display address 5	Respond to display with address 5
off	**on**	**on**	off	**on**	off	Display address 6	Respond to display with address 6
on	**on**	**on**	off	**on**	off	Display address 7	Respond to display with address 7
off	off	off	**on**	**on**	off	Display address 8	Respond to display with address 8
on	off	off	**on**	**on**	off	Display address 9	Respond to display with address 9
off	**on**	off	**on**	**on**	off	Display address 10	Respond to display with address 10
on	**on**	off	**on**	**on**	off	Display address 11	Respond to display with address 11
off	off	**on**	**on**	**on**	off	Display address 12	Respond to display with address 12
on	off	**on**	**on**	**on**	off	Display address 13	Respond to display with address 13
off	**on**	**on**	**on**	**on**	off	Display address 14	Respond to display with address 14
on	**on**	**on**	**on**	**on**	off	Display address 15	Respond to display with address 15
off	off	off	off	**on**	**on**	Display address 16	Respond to display with address 16
on	off	off	off	**on**	**on**	Display address 17	Respond to display with address 17
off	**on**	off	off	**on**	**on**	Display address 18	Respond to display with address 18
on	**on**	off	off	**on**	**on**	Display address 19	Respond to display with address 19
off	off	**on**	off	**on**	**on**	Display address 20	Respond to display with address 20
on	off	**on**	off	**on**	**on**	Display address 21	Respond to display with address 21
off	**on**	**on**	off	**on**	**on**	Display address 22	Respond to display with address 22
on	**on**	**on**	off	**on**	**on**	Display address 23	Respond to display with address 23
off	off	off	**on**	**on**	**on**	Display address 24	Respond to display with address 24
on	off	off	**on**	**on**	**on**	Display address 25	Respond to display with address 25
off	**on**	off	**on**	**on**	**on**	Display address 26	Respond to display with address 26
on	**on**	off	**on**	**on**	**on**	Display address 27	Respond to display with address 27
off	off	**on**	**on**	**on**	**on**	Display address 28	Respond to display with address 28
on	off	**on**	**on**	**on**	**on**	Display address 29	Respond to display with address 29
off	**on**	**on**	**on**	**on**	**on**	Display address 30	Respond to display with address 30
on	**on**	**on**	**on**	**on**	**on**	Display self test. All display segments are switched on/off regularly.	***Reset totals to zero when powered.*** ATTENTION! The measuring unit must stay powered for *at least 15 minutes* before the new totals are stored. Then the totals are reset to zero and they cannot not be recovered.

Technical specifications.

Model	SunWatch 25 Display	SunWatch 25 Measuring Unit
Article number	130500580	130500580
Display		
Display type	4 characters LCD, 12mm high	-
Watt display	max. 9999 W. Resolution 1 W.	-
kWh display	max. 9999.999 kWh The first four digits are shown.	-
CO2 display	max. 9999.999 kg The first four digits are shown.	-
Measuring unit		
Max. current	-	25 A The measuring unit is not fused. The power output must be fused, 25 A max.
Mains voltage	-	230 VAC +/- 10%, 50 Hz.
Power consumption	-	< 2 W
Measuring range	-	0 … 5750 W
Accuracy	-	2% +/- 8 W
General		
Dimensions	Width 80 mm Height 128 mm Depth 43 mm	Width 110 mm Length 110 mm Height 65 mm
Weight	Approx. 260 gr. incl. batteries	Approx. 280 gr.
Ambient conditions	Storage –20 … 60 °C For indoor use only! 5 … 40 °C, RH 80% max. at 31 °C, altitude 2000 m max.	For indoor use only! 5 … 40 °C, RH 80% max. at 31 °C, altitude 2000 m max.
Transmitter/receiver		
Max. power	< 10mW	< 10mW
Duty cycle	< 50ms / 10 sec. (error free link) < 50ms / sec. (jammed link)	< 50ms / 10 sec. (error free link) < 50ms / sec. (jammed link)
Frequency	433.92 MHz (channel 1) 434.33 MHz (channel 2)	433.92 MHz (channel 1) 434.33 MHz (channel 2)
Frequency deviation	+/- 15 kHz max.	+/- 15 kHz max.
Modulation	FSK	FSK
Range	Approx. 50 metres , depending on the local circumstances, see manual	Approx. 50 metres, depending on the local circumstances, see manual
Addresses	2 channels with 30 addresses each	2 channels with 30 addresses each

EC DECLARATION OF CONFORMITY
In accordance with the EC guidelines as listed below, we declare:

Supplier: Mastervolt
Address: Snijdersbergweg 93, 1105 AN Amsterdam , The Netherlands
that the product: SunWatch 25
to which this declaration applies, is in conformity with the following guidelines:

LOW VOLTAGE 73/23/EEC
EN60335-:1994+ Safety of household and similar electrical appliances
EN60335-A1:1996+ Part 1: General requirements
EN60335-A11:1995+ EN60335-A12:1996+ EN60335-A13:1998+ EN60335-A14:1998
EN60335-:1991+ EN60335-:1994, modified

EMC GUIDELINE 89/336/EEC
Immunity EN-62000-6-2
Emission EN-50081/1

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