# NEW Smartmat

Battery Pack Safety - To Go

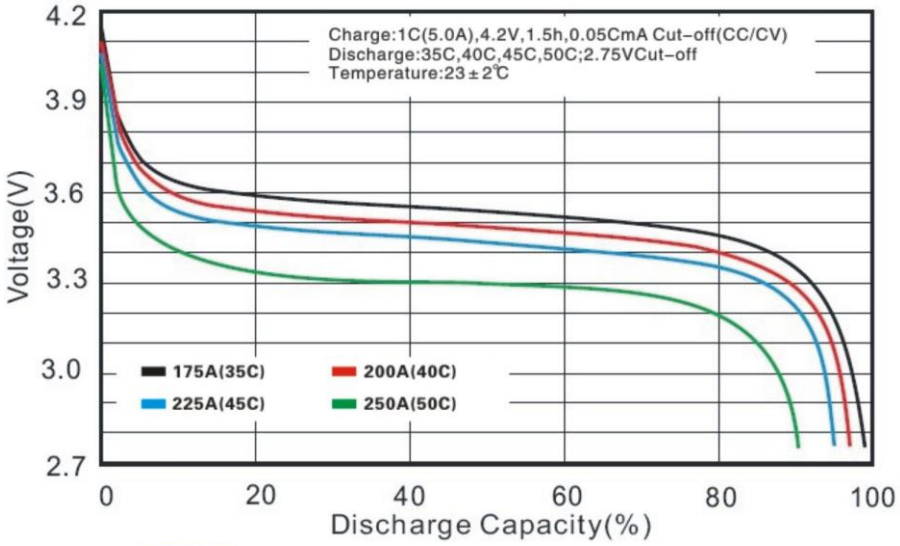

New compact design

| Circuit Safety | Battery Safety |
|---|---|
| Overcurrent i> | Overvoltage U>> |
| Shortcircuit i>> | Deep Discharge U<< |
| | |
| 16Amps | 41 – 59 Volts |
| 25Amps | 41 – 59 Volts |
| 40Amps | 41 – 59 Volts |
| 50Amps | 41 – 59 Volts |
| | |
| Max Current | Voltage Window |

Overvoltage: n*4.23 Volt
Low Voltage: n*2.90 Volt

Analog Backup
Safe Galvanic Separation
No False Tripping

**Remote + PCB Variation for your Relais and Next Level BMS Applications**




Available for different n:umber of cells and variety of max currents.
Example of future product datasheet
Image: https://www.e-material.de

Future Industries

## Innovation Disclosure (simple to understand)

A circuit breaker for battery packs, that not only provides circuit safety (i>>, i>) but also battery pack safety (u>>, u<<) and that in a variation or combination can be triggered from remote (e.g. via BMS).

Galvanic Separation especially with DC is not a simple task and the combined use of a standard circuit safety device for additional battery pack safety is a nice feat.

The trick is to manipulate the temperature of the bimetal strip by either smart internal trigger circuits (u>>, u<< ) or via remote access (like an emergency relays).

There are chances that especially in the Giga market of lightweight electric mobility (scooters, ebikes) up to 50Amps this feat could make your battery pack unique.

In addition to the extra safety it might more easily enable safe and super fast charge.

The intrinsic intelligence variation (u>>, u<<) might even as a standalone product have good market access by exchanging existing circuit breakers in older scooters.

You do not have to be a circuit breaker company – you could easily have it manufactured for your special purpose. Lithium-Ion Batteries have a characteristic curve and there is a high iteration of design like 40/50Amps with [44-61] as tripping voltage window for 2 or 3.000Watt engines.

Circuit breakers are now available in compact half-size packages and for your special application you could even think of PCB package variation for your PCB board. They are very low cost at high iteration of design while being super reliable longlived technology and known and trusted by everyone for their safety in domestic use.

Appreciating your kind feedback and opinion – for good or for bad.

# 1. Basic Principle

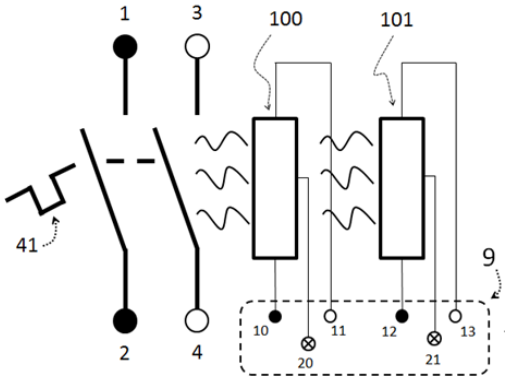



Figure 1 –Remote Variation (Replacing Relais)

The idea is to heat up the bimetal strip (41) indirectly via resistors (100-101) electrically accessible by external logic. Power contacts (10-13) and information feedback (20-21).
Redundancy and variation of resistor value possible for variation of trigger timeouts.
This variation may serve as emergency relais in BMS Applications at low cost, size and weight – especially when available in compact size PCB package.

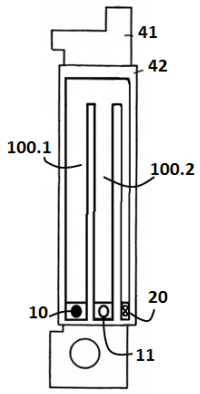



Figure 2 – Example of possible physical design

Resistors may consist of two parts (100.1 und 100.2) with ntc-ptc characteristic; isolator (42), bimetall (41), information feedback (20) in the middle. Stack units (100..101..102) on top of one another for redundancy and options

# 2. Variation – Intrinsic Intelligence

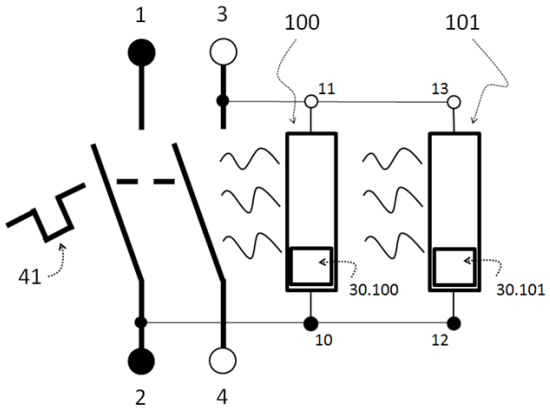



Figure 3 – Battery Pack Safety To Go

Resistors (100-101) are now enhanced with simple logic (30) connected crosswise to plus and minus (2-3). This variation triggers at danger of overvoltage (u>>) and deep discharge (u<<) providing "Single Fault Safety To Go" and needs no external logic.
Thus it is also suitable for replacing any existing circuit breaker in your scooter, when battery is known and fits into lithium standard.
When tripping power, simple logic is automatically disconnected from power (2-3).

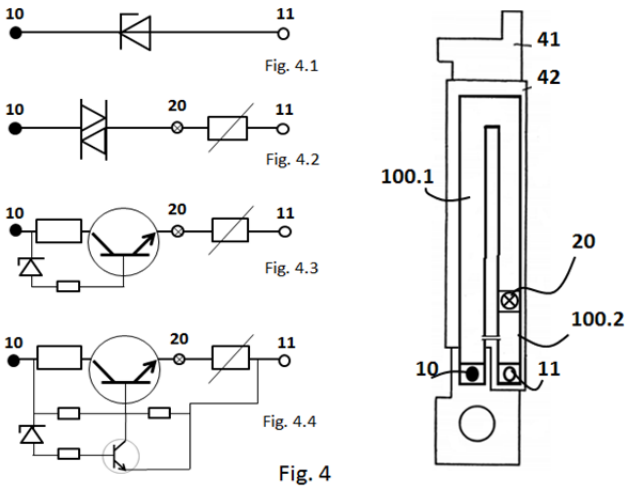


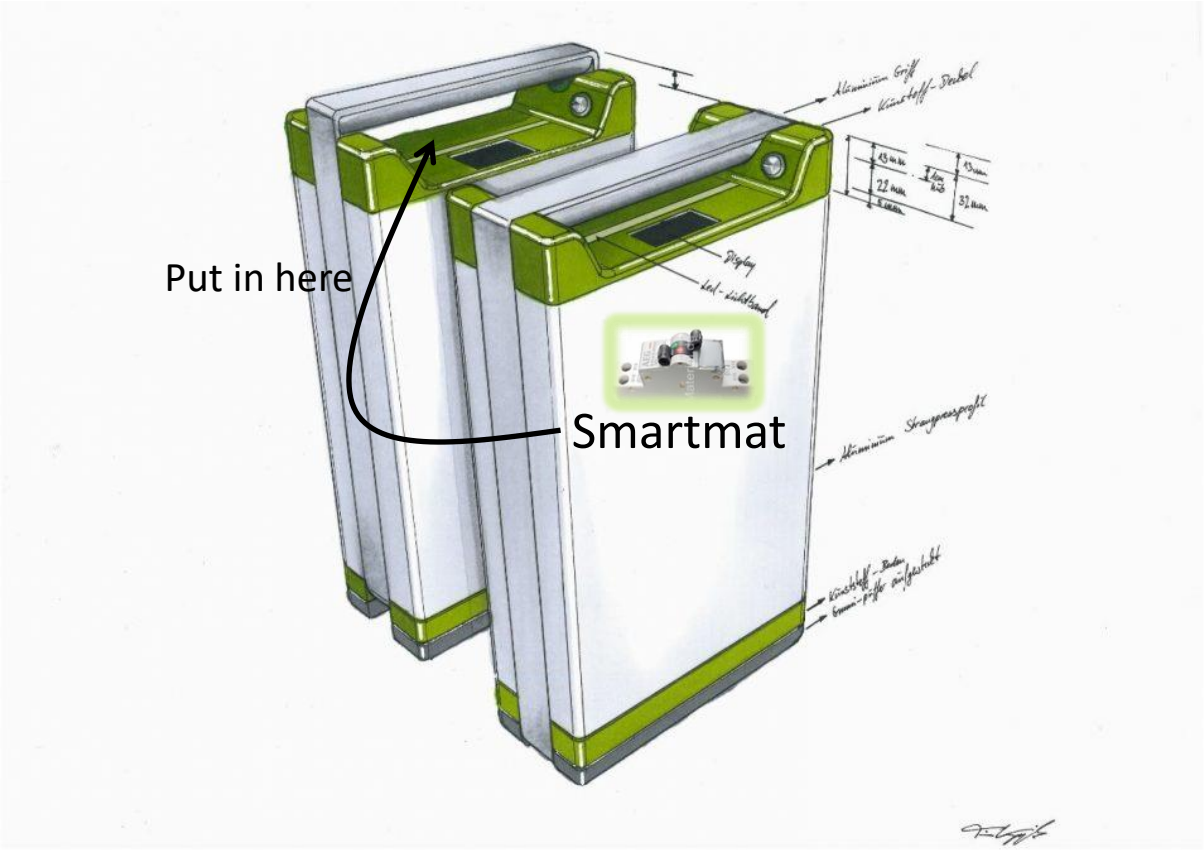

Figure 4 – Examples of simple logic (trigger circuits). Logic attached close to fixed part of bimetal.

Convenient for manufacturing process, plus-contact (10) of all circuits may be combined and directly attached to bimetal. Safe galvanic separation up to 50 Amps.

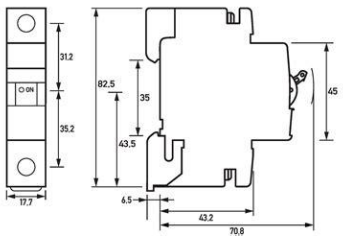
Figure 5 – physical design: keep simple logic close to the unmovable end (100-2) cover most part of bimetal strip with resistor material (100-1).

# Safest Battery Pack

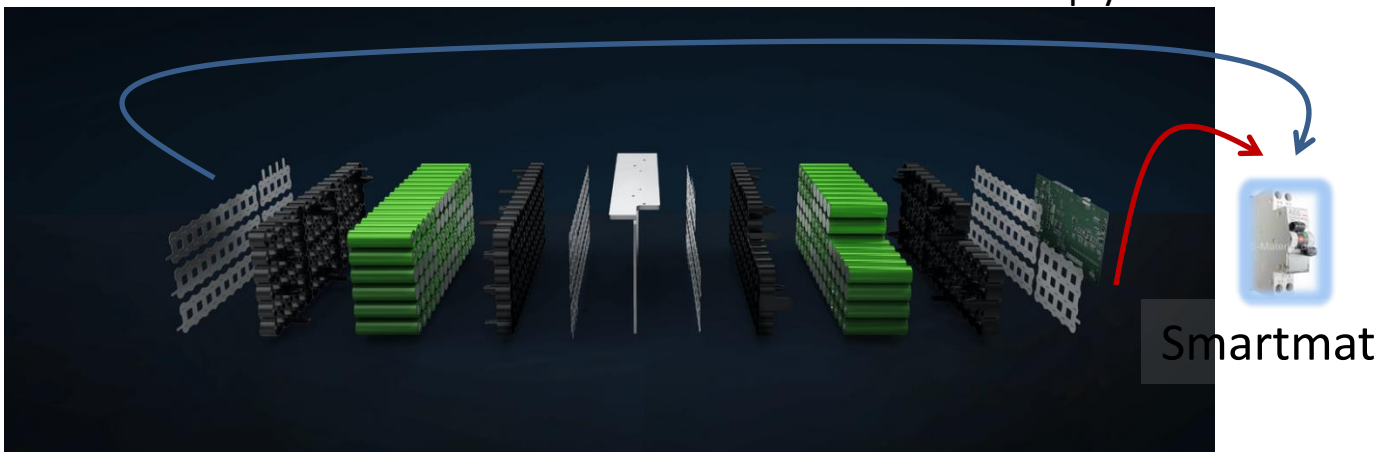
Fastest Charge




https://www.kumpan-electric.com/elektroroller-akku/



Simply connected




https://www.niu.com/de/product/n-series