

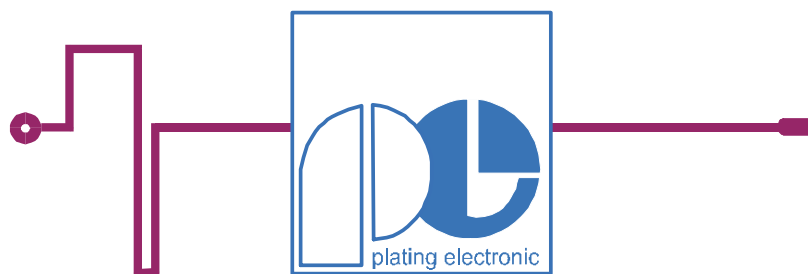


# Installation and operating manual

for

## POWER PULSE RECTIFIER

### series pe8082





### **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: POWER PULSE RECTIFIER type pe8082  
2 x 800 / 2400, water cooled  
with control unit pe8002

#### **Customer:**

Order-No.:  
pe-No.:

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



## **List of contents**

Page

1	pe8000 series -----	4
1.1.	Technical Data of the pe8000 series* -----	5
2	Safety precautions -----	6
3	Electromagnetic Fields -----	8
4	Scheme of tank installation -----	9
5	Installation of the cabinet -----	10
6	Cooling system -----	11
7	Water installation -----	12
8	13-pin connectors for the control unit -----	13
9	Connection of the high current output -----	14
10	Mains Installation -----	15
11	Cable dimensions - 10% reverse duty cycle -----	16
12	Technical specifications -----	17
12.1	Technical features of the pe8000 series, single output -----	17
12.2	Technical features of the pe8000 series, dual output -----	18
12.3	Power requirements - single output units -----	19
12.4	Power requirements - dual output units -----	20
12.5	Dimensions and weight - 10% reverse duty cycle -----	21
12.6	Cable Dimensions – 10% reverse duty cycle – dual output -----	22
13	Technical drawing pe8000 -----	23
14	Maintenance -----	24
15	Warranty conditions -----	24
16	Pictures -----	26
16.1	Total view of the cabinet -----	26
16.2	Mains connection, X1 terminal -----	27
16.3	Connections of control system, cooling water, mains cable, DC-terminals -----	28
16.4	Main switch, fuses -----	29
16.5	Inner view of the cabinet, boards -----	30
17	Technical data -----	31
18	Spare parts -----	31



## 1 pe8000 series

**plating electronic GmbH** has developed a pulse reverse power supply to assist the PCB industry in meeting its demands for greater efficiency and increased throwing power of acid copper plating processes. The versatile power supplies of the **POWER STATION pe8000 series** are capable of **pulse reverse, pulse** as well as **direct current**. When operating in the pulse mode, the systems produce a perfectly square pulse.

The key features of the pe8000 series pulse reverse power supplies are:

- Switch mode technology
- Constant forward and reverse current regulation
- Short circuit and open circuit proof
- Standard units available up to 2000A forward / 6000A reverse current (single output), and 1000A forward / 3000A reverse current (dual output)
- Water cooled with a temperature control system
- Designed to be installed in close proximity to the tank
- Parameters individual adjustable, even during operation
- Rectangular current wave shape
- Protection grade IP54
- Available with 10% and 25% reverse pulse duty cycle

All the relevant parameters of the current wave shape - as described in chapter 4 - can be adjusted individually. **plating electronic GmbH** offers a number of different possibilities to control the pulse reverse power supplies. The control systems are varying by the different applications as described in chapter 5.

Following parameters can be adjusted with the pe8000series:

- Average current
- Current ratio between forward and reverse current
- Pulse time for forward current
- Pulse time for reverse current

These adjustments can be made during operation cycle at any time and as often as necessary. The system also includes an Amp-hour-meter for dosing applications as well as a time control function which allows the operator to switch the unit automatically off after a given time.



### 1.1. Technical Data of the pe8000 series\*

- Forward timing ( $t_{for}$ ) is programmable between 0.5 - 99.9 mSec. in 0.1 mSec – steps
- Reverse timing ( $t_{rev}$ ) is programmable between 0.3 - 9.9 mSec. in 0.1 mSec – steps
- DC- mode when the Reverse time is set to 0 mSec
- Ratio  $t_{for} : t_{rev}$  variable adjustable (minimum value 10:1 or 4:1)
- Typical Rise and Fall Times: 1A / 120nsec from 10% to 90%\*\*
- Dimensions: see Technical Specifications (Chapter 12.2)

**\*see also spec. sheet chapter 12.1**

**\*\*depending on the installation and the cell layout**



## 2 Safety precautions

### General



Observe all instructions of the manufacturers, else the warranty for rectifiers and accessories will expire.

Only authorized and qualified personnel should execute mechanical and electrical installations and operation of the system.

Service and maintenance only by qualified personnel.



Operate rectifiers only in the permissible ranges of current, voltage, environmental temperature and atmospheric humidity, according to the rating plate and the operating manual.

Use plating rectifiers only for galvanic systems! No charging of batteries, no starting of engines.

Guarantee sufficient water flow for the cooling system of the rectifier.

Planner, manufacturers and user 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 high current output rails to lift or move the rectifier!

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

It is prohibited to do any kind of constructive changing on the rectifier !

### High voltage



There are components inside carrying a high voltage for at least 5 minutes after turning off.

With opened front door or with removed side panels, the rectifier has protecting grade IP 00. It is dangerous to open the casing because of the possibility to touch voltage carrying parts. Therefore, it is not permitted to use the rectifier without protection against touching.

Improper handling of electrical parts is life endangering and by doing so, including improper operation, the guarantee will be canceled.

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



### Cooling water



The cooling water is not to be used as drinking water!

Do not feed the cooling water into the drinking water pipeline!

### Electromagnetic interference / Electromagnetic field



This rectifier and plating cell to which it is hooked up will emit an electromagnetic field which can effect the operation of electronic equipment.



Persons with a pacemaker, or other active implants have to keep a safety distance of 5m from the pulse rectifier and the cabling. The effected areas have to be marked accordingly DIN 40008 / DIN 40023 as well as VBG 125.



### **3 Electromagnetic Fields**

The pulse reverse rectifiers of the pe8000 series have been tested by the "Berufsgenossenschaft der Feinmechanik und Elektrotechnik" (a German government agency) – report number EMF 09-99 – according to the following procedures and standards:

- Rules for safety and health in a workplace with exposure to Electrical Magnetic and Electromagnetic fields (MBL 16 10/95 BG F u. E)
- E DIN VDE 0848 Teil 1 05/95  
Safety in electromagnetic fields – measuring and calculation procedures
- E DIN 0848 Teil 2 10/91  
Safety in electromagnetic fields – personnel protection in the workplace against frequency of 30 kHz to 300 GHz
- DIN V VDE 0848 Teil 4 A3 07/95  
Safety in electromagnetic fields – personnel protection in the workplace against frequency of 0 kHz to 30 kHz: issue 3

The comparison of the measured value with the maximum allowable values showed, that in worst case (cables not twisted, and measured at a distance of 35 cm), the allowable value for continuous exposure close to the cables could be exceeded. People should stay at least 0.5m from the cables (elevated exposure levels for a maximum of 2 hours a day are not exceeded). In case the cables are twisted, such a safety distance is not necessary.

For persons with a pacemaker significantly lower exposure levels are allowed. The electromagnetic field may interfere with the operation of the pacemaker. The precise maximum level depends on the type of pacemaker. In general, persons with a pacemaker should stay at least 5m from electrical wiring where the cables are not twisted. With twisted cables a distance of 3m from the cabling and the periodic pulse reverse rectifier should be adhered to.

According to DIN 40008 / DIN 40003 and VBG 125, labeling is required in the effected zones.

The responsibility of a proper labeling in the effected area is on the operators duty.

Employees and visitors have to be informed by the operator about the possible danger for people with a pacemaker.

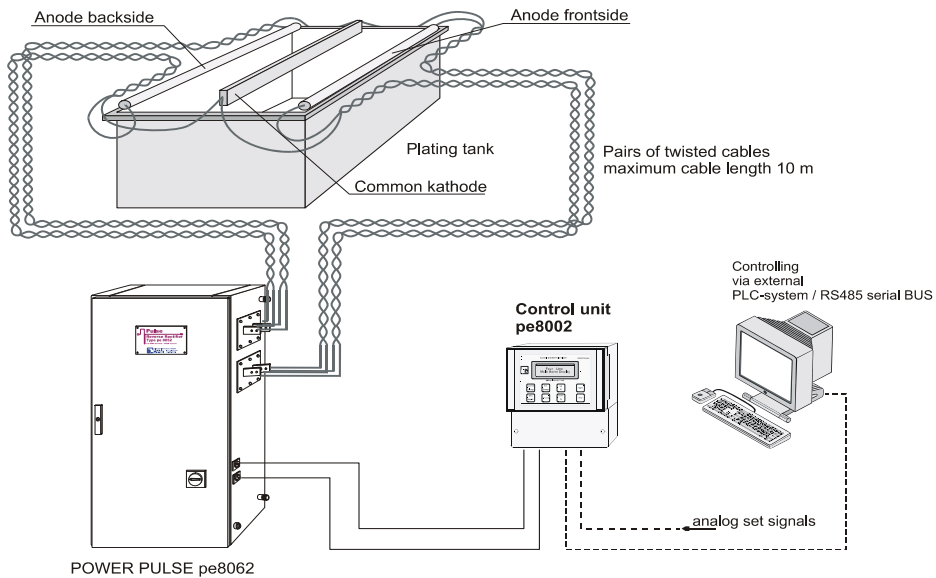




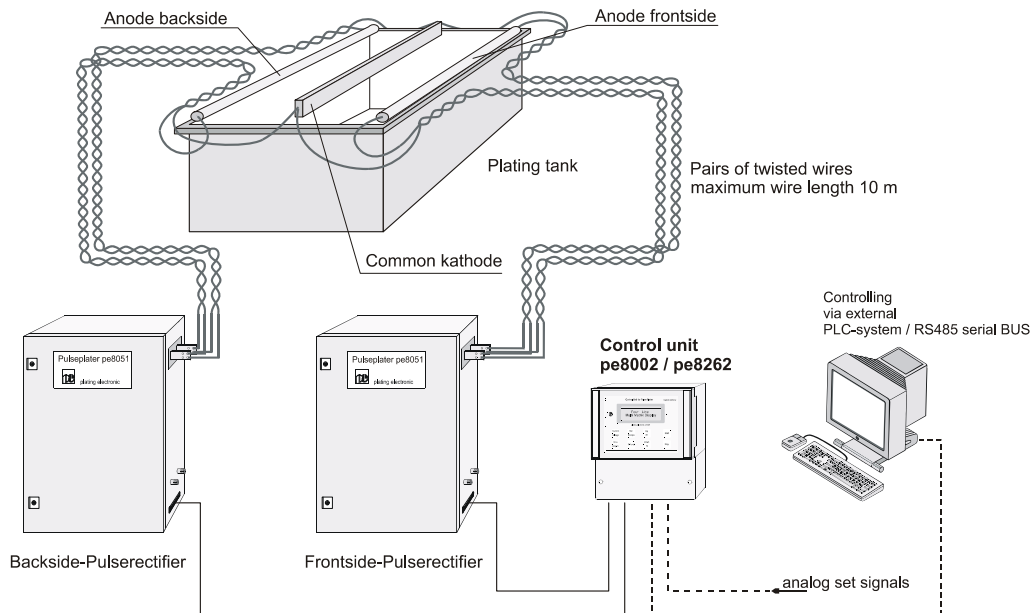
#### 4 Scheme of tank installation

Short rise and fall times in conjunction with the cell layout and the chemistry are the key issues for a successful installation and to get the expected results and quality.

Picture 8.1 shows a typical installation of pulse reverse power supplies:



Picture 8.1: Installation with dual output rectifiers



Picture 8.2: Installation with single output rectifiers



## **5 Installation of the cabinet**

While mounting the cabinet and the output-rails observe especially the following:

The cabinet must be mounted on a leveled floor.

The cabinet should always be mounted on a base of metal or concrete to avoid corrosion by corrosive liquids spilled on the floor.

Do not use force while mounting any parts (do not tighten screws with a lever, do not bend any rails or panels).

Do not over-tight any nuts or bolts.

If mounting the rectifier near the galvanic tanks, make sure that they are protected against chemical vapour, dust and dropping particles. The unit must be completely protected from liquids and excessive fumes.

Unit may generate electrical sparks and may not be used near explosive materials or environments.

After fixing cabinet, continue with water installation. When fittings and pipes are tested to be tight, start electrical installation.

Observe the installation instructions of the electrical installation.



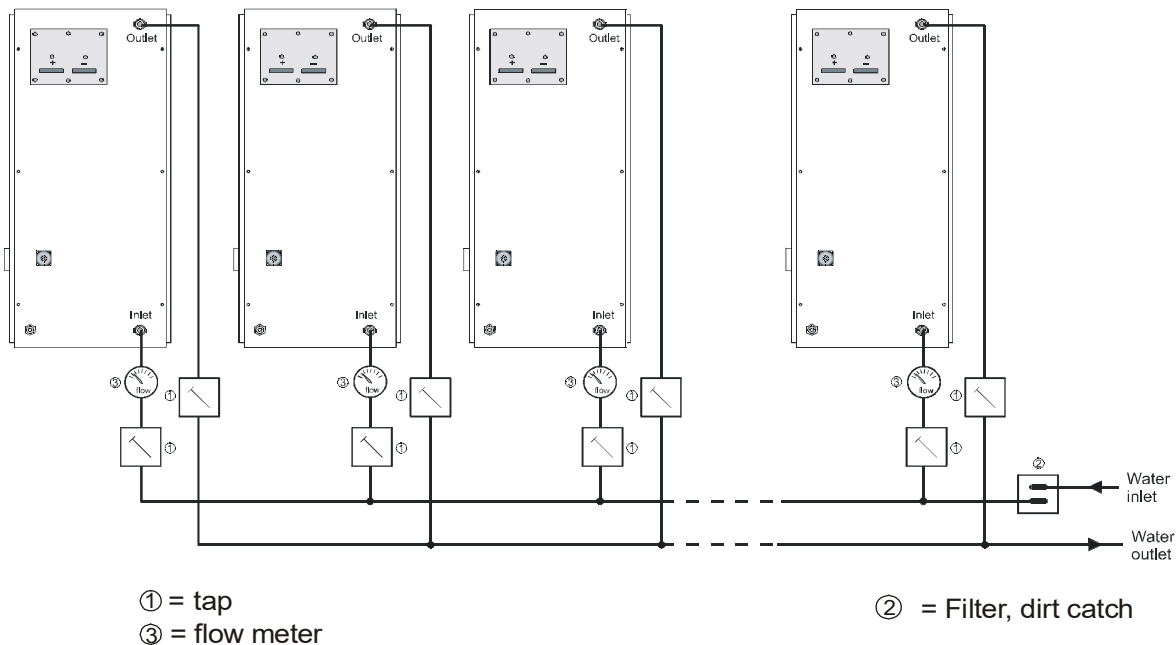
## 6 Cooling system

Based on the experience with the difficult environment in plating shops and the fact that the pulse reverse power supplies have to be installed as close to the tank as possible to avoid inductance in the cabling, **plating electronic GmbH** offers only water cooled systems.

The material of the heat-sink and the cooling system of the power supplies is stainless steel to prevent damage of the system. However, **plating electronic GmbH** recommends the use of a chiller to get a closed cooling systems and defined cooling water. The pH-value of the cooling water should be 7 +/-1.

To operate the power supply without enough clean and descaled water could cause serious damage of the unit and will void the warranty.

Picture 9.1 shows the installation of the cooling system with two taps per power supply (inlet and outlet) and a main water filter.



Picture 9.1: Cooling system of the pe8000 series

### Specifications:

System:	Closed
Environment temperature:	40°C ( 104°F )
Maximum humidity:	85%
Inlet temperature:	22 to 25°C ( 70 to 77°F )
Outlet temperature:	max. 40°C ( 104°F )
Coolant:	City-water
pH-Value:	7.0 – 8.0
Hardness:	< 1.3 mmol / l
Chloride:	< 100 mg / l
Consumption:	refer to table 12.2 on page 16
Water pressure:	min. 1 bar = 14.5 psi max. 4 bar = 58 psi
Pressure drop:	app. 0.7 bar = 10.15 psi



## **7 Water installation**

The internal water circuit begins and ends at two connecting pieces with a ½ inch thread.

Please regard flow direction. Inlet and outlet are marked with labels.

Information about water consumption you can find at the table in the annex of this documentation.

Never operate rectifier without cooling.

Make sure that external taps are open.

If all connections are tight, you can continue with connecting the unit to the control system.

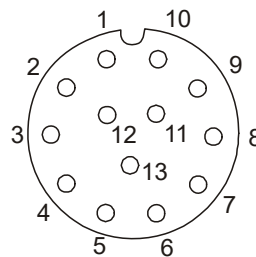
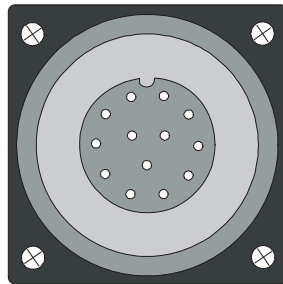


## 8 13-pin connectors for the control unit

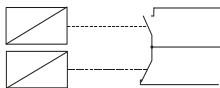
It is recommended to use the cables which are delivered prefabricated by the manufacturer.

To connect the control unit, use control cables with minimum 13 x 0,34 mm<sup>2</sup>, resp. AWG30.

Connect the screen to the PE potential at one end of the control cable. Look to the wiring scheme for the control unit.



### Connecting list :



- 1 = Temperature alarm (normally open)
- 2 = common connector of relay contacts
- 3 = General fault alarm (normally closed)
- 4 = Blocking (when connected to GND)
- 5 =  $I_{\text{timing}}$  forw./ rev (low =  $t_{\text{rev.}}$ )
- 6 = GND rectifier
- 7 =  $I_{\text{set}}$  pulse rev. (0 ... 20 mA = 0 ... 100%)
- 8 =  $U_{\text{ref}}$  10 V output
- 9 =  $I_{\text{set}}$  pulse forw. (0 ... 20 mA = 0 ... 100%)
- 10 = GND regulation board (*internal terminal X5 pin 14*)
- 11 =  $I_{\text{act}}$  (0 ... 20 mA) average
- 12 =  $U_{\text{act}}$  (=  $U_{\text{out}}$  average)
- 13 = timing pulse / pause optional

Look to the markings of the control cable (connectors X5 front side / backside).

The control cables should not be exchanged.



## **9 Connection of the high current output**

There are two critical parameters to consider when connecting a pulse rectifier to the plating tank:

The first, which applies to all rectifiers – DC as well as pulse –, is the loss in the cable (depending on the resistance of the cable). To keep the loss at a minimum the wiring should have the right dimensions.

For sizing the cables between rectifier and tank refer to the tables in the annex of this manual.

The second critical parameter is the inductance of the rectifier to tank connection. This must also be kept to a minimum. As inductance is proportional to the cable length, keeping the connection from the rectifier to the tank as short as possible will help (not more than 10 meters). A reduction of the inductance will also be achieved by using twisted pair cables, multiple twisted pair cables, laminated or multiple laminated bus bars.

The twisted pairs should be wound tightly and twisted as much as practical. Instead of using a larger quantity of smaller gauge cables the use of welding cable is recommended.

The leads must be twisted in ANODE (+) / CATHODE (-) pairs and then separated at the ends into a common CATHODE (-) lug and a common ANODE (+) lug.

The pairs must be as equal as possible in length and twistmode, or they will not share the current equally.

To avoid the EMI (Electro Magnetic Interference), the cables and / or the bus bars should be installed in a metal based conduit.



## 10 Mains Installation



Cooling water installation and installation of the control system should be finished already and **a test should have confirmed that the cooling system is tight.**

The reverse pulse rectifier should be installed and maintained by a certified electrician.

High voltage and electrical current is used inside the rectifier cabinet.

Lock out functions must be in conformance with federal, state and local codes.

During operation of the system, the cabinet must be closed. Do not open the cabinet until 5 minutes have passed since disconnecting electrical power (time to discharge internal capacitors).

### Installation of mains supply:

**Guarantee, that mains network voltage is in correspondence with the nominal voltage on the rating plate!**

The mains supply is connected to the rectifier at the X1 clamps. Phase current information you can find on the rating plate, located at the inner side of the door.

**Make sure that the possibly existing neutral lead (N) is not exchanged with any phase lead (L1, L2, L3) on the mains clamp. Serious damages could be the result.**

Only connect admissible mains cable, according to DIN VDE 298 section 4 2/89, which have enough cross section, according to DIN57100 section 523 p. VDE 0100 section 523.6.81 to the specified clamps (L1, L2, L3, (N) and PE).

The unit must be connected according to all applicable federal, state and local electrical codes.

Take special care for proper connection of all terminals.  
Install external fuse according to DIN 57100 section 430 resp. VDE 0100 section 430.6.81.

Operate rectifier only in environment temperature between +5 °C and +40°C.

The cross section of the mains cable must be designed for the maximum phase current of the whole rectifier and according to the fuse for the mains supply!

Look to the scheme for installing the **operating unit** if not using prepared equipment. Wiring the control unit requires shielded and grounded cable (minimum 13 conductor AWG 30 ).



## 11 Cable dimensions - 10% reverse duty cycle

Cable dimensions - 10% reverse duty cycle

Type	Forward current [A]	Reverse current [A]	RMS current * [A]	No. of cables pairs 95mm <sup>2</sup>	No. of cables pairs 70mm <sup>2</sup>	No. of cables pairs 50mm <sup>2</sup>	No. of cables pairs 35mm <sup>2</sup>	Max. Average Current*
pe8011	100	300	131	1	1	1	1	63
pe8021	200	600	263	2	2	2	2	127
pe8031	300	9300	394	2	2	3	3	190
pe8041	400	1200	526	3	3	4	4	254
pe8051	500	1500	657	3	4	4	5	318
pe8061	600	1800	789	4	4	5	6	381
pe8071	700	2100	920	4	5	6	7	445
pe8081	800	2400	1051	5	6	7	8	509
pe8091	900	2700	1183	5	6	8	x	572
pe8101	1000	3000	1314	6	7	8	x	636
pe8111	1100	3300	1446	6	7	x	x	700
pe8121	1200	3600	1577	7	8	x	x	763
pe8141	1400	4200	1840	8	9	x	x	890
pe8151	1500	4500	1971	8	10	x	x	954
pe8161	1600	4800	2103	9	11	x	x	1018
pe8181	1800	5400	2366	10	12	x	x	1145
pe8201	2000	6000	2629	11	13	x	x	1272

\*calculations based on:  
 $t_{forward} : 10 \text{ mSec.}$   
 $t_{reverse} : 1 \text{ mSec.}$   
 $I_{ratio} : 3$





## 12 Technical specifications

### 12.1 Technical features of the pe8000 series, single output

Technical features of the pe8000 series, single output

Type	Output current forward / reverse	Current ratio forw. / reverse	Min. forward time	Min. reverse time	Min. time ratio forw. / reverse	Water consumption		Power dissipation	
						[l / h]	[gallons/min]	[kWh]	[BTU]
pe8011	100 / 300	1:0 - 1-3.5	0.5	0.3	10:1	100	0.44	0.4	1365
pe8021	200 / 600	1:0 - 1-3.5	0.5	0.3	10:1	100	0.44	0.8	2730
pe8031	300 / 900	1:0 - 1-3.5	0.5	0.3	10:1	100	0.44	1.2	4095
pe8041	400 / 1200	1:0 - 1-3.5	0.5	0.3	10:1	100	0.44	1.6	5460
pe8051	500 / 1500	1:0 - 1-3.5	0.5	0.3	10:1	125	0.55	2.0	6825
pe8061	600 / 1800	1:0 - 1-3.5	0.5	0.3	10:1	144	0.64	2.4	8190
pe8071	700 / 2100	1:0 - 1-3.5	0.5	0.3	10:1	169	0.75	2.8	9554
pe8081	800 / 2400	1:0 - 1-3.5	0.5	0.3	10:1	192	0.85	3.2	10919
pe8091	900 / 2700	1:0 - 1-3.5	0.5	0.3	10:1	216	0.95	3.6	12284
pe8101	1000 / 3000	1:0 - 1-3.5	0.5	0.3	10:1	240	1.06	4.0	13649
pe8111	1100 / 3300	1:0 - 1-3.5	0.5	0.3	10:1	265	1.17	4.4	15014
pe8121	1200 / 3600	1:0 - 1-3.5	0.5	0.3	10:1	290	1.28	4.8	16379
pe8141	1400 / 4200	1:0 - 1-3.5	0.5	0.3	10:1	335	1.48	5.6	19108
pe8151	1500 / 4500	1:0 - 1-3.5	0.5	0.3	10:1	358	1.58	6.0	20473
pe8161	1600 / 4800	1:0 - 1-3.5	0.5	0.3	10:1	380	1.70	6.4	21838
pe8181	1800 / 5400	1:0 - 1-3.5	0.5	0.3	10:1	430	1.90	7.2	24568
pe8201	2000 / 6000	1:0 - 1-3.5	0.5	0.3	10:1	470	2.07	8.0	27298



## 12.2 Technical features of the pe8000 series, dual output

Technical features of the pe8000 series, dual output

Type	Output current forward / reverse	Current ratio forw. / reverse	Min. forward time	Min. reverse time	Time ratio forw. / reverse	Water consumption		Power dissipation	
						[l / h]	[gallons/min]	[kWh]	[BTU]
pe80052	2 x 50 / 150	1:0 - 1-3.5	0.5	0.3	10:1	100	0.44	0.4	1365
pe8012	2 x 100 / 300	1:0 - 1-3.5	0.5	0.3	10:1	100	0.44	0.8	2730
pe80152	2 x 150 / 450	1:0 - 1-3.5	0.5	0.3	10:1	100	0.44	1.8	6142
pe8022	2 x 200 / 600	1:0 - 1-3.5	0.5	0.3	10:1	100	0.44	0.6	2048
pe8032	2 x 300 / 900	1:0 - 1-3.5	0.5	0.3	10:1	144	0.64	2.4	8190
pe8042	2 x 400 / 1200	1:0 - 1-3.5	0.5	0.3	10:1	192	0.85	3.2	10919
pe8052	2 x 500 / 1500	1:0 - 1-3.5	0.5	0.3	10:1	240	1.06	4.0	13649
pe8062	2 x 600 / 1800	1:0 - 1-3.5	0.5	0.3	10:1	288	1.27	4.8	16379
pe8072	2 x 700 / 2100	1:0 - 1-3.5	0.5	0.3	10:1	338	1.49	5.6	19108
pe8082	2 x 800 / 2400	1:0 - 1-3.5	0.5	0.3	10:1	384	1.69	6.4	21838
pe8092	2 x 900 / 2700	1:0 - 1-3.5	0.5	0.3	10:1	432	1.90	7.2	24568
pe8102	2 x 1000 / 3000	1:0 - 1-3.5	0.5	0.3	10:1	480	2.12	8.0	27298



### 12.3 Power requirements - single output units

Power requirements of the pe8000 series, single output

Type	Output current forward / reverse [A]	3-Phase supply voltage [V]	208 phase current [A]	3-Phase supply voltage [V]	380 phase current [A]	3-Phase supply voltage [V]	400 phase current [A]	3-Phase supply voltage [V]	460 phase current [A]	Power requirement [VA]
pe8011	100 / 300	208	4.2	380	2.3	400	2.1	460	1.9	1500
pe8021	200 / 600	208	8.4	380	4.6	400	4.2	460	3.8	3000
pe8031	300 / 900	208	12.3	380	6.7	400	6.3	460	5.6	4400
pe8041	400 / 1200	208	16.4	380	9	400	8.4	460	7.5	5900
pe8051	500 / 1500	208	20.6	380	11.3	400	10.5	460	9.3	7400
pe8061	600 / 1800	208	24.5	380	13.4	400	12.7	460	11.1	8800
pe8071	700 / 2100	208	28.6	380	15.7	400	14.8	460	13	10300
pe8081	800 / 2400	208	32.5	380	17.8	400	16.9	460	14.7	11700
pe8091	900 / 2700	208	36.7	380	20.1	400	19.0	460	16.6	13200
pe8101	1000 / 3000	208	40.9	380	22.4	400	21.1	460	18.5	14700
pe8111	1100 / 3300	208	44.7	380	24.5	400	23.2	460	20.3	16100
pe8121	1200 / 3600	208	48.9	380	26.8	400	25.3	460	22.1	17600
pe8141	1400 / 4200	208	57	380	31.2	400	29.5	460	25.8	20500
pe8151	1500 / 4500	208	61.1	380	33.5	400	31.6	460	27.7	22000
pe8161	1600 / 4800	208	65	380	35.6	400	33.7	460	29.4	23400
pe8181	1800 / 5400	208	73.3	380	40.2	400	38.0	460	32.2	26400
pe8201	2000 / 6000	208	81.4	380	44.6	400	42.2	460	36.8	29300



## 12.4 Power requirements - dual output nits

Power requirements of the pe8000 series, dual output

Type	Output current forward / reverse [A]	3~Phase supply voltage [V]	208 phase current [A]	3~Phase supply voltage [V]	380 phase current [A]	3~Phase supply voltage [V]	400 phase current [A]	3~Phase supply voltage [V]	460 phase current [A]	Power requirement [VA]
pe80052	2 x 50 / 150	208	4.2	380	2.3	400	2.1	460	1.9	1500
pe8012	2 x 100 / 300	208	8.4	380	4.6	400	4.2	460	3.8	3000
pe80152	2 x 150 / 450	208	12.3	380	6.7	400	6.3	460	5.6	4400
pe8022	2 x 200 / 600	208	16.4	380	9	400	8.4	460	7.5	5900
pe8032	2 x 300 / 900	208	24.5	380	13.4	400	12.6	460	9.2	8800
pe8042	2 x 400 / 1200	208	32.8	380	18	400	17	460	11.1	11800
pe8052	2 x 500 / 1500	208	40.6	380	22.2	400	21	460	12.9	14600
pe8062	2 x 600 / 1800	208	48.6	380	26.6	400	25.2	460	14.7	17500
pe8072	2 x 700 / 2100	208	56.7	380	31	400	29.4	460	16.5	20400
pe8082	2 x 800 / 2400	208	64.7	380	35.5	400	33.6	460	18.4	23300
pe8092	2 x 900 / 2700	208	72.8	380	39.9	400	37.8	460	20.3	26200
pe8102	2 x 1000 / 3000	208	80.8	380	44.3	400	42	460	22	29100



## 12.5 Dimensions and weight - 10% reverse duty cycle

single output

Type	height "h" [mm]	depth "d" [mm]	width "w1" [mm]	width "w2" [mm]	weight [kg]
pe8021	600	450	640	60	100
pe8031	600	450	640	60	100
pe8041	600	450	640	60	100
pe8051	800	450	640	60	110
pe8061	800	450	640	60	120
pe8071	1000	450	640	100	140
pe8081	1000	450	640	100	150
pe8091	1200	450	640	100	160
pe8101	1200	450	640	100	170
pe8111	1400	450	640	150	190
pe8121	1400	450	640	150	200
pe8141	1800	1800	600	150	220
pe8151	1800	1800	600	150	240
pe8161	1800	1800	600	150	300
pe8181	2000	2000	600	150	360
pe8201	2000	2000	800	150	420

dual output

Type	height "h" [mm]	depth "d" [mm]	width "w1" [mm]	width "w2" [mm]	weight [kg]
pe80052	600	450	640	60	100
pe8012	600	450	640	60	100
pe80152	800	450	640	60	100
pe8022	800	450	640	60	100
pe8032	800	450	640	60	120
pe8042	1000	450	640	100	160
pe8052	1000	450	640	100	190
pe8062	1400	450	640	100	220
pe8082	1800	500	600	100	320
pe8082	2000	600	800	150	390
pe8102	2000	600	800	150	440



## 12.6 Cable Dimensions – 10% reverse duty cycle – dual output

Cable Dimensions - 10% reverse duty cycle - dual output

Type	Forward Current	Reverse Current	RMS current*	N° of cables pairs 95 mm <sup>2</sup>	N° of cables pairs 70 mm <sup>2</sup>	N° of cables pairs 50 mm <sup>2</sup>	N° of cables 35 mm <sup>2</sup>	Max. average Current** [A]
	[A]	[A]	[A]					
pe80152	2 x 50	2x 150	2x 66	2x1	2x1	2x1	2x1	2x31
pe8012	2 x 100	2x 300	2x 131	2x1	2x1	2x1	2x1	2x36
pe80152	2 x 150	2x 450	2x 197	2x1	2x1	2x2	2x2	2x95
pe8022	2 x 200	2x 600	2x 263	2x2	2x2	2x2	2x2	2x127
pe8032	2 x 300	2x 900	2x 394	2x2	2x2	2x3	2x3	2x190
pe8042	2 x 400	2x 1200	2x 526	2x3	2x3	2x4	2x4	2x254
pe8052	2 x 500	2x 1500	2x 657	2x3	2x4	2x4	2x5	2x318
pe8062	2 x 600	2x 1800	2x 789	2x4	2x4	2x5	2x6	2x381
pe8072	2 x 700	2x 2100	2x 920	2x4	2x5	2x6	2x7	2x445
pe8082	2 x 800	2x 2400	2x 1051	2x5	2x6	2x7	2x8	2x509
pe81029	2 x 900	2x 3000	2x 1314	2x6	2x7	2x8	2x10	2x636

\*calculations based on:

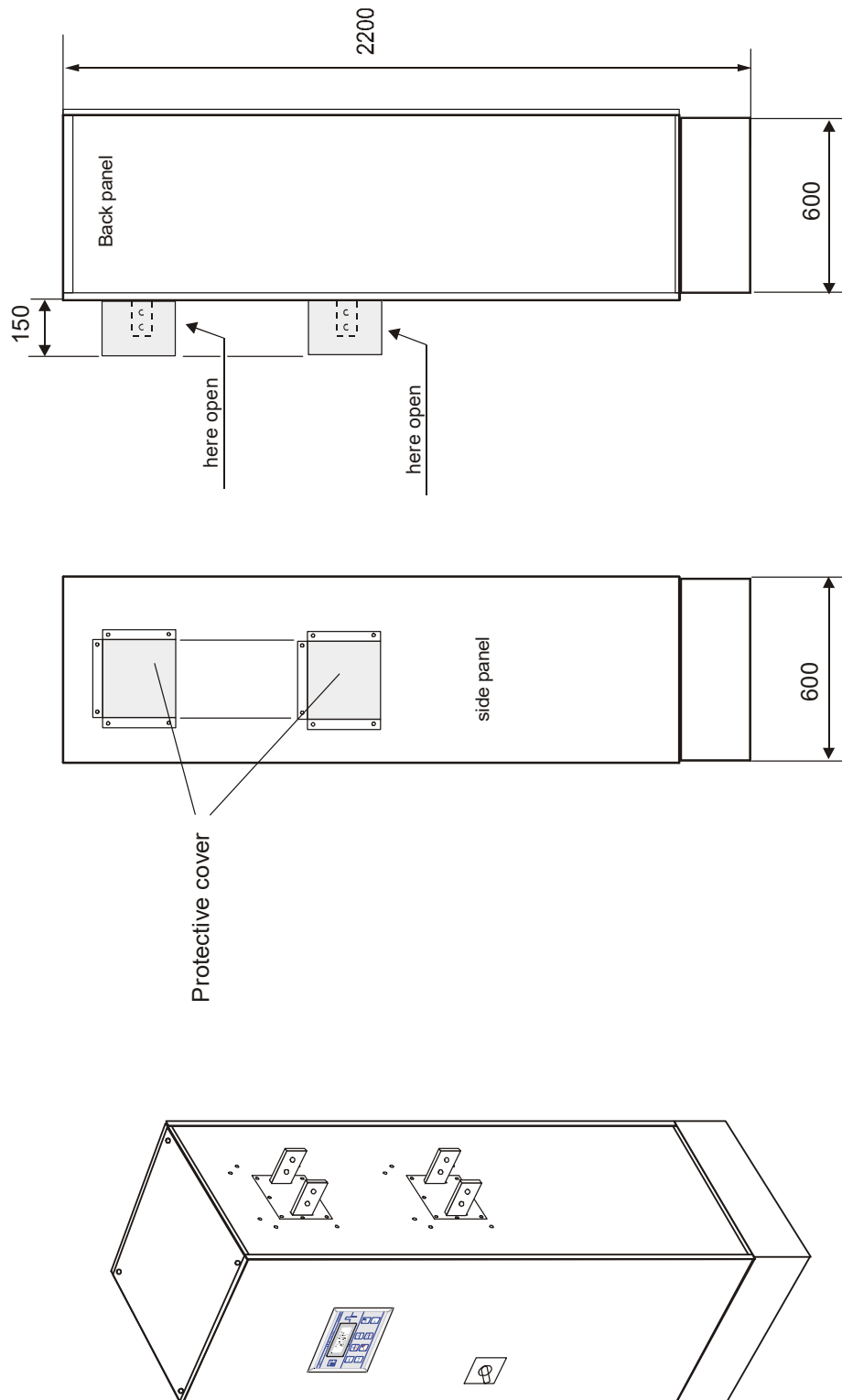
$$t_{\text{forward}} : t_{\text{reverse}} : I_{\text{ratio}} = 10 \text{ mSec.} : 1 \text{ mSec.} : 3$$

The equivalent AWG-numbers are 3/0 for the 95mm<sup>2</sup>, 2/0 for the 70mm<sup>2</sup>, 1/0 for the 50mm<sup>2</sup>, and 2 for the 35mm<sup>2</sup>.

Technical drawings: see next page



### 13 Technical drawing pe8000



Picture 12.1: Technical Drawing – Pulse Reverse Power supply pe8082



## 14 Maintenance

The only area needing preventative maintenance is the cooling system. This has to be checked periodically to avoid damage to the unit. The following checks need to be done:

- monthly check of tightness of the piping system as well as temperature control of the water inlet and outlet temperature
- every three month check of the water filter ( installation on operators responsibility)
- every six month check of the coolant condition. test coolant dor keeping the specifications, listed in this manual under topic 6: cooling system.

The rectifier is built under high quality demands and passes many function tests during production. If there appears any kind of fault, please contact plating electronic GmbH / Germany.

## 15 Warranty conditions

**plating electronic GmbH** hereby warrants for the warranty time, that, from date of purchase, the device is free of material- or construction faults.

The warranty time is limited to **12 month**.

If there is any material- or production fault during the warranty period, **plating electronic GmbH** will repair or change the device or the faulty parts of the device without charging the working- and the material costs under the following terms.

Terms:

1. If the device is adapted or changed to fit international or national technical or safety requirements for a country, which is not the country the device is designed and produced for, this is not a material- or construction failure, and therefore not covered by the warranty. The warranty does not include the costs for such adaptations or changes or corresponding attempts, not depending on how qualified or not qualified it was, or the compensation of caused harm.

2. The warranty covers none of the following items:

A: Regular inspections, services, repair or changes of parts, caused through normal wear.

B: Transport, fare and risks, which are connected directly or indirectly to the warranty.





C: Damages on the device, caused by :

1. Misuse or wrong use especially use for other than the original purpose respectively ignoring the operating- and maintenance advises and the connecting or use of the device in an other than in the country, in which the device is used, asserted technical or safety technical requirement kind.
2. Repair through none authorized workshop.
3. Accidents, higher force and other reasons which are not under the responsibility of the **plating electronic GmbH**, especially lightnings, water, fire, disturbance of the public system.
4. This warranty does not restrict the legal rights of the customer from the asserted national law and the rights of the customer against the seller from the sales contract. If the national asserted law have no other terms, the claim of the customer against the **plating electronic GmbH** restrict to this warranty and neither the **plating electronic GmbH** nor the authorized seller undertake more responsibility for direct or indirect damages from any explicit kind or conclusion admitted warranty for this device.



## 16 Pictures

### 16.1 Total view of the cabinet



Picture: View on the back panel of the cabinet, front door open

## 16.2 Mains connection, X1 terminal

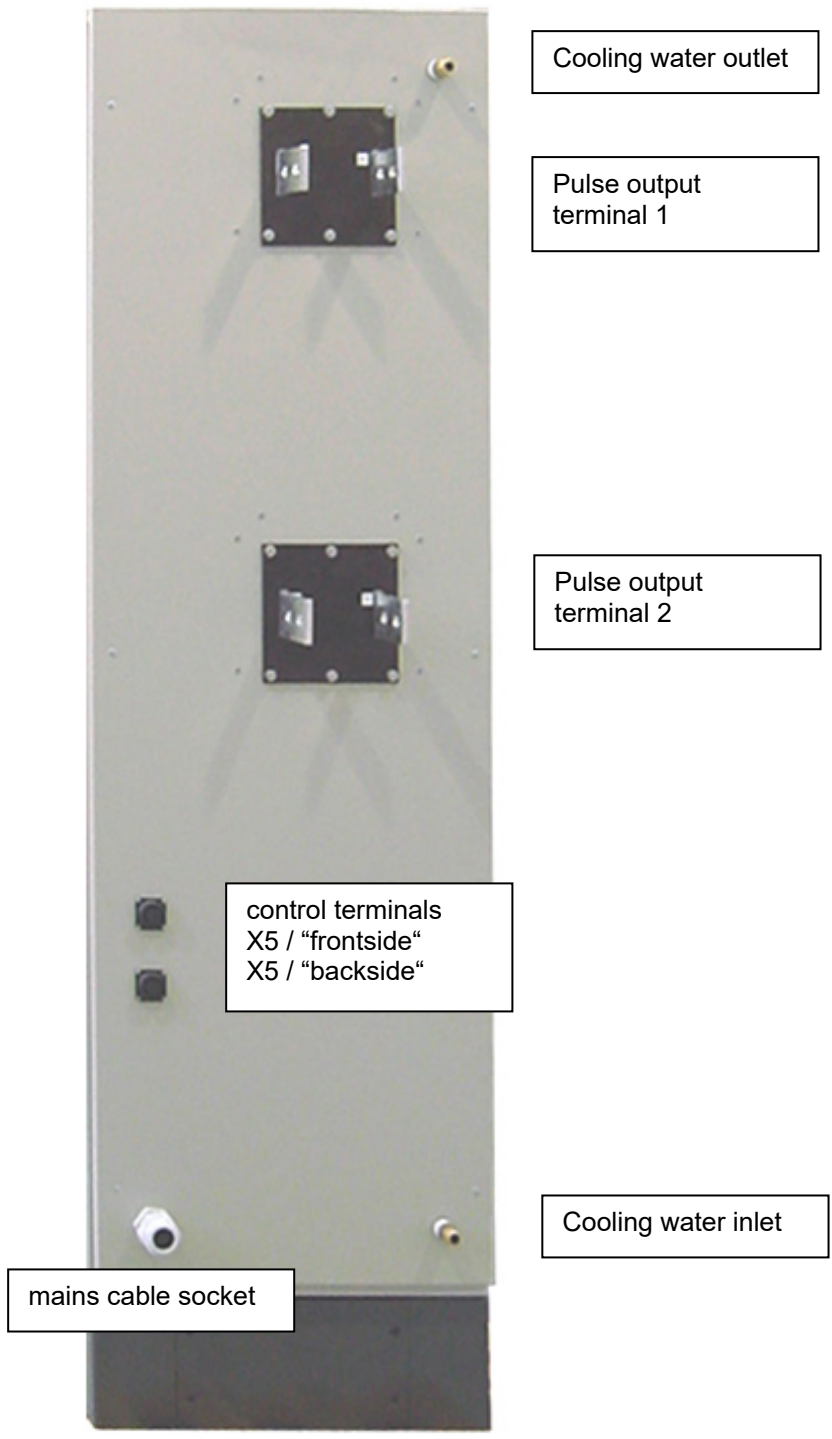


Picture: Mains input terminal X1

BUS-connections

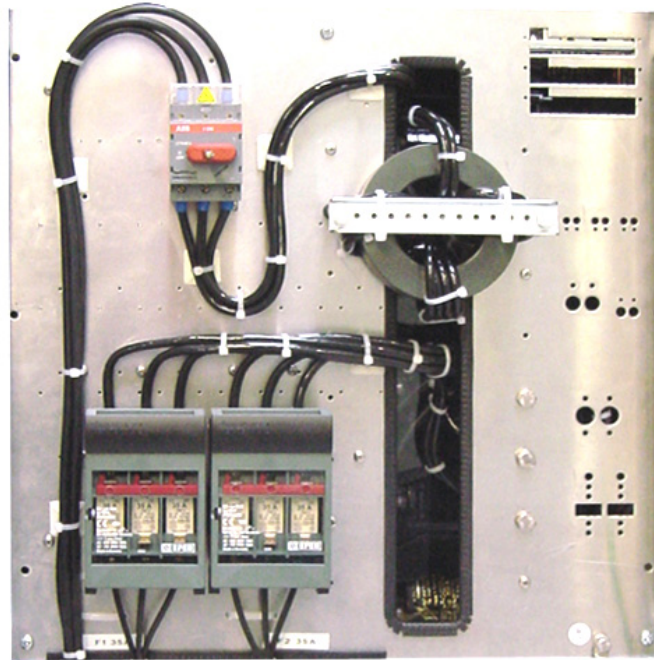


### 16.3 Connections of control system, cooling water, mains cable, DC-terminals



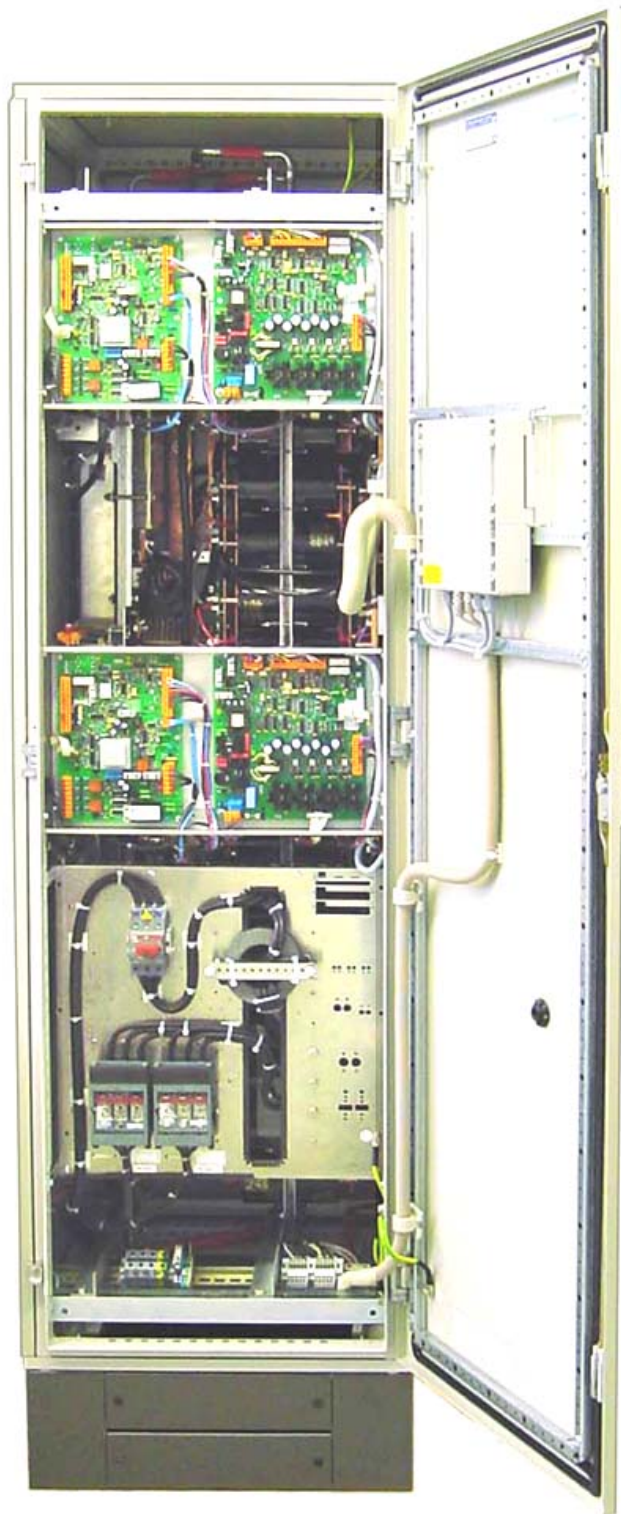


#### 16.4 Main switch, fuses



Picture: mounting plate with main switch (above) and two load separators (mains fuses) (below).

## 16.5 Inner view of the cabinet, boards



Picture: total view of the cabinet, front door open



## 17 Technical data

Type:	POWER-PULSE Rectifier pe 8082
Pulse output:	2 x 800A forward / 2400A revers
Mains input voltage:	3 x 400V AC +5% / -10%
Mains current :	33,7A / phase
Fuses :	3 x 35A NH00 load separator

**further specifications see value tables.**

## 18 Spare parts

Regulation board:	GSQ181
IGTR-Board:	IGTR3-2IGBT
Pulse board:	UP25
Board:	MOS02
IGBT:	SKM200GB123D
MOS-Transistor:	SKM313B010
Diode:	SKMD202E03
Capacitor:	--
Capacitor :	4 x 6.8µF 750V (inner circuit)
Mains rectifier:	SKD46/16
Fuse:	cartridges 3 x 35A NH load separator
Mains filter board:	NK9 NK54