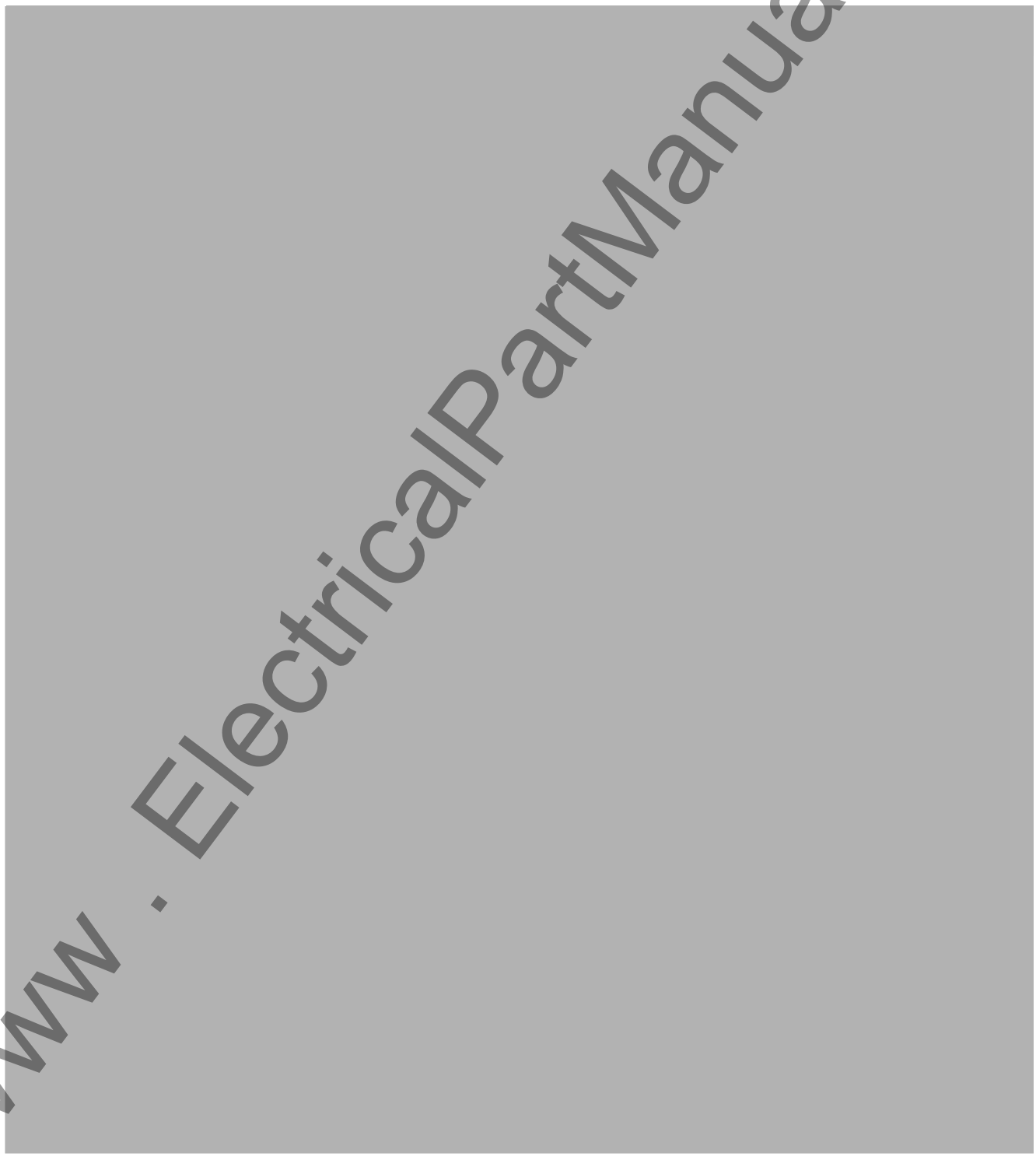
SIEMENS

SIMOVERT Master Drives

Supplement to the operating instructions

Common Rectifier and Rectifier/Regenerating Units with water cooling, Size H



Edition: **D**

Order-No.: 6SE7086-4AH85-1BA0

Conformity

We have checked the contents of this document for conformity with the hardware and software described. However, this does not absolutely preclude deviations, and we therefore cannot guarantee complete conformity. The information in the document is subjected to regular scrutiny. Any necessary corrections will be made in subsequent editions. We also welcome any suggestions you may have in the way of improvement.

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ENGLISH

Contents

1 Description

WARNING

The water-cooled rectifier or rectifier/regenerating unit is a component of an installation. It must be correctly installed by the builder of the installation in accordance with the applicable standards.

In the event of non-compliance, death, serious bodily injury or substantial damage to property can result.

Correct functioning of the cooling system is ensured by connecting the unit to an external cooling-water circuit.

The design of the cooling-water circuit with regard to

- whether it is an open or closed system
- the selection and combination of materials
- the composition or quality of the cooling water
- the dissipation of heat from the cooling water (heat exchange, fresh supply ...)

is an important factor for the functional reliability and safety as well as the useful life of the whole installation.

A maximum of three components can be connected in parallel (1 basic unit + 2 parallel units).

Moisture condensation is not permissible as in the case of air-cooled units.

From product status A2 and onwards, rectifier units can be ordered without semiconductor fuses - option L32 (In the case of product status 1, option L32 means that semiconductor fuses are built in). External cable-protection devices, however, do not provide protection for the thyristors.

The rectifier/regenerative units are generally supplied **with** semiconductor fuses. It is not permissible to operate them without semiconductor fuses.

The electronic p.c.b's must be supplied with power from an external 24 power supply system (1 A for basic unit, 0.3 A for every other unit connected in parallel).

For the changes in the MRPD setting (setting of the type) as well as other information and warnings, see the operating instructions for the air-cooled rectifier or rectifier/regenerative units.

Order No.:

Rectifier unit:	6SE7087-6AK85-0AA0	German/English
Rectifier/regenerating unit:	6SE7080-0AK85-1AA0	German
	6SE7087-6AK85-1AA0	English

2 Assembly

WARNING

The warning notes for "air-cooled units" apply.

Installation and maintenance work relating to the water-equipment is only to be done when the installation is off load.

Temperature shocks caused by cooling water with a different temperature (ΔT>10K) are to be avoided! This can occur especially when the unit is switched on (e.g. in the case of low coolant temperature in the re-cooler) or after the temperature sensors have responded in the case of a pump failure. The permissible temperature change in this case is 10 K/min. If this recommendation is not complied with, the life cycle of the unit can be reduced.

In addition, the cooling circuit must be active before load current is supplied (ensured by means of system control). A possible way of suitably adapting the coolant temperature in such cases is to switch on the unit without load current and ensure that the flow rate of the coolant is a slow as possible.

NOTE

The rectifier/regenerative feedback units comprise two partial converters, i.e. the rectifier section (see Fig. 2.1) and the regenerative feedback section (see Fig. 2.2).

The units are components which can only be mounted in cabinets. If there are additional sources of heat in the cabinet (reactors, contactors etc.), sufficient ventilation must be ensured. The units do not need any external cold air. It must be borne in mind, however, that additional heat losses of other components built into the cabinet such as reactors, contactors and so on, cannot be dissipated. The air temperature in the cabinet must not exceed 50 °C. On the C98043-A1695 module, there are terminals (X19, X29) to which fans (230 VAC) can be connected, if necessary, in order to circulate the cabinet air (up to 7 A rated current).

No protection is provided against direct touching (IP00, VBG4). The builder of the installation must ensures this protection by means of suitable devices (covers, cabinet mounting). Bore holes are provided for mounting a protective guard to prevent touching. The guard itself, however, is not included in the scope of supply.

The components which are not mounted on liquid coolers, such as electronics and, in some cases, the power-section fuses, are cooled by means of convective heat exchange.

If the components are mounted in a cabinet, therefore, it must be ensured that discharge air can enter the cabinet. Partitioning provided in units with air cooling interferes with this! Such partitioning must be avoided.

In the case of applications with IP54 degree of protection (or higher), there must be a distance of at least 90mm between the chassis and the top of the cabinet.

2.1 Notes on installation and components

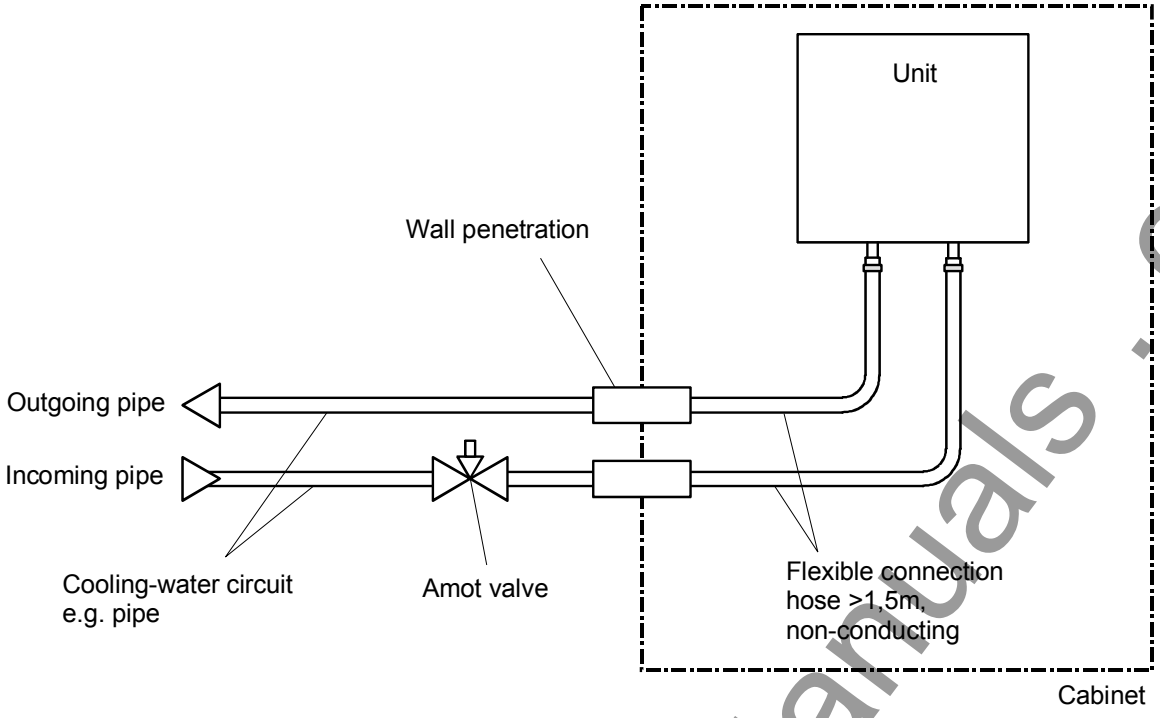
A separate circuit which is made of stainless steel and which transfers the heat to a re-cooling system via a water-to-water heat exchanger is recommended for the units.

In order to avoid electro-chemical corrosion and vibration transfer, the units are to be connected to the incoming and outgoing pipes with a flexible, non-conducting hose. The length of the hose should be > 1.5 m.

If the piping of the plant is made of plastic, the hose is not necessary.

The water hoses should be connected before installation of the converter.

If hose clamps are used for installation, they must be checked every three months to make sure that they are firmly attached.



The working pressure is to be set in relation to the flow conditions of the cooling-water network in the incoming and outgoing lines.
The required amount of cooling water per unit of time is to be set in accordance with the information provided in the section, "Technical data", e.g. by means of valves with a flow-rate indicator (as available, e.g., from "OSTACO Armaturen AG“, CH-8902 Urdorf, Tel.++411735550).
If the coolant circuits of several units are connected in parallel (e.g. rectifier/regenerating units, parallel unit, inverter, motor etc.), it must be ensured that the correct amount of coolant according to the technical data flows through the unit.

In order to comply with the maximum permissible operating pressure, suitable measures are to be taken by the user. A pressure-control device is necessary.

In the case of closed cooling systems, pressure-compensating devices with a safety valve (< 2.5 bar) and bleeding devices are to be provided.

The cooling system is to be bled immediately after it has been filled.

On the upper water heat-sink for the busbar, a venting valve is provided for this purpose (for position, see outline drawing!).

Bleeding the unit (Absolutely necessary in the case of re-filling)

- Bleeding is to be carried out when the plant is off load.
- Remove safety sealing plug before the actual venting valve and, at the same time, press down the blue safety collar.
- Bleed the unit.
- Close the bleeding valve.
- Insert the safety sealing plugs again.
- Check for leaks.

In order to reliably ensure the required flow rate, reversible-flow filters should be used instead of normal pipe sieving filters. This enables the flow to be reversed automatically. (e.g. products from "Schilling Chemie GmbH“ PF 1136, D-71687 Freiberg, Tel. 07141-703-0).

Great care must be taken when the water pipes are being laid. The pipes must be fixed securely in place by mechanical means and must be tested for leaks.

Live components must never touch the water pipes (insulating distance min. 13 mm).

2.2 Use

The same general conditions apply to use as for air-cooled units, with the exception of the cooling conditions already mentioned.

Water is normally used as the cooling medium. Only in special cases should antifreeze be added. In the cooling-water temperature range of +5 to +38 °C, operation with 100 % of the rated current is possible.

2.3 Coolant

Normal service water or a mixture of water and antifreeze can be used as the coolant.

2.3.1 Definition of cooling water

Chemically neutral and clean water containing no solid bodies (municipal water supply).

Max. particle size of any particles contained	< 0.1mm
pH value	**6.0 to 8.0**
Chlorides	< 40 ppm
Sulphates	< 50 ppm
Dissolved substances	< 340 ppm
Overall hardness	< 170 ppm
Conductivity (only water, see Section 2.3.2)	< 500 µS/cm
Cooling-water temperature increase per unit (rated operation)	$\Delta T \approx 5°C$
Operating pressure	**< 2.5 bar**

Caution! Operating pressure higher than 2.5 bar is not permissible.

Heat-sink material: not resistant to sea water (i.e. it must not be cooled directly with sea water)!

The instructions given regarding the quality of the coolant (diameter of suspended particles < 0.1 mm) must be complied with as accurately as possible. Otherwise, there is a danger that the fine cooling conduits will be blocked!

If the system is to be operated with a higher pressure, the admission pressure at each unit is to be reduced to 2.5 bar.

In the unit's cooling-water circuit, filters (sieves) for a particle size of < 100 µm are to be used! Filters (sieves) are to be cleaned at regular intervals.

If there is a danger of frost, frost-protection measures are necessary for operation, storage and transport, e.g. emptying and blowing out with air, additional heaters etc.

2.3.2 Anti-freeze additive

Due to their physical properties (thermal capacity, thermal conductivity, viscosity), anti-freeze agents reduce the performance of the cooling system. They should only be used, therefore, if it is unavoidable.

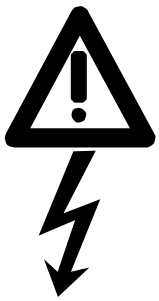
If you use anti-freeze agents, make sure that you comply with the reduction curve shown in the section, "Technical data". If this is not done, the unit's overtemperature protection device can be triggered. Premature ageing of the unit's components can also occur.

NOTE:

It must always be ensured that the necessary pump output is adapted to the viscosity increase when anti-freeze is added. The back-pressure occurring in the unit must also be taken into account.

The following table is a guideline (coolant temperature 20° C):

Antifrogen N proportion of the coolant	Kinematic viscosity (mm^2/s)	Relative pressure loss (bar)
0 %	1.05	0.95
20 %	1.07	1.14
30 %	2.5	1.24



WARNING

Operation of the units at temperatures below 5 °C is not permissible even if anti-freeze is used.

If anti-freeze is used, it must be ensured that no differences in potential occur in the cooling circuit. If necessary, the components are to be connected to a potential compensation bar.

If less than 20 % ANTIFROGEN N is added, there is an increased danger of corrosion which can reduce the lifetime of the unit.

If anti-freeze is used, the requirements regarding the water-tightness of the circuit are increased because the surface tension of the water–ANTIFROGEN N mixture is approximately 100 times less than that of pure water.

High-quality hot-water-resistant IT seals are suitable as sealing material. Graphite threads can be used to seal the packing glands. In the case of pipe connections where hemp is used, the application of Fermit or Fermit oil has proved to be effective.

If other agents are used, the life of the units can be reduced. Mixing various anti-freeze agents is not permissible under any circumstances.

If anti-freeze is used, the name of the agent, the manufacturer and the mixing ratio must be documented.

NOTE

The safety data sheet is to complied with for anti-freeze!

ANTIFROGEN N (from the Höchst company) is preferred as the anti-freeze agent.

In order to ensure that the good anti-corrosion properties of ANTIFROGEN N–water mixtures have an effect, the concentration must be at least 20 %. The electrical conductivity of the coolant is always increased when anti-freeze is added. The electro-chemical corrosion entailed by this is compensated for by inhibitors contained in the ANTIFROGEN N.

The water–ANTIFROGEN N mixture must be renewed every 3 to 5 years.

If sealing strips made of polytetrafluor ethylene are used, leaks can occur.

If other anti-freeze agents are used, they must have an ethylene glycol basis. In addition, they must be approved for use for well-known automobile companies (GM, Ford, Chrysler). Example: DOWTHERM SR-1.

The coolant mixture requires that the water definition given is strictly complied with.

2.4 Notes on materials

Cooling-water installations with components of copper or copper compounds must be avoided and are only possible if special measures are taken, e.g. closed cooling circuit, full-filtering system (i.e. CU ions are filtered out), additives to the water (e.g. products of "Schilling Chemie GmbH", P.O.Box 1136, D-71687 Freiberg, Tel. +49 7141-703-0).

The hose connecting nipples on the heat-sink side must be made of stainless steel or thick aluminium. The connecting nipples must never be made of brass or copper.

PVC hoses are unsuitable if anti-freeze is used.

Rigid-PVC pipes are suitable for the anti-freeze agents named in Section 2.3.2.

It must be ensured that the water circuit is completely free of zinc.

The following is especially important if anti-freeze agents are used:

Zinc breaks down all inhibitors which have a glycol basis.

Never use galvanized pipes!

If normal iron pipes or components made of grey cast iron are used for the piping (e.g. motor housing), a separate circuit with water-to-water heat exchangers is to be used for the units.

If a heat exchanger made of CuNi 90/10 is used, the water conductivity and the installation notes (hose) must be borne in mind.

2.5 Protection against moisture condensation

Special measures are necessary for protection against moisture condensation.

Moisture condensation occurs when the inlet temperature of the cooling water is considerably lower than the room temperature (air temperature). Depending on the relative humidity Φ of the air, the temperature difference between the cooling water and the air can be higher or lower. The temperature at which water vapour in the air becomes saturated and dew begins to form is called the dew point.

In the following table, the dew points (in °C) for an atmospheric pressure of 1 bar (corresponding to an altitude of approx. 0 to 500 m) are given. If the cooling-water temperature is below these levels, moisture condensation can be expected, i.e. the cooling-water temperature must always be higher than the dew-point temperature.

T Raum °C	Φ=20%	Φ=30%	Φ=40%	Φ=50%	Φ=60%	Φ=70%	Φ=80%	Φ=85%	Φ=90%	Φ=95%	Φ=100%
10	<0	<0	<0	0,2	2,7	4,8	6,7	7,6	8,4	9,2	10
20	<0	2	6	9,3	12	14,3	16,4	17,4	18,3	19,1	20
25	0,6	6,3	10,5	13,8	16,7	19,1	21,2	22,2	23,2	24,1	24,9
30	4,7	10,5	14,9	18,4	21,3	23,8	26,1	27,1	28,1	29	29,9
35	8,7	14,8	19,3	22,9	26	28,6	30,9	32	33	34	34,9
38	11,1	17,4	22	25,7	28,8	31,5	33,8	34,9	36	36,9	37,9
40	12,8	19,1	23,7	27,5	30,6	33,4	35,8	36,9	37,9	38,9	39,9
45	16,8	23,3	28,2	32	35,3	38,1	40,6	41,8	42,9	43,9	44,9
50	20,8	27,5	32,6	36,6	40	42,9	45,5	46,6	47,8	48,9	49,9

Dew-point temperature as a function of the relative humidity Φ and the room temperature for an installation altitude of 0 m.

The dew point depends on the absolute pressure, i.e. on the installation altitude. The dew points for a lower atmospheric pressure are below those for an altitude of 0 m. Ensuring that the cooling-water intake temperature is suitable for an altitude of 0 m is therefore always sufficient.

There are different ways of protecting the equipment against moisture condensation:

1. The simplest method is to place a temperature-controlled valve device in the intake pipe of the cooling circuit, e.g. a "bypass method" called an "Amot" valve (source: Ing. Büro Neudörfer Fichtenstr. 5, 91094 Langensendelbach, Tel.:+49 9133/3497). The disadvantage of this method is that the water temperature is always kept at the temperature permanently set in the bypass valve. This temperature, however, is within the range of the maximum achievable room temperature (when moisture condensation is most likely). The result is that the unit is always subjected to the maximum thermal stress.

2. A much less wearing method for the units is a closed-loop water-temperature control system. Depending on the room temperature, the water temperature is adjusted to the room temperature. This method is always to be preferred in the case of high room temperatures, low water temperatures and high humidity levels.

3. Physical moisture removal. This is only effective for closed rooms. The way this functions is based on intentional condensation of the air moisture on an air-to-water heat exchanger which is continuously operated with the cold cooling water.

4. In order to provide protection against moisture condensation, it is possible to check the humidity with a humidity detector. A humidity detector can be obtained from ENDRICH (Tel.: +49 7452/6007-0). With this detector, an alarm contact is actuated when a dew-point difference of 2 K occurs.

2.6 Cabinet design and connecting system

1-inch internal threads are to be used for connecting the water supply. The connecting nipples are to be made of stainless steel or thick aluminium. Ideally, flat seals are to be used for sealing.

The "Goldschlange“ hose from the PAGUAG company is recommended as the connecting hose. An NW25 sleeve-type threaded joint should be used for the Goldschlange hose with an internal part in V2A and a double nipple in V2A.

Cooling-water intake and return lines are to be connected according to the lettering on the bottom of the units (see also outline drawing!).

2.7 Dimension drawing

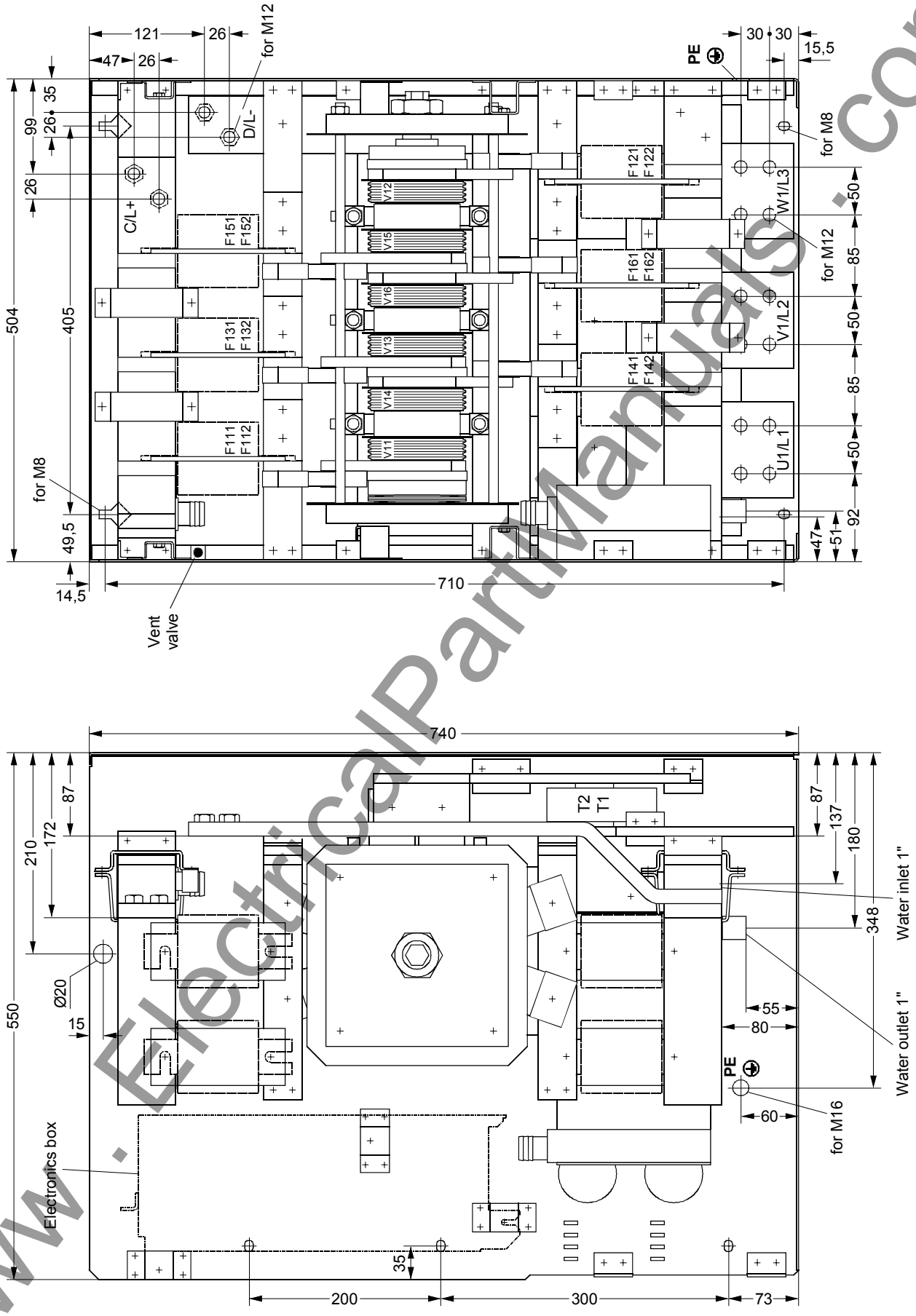


Figure 2.1 Dimension drawing, common rectifier

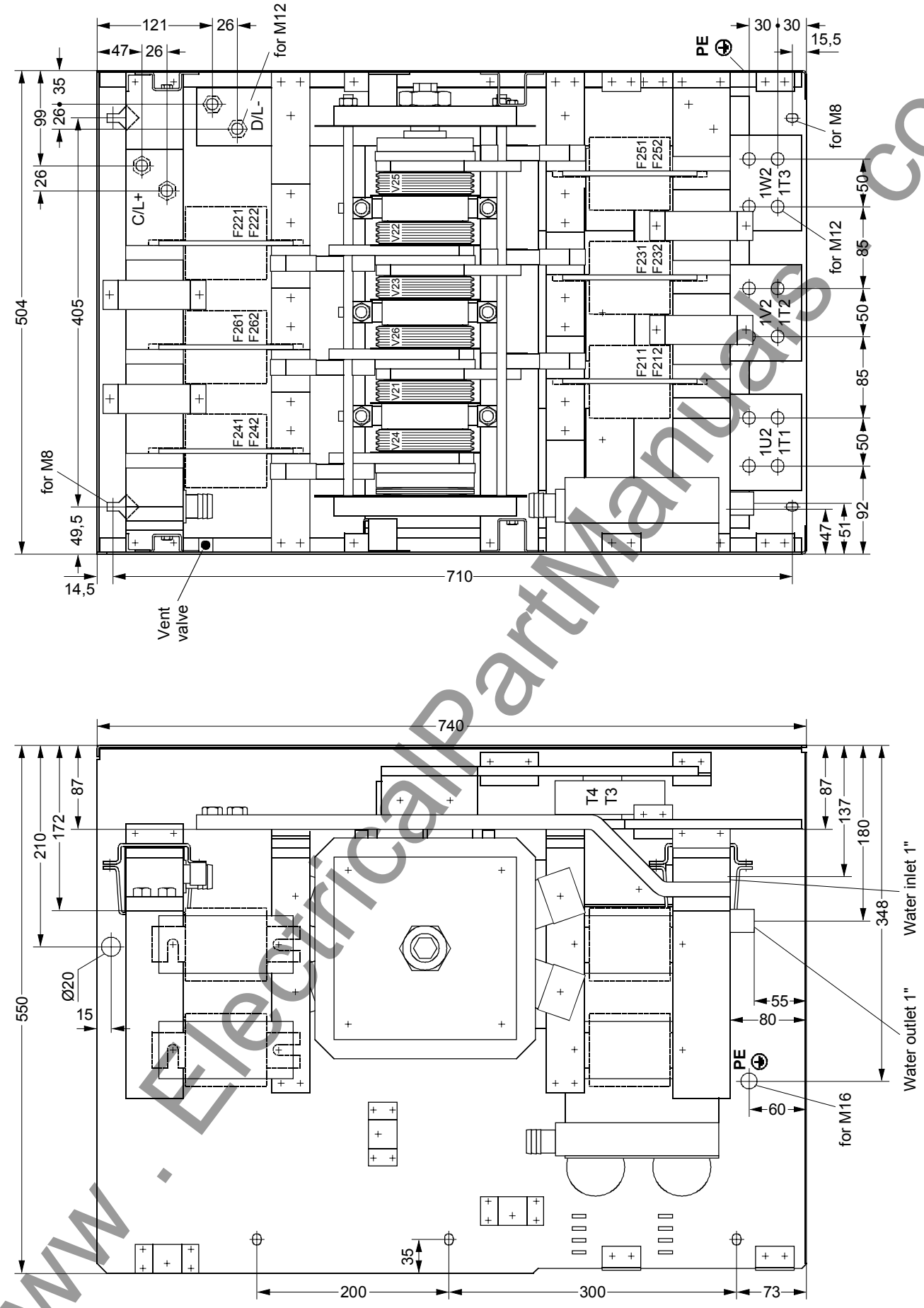


Figure 2.2 Dimension drawing, regenerating unit

3 Connection

WARNING

The warning notes for "air-cooled units" apply.

Installation and maintenance work relating to the water-equipment is only to be done when the installation is off load.

NOTE

In the case of a parallel connection, see also Section 3.7 of "air-cooled units".

CAUTION! Because the unit has been designed as a system component, the power connections have not been designed as direct connections.

The AC connections from the supply and the DC connections to the DC link must be made via suitably dimensioned copper rails (no cable, no aluminium).

The components have 3 temperature measuring points on each copper rail of the anode which is not water cooled. The highest temperature is evaluated. This temperature measurement serves as an indicator of overloading or pump failure. The thyristors of the components, however, **cannot** be 100 % protected in this way! The degree of success depends on the operating status of the converter and the flow rate of the coolant.

The rectifier units are delivered with semiconductor fuse for product status A2 and onwards. Option L32 means that they are delivered without semiconductor fuses.

The rectifier/regenerating units are generally operated **with** fuses.

The electronic p.c.b's must be supplied with power from an external 24 power supply system (1 A for basic unit, 0.3 A for every other unit connected in parallel).

A rectifier/regenerating unit consists of two converters in separate housings.

The coolant circuits of the two converters are to be connected in parallel. From product status A2 onwards (cooling boxes with a pressure drop of 0.65 bar), the two converters can be connected in series as well because they only have power losses alternately.

The electronics board is located in the rectifier unit. The firing cables, temperature sensors and fuse monitor are to be connected using the cables supplied in accordance with the general and power-circuit diagrams in Section 3.3. The regenerating unit is to be mounted to the right of the rectifier unit.

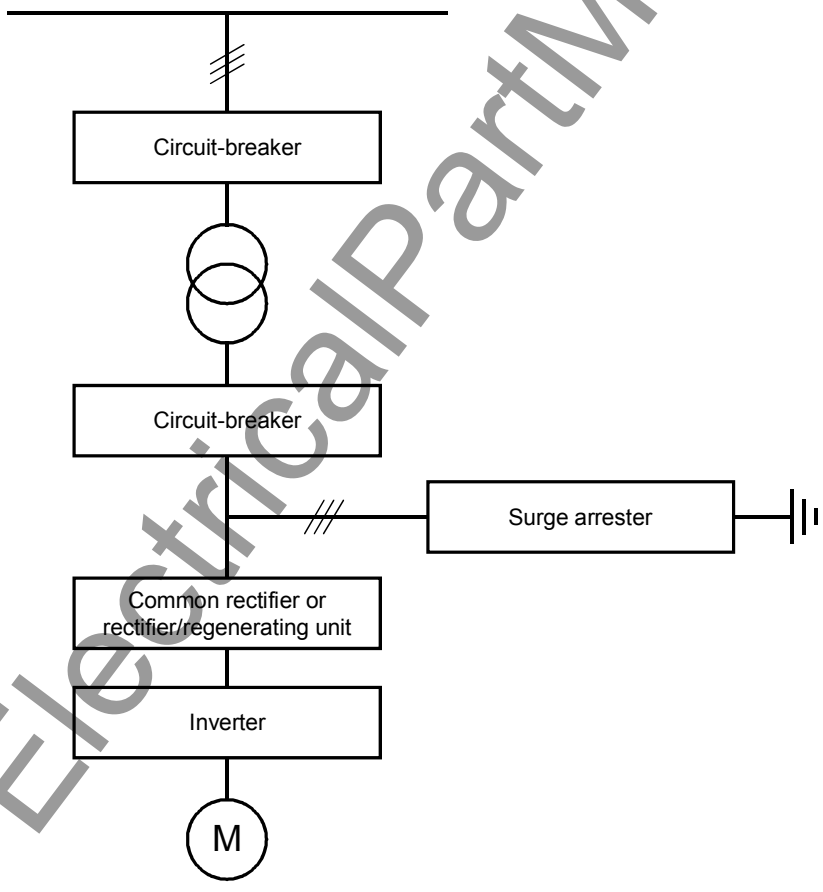
3.1 Protective surge arresters

WARNING

We recommend the provision of protective surge arresters (supplied by DEHN, type VAV 1000) on the system side. One surge arrester per phase is connected to ground at the input of the common rectifier or rectifier/regenerating unit (use short-circuit-proof lead, fuse protection < 100 A – read data sheet supplied by surge arrester manufacturer!). These are particularly effective in isolated-neutral systems in preventing sparkovers and damage caused by voltage surges in the system. Experience shows that these surge voltages can be several kilovolts in magnitude. They can generate high-intensity secondary arcs when sparkovers occur, causing damage, possibly irreparable, to the device or installation concerned. The arc heat may also damage plastic components resulting in leakage of cooling water.

These surge voltages occur, for example, in the case of phase-to-ground faults or potential differences in the system, or as a result of system impedances in connection with the high switching gradients of e.g. IGBT semiconductor switches. Apart from sparkovers, these surges may also cause damage to parts insulated to ground (e.g. decomposition or electrical corrosion).

The surge arresters recommended above feature a defect display. It is advisable to perform a visual check on the devices at regular intervals.



Surge arresters can be ordered from:

Order-No.: 901000 / Type VAV1000

DEHN+SÖHNE
Hans-Dehn-Straße 1
D-92318 Neumarkt/Opf.

eMail: info@dehn.de

3.2 Power connections

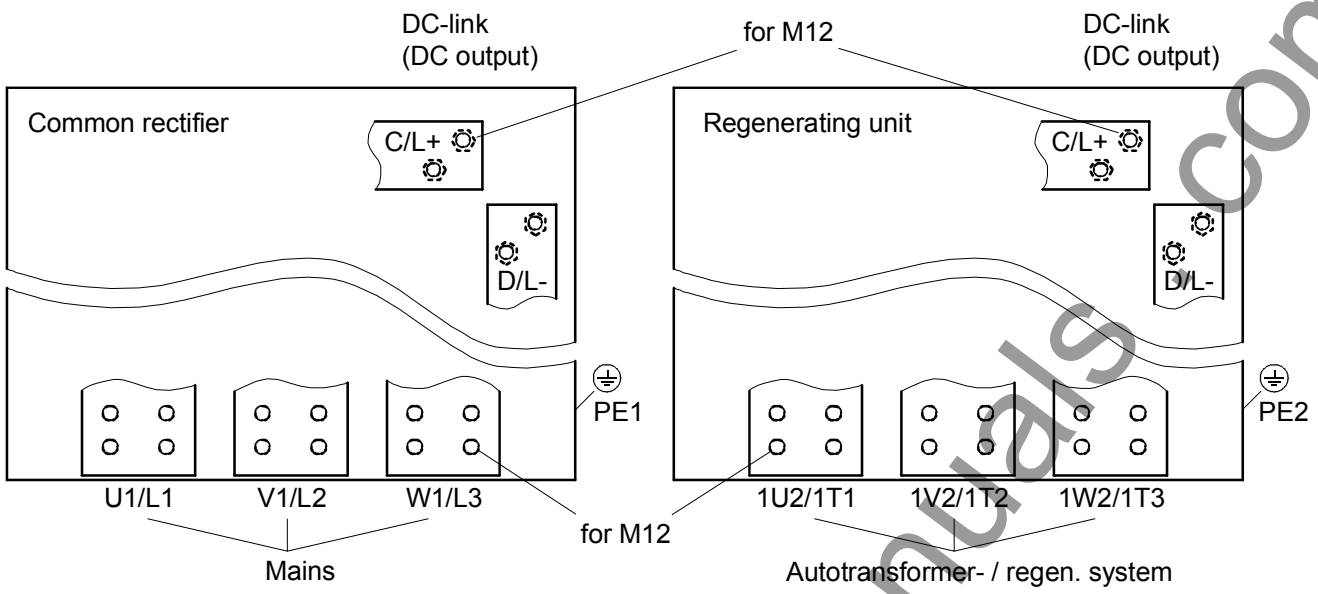


Figure 3.1 Mains connection

The protective conductor is connected either via the sheet-steel housing in the case of cabinet installation or at the protective-conductor terminal on the right-hand side of the housing.

3.3 Fuses

3.3.1 Fuses for rectifier / regenerating unit

Unit Order No.	Built-in branch fuses F111 to F162 or F211 to F262	
Basic unit	A	Type
6SE7041-5EH85-1BA0	1000	R3047621 J M
6SE7041-3FH85-1BA0	1000	R3047621 J M
6SE7041-3HH85-1BA0	1000	R3047621 J M
6SE7042-1EH85-1BA0	800	3NE3388-8
6SE7042-0FH85-1BA0	800	3NE3388-8
6SE7042-0HH85-1BA0	800	3NE3388-8
6SE7042-8EH85-1BA0	1000	R3047621 J M
6SE7042-8FH85-1BA0	1000	R3047621 J M
6SE7042-7HH85-1BA0	1000	R3047621 J M

Unit Order No.	Built-in branch fuses F111 to F162 or F211 to F262	
Parallel unit	**A**	**Type**
6SE7041-5EH85-1BD0	1000	R3047621 J M
6SE7041-3FH85-1BD0	1000	R3047621 J M
6SE7041-3HH85-1BD0	1000	R3047621 J M
6SE7042-1EH85-1BD0	800	3NE3388-8
6SE7042-0FH85-1BD0	800	3NE3388-8
6SE7042-0HH85-1BD0	800	3NE3388-8
6SE7042-8EH85-1BD0	1000	R3047621 J M
6SE7042-8FH85-1BD0	1000	R3047621 J M
6SE7042-7HH85-1BD0	1000	R3047621 J M

Table 3.1 Built-in brunch fuses for rectifier / regenerating units

3.3.2 Fuses for common rectifier (replaced by lug with option L32)

Unit Order No.	Built-in branch fuses F111 to F162	
Basic unit	**A**	**Type**
6SE7041-5EH85-0BA0	1000	R3047621 J M
6SE7041-3FH85-0BA0	1000	R3047621 J M
6SE7041-3HH85-0BA0	1000	R3047621 J M
6SE7042-1EH85-0BA0	800	3NE3388-8
6SE7042-0FH85-0BA0	800	3NE3388-8
6SE7042-0HH85-0BA0	800	3NE3388-8
6SE7042-8EH85-0BA0	1000	R3047621 J M
6SE7042-8FH85-0BA0	1000	R3047621 J M
6SE7042-8HH85-0BA0	1000	R3047621 J M
Parallel unit		
6SE7041-5EH85-0BD0	1000	R3047621 J M
6SE7041-3FH85-0BD0	1000	R3047621 J M
6SE7041-3HH85-0BD0	1000	R3047621 J M
6SE7042-1EH85-0BD0	800	3NE3388-8
6SE7042-0FH85-0BD0	800	3NE3388-8
6SE7042-0HH85-0BD0	800	3NE3388-8
6SE7042-8EH85-0BD0	1000	R3047621 J M
6SE7042-8FH85-0BD0	1000	R3047621 J M
6SE7042-8HH85-0BD0	1000	R3047621 J M

Table 3.2 Built-in brunch fuses for common rectifier

3.4 Single-line diagrams with suggested circuit arrangements

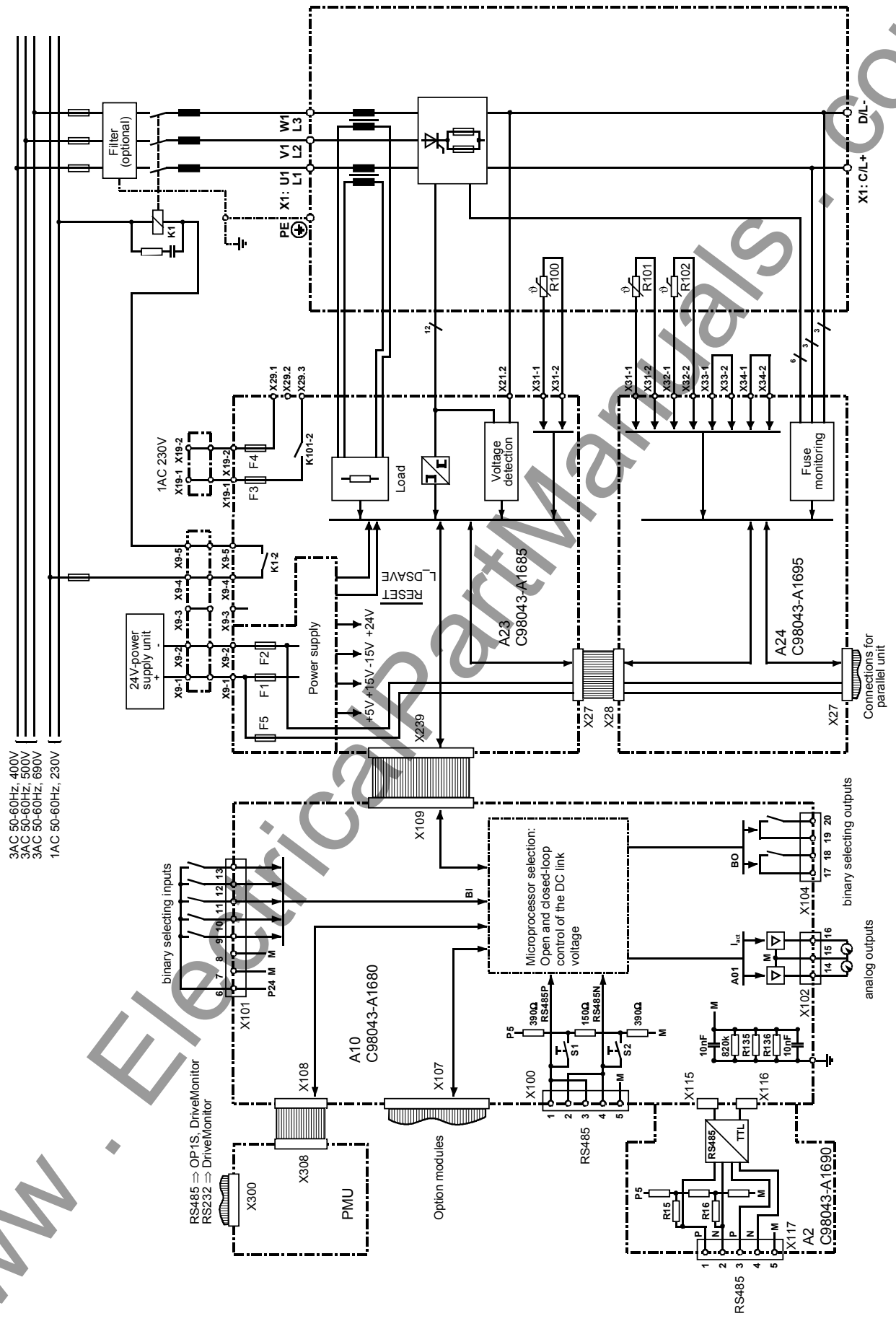


Figure 3.2 Single-line diagram with suggested circuit arrangement, common rectifier

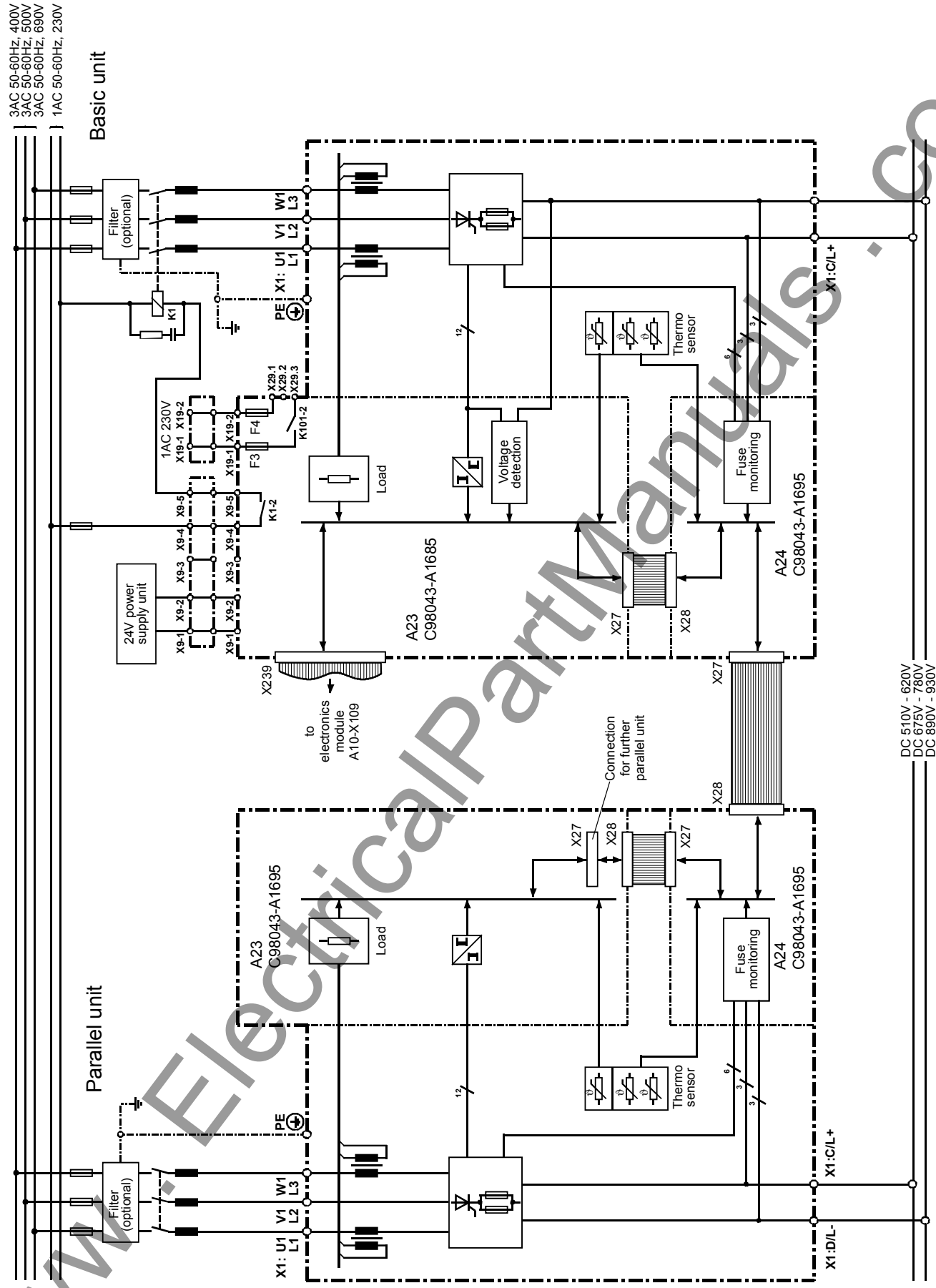


Figure 3.3 Single-line diagram with suggested circuit arrangement for parallel connection, common rectifier

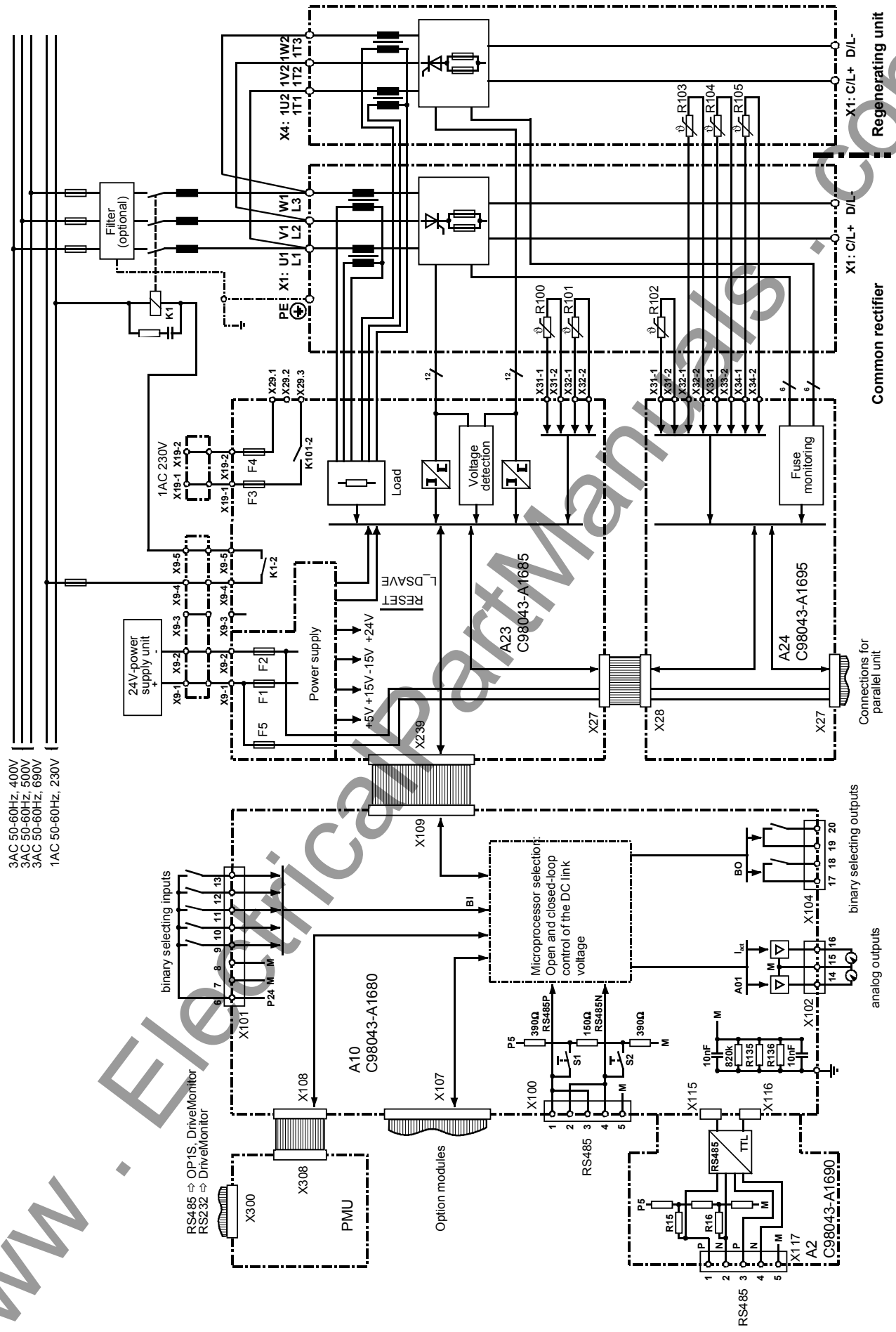


Figure 3.4 Single-line diagram with suggested circuit arrangement without autotransformer, rectifier/regenerating unit

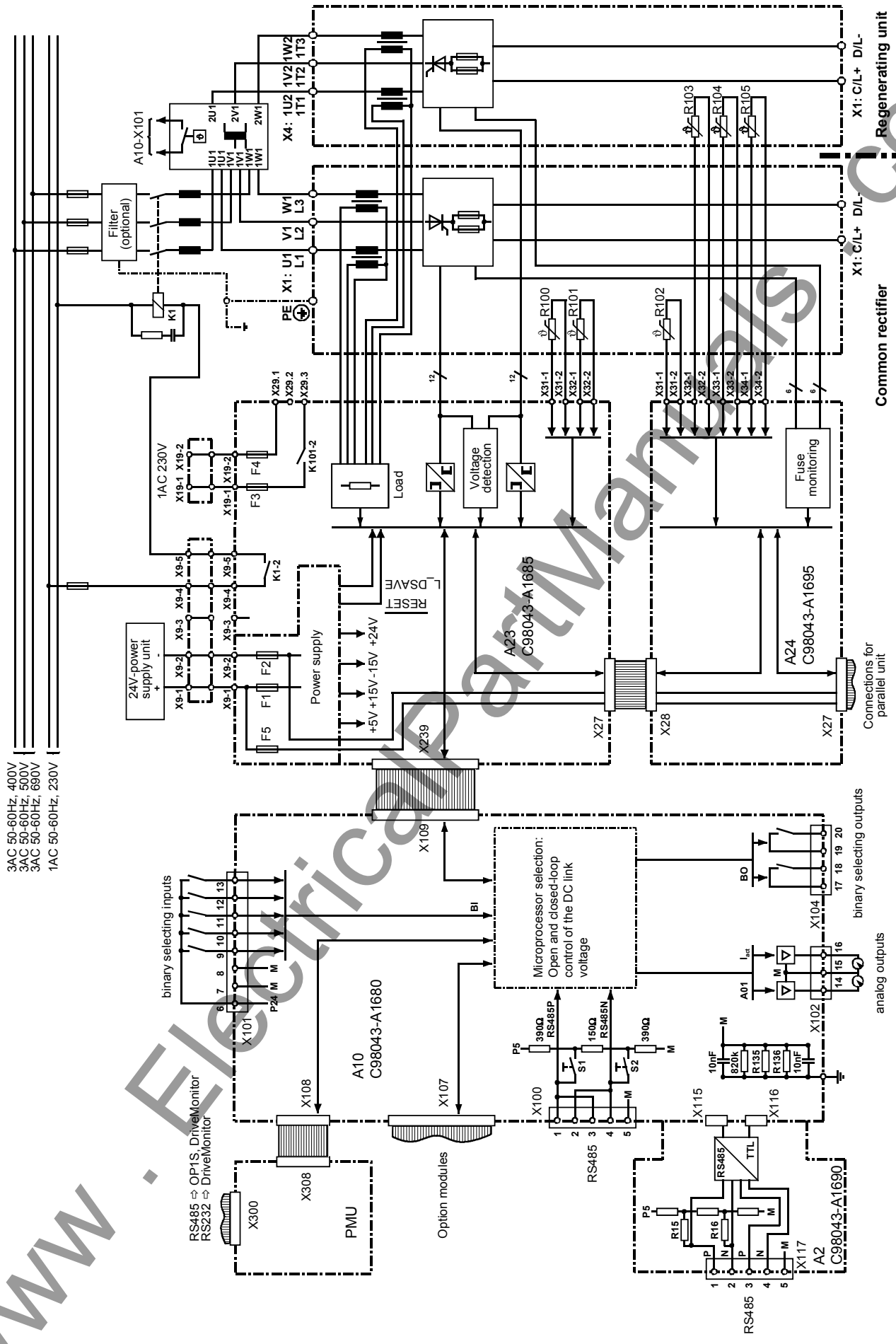


Figure 3.5 Single-line diagram with suggested circuit arrangement with autotransformer, rectifier/regenerating unit

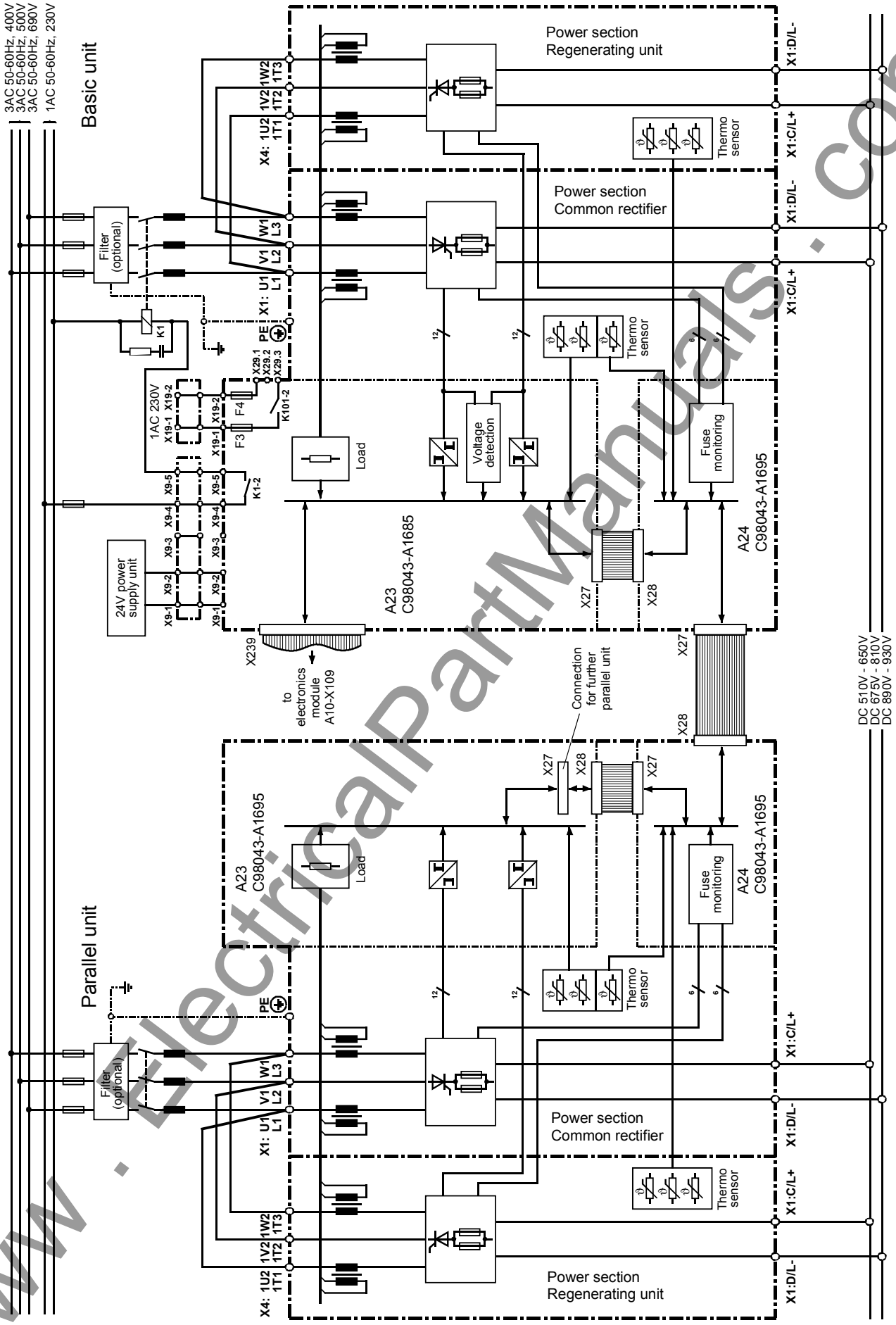


Figure 3.6 Single-line diagram with suggested circuit arrangement for parallel connection without autotransformer, rectifier/regenerting unit

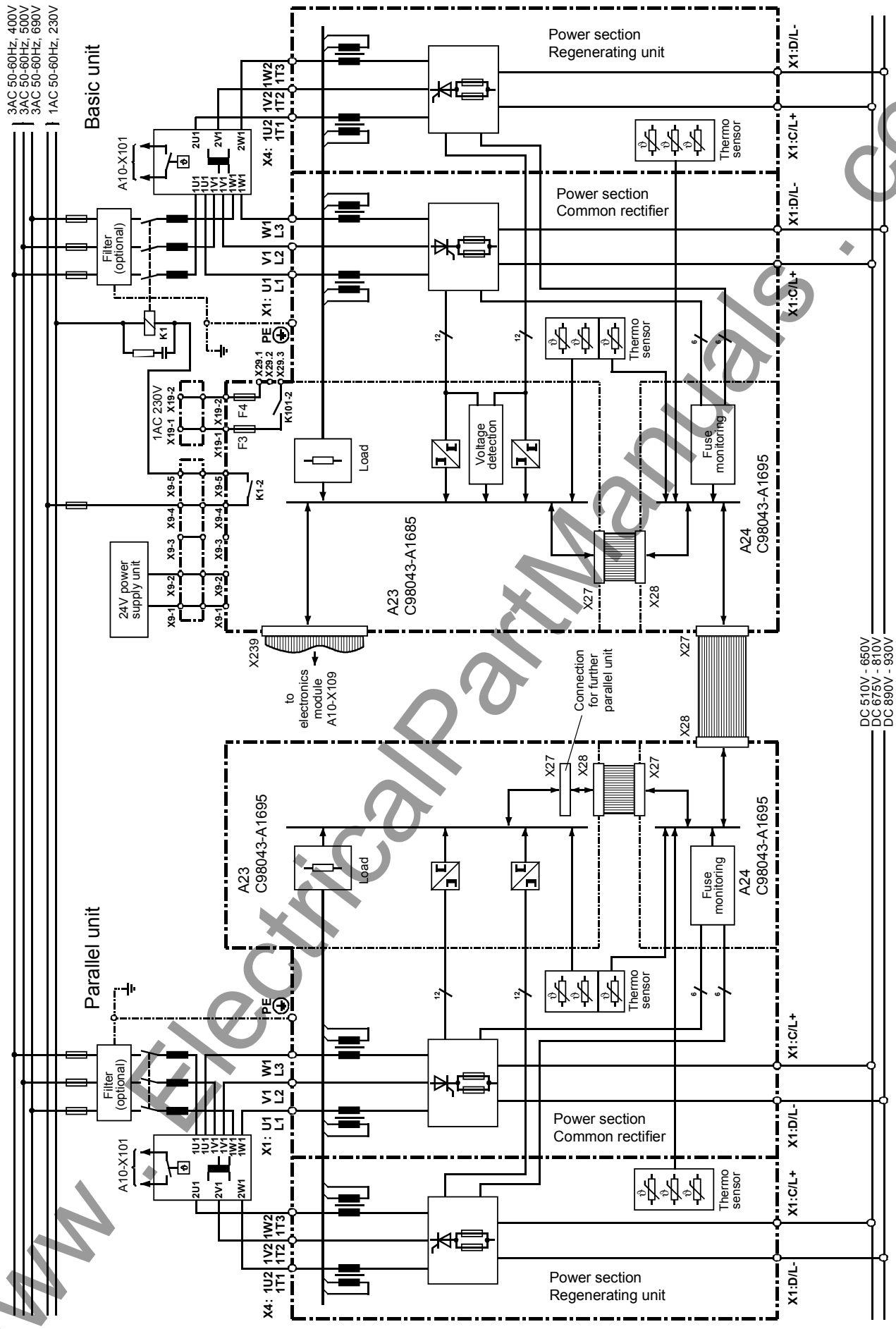


Figure 3.7 Single-line diagram with suggested circuit arrangement for parallel connection with autotransformer, rectifier/regenerating unit

3.5 Power sections

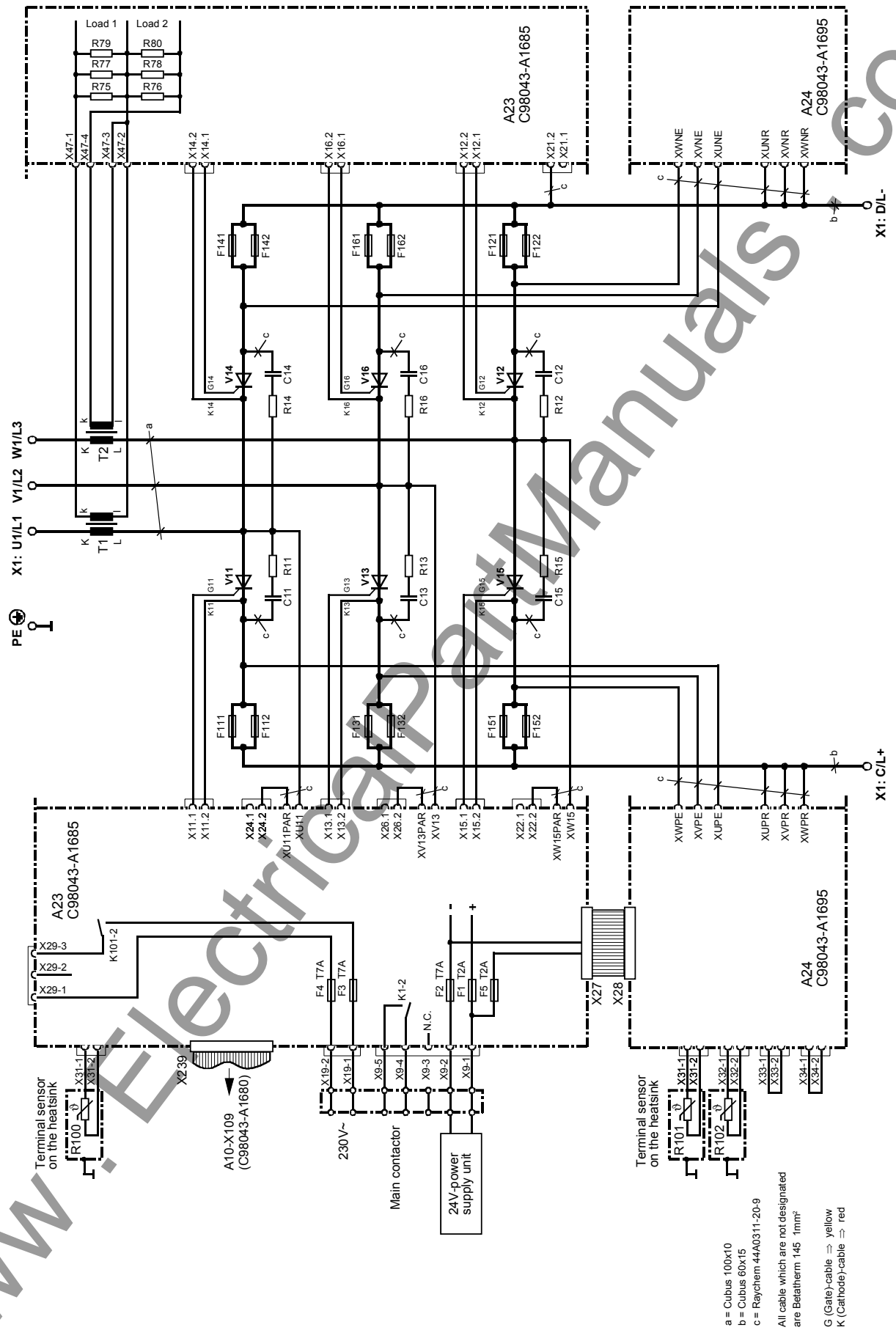


Figure 3.8 Power section, common rectifier

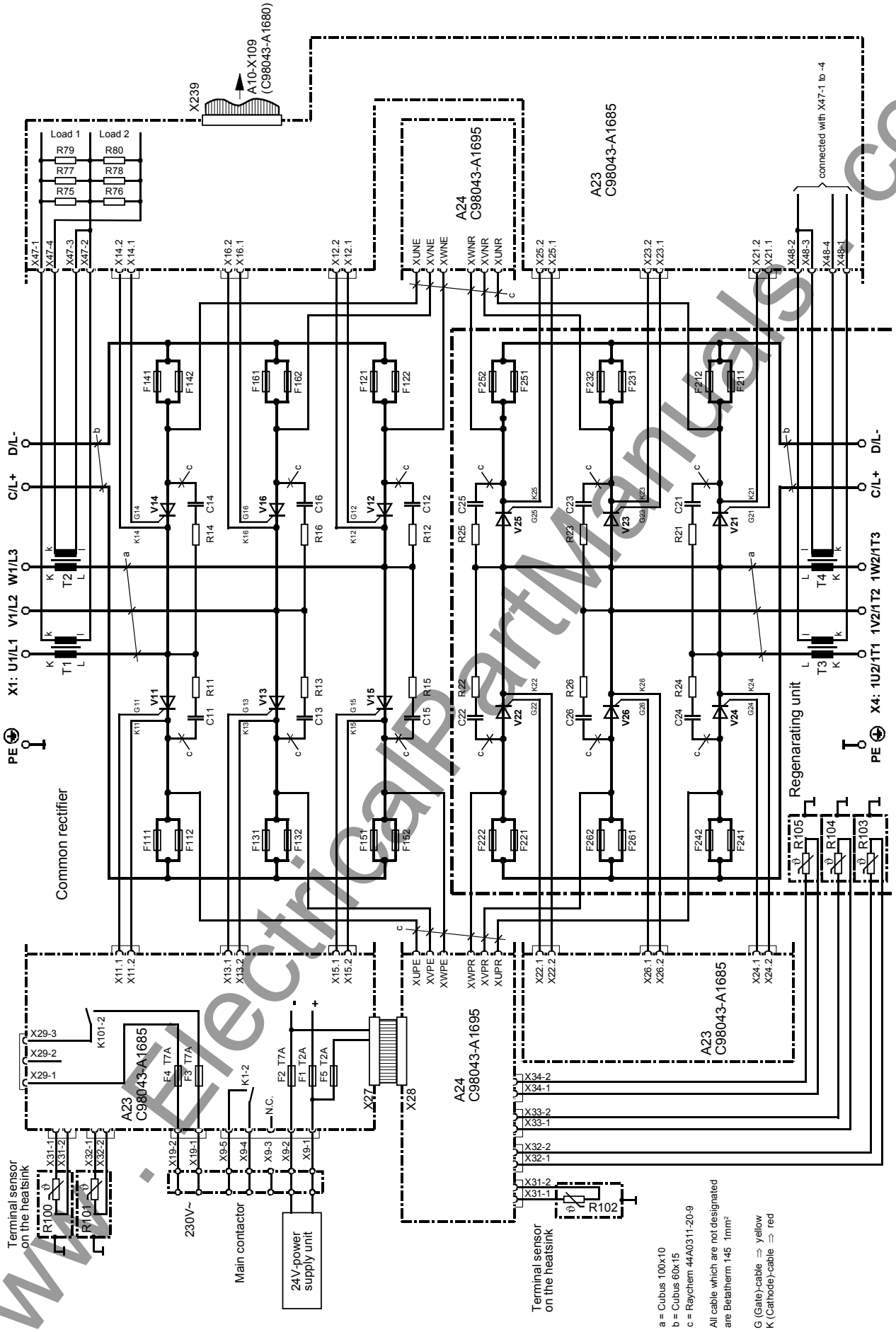
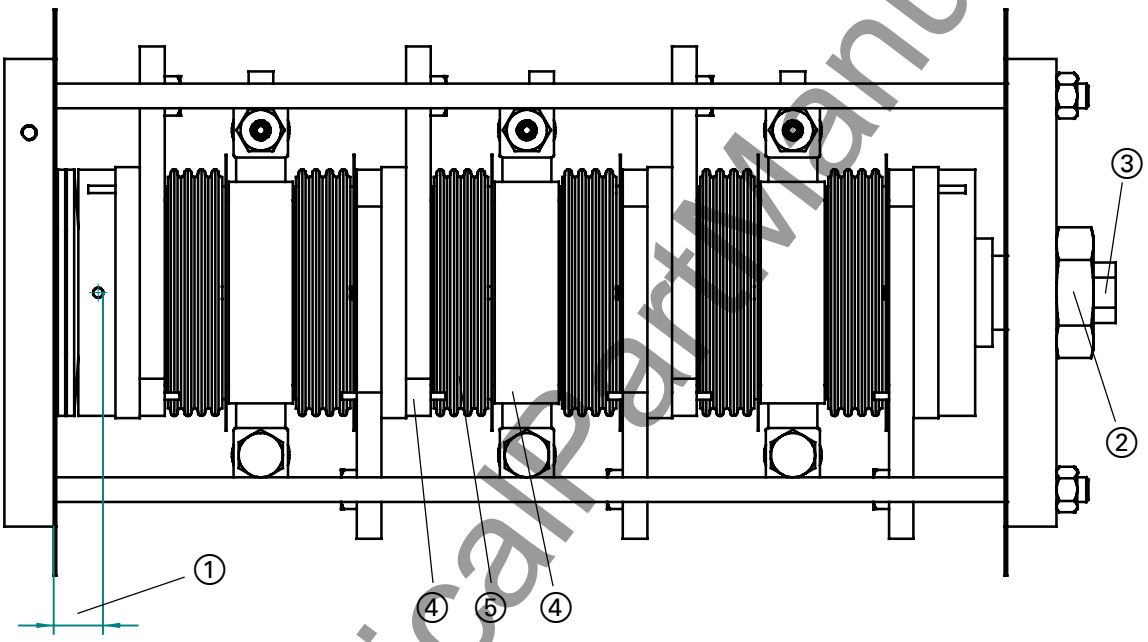


Figure 3.9 Power section, rectifier/regenerating unit

8 Maintenance

	WARNING
	The warning notes for "air-cooled units" apply. Installation and maintenance work relating to the water-equipment is only to be done when the installation is off load.

8.1 Thyristor replacement



1.) Remove reference spacer ① (accuracy: ± 0.1 mm)
2.) Loosen lock nut (SW 46) ② .
3.) Unscrew adjusting screw (SW 22) ③ max. four turns.
4.) Carefully press apart the contact rails ④ of the corresponding thyristor.
5.) Remove thyristor disc ⑤.
6.) Using a spatula, apply a thin layer of contact grease (Elektrolube 2A-X) to the new thyristor disc.
7.) Insert new thyristor disc. Make sure it is positioned correctly (polarity and terminals)! Connect firing cables.
8.) Screw in adjusting screw (M30x1.5) ③ until the reference gauge ① has been reached.
9.) Firmly tighten ② lock nut.

The position of the thyristor and its diameter may not be the same as in the diagram!

After a thyristor defect, check the fuse indicators at the least.

For further information and warnings, see the operating instructions for air-cooled rectifier or rectifier/regenerating units.

8.2 Dimensioning of the burden resistors

Average DC current		A	1300	1500	1950	2100	2660	2850
Burden voltage for 100%		V	1					
Burden resistors *)	R75, R76	Ω	39	33	27	27	18	18
	R77, R78	Ω	39	33	27	33	22	18
	R79, R80	Ω	390	680	150	51	110	150

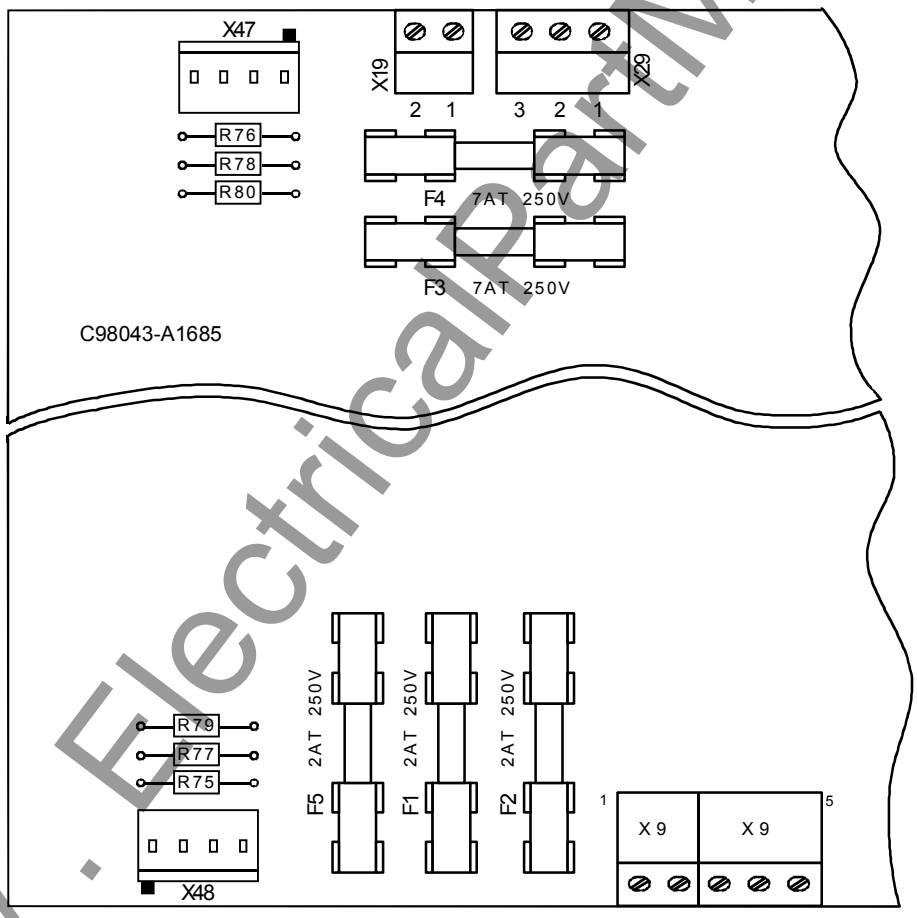
*) on module C98043-A1685 or C98043- A1695 in the case of parallel units

Notes

The maximum power loss is 37 mW at 18 W. The resistors have an output of 300 mW.

Replacement boards are supplied **without** burden resistors, i.e. the original burden resistors must be unsoldered for boards which replace defective boards.

Location of the burden resistors and fuses



8.3 Changing fuses

The fuses have been mounted in the factory with the indicator pointing to the outside of the unit. This must be borne in mind when a fuse is being changed.

10 Spare parts

For water-cooled rectifier units and rectifier/regenerating units, type H.

Equipment identifier	Designation	Order number	Used in
A10	PCB electronics(CUR)	6SE7090-0XX85-1DA0	all unit types - . BA0
D14	Software (EPROM)	6SW1701-0DA14	all unit types - . BA0
A23	FBG- Power Interface	6SE7041-8EK85-0HA0	6SE7041-5EH85-0BA0 6SE7042-1EH85-0BA0 6SE7042-8EH85-0BA0
A23	FBG- Power Interface	6SE7041-8GK85-0HA0	6SE7041-3FH85-0BA0 6SE7042-0FH85-0BA0 6SE7042-8FH85-0BA0 6SE7041-3HH85-0BA0 6SE7042-0HH85-0BA0 6SE7042-8HH85-0BA0
A23	FBG- Power Interface	6SE7041-8EK85-1HA0	6SE7041-5EH85-1BA0 6SE7042-1EH85-1BA0 6SE7042-8EH85-1BA0
A23	FBG- Power Interface	6SE7041-8HK85-1HA0	6SE7041-3FH85-1BA0 6SE7042-0FH85-1BA0 6SE7042-8FH85-1BA0 6SE7041-3HH85-1BA0 6SE7042-0HH85-1BA0 6SE7042-7HH85-1BA0
A23	FBG- Power Interface	6SE7041-8EK85-0LA0	6SE7041-5EH85-0BD0 6SE7042-1EH85-0BD0 6SE7042-8EH85-0BD0
A23	FBG- Power Interface	6SE7041-8GK85-0LA0	6SE7041-3FH85-0BD0 6SE7042-0FH85-0BD0 6SE7042-8FH85-0BD0 6SE7041-3HH85-0BD0 6SE7042-0HH85-0BD0 6SE7042-8HH85-0BD0
A23	FBG- Power Interface	6SE7041-8EK85-1MA0	6SE7041-5EH85-1BD0 6SE7042-1EH85-1BD0 6SE7042-8EH85-1BD0

Equipment identifier	Designation	Order number	Used in
A23	FBG- Power Interface	6SE7041-8HK85-1MA0	6SE7041-3FH85-1BD0
A24	FBG- Power Interface	6SE7042-8EK85-0LA0	all unit types - . EH85-
A24	FBG- Power Interface	6SE7042-8GK85-0LA0	all unit types - . FH85- and all unit types - . HH85-
V11 to V16	Disc-type thyristor	6SY7010-0AA63	6SE7041-5EH85-0B . 0 6SE7041-5EH85-1B . 0 6SE7041-3FH85-0B . 0 6SE7041-3FH85-1B . 0
V11 to V16	Disc-type thyristor	6SY7010-0AA47	6SE7041-3HH85-0B . 0 6SE7041-3HH85-1B . 0
V11 to V16	Disc-type thyristor	6SY7010-0AA53	6SE7042-1EH85-0B . 0 6SE7042-1EH85-1B . 0
V11 to V16	Disc-type thyristor	6SY7010-0AA55	6SE7042-0FH85-0B . 0 6SE7042-0FH85-1B . 0
V11 to V16	Disc-type thyristor	6SY7010-0AA57	6SE7042-0HH85-0B . 0 6SE7042-0HH85-1B . 0
V11 to V16	Disc-type thyristor	6SY7010-0AA58	6SE7042-8EH85-0B . 0 6SE7042-8EH85-1B . 0
V11 to V16	Disc-type thyristor	6SY7010-0AA60	6SE7042-8FH85-0B . 0 6SE7042-8FH85-1B . 0
V11 to V16	Disc-type thyristor	6SY7010-0AA61	6SE7042-8HH85-0B . 0 6SE7042-7HH85-1B . 0
V21 to V26	Disc-type thyristor	6SY7010-0AA41	6SE7041-5EH85-1B . 0
V21 to V26	Disc-type thyristor	6SY7010-0AA47	6SE7041-3FH85-1B . 0
V21 to V26	Disc-type thyristor	6SY7010-0AA50	6SE7041-3HH85-1B . 0
V21 to V26	Disc-type thyristor	6SY7010-0AA55	6SE7042-1EH85-1B . 0
V21 to V26	Disc-type thyristor	6SY7010-0AA57	6SE7042-0FH85-1B . 0
V21 to V26	Disc-type thyristor	6SY7010-0AA52	6SE7042-0HH85-1B . 0
V21 to V26	Disc-type thyristor	6SY7010-0AA60	6SE7042-8EH85-1B . 0
V21 to V26	Disc-type thyristor	6SY7010-0AA61	6SE7042-8FH85-1B . 0
V21 to V26	Disc-type thyristor	6SY7010-0AA62	6SE7042-7HH85-1B . 0
F1, F5	Fuse link	6SY7010-2AA01	all unit types
F2 to F4	Fuse link	6SY7010-2AA23	all unit types
F111 to F262	Fuse link	6SY7010-2AA24	all unit types - . EH85- and all unit types - . HH85-
F111 to F262	Fuse link	3NE3338-8	all unit types - . FH85-

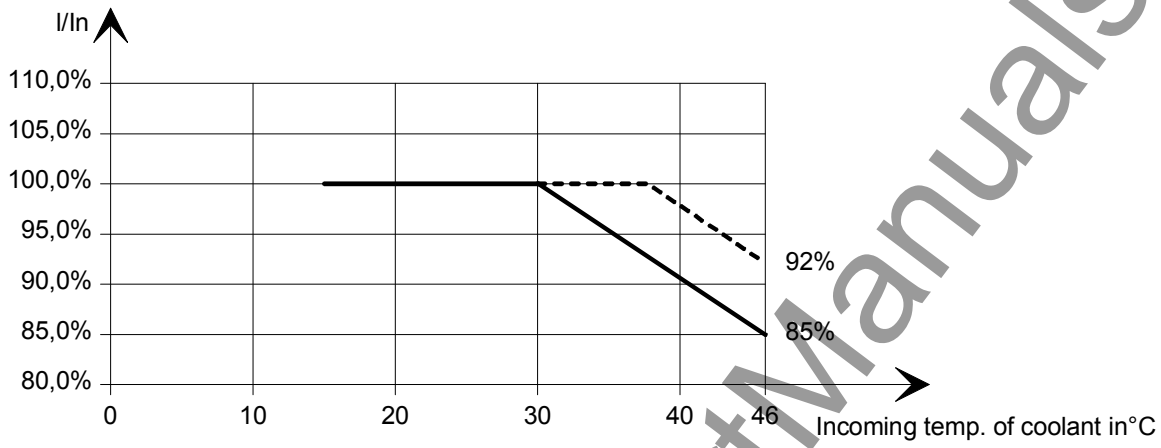
Equipment identifier	Designation	Order number	Used in
R100 to R102	Temperature sensor	6SY7010-6AA04	all unit types
R103 to R105	Temperature sensor	6SY7010-6AA04	all unit types -1BA0 + -1BD0
T1 und T2	Current transformer	6RY1702-0AA05	all unit types
T3 und T4	Current transformer	6RY1702-0AA05	all unit types -1BA0 + -1BD0
	Plug contacts for temperature sensor and current transformer	6SY7010-7AA15	all unit types -0BA0 + -0BD0

14 Technical Data

In the event of conditions of use other than those listed in this chapter, please contact your local Siemens branch or national subsidiary.

Cooling water: See section, ”Coolant” !

Current reduction: When 60 % water and 40 % glycol is used ——
When 100 % water is used - - - -



WARNING

WARNING! Operating a unit at temperatures below +5 °C is not permitted even if anti-freeze is used!

If less than 20 % Antifrogen N is added, there is an increased danger of corrosion which can result in a reduction of the units useful life.

If more than 40% is added, the transfer of heat and therefore the functioning of the unit is affected.

It must always be ensured that the required pump output is adjusted when Antifrogen N is added.

The necessary flow rate of the coolant must always be achieved.

Storage temperature		– 25 °C to +70 °C
Transport temperature		– 25 °C to +70 °C
Coolant intake temperature		+ 5 °C to + 38 °C (max + 46°C with current reduction)
Operating pressure		< 2,5 bar
Environmental class	3K3	DIN IEC 721-3-3 / 04.90
Soiling	2	DIN VDE 0110 Part 1 / 01.89 moisture not permitted
Overvoltage category (power section)	III	DIN VDE 0110 Part 2 / 01.89
Overvoltage resistance class (with converter connected)	1	DIN VDE 0160 / 04.91
Type of protection	IP00	DIN VDE 0470 Part 1 / 11.92 ≙ EN 60529
Interference immunity		IEC 801-2, IEC 801-4
Mechanical strength		DIN IEC 68-2-6 / 06.90

	Frequency range Hz	Constant amplitude of deflection mm	 acceleration m/s^2 (g)
– stationary use	10 to 58	0,075	
	more than 58 to 500		9,8 (1)
– during transport		3,5	
			9,8 (1)

The units can also be operated in load class II. The permissible values must be taken from the following tables.

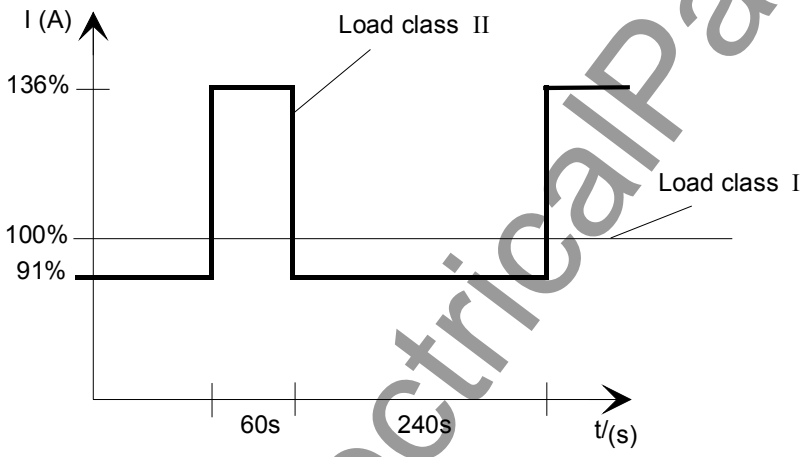


Figure 14.1 Power output according to load class II

Common 6SE70..-.....-0BA0 Rectifier		41-5EH85	42-1EH85	42-8EH85	41-3FH85	42-0FH85	42-8FH85
Rated voltage, rated frequency, rated current							
Rated voltage Inout U_n Output U_{dn}	V	3 AC 380 to 480V +10% –15% 1) DC 510 to 650V +10% –15%			3 AC 500 to 600V +10% –15% DC 675 to 810V +10% –15		
Rated frequency f_n Input Output	Hz	46 to 64 (automatic frequency matching) D.C.					
Rated current I_n Input (rms value) AC Output (average) DC	A	 1300 1500	 1820 2100	 2470 2850	 1125 1300	 1690 1950	 2470 2850
Load class II to EN 60146-1-1							
Rated output current average	A	1380	1930	2620	1195	1795	2620
Base load duration	s	240					
Excess output current average	A	2040	2860	3875	1770	2650	3875
Excess current duration	s	60					
Losses, cooling, power factor							
Power factor Mains $\cos\varphi_{1N}$		1					
Power dissipation - Maximum	kW	4.76	6.12	9.14	4.06	5.70	9.23
Cooling air requirement	l/min	27					
coolant pressure drop Δp	bar	0.75 1)					
Dimensions, weight							
Width Height Depth	mm mm mm	504 740 550					
Weight app.	kg	142					

Parallel units“ (-1BD0 bzw. -0BD0) for connecting in parallel have the same technical data as the corresponding "basic units"(-1BA0 bzw. -0BA0). Please note the unit correspondence and notes of Section 3.7 (of the operating instructions for air-cooled rectifier units or rectifier/regenerating units)!

The permissible output current in parallel mode is reduced (due to current division between the power sections) by 10 % as compared to the sum of the rated currents of the separate power sections.

1) For units from product status A2 and onwards (labelling on the unit at the coolant connection).

Common Rectifier 6SE70..-.....-0BA0		**41-3HH85**	**42-0HH85**	**42-8HH85**
Rated voltage, rated frequency, rated current				
Rated voltage Inout U_n Output U_{dn}	V	3 AC 660 to 690V ±15% DC 890 to 930V ±15%		
Rated frequency f_n Input Output	Hz	46 to 64 (automatic frequency matching) D.C.		
Rated current I_n Input (rms value) AC Output (average) DC	A	 1125 1300	 1690 1950	 2470 2850
Load class II to EN 60146-1-1				
Rated output current average	A	1195	1795	2620
Base load duration	s	240		
Excess output current average	A	1770	2650	3875
Excess current duration	s	60		
Losses, cooling, power factor				
Power factor Mains $\cos\varphi_{1N}$		1		
Power dissipation - Maximum	kW	4.60	6.08	9.40
Cooling air requirement	l/min	27		
coolant pressure drop Δp	bar	0.75 [1)]		
Dimensions, weight				
Width Height Depth	mm mm mm	504 740 550		
Weight app.	kg	142		

Parallel units“ (-1BD0 bzw. -0BD0) for connecting in parallel have the same technical data as the corresponding "basic units"(-1BA0 bzw. -0BA0). Please note the unit correspondence and notes of Section 3.7 (of the operating instructions for air-cooled rectifier units or rectifier/regenerating units)!

The permissible output current in parallel mode is reduced (due to current division between the power sections) by 10 % as compared to the sum of the rated currents of the separate power sections.

1) For units from product status A2 and onwards (labelling on the unit at the coolant connection).

R/R unit 6SE70..-.....-1BA0		41-5EH85	42-1EH85	42-8EH85	41-3FH85	42-0FH85	42-8FH85
Rated voltage, rated frequency, rated current							
Rated voltage Rectifier connection	V	3 AC 380 to 480V +10% –15% [1]			3 AC 500 to 600V +10% –15%		
Regenerating connection		using an (auto) transformer 1.2 times the voltage of the rectifier connection					
DC link voltage		DC 510 to 650V +10% –15%			DC 675 to 810V +10% –15%		
Rated frequency f_n Input Output	Hz	46 to 64 (automatic frequency matching) D.C.					
Rated current (rms value) With autotransformer	A						
Regenerating, line side		1400	1960	2665	1215	1825	2665
Regenerating, unit side		1170	1640	2220	1015	1520	2220
Rectifier operation		1300	1820	2470	1125	1690	2470
Without autotransformer							
Regenerating, unit side		1170	1640	2220	1015	1520	2220
Rectifier operation		1300	1820	2470	1125	1690	2470
Load class I to EN 60146-1-1 of the DC link current (average value) in rectifier operation; currents reduced to 92% in regenerating operation							
Rated current (average) DC link connection Rectifier operation	A	1500	2100	2850	1300	1950	2850
Load class II to EN 60146-1-1 of the DC link current (average value) in rectifier operation; currents reduced to 92% in regenerating operation							
Rated current	A	1380	1930	2620	1195	1795	2620
Base load duration	s	240					
Excess current	A	2040	2860	3875	1770	2650	3875
Excess current duration	s	60					
Losses, cooling							
Power dissipation - Maximum	kW	4.76	6.12	9.14	4.06	5.70	9.23
Cooling air requirement	l/min	54 [2]					
coolant pressure drop Δp	bar	0.75 [1]					
Dimensions, weight							
Width	mm	504					
Height	mm	740 [3]					
Height	mm	550					
Weight app.	kg	142 [3]					

„Parallel units“ (-1BD0 bzw. -0BD0) for connecting in parallel have the same technical data as the corresponding "basic units"(-1BA0 bzw. -0BA0). Please note the unit correspondence and notes of Section 3.7 (of the operating instructions for air-cooled rectifier units or rectifier/regenerating units)!

The permissible output current in parallel mode is reduced (due to current division between the power sections) by 10 % as compared to the sum of the rated currents of the separate power sections.

1) For units from product status A2 and onwards (labelling on the unit at the coolant connection).
2) If the cooling circuits of the two converters are connected in parallel.
3) A rectifier/regenerating unit consists of two converters in separate housings.

R/R unit 6SE70..-.....-1BA0		41-3HH85	42-0HH85	42-7HH85
Rated voltage, rated frequency, rated current				
Rated voltage Rectifier connection Regenerating connection DC link voltage	V	3 AC 660 to 690V ±15% using an (auto) transformer 1.2 times the voltage of the rectifier connection DC 890 to 930V ±15%		
Rated frequency f_n Input Output	Hz	46 to 64 (automatic frequency matching) D.C.		
Rated current (rms value) With autotransformer Regenerating, line side Regenerating, unit side Rectifier operation Without autotransformer Regenerating, unit side Rectifier operation	A	 1215 1015 1125 1015 1125	 1825 1520 1690 1520 1690	 2485 2075 2310 2075 2310
Load class I to EN 60146-1-1 of the DC link current (average value) in rectifier operation; currents reduced to 92% in regenerating operation				
Rated current (average) DC link connection Rectifier operation	A	1300	1950	2660
Load class II to EN 60146-1-1 of the DC link current (average value) in rectifier operation; currents reduced to 92% in regenerating operation				
Rated current	A	1195	1795	2450
Base load duration	s	240		
Excess current	A	1770	2650	3620
Excess current duration	s	60		
Losses, cooling				
Power dissipation - Maximum	kW	4.60	6.08	8.52
Cooling air requirement	l/min	54 [2]		
coolant pressure drop Δp	bar	0.75 [1]		
Dimensions, weight				
Width Height Height	mm mm mm	504 740 [3] 550		
Weight app.	kg	142 [3]		

„Parallel units“ (-1BD0 bzw. -0BD0) for connecting in parallel have the same technical data as the corresponding "basic units"(-1BA0 bzw. -0BA0). Please note the unit correspondence and notes of Section 3.7 (of the operating instructions for air-cooled rectifier units or rectifier/regenerating units)!

The permissible output current in parallel mode is reduced (due to current division between the power sections) by 10 % as compared to the sum of the rated currents of the separate power sections.

1) For units from product status A2 and onwards (labelling on the unit at the coolant connection).
2) If the cooling circuits of the two converters are connected in parallel.
3) A rectifier/regenerating unit consists of two converters in separate housings.

Bisher sind folgende Ausgaben erschienen:
The following versions have appeared so far:
Editions antérieures:
Hasta ahora han aparecido las siguientes versiones:
Finora sono state pubblicate le seguenti edizioni:

Ausgabe **Version** **Edition** **Versión** **Edizione**	**interne Sachnummer** **Internal Part number** **Référence interne** **Nº de referencia interna** **Numero interno**
A	C98130-A7001-A1-01-6419
B	C98130-A7001-A1-02-6419
C	C98130-A7001-A1-03-6419
D	C98130-A7001-A1-04-6419

Ausgabe **D** besteht aus folgenden Kapiteln
Version **D** consists of the following chapters
L'édition **D** comprend les chapitres suivants
La versión **D** consta de los capítulos siguientes
L'edizione **D** comprende i seguenti capitoli

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Ein- und Ein/Rückspeiseeinheiten mit Wasserkühlung Betriebsanleitungszusatz
Common Rectifier and Rectifier/Regenerating Units with water cooling Supplement to the operating instructions
Unités d'alimentation et unités d'alimentation/récupération à refroidissement par eau Complément aux instructions de service
Unidad de alimentación y unidad de alimentación y realimentación con refrigeración por agua Complemento a las Instrucciones de servicio
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