DESCRIPTION EMERGENCY POWER FUNCTION

The devices of the Fronius Symo Hybrid series are offering the possibility to supply the household with power in the case of a power failure since autumn 2016. Basic requirements for the full use of the emergency power function are a Fronius Symo Hybrid Inverter, a connected battery*, a Fronius Smart Meter as well as the implementation of an emergency current switchover.

Technical data:
For the devices of the Fronius Symo Hybrid series the following technical data apply in emergency power supply:

	Fronius Symo Hybrid 3.0-3-S	Fronius Symo Hybrid 4.0-3-S	Fronius Symo Hybrid 5.0-3-S
Max. continuous power	3100W	4100W	5100W
Max. power per phase	1250W	1660W	2080W
Max. current	25A	25A	25A
Switchover time	<60s	<60s	<60s

Discharge power of the battery:
The maximum continuous power is also dependent on the discharge power of the connected battery.
The discharge capacity of the battery is calculated as follows:
Charging / discharging capacity = number of battery modules * 50V * 16A.

Example Solar Battery 7.5 (5 battery modules):
5 pieces * 50V * 16A = 4000W nominal capacity

Attention: the power can vary by up to +/- 20%, depending on the charge level.

The behavior under overload conditions is not affected from this limitation by the discharge power of the battery.

Nominal voltage and overcurrent:
After the device is started, the nominal voltage is immediately available.

In the short term, a maximum peak current of up to 25A per phase is possible. This value applies to all device alternatives. In this overcurrent case, the voltage is decreased to maintain the rated current. After reduction of the current (load is switched off), the voltage is raised again to the nominal voltage with a ramp.

* The emergency power function can be used without battery, due to alternating weather conditions shut off and a output fluctuations can occur.

Overload:
A short-term overload is possible for all devices (see figure 1-3). This refers to the respective power per phase. The graphs in the diagram below shows, that max. power of the inverter can be exceeded till the red dotted line gets reached. (e.g. Fronius Symo Hybrid 5.0: 5000W in 0,28s). In this overload case, compared to the overcurrent, the voltage is kept in the range of the nominal voltage.

Example overload without base load:
Device alternative Fronius Symo Hybrid 5.0
Max. unbalanced load: 2080W
Base load: 0W
Additional load: 4000W

There is a short-term load of 4000W. This can be provided as shown in Figure 1 for a maximum of **0.37 seconds** before the inverter is switched off to prevent thermal damage to the device.

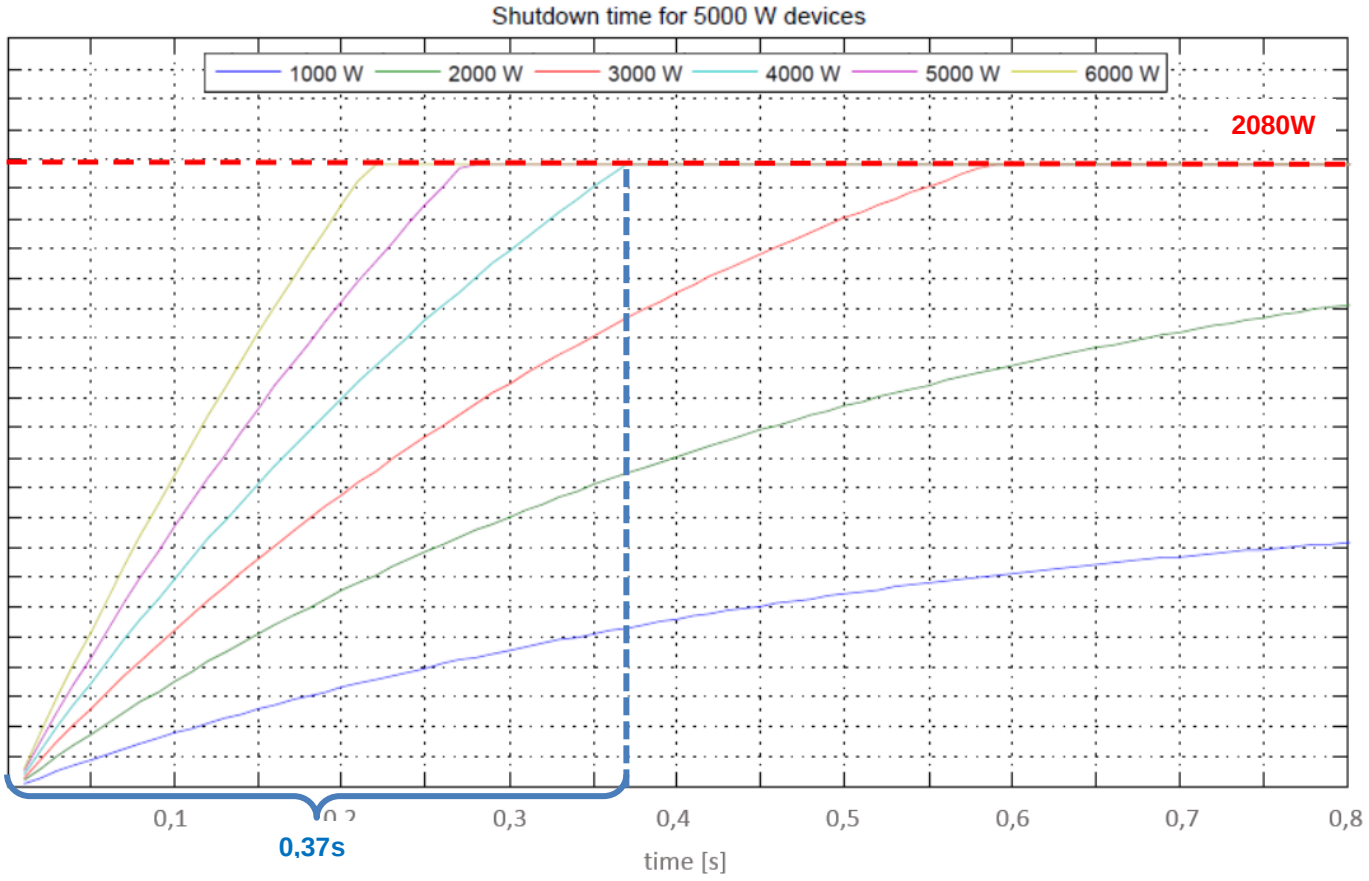

Figure 1: Power per phase according to time for Fronius Symo Hybrid 5.0

If devices are already in operation on the phase under consideration before the overload case, the overload duration reduces according to the previously obtained power (Figure 3-5).

Example of overload:
Device alternative Fronius Symo Hybrid 3.0
Max. unbalanced load: 1250W
Base load: 500W
Additional load: 2500W

There is a short-term load of 3000W. This can be provided as shown in Figure 2 for a maximum of **0.17 seconds** before the inverter is switched off to prevent thermal damage to the device.

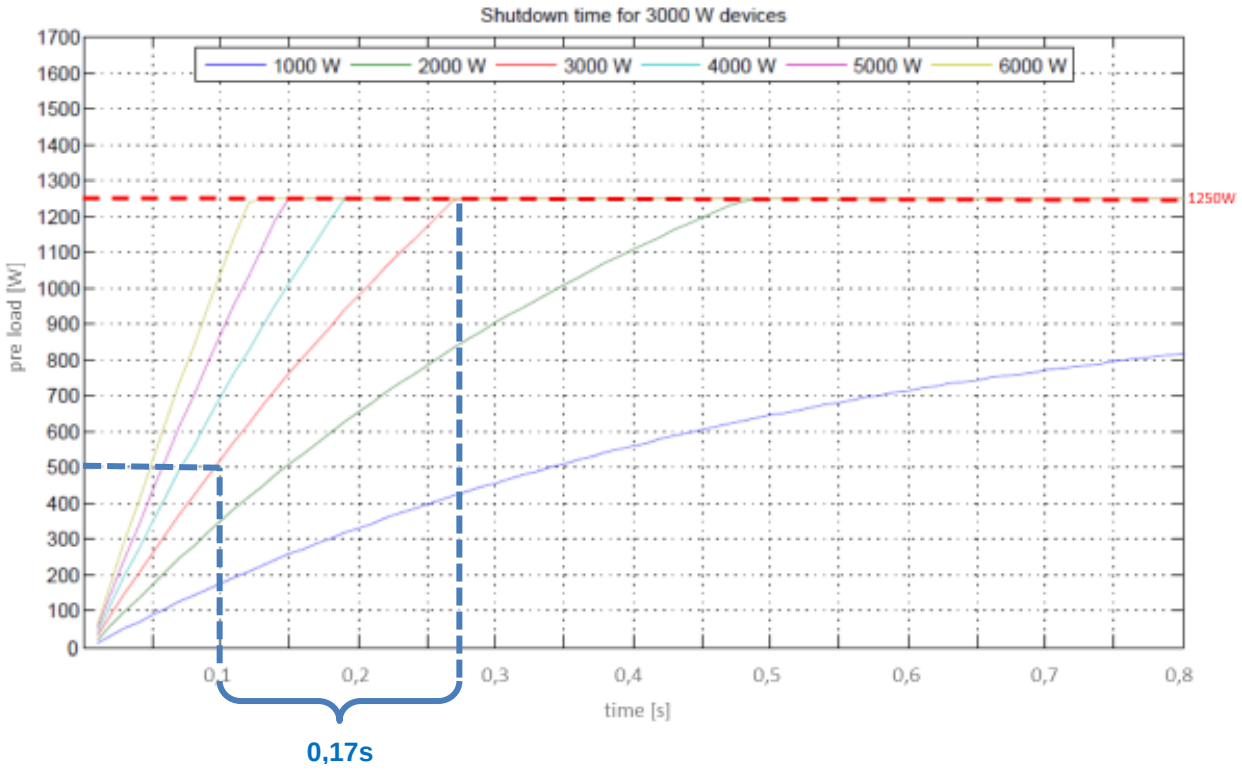

Figure 2: Fronius Symo Hybrid 3.0: Example preloading 500W connection of 2500W

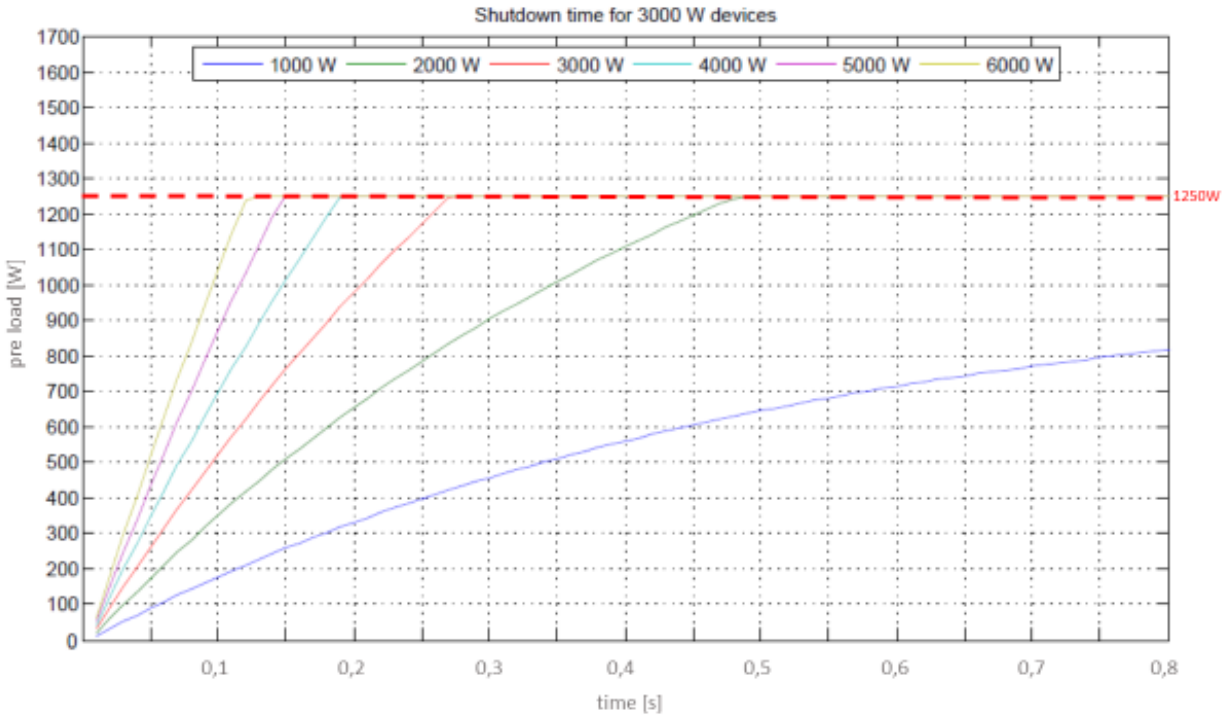

Figure 3: Power per phase according to time for Fronius Symo Hybrid 3.0

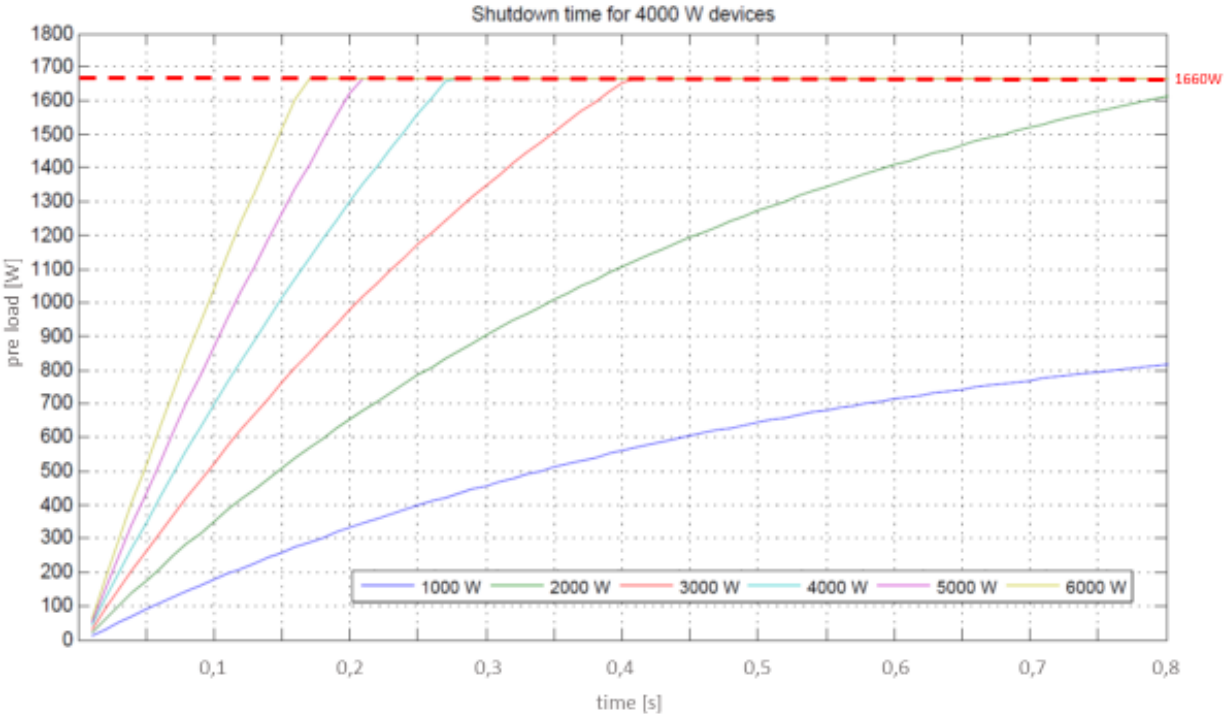

Figure 4: Power per phase according to time for Fronius Symo Hybrid 4.0

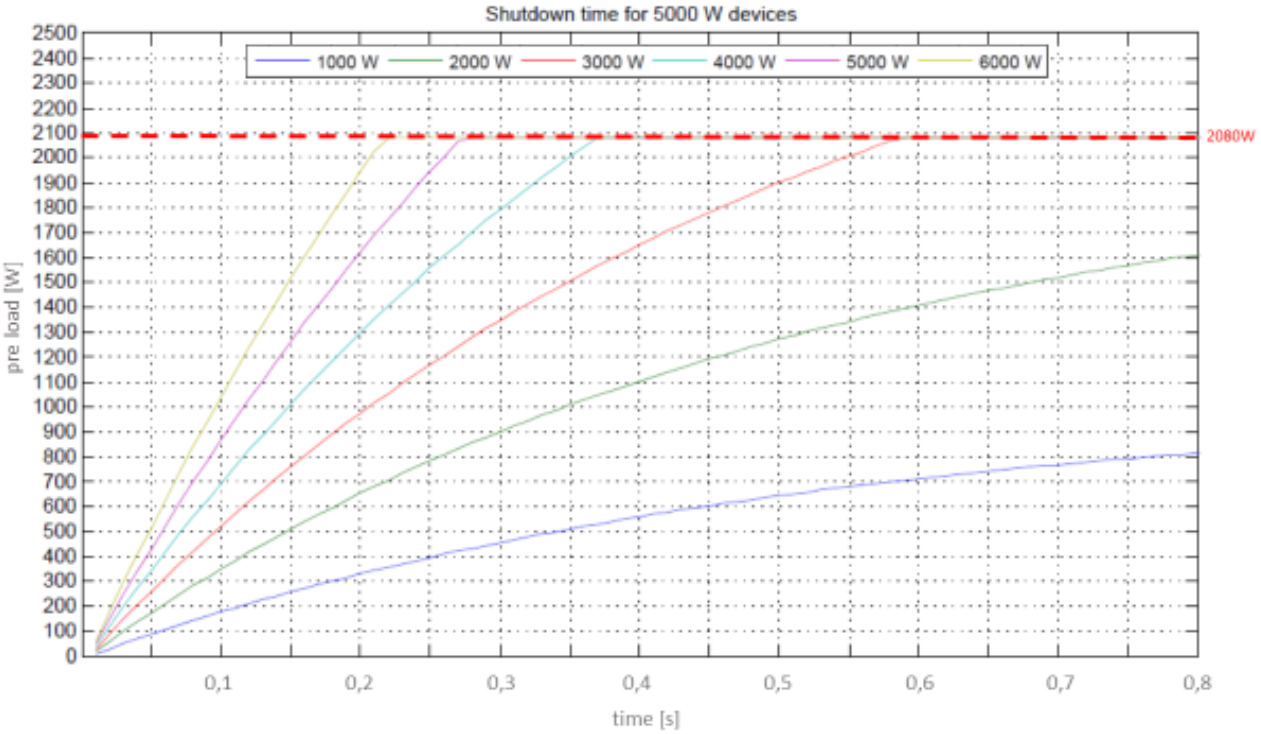

Figure 5: Power per phase according to time for Fronius Symo Hybrid 5.0

Three phase overload:
Similar to the power per phase, the total power of the Fronius Symo Hybrid can be exceeded for a short period of time. According to Figure 6-8 all Fronius Symo Hybrid inverters can handle up till 8KW for some hundredth of a second. Due to this consumers with a high starting current can be started.

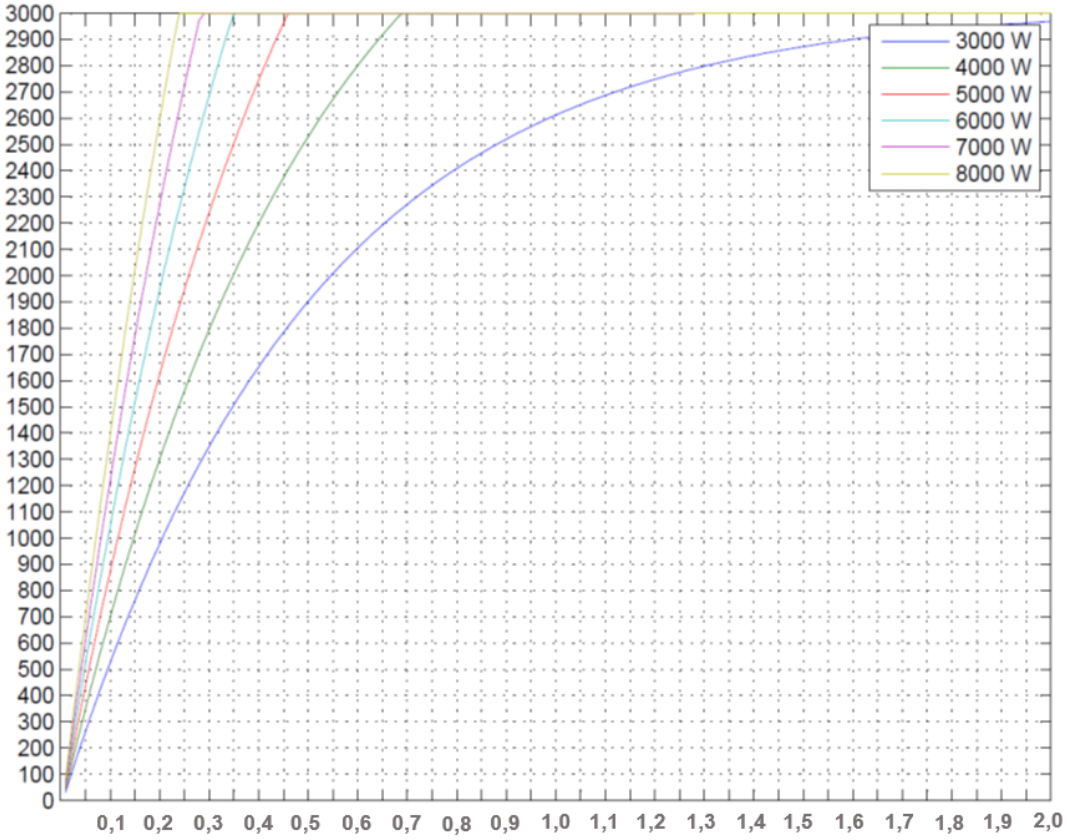

Figure 6: Total power according to time for Fronius Symo Hybrid 3.0

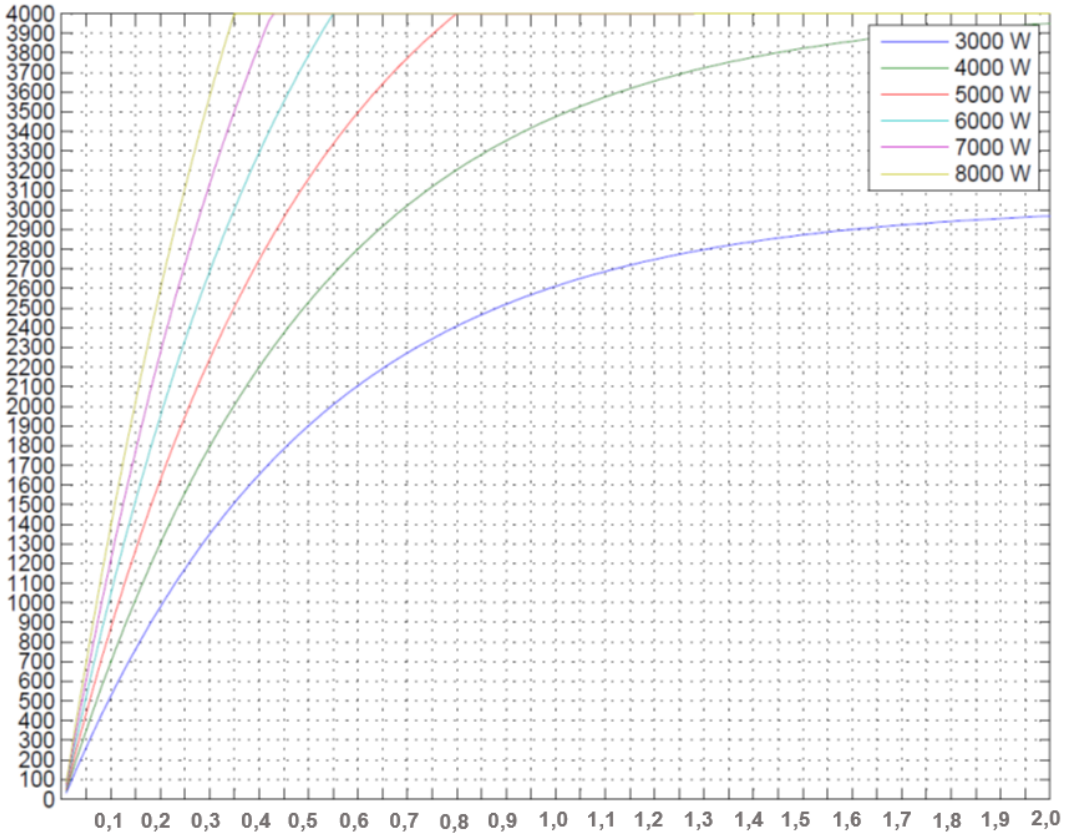

Figure 7: Total power according to time for Fronius Symo Hybrid 4.0

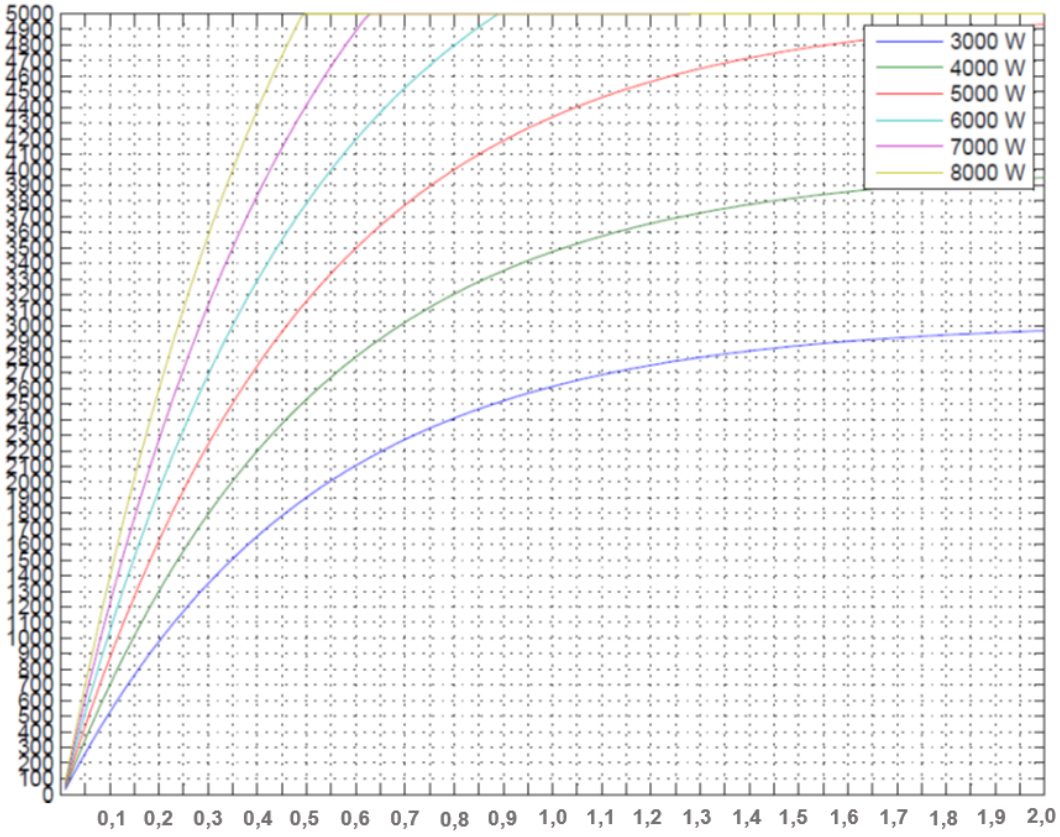

Figure 8: Total power according to time for Fronius Symo Hybrid 5.0

Emergency power switchover (grid disconnection):

The purpose of the emergency power switchover is to ensure the disconnection of the household from the grid before the isolated operation is activated. This ensures that maintenance personnel are not endangered by unintentionally fed energy.
Depending on the grid operator, the requirements for emergency power switchover can differ. The design of the emergency power switchover itself is the responsibility of the installation company and has to be coordinated with the grid operator. The wiring diagrams provided by Fronius (www.fronius.com) can be used as a planning aid.

Recommendation for emergency power installations:

- Combine important devices in their own emergency circuit
- Divide loads equal over all phases
- In the emergency power case switch the devices on time-delayed as far as possible

Frequently asked questions about emergency power supply

Which devices work in the emergency power supply?
An overall response is not possible because only a small number of devices can be tested. However tests have shown that devices with strong power supplies can lead to an interruption of the emergency power supply due to the very high inrush currents.

What can I do if the devices have too high inrush currents?

- Reduce or deactivate the basic load
- Add the not working devices on a different phase
- Use of inrush current limiters (can help with special consumer loads)

Example inrush current limiter:
http://www.schalk.de/messrelais/articles/ebn-2.html
http://www.ivt-hirschau.de/index.php?cPath=165_166
http://www.elv.at/elv-230v-einschaltstrombegrenzer-esb-54-1.html?refid=SEM_30007

Leitungsschutz von Verbrauchern im Notstrombetrieb:

The inverter has an integrated short-circuit monitoring and an undervoltage protection.

Tripping time:

- Undervoltage protection: 1,5s
- Short-circuit monitoring: 1,0s