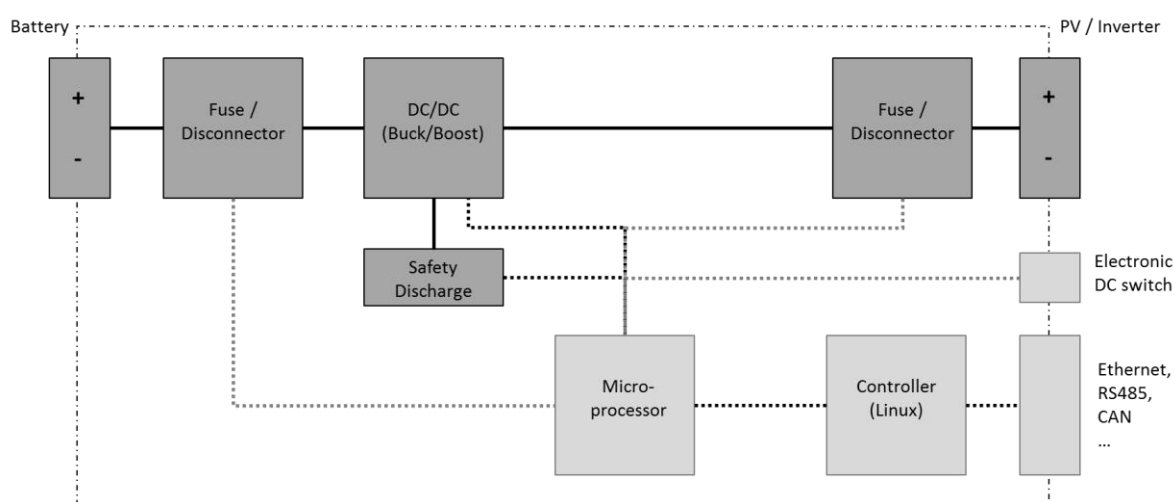


## TECHNICAL INFORMATION

The ambiBOX is a power modulating and bi-directional working DC/DC converter. It is based on a synchronous, transformerless converter topology. Due to the *DCDC Flow™* technology, it is able to link volatile DC sources and loads with different voltage levels dynamically and high response time at a time.

### BLOCK DIAGRAM



Its internal architecture is based on two controller units, one for safety, critical and core functionalities and one for EMS, BMS and customer applications.

The DC/DC power board consists of a synchronous converter (buck / boost) with SiC semiconductors in a two channel interleaved configuration.

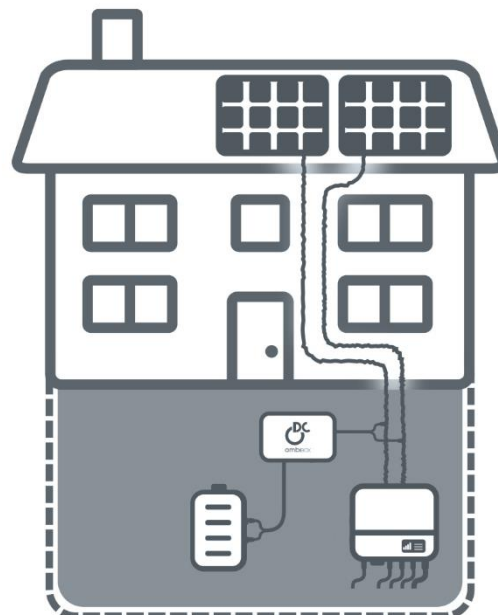
How does it work in principle?

The charging mode (power collecting mode, battery charging) is realized by fast switching on and off of the upper semiconductors by use of pulse width modulation (PWM) while the discharging mode (power providing mode, consumption mode) is using a similar PWM regulation pattern and switching on and off the low side semiconductors of a simple phase leg configuration. By dividing the needed current into several independent phases using the interleaved configuration, the total system can offer higher power levels by moderate total dissipation losses and smaller component size. The ambiBOX fact sheet shows possible power output levels according to different voltage ranges.

## WIRING

### Retrofit installation

The ambiBOX will be directly connected in parallel to the photovoltaic string. It behaves like a photovoltaic module / string. No communication between the inverter and the ambiBOX is required.

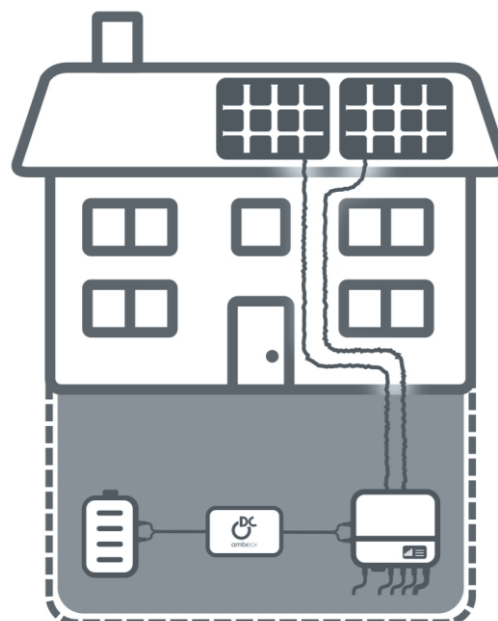


### Scalable and modular

Multiple ambiBOX devices can be used in parallel (Master-Slave).

### New installation

For new installations the ambiBOX can be connected to the "Battery-Link" / "DC-Link" of the inverter. Alternatively, a connection in parallel like for retrofitting is possible, too.



### Power supply

No external power supply is required. The ambiBOX is self-supplied out of the battery and the photovoltaic string.

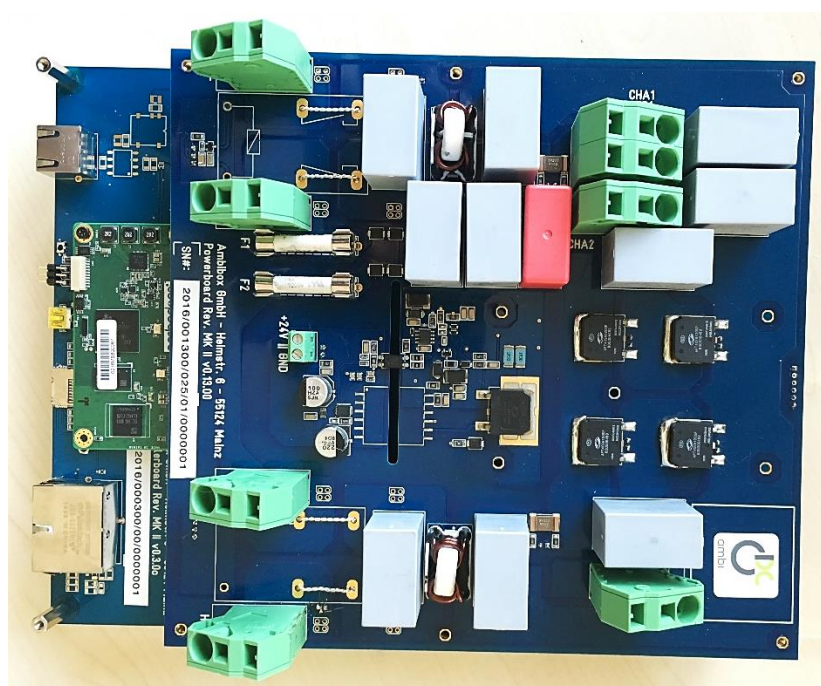
## SAFETY

The ambiBOX is able to detect and react on different failures and critical issues, for example: over-voltage, over-current, short-circuits and over-temperature, due to:

- Voltage and current sensing on both sides
- Fuses on both sides and terminals (+/-)
- Mechanical (galvanic) disconnection on the PV side, optionally on both sides
- Safety discharging unit on both sides
- Temperature sensing of power module and supplies

## PICTURE

The picture shows the prototype MK2 of the ambiBOX w/o housing and heat sink.



## SPECIFICATION

|                                       | AmbiBOX 48  | AmbiBOX mini      | AmbiBOX mid       | AmbiBOX car       | AmbiBOX open      |
|---------------------------------------|---|-------------------|-------------------|-------------------|-------------------|
| <b>Input voltage range</b>            | 48 VDC – 60 VDC   | 96 VDC – 120 VDC  | 250 VDC – 300 VDC | 400 VDC – 580 VDC | 48 VDC – 600 VDC  |
| <b>Maximum input current</b>          | <i>interleaved max 2x 25A</i>                                     |                   |                   |                   |                   |
| <b>Output voltage</b>                 | 110 VDC – 500 VDC   | 150 VDC – 800 VDC | 300 VDC – 800 VDC | 450 VDC – 800 VDC | 110 VDC – 850 VDC |
| <b>Continuous output power</b>        | 2000 W  | 4500 W – 6000 W   | 12000 – 14000 W   | 20000 W           | 2000 – 20000 W    |
| <b>Inverter DC link compatibility</b> | 1ph.  | 1ph. + 3ph.       |                   |                   |                   |
| <b>Response time P=0 =&gt; Pmax</b>   | 50 ms   |                   |                   |                   |                   |
| <b>PWM frequency / resolution</b>     | 57,6 kHz / 14 Bit   |                   |                   |                   |                   |
| <b>Minimum power</b>                  | 30 W  |                   |                   |                   |                   |
| <b>Own consumption</b>                | 6 W   |                   |                   |                   |                   |
| <b>Maximum heat dissipation</b>       | < 250 W   |                   |                   |                   |                   |
| <b>Communication</b>                  | RS485, UART, CAN (opt.), ETH (opt.)                               |                   |                   |                   |                   |
| <b>Protocols</b>                      | MODBUS RTU, MODBUS TCP (opt.), TCP/IP (opt.), CAN 2.0             |                   |                   |                   |                   |
| <b>Functionalities</b>                | bidirectional power supply, EMS, daisy chain, DC charging vehicle |                   |                   |                   |                   |
| <b>Outer dimensions</b>               | 30 x 21 x 15 cm   |                   |                   |                   |                   |
| <b>Weight</b>                         | approx. 5,5 kg  |                   |                   |                   |                   |
| <b>Efficiency<sup>2</sup></b>         | 89,82%  | 89,82% – 94,64%   | 89,82% – 94,64%   | 98,22%            | 89,82% – 97,87%   |

<sup>2</sup> efficiency estimation for P/Phom = 0.4 – 0.75



### DIN A4

Currently, the box fits to a DIN A4 paper format



### 8 Watts/cm<sup>3</sup>

Power density target



### Variable control

through the Internal microprocessor

## 48 to 800 Volt DC

VARIABLE INPUT AND OUTPUT BANDWIDTH