

Frequently asked questions about inverters

How much battery capacity do I need with an inverter?

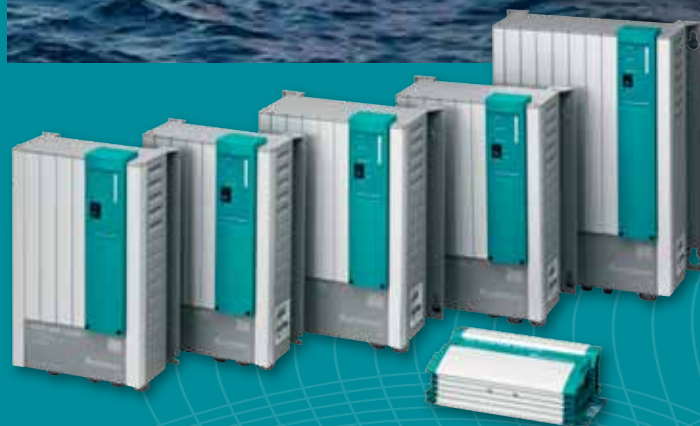
As a rule, the battery capacity for a 12 Volt system is around 20% of the inverter capacity. For 24 Volt inverters, it is 10%. The battery capacity for a 12 Volt Mass Sine 12/1200, for instance, is 240 Ah, while a 24 Volt Mass Sine 24/1500 inverter would require at least 150 Ah.

How much power does an inverter consume?

Mastervolt sine wave inverters have an output efficiency of at least 92%, which is the maximum that can be achieved with modern technology. Power loss due to the conversion process therefore amounts to approx. 8%. If you connect an 850 W coffee maker to a Mass sine wave inverter, consumption will be 850 W divided by the onboard voltage of 12 Volt, i.e. 70 A. Add another 8% ($100\% - 92\% = 8\%$) to this total for the inverter consumption, and you reach a total power consumption of $70 + 6 = 76$ A. Of course, a coffee maker will only be in use for a short period of time, so the consumption measured in Ah will be relatively modest ($76 \times 5 \text{ min.} = 6.5 \text{ Ah}$). As a rule you should divide the connected capacity by 10 for 12 Volts and by 20 for 24 Volts. This also includes all the power losses in the cables and the inverter.

Is there a stand-by switch on the inverter?

Definitely! Most Mastervolt inverters and Combis are even equipped with two energy saving solutions. Activating the Economy mode reduces battery consumption by an extra 10%. A dipswitch or jumper arrangement needs to be adjusted for this function, which takes output voltage down to 208 Volt, thereby also reducing power consumption from the battery. Low-load devices like microwaves and DVD clocks function as normal at this lower voltage. With some inverter models it is even possible to activate a stand-by mode.



In this mode the inverter sets a tiny pulse on the 230 Volts installation, checking for any connected appliances. As soon as the pulse detects consumption, voltage returns to normal strength to power the connected equipment. The economy mode ensures that the power consumption of the inverter stays at virtually zero.

Can I power a computer with an inverter?

Yes, you can. All Mastervolt sine wave inverters can easily and safely supply a computer without the slightest problem or risk. In fact, the output voltage from an inverter is often better than that from the electricity grid. This is why Mastervolt inverters, combined with a battery charger and a battery set, are often used as a shore back-up system in places where the grid connection is unreliable. Laptops can also be powered by an inverter.



Can a microwave be powered with an inverter?

Any microwave model can be connected to a Mastervolt inverter. Bear in mind that an 800 Watt microwave consumes 1200 to 1300 Watt from the 230 Volt system, and that the capacity of the inverter must be able to handle this. Apart from that, the total consumption of the microwave-inverter combination is moderate: Using the microwave for five minutes will use around 8 Ah on a 12 Volt system and 4 Ah on a 24 Volt system.

Are there any appliances that cannot be powered by an inverter?

You can connect almost any appliance to an inverter, with a few practical exceptions. While heavy loads, such as that required by an electric heater, can be supplied by the inverter, battery capacity will usually be insufficient to maintain the supply for any significant length of time. Appliances that are only used for a limited time period, such as washing machines, driers or a small hotplate, should be fine as long as the battery has sufficient capacity. In these cases it is advisable to use a power source such as an alternator, which also powers the battery. Keep in mind that heavy users such as engines, pumps, air conditioning and fridges have a starting current that is between 5 to 10 times higher than the nominal absorbed capacity. The inverter has to be able to supply accordingly.

How much current will an inverter draw from my batteries?

This depends on the equipment connected to the inverter. There is a simple method to calculate how much power your

inverter is using: For 12 Volt inverters, divide the connected load by 10; for 24 Volt inverters, divide by 20.

How thick should my battery cables be?

Using the method described above, calculate how much power your inverter will be drawing at maximum capacity (120 amps in the case of a Mass Sine 12/1200, for example). Then count 3 amps per mm². In the above example this is 120 divided by 3 = 40 mm². The standard cable thickness closest to that is 35 mm². This rule applies to cables up to three metres in length. If the inverter is further away from the battery, choose the next size up (50 mm² for instance).

Does an inverter need a lot of ventilation?

An inverter needs very little ventilation - two approx. 60 cm² ventilation openings are usually enough. Larger inverters, from 1500 W upwards, need twice that size. Inverters used in high ambient temperatures, and those expected to be operating at full capacity for a long period, require openings that are four times as large.

Example: How much does an inverter consume with a 400W load connected?

For a 12 V inverter such as a Mass Sine 12/1200, consumption will be $400/10 =$ approx 40 amps.

For a 24 V inverter, say a Mass 24/1500, the corresponding figure is $400/20 =$ approx 20 amps.

It is important to remember that this is only an approximation: The actual consumption will tend to be some 5 to 15% less, depending on the load type.

Can an inverter be used in parallel with the generator or shore power?

No, stand-alone inverters cannot function in parallel with a generator or shore power. A Mastervolt Mass Combi is the solution if you need more power than is available from the shore power connection or the generator. If shore or generator power is connected to the onboard grid simultaneously with an inverter, we strongly advise installing a Masterswitch or Systemswitch junction. The main function of the Masterswitch is the automatic and safe switching between shore, generator and inverter power.

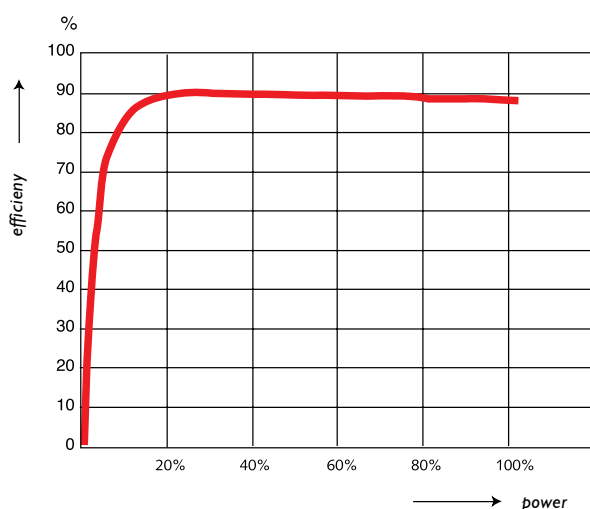
What is no-load consumption?

No-load consumption measures the amount of power used by the inverter during periods of no load while the inverter is still switched on. With modern inverters, this amount is approximately 4 Watt. Mastervolt inverters are equipped with an economy mode (see stand-by switch) so that no-load consumption can be reduced even further.

What is efficiency?

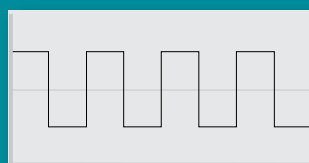
An inverter uses a small amount of energy during the conversion process. The difference between the input and the output is expressed in percentages. The efficiency of modern inverters is 92%. This means that 8% of capacity is used to convert battery voltage to 230 Volt 50 Hz. A connected load of 250 Watt, for instance, requires around 270 Watt to be supplied by the batteries

Efficiency versus capacity:

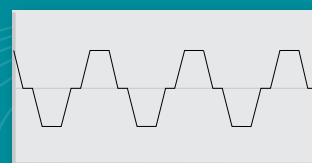


What are trapezoidal or square wave inverters?

Modern inverters generate a sine wave-shaped output current similar to that of the public grid and perfectly suited to powering sensitive equipment. Trapezoidal inverters, also called modified sine wave, are the ancestors of the modern sine wave inverters. As the name suggests, they generate an output current in the shape of a trapezium. This type of current is inappropriate for sensitive equipment. The square wave inverter, in turn, is the predecessor of the trapezoidal inverter and represents the first generation of inverters. It is also unsuitable for delicate equipment.

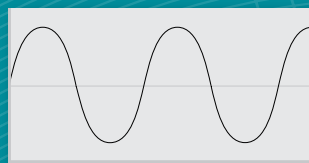


Square



Trapezoidal or modified sine wave

The best choice is a Mastervolt inverter with a sine wave-shaped output current. This will ensure you problem-free operation of the connected equipment.



Sine wave

Can I power a small air conditioning system via the inverter?

It is perfectly possible to power a small air conditioning installation of, for instance, 4500-6000 BTU via an inverter. While it is important to remember not to leave the air conditioning running for too long, cooling down a cabin before going to bed is fine as long as the battery set and inverter are correctly calibrated with this type of power consumption in mind. Also remember to pay attention to the start up current, which can be up to five times higher than nominal capacity.

Can I cook with electric appliances using an inverter?

Cooking is definitely possible with an inverter as long as the battery set is reasonably large and the inverter has a capacity of at least 2 kW. The preparation of a complete meal will, in general, require the generator to be activated or shore power to be plugged in. Switching on the generator to heat up a cup of soup or cook a steak or an egg is rather wasteful, since the generator will not even warm up properly before it is turned off again: This is bad for the generator and environmentally unsound. Instead, we recommend that you power one of the hotplates via the inverter - a snack can then still be prepared or heated without needing to start the generator. The inverter can also power the entire electric cooker, as long as a 5 to 10 kW inverter is combined with a battery of 24 Volt (with a minimum capacity of 600 Ah). Just remember to recharge the battery with the alternator or battery charger after use.



Inverter selection table

AC appliances	AC Master 300 W	AC Master 500/750 W Mass Sine 800 W	AC Master 1350 W Mass Sine 1200/1500 W	Mass Sine 2000/2500 W	Mass Sine 5000 W
• TV/DVD/audio	●	●	●	●	●
• NiCad battery charger	●	●	●	●	●
• PC/laptop	●	●	●	●	●
• small drill	●	●	●	●	●
• fluorescent lights	●	●	●	●	●
• small kitchen appliances	○	●	●	●	●
• small refrigerator	○	●	●	●	●
• small microwave	○	○	●	●	●
• coffee maker	○	○	●	●	●
• hairdryer (1000W)	○	○	●	●	●
• vacuum cleaner/microwave	○	○	●	●	●
• refrigerator/freezer	○	○	●	●	●
• angle grinder	○	○	●	●	●
• water pump	○	○	●	●	●
• heavy tools	○	○	●	●	●
• microwave/oven	○	○	●	●	●
• washing machine 3 kg	○	○	○	○	●
• air conditioning/electric hob	○	○	○	○	●
Battery capacity 12 V/min.	80 Ah	100 Ah	200 Ah	300 Ah	600 Ah
Battery capacity 24 V/min.	40 Ah	50 Ah	120 Ah	200 Ah	400 Ah

- Appliance can operate continuously if connected to inverter, capacity of battery decides operation time.
- Appliance or tool can operate for a reasonable amount of time (not continuously).
- Use next model.