ECTIVE TSI Series 230V Pure Sine Wave Inverter with NVS Function Instruction Manual

Contents

ECTIVE

ECTIVE TSI Series 230V Pure Sine Wave Inverter with NVS Function

Product Information

The ECTIVE SI & TSI Series Power Inverter Pure Sinewave is an inverter that converts DC power from a battery into AC power that can be used to run household appliances, tools, and other electronics. The inverter is available in various models with different power ratings ranging from 300W to 3000W and input voltages of 12V or 24V. The inverter comes with a recommended cable cross-section size of 100cm, 150cm, or 200cm.

Product Usage Instructions

1. Before using the inverter, ensure that the battery and cables are properly connected to the inverter.
2. Turn on the inverter using the ON/OFF switch located on the front panel.
3. The LED indicators on the front panel will show the status of the inverter. The ‘Power’ LED indicates that the inverter is on and functioning correctly. The ‘Fault’ LED indicates that there is a problem with the inverter.
4. The USB port on the front panel can be used to charge small electronic devices such as smartphones and tablets.
5. The Schuko socket on the front panel can be used to connect household appliances and other electronics to the inverter.
6. For models with a remote control, connect the remote control using the RJ12 cable, and use it to control the inverter from a distance.
7. Ensure that the inverter is not used in vehicles where the positive pole is connected to the body of the vehicle.
8. Refer to the user manual for further information on operating and maintaining the inverter.

What is an inverter

An inverter is a technical device to invert d.c. voltage into sinusoidal alternating voltage. In the case of the ECTIVE inverter the d.c. voltage is usually provided by a battery. In this way, the inverter inverts direct into alternating current. The 230 V grounded protected contact socket of the inverter allows to operate electronic devices independant of positi-on and autonomously, which usually need a 230 V a domestic power supply. With the ECTIVE TSI series, you also have the function of a uninterruptible power supply (UPS). Existing mains current is here prioritized. If the mains is switched off, the inverter automatically switches to battery operation within 16 ms and ensures an uninterrupted operation of your consumers.

ECO-Mode:
With the ECO-Mode from TSI5-series you have the additional function of a battery priority circuit. When the ECO-Mode is switched on and AC- Power is available, the battery does not use the AC power and the batteries will not be charged. (ECO-Mode = Energy-Saving-Mode) The battery priority function is active as long as the battery voltage is over the certain “cut off”-battery voltage (voltage values see the chart “safety features”). If this value is deceeded and the shore power is still connected, the inverter returns to mains priority circuit to avoid battery damage.

Explanation of symbols

- **Warning!**
  Failure to comply with these instructions could result in death or serious injury.
- **Caution!**
  Failure to comply with these instructions can cause functional impairment or damage of the device.
- **Please note!**
  Further information for the operation of the device.

Scope of supply

- 1x Inverter
- 1x 230 V cold-device plug (devices of the TSI-Series up to including 2500W)
- 1x Operating Instructions

Model	Continuous output	Input voltage
SI 3	300 W	12 V
SI 3		24 V
SI 5 / TSI 5	500 W	12 V
SI 5 / TSI 5		24 V
SI 10 / TSI 10	1000 W	12 V
SI 10 / TSI 10		24 V
SI 15 / TSI 15	1500 W	12 V
SI 15 / TSI 15		24 V
SI 20 / TSI 20	2000 W	12 V
SI 20 / TSI 20		24 V
SI 25 / TSI 25	2500 W	12 V
SI 25 / TSI 25		24 V
SI 30 / TSI 30	3000 W	12 V
SI 30 / TSI 30		24 V

Reccomended battery cables and battery capacity

(Cables and batteries are not included!)

Model	Input voltage	Number of sets	Recommended thickness at 100cm	Recommended thickness at 150cm	Recommended thickness at 200cm	Recommended thickness at 300cm	Battery capacity (Wet, Gel, AGM)	Battery capacity (LiFePO4)
SI 3	12V	1	4mm²	6mm²	10mm²	16mm²	≥ 50 Ah	≥ 25Ah
SI 3	24V	1	2,5mm²	4mm²	6mm²	10mm²	≥ 25 Ah	≥ 12Ah
SI/TSI 5	12V	1	6mm²	10mm²	16mm²	25mm²	≥ 100 Ah	≥ 50Ah
SI/TSI 5	24V	1	4mm²	6mm²	10mm²	16mm²	≥ 50 Ah	≥ 25Ah
SI/TSI 10	12V	1	16mm²	25mm²	35mm²	50mm²	≥ 160 Ah	≥ 90Ah
SI/TSI 10	24V	1	6mm²	10mm²	16mm²	25mm²	≥ 80 Ah	≥ 50Ah
SI/TSI 15	12V	2	10mm²	16mm²	25mm²	35mm²	≥ 250 Ah	≥ 125Ah
SI/TSI 15	24V	2	6mm²	10mm²	16mm²	25mm²	≥ 120 Ah	≥ 70Ah
SI/TSI 20	12V	2	16mm²	25mm²	35mm²	50mm²	≥ 320 Ah	≥ 180Ah
SI/TSI 20	24V	2	10mm²	16mm²	25mm²	35mm²	≥ 160 Ah	≥ 90Ah
SI/TSI 25	12V	2	25mm²	35mm²	50mm²	50mm²	≥ 400 Ah	≥ 200Ah
SI/TSI 25	24V	2	10mm²	16mm²	25mm²	35mm²	≥ 200 Ah	≥ 100Ah
SI/TSI 30	12V	2	25mm²	35mm²	50mm²	50mm²	≥ 480 Ah	≥ 250Ah
SI/TSI 30	24V	2	10mm²	16mm²	25mm²	35mm²	≥ 240 Ah	≥ 125Ah

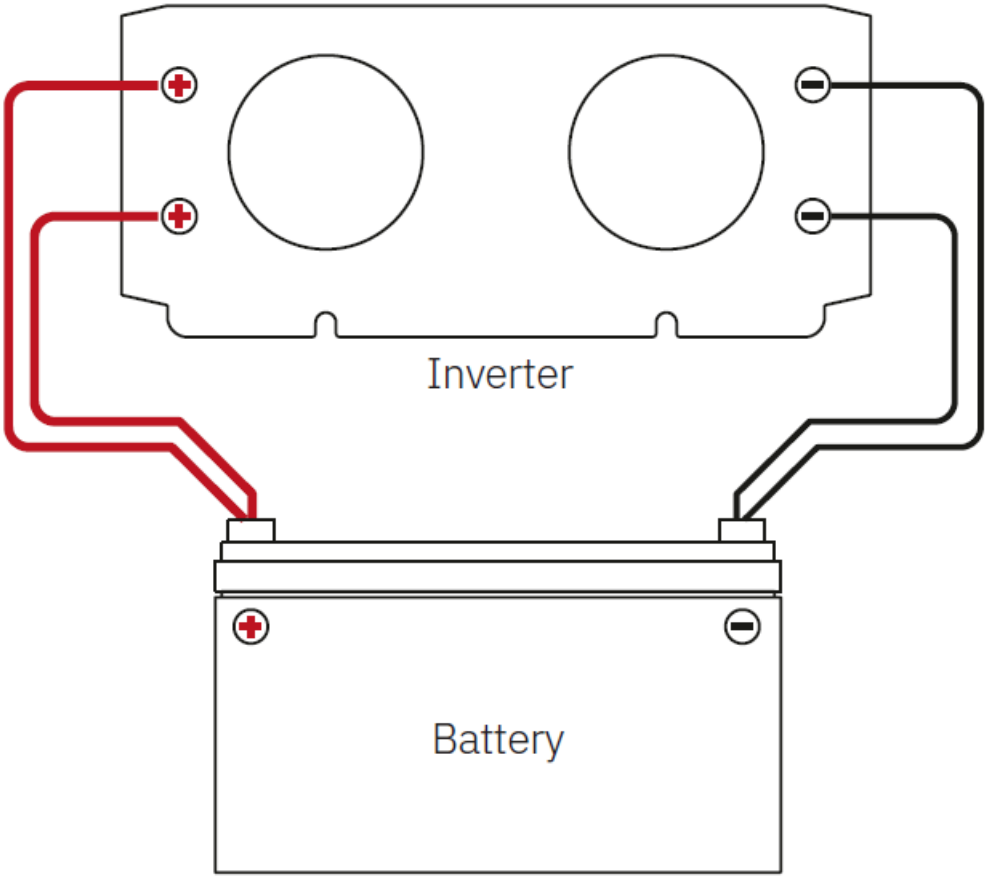
Caution!

Please note the capacity!
An underrun of the recommended battery capacity can cause a loss of performance or serious use restrictions as a result of voltage drops.

Warning!

Fire hazard!
If two sets of battery cables are recommended, both sets with an appropriate cable thickness must be installed. Failure to do so can easily lead to overheating of the overloaded cables and connection points and cause a dangerous cable fire.

Connecting an inverter and a battery with 2 sets of cables



Caution!

Please respect sufficient ventilation!
The inverter produces heat loss. The device is equipped with thermal overload protection. Insufficient ventilation can affect the function of the inverter because the inverter can shut itself down for safety reasons. Please follow the appropriate installation advice below.

Accessories

Accessories (sold separately)

SI-Series

Model	Designation
All SI Models 500 W and upwards	Remote RC 1
All SI Models 500 W and upwards	3m RJ12 remote cable

TSI-Series

Model	Designation
All TSI Models 500 W and upwards	Remote RC 2
All TSI Models 500 W and upwards	3m RJ12 remote cable

Intended use

Warning!

Fire hazard!
The ECTIVE inverter of the SI/TSI-series are generally build for so called “Off-Grid”-Systems and should only be used autonomously. Do not connect the inverter output (socket) with an other voltage source. All models with a mains priority circuit should be connected with a power supply only through the provided AC-input. Disregarding this advice is life threatening and will destroy the inverter immediately.

Caution!
The inverter should not be used in vehicles, in which the +pole is connected to the chassis!

Caution!

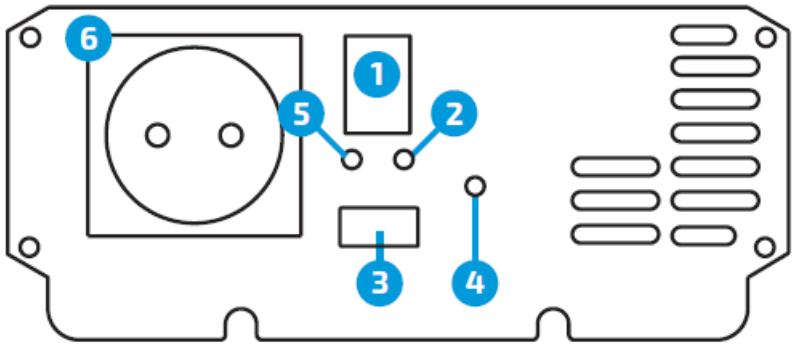
Please mind the input voltage!
The inverter should only be connected to voltage sources that correspond to following provisions. 12 V=12 V, 24 V= 24 V

If connected to a higher voltage source the fuse can immediately blow and destroy the inverter.

Overview of the inverter

These illustrations show the most important external components and connections.

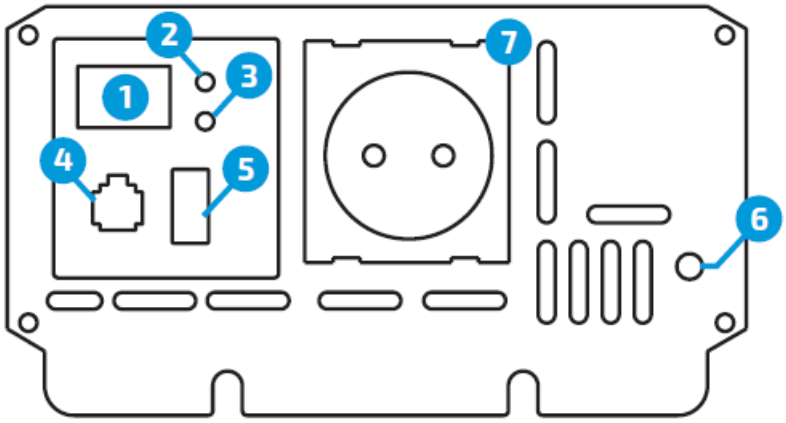
Front view: SI 3



1. Switch ON/OFF
2. LED „Fault“
3. USB-port

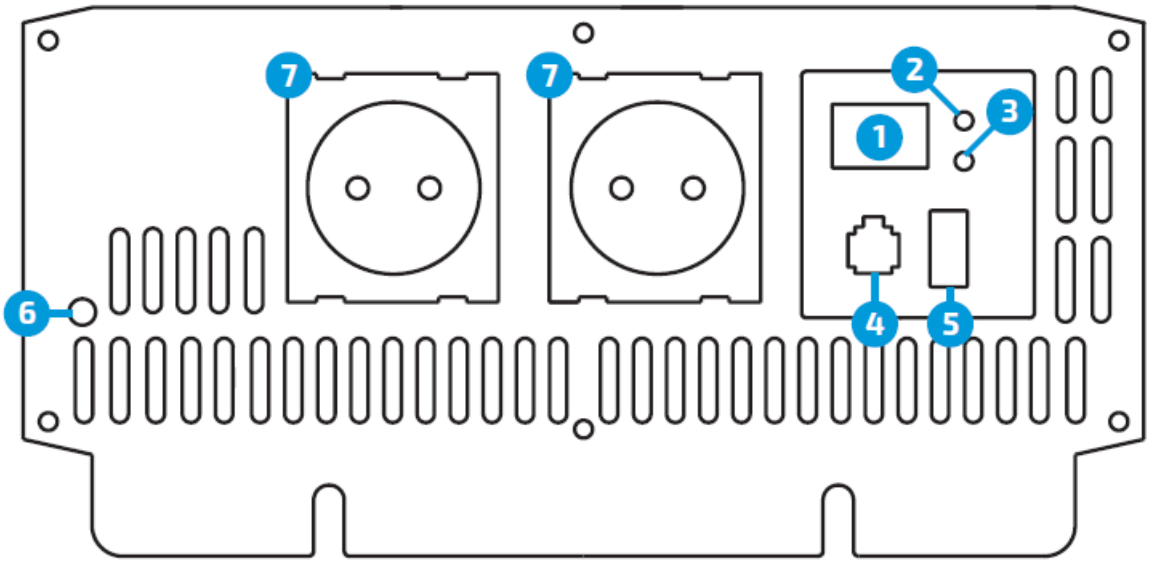
4. Protective earthing
5. LED „Inverter“
6. 230 V power socket

Front view: SI 5 and SI 10



1. Switch ON/OFF
2. LED „Power“
3. LED „Fault“
4. Remote control port
5. USB-port
6. Protective earthing
7. 230 V power socket

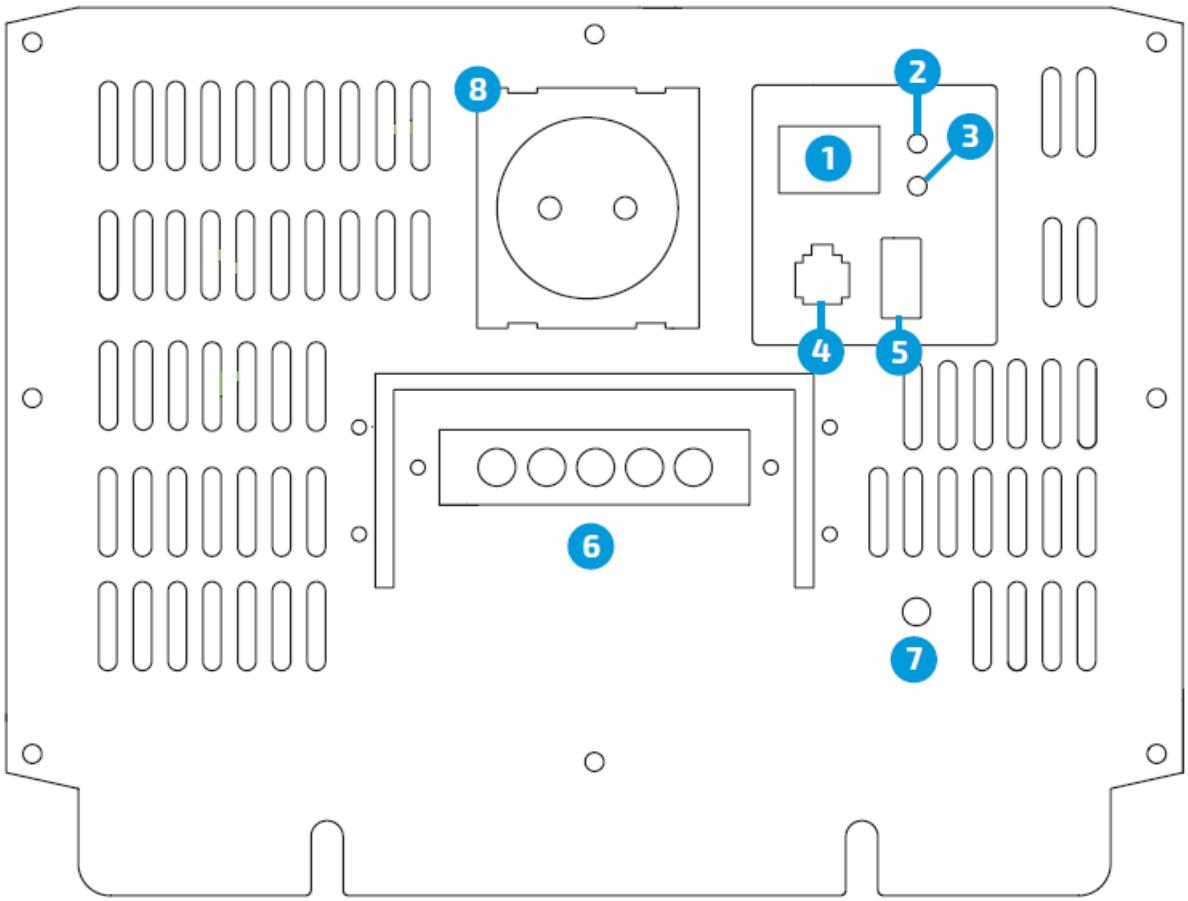
Front view: SI 15, SI 20 and SI 25



1. Switch ON/OFF
2. LED „Power
3. LED „Fault“
4. Remote control port

5. USB-port
6. Protective earthing
7. 230 V power socket

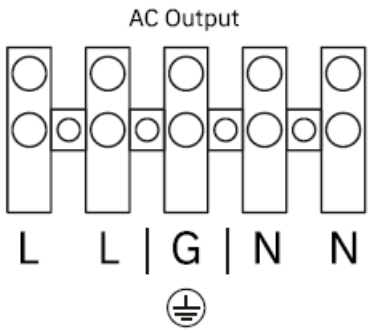
Front view: SI 30



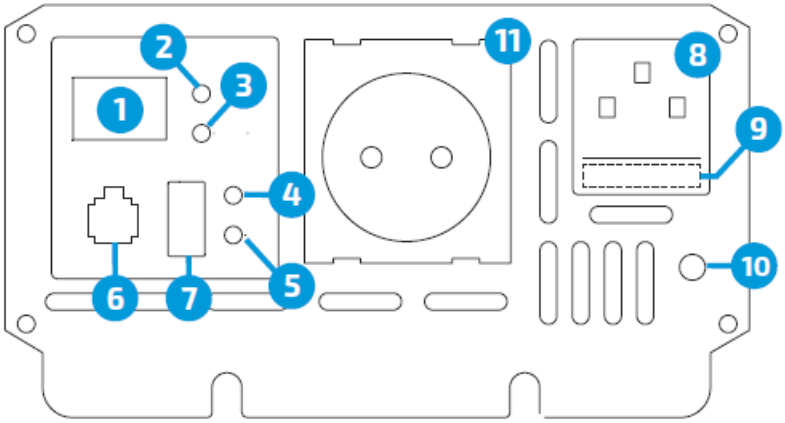
1. Switch ON/OFF
2. LED „Power“
3. LED „Fault“
4. Remote control port
5. USB-port
6. Shore power connection
7. Protective earthing
8. 230 V power socket

Terminal for direct connection

(SI 30)

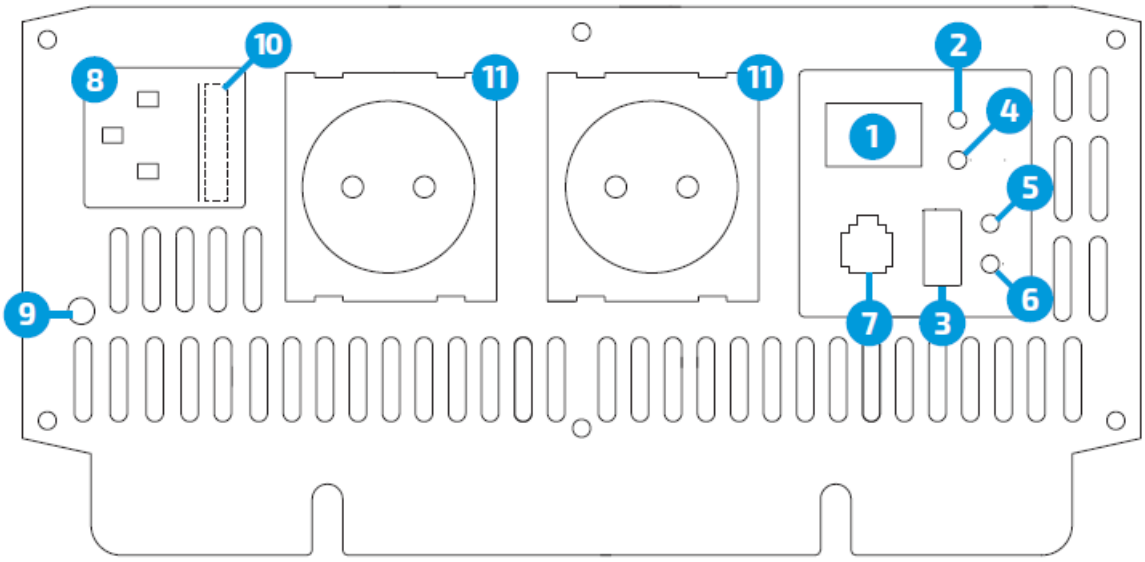


Front view: TSI 5 and TSI 10



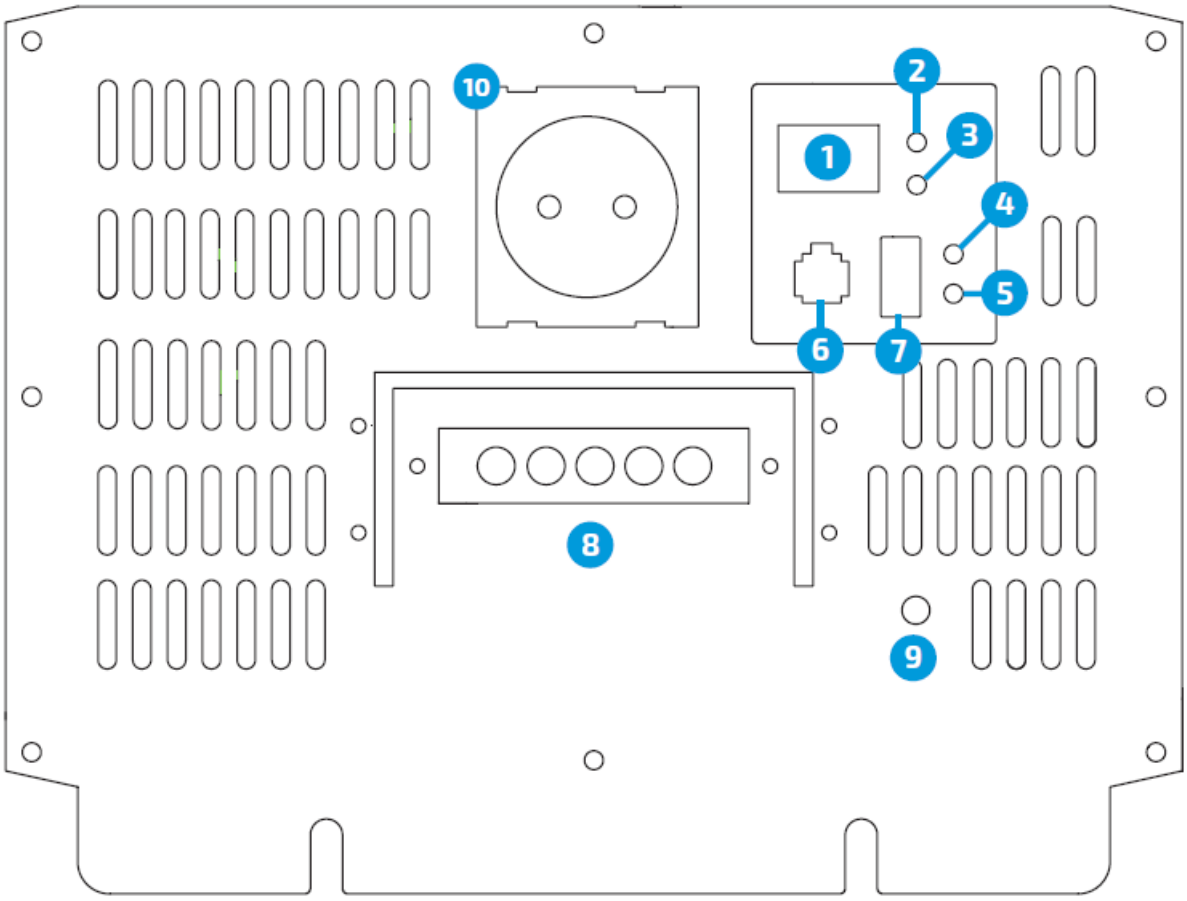
1. Switch ECO/OFF/UPS
2. LED „Power“
3. LED „Fault“
4. LED „AC-In“
5. LED „By-Pass“
6. Remote control port
7. USB-port
8. Shore power connection
9. Fuse
10. Protective earthing
11. 230 V power socket

Frontansicht: TSI 15, TSI 20 und TSI 25



1. Switch ECO/OFF/UPS
2. LED „Power“
3. USB-port
4. LED „Fault“
5. LED „AC-In“
6. LED „By-Pass“
7. Remote control port
8. Shore power connection
9. Protective earthing
10. Fuse
11. 230 V power socket

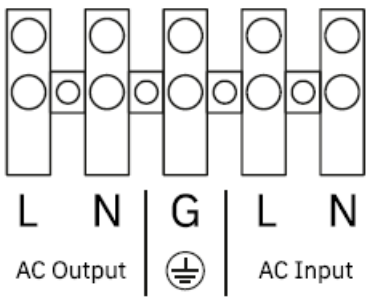
Front view: TSI 30



1. Switch ECO/OFF/UPS
2. LED „Power“
3. LED „Fault“
4. LED „AC-In“
5. LED „By-Pass“
6. Remote control port
7. USB-port
8. Shore power connection
9. Protective earthing
10. 230 V power socket

Terminal for direct connection

(TSI 30)



Caution!

Please note the maximum power of electronic devices! For currents >15 A electronic devices have to be connected directly to the terminal for direct connections.

Warning!

Risk of electric shocks
The device is always equipped with security features to prevent dangerous electronic shocks.

However, in order to ensure the highest possible safety during operation, it is imperative that the inverter's ground connection be connected to a protective earth (usually green-yellow cable) in any case.

Operating conditions

Everything at a glance

Power indication proportional to the continuous output indicated in %	120% – 150% for 10 seconds 150% – 200% for 2 seconds
Switching time UPS (TSI series)	<16 ms
AC voltage	230 V
	AC voltage fluctuation: max . 10%
	Frequency: 50 Hz ± 1Hz
Waveform	Pure sine wave (THD < 4%) at rated input voltage
Battery types	Wet, AGM, GEL, Li-Ion (only with BMS)

Idle current consumption SI-/TSI-Series

Caution!

Idle current consumption!
When the inverter is not in use, turn it off with the main switch. Otherwise, idle current consumption will take place according to this table and deep discharge may damage your battery.

Model	12 V	24 V
SI 3	approx. 0,55 A	approx. 0,28 A
SI / TSI 5	approx. 0,60 A	approx. 0,30 A
SI / TSI 10	approx. 0,70 A	approx. 0,35 A
SI / TSI 15	approx. 0,90 A	approx. 0,45 A
SI / TSI 20	approx. 1,00 A	approx. 0,50 A
SI / TSI 25	approx. 1,10 A	approx. 0,50 A
SI / TSI 30	approx. 1,20 A	approx. 0,60 A

Efficiency range

System voltage	Efficiency
12 V	86% – 90%
24 V	87% – 91%

The efficiencies depend on the type of consumer and load. For example, the inverter typically has the highest efficiency at a load of approx. 70 %.

Recommended surrounding conditions

Operating temperature	-15 °C to 40 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	20 % ~ 90 %

Please note!

Please mind the starting current!
Keep in mind that inductive devices (for example power drills or refrigerators etc.) often need a 3–10 times higher power at the beginning than indicated on the descriptive type plate. The maximum power of this short period should not surpass the maximum power of the inverter.

Please note!

Listen to the acoustic signal!
In case of overload, an acoustic signal will sound. If the needed power is not reduced to the maximal continuous output, the inverter will shut down automatically.

Please note!

Output losses because of heat
An ambient temperature over 40°C (for ex. due to heat at the installation site or direct sunlight) can lower the specified output and efficiency.

General safety instructions and installation notes

Warning!

Limited number of users
The following persons should use this product only under the supervision of another responsible person:

- persons with limited physical aptitude
- persons with limited mental aptitude
- persons with limited sensory aptitude.
- children under the age of 12
- Use the device only in accordance with its designated use.

- Store the device out of the reach of children.
- Maintenance and repairs may only be performed by a specialist who is familiar with the latest guidelines (for ex. VDE- standards).

Warning!

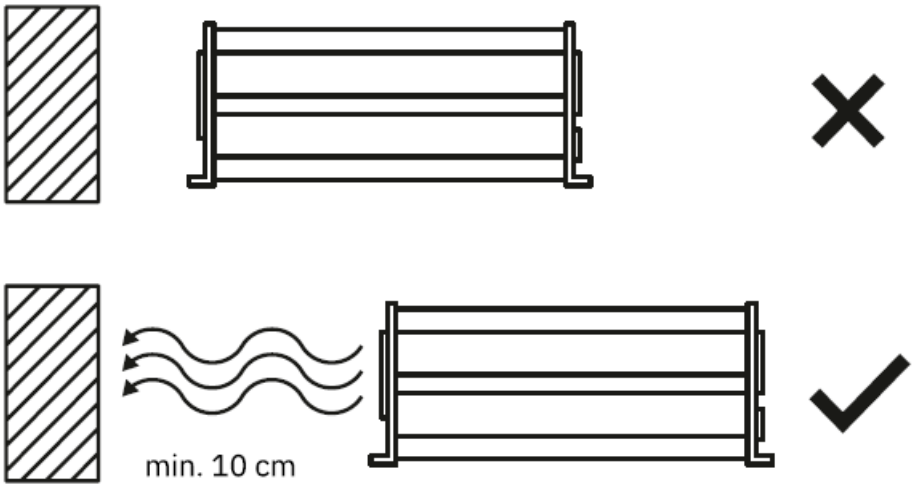
Installation instructions

- The installation of this equipment may only be performed by trained and authorized personnel and in compliance with all applicable safety regulations and guidelines.
- Especially when used on a boat an incorrect installation can lead to corrosion damage. Therefore the installation should be performed by trained boat electricians.

Warning!

Important mounting instructions!
To reduce the risk of fire, injuries and electronic shocks, please note the following instructions:

- The device can be installed horizontally or vertically.
- Do not cover the ventilation slits and ensure adequate ventilation. The installation site of the inverter has to be well ventilated.
- Install the inverter only on solid mounting surfaces.
- Do not pull the cable.
- Grasp all cables tightly during the mounting and dismantling.
- Always start with connecting the input voltage and switch the inverter on afterwards.
- Do not install near heat sources or in direct sunlight.
- Avoid dust, humidity and flammable or caustic substances near the inverter.
- The inverter heats up during operation, keep away from heat-sensitive materials.
- Do not drop the inverter and avoid shocks.
- Do not place any objects on top of the inverter.
- Do not open the device.
- Only use dry wipes for cleaning. Switch off the inverter before cleaning.
- Switch of the inverter before all kinds of work.
- In case of sharp-edged ducts please use an empty conduit or cable bushing.
- Do not use the same duct for the 230 V output cable and the DC cable.
- Only use the device if the inverter is without any damage.
- Do not cover the ventilation slits.
- The power supply must be switched off before handling the device.



Commissioning of the inverter

1. Make sure that the on/off button of the inverter is switched “off”. If the input voltage is provided by a supply unit, switch it off as well.
2. Connect the inverter to the DC voltage source with the delivered cables.
3. Connect the delivered power cable to the inverter (TSI-Series).
4. Switch on the inverter.
5. **only for TSI-Series:** wait approx. 12 sec. until the inverter turns on.
6. Switch on all of the electronic devices one by one.

Please note!

Sparking!
The connection process to the input DC voltage source leads to sparking because of the charging of the internal capacitors.

Wintering / prolonged non-utilization

Please note!
When the inverter isn‘t in use for longer periods of time, please follow this advice to protect your battery from discharge:

1. Disconnect all consumers from the inverter
2. Disconnect the battery from the inverter by using a disconnector or by disconnecting the cables.

If the battery isn’t completely disconnected, a minimal current consumption by the inverter will continue to take place.

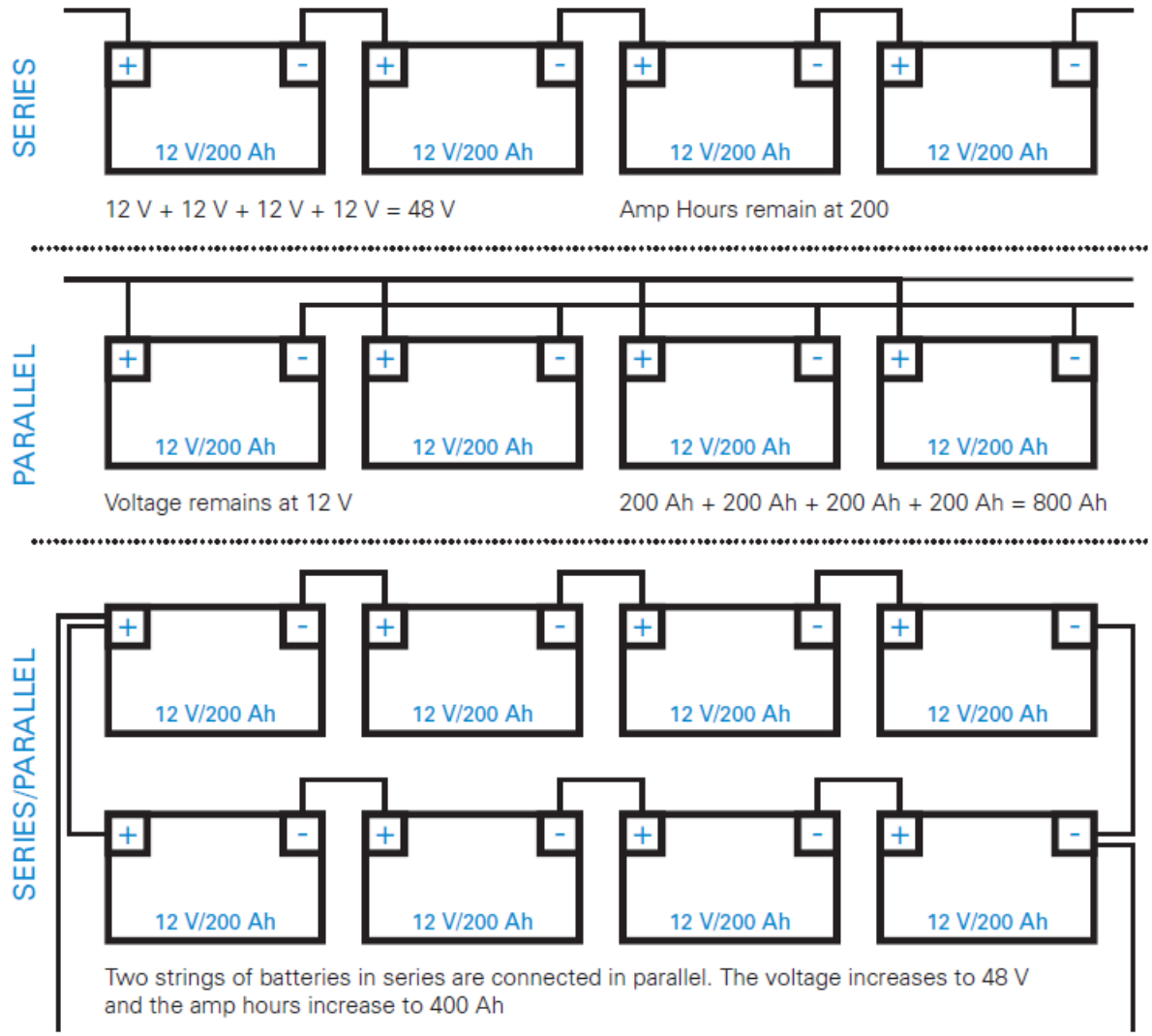
Possible configurations of batteries

If several batteries are used, there are various configuration possibilities of the battery banks depending on the inverter model (12 V, 24 V).

- Series connection (serial): voltages add up, capacity remains unchanged.
- Parallel connection (parallel): capacities add up, voltage remains unchanged.

- Series and parallel connection (serial and parallel): capacities and voltages add up.

Examples:



Technical information

SI-Series

Model	Power	Dimensions (LxWxH)	Empty weight
SI 3	300 W	175 × 150 × 55 mm	1,3 kg
SI 5	500 W	255 × 150 × 75 mm	2,5 kg
SI 10	1000 W	370 × 150 × 75 mm	3,4 kg
SI 15	1500 W	360 × 220 × 90 mm	5,1 kg
SI 20	2000 W	385 × 220 × 90 mm	6,2 kg
SI 25	2500 W	445 × 220 × 90 mm	6,9 kg
SI 30	3000 W	425 × 220 × 150 mm	10,5 kg

TSI-Series

Model	Power	Dimensions (LxWxH)	Empty weight
TSI 5	500 W	300 x 150 x 75 mm	2,6 kg
TSI 10	1000 W	410 x 150 x 75 mm	3,5 kg
TSI 15	1500 W	390 x 220 x 90 mm	5,3 kg
TSI 20	2000 W	450 x 220 x 90 mm	6,4 kg
TSI 25	2500 W	500 x 220 x 90 mm	7,2 kg
TSI 30	3000 W	500 x 220 x 150 mm	10,8 kg

Safety features

Please note!

Restart necessary!
The inverter is equipped with several safety features to protect the inverter and all its components as for example the batteries. The inverter is equipped with a thermic and electronic over-/undervoltage protection. If the required values are exceeded or not reached, the device disconnects the AC output and must be switched off and on again before restarting via the ON/OFF switch.

Caution!
The device remains switched on when the AC output is disconnected. There is a risk of deep discharge of connected batteries due to the power consumption of this standby mode.

The inverter disconnects the AC output in the following cases:

- internal temperature too high
- required output load too high
- input voltage too high or too low

Reason	12 V	24 V	Action
risk of under-voltage	10 .8V±0 .2V	21 .6V±0 .4V	2x acoustic signal + red LED flashing, inverter still working
total undervol- tage	10 .2V±0 .2V	20 .4V±0 .4V	3x acoustic signal + red LED flashing, automatic i nverter shutdown
overvoltage	15 .5V±0 .2V	31 .0V±0 .4V	4x acoustic signal + red LED flashing, automatic i nverter shutdown
overheating	internal temperature >75°C		5x acoustic signal + red LED flashing, automatic i nverter shutdown
overload due to pow erful consumers	regardless of the type		constant acoustic signal + red LED flashing, auto matic inverter shutdown
short circuit of consu mers	regardless of the type		11x acoustic signal + red LED on, automatic invert er shutdown
polarity reversal	SI 3		via fuse: the fuse blows
	SI 5, SI 10, SI 15, SI 20, SI 25, SI 30 TSI 5, TSI 10, TSI 15, TSI 20, TSI 25, TSI 30		via MOSFET: MOSFET cutoff
undervoltage ECO-Mode	11V±0 .2V	22V±0 .4V	shift to mains priority circuit

Please note!

Exclusion of liability
Damages caused by polarity reversal and short circuits are excluded from liability.

Self error correction

Symptom	Possible cause	Solution
• inverter switched on • status LED does not flash • no acoustic signal • no output voltage	No input voltage .	1 . check battery voltage 2 . check i nput fuse 3 . check all connections to battery
	blown fuse due to polarity reversal (Caution: polarity reversal can dam age the inverter despite a fuse)	Exchange blown fuses and connect cables correctly . If inverter does not work after excha nge, it’s broken . Please call the support!
Acoustic signal sounds once	1 . connection to consumers cut off 2 . short circuit of consumers	1 . check connection 2 . check if short circuit
acoustic signal sounds 2x and red LED flashes .	possible undervoltage (see table)	1 . check charging status of battery, charge if necessary 2 . check compatibility of battery ca ble, use higher cross section if necessary 3 . check if conductive parts (cables , pole terminals, lugs) are damaged

Symptom	Possible cause	Solution
acoustic signal sounds 3x and red LED flashes	total undervoltage (see table)	1 . check charging status of battery, charge if necessary 2 . check compatibility of battery ca ble, use higher cross section if neces- sary 3 . check if conductive parts (cables , pole terminals, lugs) are damaged
acoustic signal sounds 4x and red LED flashes	input voltage too high (see table)	1 . check voltage 2 . check charging voltage of batter y charger 3 . check if there are un- wanted vol tage sources
acoustic signal sounds 5x and red LED flashes	inverter overheated	check ventilation, if damaged, call s upport check if ventilations slits are free check if ambient air is cool enough reduce power
red LED flashes permanently	maximum short-term power reache d	switch off inverter reduce power cool down inverter

Caution!

Immediately eliminate error sources!

- Make sure that error sources are eliminated. Multiple restarts due to unsolved errors can destroy the inverter.
- Especially prevent short circuits and polarity reversals because they can destroy the device despite protection.

Guarantee

The statutory warranty period shall apply. In case of complaints, please contact the office located in your country or the point of sale. In order to receive a quick response to your guarantee request, please send the following documents.

- copy of invoice with purchase date
- justification of complaints or error description

Please note!
In the following cases the liability for damage is excluded:

- damage of the device caused by overvoltage and mechanical impacts
- mounting and connection errors
- inappropriate use of the device
- modification of the device without permission of the producer

Disposal
Please recycle or dispose of the packaging material for this product. The german Electronic Equipment Act (ElektroG) regulates how to place electronic devices on the market, how to recycle and dispose of them.

Please note!
In case of decommissioning of the device, please contact the nearest recycling centre or point of sale in order to get information about the disposal regulations.

ECTIVER

eine Marke der / a brand of batterium GmbH

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Documents / Resources

	ECTIVE TSI Series 230V Pure Sine Wave Inverter with NVS Function [pdf] Instruction Manual TSI Series 230V Pure Sine Wave Inverter with NVS Function, TSI Series, 230V Pure Sine Wave Inverter with NVS Function, Wave Inverter with NVS Function, Inverter with NVS Function, NVS Function

References

- ECTIVE - Mobile Stromversorgung für Macher