

# ELTROPLAN-REVCON

Elektrotechnische Anlagen GmbH

## Operating instructions



Rectifier unit

REVCON<sup>®</sup> EDC

Power range 200 ... 400A

Nominal voltages 400V, 460V, 500V

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## Preface and general information

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### 1 Preface and general information

#### 1.1 About these Operating Instructions

- These Operating Instructions help you to work properly on and with the power rectifier units REVCON<sup>®</sup> EDC. They contain safety information which must be observed and information which are necessary for an undisturbed operation of the units together with the exploitation of all the advantages of the system.
- All persons who work on and with the rectifier units REVCON<sup>®</sup> EDC must have the Operation instructions available and observe all relevant notes and instruction.
- The Operating Instructions must always be in a complete and perfectly readable state.

##### 1.1.1 Terminology used

###### **Rectifier unit**

For „rectifier unit REVCON<sup>®</sup> EDC“ the term “rectifier unit” is used in the following.

###### **Controller**

For the frequency inverter which is used together with the power rectifier unit in the following the term „Controller“ is used.

###### **Drive system**

For a drive system with power rectifier units, controller and other components of the drive system in the following the term „Drive system“ is used.

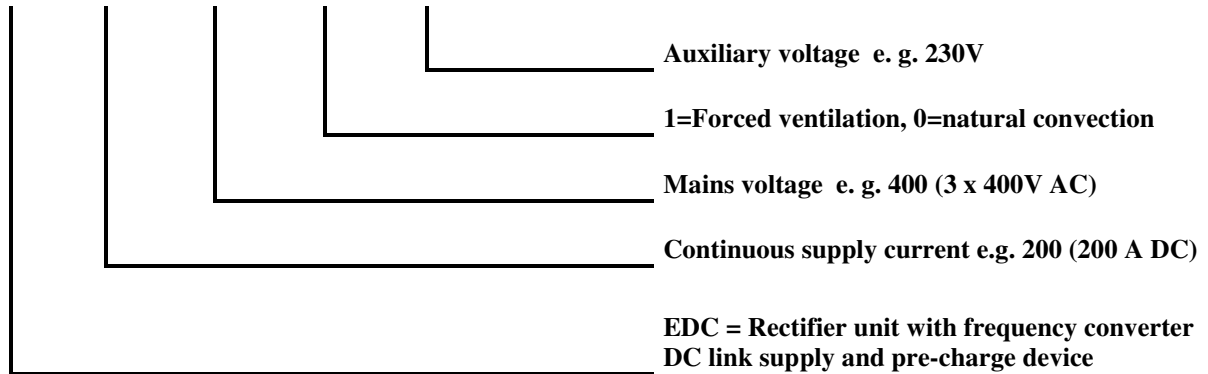
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## Preface and general information

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### 1.1.2 Ordering code

EDC 30 - XXX - 1 - 230 V AC



## 1.2 Scope of supply

- 1 rectifier unit REVCON<sup>®</sup> EDC
- 1 Operating instructions
- After receipt of the delivery verify immediately, if the scope of supply correspond to the shipping documents. We make no warranty for later complained defects.

### Claim

- Visible transport damages in transit immediately at the deliverer.
- Visible deficiencies/incompleteness immediately to ELTROPLAN-REVCON.



## Preface and general information

### 1.3 Legal regulations

<b>Labelling</b>	<b>Nameplate</b>	<b>CE-mark</b>	<b>Manufacturer</b>
	Rectifier units REVCON® EDC are unequivocally marked by the contents of the nameplate.	Conforms the EC Low Voltage Directive	ELTROPLAN-REVCON Edisonstraße 3 D-59199 Bönen
<b>Patent rights</b>	The power rectifier unit <b>REVCON® EDC</b> is protected in Germany and Europe by patents: <b>Patent-No.: DE 3938654C1</b> and <b>Patent-Nr.: 90123584.6-2207</b> . Patent infringements become prosecute.		
<b>Application as directed</b>	<p><b>Rectifier unit REVCON® EDC</b></p> <ul style="list-style-type: none"> <li>• Must only be operated under the conditions prescribed in these instructions.</li> <li>• Are components <ul style="list-style-type: none"> <li>– to feedback electrical energy</li> <li>– used for installation into a machine</li> <li>– used for assembly together with other components to form a machine.</li> </ul> </li> <li>• Are electric units for the installation into control cabinets or similar enclosed operating housing.</li> <li>• Comply with the requirements of the Low-Voltage Directive</li> <li>• Are not machines for the purpose of the Machinery Directive</li> <li>• Are not to be used as domestic appliances, but only for industrial purpose.</li> </ul> <p><b>Drive systems with rectifier unit REVCON® EDC</b></p> <ul style="list-style-type: none"> <li>• Comply with the EMC-Directive if they are installed according to the guidelines of CE-typical drive systems.</li> <li>• Can be used <ul style="list-style-type: none"> <li>– on public and non-public mains</li> <li>– in industrial as well as residential and commercial premises</li> </ul> </li> <li>• The user is responsible for the compliance of this application with the EC directives.</li> </ul>		
<b>Liability</b>	<ul style="list-style-type: none"> <li>• The information, data and notes in these Operating Instructions met the state of the art at the time of printing. Claims referring to rectifier units which have already been supplied cannot be derived from information, illustrations and descriptions given in these Operation Instructions.</li> <li>• The specifications, processes and circuitry described in these Operating Instructions are for guidance only and must be adapted to your own specific application. ELTROPLAN-REVCON does not take responsibility for the suitability of the process and circuit proposals.</li> <li>• The indications given in these Operating Instructions describe the features of the product without warranting them.</li> <li>• ELTROPLAN-REVCON does not accept any liability for damage and operating interference caused by: <ul style="list-style-type: none"> <li>– disregarding these instructions</li> <li>– unauthorized modifications to the rectifier unit</li> <li>– operating errors</li> <li>– improper working on and with the rectifier unit</li> </ul> </li> </ul>		
<b>Warranty</b>	<ul style="list-style-type: none"> <li>• Warranty conditions: see sales and delivery conditions of ELTROPLAN-REVCON GmbH.</li> <li>• Warranty claims must be made immediately after detecting defects or faults.</li> <li>• The warranty is void in all cases where liability claims cannot be made.</li> </ul>		
<b>Disposal</b>	<b>Material</b>	<b>Recycle</b>	<b>Disposal</b>
	Metal	●	-
	Plastic	●	-
	Printed-board assemblies	-	●



## Preface and general information

### EC-declaration of conformity

#### According to the EC-Low Voltage Directive (2006/95/EEC)

The rectifier units REVCON® EDC have been developed, designed and manufactured in accordance with the above mentioned EC-Directive and in sole responsibility of

**ELTROPLAN-REVCON Elektrotechnische Anlagen GmbH,  
 Edisonstraße 3, D-59199 Bönen**

Considered standards:

Standard	
DIN VDE 0160 5.88 +A1 / 4.89 +A2 / 10.88 PRDIN EN 50178 Class VDE 0160 / 11.94	Equipment of power installations with electronic components
EN 61558-1/A1	Safety of power transformers, power supplies, reactors and similar products
EN 60529	International protection rating
DIN VDE 0100	Guidelines for the design of power installations

### 1.4.4 EC-directive Electromagnetic compatibility

EMC directive (89/336/EWG)  
 Replaced by: EMC-directive (2004/108/EG)

**General:**

The objective target describes article 4 (2004/108/EG), as follows:

*The... designated devices must be so manufactured, that*

*(a) an intended operation of radio- and telecommunication devices and other devices is possible and*

*(b) the devices have an adequate stability against electromagnetically disturbances, so that an intended operation is possible.*



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## Preface and general information

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### **EG-declaration by the manufacturer**

#### **in terms of the EG-standard EMC (2004/108/EG)**

The listed REVCON® products are in terms of the EMC no independently recoverable products, this means only after integration in the overall system would they be rateable regarding to EMC. The rating became detected for typical plant constructions, but not for the several products.

**ELTROPLAN-REVCON Elektrotechnische Anlagen GmbH,  
Edisonstraße 3, D-59199 Bönen**

### **1.4.5 EC-Directive Machinery**

Machine directive (98/37/EG)  
Changed by: Modification directive (2006/42/EG)

#### **General:**

*Machinery means an assembly, fitted with or intended to be fitted with a drive system other than directly applied human or animal effort, consisting of linked parts or components, at least one of which moves, and which are joined together for a specific application.*

### **EC- declaration by the manufacturer**

#### **in terms of the EG-directive machines (2006/42/EG)**

The rectifier units REVCON® EDC were developed, designed and manufactured in accordance to the above named EG- directive in exclusive accountability by

**ELTROPLAN-REVCON® Elektrotechnische Anlagen GmbH,  
Edisonstraße 3, D-59199 Bönen**

The operation of the rectifier units REVCON® EDC is prohibited as long as it is determined, that the machine, in which it should be installed, conforms to the regulations of the EG-directive machines.

**2 Safety information**



**Safety and application notes  
for drive converters**

(Low-Voltage Directive (2006/95/EEC))

**1. General**

During operation, rectifier unit may have, according to their type of protection, live, bare, in some cases also movable or rotating parts as well as hot surfaces.

Non –authorized removal of required cover, inappropriate use, incorrect installation or operation, creates the risk of severe injury to persons or damage to material assets.

Further information can be obtained from the documentation.

All operations concerning transport, installation and commissioning as well as maintenance must be carried out by qualified, skilled personnel (IEC 364 and CENELEC HD 384 or DIN VDE 0100 and IEC-Report 664 or DIN VDE 0110 and national regulations for the prevention of accidents must be observed).

According to this basic safety information qualified skilled personnel are persons who are familiar with the erection, assembly, commissioning and operation of the product and who have the qualifications necessary for their occupation .

**2. Application as directed**

Rectifier units are components which are designed for installation in electrical systems or machinery.

When installing in machines, commissioning of the rectifier unit (i.e. the starting of operation as directed) is prohibited until it is proven, that the machine corresponds to the regulations of the EC Directive (2006/42/EG) (Machinery Directive); EN 60204 must be observed.

Commissioning (i.e. starting operation as directed) is only allowed when there is compliance with the EMC-Directive (2004/108/EG).

The rectifier units meet the requirements of the Low-Voltage Directive (2006/95/EEC). The harmonized standards of the prEN 50178/DIN VDE 0160 series together with EN 60439-1/DIN VDE 0660 part 500 and EN 60146/DIN VDE 0558 are applicable for the rectifier unit. The technical data and information on the connection conditions must be obtained from the nameplate and the documentation and must be observed in all cases.

**3. Transport, Storage**

Notes on transport, storage and appropriate handling must be observed.

At non-observance any warranty expires.

The rectifier unit has to be protected from inadmissible stress.

The transport is only valid in original packaging and in the thereon by pictograms marked transport position.

In particular during transport and handling no components are allowed to be bent and / or isolating distances may not be altered. The units are equipped with electrostatic sensitive devices, which may be damaged by improper handling. Therefore it has to be avoided to get in contact with electronic components. If electronic components are damaged mechanically the unit must not be put into operation, as it cannot be ensured, that all relevant standards are observed. Climatic conditions must be observed according to prEN 50178.

**4. Erection**

The devices must be erected and cooled according to the regulations of the corresponding documentation.

The rectifier units must be protected from inappropriate loads. Particularly during transport and handling, components must not be bent and / or isolating distances must not be changed. Touching of electronic components and contacts must be avoided.

Rectifier units contain electro-statically sensitive components which can easily be damaged by inappropriate handling. Electrical components must not be damaged or destroyed mechanically (health risk are possible!).

**5. Electrical Connection**

When working on live rectifier units, the valid national regulations for the prevention of accidents (e.g. VBG 4) must be observed. Before any installation or connection works, the plant has to be switched off and to be secured properly.

The electrical installation must be carried out according to the appropriate regulations (e.g. cable cross-sections, fuses, PE-connection). More detailed information is included in the documentation. When using the rectifier unit with controllers without safe separation from the supply line (to VDE 0100) all control wiring has to be include in further protective measures (e.g. double insulated or shielded, grounded and insulated). Notes concerning the installation in compliance with EMC – such as screening, grounding, arrangement of filters and laying of cables – are included in the chapter installation of this documentation. These notes must be also observed in all cases for rectifier units with the CE-mark. The compliance with the required limit values demanded by the EMC legislation is the responsibility of the manufacturer of the system or machine.

**6. Operation**

Systems where rectifier units are installed, if applicable, have to be equipped with additional monitoring and protective devices according to the valid safety regulations e.g. law on technical tools, regulations for the prevention of accidents, etc. .

After disconnecting the rectifier unit from the supply voltage, live parts of the power rectifier unit and power connections must not be touched immediately, because of possibly charged capacitors. For this, observe the corresponding labels on the drive controllers.

During operation, all covers and doors must be closed.

**7. Maintenance and service**

The manufacturer's documentation must be observed.

**This safety information must be kept!**

The product-specific safety and application notes in these Operating Instructions must also be observed!

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## Safety information

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### 2.1 General safety information

- These safety regulations are not entitled to completeness. In case of questions please contact our technicians.
- When commissioning the rectifier unit it is compliant with the state of the art. The power rectifier unit generally allows safe operation.
- The statements of this manual describe the attributes of the products without guaranteeing them.
- The power rectifier unit may expose persons, the power rectifier units itself and other material to danger, if
  - non qualified personal works at and with the power rectifier unit.
  - The power rectifier units are used in opposite to its purpose.
- Power rectifier units have to be projected in a way, that they fulfil their function and don't expose persons to danger, if they are mounted correctly and are used in accordance with their purpose. This applies also for the interplay with the whole plant.
- The units, operational data and circuit details described in this manual have to be understood analogously and have to be checked for transferability to each application.
- For the reasons of personal safety, the observance of the EMC-regulations and for the regular cooling the operation of the device is only allowed with a closed cover of the housing and with mounted flanges!
- Use the drive system only in flawless condition.

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## Safety information

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- Modifications of the power rectifier units without consultation of a REVCON®-technician are not allowed generally.
- The warranty given by us expires, if the unit is modified or (even partially) dismantled or if it is used in contradiction to our instructions.
- The constructor of the plant, who has to know the technical guidelines, bears the responsibility for the correct selection and arrangement of the electrical components.
- Putting into operation of the power rectifier unit is only admissible at VDE-conform nets of electrical power supply. Non observance may damage the device!
- In accordance with the corresponding standards and guidelines the operation on even for a short time over-compensated networks ( $\cos\phi\leq 1$ ) respectively on un-choked compensation-units is not admissible. If this is done nevertheless, overvoltage will occur (caused by oscillating currents), which may damage all connected components, especially electronic units like controllers and power rectifier units.
- To low powered or unloaded generators and to regulating transformers it is never allowed to feed back power without a previous consultation of our application department. Otherwise unintended voltage rises / excess voltages are generated, which may damage or destroy REVCON® and combined units!
- Before operating at nets without reference to neutral ground additional safety measures (e.g. installation of over voltage suppressors like MOV's) have to be done. If necessary, please ask for technical support by our technicians.

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## Safety information

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- An undisturbed operation of the power rectifier unit is only probable, if the following instructions are observed. If these instructions are not observed, tripping of the unit and damages may occur.
- Pay attention to the correct values of mains and DC-bus voltage.
- Separate power and control wires (> 15cm)
  - Use shielded or twisted control wires. Connect both ends of the shield to ground!
  - When using the digital input devices, only use suitable switching devices, whose contacts are able to switch the connected voltages.
  - Connect the housings of drive, controller and power rectifier unit to ground carefully. Connect shields of power cables to ground at both ends with as big surface as possible (remove lacquer)!
  - Connect the cabinet or the plant by a star-shaped network to ground (ground loops have to be avoided!)
- The power rectifier unit has been designed for a fixed connection to mains only. Especially when using RFI-filter leakage current values > 3,5mA may occur. The cross section of the earthing conductor must be at least 10mm<sup>2</sup> copper, or a second conductor has to be connected in parallel (star shaped grounding network).
- If components are used, which have no electrical separated inputs / outputs it is necessary to equalize the potentials (e.g. by an equalizing wire). If this is not observed, these components may be damaged by equalizing currents.
- When carrying out an insulations test in accordance with VDE0100/part 620 the device has to be disconnected to avoid damage to the power semiconductors. This procedure corresponds with the standard, as each device performs a high voltage test in accordance with VDE 0160 (EN 50178) in the course of final testing after manufacturing.

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## Safety information

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- A standard fault-current circuit breaker (sensitive on peak currents) is not allowed to be used as the only protective measure when using controller and power rectifier unit. Caused by a DC-component in the mains current a controller with 3-phase input voltage may prevent a fault-current circuit breaker from tripping in case of a earth fault. In accordance with VDE 0160 a fault-current circuit breaker is not allowed to be used as the only protective measure. In dependence on the kind of network (TN, IT, TT) further protective measures in accordance with VDE 0100 part 410 are necessary. For a TN-network this may be an over current protection, for an IT-network an insulation supervision with pulscode-measurment. For all kind of networks protective insulation (-transformer) may be used, if required power and length of wires allow that. When selecting a fault current circuit breaker the following measures have to be considered:
  - The fault current circuit breaker has to be compliant with the VDE 0664 standard.
  - The tripping current should be 300mA or more, to prevent a premature tripping caused by the leakage current of the controller. In dependence on the load, the length of the motor cables and the usage of a RFI-filter the leakage current may even be much higher.

Fault current circuit breakers, which are sensitive to all kinds of leakage currents, grant a good protection and are suitable as the only protection measurement for one or three phase controllers. The connection instructions of the manufacturer have to be observed.



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## Safety information

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### 2.2 Safety-responsible persons

#### User

- User is any natural or legal entity, who uses the drive system or by whom order the drive system is used.
- The user respectively his security officer have to grant
  - that all relevant regulations, instructions and laws have to be observed
  - that only qualified personnel works with or at the drive system
  - that the relevant manual is available for the personnel during any works
  - that a non-qualified personnel is prohibited to work on the drive system

#### Qualified staff

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##### Stop!



Qualified staff means persons, that are entitled (by the safety responsible) due to their training, experience, education, their knowledge in relevant norms, directives, accident directives and operation conditions to execute the necessary works and to recognize possible danger and to avoid it. (Definition of qualified staff IEC 364)

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#### Intended Use

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##### Stop!



Power rectifier units are electrical drive components, which are directed to be installed in electrical plants or machines. They have to be used only for drive systems with infinity variable speed controls of 3-phase asynchronous or permanent magnet motors. The usage with other electrical loads is not permitted and may damage the devices. The power rectifier unit may only be connected to symmetrical networks. Non-observance may damage the devices.

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### 2.3 Layout of the safety information

- All safety notes have a uniform layout:
  - The icon characterizes the type of danger.
  - The signal word characterizes the severity of danger.
  - The note describes the danger and suggests how to avoid the danger.



#### Signal word

Legend

	Used pictograms		Signal words	
<b>Warning of injury to persons</b>		Imminent danger by current	<b>Danger!</b>	Warns of an immediately imminent Danger. Consequences by disregard: Death or severe injuries
		Warning of a imminent danger	<b>Warning</b>	Warns of a possible, very danger situation. Possible consequences by disregard: Death or severe injuries
		Dangerous situation	<b>Caution!</b>	Warns of a possible, dangerous situation. Possible consequences by disregard: Minor or small injuries
		Warning of hot surface	<b>Warning!</b>	Warns of touching a hot surface. Possible consequences by disregard: Burnings
<b>Warning of property damages</b>		Harmful situation	<b>Stop!</b>	Warns of possible property damages. Possible consequences by disregard: Damage of the drive system or its surroundings
<b>Useful information and application notes</b>		Information	<b>Note!</b>	Marks a generally, useful note, tip. If you follow it, you make the handling of the system easier

### 2.4 Residual hazards



#### Operators safety

After mains disconnections, the power terminals + and – remain live for several minutes.

#### Protection of the device



Cyclic connection and disconnection of the supply voltage at terminals L1, L2 und L3, may overload the internal input current limitation:

Allow at least 1 minute between disconnection and reconnection.

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## Safety information

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### 2.5 General instructions

By this information to erectors and users of a plant hints on properties and directions concerning the power rectifier unit are given. These hints are not entitled to completeness.

#### **Unchoked compensations plants and resonance hazard**

Compensation plants are used in the centre of the power supply of a company. Disturbances or damages at these plants have effects on the power supply and may result in interrupted production processes.

Although this is no longer state of the art, many compensation plants are in operation without any choking. The problems, which result from a usage of such an unchoked compensation plant, are manifold:

- direct resonance
- resonance rise
- switching transients or
- impairments of centralized ripple systems

The fact, that a company produces back effects to the power supply is not the only reason for the creation of resonance. Decisive for the risk, to generate a resonance is the compensation power at the medium voltage transformer. The higher this power is the higher is the risk of resonance. The second important factor is the harmonic load of the medium voltage level. This harmonic load is transmitted via the transformer and causes effects on the low voltage level. Most often the limits were exceeded for the 5th harmonic component.

## Technical data

### 3 Technical data

#### 3.1 Characteristics

- Small compact housing
- Power supply for controller
- Power range 200A to 400A (800/1200A by parallel connection)
- Available for mains voltages from 400V, 460V, 500V (230V and 690V on request)
- DC-bus coupling of several controllers possible
- User-friendly commissioning – no adjustment or programming necessary

#### 3.2 General data / application conditions

Range	Values
Permissible temperature range*	During transport of the unit: -25°C...+70°C (to VDE 0160) During storage of the unit: -25°C...+55°C (to VDE 0160) During operation of the unit: 5°C... +40°C without power derating 40°C...+55°C with power derating
Humidity class*	Humidity class F without condensation ( 5% - 85% relative humidity)
Installation height h*	H ≤ 1000 m a.m.s.l. without power derating 1000 m a.m.s.l. < h 4000 m a.m.s.l. with power derating
Air pressure*	86kPa – 106kPa to VDE0875 part 11 and prEN55082
Degree of pollution	VDE 0110 Part 2 degree 2
Noise immunity	EN 61000-4-4 degree 4 EN 61000-4-2 degree 3 EN 61000-6-2 criterion A
Insulation strength	Overvoltage category III according to VDE 0110
Packaging	DIN 55468 for transport packaging materials
Type of protection	IP 20
Approvals	CE: Low-Voltage Directive

\*Climatic conditions according to class 3K3 (EN 50178 Part 6.1)

## Technical data

### 3.3 Rated data

#### 3.3.1 Rectifier unit

REVCON® type		EDC 400V	EDC 460V	EDC 500V
Nominal range of the interlinked mains voltage	$U_N$ [V]	$380 \leq U_N \leq 415$	$440 \leq U_N \leq 480$	500
* <sup>1</sup> Tolerance of the interlinked mains voltage	$U_N$ [V]	-15% / +10%	-15% / +10%	-15% / +10%
Mains frequency	$f_N$ [Hz]	$40 - 60 \pm 10 \%$		
Overload capability		(see table 3.3.2.1 to 3.3.2.3)		
Efficiency	$\eta$ [%]	ca. 98 % (2 % therm. losses)		
Power factor	$\cos\varphi$	~ 1		
Fundamental frequency component	g	~ 0,7- 0,95		
* <sup>2</sup> Required airflow	$m^3 / h$	a) EDC 200-400 : 450	b) EDC 400-400 : 700	
Power derating	[%/K]	$40^\circ C < T_a < 55^\circ C \Rightarrow 2\%/K$		
	[%/m]	$1000m \ddot{u}NN < h \leq 4000m \ddot{u}NN \Rightarrow 5\%/1000m$		

Table 3.3.1.1

\*<sup>1</sup> Depending on the size of the unit (nominal power and nominal voltage)

\*<sup>2</sup> Alternative case-type with minor changed dimensions

## Technical data

### 3.3.2 Current load

Nominal voltage 400V

REVCON <sup>®</sup> - type	P [kW]		I <sub>AC</sub> max. [A]		I <sub>DC</sub> max. [A]	
	100%	1 min in 10 min	100%	1 min in 10 min	100%	1 min in 10 min
EDC 200-400-1-230 V AC	115	172	166	248	200	300
EDC 400-400-1-230 V AC	229	344	330	496	400	600
EDC 800-400-1-230 V AC	458	687	661	992	800	1200
EDC 1200-400-1-230 V AC	687	1030	992	1487	1200	1800

**Table 3.3.2.1**

All values refer to a mains voltage of 400V

Nominal voltage 460V

REVCON <sup>®</sup> - type	P [kW]		I <sub>AC</sub> max. [A]		I <sub>DC</sub> max. [A]	
	100%	1 min in 10 min	100%	1 min in 10 min	100%	1 min in 10 min
EDC 200-460-1-115 V AC	132	198	166	248	200	300
EDC 400-460-1-115 V AC	263	395	330	496	400	600
EDC 800-460-1-115 V AC	527	790	661	992	800	1200
EDC 1200-460-1-115 V AC	790	1185	992	1487	1200	1800

**Table 3.3.2.2**

All values refer to a mains voltage of 460V

Nominal voltage 500V

REVCON <sup>®</sup> - type	P [kW]		I <sub>AC</sub> max. [A]		I <sub>DC</sub> max. [A]	
	100%	1 min in 10 min	100%	1 min in 10 min	100%	1 min in 10 min
EDC 200-500-1-230 V AC	143	215	166	248	200	300
EDC 400-500-1-230 V AC	286	429	330	496	400	600
EDC 800-500-1-230 V AC	573	859	661	992	800	1200
EDC 1200-500-1-230 V AC	859	1288	992	1487	1200	1800

**Table 3.3.2.3**

All values refer to a mains voltage of 500V

#### Note!

Like the input of a controller the input of the REVCON<sup>®</sup>-feed- and rectifier unit is not protected for overload. Therefore it is necessary to pay attention that the maximum DC-input current of the drive controller (including the overload factor) does not exceed the maximum supply current of the rectifier unit when designing the plant.

If the maximum DC- input current of the controller exceeds this value nevertheless, the motor current limit of the controller must be adjusted on the maximum REVCON value. In any case it is important to calculate with the overload factor of the controller.





## Technical data

### 3.3.3 Fuses and wire cross sections

The power rectifier unit is connected to mains supply via the terminals L<sub>1</sub>-L<sub>3</sub> at the connection plate. Mains fuses must be designed according to the current load capacity of the supply wire.

#### 3.3.3.1 Series fuses

Semiconductor fuses have to be connected in series with the power rectifier unit as following tables (refer to figure 4.4.1.1.1 position 1). The listed manufacturer is recommended, but naturally also comparative fuses of other manufacturer (e.g. Jean Müller, Ferraz, and Bussmann) are suitable.

REVCON® - type	Max. fuse AC	Connection terminal and max. cross section of the supply line*
EDC 200-400-1-230 V AC	Siba 2071332.500 500A 1100V NH 01	CS M10 150mm <sup>2</sup>
EDC 400-400-1-230 V AC	Siba 2071332.630 630A 1100V NH 01	CS M10 150mm <sup>2</sup>
EDC 800-400-1-230 V AC	Siba 2071332.630 2*630A 1100V NH 01	CS M10 2*150mm <sup>2</sup>
EDC 1200-400-1-230 V AC	Siba 2071332.630 3*630A 1100V NH 01	CS M10 3*150mm <sup>2</sup>

Table 3.3.3.1.1

REVCON® - type	Max. fuse AC	Connection terminal and max. cross section of the supply line*
EDC 200-460-1-115 V AC	Siba 2071332.500 500A 1100V NH 01	CS M10 150mm <sup>2</sup>
EDC 400-460-1-115 V AC	Siba 2071332.630 630A 1100V NH 01	CS M10 150mm <sup>2</sup>
EDC 800-460-1-115 V AC	Siba 2071332.630 2*630A 1100V NH 01	CS M10 2*150mm <sup>2</sup>
EDC 1200-460-1-115 V AC	Siba 2071332.630 3*630A 1100V NH 01	CS M10 3*150mm <sup>2</sup>

Table 3.3.3.1.2

REVCON® - type	Max. fuse AC	Connection terminal and max. cross section of the supply line*
EDC 200-500-1-230 V AC	Siba 2071332.500 500A 1100V NH 01	CS M10 150mm <sup>2</sup>
EDC 400-500-1-230 V AC	Siba 2071332.630 630A 1100V NH 01	CS M10 150mm <sup>2</sup>
EDC 800-500-1-230 V AC	Siba 2071332.630 2*630A 1100V NH 01	CS M10 2*150mm <sup>2</sup>
EDC 1200-500-1-230 V AC	Siba 2071332.630 3*630A 1100V NH 01	CS M10 3*150mm <sup>2</sup>

Table 3.3.3.1.3

ES ≙ end sleeve for strands

CS ≙ cable socket with drill hole for M6 / M8 / M10

\* At the copper lugs of the commutation choke

\*\* At the fuse holder respective disconnecter

## Technical data

### 3.3.3.2 Internal fuses

The power rectifier unit is equipped with semiconductor fuses according to the following tables (refer to figure 4.4.1.1.1. position 7). The listed manufacturer is recommended, but naturally also comparative fuses of other manufacturer (e.g. Jean Müller, Ferraz, and Bussmann) are suitable.

REVCON® - type	DC-fuses (use fast acting semiconductor fuses only)	Connection terminal and max. cross section of the supply line *
EDC 200-XXX-1-230 V AC	Siba 20 713 32 630A 1000 V NH 1	RK M10 150mm <sup>2</sup>
EDC 400-XXX-1-230 V AC	Siba 20 713 32 800A 1000 V NH 1	RK M10 150mm <sup>2</sup>

Table 3.3.3.2.1

ES ≙ end sleeve for strands

CS ≙ cable socket with drill hole for M6 / M8 / M10

\* At the copper lugs of the commutation choke

\*\* At the fuse holder respective disconnecter

**The types EDC 800... and EDC 1200... consist of a parallel connection of EDC 400...therefore are the internal fuses identical with the above named types.**

#### Stop!



If semiconductor fuses trip, please get in contact with ELTROPLAN-REVCON immediately, as possibly further protective measures have tripped. If internal fuses are exchanged, please verify that only the original types are used for replacement.



#### Danger!

Before replacing a fuse, switch off all voltages!

---

## Technical data

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### 3.3.4 DC-bus capacitors

The pre-charge limiter of the REVCON<sup>®</sup> EDC is adapted (at a maximum switch-on frequency of 1/min) to the normally used DC-bus capacitance values of the controller. In table 3.3.5.1 the maximum allowed values are listed.

REVCON <sup>®</sup> -type	Max. DC-bus capacitance
EDC 200 - EDC 400	20000 $\mu$ F
EDC 800	40000 $\mu$ F
EDC 1200	60000 $\mu$ F

Table 3.3.5.1

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#### **Danger!**



An operation with higher DC-bus capacitance values is allowed after consulting our technical department and corresponding modification of the unit.

---

### 3.3.5 RFI-filter

To observe the EMC-rules in accordance with figure 4.4.1.1.1 a radio frequency interferences filter class A can be preconceived to the REVCON® unit. In tables 3.3.4.1 to 3.3.4.3 the power rectifier units are assigned to the corresponding RFI-filter types.

REVCON® - type	Order designation for filter	Case type
EDC 200-400-1-230	RF-EDC 200-400	6
EDC 400-400-1-230	RF-EDC 400-400	7
EDC 800-400-1-230	RF-EDC 800-400	8
EDC 1200-400-1-230	RF-EDC 1200-400	9

Table 3.3.6.1

REVCON® - type	Order designation for filter	Case type
EDC 200-460-1-115	RF-EDC 200-460	6
EDC 400-460-1-115	RF-EDC 400-460	7
EDC 800-460-1-115	RF-EDC 800-460	8
EDC 1200-460-1-115	RF-EDC 1200-460	9

Table 3.3.6.2

REVCON® - type	Order designation for filter	Case type
EDC 200-500-1-230	RF-EDC 200-500	6
EDC 400-500-1-230	RF-EDC 400-500	7
EDC 800-500-1-230	RF-EDC 800-500	8
EDC 1200-500-1-230	RF-EDC 1200-500	9

Table 3.3.6.3

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## Installation

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### 4 Installation

#### 4.1 Mechanical installation

##### 4.1.1 Important hints

- Use the power rectifier units as build-in devices only!
- Observe free spaces!
  - Several power rectifier units in one cabinet may be installed next to each other without spacing.
  - Keep a horizontal distance of at least 70mm to other components and to the cabinet walls.
  - Keep a vertical distance of at least 150mm to other components and to the cabinet walls.
- Ensure that there are no obstacles in the way of the cooling air input and output
- If the cooling air is polluted (dust, dirt swirl, grease, aggressive gas) so that the function of the power rectifier unit may be impeded
  - Take sufficient countermeasures, e.g. separate cooling air, mounting of air filters, periodical cleaning.
- Do not exceed the ambient temperature permissible during operation.

#### Provided mounting position

The power rectifier unit has been designed for vertical wall mounting ( $\pm 15^\circ$ ) only. Mounting is allowed only on a flat surface without using any kind of spacers. This kind of mounting is necessary to guarantee the right way for the cooling air. A power loss of 3 % from the maximum nominal power rating has to be calculated. Air-temperature may not exceed 40 °C near the unit. Air-in- and air-out-openings at the top and the bottom of the unit may not be concealed by installation materials such as cable ducts or other equipment. Keep a distance of min. 15 cm to the air-in- and air-out-openings and a distance of min. 7 cm to beside mounted parts or cabinet-walls.

## 4.2 Dimensions

### 4.2.1 Rectifier unit

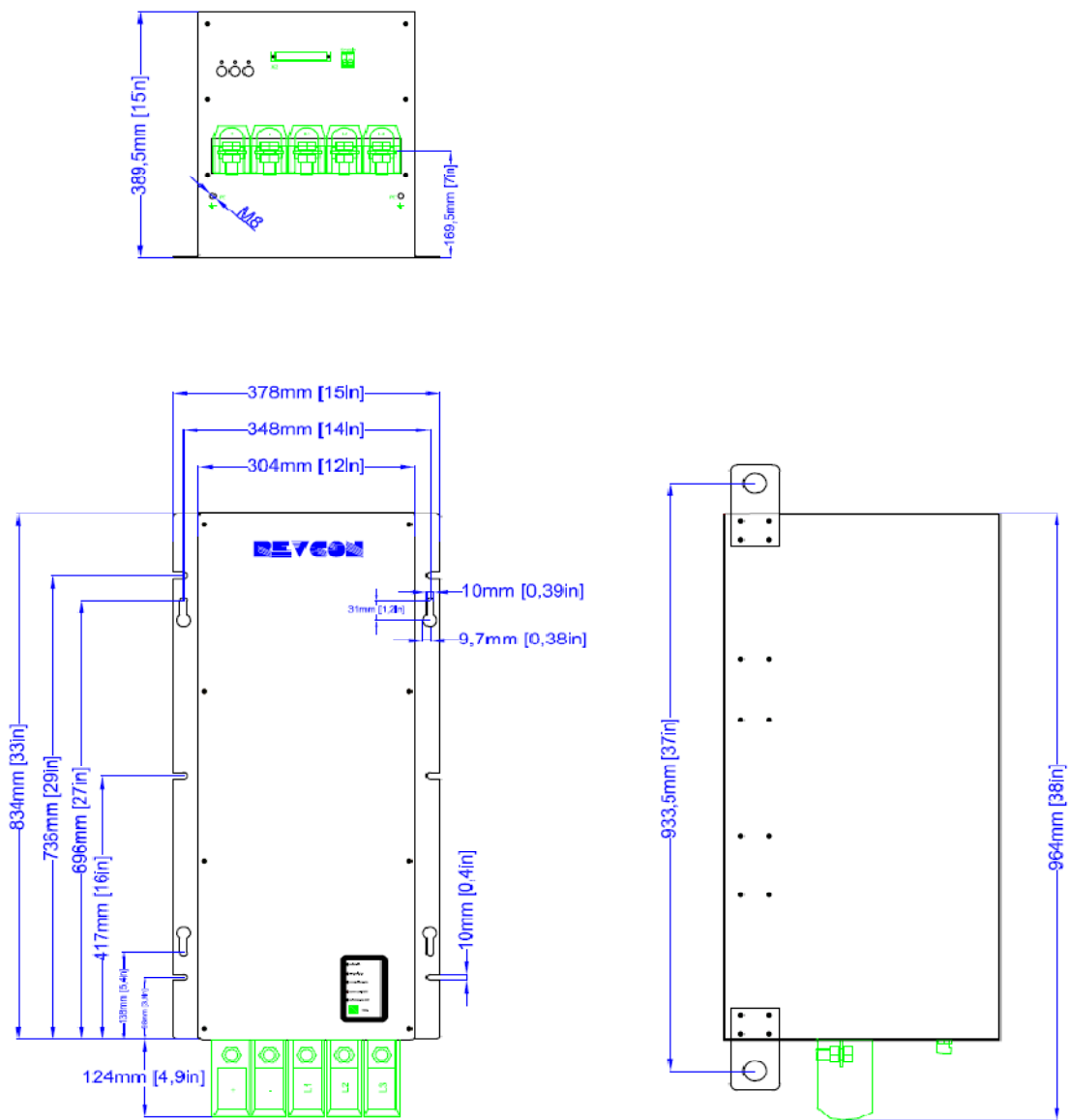
The types EDC 800... and EDC 1200... consist of a parallel connection of EDC 400...

Therefore the dimensions must be added accordingly.

#### 4.2.1.1 Dimension diagram

**EDC 200-XXX... to EDC 400-XXX...**

**Construction 3/800**





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## Electrical Installation

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### 4.3 Electrical installation

#### 4.3.1 Operators safety

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##### **Danger!**



After mains disconnection, the DC-bus terminals of the power rectifier unit remain live for several minutes! The exact time, till this voltage has decreased to a not dangerous value is dependent on the used controller and has to run down before any service operations or similar activities are started.

The exact values have to be cross checked with the documentation of the controller.

---

Replace defective fuses by the regular types (chapter 3.3.3) only and without any live voltage.

#### 4.3.2 Protection of the power rectifier unit

---

##### **Stop!**

The power rectifier units contain electrostatic sensitive devices (ESSD).



During working at the terminals the personnel has to observe the rules of the international standard IEC 747-1 chapter 9. Basically before starting the works the personnel has to free itself from electrostatic voltages:

Discharge yourself by touching the PE-screw of the housing or another grounded surface in the cabinet.

---

**4.3.3 Mains types / Mains characteristics**

**Danger!**



Observe the restrictions in accordance to the respective mains type!

If you want to run power rectifier units at mains types, which are not listed in the table below please consult our technicians.

VDE conformal mains type	Operation of the power rectifier unit	Remark
With grounded star point	<b>Allowed</b>	Observe the technical data of the unit
With isolated star point	<b>After consulting the manufacturer and possible modification of the unit allowed</b>	
With grounded active wire	<b>After consulting the manufacturer allowed</b>	

Table 4.3.3.1

**4.3.4 Specifications of the used wires**

- The used wires have to be compliant with the specifications on site ( e.g. UL or UL-c)
- The regulations about the minimum cross section of PE-wires have to be observed!
- The effectiveness of a screened wire is dependent on
  - a good screen connection
  - a low screening impedance:
    - Use screens tin- or nickel-plated copper screens only!
  - the swamp factor of the screen mesh:
    - at least 70% to 80% with a swamp angle of 90°
- Protect the mains wires of the power rectifier unit with the provided wire protection fuses.

---

## Electrical Installation

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### 4.4 Connection

The supply line must be connected at the lead-through terminal at the bottom side of the enclosure.

#### 4.4.1 Power connection

##### **Fusing (also refer to chapter 3.3.4)**

- The specifications of chapter 3.3.4 (fuses and wire cross sections) are recommendations and refer to the operation
  - in cabinets and machines
  - installation in cable ducts
  - maximum ambient temperature +40°C.
- When choosing the cross section of the wire the voltage drop under load should be considered (refer to chapter 3.4)
- Protection of the wires at mains side (L1, L2, and L3):
  - by commercial wire protection fuses.
  - fuses have to be compliant with the relevant standards on site.
  - rated voltages of the fuses have to be compliant with the voltage on site.
- Protection of the power rectifier unit at mains side (L1, L2, and L3):
  - by commercial semiconductor fuses
  - fuses have to be compliant with the relevant standards on site
  - rated voltage of the fuses have to be compliant with the voltage on site
- Protection of the power rectifier unit at DC side (+UG, -UG):
  - fuses are part of the power rectifier unit (refer to chapter 3.3.4.2)

**The erector/user of the plant bears the responsibility for the observance of further relevant standards (e.g.: VDE 0113, VDE 0289 and so on).**

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## Electrical Installation

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### Connection

- All connections should be as short and low-impedance as possible.
- For the observance of the EMC-guideline (in accordance to actual standards like VDE 0160 and EN 50178) screened wires have to be used.
- Connect the mains supply wires at the terminals L1, L2, L3 (at the mains choke) of the power rectifier unit. Only three phase connection is allowed.
- A defined phase sequence (clockwise rotation field) must be observed at the main circuit connection of the power unit. The power rectifier unit is equipped with a phase-sequence control unit. In case of an incorrect rotation field an error message is displayed via LED as follows: "rotation field failure" or "phase failure". In this case two phases, connected to the power unit, have to be exchanged.
- Connect the earthing wire of the supply cables to the earthing screw of the power rectifier unit.
- The wires for the DC-bus coupling between controller and power rectifier unit have to be connected to the DC terminals. It is absolutely necessary to observe the correct polarity.

---

#### **Danger!**



An interchanging of + (PLUS) and – (MINUS) avoids the correct function of the power rectifier unit.

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#### **Danger!**



It is in no case allowed to pre-connect not current compensated direct inductances!

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## Electrical Installation

### 4.4.4.1 Wiring diagram

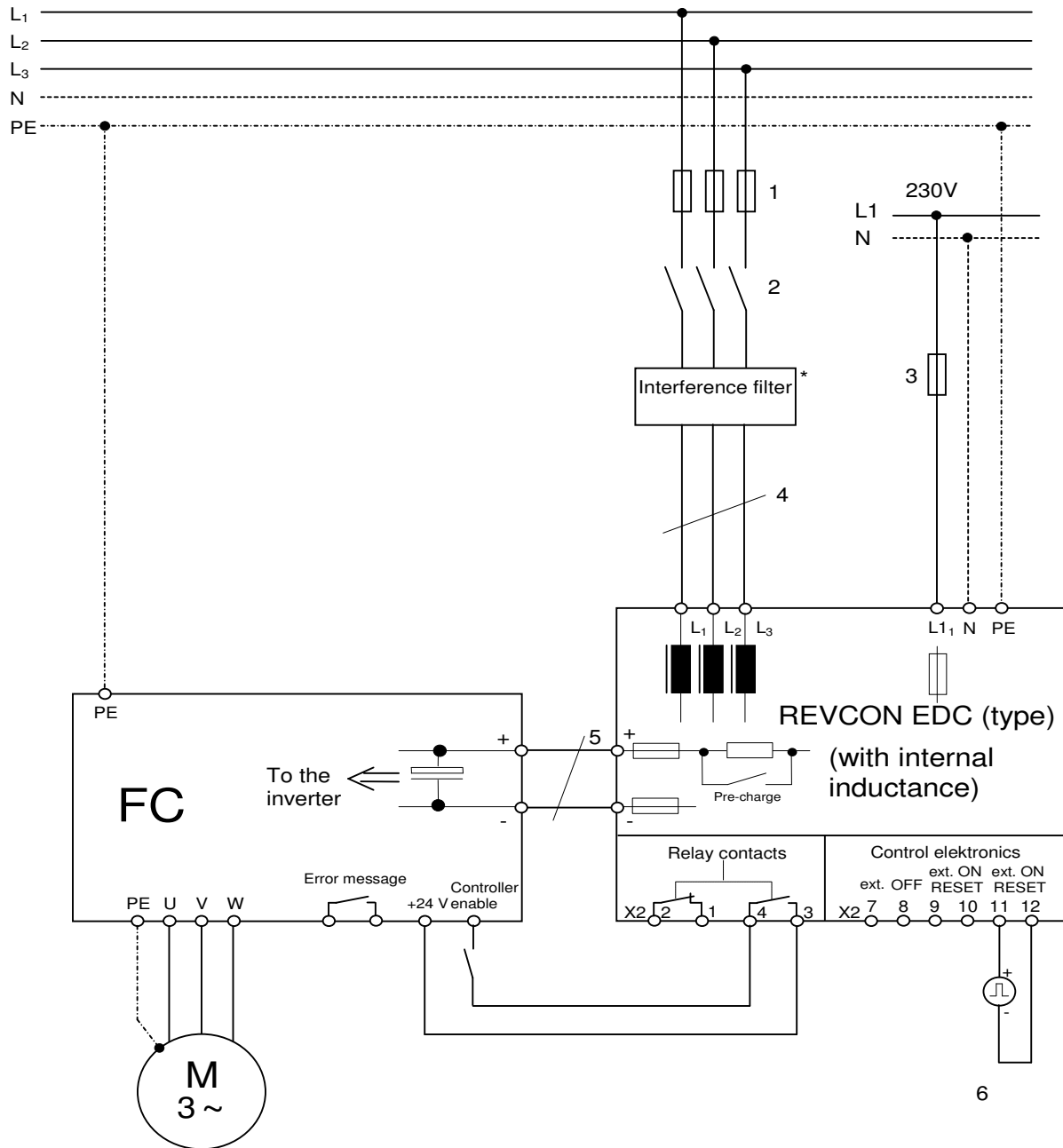


Figure 4.4.1.1.1 Wiring schematic of the rectifier unit REVCON® EDC and one or more controllers

#### Note!



This is a wiring example. Special features of a application (e.g. installation of a PLC) may require modifications of the wiring of the terminals X2.1 ... X2.12.

#### Danger!



\* It is in no case allowed to pre-connect not current compensated direct inductances!

**Legend for figure 4.4.1.1.1 (REVCON® EDC)**

1. Fusing in accordance with this manual.
2. It is not allowed to connect any other devices except the rectifier unit behind the main magnetic switch.
3. Fusing (230 V supply voltage (not applicable at some devices) <2A current consumption) according to DIN VDE 0298 or short circuit protected wiring.
4. Cable cross section according to the valid VDE-directives.
5. At these terminals one or several controllers (even with different power ratings) may be attached, like it shown in figure 4.5.1. Even if several controllers are attached, the DC-wires have to be as **short and low impedance** as possible!
6. The „ON“ or „RESET“ signal may be initiated via terminals 11 and 12:  
Terminals 11 and 12: Positive pulse (12-24 V DC); practicable e.g. via PLC  
(terminal 11 +, terminal 12 -).

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## Electrical Installation

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### 4.4.2 Connection of the fan supply

All devices are equipped with two additional terminals at the connection plate of the rectifier unit for the supply of the fan [blue terminal = N, grey fuse terminal = L ]. The fuse inside the fuse terminal has the designation **medium 500V 5x30mm and** is only installed for internal wire protection at the device.

### 4.4.3 Control wires

- Connect the control wires to the terminal row X2 at the control plate of the power rectifier unit.
- Don't parallel control wires to interfering power wires.
- Connect the screening of the control wires with an as big as possible surface to the metal cable glands of the flange.

### 4.4.4 Control functions

The control terminal strip is placed on the control board and is indicated with X2. It is fitted with a plug-in device for easy handling (see figure 4.4.4.2).

The control board must always be designed for the respective main circuit voltage. Therefore the main circuit voltage (230 V, 380 V - 415 V, 440 V - 480 V, 500 V or 690 V) must be declared with every order. This is also necessary for a possible exchange of the device.

From the control terminal strip the operating condition or rather the collective error can be connected to extern. There is also the possibility to execute the external reset or the switch-functions and to connect them with the controller or the PLC.

## Electrical Installation

### Space diagram of the control board REV 1.4.X

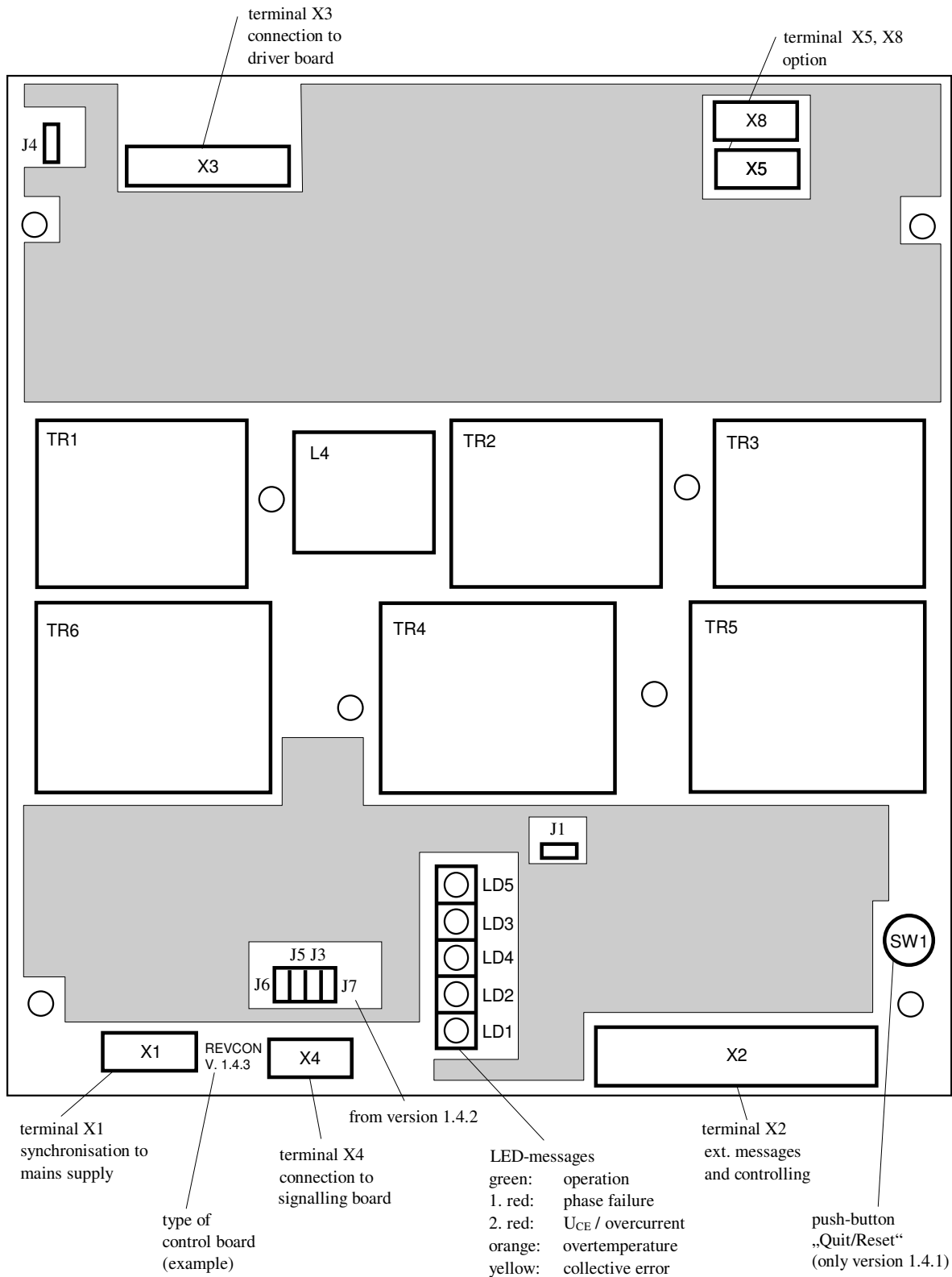


Figure 4.4.4.1



## Electrical Installation

### Terminal usage:

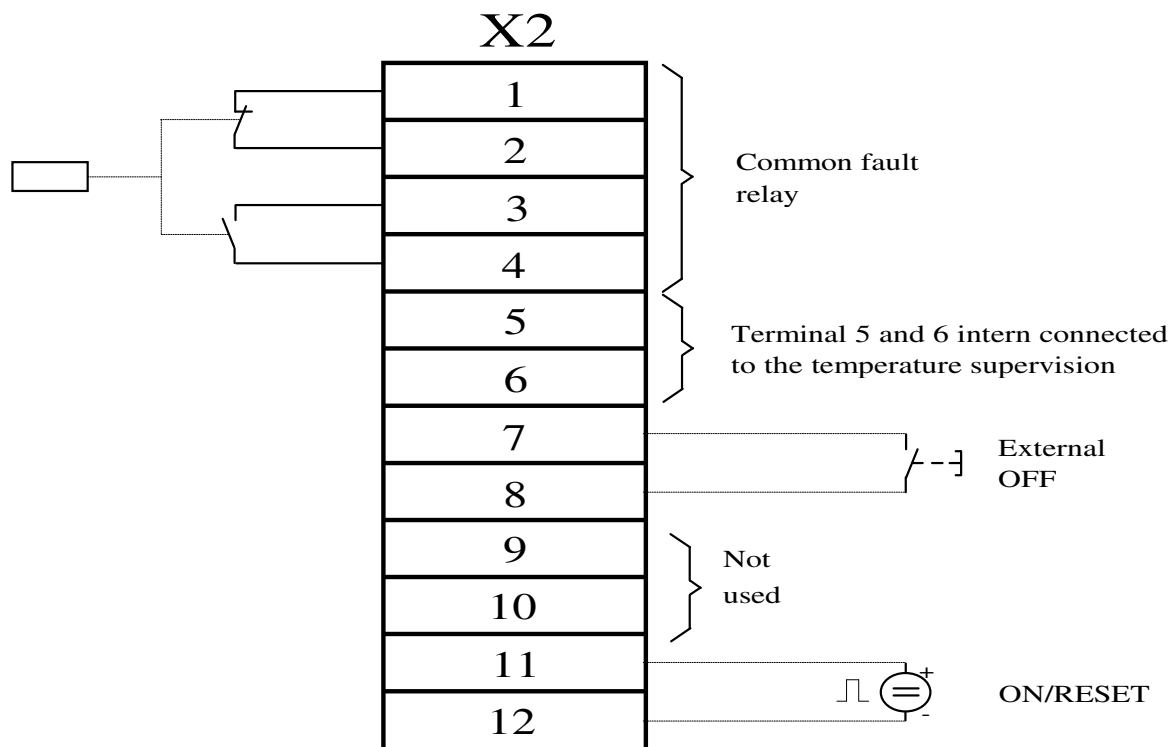


Figure 4.4.4.2

### Terminals 1-4 (refer to figure 4.4.4.2)

These terminals are contacted to two potential free (SELV) relay contacts (one NOC and one NCC) with a maximum current load of 5 A AC or 3 A DC. It is not allowed to connect other voltage types than SELV!

In figure 4.4.4.2 the relay is displayed in rest position.

The relay toggles, if:

- 1.) Power supply is o.k.
- 2.) No error present, and after perhaps an **ON**-signal has been released.

If an **OFF**-signal has been released, an collective error is display as the relay toggles.

### **Stop!**



To avoid, that the frequency converter accelerate the motor already during the preload, a contact of the error message relay must be integrated into the pulse release of the converter.

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## Electrical Installation

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### **Terminals 5 and 6**

These terminals are already used for the internal temperature supervision of the heat sink.

### **Terminals 7 and 8**

#### **(Use screened wires only, maximum length)**

#### **OFF-signal**

These terminals may be used for an external **OFF**-signal (NOC, short time contact) to stop the power rectifier unit.

---

### **Danger!**

If an external voltage is connected to terminals 5 to 10 unattended actions and damages may occur.

---

### **Terminals 9 and 10**

Not used

### **Terminal 11 and 12**

#### **(Used screened wires only)**

These terminals may be used for an external **ON**-signal (external voltage 12 – 24V DC [e.g. from PLC], short time pulse) to start / reset the rectifier unit.

(Connect „Plus“ to terminal 11, „Minus“ to terminal 12)

## Electrical Installation

### 4.5 Installation of a power rectifier unit in a CE-typical drive system

<b>General</b>	<ul style="list-style-type: none"> <li>• <b>The user is responsible for the compliance of his application with the EC directives.</b></li> <li>- If you observe the following measure you can be sure that the drive system will not cause any rectifier unit-caused EMC problems, i.e. comply with the EMC Directive when running the machine.</li> <li>- If devices which do not comply with the CE requirement concerning noise immunity EN 61000-6-2 are operated close to the power rectifier unit, these devices may be interfered electromagnetically by the power rectifier units.</li> </ul>
<b>Assembly</b>	<ul style="list-style-type: none"> <li>• Connect the power rectifier unit and the RFI-filter to the grounded mounting plate with a wire of large cross section as possible: <ul style="list-style-type: none"> <li>- Mounting plates with conductive surfaces (zinc-coated or stainless steel) allow permanent contact.</li> <li>- Varnished boards should not be used for installation in accordance with EMC.</li> </ul> </li> <li>• If you use several mounting plates: <ul style="list-style-type: none"> <li>- Connect as much surface of the mounting plates as possible (e.g. with copper bands)</li> </ul> </li> <li>• Ensure the separation of power and control cables.</li> <li>• Cable guides as close as possible to the reference potential. Unguided cables have the same effect as aerials.</li> </ul>
<b>Filters</b>	<ul style="list-style-type: none"> <li>• Use RFI filters which are assigned to the power rectifier unit. RFI filters reduce impermissible high frequency interference to a permissible value.</li> </ul>
<b>Screening</b>	<ul style="list-style-type: none"> <li>• Metallic cable glands ensure a big-surface connection between screen and housing</li> <li>• If the screened wire are interrupted at relays or terminals: <ul style="list-style-type: none"> <li>- Connect the screens of the wires with a big surface to the mounting plate.</li> </ul> </li> <li>• If the mains wires between RFI-filter and power rectifier unit are longer than 300mm: <ul style="list-style-type: none"> <li>- Use screened mains wires</li> <li>- Connect the screen direct at the controller / power rectifier unit and at the RFI-filter to the mounting plate.</li> </ul> </li> <li>• Screen the control wires: <ul style="list-style-type: none"> <li>- Connect the screens on the shortest possible way to their terminals.</li> </ul> </li> </ul>
<b>Earthing</b>	<ul style="list-style-type: none"> <li>• All metallic conduction components (power rectifier unit, controller, RFI-filter) have to be connected to one common earthing point (PE-bus bar).</li> <li>• Observe the in the safety guidelines defined minimum cross sections: <ul style="list-style-type: none"> <li>- For EMC not the cross section, but the surface of a wire and the contact to the mounting plate is important for the function.</li> </ul> </li> </ul>

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## Electrical Installation

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Power rectifier units are electrical units for usage in industrial and commercial plants. In accordance with the EMC guideline 2004/108/EC it is not obligate to mark these units, as in the sense of the EMC directive and the EMC law they are components to be mounted by an competent electromechanical engineer and cannot be used stand alone. The proof of the observance of the protective aims of the EMC directive has to be carried out by the erector / user of the machine / plant. If the by ELTROPLAN-REVCON released RFI-filters are used and the following measures and installation directives are observed, the adherence to the prescribed data is cleared.

In combination with the related RFI-filter the power rectifier unit has been designed for the usage in ambient of the limit class „A“ („B“ on request).

Definition in accordance with generic standards:

- Electromagnetic compatibility (EMC) - Part 6-4: EN 61000-6-4 and IEC 61000-6-4:2006 Generic standards-Emission standard for industrial environments.
- Electromagnetic compatibility (EMC) - Part 6-2: EN 61000-6-2 and IEC 61000-6-2 Generic standards- Immunity for industrial environments.

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## Electrical Installation

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### 4.5.1 Installation

#### Appropriate design of pant and cabinet:

To avoid noise in coupling lay

- a) Mains/supply wires
- b) Motor wires of controllers / servo amplifiers
- c) Control- and data wires (small voltage range < 48 V) with a distance of at least 15 cm between each other.

To obtain low resistive HF-connections, grounding, screening and other metallic connections (e. g. mounting plates, mounted units) have to be done with a as big as possible surface to metallic ground. Use grounding and potential equalisation wires with as big cross section as possible (min. 10mm<sup>2</sup>) or thick grounding tapes.

Use copper or tinned copper screened wires only, as steel screened wires are not suitable for high frequency applications. Connect the screen with metal clamps or metal glands to the equalisation bars or PE-connections. Don't extend the screen with single wires!

If external RFI-filters are use, these have to be mounted not more than 30cm away from the noise source and with a very good, low resistive based contact.

Inductive switching units (relay, magnetic contactor and so on) have to be equipped with varistors, RC-circuits or suppressor diodes always.

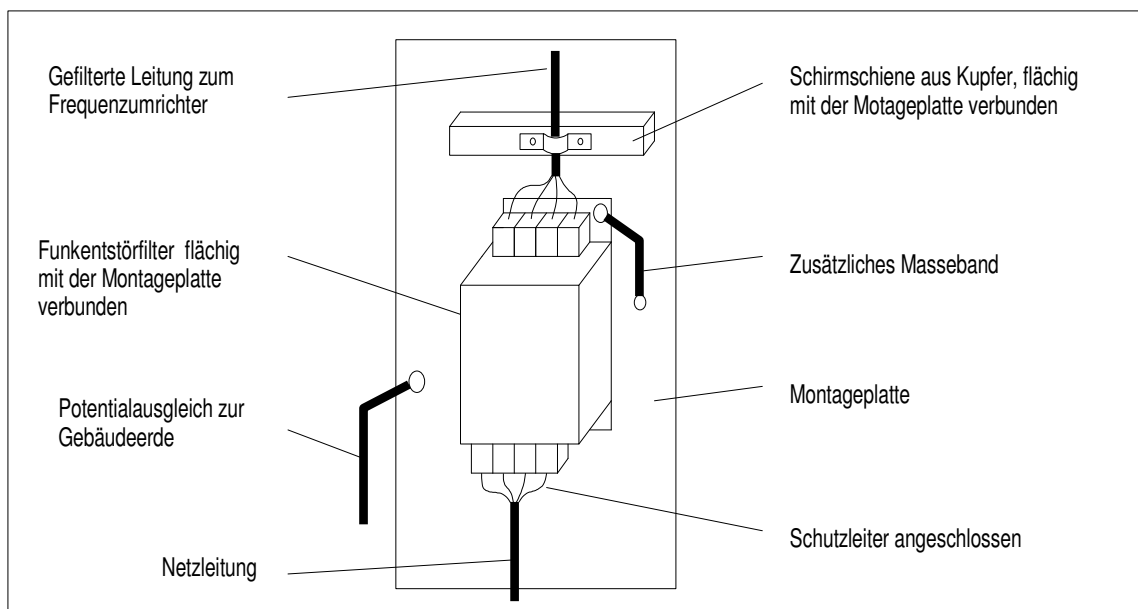
All connections have to be as short as possible and must lay as close to the ground potential as possible, as free hovering wires act like aerials.

Avoid wire loops in all wires. Connect unused wires to ground at both ends.

If unscreened wires are used, twist the pairs to attenuate unsymmetrical noise.

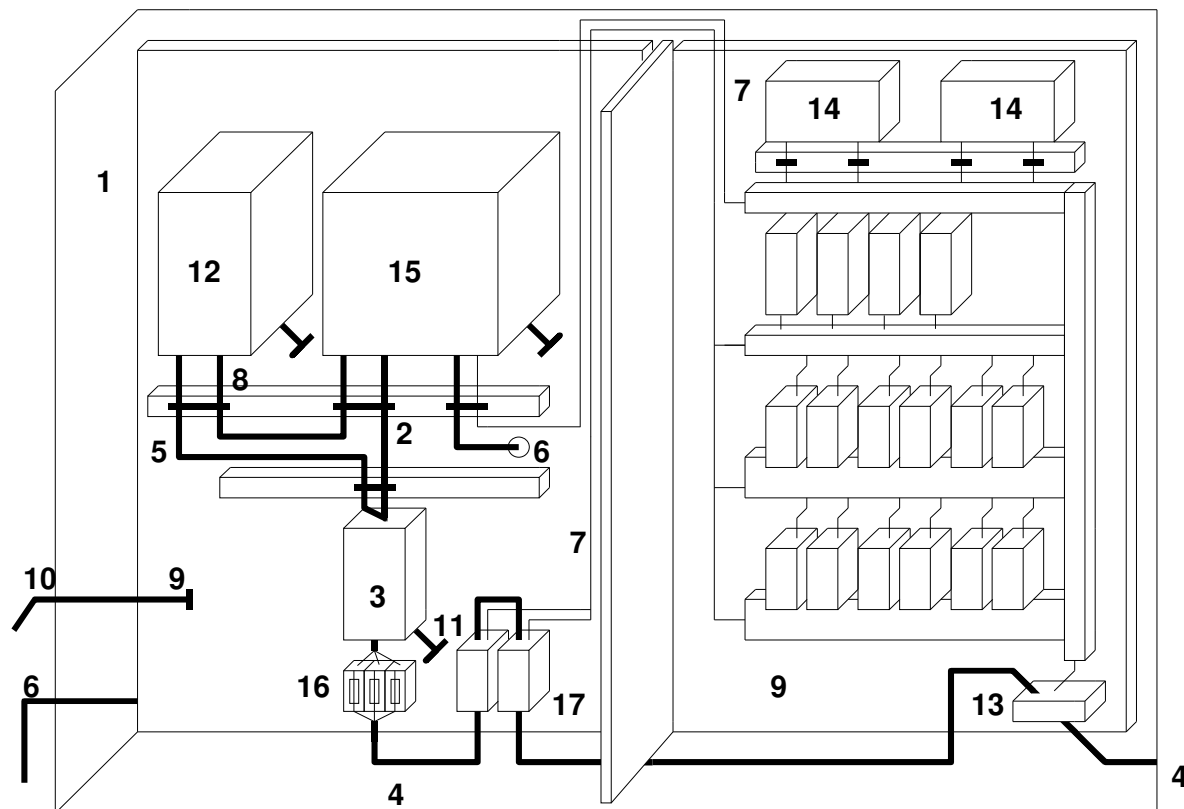
### 4.5.2 Connection of a RFI-filter

The following figure shows mounting and connection of an external RFI-filter:



## Electrical Installation

### 4.5.3 Design of an EMC-conformal cabinet



- |  |   |
|--|---|
| <ol style="list-style-type: none"> <li>1. Cabinet</li> <li>2. Wiring between RFI-filter and controller</li> <li>3. RFI-filter</li> <li>4. Mains supply wire</li> <li>5. Wiring between RFI-filter and power rectifier unit:<br/>Cross section in accordance with fusing or short circuit proof!</li> <li>6. Motor wiring</li> <li>7. Control wiring</li> </ol> | <ol style="list-style-type: none"> <li>8. DC-bus wiring with power rectifier unit (DC)</li> <li>9. Mounting plate (common star point)</li> <li>10. Potential equalisation</li> <li>11. Additional earthing wire</li> <li>12. Power rectifier unit</li> <li>13. Mains connection</li> <li>14. PLC</li> <li>15. Controller</li> <li>16. Mains fuses</li> <li>17. Mains magnetic switch</li> </ol> |
|--|---|

### 4.5.4 Remarks

Generally a system should be divided in an area for power electronics and an area for control electronics. This is not only important, if the system is mounted in one cabinet, but even also if it is spread over several cabinets. As of the strong noise emission of the power wires it is recommended to mount a screening wall. This wall must have a low resistive contact to the frame or the mounting plate (remove lacquer!).

The installed power rectifier unit and the connected RFI-filter must form an integrated whole, i.e. they have to be connected via the mounting plate without an isolating lacquer.

The connection wire between power rectifier unit and RFI-filter must be screened. At both ends the screen has to be connected to ground. The wire should not be longer than 300mm.

The mounting plate of the power rectifier unit should be the star point for the whole grounding and screening of the machine or plant. If the drive or other components of the plant cause interference, the HF connection of these components is bad. This could be improved by an additional potential equalisation.

By using RFI-filters the leakage current is increased. As the leakage current is higher than 3,5 mA, one of the following conditions must be fulfilled:

- Cross section of the protective wire must be at least 10 mm<sup>2</sup> CU.
- Supervision of the protective wire by a module, which trips in case of a fault.
- Install a second wire in parallel to the protective wire via separate terminals.  
This wire must be conformal with VDE 0100 / part 540.



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## Electrical Installation

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### 4.5.5 Installation of control wires

The screen of digital signal wires, which are not connected to terminals, has to be connected to the screen bars to decrease the impedance of the screen.

The screen of digital signal wires, which are connected to terminals, has to be connected with as big surface as possible to ground.

If the screen is grounded via a single wire, the noise discharge is getting worse by 70%.

For screen connection commercial cable clamps are suitable.

If unscreened signal wires are used, install only twisted pair wires.

## **5 Commissioning**

---



### **Danger!**

Prior to initial switch-on of the power rectifier unit check the wiring for completeness, short-circuit and earth fault.

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### **Danger!**

If the wiring is not correct, a non-intended operation of controller and/or power rectifier unit is possible.

---

### **5.1 First power up**

1. Precondition:  
It must be ensured before the first power-up, that combined with the rectifier unit also minimum 15% of for this unit maximum valid DC-link capacity (see table 3.3.5.1) is switched-on, to achieve an adequate smoothing of the DC-link voltage. **This is also valid for every further power up.**
2. Switch on mains supply :
  - The power rectifier unit is ready for operation after ca. 1s
3. Check the readiness for service of the power rectifier unit:
  - If only the green LED is on:  
Power rectifier unit is ready for service.
  - If beside the green LED also other LED's are on:  
A disturbance is present. Before continuing with commissioning, remove the disturbance (refer to chapter 7 "Troubleshooting").
4. Check the readiness for service of the controller:
  - Proceed in accordance with the controller manual.

## Troubleshooting and fault elimination

### 6 Troubleshooting and fault elimination

The five LEDs in the cover of the rectifier unit display the operating condition. For easier visibility during service and first powering up similar LED's are placed on the control board.

#### 6.1 LED-messages

LED-display: Error code:	LED – display				
	Operation	Phase failure	U <sub>CE</sub>	Overtemperature	Disturbance
	Green	Red	Red	Orange	Yellow
1	X				
2	X				
3	X			X	X
4	X				X
5	X				X
6	X				X
7	X	X			X
8	X		X		X
9	X	X	X		X
10	X	X	X	X	X
11					
12	X				X
13	X	X			

Table 6.1.1

## Troubleshooting and fault elimination

LED-display Error code:	Status report		Relay
	At commissioning	During operation	
1	Ready to operate (after approx. 1s)	System in operation	Relay in resting position
2	Ready for operation, but no power feedback ⇒ Check the DC-fuses.		Relay in resting position
3		Overtemperature of the heat sink ⇒ Error-message is not resettable as long as the temperature is too high.	Relay dropout
4		Error code 3 ⇒ Heat sink temperature declined to normal and the error is resettable.	Relay dropout
5	System has been switched off, (external OFF) ⇒ Reset necessary	System has been switched off, (external OFF) ⇒ Reset necessary	Relay dropout
6	Overvoltage has been detected (J8 closed) ⇒ After grid voltage has declined to its nominal value, reset necessary		Relay dropout
7	Rotary field orientation incorrect or one phase is missing	Phase failure has been detected ⇒ Reset necessary	Relay dropout
8		Overcurrent has been detected ⇒ Reset necessary	Relay dropout
9	Error code 7 and 8	Overcurrent and phase failure have been detected simultaneously.	Relay dropout
10	Several errors have been detected simultaneously	Several errors have been detected simultaneously	Relay dropout
11	System off, at least two phases lost	System off, at least two phases lost.	Relay dropout
12		With option IFP: I <sup>2</sup> t-tripping ⇒ Reset necessary	Relay dropout
13		Voltage breakdown during commutation but without tripping as jumper 3 and 7 are open (chapter 6e) ⇒ Operation possible, mains supply improvement recommended	Relay dropout

Table 6.1.2

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## Service

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### 7 Service

The energy supply unit is maintenance-free, if the provided application conditions are observed (refer to chapter 3.2).

If the cooling air is polluted, the cooling air input may be blocked. Therefore check the power rectifier unit periodically (depending on the degree of pollution approx. every 4 weeks).



#### **Danger!**

Don't use sharp or tapering objects like knife or screw driver to clean the cooling air input.

---

Clean the cooling air input with a vacuum cleaner.

## 8 Appendix

### 8.1 Options

#### 1. Fuse holder with fuses for mains supply

In accordance with table 3.3.3.1.1-5 for the power rectifier unit the following fuses are available:

REVCON® - type	Order designation	Configuration
EDC 200	SH EDC ZZZ-XXX	B
EDC 400	SH EDC ZZZ-XXX	C

ZZZ  $\cong$  rated power of the rectifier unit  
 XXX  $\cong$  rated voltage of the rectifier unit

#### 2. RFI-filter

Technical data for the RFI-filter are documented in chapter 3.3.5 (dimensions) and 4.5.2 (connection).

#### 3. Option IL (Isolation lacquer)

To protect the electronic components of the power rectifier unit from pollution of the cooling air, all printed circuit boards may be coated with an isolating lacquer. This option improves the service reliability, but it doesn't release the user from the duty to observe the in chapter 3.2 specified application conditions.

#### 4. Overvoltage suppressor

If the power rectifier unit (as well as a controller) is connected to ungrounded mains supply, it only may be run, either if it is connected via an isolating transformer or if the plant is protected by overvoltage suppressors. But also with grounded mains supply it may be useful to install overvoltage suppressors, if it is possible, that voltage peaks occur. For choosing the best overvoltage suppressor for your specific application, please get in contact with one of our technicians.

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## Appendix

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### 5. External operating an signalling panel

When mounting the device inside a cabinet it is possible to mount an operator panel in the door of the cabinet by using the external operating and signalling panel. The external operating and signalling panel contains the complete display (LED's) of all running and failure messages of the power rectifier unit and also the ON / RESET push button switch. The connection to the power rectifier unit has to be done with a (shielded) flat cable to the socket X4 of the control board (refer to figure 4.4.4.1).

---

#### Note!

The connection of the external operating and signalling panel to the power rectifier unit has no influence on the operating and error messages of the LED's placed on the control board. In this case both displays are active on the same time.



In case of simultaneous usage of the external operating and signalling panel and the ON/OFF function via the control terminal X2 the switch off signal always has priority, independent of the ON-RESET push button switch.

---

#### Stop!

Don't put an external voltage to the socket X4 of the control board or to the external operating and signalling panel. This may damage the device.



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### 6. Option SKS-module

For all power rectifier units a SKS-module is available. This module enables the power rectifier unit to generate sine wave mains currents (THD I =8-15% depending on controller and load). In addition the maximum feedback power increases by approx. 15% in relation to operation without SKS-module. The module has to be connected to the power rectifier unit according to figure 4.4.1.1.1. For technical data refer to chapter 3.3.4 (type overview) and 4.2.3 (dimensions).

## **8.2 REVCON<sup>®</sup> Product overview**

### **1. REVCON<sup>®</sup> SVC**

Power feedback units for short time operation  
(Crane systems, discontinuous centrifugal, etc.)

### **2. REVCON<sup>®</sup> SVCD**

Power feedback units for continuous operation  
(Engine test beds, escalators, wind energy plants, elevators etc.)

### **3. REVCON<sup>®</sup> DCV**

Power supply- and feedback unit  
For multiple motor applications with dynamic alternation of loads)

### **4. REVCON<sup>®</sup> OSKM**

Harmonics compensation module to reduce the harmonics loading  
(In preparation)

### **5. REVCON<sup>®</sup> PFU**

Power feedback units for plants for extraction of regenerative Energy (Wind- / hydraulic power plants etc.). In connection with a durable excited Generator is no drive controller necessary!

### **6. REVCON<sup>®</sup> HSTV**

Boost-converter for the generation of an increased direct current link voltage for the torque increasing in over- synchronous range of speeds

### **7. REVCON<sup>®</sup> EDC**

Power rectifier module for multiple motor applications (supply of multiple drive controller) without generator- operation

### **8. REVCON<sup>®</sup> SKS**

Filter module for the generation of sinusoidal line currents (THD I 10-16% according to the feedback unit and the load). Can be combined with REVCON SVC, SVCD, DCV, CDCV and PFU and with the most commercial converters!

### **9. REVCON<sup>®</sup> RHF**

Filter module for the generation of sinusoidal line currents (THD I 5-16% according to the frequency converter and the load). Filter module of the newest generation with smaller dimensions and reduced weight and better performance

All products are available for 400V line voltage, the most also for 230V, 400V, 460V, 500V, 600V and 690V! According to the product power from 4 to 440kW can be transmitted, whereby the most products are appropriate for parallel connection, so that power ratings until the megawatt range can be achieved!



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## Contact

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### 8.3 Contact

**Eltroplan-REVCON Elektrotechnische Anlagen GmbH**

**Edisonstraße 3**

**D-59199 Bönen**

**Phone +49 (0)2383 920 22 22**

**Fax +49 (0)2383 920 22 66**

**E-Mail [info@REVCON.de](mailto:info@REVCON.de)**

**Web [www.REVCON.de](http://www.REVCON.de)**

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**11/12**

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