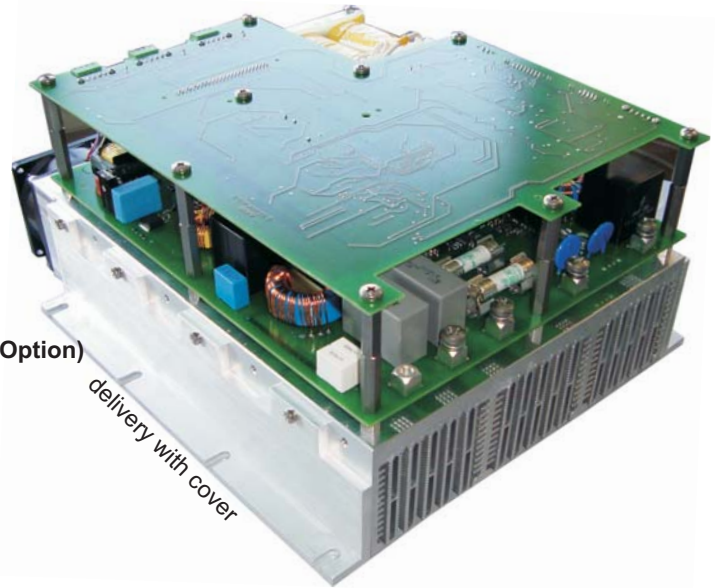


- On board network conditioning
- Chassis mounting incl. fans
- Efficiency >97%
- High voltage input range
- EMC EN50121.3.2 / 55022.B
- Inhibit polarity free and floating
- Dyn./continuous short circuit proof
- Over voltage protection logic/thyristor
- Parallel operation with Power-Sharing (Option)
- Connection for Control-Panel



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## Series TSR

### Main points:

#### Input:

- wide input voltage range
- Soft start (external relay)
- Intergrated input fuse
- Burst/surge EN61000-4-4/5
- Cross plug. protection series diode
- low stand-by current  
<15,5mA with Inhibit  
<20mA without Inhibit
- Under voltage turn-off with hysteresis
- Input filter conducted EN 50121-3-2
- Screw connectors M6

#### Output:

- Accuracy absolute  $\pm 1,5\%$
- Regulation factor  $\Sigma(U_i + I_o + T_a) < \pm 1,5\%$
- Ripple <200 mV<sub>pp</sub> const. over T<sub>a</sub>
- Spikes <500 mV<sub>pp</sub> (T 1:1/50MHz)
- Response time  $\Delta I=50\% \leq 10\text{ms}$
- adjustable current limitation (4 levels)
- Short circuit current  $\leq 1,05 I_{o-max}$
- Output spike filter (C - L<sup>2</sup> - C)
- Over voltage protection logic 1,2 U<sub>o-max</sub> and thyristor dyn. to input fuse
- U<sub>o</sub> = f(TBat) PT1000
- Output sided de-coupling diode
- Screw connection M6

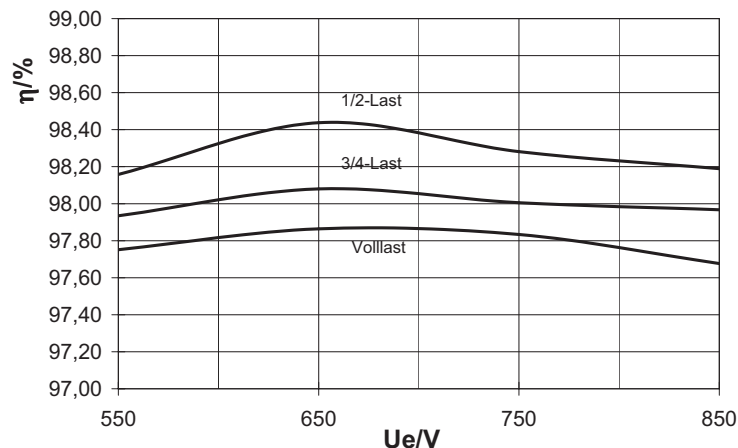
#### In general:

- All interfaces floating
- Charging management, programmable Battery charging curve, monitoring over RS232-interface
- Ambient temperature T<sub>a</sub> -25/+50°C  
60°C short term
- 3 fans temperature controlled and rotation monitored
- Max. heat sink temperature \*.-point 95°C
- Ground connection M6
- Over temperature turn-off
- Clock frequency approx. 20kHz
- Chopper current to foil/ceramic-C's
- Common 0V input-output
- MTBF on request
- Shock/vibration acc. EN 61373
- Chassis mounting
- Dimension incl. flange [with connectors]:  
L x W x H (362 x 290 x 181,5)mm
- Weight approx. 15kg with cover

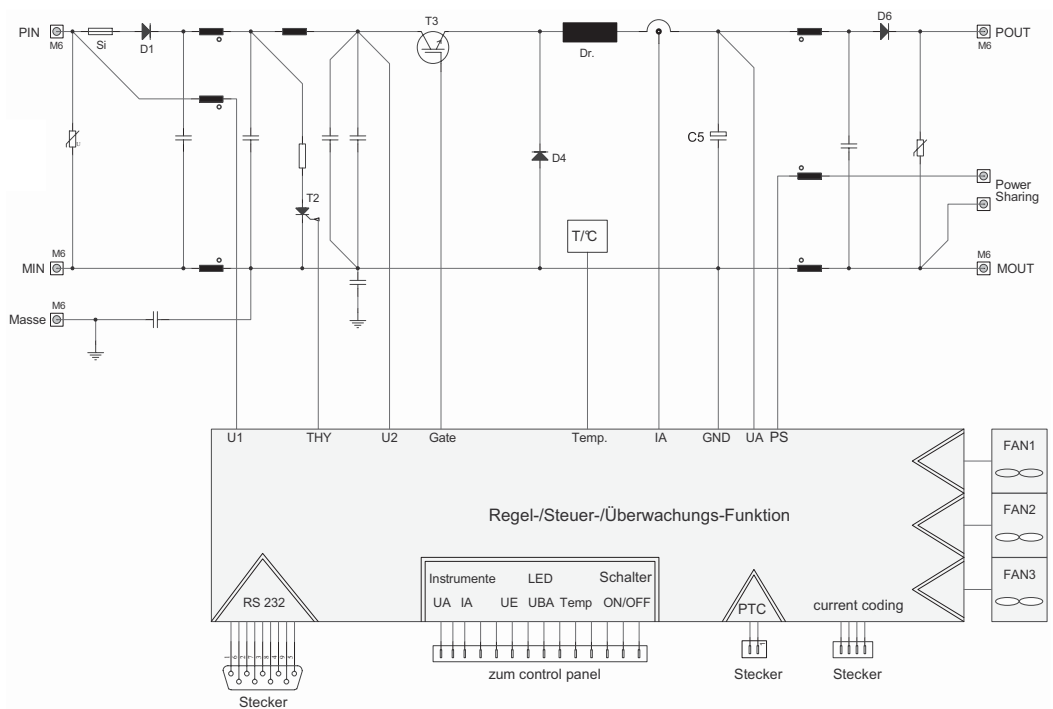
| U <sub>i</sub><br>min / range<br>V | U <sub>o</sub><br>nom<br>V | I <sub>o1 max</sub><br>A | I <sub>A 2,3,4</sub><br>coded | η<br>% | Model number       |
|------------------------------------|----------------------------|--------------------------|-------------------------------|--------|--------------------|
| 135 - 215<br>300 dyn.              | 110                        | 30                       | 20/15/8                       | 96,5   | TSR 01.170.110.300 |
| 235 - 360<br>450 dyn.              | 220                        | 20                       | 15/10/5                       | 98     | TSR 01.300.220.200 |
| 470 - 710<br>850 dyn.              | 450                        | 15                       | 12/8/4                        | 97     | TSR 01.550.450.160 |
| 635 - 950<br>1050 dyn.             | 620                        | 12                       | 9/6/3                         | 98     | TSR 01.680.620.120 |

Change input/output parameters for the use on a intermediate circuit U<sub>zk</sub> with on request transformer adapted and rectified

### Efficiency

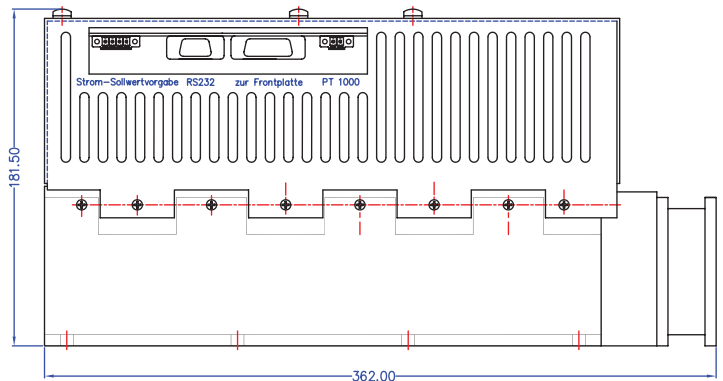
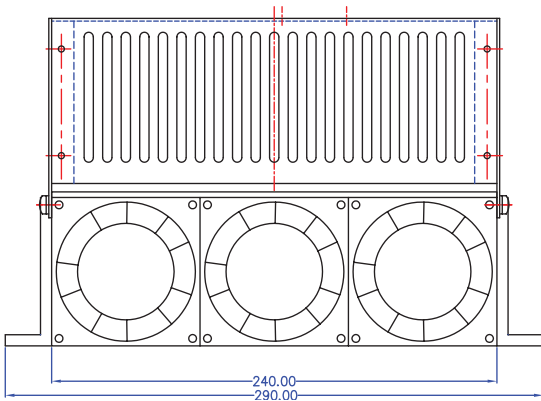


The TSR series is designed for non-isolated and intelligent battery charging of high voltage batteries supplied out of a high voltage intermediate circuit. According to the step-down ratio the converter shows an efficiency of 97,5-98,5% at the output power of 7,5kW. For functional reasons an input series network de-coupling diode (D1) is integrated to prevent energy re-feeding. The output is de-coupled with a series diode (D6) to prevent the battery's re-feeding over Transistor T3 to the input. The thyristor (T2) blows the input fuse (Si) in the case of an output sided over voltage. A 5s time delay to the thyristor prevents the internal capacitor's (C5) discharge when the output shoots over because of an interruption of charging (Battery relay). The choke's inductivity (Dr) is very high to prevent the choke's discontinuous mode operation when the current coding limits the battery charging current  $(0,25/0,5/0,75/1) \times I_{max}$ .



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## Mechanic



The battery's charging end voltage is linear adapted by PTC (PT1000) over the temperature range  $-30/+50^{\circ}\text{C}$ . At  $>50^{\circ}\text{C}$  the charging end voltage is constant and from  $>55^{\circ}\text{C}$  the voltage is set back to the nominal battery voltage level. An internal temperature monitoring activates the fans. The rotation speed is a function of the temperature and a blocked fan will be signalled. The control Panel can be separately positioned over the isolated interface.

Current and voltage levels can be displayed with analogue instruments. LEDs signal different failures. the converter can be switched ON/OFF with a switch. On request with the RS232 interface the operational modes can be read out from the controlling system with a defined protocol after the TSR's wake-up. Different commands allow the read out of operational modes, firmware-version and further functions. All interfaces are isolated. Please ask for a detailed functional description.

