SCHALTBAU

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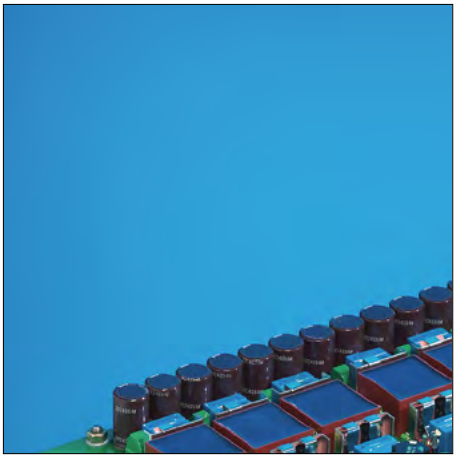
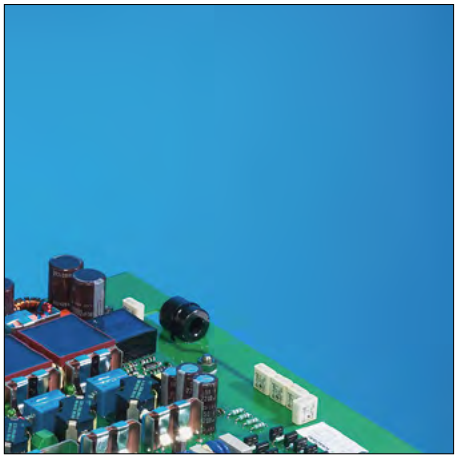
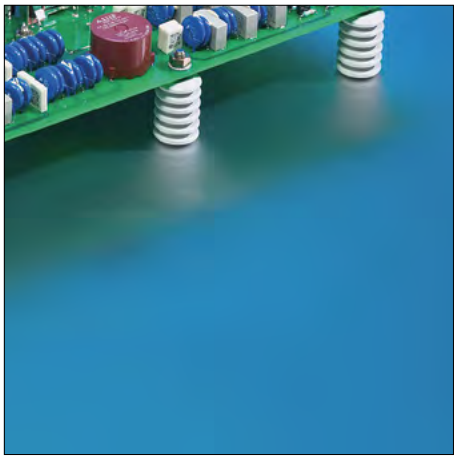
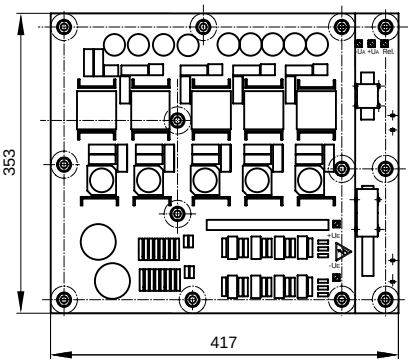
Flat battery power supply for rail vehicles

ZH1800, ZH1801 and ZH1804









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Flat battery power supply ZH1800, ZH1801, ZH1804 Series

Power is supplied to passenger coaches from the locomotive via the train line, a cable running the length of the train. Static onboard three-phase AC inverters transform kilo voltages (to UIC 550) into the desired load voltages. Since the controls of the inverters cannot be powered by the high voltage supply, the control voltage necessary for operating the inverters must be provided by a vehicle battery.

The problem that arises is that many other loads such as the lighting of the train are being supplied by the vehicle battery, too. Normally, the battery gets charged by means of the train's power supply equipment. During downtimes, however, this is not possible. Supplying the many other loads with energy will result in considerable strain of the battery and often deep or total discharge.

Consequently, when the train starts running again and its power supply equipment is expected to do so, too, the static inverters cannot return to operation because of a flat vehicle battery that can no longer provide the necessary control voltage.

A Flat Battery Power Supply of Schaltbau is the solution to this problem. For, in the event of a flat battery, it will draw the initial current directly from the 1 to 3 kV traction voltage of the train line and convert it to the low-voltage start-up power required for the inverter control circuit. It takes about 3 (cycles) x 3 minutes for the output to come up to full voltage. Time enough for the power supply equipment of the train to start operating again and for the vehicle battery to start recharging (see schematic on page 4).

Features

- Static onboard three-phase AC inverter with power factor adjustment
- Providing control voltage for static inverters of power supply equipment directly from the train line

Suitable for use with

- all train lines carrying voltages to UIC 550
- rail vehicles with high-voltage inverters providing power from the train line

Benefits

- Static onboard inverters functioning as flat battery power supply
  - are capable of operating in different main-line electrification systems (independent of line voltage for overhead wire supply system)
  - allow for international train operation without a locomotive change at frontiers
  - offer high operational availability (After each start-up the duty cycle is only about 18 minutes. The device turns off automatically before high voltage is being switched off.)
- Cost of operation:
  - No unscheduled maintenance due to flat battery
  - No backup batteries for uninterruptible power supply required
- Operational reliability:
  - Failure-free operation and supply with rolling stock
  - No cancellation of train service because of flat batteries

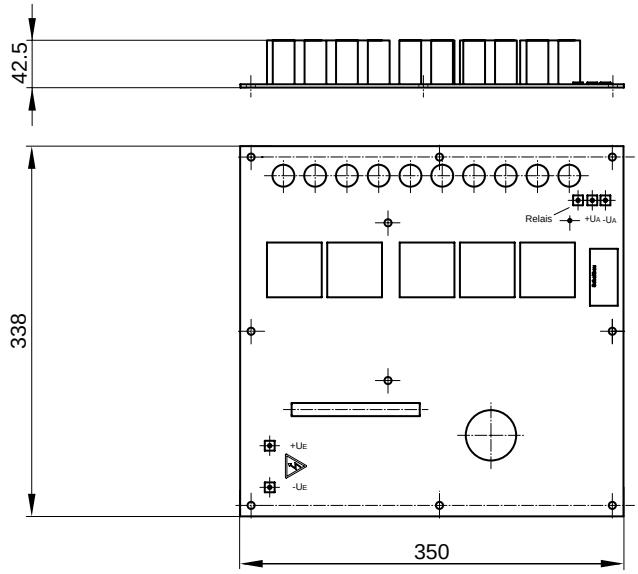
Technical data

Series	ZH1800	ZH1801	ZH1804
Input voltage to UIC 550	1 kV 16 $^2/_3$ ... 60 Hz	1 kV 16 $^2/_3$ Hz / 1.5 kV 50 Hz 1.5 kV DC	1 kV 16 $^2/_3$ Hz / 1.5 kV 50 Hz 1.5 kV DC / 3 kV DC
Output voltage	24 V ± 1.5%	24 V / 110 V DC ± 1.5%	22.2 V ± 1.5% 24 V / 110 V DC ± 2%
Output current I_{Omax}	13.5 A	15 A / 3.2 A	18.5 A // 15 A / 3.2 A
Total power (3*3min cycle)	320 W (without derating)	350 W (without derating)	410 W // 320 W (without derating)
Switch ON voltage	> 865 Vs and < 1800Vs	> 940 Vs and < 2900 Vs	> 940 Vs and <3800 Vs
Switch OFF voltage	< 750 Vs and > 2300 Vs	< 840 Vs and > 3100 Vs	< 840 Vs and >5100 Vs
Protection: short circuit/ thermal / overload	● / ● / ●	● / ● / ●	● / ● / ●
Relay output	at U_O >18 V / >80 V (22.2 V and 24 V version / 110 V version) contact bridged to -U_O		
Transient time	3 msec	3 msec	3 msec
Efficiency load max. / 50% partial load	> 80% / > 82%	> 84% / > 86%	> 84% / > 86%
Temperature T_a permanent/ for 10 min storage/ short time	-25°C ... +70°C / -40°C ... +85°C -40°C ... +50% / 90°C	-25°C ... +70°C / -40°C ... +85°C -40°C ... +50% / 90°C	-25°C ... +70°C / -40°C ... +85°C -40°C ... +50% / 90°C
Dimensions short printed board (L x D x H) mm long printed board	350 x 338 x 42.5 - - -	441 x 338 x 42.5 500 x 338 x 42.5	417 x 353 x 97.5 441 x 393 x 97.5
Weight	4.2 kg	4.2 and 4.3 kg resp.	8.5 and 8.7 kg resp.

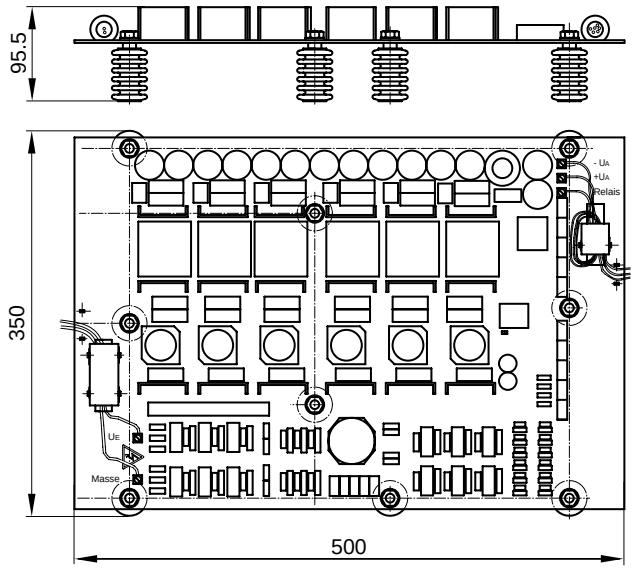
Note: Distributed exclusively by Schaltbau GmbH. Design and manufacture based on patents of R. Kalfhaus by Syko GmbH in accordance with specifications of DB AG and Schaltbau GmbH.

Dimension diagrams

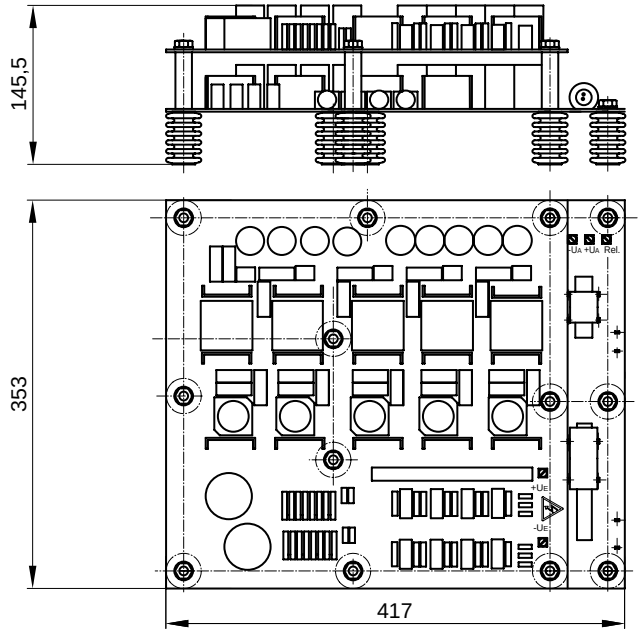
ZH1800 Series



ZH1801 Series



ZH1804 Series



Reduced scale diagrams / dimensions in mm

Ordering code, Stock items

Ordering information

Example: **ZH1801.024.1.S**

Series:

ZH180	Static inverter with power factor adjustment

Type:

0	**ESP0** with input voltage: 1kV 16 ⅔ Hz up to 60 Hz
1	**ESP1** with input voltage: 1kV 16 ⅔ Hz, 1.5 kV 50 Hz, 1.5 kV DC
4	**MSP** with input voltage: 1kV 16 ⅔ Hz, 1.5 kV 50 Hz 1.5 kV DC, 3 kV DC

Output voltage:

022	22.2 V DC
024	24.0 V DC
110	110.0 V DC

PCB assembly:

0	no insulators
1	with insulators
2	with insulators and mounting plate (on request)
3	with insulators, mounting plate, and EMC cover

Style:

G	Only for ZH1804 with larger PCB and enhanced insulation (no solid insulation) to keep clearance and creepage distances at specified levels
S	Special design only for ZH1801.024: short PCB without ferrite core at I/O

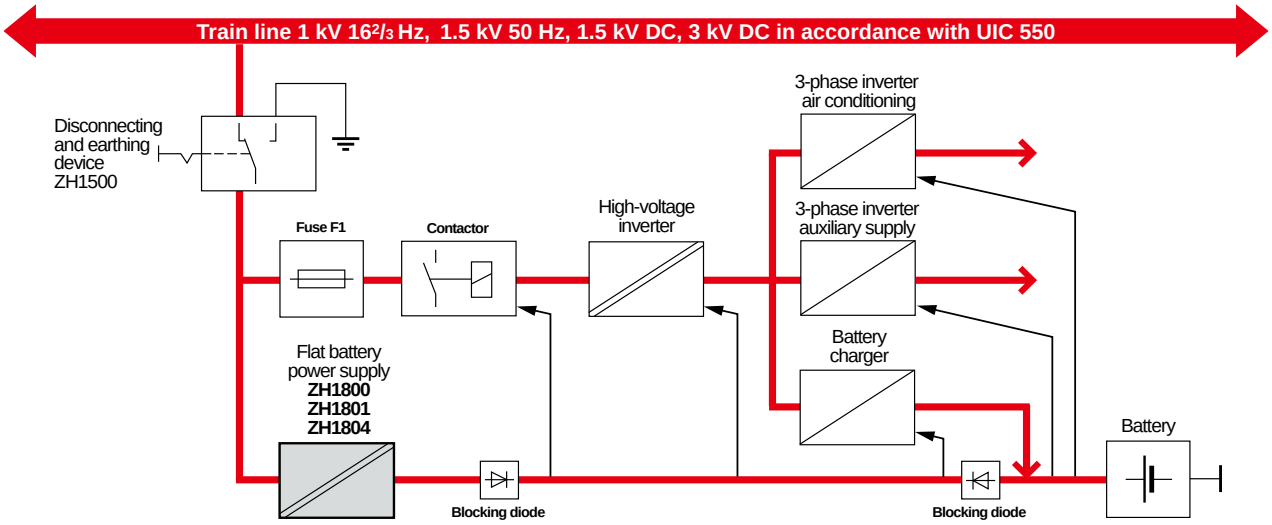
Stock items

Ordering code	Description
	Type **ESP0** with enhanced insulation
ZH1800.024.0.S	24V output, very short PCB without insulators and ferrite cores
	Type **ESP1** with enhanced insulation
ZH1801.024.0	24V output, PCB without insulators
ZH1801.110.0	110V output, PCB without insulators
ZH1801.024.1	24V output, PCB with insulators
ZH1801.110.1	110V output, PCB with insulators
ZH1801.024.3*	24V output, PCB with insulators, mounting plate, and EMC cover
ZH1801.110.3*	110V output, PCB with insulators, mounting plate, and EMC cover
	Type **MSP** with short PCB, enhanced insulation, and transformers with solid and double insulation
ZH1804.024.0	24V output, without insulators
ZH1804.110.0	110V output, without insulators
ZH1804.024.1	24V output, with insulators
ZH1804.110.1	110V output, with insulators
ZH1804.024.3*	24V output, with insulators, mounting plate, and EMC cover
ZH1804.110.3*	110V output, with insulators, mounting plate, and EMC cover

* All types marked with an asterisk have been accorded both the CE approval mark and the EU conformity marking.

All other types cannot be labelled with the CE approval mark by Schaltbau because it is the customer who will be held accountable for the end product. After installing the flat battery power supply in an EMC-compatible housing it is up to the end user to apply for CE approval and EU conformity marking of the whole unit.

Schematic of start-up circuit with static inverter as flat battery power supply



Operating voltages

Input voltages

Area of application for flat battery power supply			Minimum voltage up to 10 min U_{min2} (V)	Minimum voltage continuous rating U_{min1} (V)	Minimum voltage continuous rating U_{min1} (V)	Minimum voltage continuous rating U_{min1} (V)	Maximum voltage up to 5 min U_{max2} (V)	Maximum voltage up to 10 sec U_{max2a} (V)
ZH1804	ZH1801	ZH1800						
→	→	→	700	800	1000 / 16 ⅔	1150	1200	1250 / 1280*
→	→	---	1050	1140	1500 / 50	1650	1740	1860
→	→	---	900	1000	1500 (DC)	1800 / 2000*	1950 / 2050*	2050 / 2500*
→	---	---	1800	2000	3000 (DC)	3600 / 4000*	3900 / 4300*	4050 / 5000*

* Input voltage in accordance with UIC 550 issued Jan 1, 1997, and additional requirements of DB AG

Output voltages

Three basic types of flat battery power supply are available to suit the requirements of different applications. You can choose between the following output voltages:

Series	Output voltages
ZH1800	24.0 V DC ± 1.5%
ZH1801	24.0 V oder 110 V DC ± 1.5%
ZH1804	22.2 V DC ± 1.5% oder 24 V bzw. 110 V DC ± 2%

Variants see also code, stock items

Flat battery power supply type **ZH1800** is only available with short PCB. For type **1801** and **1804**, however, there are the following styles to choose from:

- Variant with long PCB
- Variant with insulators
- Variant with insulators and mounting plate
- Variant with insulators, mounting plate, and EMC cover

Special designs

If you need a special design, do not hesitate to contact us. You might find your required Flat Battery Power Supply among our **special designs**. If not, we also supply designs **to customer requirements**. Please note that in this case minimum order quantities apply.

Schaltbau GmbH
Klausenburger Strasse 6
81677 Munich
Germany

Phone +49 89 9 30 05-0
Fax +49 89 9 30 05-350
e-Mail contact@schaltbau.de
Internet www.schaltbau.de

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