

## Technical data:

	SW-2000-12 SYNC as single unit	2 × SW2000-12 SYNC in parallel operation	SW-2000-24 SYNC as single unit	2 × SW2000-24 SYNC in parallel operation
Input voltage (dc)	12V	12V	24V	24V
Input voltage range	11-15V	11-15V	22-30V	22-30V
Max. input current	220A	440A	110A	220A
Battery low - warning	12V	12V	23V	23V
Battery low - switch off	10,5V	10,5V	21V	21V
Battery recharged - switch on	12,5V	12,5V	25V	25V
Stand-by consumption	18VA	36VA	21,6VA	43VA
DC fuse protection	6 x 40A	6 x 40A	6 x 20A	6 x 20A
Continuous output power	2000VA	4000VA	2000VA	4000VA
Peak output power	3000VA	6000VA	3000VA	6000VA
Output voltage (ac)	225V	225V	225V	225V
Frequency (+/-1%)	50 Hz	50 Hz	50 Hz	50 Hz
Max. output current (continuous/peak)	9,3/18,6 A <sub>eff</sub>	19/28 A <sub>eff</sub>	9,3/18,6 A <sub>eff</sub>	19/28 A <sub>eff</sub>
Efficiency	above 88%	above 88%	above 88%	above 88%
Input type	pole terminal	pole terminal	pole terminal	pole terminal
Output power outlet	1 × Schuko 1 × Euro	1 × Schuko 1 × Euro	1 × Schuko 1 × Euro	1 × Schuko 1 × Euro
Fan cooling	yes	yes	yes	yes
Can be operated by remote control	yes	yes	yes	yes
Dimensions (mm)	455x245x70	2x(455x245x70)	455x245x70	2x(455x245x70)
Weight	5,2 kg	2x(5,2 kg)	5,2 kg	2x(5,2 kg)
"E" Mark reg. Number	e1 024372			

### Recommended minimum DC wire cross section:

	<b>up to 2m</b>	<b>up to 3m</b>
SW-2000 SYNC	35mm <sup>2</sup>	50mm <sup>2</sup>

### Recommended battery capacity:

	<b>12V</b>	<b>24V</b>
SW-2000 SYNC	min. 300Ah	min. 150Ah



#### Environmental protection information

When no longer in use, this product may not be deposited in the normal household waste but should be brought to a collection point for the recycling of electrical and electronic appliances. A symbol on the product, the operating instructions or the packaging draws attention to this. The materials are recyclable as marked. By re-use, recycling or another form of using old appliances you are making an important contribution towards the protection of the environment. Please ask your local authorities for the appropriate disposal point.



# INSTRUCTION MANUAL



## SW SYNC SINE WAVE INVERTERS

### SW-2000-12-SYNC and SW-2000-24-SYNC models

Dear Customer,

Thank you for buying our product. You have bought one of the most powerful, most compact and most reliable sine wave inverter of its class. Please make sure to read this manual carefully before putting the unit into operation.

#### WARNING!!! Important security advice!

- **Warning!!** Use fluorescent lamps only with electronic starters or with an electronic transformer. Using fluorescent lamps with normal starters will damage your inverter.
- This unit produces alternating current of 230V and is not to be put in children's hands!
- Even when the unit has been turned off, there can still be 230V AC at the output for a while.
- Must not be operated under adverse circumstances such as: Temperatures above 50°C, inflammable gas, solvents, vapours, dust, and humidity over 80 % rel. or water.
- The unit must only be operated in closed, dry rooms.
- All alternating current loads, which belong to Protection Class I (units with 3-pinned plug containing Earth-pin) must be earthed via the PE-connector at the inverter's output socket. According to regulations the PE-connector of the output socket, the inverter housing and the minus pole of the battery are all internally connected. A separate earth screw must be earthed for the SW-150. None of the two inverter output (no Line or Neutral wire!) can be connected in any way to the Ground.
- As soon as you assume that operation of the unit under safe circumstances is no longer possible, unplug the unit immediately and make sure that it not put into operation inadvertently. Operating the unit becomes unsafe when the unit does not show any signs of working or has been visibly damaged (e.g. damage has occurred during transport or after storing the unit under unfavourable circumstances).
- Service and repairs - Servicing and repairs must be conducted by authorised personnel only. Only fuses of the indicated value shall be used as replacement. It is not allowed to use repaired fuses or short-circuit the fuse holders.
- **Caution: To achieve proper electrical contact between the bolts and the battery cables, always fasten the nuts of the DC connectors (figure 1) even if only used for testing purposes.**

#### Servicing and repair

can be conducted by authorised personnel only. Only fuses with the same rating and characteristics can be used as replacement. It is forbidden to mend the burned fuse or short-circuit the fuse-holder. Before service or fuse replacement, all equipment must be disconnected from the inverter and the inverter itself from the batteries. It is necessary to wait for an additional 3 minutes in order to avoid electric shock hazard from the internal capacitors.

#### Description

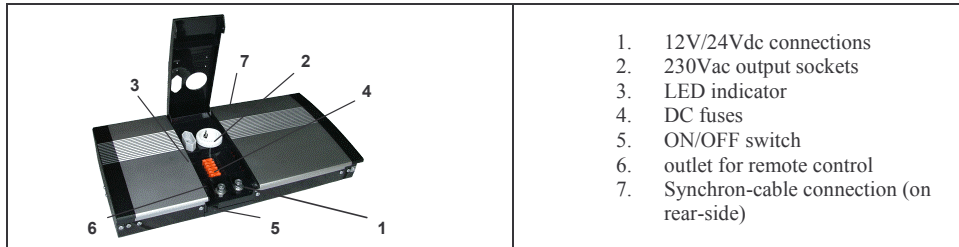
The SW2000 SYNC inverter is capable of being parallel-connected with another SW2000 SYNC model rendering a 4000VA continuous power for heavy loads or high start-up currents. Only two SW2000 SYNC inverter models can be parallel connected via a Synchron-cable which is provided for these models. One single unit of the SW2000 SYNC model can also be used as a standard stand-alone SW2000 inverter with output power of 2kVA. When connecting two SW2000 SYNC units in parallel, the 4kVA output power can be taken from any of the two units (power sharing) which means that e.g. you can connect one large 3500W load to the output socket of one of the inverters or you can connect several smaller loads using the output sockets of both inverters.

The inverters of the SW family are modern, microprocessor-controlled devices especially suited for mobile applications. The inverter converts the low DC input voltage into a higher AC voltage. The output signal voltage corresponds to a true sinusoidal alternating voltage. Unlike trapezoidal inverters, true sine wave inverters will provide a largely trouble-free operation to highly sensitive measuring equipment, computer systems, audio and DVD equipment, satellite systems, television sets, pumps and all devices with a transformer.

### The following features distinguish the SW sine-wave inverters:

- Low idle power consumption
- Low weight
- Precise crystal-controlled 50Hz frequency
- Low battery warning
- Short circuit protection
- Reverse polarity protection
- true sinusoidal output voltage
- temperature-activated protective circuit
- high efficiency
- precise voltage thresholds
- Under / Over voltage protection
- Overload management
- Low voltage shutdown
- Soft start - for loads with high inrush current
- can be operated via remote control
- output- and temperature-controlled fan

### Functional Description



1. 12V/24Vdc connections
2. 230Vac output sockets
3. LED indicator
4. DC fuses
5. ON/OFF switch
6. outlet for remote control
7. Synchron-cable connection (on rear-side)

### LED Indicator: The LED indicates various status of the inverter's operation.

- **LED lights continuously green** Normal operation of the inverter within specifications.
- **LED flashes red** The battery voltage is below nominal. Depending on the current draw, further use may lead to shutdown due to too low battery voltage.
- **LED lights continuously red**
  - The battery voltage has dropped below the minimum level and the battery is discharged. To protect the battery from damaging deep-discharging, the inverter has shut off the AC voltage. Resetting the device is only possible after the battery has been sufficiently re-charged.
  - The maximum rated continuous power of the inverter has been exceeded. The overload management has turned off the output of the inverter.
  - The connected load has too high power consumption and takes too high inrush current / is defective making short-circuit at the inverter output. The inverter now attempts a warm restart five times every five seconds and then every thirty seconds. During the restart attempt, the LED briefly glows green. If the inverter does not turn on after several restart attempts, you should disconnect the load from the output and check the status of the inverter. Also try to operate the load device from the mains and have it repaired or maintained by a technician in case it turns out to be faulty.

### Connection and Operation

Check that the specifications of the load (voltage, frequency, power) correspond to the inverter's specifications. Use only wiring of sufficient cross-section and length for the battery cables and make sure that the battery cable connectors and the inverter screw-terminal have a clean and tight contact.

- **Caution: To achieve proper electrical contact between the bolts and battery cables, always fasten the nuts of the DC connectors (figure 1) even if only used for testing purposes.**

Check for adequate free space around the ventilation slots to ascertain sufficient cooling. Never cover the ventilation slots and never operate the device near combustible materials.

Connect the inverter with the battery and switch it on. If everything is connected properly and operated within specifications, the green LED will light up.

Connect both SW2000 SYNC inverters with the 5-pole synchron-cable (provided free for two SW2000 SYNC units). Attention: switch on both inverters before connecting/switching on the loads. One inverter without synchron-cable can be used as a single unit (2kVA).

### General notes on operating AC loads from inverters

In general, all AC loads may be operated from inverters. To estimate the power requirements and necessary reserves, one needs to know some characteristics of typical AC loads. Most AC loads have been designed for mains operation. One important point to note however is the required inrush current, which does not play a big role when the load is operated from mains voltage since the mains grid is capable of delivering very large currents. Domestic equipment manufacturers therefore do not focus on inrush current. In the case of various consumer loads, this value may be higher by a multiple than the nominal value calculated from the rated power output of the device.

- Incandescent lamps up to 8x higher inrush current within 1 sec
- Refrigerators, water pumps up to 10x higher inrush current within 3 sec
- Television sets up to 10x higher inrush current within 1 sec

**Therefore it is important to choose an inverter with sufficient power reserves. For example an inverter supposed to supply a small refrigerator of 50W nominal power has to deliver a peak power of 500W.**

### Reverse Polarity Protection

In case the DC input is accidentally connected with reversed polarity the current will flow across a diode, which triggers the fuse. In this case first the cables must be disconnected from the battery, replace the fuse then establish the proper polarity connection with the batteries.

### Deep discharge protection

Lead acid batteries must be protected against deep discharging; otherwise the cells will be irreversibly damaged (sulphation). All loads will be switched off automatically when battery discharge voltage is reached. A new automatic load re-connection is possible only after re-charging the battery to an appropriate level. This is to make sure that the battery leaves the discharged status as soon as possible.

### Overload-, and short-circuit protection

In case the SW inverters are permanently overloaded, the protection circuit will switch off the unit. After a few restart attempts the inverter remains switched off, further operation is only possible by manual resetting. The SW inverters also protected electronically against short-circuit at their output; in such case the inverter will remain fully operational.

### Replacing the fuse

The fuses are located under the DC connector cover (12V: 40A; 24V: 20A). In case the fuse is blown the inverter has to be disconnected and the fuse replaced with a new one of the same current rating. Subsequently check the device without any load connected. In case the fuse blows again the device is defective and has to be repaired by an authorized technician.

### Remote control

The inverter can be switched on and off remotely by the use of a switch, the required small plug is supplied in the box. We suggest stranded wire of 2, x 0,5 mm<sup>2</sup> to be used with the supplied plug. The cable may be extended up to a length of 10m. You may use any switch as ON/OFF switch, since the internal 12V direct voltage is used as switching voltage. **IMPORTANT!** Do not connect the remote plug without the remote switch installed! If the loose stranded wire touches the metal housing, the inverter will be damaged! Always build the remote switch in before connecting the plug.

### Main switch

The inverter can be started by the main switch, which is located on the side of the inverter. If there is no load connected to the unit, it is recommended to switch the unit off, this will save the batteries from discharging.

### "E" Mark certified

The automotive EMC electromagnetic compatibility directive 95/54/EC was introduced to ensure that the driver's direct control of a vehicle is not affected by electromagnetic interference from installed electronic and electrical equipment. Since October 2002 all aftermarket electrical and electronic equipment including radios, light bars, sirens, videos etc must be compliant with the directive and "e" marked accordingly.