

Documentation type: Operating manual  
Author: J. Schumann  
Last modification by: Phillip  
Last saving date: 2010-10-07

Last modification:

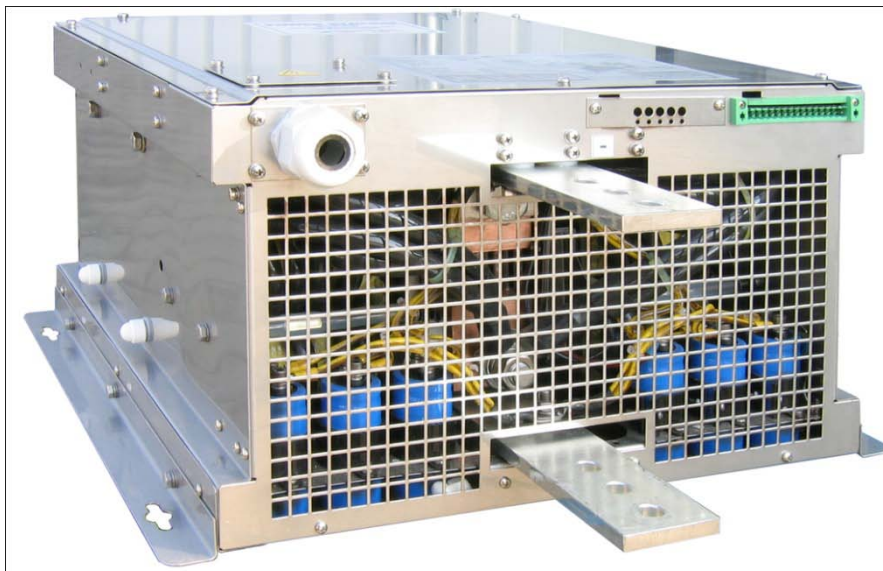
Print date: 2010-10-07

Doc-No.: **ZK-161150-03-V02**

Comment:

**Operating manual for**  
**electroplating DC power supply**  
**type POWER STATION pe3000-6**

**with GSQ193-5 board, I-actual / U-actual = 0 ... 10V,**  
**mains power supply = 3 x 400V AC without N**



**DC-output: 15V / 1000A**

**Australian Rectifiers Pty Ltd**  
15 Richards Road Hoppers Crossing Vic 3029  
Ph: + 61 3 9369 4566  
email: [sales@ausrec.com.au](mailto:sales@ausrec.com.au)  
[www.australianrectifiers.com.au](http://www.australianrectifiers.com.au)



## **List of Contents:**

1	Conformity assertion of the European community-----	3
2	General security information -----	4
2.1	The ground potential -----	5
3	Cooling air -----	6
4	After Transportation -----	7
5	Installation of the DC power supply modules -----	7
6	Operation conditions -----	8
7	General description -----	8
7.1	Switch mode technology -----	8
7.2	Installation-----	9
8	Connector X5, control signals -----	10
8.1	Control cable -----	10
8.2	Indirect-coupling (galvanic isolation) of control signals-----	10
8.3	Service connector X5 -----	11
8.4	Standard connecting scheme -----	11
9	DC-output bus bars -----	12
10	Mains supply-----	13
11	Operation -----	14
11.1	Extern ON-----	14
11.2	Blocking-----	14
11.3	Constant current regulation (CC)-----	15
11.4	Constant voltage regulation (CV) -----	15
11.5	Readout values for current and voltage -----	16
11.6	Indication relay-----	16
11.7	Auxiliary voltages-----	16
12	Preventative maintenance-----	17
12.1	Service-----	17
13	Technical data-----	18
14	Dimensions-----	19
14.1	Mounting holes-----	19
15	Fan side-----	20
16	Spare parts-----	21
17	Warranty and delivery conditions -----	21

## 1 Conformity assertion of the European community

corresponding to the EMV-guidelines 89/336/EWG about the electromagnetic compatibility and the low-voltage guidelines 73/23/EWG

we, the manufacturer,

Name: plating electronic GmbH  
Ust.-Id No.: DE 141938869  
Address: Marie-Curie-Straße 6  
79211 Denzlingen / Germany

declare in our own responsibility according to item 10 paragraph 1 of the EG-guideline 89/336/EWG, that our product

Installation: DC power supply type POWER STATION pe3000-6  
15V / 1000A

**Customer: Australian Rectifiers Pty Ltd**

pe-No.: 161150

on which the declaration is related to, is corresponding to the following norms and standards resp. normative documents:

EN 50081-2 (1994)  
EN 50082-2 (1995)  
EN 55011 (class A, group 1)  
VDE0160 (1988)

Denzlingen,  
1997/01/02

by order:

  
J. Schumann  
plating electronic

## 2 General security information



This DC power supply was delivered after a thorough function- and safety-control. Only qualified staff shall connect the DC power supply and put it into operation. Service and maintenance is only to be performed by qualified personnel.

Parts carrying a high voltage potential are installed inside the casing.



These are marked with a warning sticker. Improper handling of the electrical parts is life endangering and by doing so, including improper operation, cancels the guarantee.

Mechanical and electrical installation and operation of the system is only to be done by authorized personnel. Observe all instructions of the manufacturer; else, the warranty for DC power supplies and accessories will expire.



### Attention!

Do not operate any DC power supply with one or more loose cable connectors!

If during operation one or more plugs are pulled out of the boards inside the modules, electronic parts and the power unit will be destroyed!



### High voltage

There are components inside carrying a high voltage for up to 5 minutes after turning off.

Without casing, the DC power supply has protecting grade IP00. It is dangerous to open the casing because of the possibility to touch voltage-carrying parts. Therefore, it is not permitted to use the DC power supply without protection against touching.

After performing maintenance on the unit, all orange connectors must be checked to ensure proper contact. Failure to do so may result in a loose connection, which will result in serious damage to the unit.

It is prohibited to do any kind of constructive changes on the DC power supply!



### **Security information**

The DC-power-supplies of the POWER STATION pe3000 series can be operated as desktop or wall-mounting units. If they are not installed inside cabinets or other casings, make sure that they are protected against dropping particles, water, dust and vapor!

Plating electronic recommends installing the DC-power-supplies in cabinets or other protective casings.

Mounting, repairing, electrical installation, adjusting and maintenance are only to be done by qualified personnel!

The DC power supplies are only to be operated in the permissible ranges of current, voltage, environmental temperature and atmospheric humidity according to the rating plate and the operating manual.

The plating DC power supplies are only to be used for plating systems!

### **No charging of batteries, no starting of engines.**

Guarantee a sufficient fresh air stream for the cooling of the DC power supply.

Customer and operator are responsible for a proper and safe installation and operation.

It is strictly prohibited to remove, change or deactivate security devices as protection lattices and covers!

Do not use the DC-output rails to lift or move the DC power supply!

## **2.1 The ground potential**



The signals of the contacts 1 to 13 of the service terminal X5 are related to the **minus-contact** of the DC-output!

MINUS-DC-output = COM GND and Ref. GND

This fact is to be considered especially if several DC power supply modules are controlled by a common control system (if the X5 terminals are used), or if the DC outputs are wired up in parallel.

Please read the information about the indirect-coupling of the X5 signals!

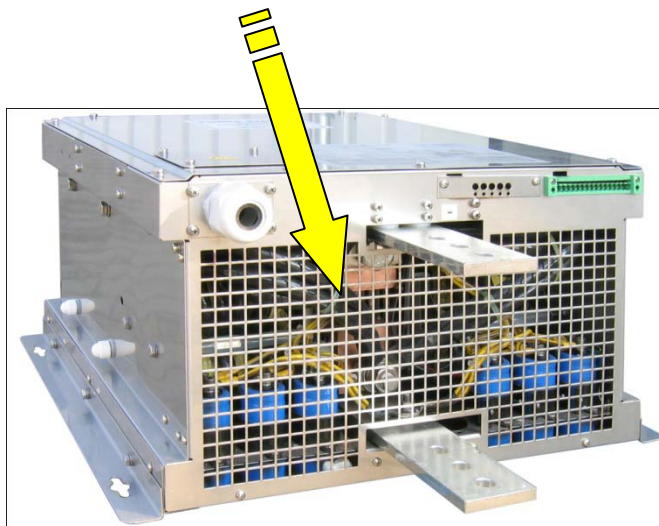
If there is a current leakage towards the ground (PE), this may cause disturbance inside the DC power supply. If a disconnecting of the internal PE-wiring is necessary, the user has to take precautions, according to the regulations of the land the device is used in, to assure that there is no danger for persons.

Assure a protection against touching of the DC-output!

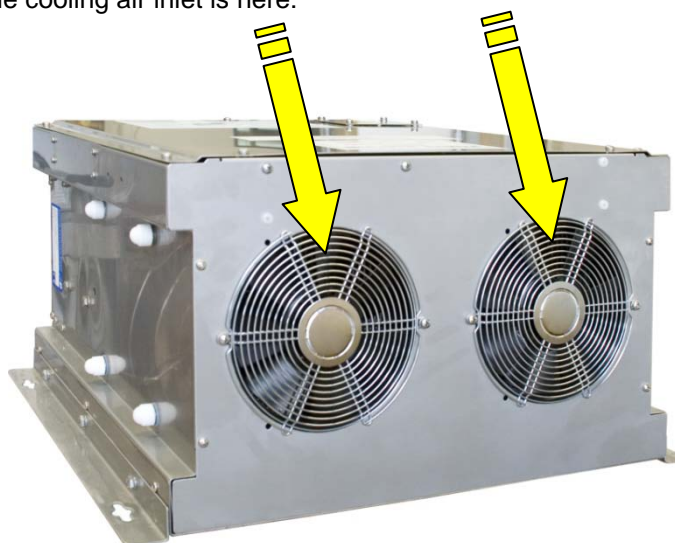
### 3 Cooling air

The device is air cooled by two fans. The cooling air consumption is max. 1000m<sup>3</sup>/h.

The cooling air outlet is here:



The cooling air inlet is here:



Keep a distance to walls, to other DC power supply modules or to other components that could constrain the cooling air stream.

## **4 After Transportation**



### **Attention:**

After transportation, all electrical connections must be checked!  
Vibrations during transportation may loosen the screws of clamps.

Check mains wiring and DC connections as well as control cables.

Loose cable connections may cause overheating of clamps and cables and can destroy the installation.

## **5 Installation of the DC power supply modules**

While mounting the cabinets and the DC-bars observe especially the following:

- The cabinets must be mounted in a horizontal or vertical way.
- Don't tighten screws with a lever; do not bent any rails or panels.
- DC power supply modules and other components are to be mounted in a vertical or a horizontal position according to their standard.
- If mounting the cabinets near the plating tanks is necessary, one has to make sure that they are protected against chemical vapor and dust and dropping particles.
- Ensure an unhindered airflow at the air input and air output.
- Observe the installation instructions of the electrical installation.

## 6 Operation conditions

Plating DC power supplies are not to be operated in an explosive environment. Ensure a sufficient airflow to avoid an internal overheating. Always install the DC power supplies directly on to a strong surface and never near an object that may block the airflow.

It is recommended to supply the unit or the operating area with fresh air.

### Attention:

It is forbidden to operate the DC power supply in an aggressive atmosphere without supplying fresh air to the operating area!

## 7 General description

The electroplating DC power supply POWER STATION is a sophisticated switch mode type rectifier for the electroplating industry. It is designed to fit in a wall-mounting casing.

The control of the output parameters is done by signals at connector X5 by a separate control unit.

The electronic regulation guarantees the correctness of the output parameters during the operation, even with variable loads.

**The device is over temperature protected. In case of rising interior temperature, first the fan speed increases. If the temperature still increasing, the device decreases the output current automatically and, after a cooling phase, increases it.**

**Do not use the device at a higher environmental temperature than 40°C!**

### 7.1 Switch mode technology

This device was designed as switch mode type DC power supply. The advantages of the switch mode technology are:

- very compact design
- maximum regulation accuracy
- very low ripple
- high efficiency and power factor >95%



## 7.2 **Installation**

The unit should be installed at the working place with the holes preferred for wall mounting.

At choosing the working place, please observe that the unit is not exposed to corrosive fume and high atmospheric humidity (>70%),

**If the unit is exposed to corrosive fume and high atmospheric humidity (>70%), provide the unit with fresh air.**

### **Attention!**

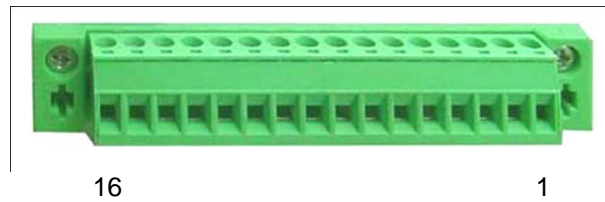


**High weight!  
Sharp metal edges!**

**Wear individual protective clothing!**

## 8 Connector X5, control signals

Connect X5 with the signals that are necessary for your application as described below.



**Attention:** Pin 1 = to the right hand side!

If the DC power supply is controlled by an external control unit, connect the DC power supply to the control unit as shown in the documentation of the control unit.

### 8.1 Control cable

Use shielded control cable with wire cross section of  $16 \times 0.34\text{mm}^2$ .  
If the control cable is longer than 15 meters, use cable cross section  $16 \times 0.5\text{mm}^2$ .

Connect one end of the shield to PE.

### 8.2 Indirect-coupling (galvanic isolation) of control signals



**Attention:**

If several DC power supply units are used at one control system, one has to make sure that the control signals such as

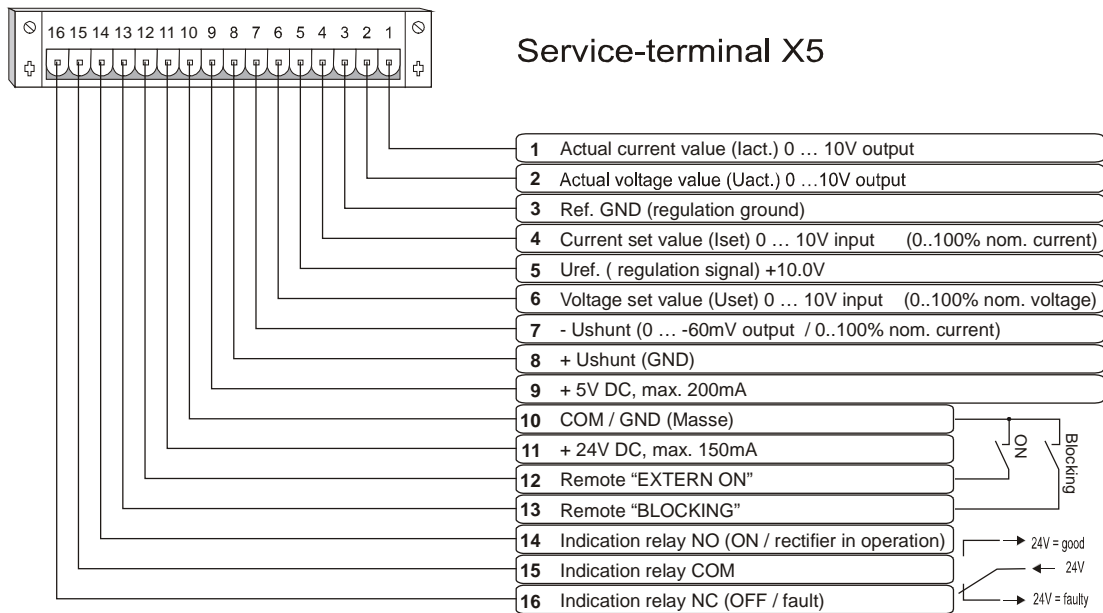
I-act., U-act., I-set and U-set  
Shunt signal and  
auxiliary supply voltages

are indirect-coupled from each other (galvanic isolation). Else, the regulation boards or other electronic components could be damaged.

Preferably, use the multi channel isolation amplifiers of *plating electronic GmbH*.

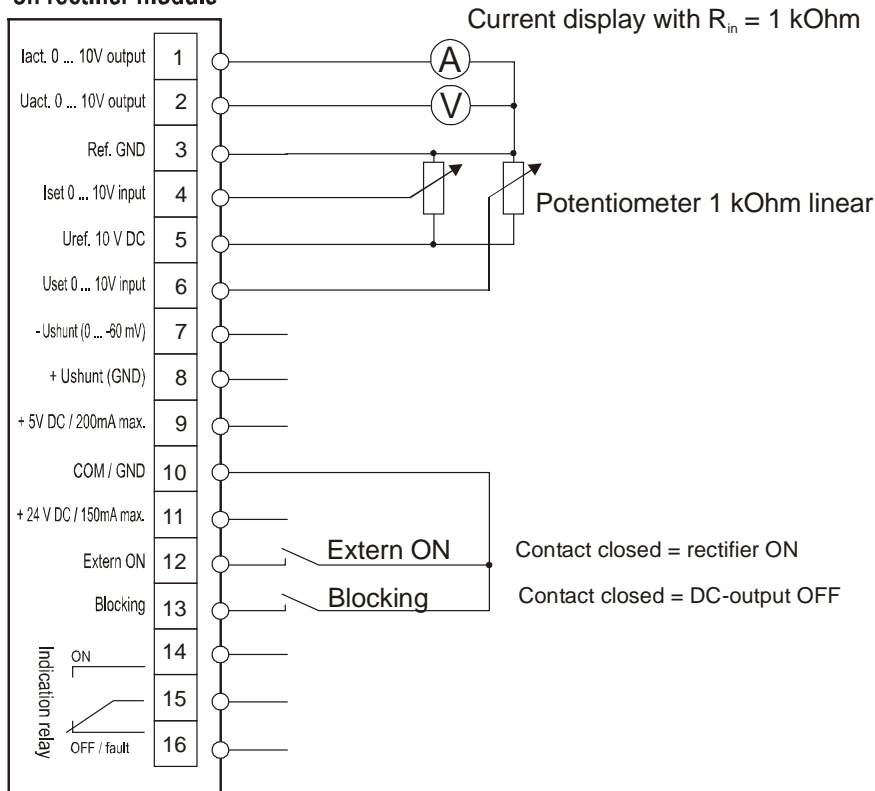
Other functions such as BLOCKING or EXTERN ON are only to be used with potential free contacts!

### 8.3 Service connector X5



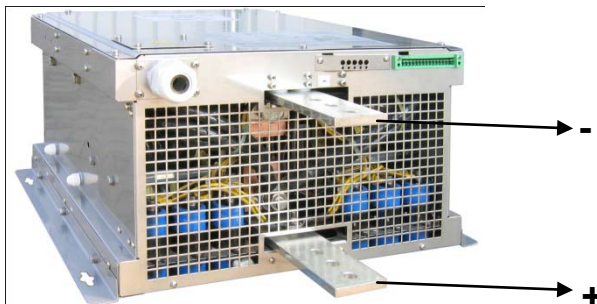
### 8.4 Standard connecting scheme

#### X5-service-terminal on rectifier module



## 9 DC-output bus bars

Connect the plating tank electrodes to the DC bus bars of the DC power supply by connecting the DC-current output + and - to the tank.



Check for right polarity and contact.

Look for the DIN VDE 0298-4 / 2003-08

admitted cable cross section and the correct polarity.

Adhere to the adequate regulations that are valid for the country the power supply is used in!

### **Attention:**

The connection of active loads such as batteries or DC-machines to the DC bus bars would cause damages to the unit!

### **Please check:**

Make sure that the supply cables are directly connected to your main supply. Do not wire the power supply or the high-current cables into a roll or bind the supply and the high-current wiring together with other wires. Otherwise overheating is possible.

## 10 Mains supply

**Supply voltage: 3 x 400V AC +/-10% without N, 50-60cps**

**Connect L1, L2, L3, PE**

**(N not required).**

Mains cable specification:

The mains cable must be selected corresponding to the following regulation:

DIN VDE 0298-4 / 2003-08

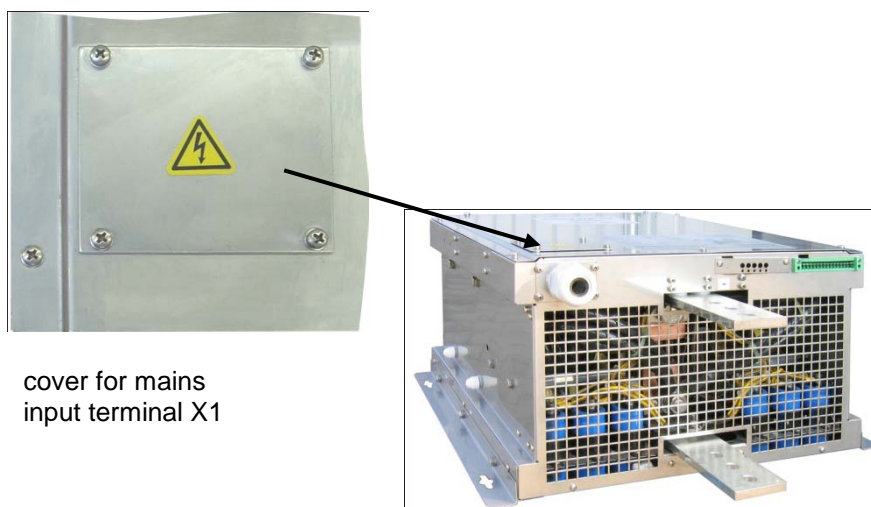
Use equivalent regulations that are valid for the country the device is used in.

Pay attention to the correct connection of PE.

Provide for an allowable fuse admitted to

DIN VDE 0636-2 (VDE 0636-2): 2008-03

DIN EN 60296-1



**Adhere to the adequate regulations that are valid for the country the power supply is used in!**

Check for the correct environmental temperature.

## 11 Operation

If the mains is connected to X1 terminal, the unit is ready for operation.

Please respect the description of the "Extern ON" contact in the description below.

The control of the output parameters is done by signals at connector X5 by a separate control unit.

The actual parameters for voltage and current are given out as readout signals on terminal X5. See connecting list below.

### 11.1 Extern ON

To switch the **DC power supply ON**, connect pin 10 of the X5-terminal to pin 12 of the X5-terminal.



**Attention:**

The unit is not disconnected from mains if the function is set to OFF!



**Attention:**

This contact is not to be used to switch the DC power supply ON and off frequently. The relay could be damaged!

Reaction delay of the ON relay: 1 ... 3 seconds!

For frequently switching on and off please use the **BLOCKING** function!

**Use only potential free contacts!**

### 11.2 Blocking

To switch the **DC-output** off, connect pin 10 of the X5-terminal to pin 13 of the X5-terminal (BLOCKING activate).



**Attention:**

The unit is not disconnected from mains if the DC output is set to BLOCKING!

**Use potential free contacts!**

### 11.3 Constant current regulation (CC)

If a constant current is needed, follow these terms:

First, move the output voltage to the highest admitted level for your process using the voltage set signal U-set.

Now use the current set signal I-set to adjust your DC-current.

Both, the current and the voltage, will be displayed on the control unit.

#### Setting procedure:

Supply 10V to the X5-terminal pin 6 (+) and pin 3 (-) to set the DC-output voltage to maximum.

Supply 0 ... 10V to the X5-terminal pin 4 (+) and pin 3 (-) to set the DC-output current from zero to maximum.

Preferably, use the **10.2V Uref.** signal at **X5/5** to supply the set signals. If an external control voltage is used the GND of the external control voltage must be connected to X5/3 (GND).

#### Attention:

**If one set signal is set to zero, the DC output is disabled!**

### 11.4 Constant voltage regulation (CV)

If a constant voltage is needed, follow these terms:

First move the output current to the highest admitted level for your process using the current set signal I-set.

Now use the voltage set signal U-set to adjust your DC-voltage.

Both, the current and the voltage, will be displayed on the control unit.

#### Setting procedure:

Supply 10V to the X5-terminal pin 4 (+) and pin 3 (-) to set the DC-output current to maximum.

Supply 0 ... 10V to the X5-terminal pin 6 (+) and pin 3 (-) to set the DC-output voltage from zero to maximum.

Preferably, use the **10.2V Uref.** signal at **X5/5** to supply the set signals. If an external control voltage is used the GND of the external control voltage must be connected to X5/3 (GND).

#### Attention:

**If one set signal is set to zero, the DC output is disabled!**

### 11.5 Readout values for current and voltage

The read out values I-act. and U-act. are wired up to the terminal X5 pin 1 (I-act.) and pin 2 (U-act).

The signals are

0 ... 10V for 0A ...  $I_{nom}$

and

0 ... 10V for 0V ...  $U_{nom}$ .

The signals I-act. and U-act. are related to Ref. GND (pin X5/3).

### 11.6 Indication relay

The indication relay is an internal relay, which indicates if the DC power supply is in operation, or if the system is off. The relay contacts are connected to pin 14 – 16 of the service connector X5.

15 = COM

16 = NC

14 = NO

- **relay contact X5/14 and X5/15 closed** = in operation, EXTERN-ON-contact at X5/10 and X5/12 was closed by customer
- **relay contact X5/16 and X5/15 closed** = system switched OFF by EXTERN-ON-contact (X5/10 and X5/12 open), or mains supply OFF, or internal error.

#### Attention:

The BLOCKING function does not influence the indication relay!

### 11.7 Auxiliary voltages

On the service terminal X5, two auxiliary voltages are available:

5V DC            max. 200mA

24V DC           max. 150mA

These voltages can be used to supply external components such as relays or LEDs.

Always consider the maximum load capability of these outputs. If they are overloaded, the regulation board could be damaged.



#### Attention!

The auxiliary voltages are only available if the "EXTERN ON" contact is closed (pin 10 and 12 on service terminal X5).



## **12 Preventative maintenance**

The DC power supplies are, except the fans, service free. If you do the following maintenance procedures once a year, it would be advantageous.

- Clean the fans and blow away dirt with compressed air  
(Use only oil- and water free compressed air!)
- Check the fans (function and unusual noises)
- Check the electrical connections (tightness)
- Clean the output rails

### **Pay attention:**

It is prohibited to do any kind of constructive changes on the DC power supply!

### **Be careful:**

There are components inside carrying a high voltage for up to 5 minutes after turning off.

Without casing, the DC power supply has protecting grade IP00. It is dangerous to open the casing because of the possibility to touch voltage-carrying parts. Therefore, it is not permitted to use the DC power supply without protection against touching.

### **12.1 Service**

The DC power supply was built under high quality demands and has passed many function tests during production. If there is any kind of fault, please contact the **plating electronic GmbH**.

### 13 **Technical data**

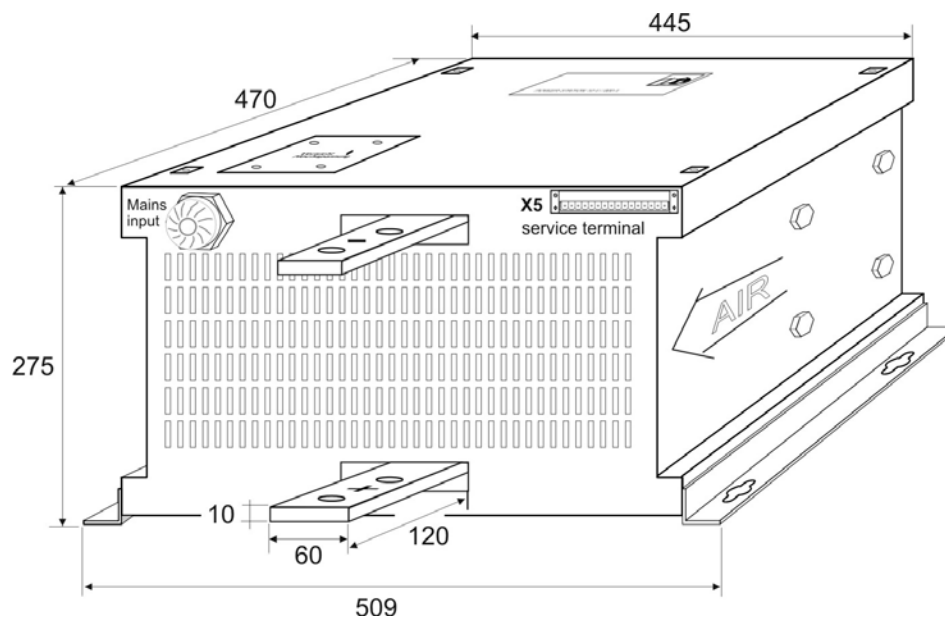
Device type:	POWER STATION pe3000-6
Function:	Plating DC power supply
Mains voltage:	3 x 400V AC +/-10% 50-60cps
Neutral connector:	no
Phase current:	28A / phase
required cable cross section of the mains cable:	according to DIN VDE 0298-4 / 2003-08
DC output voltage:	0 ... 15V, infinitely variable
DC output current:	0 ... 1000A, infinitely variable
required cross section of the DC copper rail:	according to DIN VDE 0298-4 / 2003-08
Ripple:	< 1% of nominal voltage at 300cps *)
Regulation inaccuracy:	< 1% *)
Cyclic duration factor:	100%
Environmental temperature:	0 to +40°C
Noise suppression:	according to EN 55011 curve A
Internal fuse:	32At
Protection grade:	IP 20
Cooling:	Air, by fan
Cooling air consumption:	1000m <sup>3</sup> /h (2 fans)
Weight:	53kg
Dimensions:	509 x 275 x 470 (W x H x D)
Casing (color):	unpainted

\*) valid for 2 – 100% of the nominal values

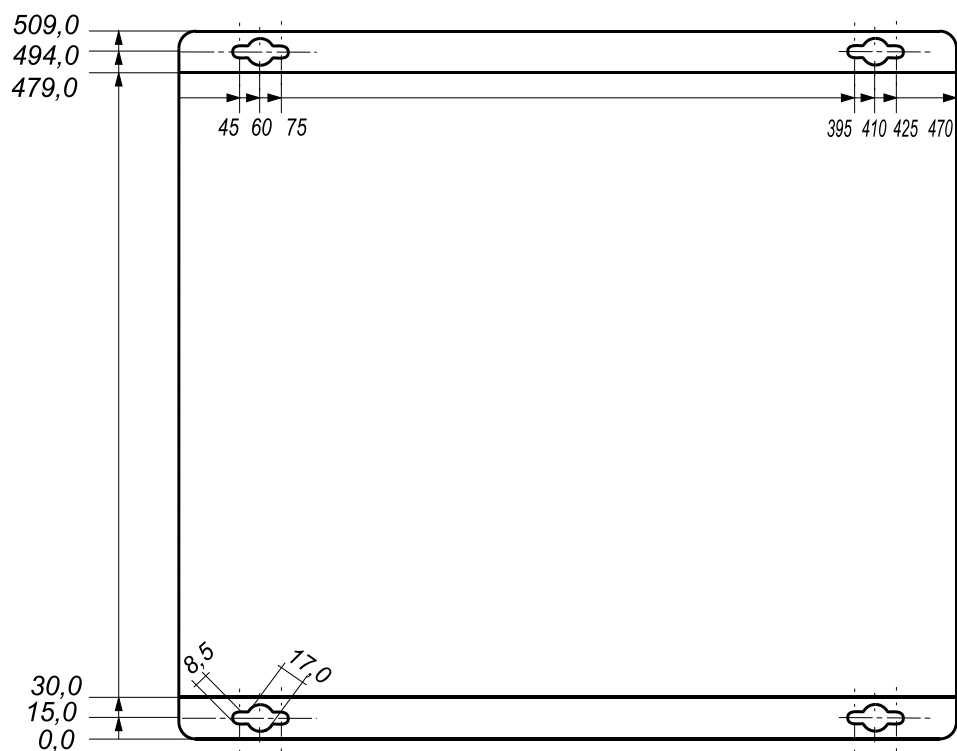
#### Other features:

- \* automatic turn off at under- and over voltage with defined start level
- \* protection against short circuit and open circuit
- \* over temperature protected
- \* power factor > 80 % (switch mode technology)

## 14 Dimensions



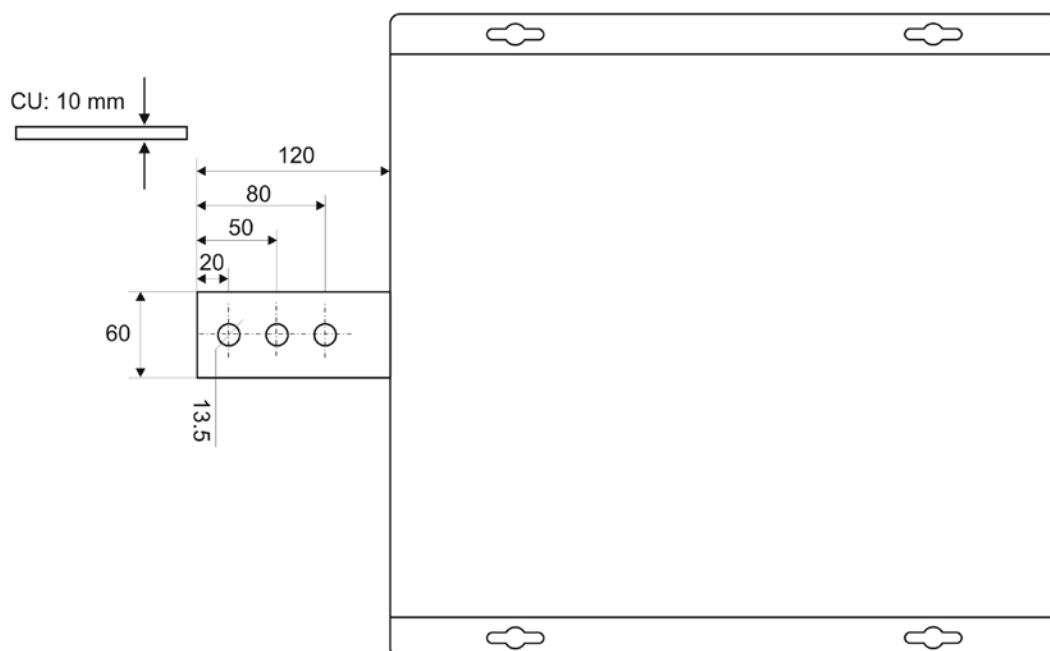
### 14.1 Mounting holes



Back side view

DC bus bars:

DC-Anschlußschienen für Ausgangsleistung 1000A  
 DC-output rails for 1000A



## 15 Fan side



Fan side, cooling air inlet

## **16 Spare parts**

Fan:	Type NMB-MAT5910PL (24V DC)
Fan regulation board:	HPL0x
Aux. fuse:	3.15At / 500V AC (6.3 x 32mm)
Main fuse:	G-type 10 x 38 mm, 32At / 400V AC
Regulation board:	Type GSQ193-5 (400V AC, I-act. 0 ... 10V)
Mains filter board:	NK5-S01-400
Mains filter board:	NK9-9 / 400V
Output capacitor:	6800µF / 40V
Output diode:	DSS2X160-01A IXYS 100V
IGBT:	SKM100GB125DN
Mains rectifier:	SKD62/16
Z-capacitor:	6.8µF / 750V KMKP

## **17 Warranty and delivery conditions**

Our general trading conditions are effective. They can be ordered from:

plating electronic GmbH  
Marie-Curie-Straße 6  
D-79211-Denzlingen

Our trading conditions can also be seen on our internet home page under:

[www.plating.de](http://www.plating.de)

(plating-electronic/trading-conditions)

---

Print date: 07.10.2010