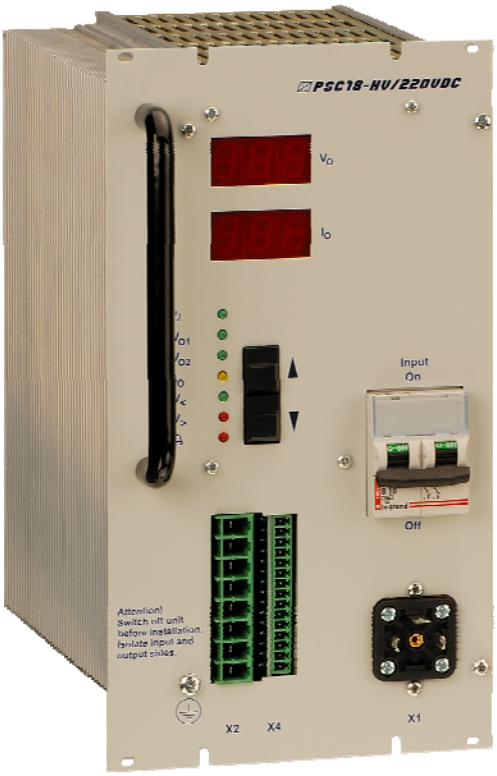
ELTEK VALERE
always on

DC/DC CONVERTER
PSC18

USER MANUAL



BHB.PSC-18.D30-1020.HB101

General information

IMPORTANT! Please read this operation and maintenance manual carefully before assembling and start up the unit!

The operation and maintenance manual is part of this unit, i.e. it should be made available to each and every person concerned with the start up, maintenance or operation of the unit. The unit should be moved, mounted, started, operated and maintained only by skilled personnel. The local specifications for the prevention of accidents as well as the general guidelines according to IEC 364 should always be followed!

The functional description in the operation and maintenance manual correspond to those at the time of the publication. Technical design modifications or those of power ratings can be carried out by the supplier without announcing any revision or announcement. There is no responsibility for the constant revision of the operation and maintenance manual

The module is manufactured in accordance with applicable DIN and VDE standards such as VDE 0106 (part 100) and VDE 0100 (part 410). The CE marking on the module confirms compliance with EU standards 2006-95-EG (low voltage) and 2004-108-EG (electromagnetic compatibility) if the installation and operation instructions are followed.

The units are delivered according to our delivery conditions. Rights to alterations in the technical details in this operation and maintenance manual as well as in the respective data sheets are reserved.

Claims about faulty goods have to be made as soon as possible after receipt of material. Packing note and invoice as well as the information about the type, serial number and damage description have to be transmitted to the supplier.

Warranty claims not be accepted in case of visible external influences (e.g. missing or loose screws, welding, loose sheets, etc.), which could be attributed to an unauthorised opening of the unit. The supplier is not responsible for applications of the unit, not intended by the manufacturer. The end user is responsible to take the necessary action for the prevention of damage to personnel and material (see the upper text section).

Supplier

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IMPORTANT!

Table of Contents

1. General Information

The Switch Mode Power Supply units PSC18 (named SMPS in the following) supply an output power of 1500W (max. 1800W).

A typical application is a mains-connected secured DC-power supply source feeding the connected battery as well as the consumer load. Hereby, the dynamic regulating performances are particularly advantageous during input voltage and consumer load deviations.

The SMPS unit operates to an IV-characteristic according to DIN 41772/41773 and represents a complete unit for implementation in a 19" assembly carrier according to DIN 41494. The operation and indication elements as well as the plugs are located on the front plate of the unit.

2. Type range

PSC18

Type designation	Article code	Input-voltage in V DC	Output-voltage in V DC	Output-current in A DC
110/24-40	200-018-740.00	110	24	40
110/48-30	200-018-750.00	110	48	30
110/60-25	200-018-760.00	110	60	25
110/110-13.4	200-018-770.00	110	110	13.4
110/220-6.7	200-018-780.00	110	220	6.7
110/220-6.7 Relay	200-018-780.01	110	220	6.7
220/24-40	200-018-840.00	220	24	40
220/48-30	200-018-850.00	220	48	30
220/60-25	200-018-860.00	220	60	25
220/110-13.4	200-018-870.00	220	110	13.4
220/220-6.7	200-018-880.00	220	220	6.7

Available options and accessories:

- Temperature sensor lead LM 335 (sensor lead in M5 cable shoes with 2m wire)
- CAN-Bus-interface
- One set input and output plug:
  24 – 110V DC
  220V DC

3. Start up procedure

Before connecting to the input voltage, it should be checked whether the voltage information on the rating plate corresponds to the available voltage and also that the polarity corresponds to the connection plan of the plug. The mains connection is done via a unit plug at the front side. The protective conductor should be generally connected (protection class 1, leakage current ≤ 3.5 mA).

Important:
If a pole of the output side has been earthed, then the SMPS unit should be grounded via the separate PE connection on the front plate at the left side near the DC- output connection.
In this case, the protective conductor at the input side should not be connected via the input plug (earth circuit). This is particularly important for parallel connection without external decoupling diodes.

The DC-output connection is done via a SUB-MIN-D-plug of design 21 WA4 on the front side. The output plug also contains the connections for the signals, sensor cable connections, symmetry regulation and temperature sensor lead.

Note:
The SMPS is equipped with a high capacitive capacitor connected in the output. If the SMPS output in the dead state is connected "hard" to a battery or other parallel operating SMPS, then it results in a considerable surge of charging current, which could lead in welding the plug contacts when the plug is inserted.

This can be avoided by the following proceedings:

- Switch on the SMPS before mounting without the output plug; insert the connection plug only after the adjusted output voltage is attained.
- Disconnecting the DC- circuit with a switch or a fuse
- Charging with a protective resistance (approx. 1 Ohm/V)
- Use of decoupling diodes

After switching off the unit, the capacitors in the input and output circuits can still conduct voltage; the discharge time of the input circuit is approx. four seconds, that of the output circuit is approx. 15 seconds.

The SMPS unit operates with natural air cooling. The temperature of the inflow air should not exceed 45°C. If several units are operated via one another in the cabinet, then either forced cooling should be provided or a vertical distance of at least 134 mm = 3 HU should be maintained between the units. Air flaps should be mounted between the mounting levels such that the temperature of the inflow air of the individual mounting levels does not exceed the permissible operation temperature. Cabinet rooms should be designed for a max. ambient temperature of 40°C. Temperatures upto 60°C are permitted for a short time or in the case of forced cooling in the cabinet, but should be avoided in the interest of the lifetime of the unit.

The power loss per unit is approx. 150 W to 170 W (depending on the type).

4. Operation

The unit is operated using the operating elements arranged on the front plate. The operating elements are described in the respective sections and are assigned by the labels on the front plate of the unit (see Pt. 7.1/7.2).

5. Functions

5.1 Circuit diagram

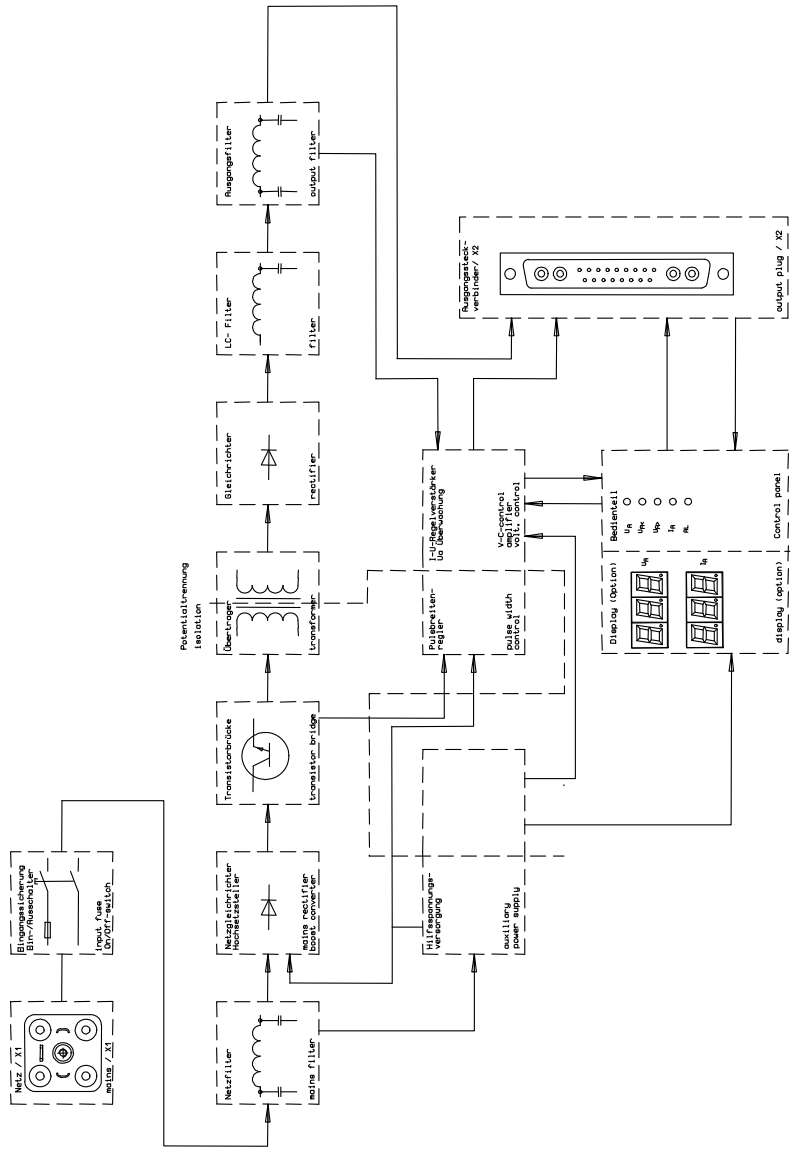


Fig. 1:
Circuit diagram
PSC18

5.2 Electrical function description

The SMPS unit consists of the following main functional components:

1. Input filter suppressing the feedback of high frequency interference produced by the unit into the mains as well as for the attenuation of the interference voltages and voltage transients superimposed on the mains.
2. Rectifier (polar protection) with synchronised power controller (operating frequency 100 kHz) for converting the input voltage into a pre-regulated DC-voltage of approx. 380V (DC – Input 110V DC: 170V), regulating the input voltage curve and restricting the inrush current.
3. Transistor bridge circuit for converting the 380 (170)V DC into a pulse-width regulated stepped voltage with a frequency of 100 kHz.
4. Power transmitter to the potential separation and voltage adaptation at the secondary side
5. Rectifier with fast switching diodes
6. LC filter for smoothing the DC- voltage ripple at the rectifier output
7. Output filter for smoothing the interfering voltages on the output voltage
8. Auxiliary current supply for the internal power supply to the control components with potential separation at the primary and secondary side.
9. Regulating line with potential separation by optocoupler.
10. Operating component with parameter adjustments, signalling, monitoring and indication elements

5.2.1 Electrical insulation

Due to the design of the unit and of the components as well as design of separated connections of the input and output circuits

- the SMPS series with $U_A \leq 60$ V DC fulfil the EN 60950 and VDE 0100 Standard; i.e. protection against shock currents due to the functional extra low voltage with a safe electrical insulation.
- the SMPS series $U_A > 60$ V DC satisfy the safe electrical insulation up to $U_A =$ 220 V DC according to EN 60950 and VDE 0160 Standard.

5.2.2 Input

The input is protected by a 2-pole circuit breaker. This circuit breaker is used also as on/off-switch.
The MCB is situated before the input filter. The SMPS has a current limitation which limits the inrush current to the level of nominal input current.

5.2.3 Output

The output-characteristic is an IV-characteristic according to DIN 41772 or DIN 41773. An active current distribution or a characteristic curve (- 1% for 100 % I_{nom} can be selected for parallel operation (factory adjustment: characteristic curve)
The output is continuously short circuit proof due to a constant current regulation.

5.2.4 Output voltage dynamic behaviour

In case of load changes in the load between 10% and 90% I_{nom} or 90% and 10% I_{nom} the dynamic voltage deviation is max. ± 3% and is compensated to the static limits within max. 1.5 ms.

5.2.5 RFI suppression

The SMPS unit fulfils the conditions of the RFI class " B " according to VDE 0878 T 1 or EN 5501 /55022. When measured with a filter according to CCITT-recommendations, the output ripple is psophometric < 1 mV (24V), < 1.8 mV (48V) as well as < 2 mV (60V).

5.2.6 Parallel operation mode

Due to the parallel operation ability of the SMPS it is possible to design the redundant cabinets according to the principle n+1.

Due to the 1% characteristic curve (factory adjustment) a load distribution of about ± 10% and due to the optional **active current distribution** (see pt. 7.3, factory adjustment necessary), about ± 5% is attained.

During the adjustment of the characteristic curve, the load distribution can be optimised by increasing the output voltage in the unit having the smallest load current and decreasing the output voltage in the unit having the largest load current (see pt. 5.4).
The selective monitoring of the individual SMPS is possible only with internal or external decoupling diodes in the output.

The delivery of units with an output voltage ≤ 60 V DC with already incorporated internal decoupling diodes is optional. The units are labelled with p (internal decoupling diode in the plus branch) or m (internal decoupling diode in the minus branch).

5.3 Monitoring

5.3.1 Mains Voltage Monitoring

Mains voltage monitoring; signaling with LED "Mains", criterion: output voltage of step-up-converter ≥ 370 V (165V), at the same time operation monitoring of step-up-converter (equivalent to main voltage of appr. ≥ 195 (100)VAC; depends on load).
The LED is dark if mains voltage low or the step-up-converter is out of order.
This signal is included in collective failure signal. Additional there is an optocouppler signal (mains O.K.)

5.3.2 Operation Monitoring

Functional monitoring; signaling with LED "U_{A1}", criterion: output voltage ≥ 97 % of adjusted output voltage without constant current regulation and ≥ 85 % of the adjusted output voltage with constant current regulation. The signaling threshold of this monitoring follows the adjusted nominal output voltage automaticly.
This signal is included in collective failure signal of rectifier. Additional there is an optocouppler signal (U_A O.K.)
At operation with internal decoupling diodes the voltage before diodes will be measured.

5.3.3 Output Voltage Low

Output voltage low monitoring; signaling with LED "U<", criterion: output voltage is higher than adjusted level U<;
This signal is included in collective failure signal. It has its own relay contact on signaling connector too. If the voltage value is O.K. Pin 13 and Pin 17 of X2 or Pin 11 and Pin 15 of X4 (220V – output voltage)are closed.

5.3.4 Output Voltage High

Output voltage high monitoring; signaling with red LED "U>", criterion: output voltage higher than adjusted level U>;
This signal is included in collective failure signal of SMPS. If there is an error the LED burnes and the SMPS switches off internal. This protective unit has an automatic locking and should be set back with the mains switch or remote ON/OFF.

5.3.5 Protection Against Overheating

Protection against overheating; signaling with red LED "Alarm", criterion: temperature of heat sink > 90°C.
The over-temperature protection switches OFF the SMPS when the limited temperature is attained.
This signal is included in collective failure signal. You have to reset the unit by ON/OFF switch.

5.3.6 Signals

The signals "U_A O.K.", "Mains O.K." and "Constant Current Mode I_{const}" are optocouppler signals with a loading of 30 V/5 mA. The optocoupplers switches off at error. The collective failure signal is delayed for appr. 10 sec. The relay contacts between Pin 14 and Pin 15 of X2 and Pin 12 to Pin 14 of X4 (220V – Output voltage) are open and between Pin 15 and Pin 16 are closed at error.

5.4 Output and threshold adjustment

The adjustment of output values and monitoring thresholds are very easy. All values will be adjusted with front keys by showing the actual value in the front side digital displays.
In normal operation the top display shows the output voltage ($U_{A1}/U_{A2}/U_{A3}$) and the bottom display shows the output current (I_A).

For any adjustment please follow these instructions:

- press both keys UP/DOWN(↑↓) together for a short time; the SMPS changes to adjustment mode
- press the key UP(↑) or DOWN(↓) to change the adjustment parameter (see also table on bottom)
- press both keys UP/DOWN(↑↓) together for a short time; the SMPS changes to value change mode
- press the key UP(↑) or DOWN(↓) to change the adjustment value (if you hold the key the value changes quicker)
- press both keys UP/DOWN(↑↓) together for a short time; the SMPS changes back to adjustment mode (at this moment the changed value will be storaged)
- press both keys UP/DOWN(↑↓) for appr. 3 sec. to change back in operation mode

Adjustable parameters in adjustment mode:

Display	Parameter
Uo1 (=U_{A1})	tripple charge voltage
Uo2 (=U_{A2})	boost charge voltage (look also cap. 6.5)
Uo3 (=U_{A3})	voltage at discharge test (look also cap. 6.4)
Io (=I_A)	output current
U<	output voltage low threshold (look also cap. 5.3.3)
U>	output voltage high threshold (look also cap. 5.3.4)
t	coefficient of temperature for temperature compensation of charge voltage (look also cap. 6.2)

The monitoring thresholds follow automaticly the adjusted nominal values of output voltage. The monitoring thresholds for mains/step-up-converter and over heating are not changeable.
The adjustment ranges for several thresholds you can find in technical specifications.

6. External Functions

6.1 Output voltage sensor leads

With sense links for output voltage you can compensate voltage losses over wires or diodes.
The max. regulation difference is approx. 4 % of the nominal voltage.
Interruption on sense links, confusing of poles or short circuit can`t damage the rectifier. At interrupt it can be a voltage increase of max. 4%.

6.2 Temperature Compensation of Charging voltage

At using of closed batteries we recommend the temperature controlled compensation of charge voltage. You has to connect a external active temperature sensor (option) on signaling connector. The coefficient of temperature normally is -4 mV/K per cell (in temperature range of 0-50 °C). The basic temperature is 20°C. The coefficient can be adjusted between -1 to -6mV/K per cell (look cap. 5.4).
The sensor will be connected with a 2pole wire (0.25 mm^2). It can be mounted directly on top of battery or on battery poles. At big distances (from 2m) we recommend a shielded wire with connection of the shield on SMPS ground.

6.3 External Switch ON/OFF

The SMPS can be switched on/off with an external signal. The input is free of potential by an optocouppler and fulfills the suppostion for safe electrical decoupling to mains and output side. The signaling voltage is 10-24 V, the internal resistance 2.7 kOhm. The input is protected against confusing the poles. At higher supply voltages the current in the control circuit has to be limited to 5-7mA with a resistor (for instance 6.8 kOhm at 48/60V DC).

6.4 Discharge Test

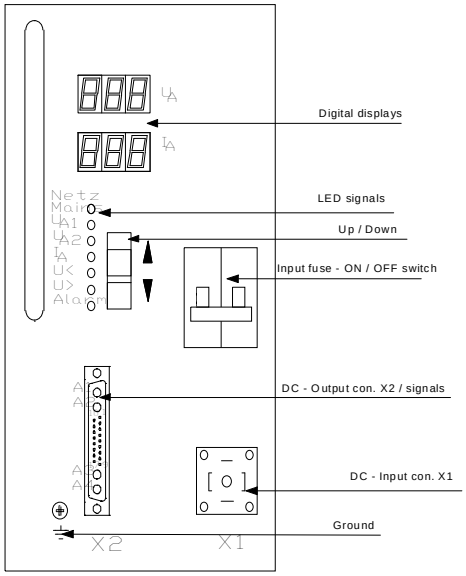
The discharge test voltage can be adjusted by the user
(parameter UA3; see cap. 5.4). If the discharge test mode active the LED UA1 is on.

6.5 Boost Charge Mode

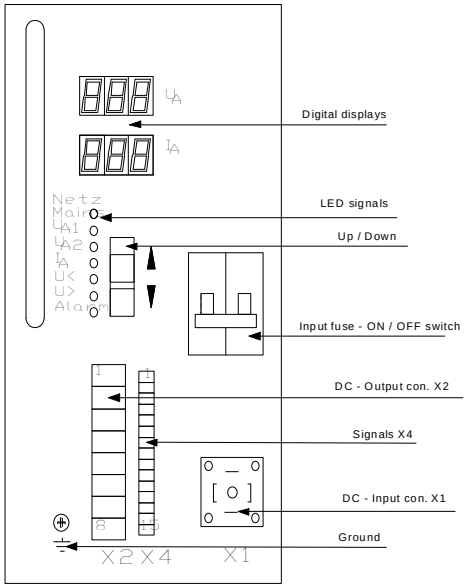
The SMPS module has a second charge line (boost charge line). To select this mode, a voltage is to be to connected to pin 2 of the output connector X2 (look cap. 7.3). The boost charge mode will be signalized with LED UA2. The user is able to adjust the voltage value (see cap. 5.4).

7. Operation Elements and Connectors

7.1 Front View / Operation Elements 24/48/60/110 V-Version



7.2 Front View / Operation Elements 220 V-Version



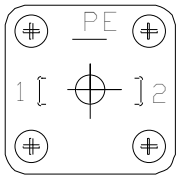
7.3 Indication Instruments

The PSC has digital instruments from 0-999 for current and voltage. The accuracy is equivalent to class1 in relation to nominal output voltage. The displays can be switched over to showing the adjustment values of monitoring thresholds. In this mode the parameter short name is shown in the top display and its value (UA1, UA2, UA3, IA, U<, U>) in the bottom display.

7.4 Electrical Connectors of Input and Output

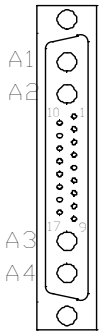
X1: DC-mains input / GDM-connector

X1, Pin	Function
1	+ DC - Input
2	- DC - Input
PE	PE



X2: 24, 48, 60 and 110V- version
DC output and signaling contacts / SUB-MIN-D-connector 21WA4

X2, Pin	Function
A1	(+) - output
A2	(+) - output (additional for $I_A \geq 40$ A)
A3	(-) - output (additional for $I_A \geq 40$ A)
A4	(-) - output
1	(+) - output voltage sense link
2	signal input discharge test mode / boost charge mode [1]
3	optocouppler emitter
4	optocouppler collector "Mains O.K."
5	optocouppler collector "U_A O.K."
6	optocouppler collector "I_A"
7	temperatur sensor (+) [2]
8	control wire for active current sharing [3]
9	(-) - output voltage sense link
10	analog ground (for temperature sensor (-), active current sharing)
11	(+) external switch ON/OFF [4]
12	(-) external switch ON/OFF
13	relay contact U< , N/O [5]
14	relay contact collective failure , N/O
15	relay contact collective failure , COM
16	relay contact collective failure , N/C
17	relay contact U< , COM



1)
tri-state-input, pin 2 on -U_A = discharge test mode,
pin 2 on +U_A = boost charge mode
Note:
At 60/110V units there has to connect an additional resistor

in the control wire to $+U_A$ (60V:18 kOhm; 110V:56 kOhm.

2)
connection of temperature sensor with 2pole wire to pin 7(+) and pin 10 (-)
Note:
If several modules are in paralleling then the pin 7 and pin 10 from every unit has to closed.

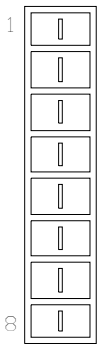
3)
At active current sharing mode of paralleling units the pin 8 of every module has to connect together.The Analog – GND (pin 10) has to connect too.
ATTENTION: If you have decoupling diodes in minus at output side the using of sense links are **not** allowed

4)
external switch ON/OFF with optocouppler: internal resistor 2,7kOhm, $I_{min} \leq 5$ mA, $I_{max} = 10$ mA
Note:
The input is free of potential with safe electrical decoupling to primary side and with 500V DC to secondary side.

5)
The relay outputs are free of potential with safe electrical
decoupling to primary side and with 500V DC to secondary side.

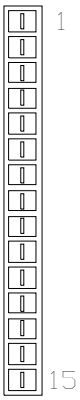
X2: 220V version (DC output - 8xCOMBICON $4mm^2$)

X2, Pin	Function
1	(+) – Output
2	(+) - output (additional for $I_A \geq 40$ A)
3	(+) - voltage sense link
4	control wire for active current sharing 6)
5	BUS ground
6	(-) - voltage sense link
7	(-) - output (additional for $I_A \geq 40$ A)
8	(-) - output



X4: (Signals - 15xCOMBICON $1,5mm^2$)

X4, Pin	Function
1	(+) external switch ON/OFF 4)
2	(-) external switch ON/OFF
3	optocouppler emitter
4	optocouppler collector "Mains O.K."
5	optocouppler collector "U_A O.K."
6	optocouppler collector "I_A"
7	BUS ground
8	signal input discharge test mode / boost charge mode 1)
9	temperature sensor (+) 2)
10	control wire for current sharing mode 3)
11	relay contact U< , NO 5)
12	relay contact collective failure , NO 5)
13	relay contact collective failure , COM
14	relay contact collective failure , NC 5)



15	relay contact U< , COM

1)
tri-state-input, pin 8 on $-U_A$ = discharge test mode, pin 8 on $+U_A$ = boost charge mode
Note:
There has to connect an additional resistor in the control wire to $+U_A$ of 150 kOhm.

2)
connection of temperature sensor with 2pole wire to pin 9(+) and pin 7 (-)
Note:
If several modules are in paralleling then the pin 7 from every unit has to closed.

3)
At active current sharing mode of paralleling units the pin 10 of every module has to connect together. The Analog – GND (pin 7) has to connect too.
ATTENTION!!! If you have decoupling diodes in minus at output side the using of sense links are **not** allowed.

4)
External switch ON/Off with optocouppler: internal resistor 2,7kOhm, $I_{min} \leq 5$ mA, $I_{max} = 10$ mA
Note:
The input is free of potential with saved electrical decoupling to primary side and with 500V DC to secondary side.

5)
The relay outputs are free of potential with saved electrical
decoupling to primary side and with 500V DC to secondary side.

6)
At active current sharing mode of paralleling units the pin 4 (DC – Output) of every module has to connect together. The BUS – GND (pin 5) has to connect too.

ATTENTION!
You can use version 6) or 3) of wiring for active current sharing mode, not both together!

8. Maintenance

In general, the module is maintenance-free.
A yearly inspection with following checks is recommended:

- Mechanical inspection
- Removal of dust and dirt, especially on radiator surfaces
- Check for internal dust or humidity

Attention! Dust combined with moisture or water may influence or destroy the internal electronic circuits.
Dust inside the unit can be blown out with dry compressed air.
The interval between the checks depends on ambient conditions of the installed module.

9. Fault finding instructions

Only skilled and trained technical personnel should carry out all necessary operations at the unit.

9.1 No Output Voltage

- DC - mains voltage is present?
- mains switch is on?
- input plug is connect strong and correctly?
- confusing the poles or short circuit on output?
- at paralleling: confusing the poles at external decoupling diodes?
- monitoring of output voltage high U> signalize an error (light on LED U>)?; switch the unit off and on again and check the adjusted value of U> (see cap. 5.4)!

If the module still does not work even though all checks have been done, contact your sales agent or the ELTEK VALERE INDUSTRIAL service department.

9.2 Deviation of Output Voltage

- operates the module in constant current mode (overload)?;
  reduce the load!
- adjustment of voltage value U_A wrong?
  adjust output voltage to nominal values (look cap. 5.4)!
- interruption in external sense links?
- voltage losses over decoupling diodes on output side? ;
  adjust the output voltage to higher level or use sense links!

If the module still does not work even though all checks have been done, contact your sales agent or the ELTEK VALERE INDUSTRIAL service department.

10. Technical Data

10.1 General Technical Data

Nominal input voltage	220V DC (110V DC) +20/ -15%
Monitoring input voltage	LED - signals U_E <195V DC (100V DC) Varistor protection U_E > 270V DC (150V DC)
Inrush current	16A at 10ms
Recommended mains fuse	gL 16A
Output characteristic	IV line acc. to DIN 41772/ DIN 41773
Emission	acc. to EN50081-1
conducted interference voltage	acc. to EN 55011/EN55022 class "B"
radiated electromagnetic fieldstrength	acc. to EN 55011/EN55022 class "B"
Immunity	acc. to EN50082-2
cabinet	ESD-test acc. EN61000-4 part 2; 6kV contact; 8kV air discharge HF-field acc. to EN61000-4 part 3; 10V/m (30MHz- 1GHz)
power wires	Burst-test acc. to EN61000-4 part 4; 2kV Surge-test acc. to EN61000-4 part 5; 4kV unsymmetric; 2kV symmetric
signal wires	Burst-Test acc. to EN61000-4 part 4; 2kV Surge-Test acc. to EN61000-4 part 5; 2kV unsymmetric
Protection (electr.)	with safed decoupling at $U_A \leq$ 60V DC acc. to VDE0100 part 41011.83 cap. 4.3.2; at 110 V DC $\leq U_A \leq$ 220V DC acc. VDE 0160 5.88 cap. 5.6
Dynamic voltage difference	≤ 3 % at load changes between 10 % - 90 % - 10 % of nominal output current (regulation time ≤ 1 ms)
Short circuit capability	continuously short circuit proof (constant current controlling)

Protection / monitoring / signaling	2pol. MCB (220V DC:10A; 110V DC:20 A) at front;
mains monitoring „Mains“	green LED
operation monitoring „U_{A1}“	greenLED
output voltage low „U<„	green LED with relay contact
output voltage high „U>„	red LED
constant current mode „I_A“	yellow LED
over temperature	blinking red LED
digital instruments	
for current: for voltage:	displays values from 00,1 to 99,9 A DC displays values from 00,1 to 999 V DC
External functions	
signal U<	with relay contact (contact loading: 60V DC/1A, 125V DC/1A)
collective failure	with relay contact (approx. 10sec. delayed) (contact loading: 60VDC/1A, 125VDC/1A)
control wire	for active current sharing
discharge test mode / boost charge mode	(voltage values adjustable)
temperature controlled compensation of charge voltage coefficient of temperature	-4mV/K per cell (adjustable) with external sensor (optional)
external sense links for output voltage	signaling with optocouppler „U_A O.K.“ , „Mains O.K.“ and „I_{const}“
external switch	ON/OFF function
Operation in paralleling	up to 20 modules possible, load sharing appr.10%
Construction	19"-cassette to mount in 19“ subracks acc. to DIN 41 494
Protection (mech.)	IP 20
Cooling	temperature controlled fan cooling
Ambient temperature	0°C to 45°C, 0°C to 40°C at mounting in cabinet

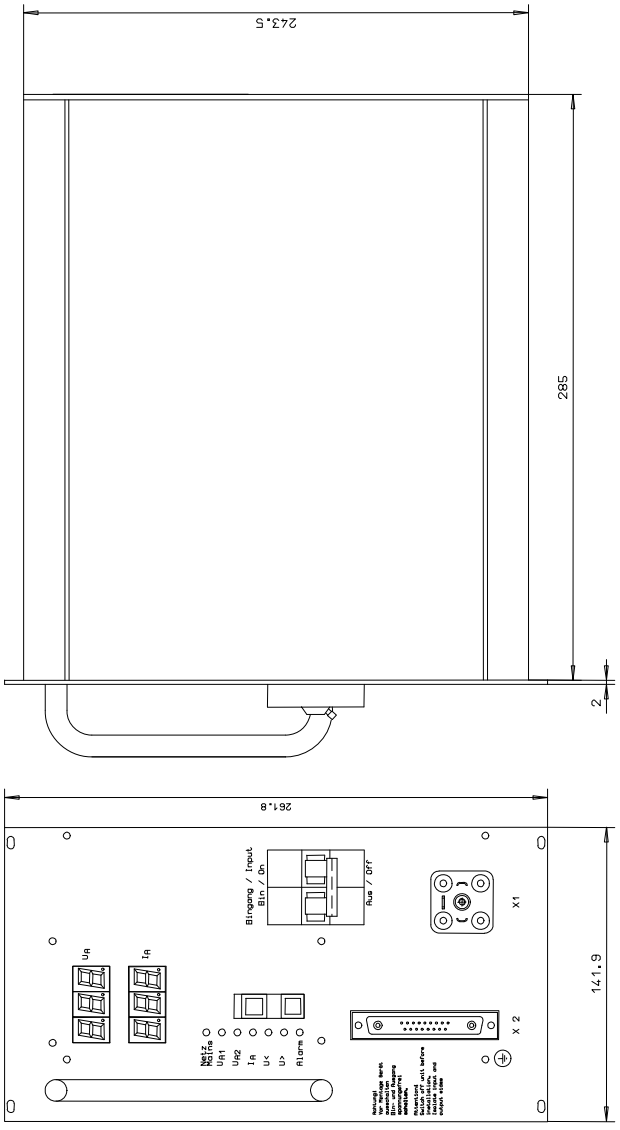
Storage temperature	-30°C to + 70°C
Ambient conditions	IEC 721 part 3-3 class 3K3 / 3Z1 / 3B1 / 3C2 / 3S2 / 3M2
Max. operation altitude	1000 m
Mechanical construction	acc. to VDE 0160 rev. 5.88 cap. 7.2.2
Painting	color RAL 7035 (front panel only)
Dimensions	262 x 142 x 285 mm H x W x D (1/3-19“ x 6U)
Connectors Mains connector X1	3-pole, type GDM 2011
DC connector X2	24-110V DC: SUB-Min-D-connector 21WA4 220V DC: front terminals 8x4mm^2, COMBICON (DC-output); front terminals 15x1,5mm^2 (signal contacts)
None-fused earthed conductor	screw M4

10.2 Type Specific Data

Typ **G110 G24/40** **G220 G24/40**	**G110 G48/30** **G220 G48/30**	**G110 G60/25** **G220 G60/25**	**G110 G110/13,3** **G220 G110/13,3**	**G110 G220/6,7** **G220 G220/6,7**
Name in brief **PSC18** /110/24-40 /220/24-40	**PSC18** /110/48-30 /220/48-30	**PSC18** /110/60-25 /220/60-25	**PSC18** /110/110-13,3 /220/110-13,3	**PSC18** /110/220-6,7 /220/220-6,7
Input current 9,8 A DC 4,9 A DC	14,5 A DC 7,3 A DC	15,2 A DC 7,6 A DC	14,9 A DC 7,4 A DC	14,9 A DC 7,4 A DC
Output voltage **U_{A1} in V DC** **Adjusted value** 24,0 ± 1 % **Adjusting range** 23,4 to 28,8	48,0 ± 1% 46,6 to 57,6	60,0 ± 1 % 58,5 to 72,0	110,0 ± 1 % 105 to 130	220,0 ± 1 % 211 to 260
Output voltage **U_{A2} in V DC** **(Boost charge)** **Adjusted value** 28,8 ± 1 % **Adjusting range** 24 bis 30	57,6 ± 1 % 48 to 60	72,0 ± 1 % 60 to 73	129,6 ± 1 % 108 to 135	259,2 ± 1 % 216 to 270
Output voltage **U_{A3} in V DC** **(discharge test)** **Adjusted value** 22,2 ± 1 % **Adjusting range** 20,4 bis 24	44,4 ± 1 % 40,8 to 48	55,5 ± 1 % 51 to 60	99,9 ± 1 % 91,8 to 108	200 ± 1 % 184 to 216
Output current I_A in A DC **Adjusted value** 40 ± 2 % **Adjusting range** 20 bis 40	30 ± 2 % 15 to 30	25 ± 2 % 12,5 to 25	13,3 ± 2 % 6,7 to 13,4	6,7 ± 2 % 3,4 to 6,7
Type of battery 12 Pb - cells	24 Pb - cells	30 Pb – cells	54 Pb - cells	108 Pb - cells
Efficiency 90 %	91 %	91 %	91 %	91 %
Voltage wave ≤ 20 mV_{ss}	≤ 20 mV_{ss}	≤ 20 mV_{ss}	≤ 20 mV_{ss}	≤ 20 mV_{ss}
Error volt. according to CCITT ≤1,0 mV	≤ 1,8 mV	≤ 2,0 mV		
Monitoring				
DC-Undervoltage U< in V DC **Threshold value** 20,4 **Adjusting range** 19,2 to 24	40,8 38,4 to 48	51,0 48 to 60	91,8 86,4 to 108	184 173 to 216
DC-Overvoltage U> in V DC **Threshold value** 30 **Adjusting range** 26 to 30	60 52 to 60	75 66 to 75	135 119 to 135	270 238 to 270

11. Dimensions / Front View

11.1 Dimensions / Front View - PSC18 (24, 48, 60 and 110V Version)



11.2 Dimensions / Front View - PSC18 (220V Version)