

# Plugbox

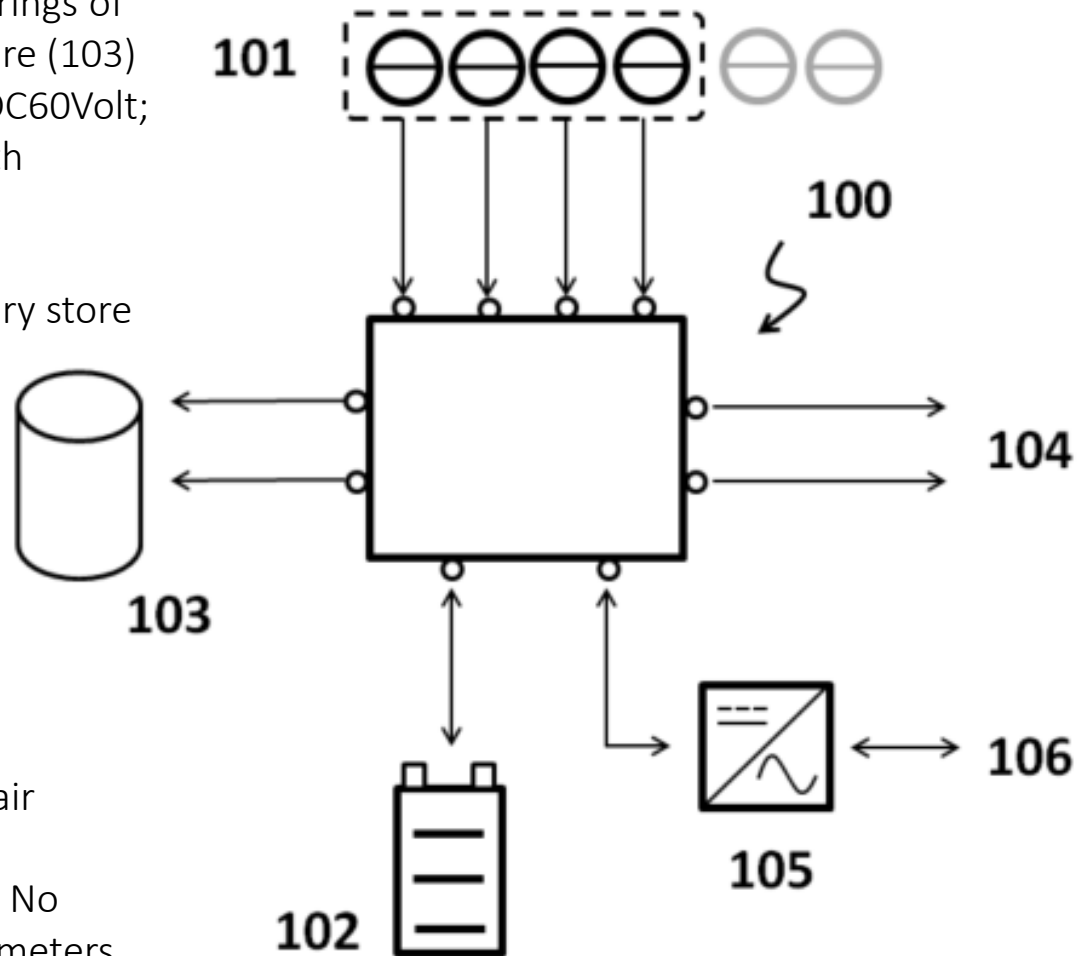
DC Power Hub (100) to connect up to 6 strings of PV (101) with Battery (102) Secondary Store (103) e.g. waterpumps; providing DC-Grid e.g. DC60Volt; on-board powerplug for inverter (105) with AC230Volt applications.

Secondary Store will be filled, when primary store is full or max current exceeded.

**90Amps PV**  
**50Amps BAT**  
**Efficiency: 99%**  
**EMI free: not causing nor sensitive**

Material Cost: about \$200  
Lifetime: Everlife Design, Micro Open Repair

5 Operational Amplifiers are all the logic – No  
Software: easy analog way to modify parameters  
for your specific battery range and max current  
etc.



# Unique

- **5.000Watt Performance with redundant safety**  
Best Performance with 48Volt battery technology and 6 strings of 2-serial PV.  
90Amps PV. 50Amps Battery. Compatible with lithium-ion technology due to high safety design.
- **99% Efficiency** together with avoiding any high-frequent switching operations the key for everlife-design. Simple and longlived as electric house installation – and yet smart enough.
- **Designed Lifetime of 50-83\* years**  
You can do the math for yourself in completely open design and calculations – and kindly help me fix any bug – basic infrastructure like electricity needs lifetime like that.
- **Total cost of components less then \$160** Including casing, circuit breakers for all pv strings, bat, dc-circuits, power connectors, basic visualization

**The Punchline is this:**  
if you want to reach zero coal by using PV and BAT: you need **10TW SOLAR**

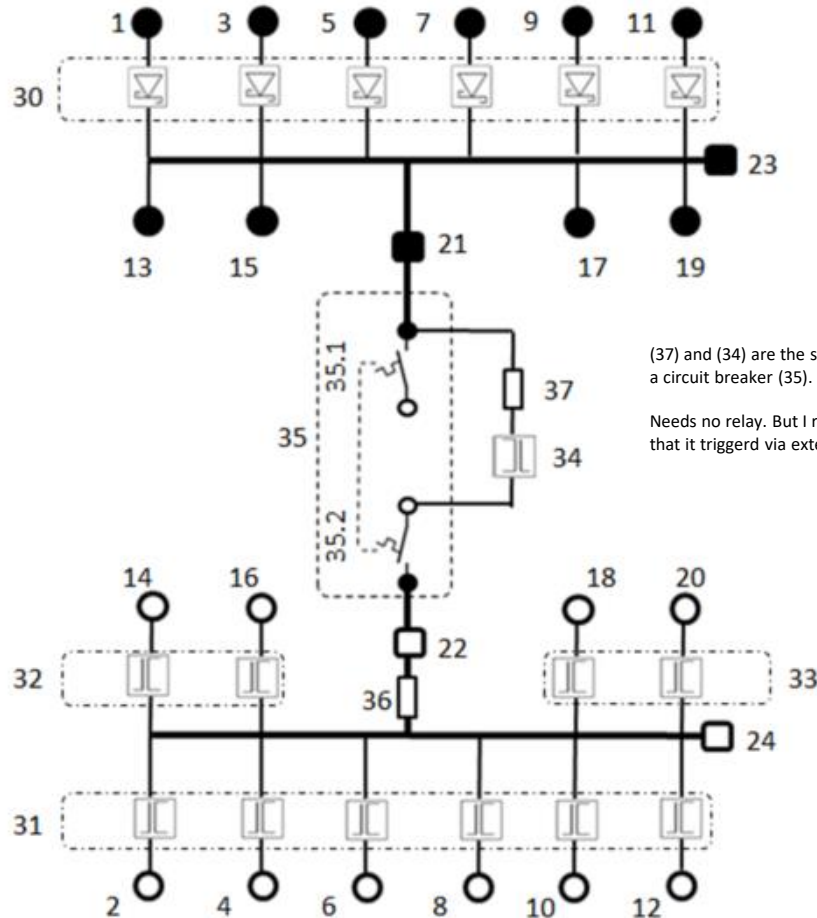
Hundred times of today. So we are at **1%**

You cannot do this with shortlived and troublesome inverters.

see slides in videos Apprentice's Work and Masterpiece

\*Joachim Dorfmueller reached 83 years – and as tribute I am referencing the everlife design to his final age.

# Overview Power



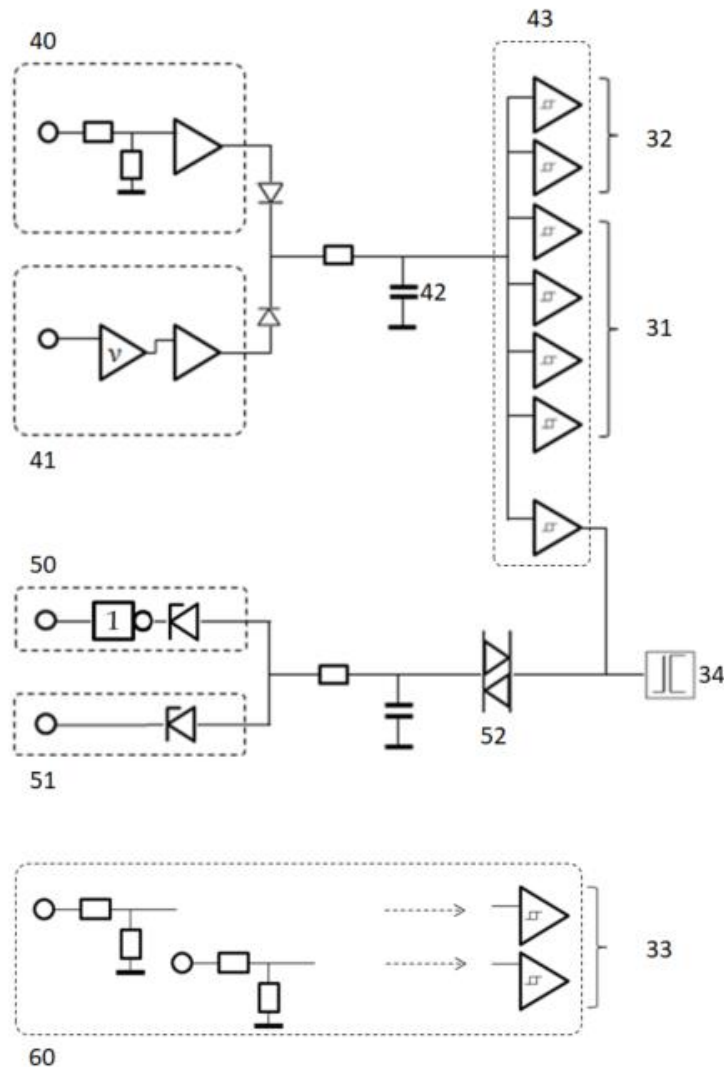
Diodes (30) are in current design replaced by circuit breakers: this leads to 99% efficiency instead of 98%. However PV Panels will consume some 100mA current after sundown. There is too much of a pro and con discussion on that to present here: anyway you can use external zenerdiodes or switch off circuit breakers at evening alongside with your other standby consumers. Or Redesign with diodes on board.

(37) and (34) are the shortcircuit-tripping-variation of a circuit breaker (35).

Needs no relay. But I recommend using a smartmat that it triggered via externally heating up bimetal strip

- 1-24 Powerplugs (Plug-Box)
- 30 Diodes/Circuit breakers
- 31-33 FET
- 34+37 see comment
- 35 Switch
- 36 Shunt

# Overview Control



*In case of*

40 overvoltage detection

41 overcurrent detection

*the*

43 comparators with rising trigger threshold

*will trigger one by one. Usually with the first (new) trigger this chain will stop. A hysteresis keeps the (new) position for at least 5min.*

*So before PV energy is disconnected (31) the current will be transferred to secondary store (32) first. This will happen each day when battery full.*

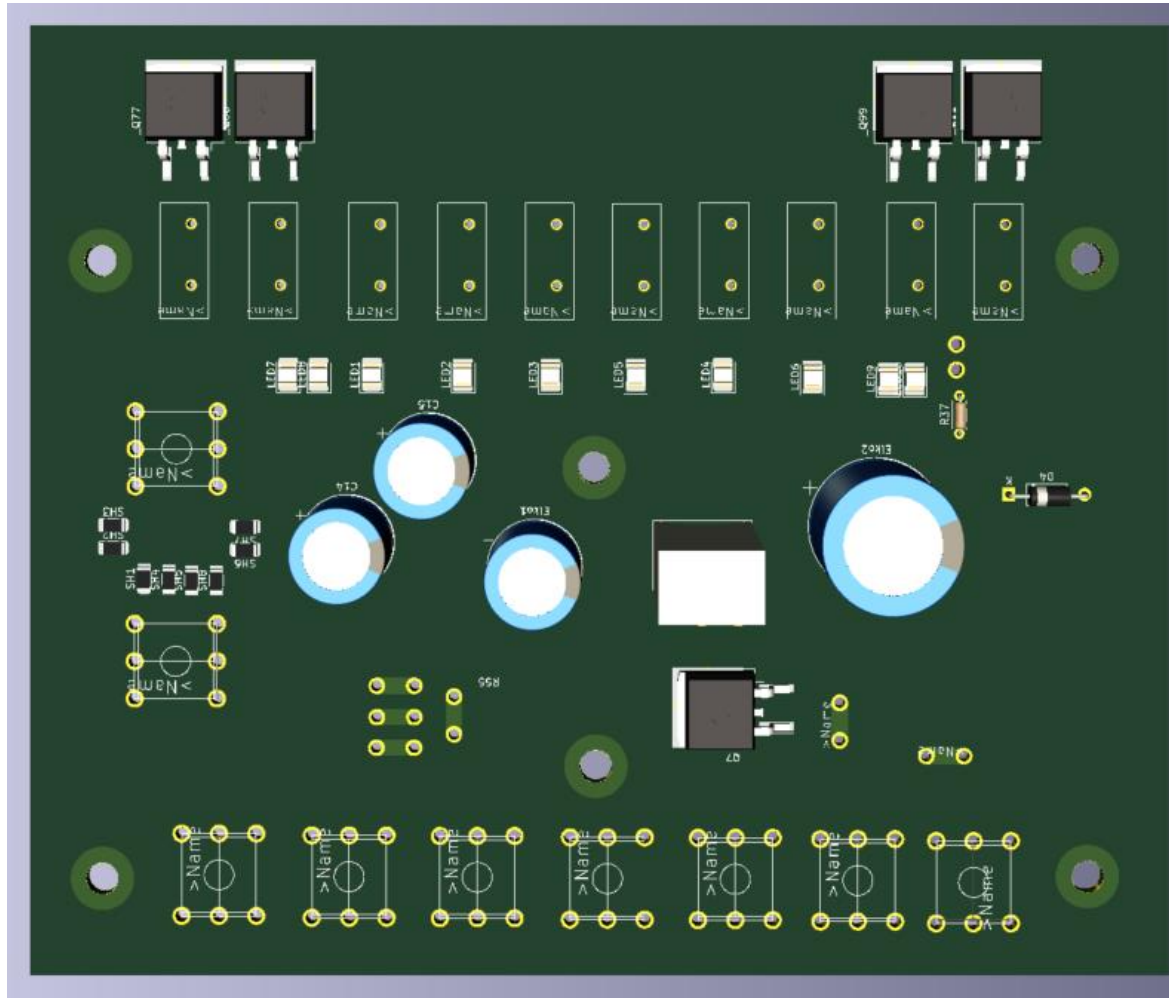
*You will have a switch to adjust overcurrent (12-24-36-48Amps) – and can use this to prioritize primary or secondary store.*

50 undervoltage detection

51 overvoltage detection (both using zenerdiode as comparator and diac as trigger– I replaced that in the new design with a 5th comparator.) *trigger the galvanic separation - usually a never happen event if 40 and 41 work well.*

60 DC-Channels on/off

# Board Top\*



Push-In Plugs

No EMI stuff needed.  
Electrolyt Capacitors  
might not be needed.

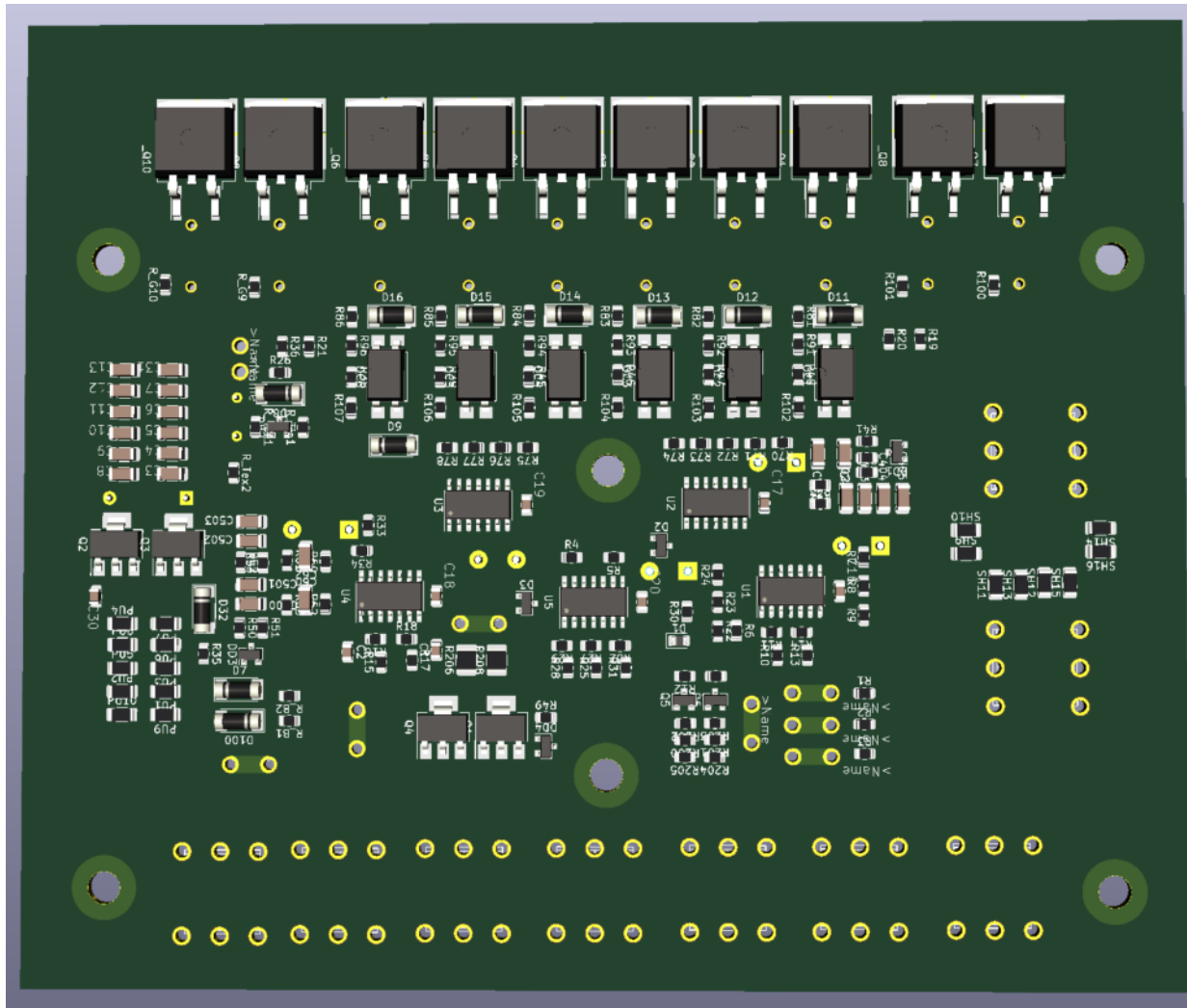
Anyways it will not get  
hot in here.

FET are SMD – the do  
not switch more often  
than 1/minute – no  
better cooling needed.

Might use more  
Push-Ins here and  
only two big  
connectors for BAT

\*Choice of components and placement finished

# Board Bottom\*



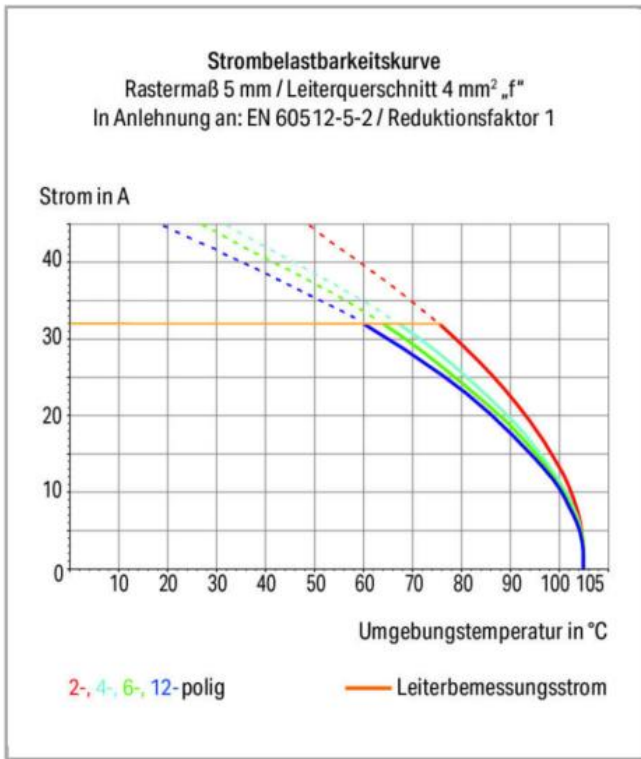
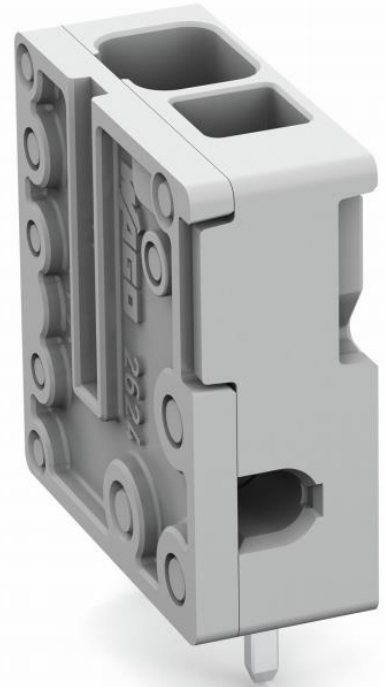
Nice symmetry for intuitive micro open repair.

Keeping systematic modules close together.

Might add some printed description (u>>, i>>, etc)

\*Choice of components and placement finished

# Push-In



https://www.wagoproducts.com/printed-Circuit/series-2624/wago-2624-3101/

On-Line Electronics, Inc. Featuring WAGO Products

Enter keyword... advanced search



WAGO Products > Printed Circuit > Series 2624 > WAGO 2624-3101

## WAGO WAGO 2624-3101

PCB terminal block



Manufacturer SKU Wago 2624-3101

Our price: \$0.66

Qty 1 Add to cart

Ask a question about this product

CALL NOW  
**1-928-379-7359**  
 No sales pitch, just simple solutions!

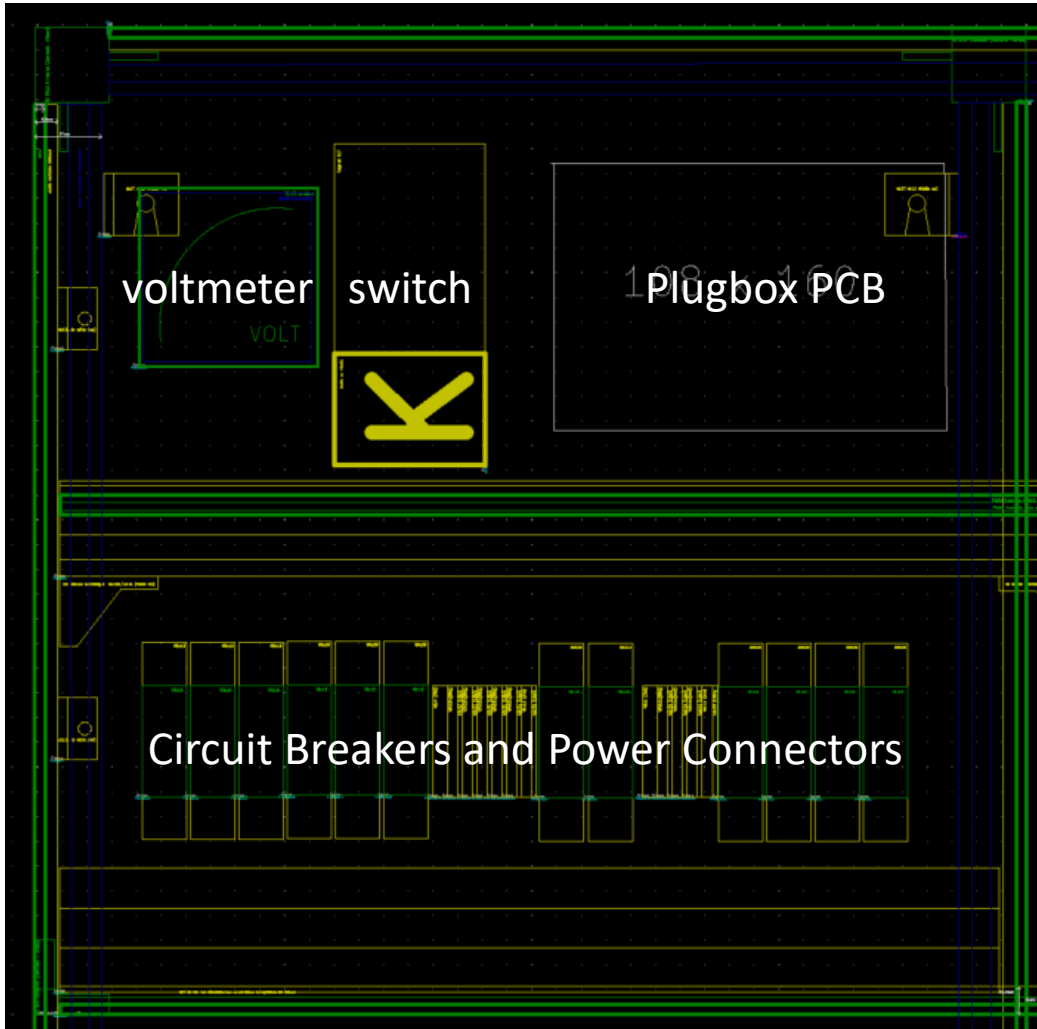
Quick Quote

Zulassungsdaten	cULUS			VDE	
UseGroup	B	C	D		
Nennspannung	300 V	-	300 V	250 V	
Nennstrom	20 A	-	10 A	24 A	
Überspannungskategorie	III				
Nennleitergröße				min	max
- starr	AWG 24-12	-	AWG 24-12	0.2 mm <sup>2</sup>	2.5 mm <sup>2</sup>
- flexibel	AWG 24-12	-	AWG 24-12	0.2 mm <sup>2</sup>	2.5 mm <sup>2</sup>
Prüfspannung	1.60 kV	-	1.60 kV	2.0 kV	



# Casing Concept

400x400



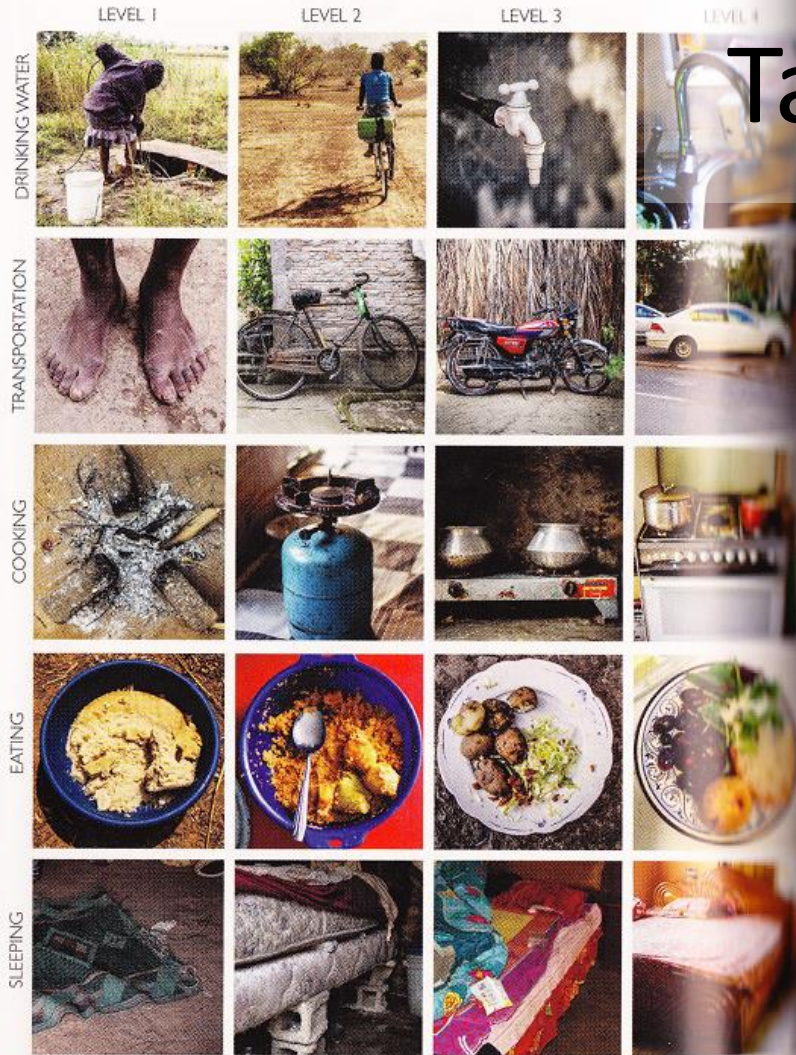
This is a drawing made with eagle/Kicad. Rather simple.

Frames could be used like you see below in different application.





## LIFE ON THE FOUR INCOME LEVELS



# Target Groups

The original idea of **Smartmat** was to create the most simple and longlived safety device for PV-BAT Systems managing  $i>$ ,  $i>>$ ,  $u>>$ ,  $u>$ .

Primary target group are the 1 Billion people on **level 1** with maybe just one panel and simple battery.

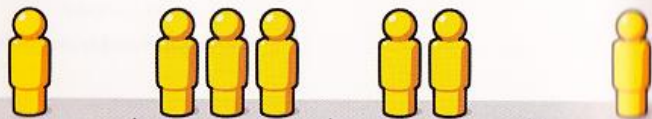
Secondary target group on next **level 2** is addressed with the 3.000Watt+ / 60Volt DC-COMB concept of **Plugbox** are the 3 billion people.

For life on **level 3** Plugbox contains powerplugs for dc/ac inverters to connect to traditional 230Volt systems or creation of island grid.

So the unique thinking in the development was bottom-up and the philosophy is: *Creating more space you really love to live in.*

In other words: Shape living for the better.

1pimple = 1billion people



LEVEL 1      LEVEL 2      LEVEL 3      LEVEL 4

Source of Scan: Factfulness - Hans Rosling, Sceptre

The world population in billions of people

Source: Gapminder (2018)

# Philosophy



Join us to  
shape living for the better

THIS IS OUR PURPOSE

If you like the spirit and design of these works – I would feel very happy to have a contact and interaction with you

\* I am not Electrolux – but it's a good motto – if we do it