

# **ADDITIONAL EMERGENCY POWER SUPPLY DEVICES**

**OP Emergency power supplies  
according to VDE 0107**

**ZSV installations according to  
VDE 0107**



## **AREAS OF USE**

- Hospitals
- Out-patient clinics
- Medical practices



# ADDITIONAL EMERGENCY POWER SUPPLY DEVICES

## General product information

### ZSV INSTALLATIONS ACCORDING TO VDE 0107 / 10.94

Safeguarding the power supply for medical and technical equipment in hospitals is a necessity which serves to protect the life and safety of the patient. For hospitals, out-patient clinics and other building installations for similar purposes it is necessary to observe DIN VDE 0107, Ed. 10.94. With a failure of the general power supply the medical technical equipment which serves to maintain the hospital operations

has to be operated from an emergency power supply.

ZSV installations are specially designed for use in hospitals and medical practices. There are basically two designs which can be supplied.

230V AC for vital consumers

24V DC for operation lights

### AREAS OF USE

- Operational and comparable lights
- Therapy equipment
- Measuring and analysis equipment
- Therapy apparatus
- Electric tools

### 1. Additional emergency power supply installations (ZSV installations) for hospitals and medical practices according to VDE 0107 / 10.94 for 230V equipment supply

The battery capacity must be designed for a three-hour operation. It can be reduced to 1 hour if a second independent emergency power supply is provided which ensures the minimum operating time of 3 hours.

Switch-over time for any type of consumer is from 0.5 to 15 seconds.

The installations must take over the supply of the consumers if the net input voltage drops below 10%.

### 2. Additional emergency power supply installations (ZSV installations) for OP lights according to VDE 0107/10.94

The battery capacity must be designed for a three-hour operation. It can be reduced to 1 hour if a second independent emergency power supply is provided which ensures the minimum operating time of 3 hours. Switch-over time < 0.5 s.

The installations must take over the supply of the consumers if the net input voltage drops below 10%. Voltage drops conditioned by the equipment must be able to be assimilated by  $\pm 5\%$  to the net voltage in stages of  $\leq 2\%$ .



# ZSV INSTALLATIONS FOR 230V EQUIPMENT SUPPLY

*1. Additional emergency power supply installations (ZSV installations) for hospitals and medical practices according to VDE 0107/ 10.94 for 230V equipment supply*

**The ZSV installations for 230V consist of the following components:**

- Constant voltage charging device with IU characteristic for charging and topping up the battery with simultaneous feed of the inverter.
- Inverter with sinusoidal output voltage for supplying the consumer with 230V alternating voltage.
- Control and monitoring device. A central microprocessor control unit is installed with clear text display for controlling and monitoring the charging device or the battery as well as displaying readings and error messages.

## DELIVERY SCHEDULE OF BASIC DESIGN

Charging part with IU characteristic according to DIN 41773

Voltage time dependent automatic charger

Connection possibility for external phase monitors

Emptying protection with complete test device

DC earth-fault monitoring

After-run control for fan

Interference suppression degree "N"

Automatic daily testing

Capacity testing

3-phase net monitoring (NHV)

Voltage monitoring of trickle charging voltage

Voltage monitoring of charging voltage, for excess voltage and under voltage

Charging current monitoring (too high / too low, no charging current although net is present)

Battery circuit monitoring

Voltage monitoring of output voltage  
Buffer store for 1000 messages and automatic function tests for 2 years

## CONSTANT VOLTAGE CHARGING DEVICE WITH MICRO PROCESSOR UNIT

The power supply devices manufactured according to the most state-of-the-art technology operate according to a controlled IU characteristic according to DIN 41773 for lead batteries and DIN 41775 for NiCd batteries. The output voltage is hereby kept constant at the set value with a deviation of  $\pm 1\%$  within a load range of from 0 to 100% of the specified current of the appliance. Fluctuations in the specified voltage of  $\pm 10\%$  and fluctuations of the net frequency of  $\pm 4\%$  are fully compensated



# ZSV INSTALLATIONS FOR 230V EQUIPMENT SUPPLY

## APPLIANCE SPECIFICATION

### MICRO PROCESSOR CONTROL UNIT

A micro processor unit is installed for controlling and monitoring the charging device, the battery as well as the display of readings and error messages. An illuminated clear text display is provided for indicating the charging voltage,

#### Error messages (in clear text)

- Voltage too high
- Voltage too low
- Emptying
- Battery circuit error
- No charging
- Net failure
- Internal faults of micro processor unit
- Voltage in battery operation too high
- Voltage in battery operation too low
- Insulation error
- Failure of inverter
- Excessive temperature
- Heavy charging
- Installation is not ready for operation according to continuous operating test or function test

charging current, emptying current, date, time as well as all status messages and test results. The messages and function tests of the last two years are stored and can be retrieved at any time.

#### Operating messages with 8 light diodes

- Malfunction
- Ready for operation
- Battery operation
- Net operation
- Consumer ON
- Test operation
- Emptying

#### Potential-free tele-message

- Installation ready for operation
- Battery operation
- Net operation
- Malfunction of the installation
- Temperature-monitoring transformer
- Emptying

### INVERTER

The inverter converts the direct voltage of the battery into a sinusoidal alternating voltage with constant frequency.

#### Technical specifications

Input voltage:	220V DC $\pm$ 20%
Output voltage:	230V AC $\pm$ 2.5%
Frequency:	50 Hz $\pm$ 0.1%
AC output voltage:	IN $\pm$ 2.5%
Ambient temperature:	0-40°C
Distortion factor:	<5%
Efficiency:	85-90%
Noise level:	<55 dB(A) measured from 1 m distance
High overload capacity:	3*I nominal
Short-circuit current:	4*I nominal
Cos phi inductive and capacitive:	0.5-1
Modern strong switch circuit technology with IGBTs	
Messages optical and potential-free	

Monitoring as standard for the input and output voltage  
Option: interruption-free electronic switch-over device  
Option: Manual change over measuring instruments for output voltage. Output current and frequency according to VDE 0107  
Option: Real power meter according to VDE 0107



# ZSV INSTALLATIONS FOR 230V EQUIPMENT SUPPLY

## MODEL TABLE

### CONSTANT VOLTAGE CHARGER

Specified voltage 216 V including smoothing 5% and interference suppression degree "N" (Table)

Input voltage (V)	Input current (A)	Nominal Output current (A)	Mains fuse (A)	Cabinet Type
D400	9,0	16	16	ST5.20
D400	12,3	22	16	ST5.20
D400	16,8	30	20	ST5.20
D400	20,2	36	25	ST8.21
D400	23,6	42	35	ST8.21
D400	28,1	50	35	ST8.21
D400	33,7	60	50	ST8.21
D400	45	80	50	ST10.21
D400	56	100	63	ST10.21
D400	67	120	80	ST10.21
D400	84	150	100	ST10.21
D400	112	200	125	ST11.21

### SINUS INVERTER

Specified voltage  
input 216 DC output 230 V 50 Hz

Type	Output power (VA)	Input Current Non Full (A)	load load (A)	Cabinet without mains back-feed	with mains back-feed
WG3,0/220	3000	0,3	15	ST5.20	ST5.21
WG4,0/220	4000	0,35	20	ST5.20	ST5.21
WG5,0/220	5000	0,38	26	ST5.20	ST5.21
WG6,0/220	6000	0,4	31	ST5.20	ST5.21
WG8,0/220	8000	0,5	41	ST8.20	ST8.21
WG10,0/220	10000	0,6	52	ST8.21	ST8.21
WG12,0/220	12000	0,6	62	ST8.21	ST8.21
WG15,0/220	15000	0,7	78	ST10.21	ST10.21
WG20,0/220	20000	0,9	105	ST10.21	ST10.21
WG25,0/220	25000	1,0	130	ST11.21	ST11.21
WG30,0/220	30000	1,4	156	ST11.21	ST11.21
WG40,0/220	40000	1,8	210	ST11.21	ST11.21

### ZSV SCHEDULE DATA

ZSV Model	3KVA	4KVA	5KVA	6KVA	8KVA	10KVA	12KVA	15KVA	20KVA	25KVA	30KVA	40KVA
Specified output in KVA with cos phi 0.8 inductive	3	4	5	6	8	10	12	15	20	25	30	40
Output voltage in V	230	230	230	230	230	230	230	230	230	230	230	230
Output frequency in Hz	50	50	50	50	50	50	50	50	50	50	50	50
Specified current output in A	13	19	22	26	35	43	52	65	87	108	130	174
Required rectifier with backing-up operation - Power supply time 1 hour	16A	16A	22A	22A	22A	22A	22A	30A	30A	30A	30A	42A
Required rectifier with backing-up operation - Power supply time 3h	16A	16A	22A	30A	30A	36A	42A	50A	60A	80A	100A	120A
Required rectifier with continuous operation - Power supply time 1 hour	22A	30A	36A	42A	60A	60A	80A	100A	120A	150A	200A	250A
Required rectifier with continuous operation - Power Supply time 3 h	30A	36A	42A	50A	80A	80A	100A	150A	200A	250A	250A	300A
Efficiency - rectifier/inverter	0,92	0,92	0,92	0,92	0,92	0,92	0,92	0,92	0,92	0,92	0,92	0,92
Installation losses in kW with backing-up	0,12	0,14	0,15	0,16	0,18	0,2	0,22	0,25	0,3	0,4	0,5	0,6
Installation losses in kW with continuous operation	0,3	0,3	0,4	0,4	0,5	0,6	0,7	0,8	1,0	1,4	1,6	2
Max. permissible safeguard for selective trigger <500ms DIAZED - gl in A	16	16	20	25	25	35	35	50	63	63	80	100
Bypass (230V/50Hz) Fuse protection In A	20	25	35	35	50	63	80	80	125	160	200	250
Battery capacity (108 Pb cell) proposed incl. 20% reserve Supply time 1h in Ah	18	24	31	37	49	62	74	93	126	155	186	252
Battery capacity (108 Pb cell) proposed incl. 20% reserve Supply time 3h in Ah	54	72	93	111	147	186	222	279	378	465	558	756
Separating transformer power in KVA	9	12	15	18	24	30	36	45	60	75	90	120
Maximum permissible overall transformer power according to VDE 0107												
Maximum individual transformer power in KVA	3,15	3,15	3,15	3,15	3,15	5	5	6,3	6,3	6,3	8	8



# ZSV INSTALLATIONS FOR 24V OP LIGHTS

## 2. Additional emergency power supply installations (ZSV-Installations) for OP lights according to VDE 0107/10.94

The ZSV installations contain the message and monitoring devices prescribed according to VDE 0107, Ed. 10.94. They basically consist of:

- Charging and topping up device with IU characteristic
- Control and monitoring device
- Consumer output circuits with cyclic DC/DC inverter
- Additional devices
- Appliance and battery casing

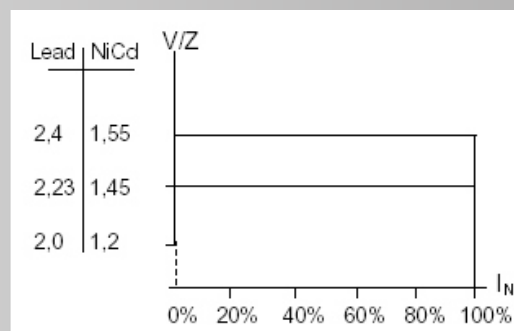
The rectifier device, battery and consumers through the DC/DC inverter are connected in parallel. When the mains voltage is present the rectifier device feeds the consumers and keeps

the battery fully charged with a constant voltage. The battery contributes to the supply of power when the connected load rises above the specified current of the appliance. In the event of a power failure the battery takes over the supply of the OP lights without any interruption. When mains power is restored the supply is again through the device with simultaneous charging of the battery. The specified current of the appliance is restricted to  $100\% I_N \pm 2\%$ . The differential current between the specified current of the appliance and the consumer current flows into the battery. The consumers are supplied with constant DC voltage through a cyclic DC/DC inverter with regulation up and down.

### CHARGING DEVICE

The charging part operates according to a regulated IU characteristic according to DIN 41773 (Fig. 1) for lead batteries and DIN 41775 for NiCd batteries. The output voltage is hereby kept constant at the set value with a deviation of  $\pm 1\%$  within a load range of 0 to 100% of the specified current of the appliance. Net voltage fluctuations of  $\pm 10\%$  and net frequency fluctuations of  $\pm 4\%$  are regulated out. An electronic regulating unit is used for regulating which has been developed for this purpose and which controls a thyristor setting member. The charging device which consists of the charging and top-up charging part is

dimensioned so that after tapping off the battery capacity laid down in the specification, 90% of the battery capacity is restored again within 6 hours.



### CONSUMER CIRCUITS

Each consumer circuit has a DC/DC inverter which can be set to the proposed OP connection. The voltage drop which is caused by the different cable lengths and conductor crosssections can thereby be compensated or regulated through a connectable measuring conductor. The DC/DC inverters are regulated with constant voltage and ensure a terminal voltage at the bulbs of  $24V \pm 1\%$  even during the charging and emptying process of the battery.



# ZSV INSTALLATIONS FOR 24V OP LIGHTS

## APPLIANCE SPECIFICATIONS

### BATTERY SELECTION

The battery is to be designed so that the consumer current can be tapped for 3 hours. Furthermore a reserve of 20% must be included in the calculations. To calculate the discharge current it is necessary to start from a mean battery voltage between the discharge final voltage and the specified voltage (22.2V or 33.3V). The efficiency of the DC/DC converter is at 85%.

Example:      Specified voltage:      24 V  
                 Bulb power:              500W

$$\frac{500W \times 1.2}{22.2V \times 0.85} \times 3h = 95.4 \text{ Ah}$$

### THE FOLLOWING MONITORING ACTIONS ARE PROVIDED IN THE BASIC SPECIFICATIONS:

Moving coil current and voltage meter K1,  
1.5 for charging voltage, charging current  
and consumer current  
Network monitoring  
DC voltage monitoring "too high"  
DC voltage monitoring "too low"  
Electronic automatic charging  
Voltage supply (24V or 36V) for indicator  
panel

#### Potential-free contacts

Voltage too low / too high  
Power failure

#### Potential-affected contacts (24V / DC) per output circuit:

Voltage too low / too high  
Power failure  
Collective fault warning

#### Potential-affected contacts (24V / DC) per output circuit:

Battery operation  
Network operation

### ADDITIONAL DEVICES

#### Temperature monitoring of transformers (T1)

The temperature of the transformer is monitored. If the transformer heats up beyond the permissible value as a result of a fault then a fault signal is implemented.

#### Earth-fault monitoring







# ZSV INSTALLATIONS FOR 24V OP LIGHTS

## APPLIANCE SPECIFICATIONS

### TECHNICAL DATA POWER SUPPLY

Net connection:	3 x 400V ± 10% 230V ± 10%
Frequency:	50Hz ± 4%
Charging characteristic:	IUoU according to DIN 41773, switchable to IUI
Specified direct voltage:	24 V or 36V battery specified voltage
Charging voltage:	2.40 V/Z ± 1% static with wet batteries 2.35 V/Z ± 1% static with maintenance-free batteries 1.55 V/Z ± 1% static with NiCd-batteries
Trickle charge voltage:	2.23 V/Z ± 1% static with wet batteries 2.27 V/Z ± 1% static with maintenance-free batteries 1.45 V/Z ± 1% static with NiCd batteries
IUI charging voltage:	> 2.65 V/Z static with wet batteries > 1.75 V/Z static with NiCd batteries
Adjusting range of charging voltage:	±5%
Charging current: Constant current	± 2%
Form factor:	about 1.1 with three-phase appliances, about 1.4 with single-phase appliances
Interference suppression degree:	"B" according to E.G guidelines 89/336
Noise level:	Max 60 dB(A) measured at 1m distance and halfway up height of appliance
Operating temperature range:	-5°C to + 40° C with max. assembly height 1000 m above NN
Efficiency:	75-92% with three-phase appliances, 65-85% with single-phase appliances
Displacement factor:	cos.phi 0.7 - 0.9 with three phase appliances cos phi 0.6 - 0.85 with single-phase appliances
Protection type:	IP21
Lacquering:	Frame RAL 7016 / casing RAL 7032

### TECHNICAL DATA DC/DC INVERTER FOR SUPPLYING CONSUMERS

Input voltage:	18-48V
Idling current collection:	about 0.3A
Output voltage:	24V (±1%)
Adjusting range:	about 23-28V
Max. power:	500 W
Overvoltage protection:	Input voltage > 60 V switch off Output voltage >30 V switch off
Interference suppression:	"B"
Tele switch-on:	Open = Appliance on
Malfunction warning:	Potential-free (max. switch power 60V/ 0.5A)
Display:	Malfunction LED red
Efficiency:	85%
Temperature range:	0-45°C
Operating type:	Continuous operation
Ventilation:	Built-in fan in front plate

### MODEL TABLES

Nominal voltage V	Type	Output current A	Cabinet type
24	E24/50	50	ST5.21
24	E24/60	60	ST5.21
24	D24/80	80	ST5.21
24	D24/100	100	ST5.21
24	D24/120	120	ST5.21
24	D24/150	150	ST5.21
24	D24/200	200	ST5.21
36	E36/50	50	ST5.21
36	E36/60	60	ST5.21
36	D36/80	80	ST5.21
36	D36/100	100	ST5.21
36	D36/120	120	ST5.21
36	D36/150	150	ST5.21
36	D36/200	200	ST5.21

# ZSV INSTALLATIONS FOR 24V OP LIGHTS

## TECHNICAL SPECIFICATIONS

All the casings listed below are powder-coated and anneal-lacquered.

Lacquer: The casing frame in RAL 7016. All other parts in RAL 7032. All casings correspond to protective system IP 21.

All doors are hung-in from the right. Doors of the floor-standing casing can be opened to an angle of 180°.

Casing plinths of 100 or 200 mm can be supplied to match up with other casings. All casings can be supplied in other colours for extra charge.

## APPLIANCE CASING

Housing type	Housing design	Max output circuits	Dimensions (mm)		
			height	width	depth
ST5.21	Vertical Cabinet	6	1400	800	600
ST8.21	Vertical Cabinet	12	1800	800	600
ST9.21	Vertical Cabinet	15	2000	900	600

## COMBINATION CASING

Housing type	Dimensions (mm)			Battery dimensions (mm)			max. departure to be installed
	height	width	depth	height	width	depth	
STK8.20	1800	600	450	600	550	380	2
STK8.21	1800	800	600	600	750	550	3
STK9.21	2000	900	600	600	850	550	6

Each casing is supplied with 2 grid bases for installing batteries.

## BATTERY CASING

Type	Dimensions H x W x D (mm)	Battery compartment H x W x D (mm)
BS 4	1200 x 600 x 430	990 x 580 x 360
BS 5.20	1400 x 600 x 600	1190 x 550 x 550
BS 5.21	1400 x 800 x 600	1190 x 750 x 550
BS 8.20	1800 x 600 x 600	1590 x 550 x 550
BS 8.21	1800 x 800 x 600	1590 x 750 x 530
BS 9.21	2000 x 900 x 600	1790 x 850 x 550
BS 10.21	1800 x 800 x 800	1590 x 750 x 750
BS 11.21	1800 x 1000 x 800	1590 x 900 x 750

Each casing is supplied with 2 grid bases for installing batteries (Bearing capacity 250 kp). Further battery grid bases or battery steps can be supplied at extra charge.

## PRODUCT INFORMATION

All casings are powder-coated and lacquered with a two-component lacquer. The cable can be inserted into the floor-standing casing on the top or bottom (at the back). In the case of wall-mounted casings the cable is inserted only on the top. In the case of emergency light devices, the standard cable is inserted on the top (at the back). For transport in the case of all floor-standing casings the front and rear lining plate can be unscrewed.



# ZSV INSTALLATIONS FOR 24V OP LIGHTS

## PRODUCT INFORMATION

### **The following products are produced by us:**

- Rectifier for charging drive batteries with  
Pulse charging characteristic  
IUIa charging characteristic  
Wa and WoWa charging characteristic
- Emergency power supply devices ( according to VDE 0108/10.89 )
- Additional emergency power supply (ZSV installations according to VDE 0107/10. 94
- Mini charging devices for charging maintenance-free batteries with IU or IUoU characteristic.
- Power supply devices for direct and alternating current consumers
- DC/DC- Converter
- Transformers and inductors up to 250 kVA capacity
- Electronic regulators and monitoring units
- Infrared controlled hand-dryers
- Special appliances and equipment