

Cascading
up to 4 x 200 A/Σ 800 A

Battery charger
with isolation



- Multi-master-principle
- **Controlled power sharing**
- **Powersharing-safety protection without loss of functionality in the case of fail of one unit**
- **Parallel operation DC network/battery without decoupling diode**
- **Controlled current splitting into battery**
- **Charging set point = f(T battery)**
- **Zero load capability / 100%-load change**
- **Reinforced insulation PD2 / OV2**
- **Shock/vibration EN61373 (any installation position desired)**

- Railway/Rolling stock
- Roadcar
- Special technology



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Series HBL.S

battery charger from DC-high voltage links or 3ph-AC input with convection or water cooling construction

Main features:

Output:

- Accuracy absolute $<\pm 1\%$
- Ripple $<100\text{ mV}_{\text{ss}}$ (const. over temp.range Tambient)
- Spikes $<250\text{ mV}_{\text{ss}}$ (T 1:1/50MHz)
- Tolerance $\pm 1\% = f(T_u/IA/UE)$
- Constant current limit Iout max
- No load, overload, short circuit protected
- Temperature controlled charging end voltage = f(Tbattery)
- Current Sharing (CS / power cascading)
- Current splitting (controlled current into battery)
- U/I-control loop
- LED for Vout = OK
- Screwing connector M8

Input:

- unit starts out of Vin
- Zero load consumption ca. 8 Watt
- Input filter acc. EN 50121.2.3
- Distortion EN 61000-4-4 SGrd 3 Burst
EN 61000-4-5 SGrd 3 Surge
- Integral run up
- Option: inrush current limitation with external choke (DC)
- Over-, under voltage turn off with hysteresis and automatic restart delay
- Cage clamp 2 x 16mm²
- Internal fuse for emergency protection (DC)
- External fuse (3Ph) provided by the customer

General:

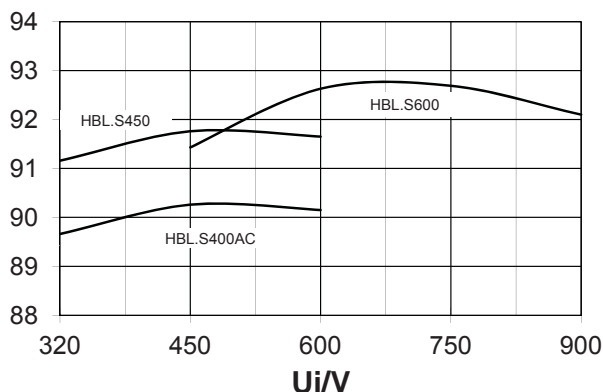
- Efficiency typ. 92%
- Air/creepage distances IN-OUT 11 mm
- Pollution degree PD2
- Overvoltage category OV2
- CAN Bus (isolated)
- e- and CE-mark on request
- Ambient temperature $-25^{\circ}\text{C}/+60^{\circ}\text{C}$
- Option: $-40^{\circ}\text{C} / +70^{\circ}\text{C}$, Derating $>60^{\circ}\text{C}$
- internal controlled ventilator
- Shock/vibration EN61373, Kat. 1, cl. B
- Dimensions LxWxH ca.: 300x460x110 mm³
- Weight: ca. 12kg, without ribbed heatsink
- Protection degree IP 20 (except output)
- overtemperature limit at cooling plate
★: 95°C
- Aripple of $>5\%$ of the input voltage needs to tell SYKO
- Temperature controlling on PCB board

Optional:

- Vout-adjustment [decline of Vout=f(TBat)]
- Internal 3ph rectifier transients /diode demolition protection
- Internal housekeeper for communication without incoming voltage
- GUI
- **Detailed instruction manual on request**

Vin	Battery	Iout max	Pout	Model
V _{DC}	V _{nom DC}	A	kW	
460 - 850 950 V / 100 ms	12	200	2,8	HBL.S600.12.200
	24	200	5,6	HBL.S600.24.200
	36	145	6,0	HBL.S600.36.145
	72	77	6,5	HBL.S600.72.077
	110	52	6,5	HBL.S600.11.052
320 - 585 850 V / 10 ms	12	200	2,8	HBL.S450.12.200
	24	180	5,1	HBL.S450.24.180
	36	130	5,4	HBL.S450.36.130
	72	70	5,9	HBL.S450.72.070
	110	47	5,9	HBL.S450.11.047
320 - 580 V 3Ph-AC 40 - 65 Hz	12	200	2,8	HBL.S400AC.12.200
	24	180	5,1	HBL.S400AC.24.180
	36	130	5,4	HBL.S400AC.36.130
	72	70	5,9	HBL.S400AC.72.070
	110	47	5,9	HBL.S400AC.11.047
Pout at charging end voltage -30°C				
Input voltage	from 200 V			on request
Output voltage	up to 800 VDC			on request
Version "H"	-40°C up to 70°C (forced cooling) ³⁾			optional
project charge:				on request
modification charge for possible changes of parameters above:				on request
Heatsink for a water- or forced air cooling system				on request
Controlled Power cascade and functional cascade up to 4 x Pout				

Efficiency curve



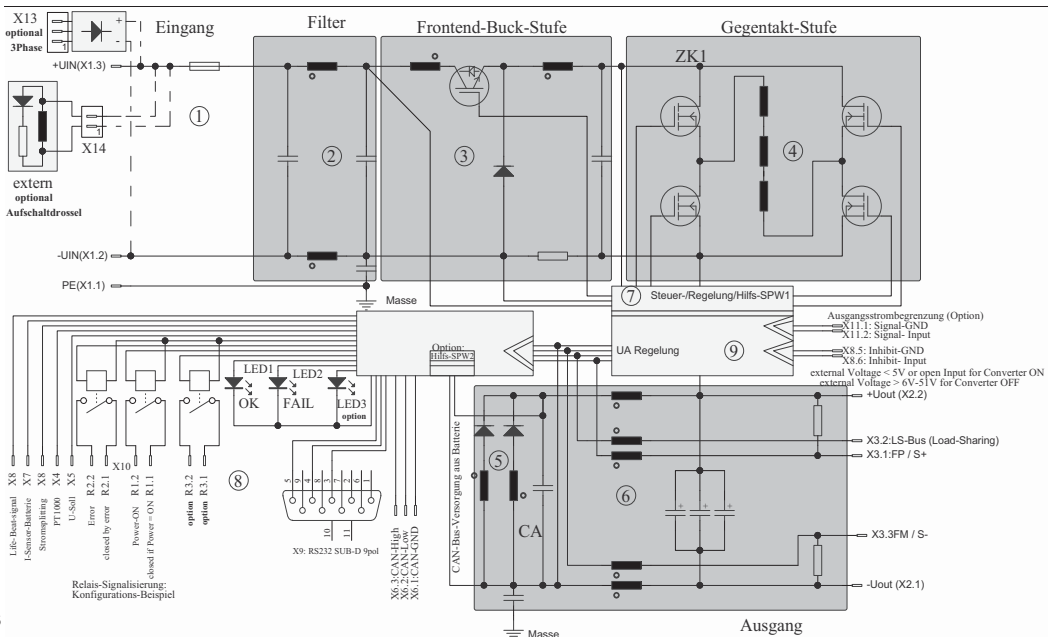
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Model **HBL.S** was designed as a battery charging system for use in numerous mobile applications (railway, ships, vehicles) at hybrid-DC-intermediate links and 3Ph input sources with a very large input range up to 1:5 (rotating speed limiting in rest position of vehicles). The topology results in a very high and constant efficiency over the input range. Inrush currents will be limited optional (external filter) and the controlled turn up currents for an integral run up result in an undisturbed and reactionless operating at DC links.

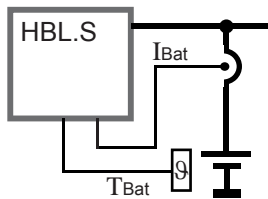
The solid construction and the direct thermal connectivity of the power modules/semiconductors on the heatsink, which is capable to integrate on a water/ribbed heat sink, offers the using in mobile applications and rugged requirements for temperature, shock/vibration.



An integrated ventilator increases the MTBF and gets feeded from the internal housekeeper. The input components are protected against long term distortions (in complete energy systems), the input meets EMC standards and deals with a rapid shut on and also short term interruptions (automatically restart). A ripple of up to <5 % of the nominal input voltage will be controlled without any operating distortions.

The option of an emergency start up of <33 % discharged battery from for the nominal feed is standard, but the battery needs to return in 50 ms to ≥33 % x Vnominal. The topology, the components, the run up out of the feed in source and the interface fulfilling in critical conditions result in a stable system performance. The zero load capability prevents a „voltage pumping“ (ripple).

parallel operation (Current Splitting)



DC network

The internal load management guides the intelligent, temperature controlled charging, current splitting and sharing (communication during parallel operation) and communication via CAN with the system. Based on this mode exists the possibility to connect up to 4 units in a controlled parallel operation with an overall power of 22 kW. With fail of one or more units the rest operate well with power reduction (nx1)xPout. The battery management will be adapted regarding customers requirements via PIC. With help of the optional integrated rectifier the unit can be switch on 3ph 400/480 Vrms/50 Hz.

interface description

- X2=output voltage
- X3=sense/load sharing
- X4=battery temperature sensor
- X5=external set point setting
- X6=CAN-Bus
- X7=battery current sensor
- X8=Inhibit/sharing monitoring
- X9=RS232
- X10=2 relay contacts
- X11=output current reduction (optional)
- X12=option 3. relay contact
- X13=3Ph input connection (

