Regenerative Frequency Converter

CFW11M G2 RB
CFW11W G2 RB

User's Manual

User's Manual

Series: CFW-11M G2 RB
CFW-11W G2 RB

Language: English

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Models CFW-11M G2 RB: 634...3012 A/380...480 V
496...2356 A/500...600 V
439...2585 A/660...690 V
CFW-11W G2 RB Models: 780...3705 A/500...690 V

Publication Date: 05/2020

Summary of the Revisions

The table below describes all revisions made to this manual.

Version	Review	Descriprion
-	R00	First edition
-	R01	Correction of the dissipated energy in the pre charge resistors, review of the applicable standards, review of preventive maintenance and general corrections

1 SAFETY INSTRUCTIONS

This manual contains the information necessary for the correct use of the regenerative frequency converter CFW-11M G2 RB (air cooled) and CFW-11W G2 RB (water cooled).

It was developed to be used by people with proper technical qualification or training to operate this kind of equipment.

1.1 SAFETY WARNINGS IN THE MANUAL

The following safety notices are used in this manual:

DANGER!
Failure to comply with the procedures recommended in this warning may lead to death, serious injuries and considerable material damages.

ATTENTION!
Failure to comply with the procedures recommended in this warning may lead to material damages.

NOTE!
The text provides important information for the full understanding and proper operation of the product.

1.2 SAFETY WARNINGS ON THE PRODUCT

The following symbols are attached to the product as safety warnings:

High voltages present.

Components sensitive to electrostatic discharges. Do not touch them.

Mandatory connection to the protective earth (PE).

Connection of the shield to the ground.

Hot surface.

1.3 PRELIMINARY RECOMMENDATIONS

DANGER!
Only qualified personnel familiar with the CFW-11M G2 RB and CFW-11W G2 RB converters and related devices must plan or perform the installation, start-up, operation and maintenance of this equipment. Such personnel must follow the safety instructions described in this manual and/or defined by local standards.
Failure to comply with the safety instructions may cause risk of death and/or equipment damage.

NOTE!
For the purpose of this manual, qualified personnel are people trained to be able to:
1. Install, ground, power up and operate the CFW-11M G2 RB and CFW-11W G2 RB according to this manual and the legal safety procedures in force.
2. Use the protective equipment according to the standards.
3. Give first aid.

DANGER!
Always disconnect the general power supply before touching any electrical component connected to the converter.
Many components may remain charged with high voltages and/or moving parts (fans) even after the AC power supply input is disconnected or turned off.
Wait for at least ten minutes to guarantee the full discharge of the capacitors.
Always connect the equipment frame to the protective earth (PE) at the proper terminal.

ATTENTION!
Electronic boards have components sensitive to electrostatic discharges. Do not touch the components or connectors directly. If necessary, first touch the grounded metallic frame or wear a ground strap.

Do not carry out any applied potential test on the converter!
If necessary, contact WEG.

NOTE!
Regenerative frequency converters may interfere in other electronic equipment. Observe the recommendations of Chapter 3 INSTALLATION AND CONNECTION on page 3-1 to minimize those effects.

NOTE!
Carefully read this entire manual before installing or operating this device.

ATTENTION!
The operation of this equipment requires detailed installation and operation instructions provided in the user's manual and manuals/guides for kits and accessories. Only the user's manual is supplied in print. The other manuals can be obtained on WEG website - **www.weg.net**. A printed copy of this information may be requested through your local WEG representative.

2 GENERAL INFORMATION

2.1 ABOUT THE MANUAL

This manual contains information for the proper installation and start-up, the main technical data and directions to troubleshoot the most usual problems of the CFW-11M G2 RB and CFW-11W G2 RB converters.

For information on other functions, accessories and operating conditions, refer to the following manuals:

- Programming manual, with the detailed description of the parameters and advanced functions of the CFW-11 RB converter.
- Manual of the I/O expansion modules.

Those manuals are available on WEG website - **www.weg.net**.

2.2 TERMS AND DEFINITIONS USED IN THE MANUAL

Regenerative Frequency Converter: three-phase switched boost-type converter that converts alternating voltage (AC) of the grid into DC voltage (DC Link). It can absorb energy from the grid (AC) or return energy to it, being used as a DC voltage supply that feeds one or more output inverters.

Output Inverter: frequency inverter with power circuit supplied by the DC Link coming from the regenerative frequency converter. It controls the motor.

Normal Duty (ND): Normal Duty (ND); operating duty of the converter that defines the maximum current values for continuous operation I_{nom-ND} and overload of 110 % for one minute. It is selected by programming P0298 (Application) = 0 (Normal Duty (ND)). The output inverter overload duty affects the regenerative frequency converter.

I_{nom-ND}: Converter rated current for operation under normal duty (ND). Overload: 1.1 x I_{nom-ND}/ 1 minute.

Heavy Duty (HD): Operating duty of the inverter that defines the maximum current values for continuous operation I_{nom-HD} and overload of 150 % for one minute. It is selected by programming P0298 (Application) = 1 (Heavy Duty (HD)). The output inverter overload duty affects the regenerative frequency converter.

I_{nom-HD}: Converter rated current for operation under heavy duty (HD). Overload: 1.5 x I_{nom-HD} / 1 minute.

Current Unbalance (%):

$$\text{Unbalance at power unit X - phase Y} = \left| \frac{I_{YX} - I_{YAVG}}{I_{YAVG}} \right| .100$$

$$I_{YAVG} = \frac{I_{Y1} + I_{Y2} + \cdots + I_{YN}}{N}$$

Where:

N = number of power units.

I_{YN} = current of phase Y (U, V or W) of the power unit N (P0815 to P0829).

I_{YAVG} = average current of phase Y.

Pre-Charge Circuit: It loads the DC link capacitors with limited current, avoiding high current peaks at the inverter energization.

DC Link: Converter DC link; voltage in direct current obtained by rectifying the alternate power supply voltage or through an external source; it feeds the output inverter bridge.

DC+: Positive terminal of the DC Link.

DC-: Negative terminal of the DC Link.

Arm U, V and W: 2-IGBT set of the converter input phases U, V and W.

IGBT: Insulated Gate Bipolar Transistor: it is a basic component of the U, V and W arms. It operates like an electronic switch in the saturated mode (closed switch) and cut off mode (open switch).

PTC: Resistor whose resistance value in ohms increases proportionally to the temperature; used as temperature sensor on motors.

NTC: Resistor whose resistance value in ohms decreases proportionally to the temperature increase; used as temperature sensor on power packs.

HMI: Human-Machine Interface; it is a device that allows viewing and changing the converter parameters. The HMI of the CFW-11M G2 RB features control keys for the regenerative frequency converter, navigation keys and a display.

FLASH Memory: Nonvolatile memory that can be electrically written and erased.

RAM memory: Random access memory.

USB: Universal Serial Bus; serial communication protocol conceived to work according to the plug-and-play concept.

PE: Protective earth.

RFI Filter: Radio Frequency Interference Filter; filter to reduce interference in the radio frequency band.

PWM: Pulse Width Modulation; pulsing voltage at the input of the regenerative frequency converter.

Switching Frequency: switching frequency of the IGBTs, usually given in kHz.

General enable: When enabled, the converter controls the voltage on the DC link. When disabled, the PWM pulses will be immediately blocked. It is controlled via digital input programmed for such function.

Heatsink: Piece of metal designed to dissipate the heat generated by power semiconductors.

UP11 G2: Power unit of the CFW-11M G2 RB with air cooling.

UP11W G2: Power unit of the CFW-11W G2 RB with water cooling.

UC11 G2: Control Unit of the CFW-11M G2 RB and CFW-11W G2 RB.

PLC: Programmable logic controller.

Amp, A: Ampere.

°C: Degrees Celsius.

AC: Alternating current.

DC: Direct current.

CFM: Cubic feet per minute; a flow measurement unit.

cm: Centimeter

CV: Brazilian unit of power = 736 Watts; usually used to indicate mechanical power of electric motors.

ft: Foot.

hp: Horse power = 746 Watts; unit of power, usually used to indicate mechanical power of electric motors.

Hz: Hertz.

in: Inch.

kg: Kilogram = 1000 grams.

kHz: Kilohertz = 1000 Hertz.

l/min: Liters per minute.

lb: Pound.

m: Meter.

mA: Milliampere = 0.001 ampere.

min: Minute.

mm: Millimeter.

ms: Millisecond = 0.001 second.

Nm: Newton meter; torque measurement unit.

rms: Root mean square; effective value.

rpm: Revolutions per minute; unit of rotation.

s: Second.

V: Volts.

Ω: Ohms.

2.3 ABOUT THE CFW-11M G2 RB AND CFW-11W G2 RB

The CFW-11M G2 RB and CFW-11W G2 RB regenerative frequency converters are the second generation of the CFW-11M RB and CFW-11W RB regenerative frequency converter line respectively. The main differences in relation to the previous generation are the following:

- Smaller. The CFW-11M G2 RB is shorter and slimmer than the CFW-11M RB, allowing the installation of three UP11 G2 RB in a panel with columns 800 mm wide and 2000 mm high. The CFW-11W G2 RB is shorter, slimmer and less deep than the CFW-11W RB, allowing the installation of three UP11W G2 in a panel with columns 800 mm wide, 2000 mm high and 600 mm deep.

- More modern. State-of-the-art components have increased the power of the converters.

The CFW-11M G2 RB and CFW-11W G2 RB regenerative frequency converters are high-performance products that enable the rectification of three-phase lines with the following advantages:

- Low harmonic distortion in the input current.

- Capacity to return energy to the line (regeneration), enabling high braking torques.

The CFW-11M G2 RB and CFW-11W G2 RB regenerative frequency converters have a modular design, with configurations containing one to five power units (UP11 G2 or UP11W G2), one control unit (UC11RB G2) and wiring cables. The modular assembly increases the converter reliability and simplifies its maintenance. There is a single control unit (UC11RB G2) which can control up to five UP11s G2 or five UP11Ws G2.

The CFW-11W G2 RB regenerative frequency converter line is water cooled, being smaller than the other converters.

The UP11s, UP11Ws and UC11RB G2 are fed through an external +24 Vdc power supply. Figure 2.1 on page 2-4 and Figure 2.3 on page 2-6 respectively show the general diagrams of the air-cooled and water-cooled converters, considering the configuration with three UP11s connected in parallel.

The UC11RB G2 control unit controls the power units. The control unit contains the control rack of the CFW-11 line and the ICUP board. This board sends signals to all UP11 G2 or UP11W G2 (PWM, control signals, etc.), and receives signals from them (current, voltage feedback, etc.).

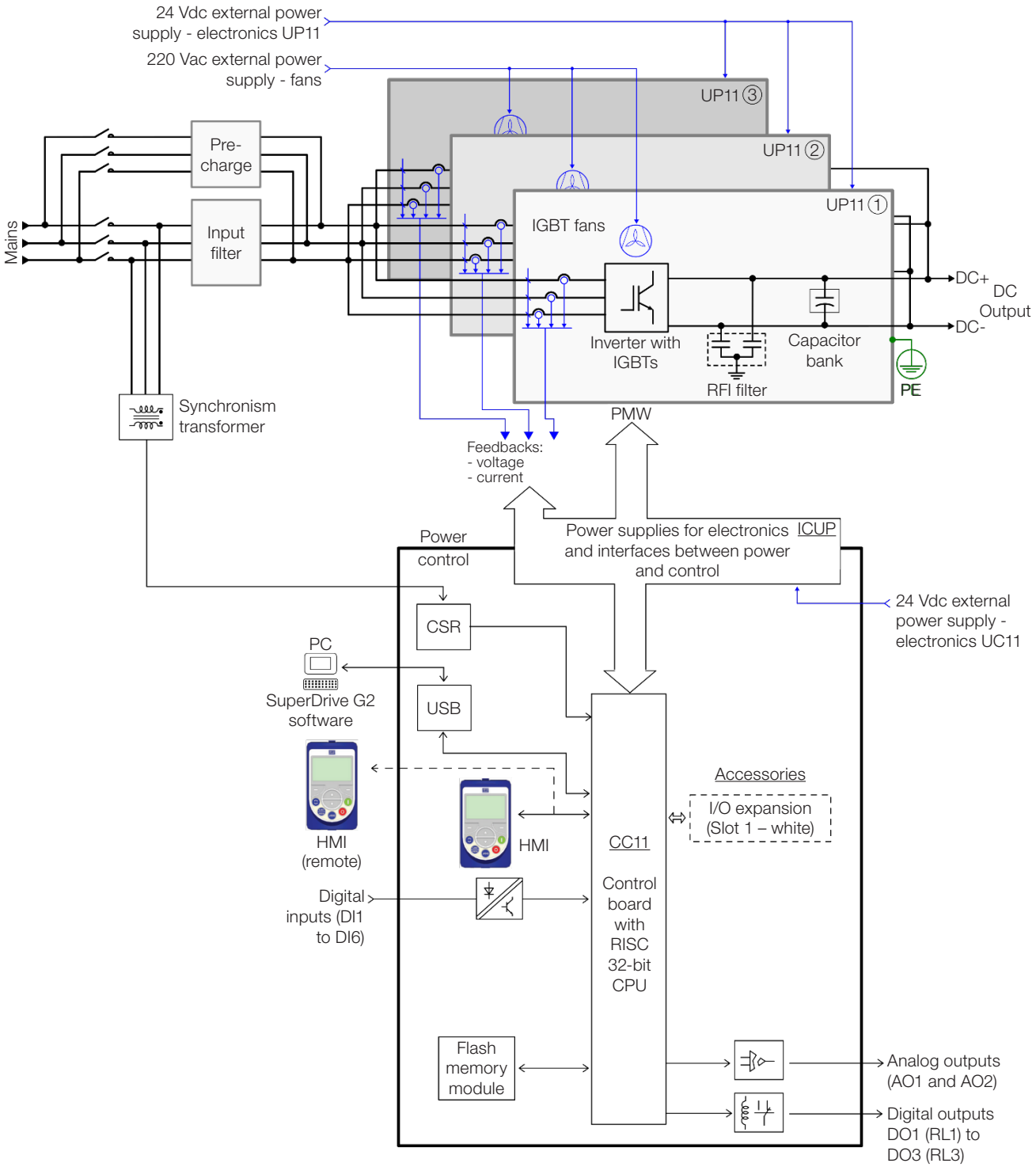


Figure 2.1: *General diagram of the CFW11M G2 RB converter*

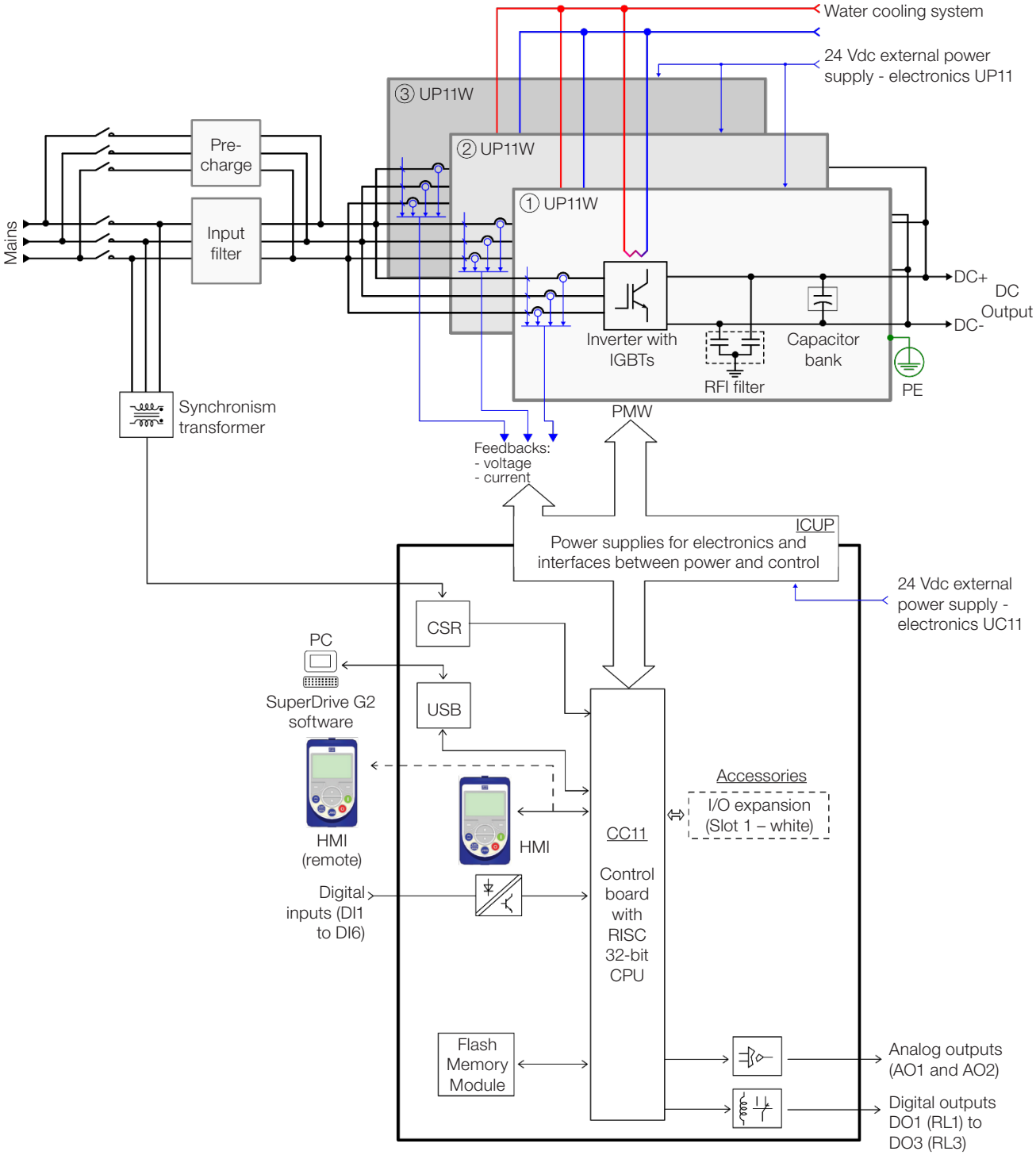


Figure 2.2: *General diagram of the CFW11W G2 RB converter*

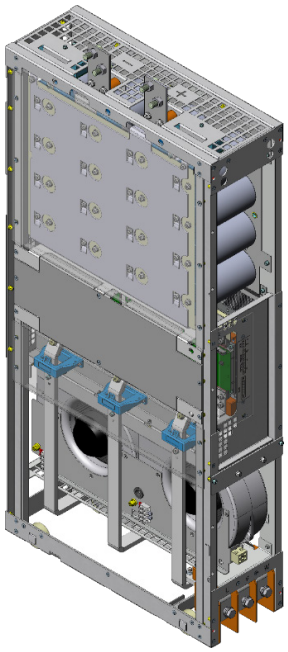


Figure 2.3: *Air-cooled Power Unit (UP11)*

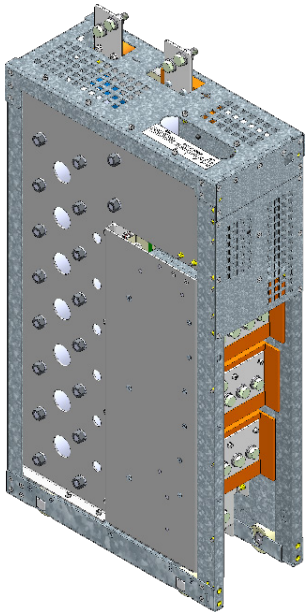


Figure 2.4: *Water-cooled Power Unit (UP11W)*

Figure 2.5: *Control Unit (UC11RB G2)*

NOTE!
To assemble the complete drive, several additional items are necessary, such as fuses on the DC power supply of each UP11 or UP11W power unit, external pre-charge circuit and input filters.

NOTE!
It is not necessary to include a current transformer (CT) in the drive for short-circuit protection at the output against the ground, since each UP11 and UP11W has its own internal protection.

2.4 UC11RB G2 IDENTIFICATION LABEL

The UC11RB G2 identification label is located on the control rack.

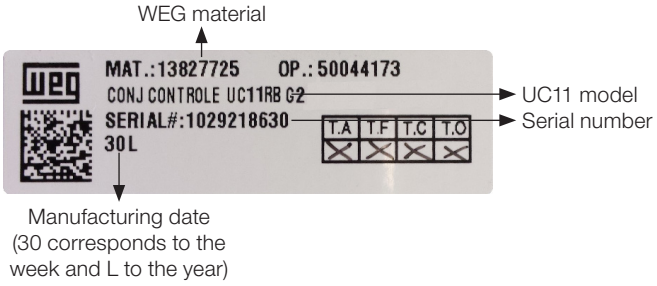


Figure 2.6: *UC11RB G2 identification label*

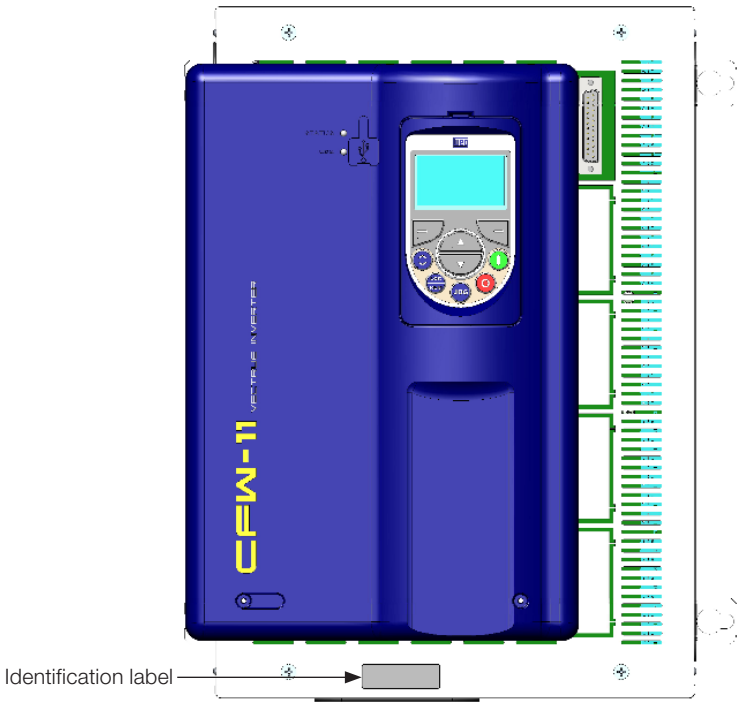


Figure 2.7: *Identification label location*

2.5 UP11 G2 AND UP11W G2 IDENTIFICATION LABEL

The identification label is located on the front of the UP11 G2 and UP11W G2.

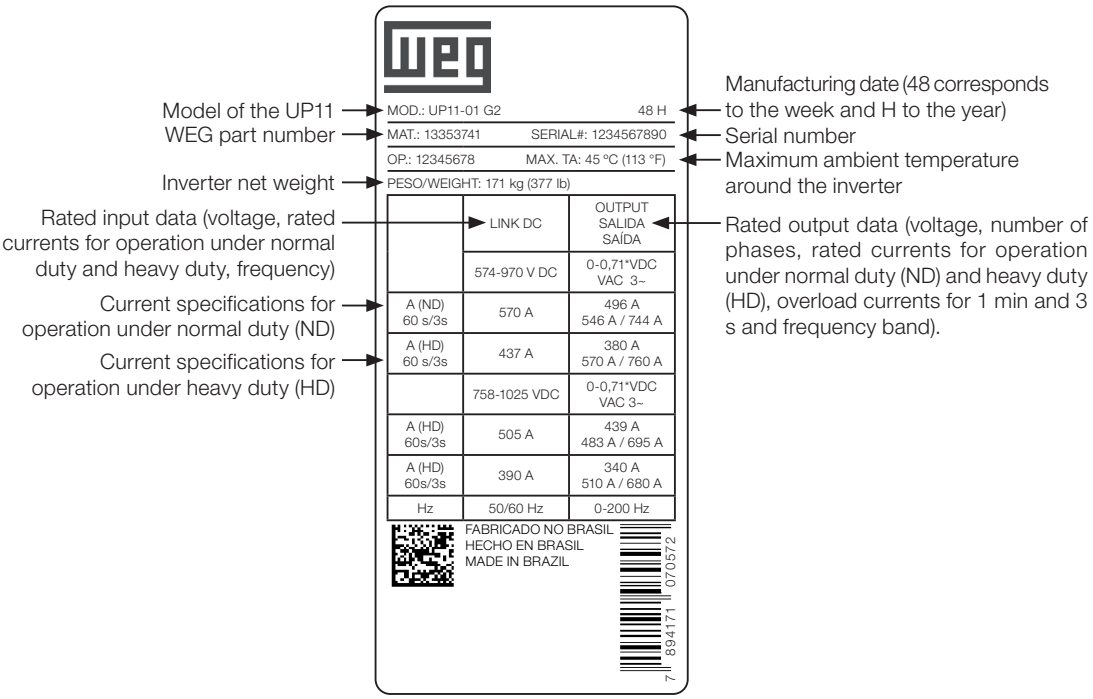


Figure 2.8: *UP11 G2 and UP11W G2 identification label*

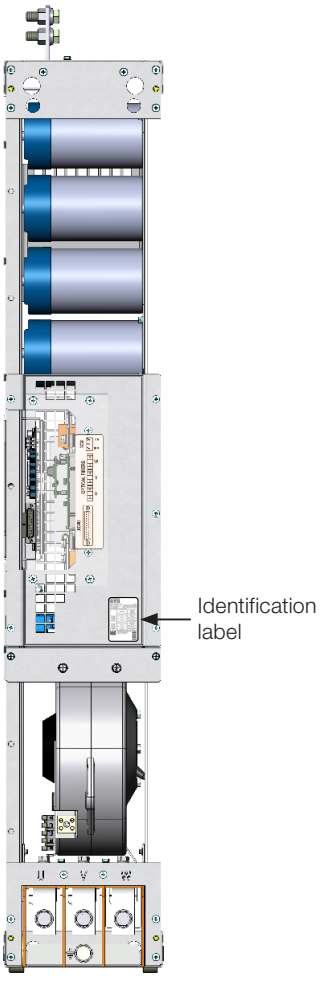


Figure 2.9: *Identification label location on the UP11 G2*

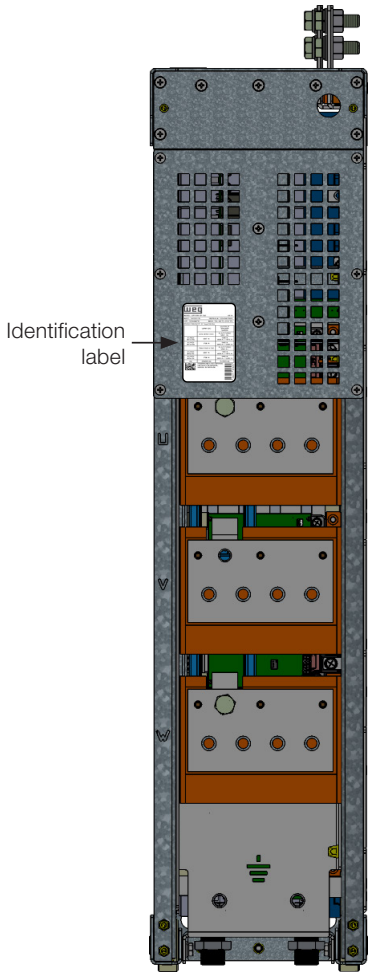


Figure 2.10: *Identification label location on the UP11W G2*

2.6 HOW TO SPECIFY THE CONVERTER MODEL (SMART CODE)

In order to specify the model of the CFW-11M G2 RB or CFW-11W G2 RB, replace the corresponding fields in the smart code with the desired rated supply voltage and rated output current for operation under normal duty (ND), as shown in the example of Table 2.1 on page 2-10.

Table 2.1: *Smart code*

		Converter Model See the list of models in Chapter 8 TECHNICAL DATA on page 8-1, which also contains the technical data of the inverters					Optional Items See Chapter 7 OPTIONAL ITEMS AND ACCESSORIES on page 7-1 for further details on the optional items			
Example	**BR**	**CFW11MG2**	**634**	**T**	**4**	**O**	**_ _**	**_ _**	**_ _**	**Z**
Field denomination	Market identification (sets the language of the manual and factory settings)	WEG Series 11 Generation 2 Modular Converter	Rated current for use under normal duty (ND)	Number of phases	Rated voltage	Optional items	Braking	Special hardware	Special software	Final coding indicator digit
Possible options	2 characters	CFW11WG2 = WEG Series 11 Generation 2 Water-Cooled Modular Converter		T = three-phase	4 = 380...480 V 5 = 500...600 V 6 = 660...690 V	O = product with optional item	RB = regenerative braking	Blank = standard H1 = special hardware #1	Blank = standard S1 = special software #1	

E.g.: CFW11MG21205T4ORBZ corresponds to a three-phase 1205 A CFW-11M G2 RB converter, with an input voltage of 380 V to 480 V. The options for the rated current of the CFW-11M G2 RB and CFW-11W G2 RB converters under normal overload (ND) are respectively found in Table 2.2 on page 2-10 and Table 2.3 on page 2-10, according to the rated input voltage of the converter.

Table 2.2: *Rated currents under normal duty (ND) for the CFW-11M G2 RB*

380-480 V	500-600 V	660-690 V
0634 = 634 A	0496 = 496 A	0439 = 439 A
1205 = 1205 A	0942 = 942 A	0834 = 834 A
1807 = 1807 A	1414 = 1414 A	1251 = 1251 A
2409 = 2409 A	1885 = 1885 A	1668 = 1668 A
3012 = 3012 A	2356 = 2356 A	2085 = 2085 A

Table 2.3: *Rated currents under normal duty (ND) for the CFW-11W G2 RB*

500-690 V
0780 = 780 A
1482 = 1482 A
2223 = 2223 A
2964 = 2964 A
3705 = 3705 A

2.7 RECEIVING AND STORAGE

The UP11 and UP11W G2 power units are supplied in a wooden box.

The UC11RB G2 control units are supplied in a cardboard box.

The package bears a copy of the identification label affixed to the converter.

To open the package:

1. Remove the front cover of the package.
2. Remove the styrofoam protection.

Check if:

1. The identification labels correspond to the models purchased.
2. Damages during transportation.

Report any problems immediately to the carrier.

If the products are not immediately installed, store them in a clean and dry place (temperature between -25 °C and 60 °C), with a cover to prevent the ingress of dust.

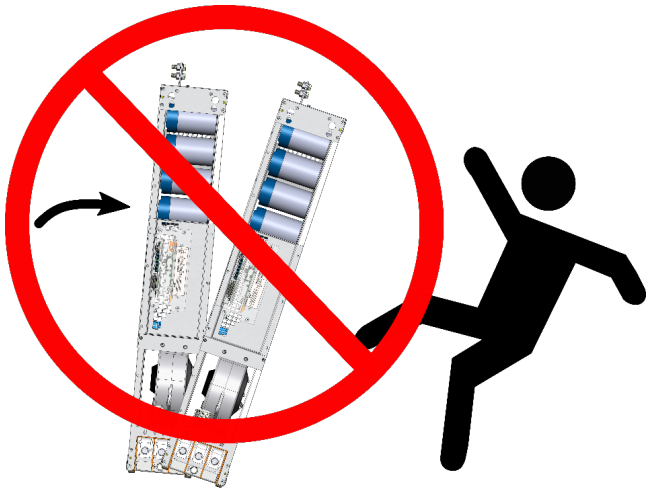


Figure 2.11: *Do not tilt the power units*

3 INSTALLATION AND CONNECTION

This chapter describes the procedures for the electrical and mechanical installation of the CFW-11M and CFW-11W G2 RB. The directions and suggestions must be observed to ensure the safety of people and equipment and the proper operation of the inverter.

3.1 AIR-COOLED UP11 G2 MECHANICAL INSTALLATION

The power units must be installed in the drive panel appropriately, allowing easy extraction and reinstallation in case of maintenance. The mounting must be such to avoid damage during the panel transportation.

3.1.1 Environmental Conditions

Avoid:

- Direct exposure to sunlight, rain, excessive moisture or marine environment.
- Inflammable or corrosive liquids or gases.
- Excessive vibration.
- Dust, metal particles or oil suspended in the air.

Permissible environment conditions for operation:

- Ambient temperature: 0 °C to 45 °C (32 °F to 113 °F) - rated conditions (measured around the inverter). From 45 °C to 55 °C (113 °F to 131 °F) - 2 % of current derating for each Celsius degree above 45 °C (113 °F).
- Maximum altitude: up to 1000 m (3.300 ft) – rated conditions.
- From 1000 m to 4000 m (3.300 ft to 13.200 ft) – 1 % of current derating for each 100 m (330 ft) above 1000 m (3.300 ft) of altitude.
- From 2000 m to 4000 m (6.600 ft to 13.200 ft) - maximum voltage (480 V for models 380...480 V and 690 V for models 500...690 V) derating of 1.1 % for each 100 m (330 ft) above 2000 m (6.600 ft).
- Maximum altitude of 4000 m (13.200 ft).
- Air relative humidity: 5 % to 95 % non-condensing.
- Pollution degree: 2 (according to EN50178 and UL508C), with non-conductive pollution. Condensation must not cause conduction of the accumulated residues.

3.1.2 Part List

For the panel mounting of the CFW11M G2 RB, it is necessary: UC11RB G2 control set, UP11 G2 power units, synchronism transformers and cable set to connect the UC11RB G2 to the UP11 G2. Table 3.1 on page 3-1, Table 3.2 on page 3-2 and Table 3.3 on page 3-2 contain the Part List of the CFW-11M G2 converter.

Table 3.1: *Part List - Drives CFW-11M G2 RB 380 - 480 V*

Qty UP11-02 G2	Rated Current [A]		Qty UC11RB G2	Qty Synchronization Transformers Set	Qty Cable Set 2.5 m	Qty Cable Set 3.0 m	Qty Cable Set 3.6 m
	ND	HD					
1	634	515	1	1	1	-	-
2	1205	979	1	1	2	-	-
3	1807	1468	1	1	-	1	2
4	2409	1957	1	1	2	1	1
5	3012	2446	1	1	-	3	2

Table 3.2: Part List - Drives CFW-11M G2 RB 500 - 600 V

Qty UP11-01 G2	Rated Current [A]		Qty UC11RB G2	Qty Synchronization Transformers Set	Qty Cable Set 2.5 m	Qty Cable Set 3.0 m	Qty Cable Set 3.6 m
	ND	HD					
1	496	380	1	1	1	-	-
2	942	722	1	1	2	-	-
3	1414	1083	1	1	-	1	2
4	1885	1444	1	1	2	1	1
5	2356	1805	1	1	-	3	2

Table 3.3: Part List - Drives CFW-11M G2 RB 660 - 690 V

Qty UP11-01 G2	Rated Current [A]		Qty UC11RB G2	Qty Synchronization Transformers Set	Qty Cable Set 2.5 m	Qty Cable Set 3.0 m	Qty Cable Set 3.6 m
	ND	HD					
1	439	340	1	1	1	-	-
2	834	646	1	1	2	-	-
3	1251	969	1	1	-	1	2
4	1668	1292	1	1	2	1	1
5	2085	1615	1	1	-	3	2

Table 3.4: Cable set items

WEG Item	Cable Set
13555095	2.5 m Cables
13555150	3.0 m Cables
13555151	3.6 m Cables

Table 3.5: Synchronous transformer set items

WEG Item	Synchronism Transformer Set
14267304	Synchronism transformer set: input voltage 380 - 480 V
14267307	Synchronism transformer set: input voltage 500 - 690 V

The panel builder must provide the other parts of the drive. Among those parts are the power busbars, pre-charge circuit, panel fans, protection fuses and input filters.

3.1.3 Lifting

Figure 3.1 on page 3-3 shows the position of the lifting lugs.

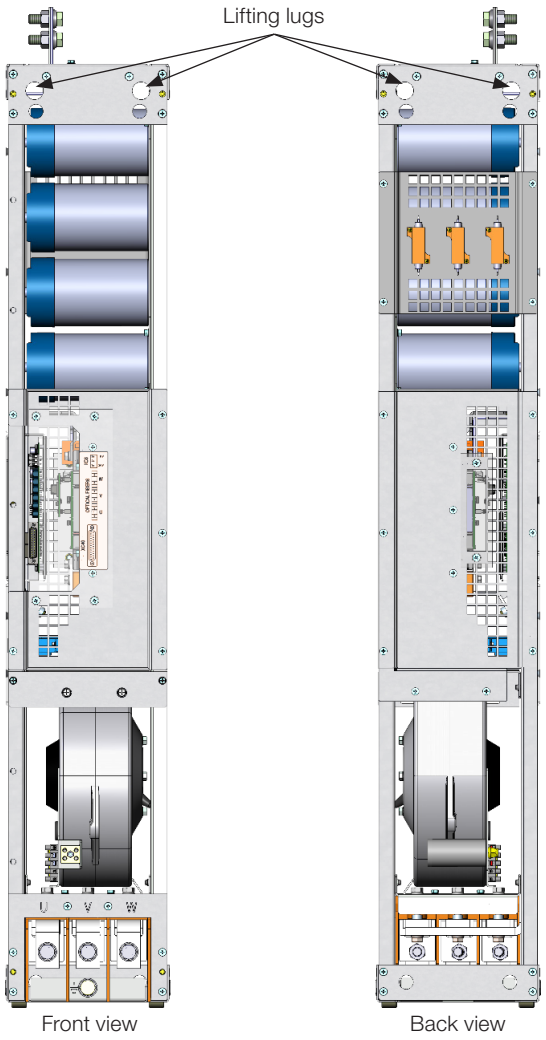


Figure 3.1: *UP11 G2 lifting lugs*

3.1.4 Panel Ventilation

The efficiency of the panel ventilation depends on the equipment installed inside the panel, such as fans, air inlets and filters. The internal fan of the UP11 G2 is not enough to cool the entire panel.

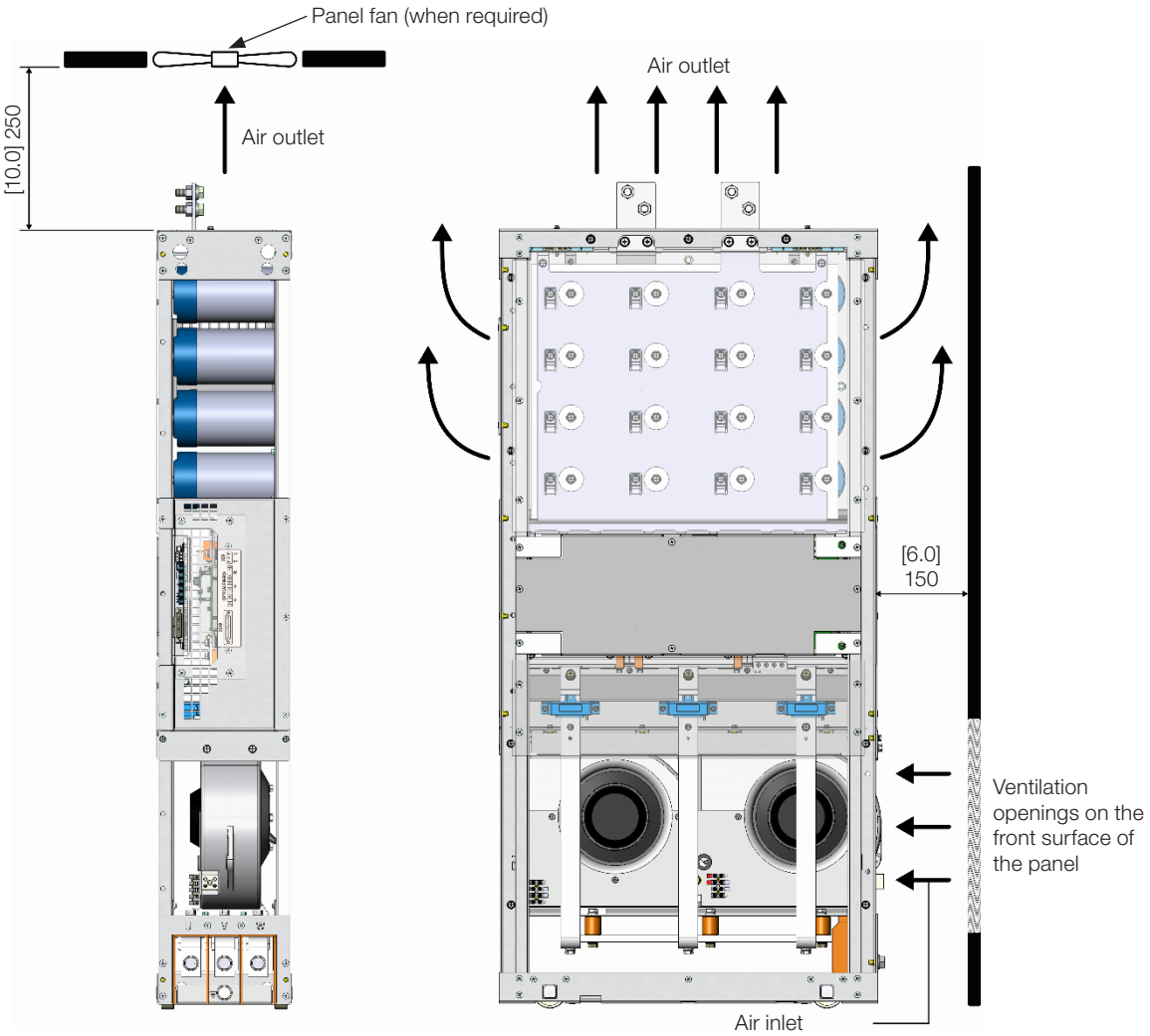


Figure 3.2: *Clearances for ventilation in mm [in]*

The total air flow of the power unit fans is 1150 m^3/h (320 l/s; 677 CFM).

3.1.5 Panel Mounting of the UP11 G2

To install the UP11 G2 in panels, the following fastening hardware is necessary:

- Rack 2 G2 allows the mounting of 1 or 2 modules side by side in 600 mm wide panels.
- Rack 3 G2 allows the mounting of 1, 2 or 3 modules side by side in 800 mm wide panels.

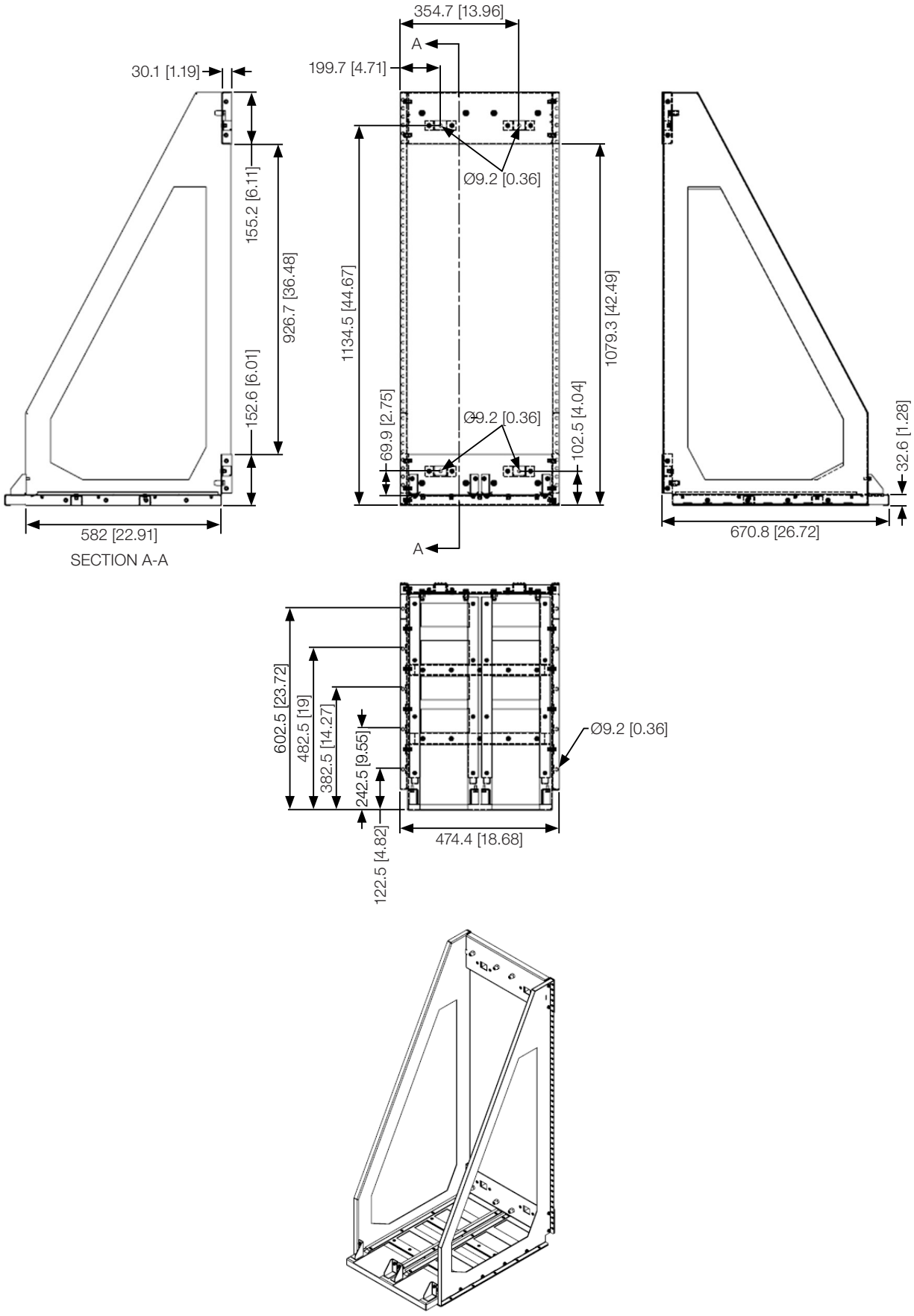


Figure 3.3: *Dimensions of Rack 2 G2 in mm [in]*

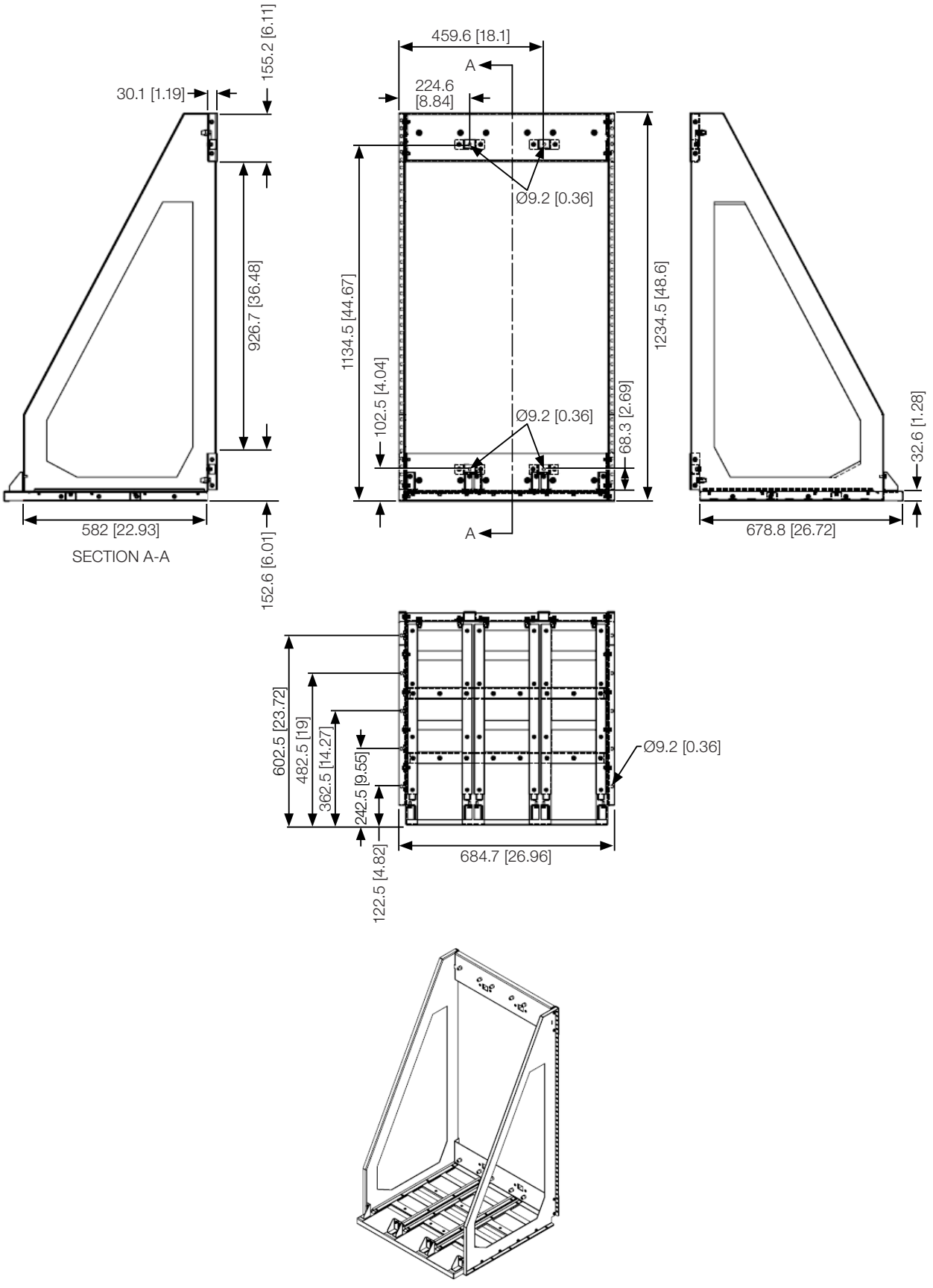


Figure 3.4: *Dimensions of Rack 3 G2 in mm [in]*

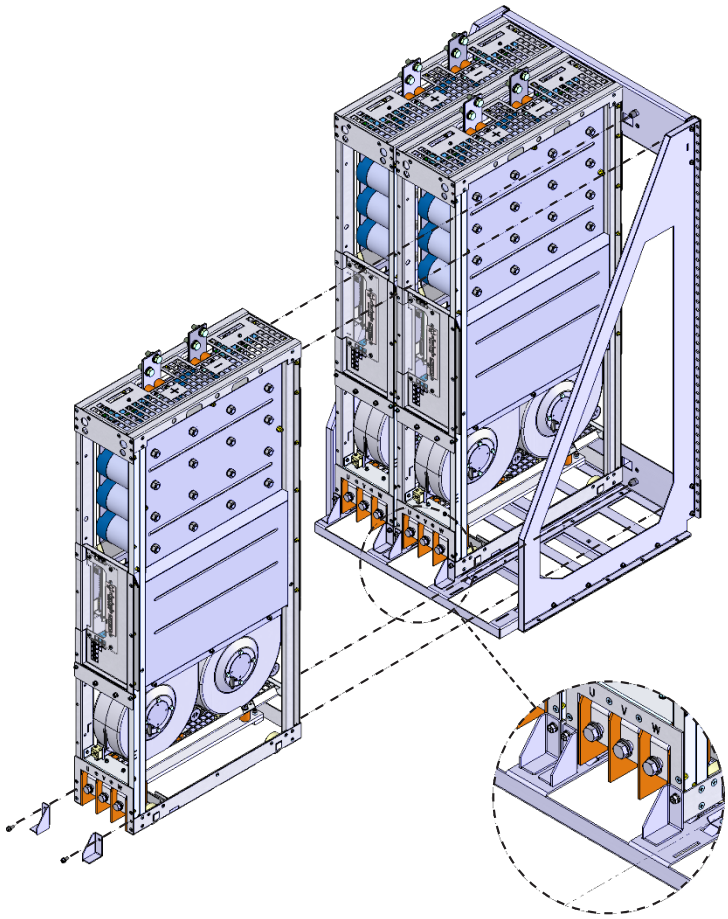
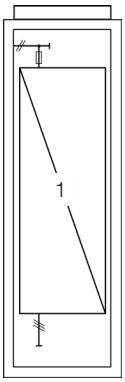


Figure 3.5: *Insertion of the UP11 G2 power modules into the Rack 3 G2*

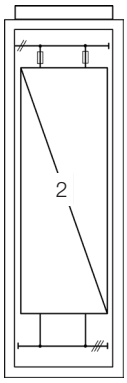
3.1.6 Panel

According to the quantity of UP11 G2 of the drive, minimum dimensions are necessary for the panels. Table 3.6 on page 3-10, Table 3.7 on page 3-10, Table 3.8 on page 3-10, Table 3.10 on page 3-19 and Table 3.11 on page 3-19 contain the minimum dimensions of the panel according to the quantity of UP11 G2 used.



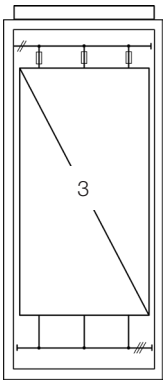
Panel Width	At least 600 mm
Panel Height	At least 2000 mm
Panel Depth	At least 800 mm
Weight Capacity	118 kg

Figure 3.6: *Panel data for a drive with 1 UP11 G2*



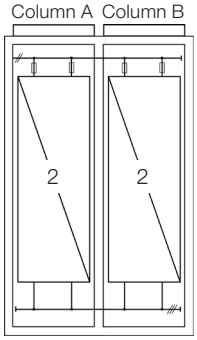
Panel Width	At least 600 mm
Panel Height	At least 2000 mm
Panel Depth	At least 800 mm
Weight Capacity	212 kg

Figure 3.7: *Panel data for a drive with 2 UP11 G2*



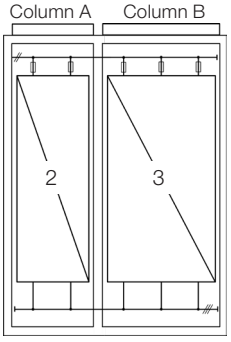
Panel Width	At least 800 mm
Panel Height	At least 2000 mm
Panel Depth	At least 800 mm
Weight Capacity	310 kg

Figure 3.8: *Panel data for a drive with 3 UP11 G2*



Panel Width	At least 600 mm (Column A) + 600 mm (Column B)
Panel Height	At least 2000 mm
Panel Depth	At least 800 mm
Weight Capacity	212 kg (Column A) + 212 kg (Column B)

Figure 3.9: *Panel data for a drive with 4 UP11 G2*



Panel Width	At least 600 mm (Column A) + 800 mm (Column B)
Panel Height	At least 2000 mm
Panel Depth	At least 800 mm
Weight Capacity	212 kg (Column A) + 310 kg (Column B)

Figure 3.10: *Panel data for a drive with 5 UP11 G2*

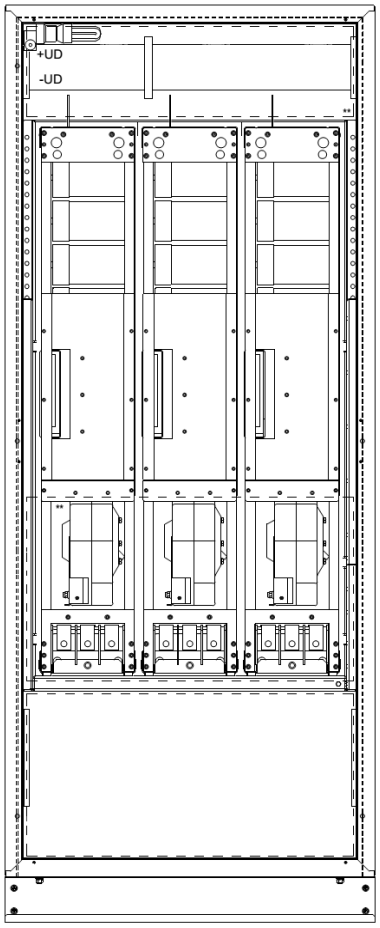


Figure 3.11: *Column with 3 UP11 G2 installed*

3.2 WATER-COOLED UP11W G2 MECHANICAL INSTALLATION

The power units must be installed in the drive panel appropriately, allowing easy extraction and reinstallation in case of maintenance. The mounting must be such to avoid damage during the panel transportation.

3.2.1 Environmental Conditions

Avoid:

- Direct exposure to sunlight, rain and high humidity.
- Inflammable or corrosive liquids or gases.
- Dust, metal particles or oil suspended in the air.

Environment conditions permitted for operation:

- Ambient temperature: 0 °C to 45 °C (32 °F to 113 °F) - rated conditions (measured around the inverter). From 45 °C to 55 °C (113 °F to 131 °F) - 0.5 % of current derating for each Celsius degree above 45 °C (113 °F).
- Coolant input temperature: 0 °C to 45 °C (32 °F to 113 °F) according to the coolant used. From 45 °C to 55 °C (113 °F to 131 °F) - 1 % of current derating for each Celsius degree above 45 °C (113 °F).
- Coolant flow: 20 l/min.
- Maximum altitude: up to 1000 m (3.300 ft) – rated conditions.
- From 1000 m to 4000 m (3.300 ft to 13.200 ft) – 1 % of current derating for each 100 m (330 ft) above 1000 m (3.300 ft) of altitude.

- From 2000 m to 4000 m (6.600 ft to 13.200 ft) - maximum voltage (690 V for models 500...690 V) derating of 1.1 % for each 100 m (330 ft) above 2000 m (6.600 ft).
- Maximum altitude of 4000 m (13.200 ft).
- Air relative humidity: 5 % to 95 % non-condensing.
- Pollution degree: 2 (according to EN50178 and UL508C), with non-conductive pollution. Condensation must not cause conduction of the accumulated residues.

3.2.2 Part List

For the panel mounting of the CFW11W G2 RB, it is necessary: control set, UP11W G2 power units and cable sets to connect the UC11RB G2 to the UP11W G2. Table 3.1 on page 3-1 contains the part list of the CFW11W G2 inverter.

Table 3.6: *Part List - CFW-11W G2 500 - 600 V Drives*

Qty UP11W-01 G2	Rated Current [A]		Qty UC11 G2	Qty Synchronization Transformers Set	Qty Cable Set 2.5 m	Qty Cable Set 3.0 m	Qty Cable Set 3.6 m
	ND	HD					
1	780	640	1	1	1	-	-
2	1482	1216	1	1	2	-	-
3	2223	1824	1	1	-	1	2
4	2964	2432	1	1	2	1	1
5	3705	3040	1	1	-	3	2

Table 3.7: *Cable set items*

WEG Item	Cable Set
13555095	2.5 m Cables
13555150	3.0 m Cables
13555151	3.6 m Cables

Table 3.8: *Synchronous transformer set items*

WEG Item	Synchronism Transformer Set
14267304	Synchronism transformer set: input voltage 380 - 480 V
14267307	Synchronism transformer set: input voltage 500 - 690 V

The panel builder must provide the other parts of the drive. Among those parts are the power busbars, pre-charge circuit, panel internal cooling, protection fuses and input filters.

3.2.3 Lifting

Figure 3.1 on page 3-3 shows the position of the lifting lugs.

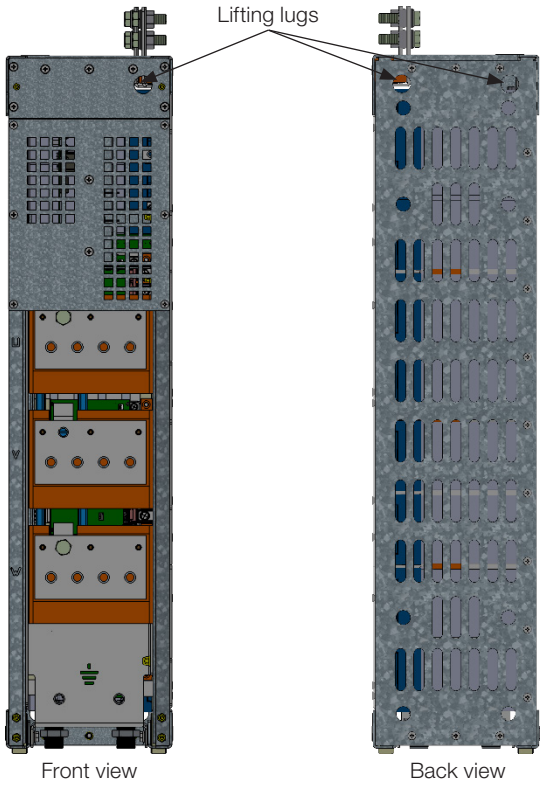


Figure 3.12: *UP11W G2 lifting lugs*

3.2.4 Panel Mounting of the UP11W G2

To install the UP11W G2 in panels, the following mounting accessories are necessary:

- Rack 2 G2 allows the mounting of 1 or 2 modules side by side in 600 mm wide panels.
- Rack 3 G2 allows the mounting of 1, 2 or 3 modules side by side in 800 mm wide panels.

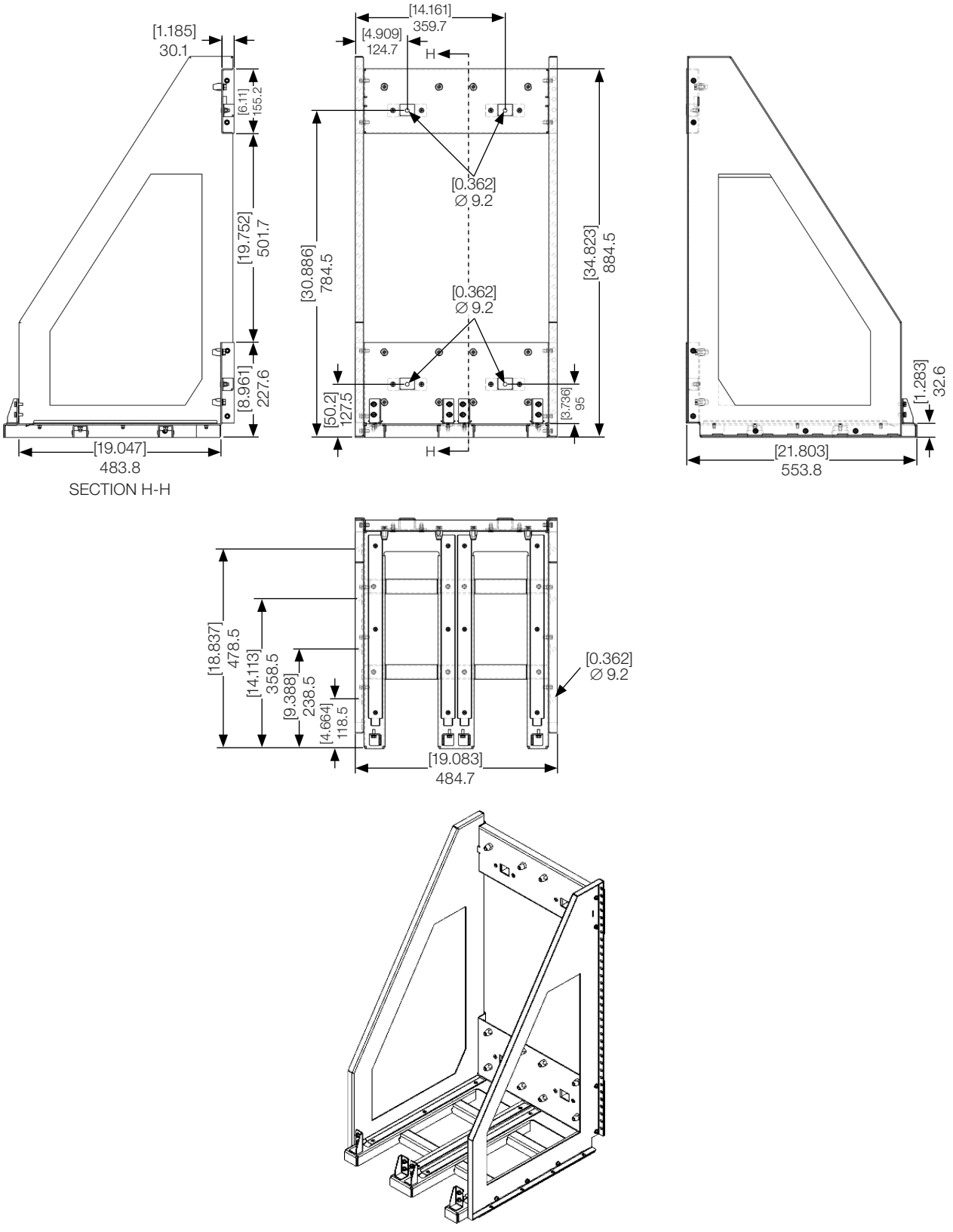


Figure 3.13: *Dimensions of Rack 2 G2 in mm [in]*

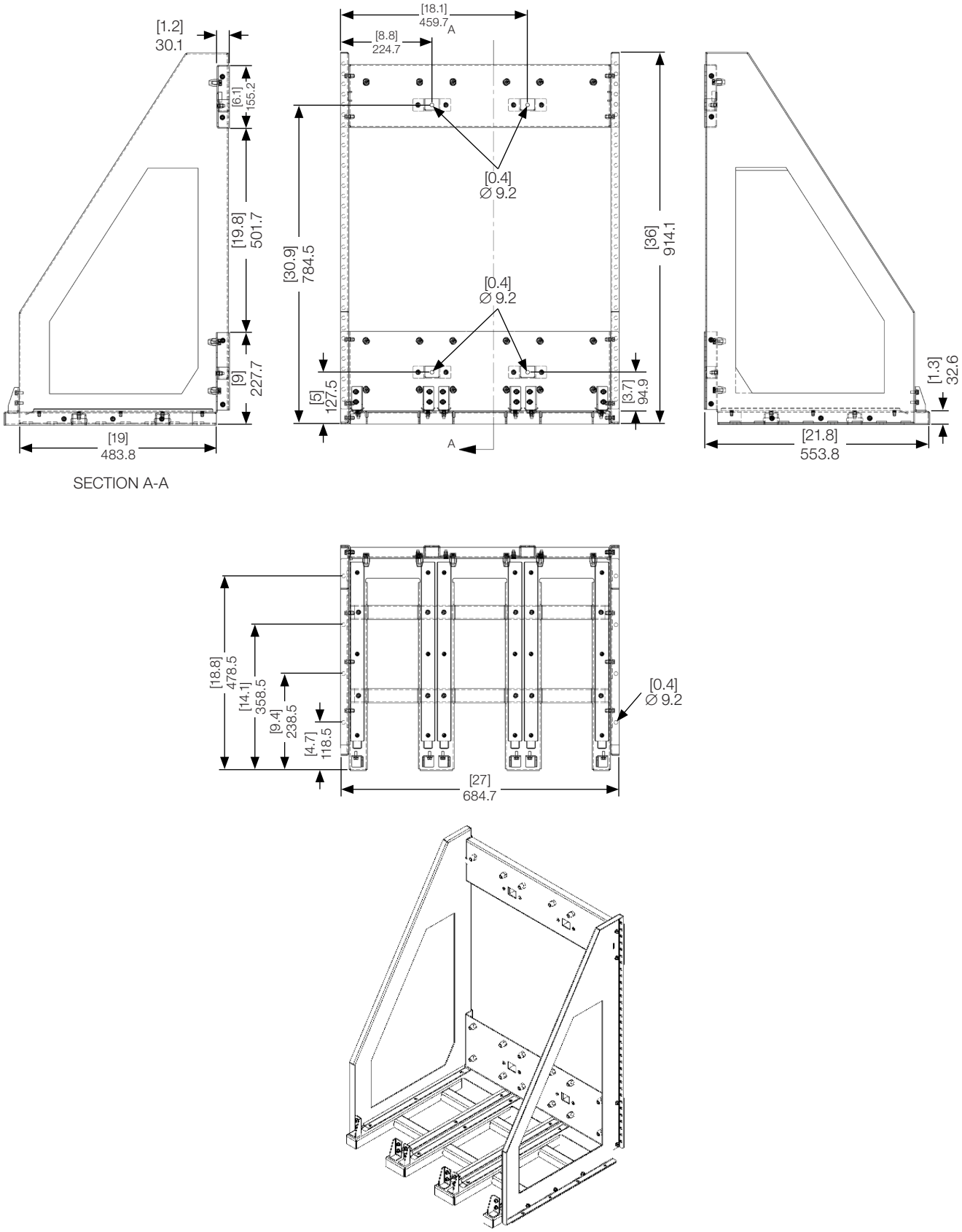


Figure 3.14: *Dimensions of Rack 3 G2 in mm [in]*

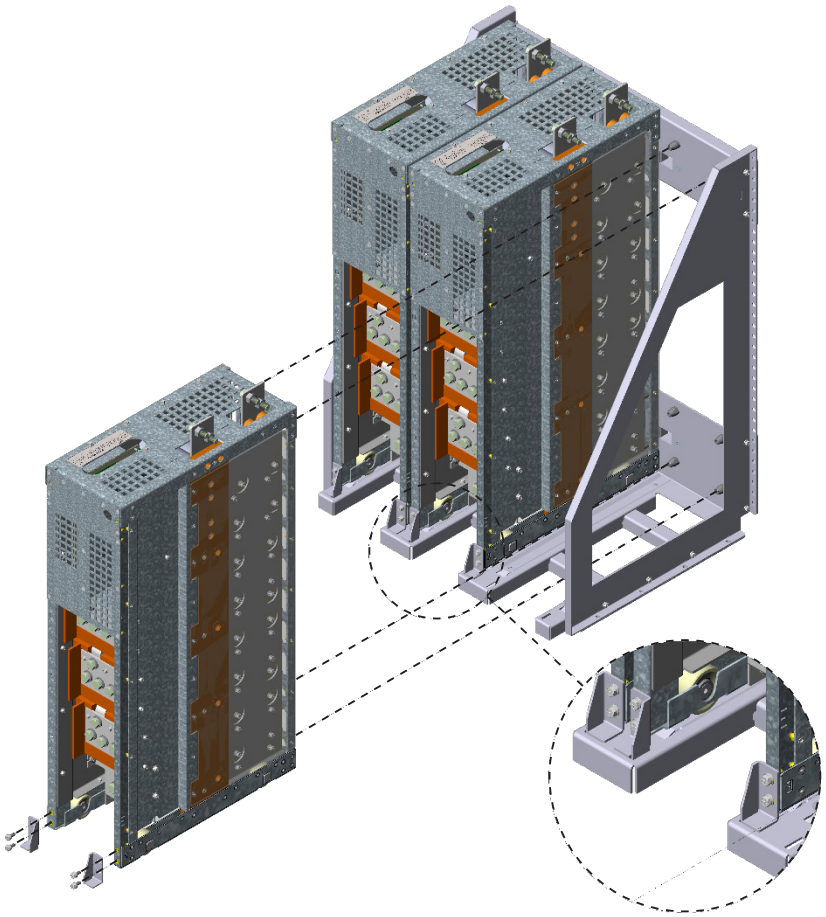
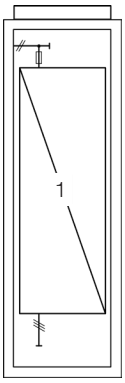


Figure 3.15: *Insertion of the UP11W power modules into the Rack 3 G2*

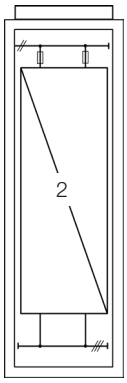
3.2.5 Panel

The minimum panel dimensions are subject to the quantity of UP11Ws G2 of the drive. Table 3.6 on page 3-10, Table 3.7 on page 3-10, Table 3.8 on page 3-10, Table 3.10 on page 3-19 and Table 3.11 on page 3-19 contain the minimum dimensions of the panel according to the quantity of UP11W G2 used.



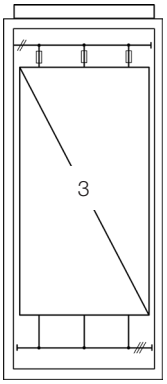
Panel Width	At least 600 mm
Panel Height	At least 2000 mm
Panel Depth	At least 600 mm
Weight Capacity	89 kg

Figure 3.16: *Panel data for a drive with 1 UP11W G2*



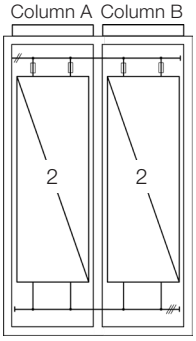
Panel Width	At least 600 mm
Panel Height	At least 2000 mm
Panel Depth	At least 600 mm
Weight Capacity	156 kg

Figure 3.17: *Panel data for a drive with 2 UP11W G2*



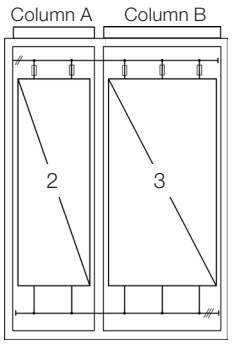
Panel Width	At least 800 mm
Panel Height	At least 2000 mm
Panel Depth	At least 600 mm
Weight Capacity	227 kg

Figure 3.18: *Panel data for a drive with 3 UP11W G2*



Panel Width	At least 600 mm (Column A) + 600 mm (Column B)
Panel Height	At least 2000 mm
Panel Depth	At least 600 mm
Weight Capacity	156 kg (Column A) + 156 kg (Column B)

Figure 3.19: *Panel data for a drive with 4 UP11W G2*



Panel Width	At least 600 mm (Column A) + 800 mm (Column B)
Panel Height	At least 2000 mm
Panel Depth	At least 600 mm
Weight Capacity	156 kg (Column A) + 227 kg (Column B)

Figure 3.20: *Panel data for a drive with 5 UP11W G2*

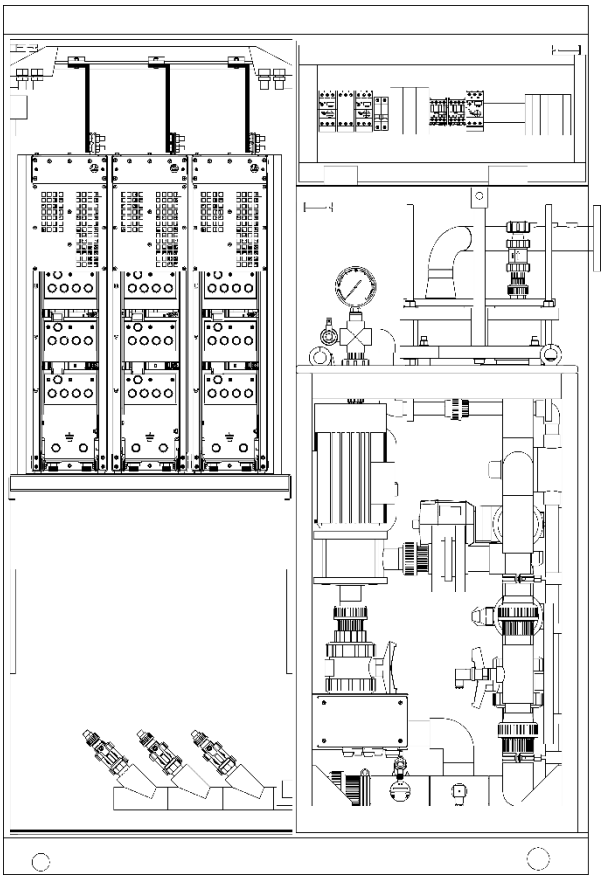


Figure 3.21: *Column with 3 UP11W G2 installed*

3.2.6 Cooling System

Figure 3.22 on page 3-17 shows the details of the coolant inlet and outlet.

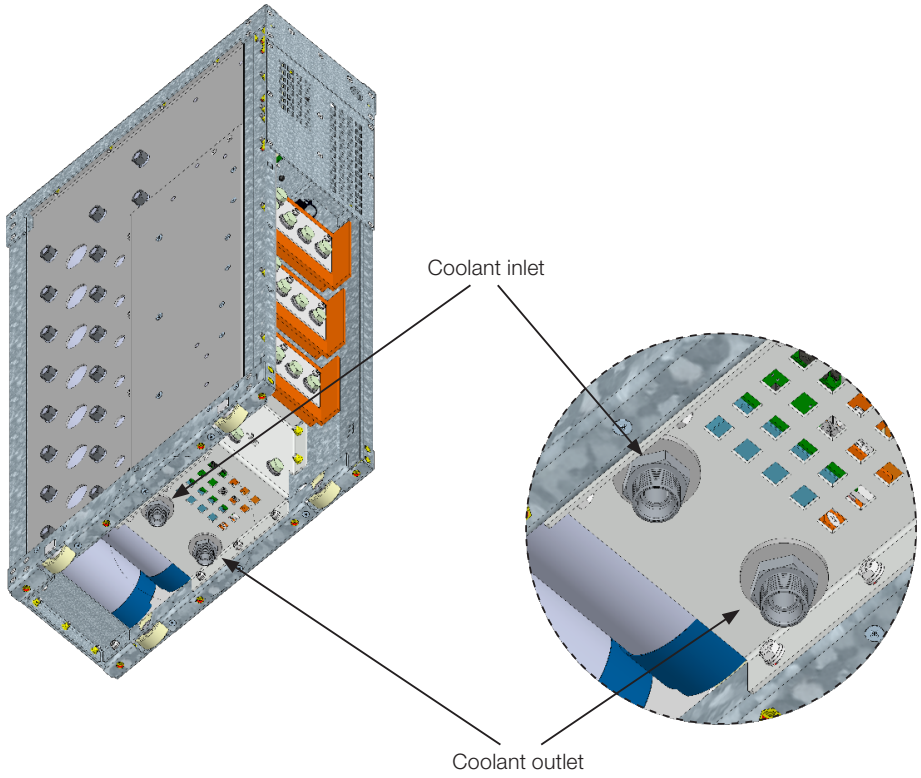


Figure 3.22: *Detail of the coolant inlet and outlet*

Table 3.9 on page 3-17 contains detailed specifications of the UP11W G2 cooling system.

Table 3.9: *Cooling system specifications*

Coolant Inlet Temperature	From 0 °C to 45 °C (32 °F to 113 °F) according to the coolant used; see Table 3.12 on page 3-19. From 45 °C to 55 °C (113 °F to 131 °F) with output current derating
Fluid Temperature Increase (1)	6 °C (46 °F)
Coolant Flow	20 l/min
Maximum Flow Allowed	30 l/min
Maximum System Pressure in Relation to the Atmosphere	6 bar (600 kPa)
Load Loss on the Inverter Heatsink (1)	0.84 bar (84 kPa)
Coolant Inlet and Outlet Fittings Used on the Inverter	Stainless steel bulkhead fitting for 16 mm tube, M24X1.5 thread and 24° taper (DIN 3861/ISO 8434-1). According to Figure 3.23 on page 3-17

(1) Considering the 20 l/min flow and the composition of 88,5 % of water, 10 % de glycol and 1,5 % of inhibitor CorteC VpCI-649 in the coolant.

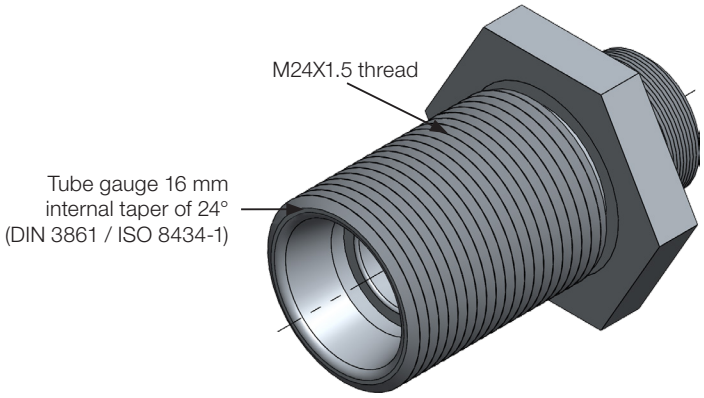


Figure 3.23: *Details of the hydraulic connection on the product*

ATTENTION!
It is recommended to use stainless steel hydraulic connections in the application cooling system.

Figure 3.14 on page 3-13 shows a simplified diagram of a closed cooling system for the UP11W G2.

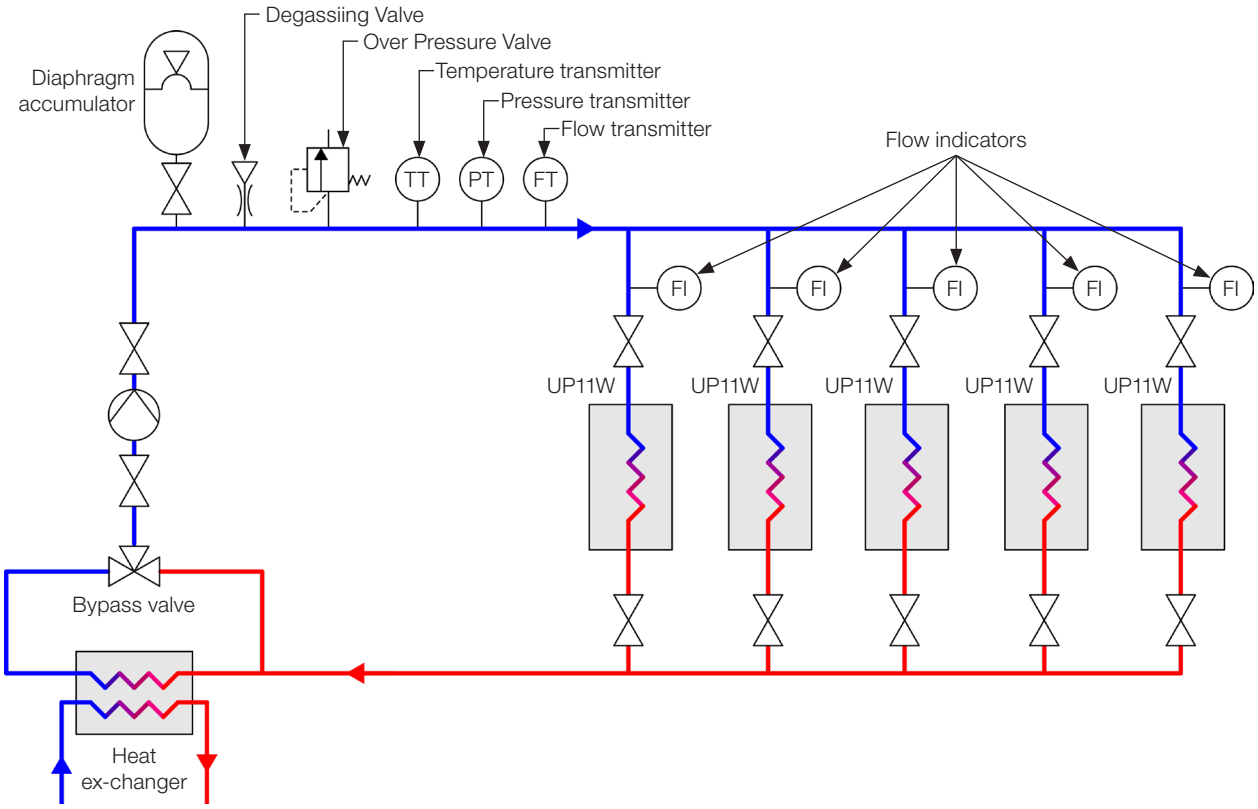


Figure 3.24: *Simplified example of a closed cooling system*

The bypass valve is necessary for the temperature control and protection against condensation. The diaphragm accumulator ensures a quite constant pressure in the cooling system even when great variations occur in the coolant temperature. The pump provides the continuous coolant flow; it is recommended that such pump be made of stainless steel. The acceptable differential pressure in the cooling circuit in relation to the atmosphere must not exceed 6 bar. That must be guaranteed by the over pressure valve.

ATTENTION!
The hoses that connect the cooling system to the UP11W G2 must not conduct electricity.

ATTENTION!
The acceptable differential pressure in the cooling circuit in relation to the atmosphere must not exceed 6 bar.

ATTENTION!
The cooling circuits of the UP11W G2 must not be connected in series in the cooling system circuit.

NOTE!
WEG RSW cooling system can be used for cooling the CFW11W G2 RB. For further information, refer to the RSW User's Manual.

The water used in the coolant must meet the specifications of Table 3.10 on page 3-19. The coolant must not contain any organic sediments or active chemical agents. The coolant is composed of demineralized water, corrosion inhibitor and ethylene glycol.

Table 3.10: *Water specification*

Characteristic	Unit	Value
pH		6 - 8
Hardness	°dH	< 10
Conductivity	µS/cm	< 10
Chlorine	mg/l	< 10
Iron	mg/l	< 0.1
Maximum particle size	µm	< 300

ATTENTION!
Do not use sea or tap water in the coolant.

The specifications of the inverter output current informed in Chapter 8 TECHNICAL DATA on page 8-1 are for a coolant temperature between 10 and 45 °C (50 °F to 113 °F), and the composition according to Table 3.11 on page 3-19.

Table 3.11: *Coolant composition for temperature from 10 to 45 °C (50 °F to 113 °F)*

Component	Proportion
Demineralized water	88.5 %
Ethylene glycol	10 %
Inhibitor CorteC VpCI-649	1.5 %

For the inverter operation at temperatures below 10 °C (50 °F), the concentration of ethylene glycol in the coolant must be increased. The increase of the percentage of ethylene glycol reduces the coolant specific heat and the system heat exchange capacity. Therefore, if the inverter operates with a quantity of ethylene glycol above the specification of Table 3.11 on page 3-19 and coolant temperature of 45 °C (113 °F), the output current must be derated. As the ethylene glycol concentration is normally increased to reduce the coolant freezing point, the coolant temperature reduction can compensate the current derating. Table 3.12 on page 3-19 shows the maximum percentage of the output current as a function of the ethylene glycol concentration and the coolant temperature.

Table 3.12: *Maximum percentage of the output current as a function of the ethylene glycol concentration and the coolant temperature*

		Glycol Concentration				
		10 %	20 %	30 %	40 %	50 %
Coolant Temperature	37 °C	100 %	100 %	100 %	100 %	100 %
	39 °C	100 %	100 %	100 %	100 %	98 %
	41 °C	100 %	100 %	100%	98 %	96 %
	43 °C	100 %	100 %	98 %	96 %	94 %
	45 °C	100 %	98 %	96 %	94 %	92 %
	47 °C	98 %	96 %	94 %	92 %	90 %
	49 °C	96 %	94 %	92 %	90 %	88 %
	51 °C	94 %	92 %	90 %	88 %	86 %
	53 °C	92 %	90 %	88 %	86 %	84 %
	55 °C	90 %	88 %	86 %	84 %	82 %

ATTENTION!
To prevent corrosion, always add 1,5 % of the inhibitor CorteC VpCI-649 to the coolant.

Condensation may occur when the incoming water temperature is significantly lower than the ambient temperature. The water temperature to avoid condensation varies according to the air relative humidity and ambient temperature.

The temperature at which the water vapor contained in the air turns into liquid as small water drops is known as "dew point".

Table 3.13 on page 3-20 shows the dew point in relation to the air relative humidity and to the ambient temperature for an atmospheric pressure of 1 atm. If the water temperature is lower than the indicated value, condensation may occur.

Table 3.13: *Dew point in relation to the air relative humidity and ambient temperature (°C)*

		Air Relative Humidity									
		5 %	10 %	20 %	30 %	40 %	50 %	60 %	70 %	80 %	90 %
Ambient Temperature	10°C	<0	<0	<0	<0	<0	0.1	2.6	4.8	6.7	8.4
	20°C	<0	<0	<0	1.9	6	9.3	12	14.4	16.4	18.3
	25°C	<0	<0	0.5	6.2	10.5	13.8	16.7	19.1	21.3	23.2
	30°C	<0	<0	4.6	10.5	14.9	18.4	21.4	23.9	26.2	28.2
	35°C	<0	<0	8.7	14.8	19.4	23	26.1	28.7	31	33.1
	40°C	<0	2.6	12.7	19.1	23.8	27.6	30.7	33.5	35.9	38
	45°C	<0	6.3	16.8	23.4	28.2	32.1	35.4	38.2	40.7	43

ATTENTION!
The water temperature must always be higher or equal to the dew point.

3.3 UC11 MECHANICAL INSTALLATION

Mounting of the UC11RB G2 on the panel door: control rack with flange mount and ICUP board shield mounted inside the door. The control rack is mounted with four screws M3 (recommended torque: 0.5 N.m).

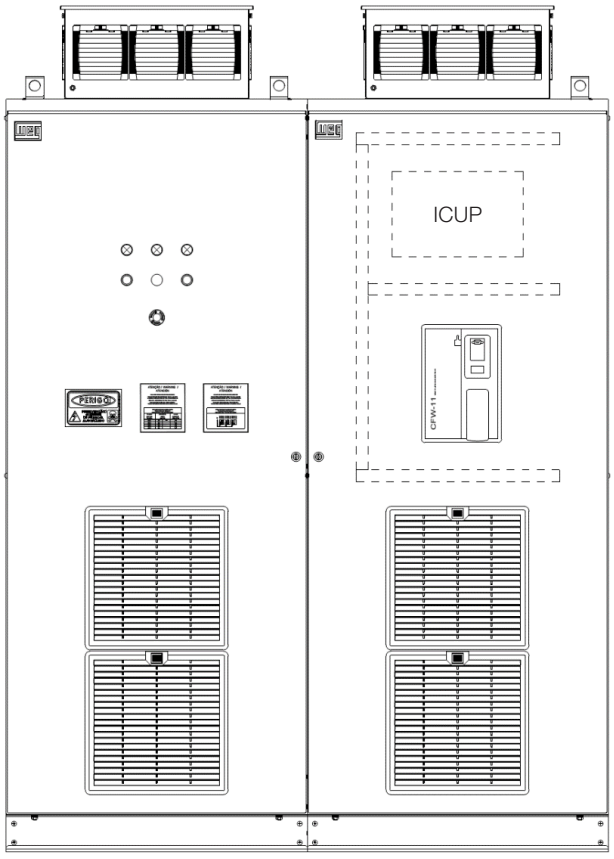


Figure 3.25: *Example of mounting of the control rack in the panel*

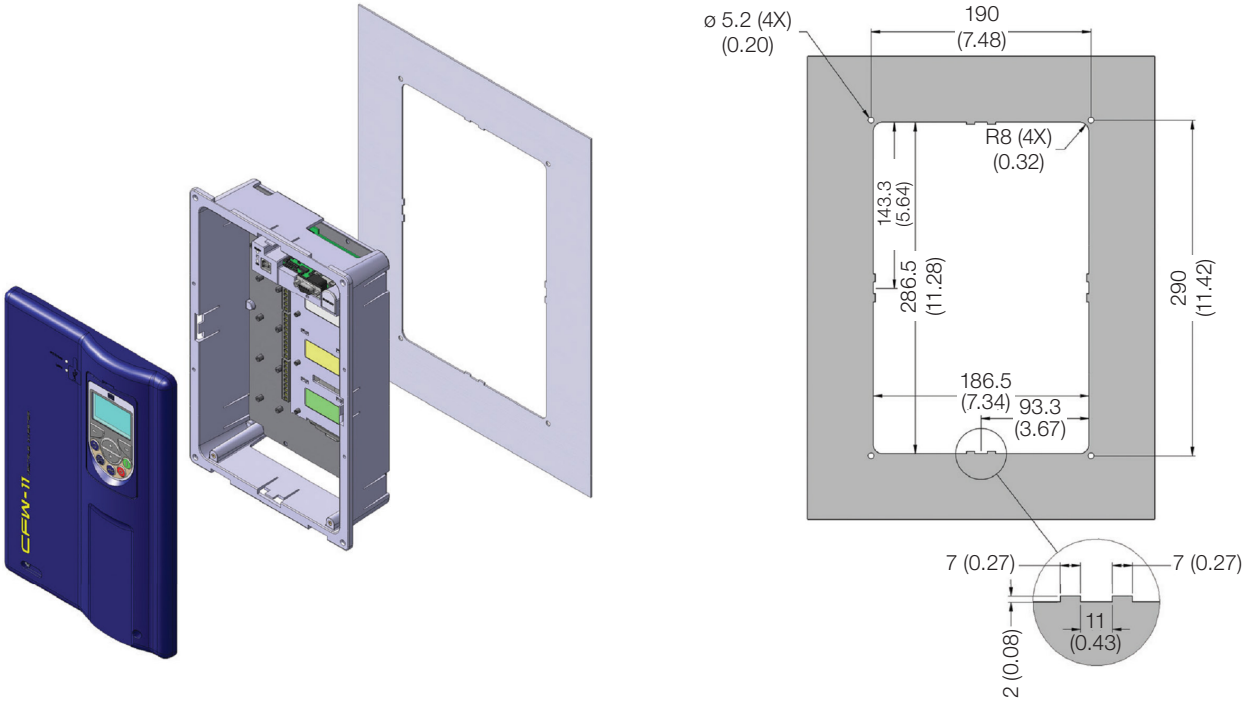


Figure 3.26: *Mounting of the control rack and necessary slots in mm (in)*

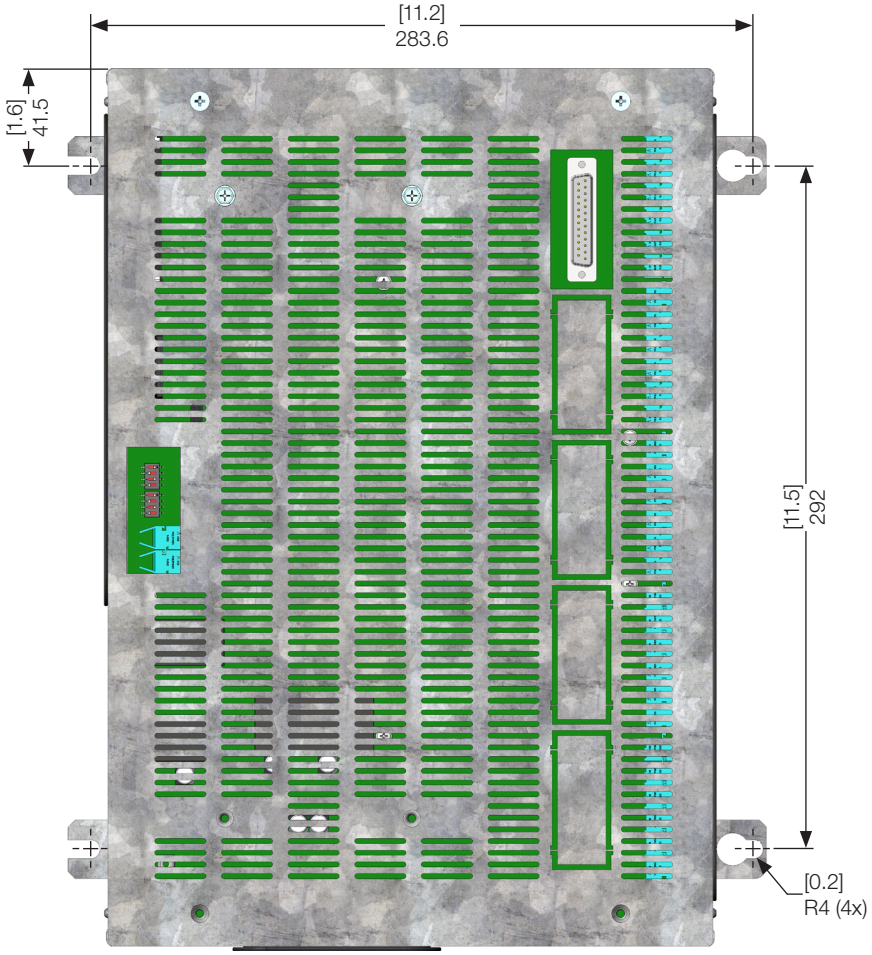


Figure 3.27: *Mounting of the base of the ICUP module in mm (in)*

The shield of the ICUP board is mounted with four screws M6 (recommended torque: 8.5 N.m).

3.4 ELECTRICAL INSTALLATION

DANGER!
The following information is intended to be a guide for proper installation. Comply with applicable local regulations for electrical installations.

DANGER!
Make sure the power supply is disconnected before starting the connections.

ATTENTION!
The CFW-11M G2 RB and CFW-11W G2 RB can be connected to circuits with short-circuit capacity of up to 100000 symmetric Arms (maximum 480 V/690 V).

ATTENTION!
The short-circuit protection of the converter does not provide short-circuit protection for the feeder circuit. The short-circuit protection of the feeder circuit must be provided in accordance with the applicable local regulations.

3.4.1 Pre-Charge

The resistors of the pre-charge circuit must be sized according to the following criteria:

- Maximum voltage.
- Maximum energy.
- Power overload capacity of the resistors during the pre-charge period (energy dissipation capacity).

Table 3.14: *Sizing of the pre-charge*

Peak current during the pre-charge (A)		0.82 x (V_{line}/R)
Pre-charge duration (1)	UP11-01 G2	0.1.N.R
	UP11-02 G2	0.2.N.R
	UP11W-01 G2	0.11.N.R

(1) This calculation considers the use of the same number of power units in the regenerative frequency converter and in the inverter connected to the motor. When the CFW11M RB G2 or CFW11W RB G2 feeds several other inverters, you must consult WEG for the correct sizing of the pre-charge resistor.

Being R the ohmic value of the resistor used on each phase and N the number of regenerative power units.

Table 3.15 on page 3-22 contains the maximum ohmic value that can be applied to the pre-charge resistors.

Table 3.15: *Maximum pre-charge resistor value for the CFW11M G2 RB*

Nº. of UP11s	Power Supply 380-480 V		Power Supply 500-600 V		Power Supply 660-690 V	
	Resistance	Dissipated Energy	Resistance	Dissipated Energy	Resistance	Dissipated Energy
1	5.0 Ω	6.5 kJ	11.0 Ω	5.5 kJ	7.5 Ω	8.0 kJ
2	2.5 Ω	13.0 kJ	3.8 Ω	11.0 kJ	5.0 Ω	16.0 kJ
3	1.5 Ω	19.5 kJ	2.5 Ω	16.5 kJ	3.5 Ω	24.0 kJ
4	1.2 Ω	26.0 kJ	2.0 Ω	22.0 kJ	2.5 Ω	32.0 kJ
5	1.2 Ω	32.5 kJ	1.8 Ω	27.5 kJ	2.0 Ω	40.0 kJ

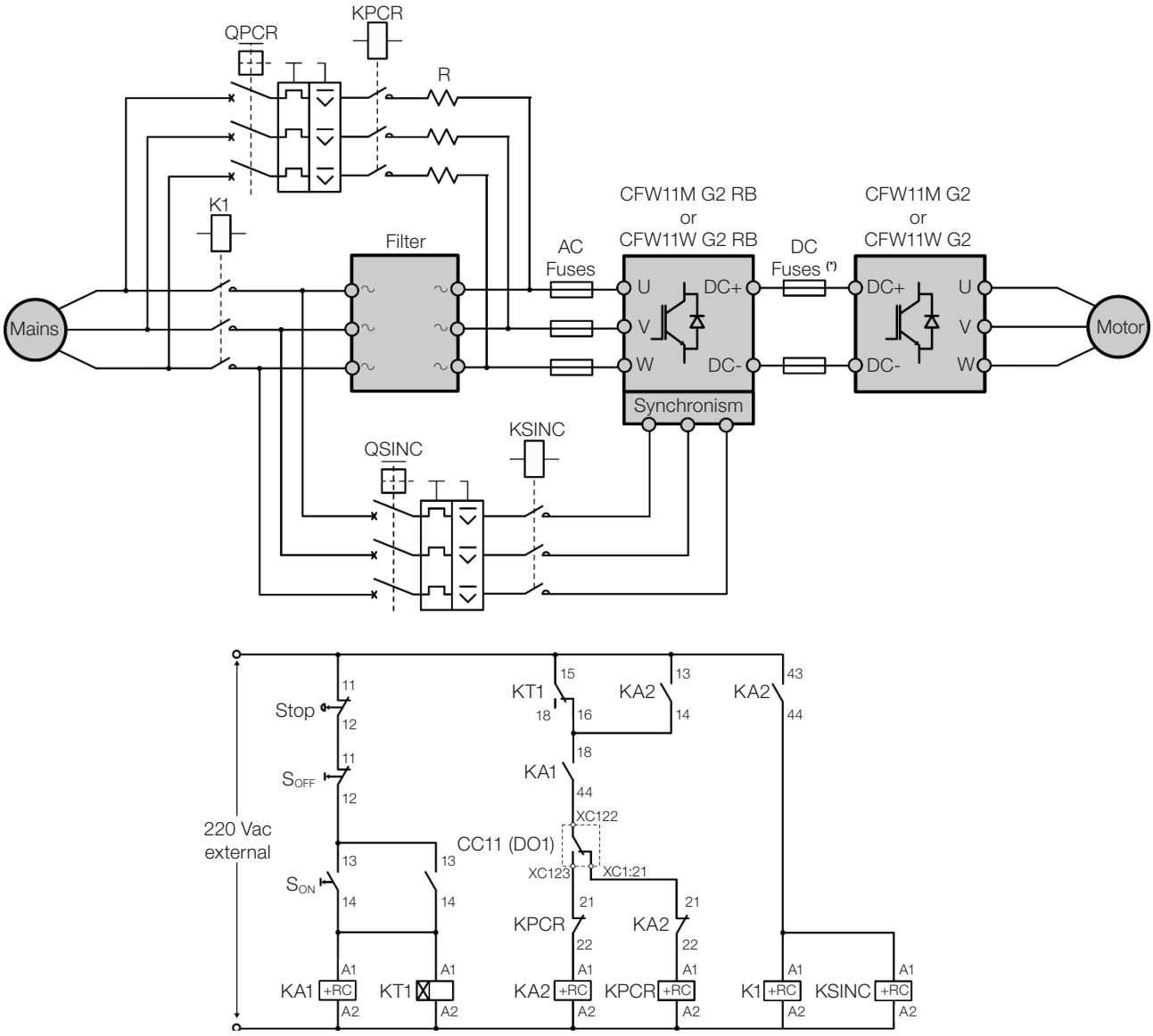
Table 3.16: Maximum pre-charge resistor value for the CFW11W G2 RB

N° of UP11Ws	Power Supply 500-690 V	
	Resistance	Dissipated Energy
1	5.5 Ω	9.0 kJ
2	3.0 Ω	18.0 kJ
3	2.0 Ω	27.0 kJ
4	1.4 Ω	36.0 kJ
5	1.2 Ω	45.0 kJ

E.g.:

In a drive consisting of three regenerative power units plus three output power units whose line voltage at the converter input is 690 Vrms (UP11-01 G2), the values obtained will be as follows:

- Using three 3 Ω resistors (one per phase), each resistor must withstand 24,0 kJ.
- The manufacturer of the resistor can inform the energy the component withstands.
- The peak current during the pre-charge will be 188.6 A and the pre-charge duration will be 0.9 s.



(*) If only one power unit is used at the output, it is not necessary to use fuses on the DC Link.

Figure 3.28: Example of a pre-charge activation circuit

The power supply of the CFW-11M G2 RB or CFW-11W G2 RB regenerative frequency converters can be done via contactor or motorized circuit breaker (represented by K1), observing that its command must be interlocked with the command of the KPCR pre-charge contactor. Figure 3.28 on page 3-23 shows an example of a recommended pre-charge circuit with the simplified power and control diagrams. The digital relay output DO1 of the CC11 board must be configured with the "Pre-Charge OK" function (P0275 = 25). This relay must be used to command the pre-charge contactor and the main contactor (motorized circuit breaker). In addition, the duration of the pre-charge must be timed to protect the components of the auxiliary circuit (resistors, contactor). This function is performed by a timing relay with on-delay, represented in Figure 3.28 on page 3-23 by RT1. The KSINC contactor ensures that the synchronism circuit will only be powered after the completion of the pre-charge. The QPCR and QSINC circuit breakers protect the pre-charge and synchronism circuits respectively.

3.4.2 Busbars

The panel busbars must be sized according to the converter output current and the drive input current. It is recommended to use copper busbars. In case it is necessary to use aluminum busbars, it is necessary to clean the contacts and use an anti-oxidant compound. If the compound is not used, any copper and aluminum joint will undergo accelerated corrosion.

3.4.3 Fuses

Fuses must be installed at the input of each power unit, that is, each power unit must be individually proteced with fuses at their input.

Ultrafast type fuses (UR) must be used at the input.

For UL conformity, use class J fuses at the converter power supply with current not above the values of Table 3.17 on page 3-24.

Table 3.17: *Recommended fuses*

Model	Current (A)	Voltage (V)	Duty	Recommended WEG Fuses	
				NH aR Flush End	
				In (A)	Modelo
UP11-02 G2	634	380-480	ND	800	FNH3FEM-800Y-A
	515		HD		
UP11-01 G2	496	500-600	ND	630	FNH3FEM-630Y-A
	380		HD		
	439	660-690	ND	550	FNH3FEM-550Y-A
	340		HD		
UP11W-01 G2	780	500-690	ND	1000	FNH3FEM-1000Y-A
	640		HD		

In Figure 3.29 on page 3-25 and Figure 3.30 on page 3-25 the fuse connection schemes are presented.

NOTE!
As noted in Figure 3.29 on page 3-25, when using one regenerative UP11 plus one output UP11, no DC fuses are required.

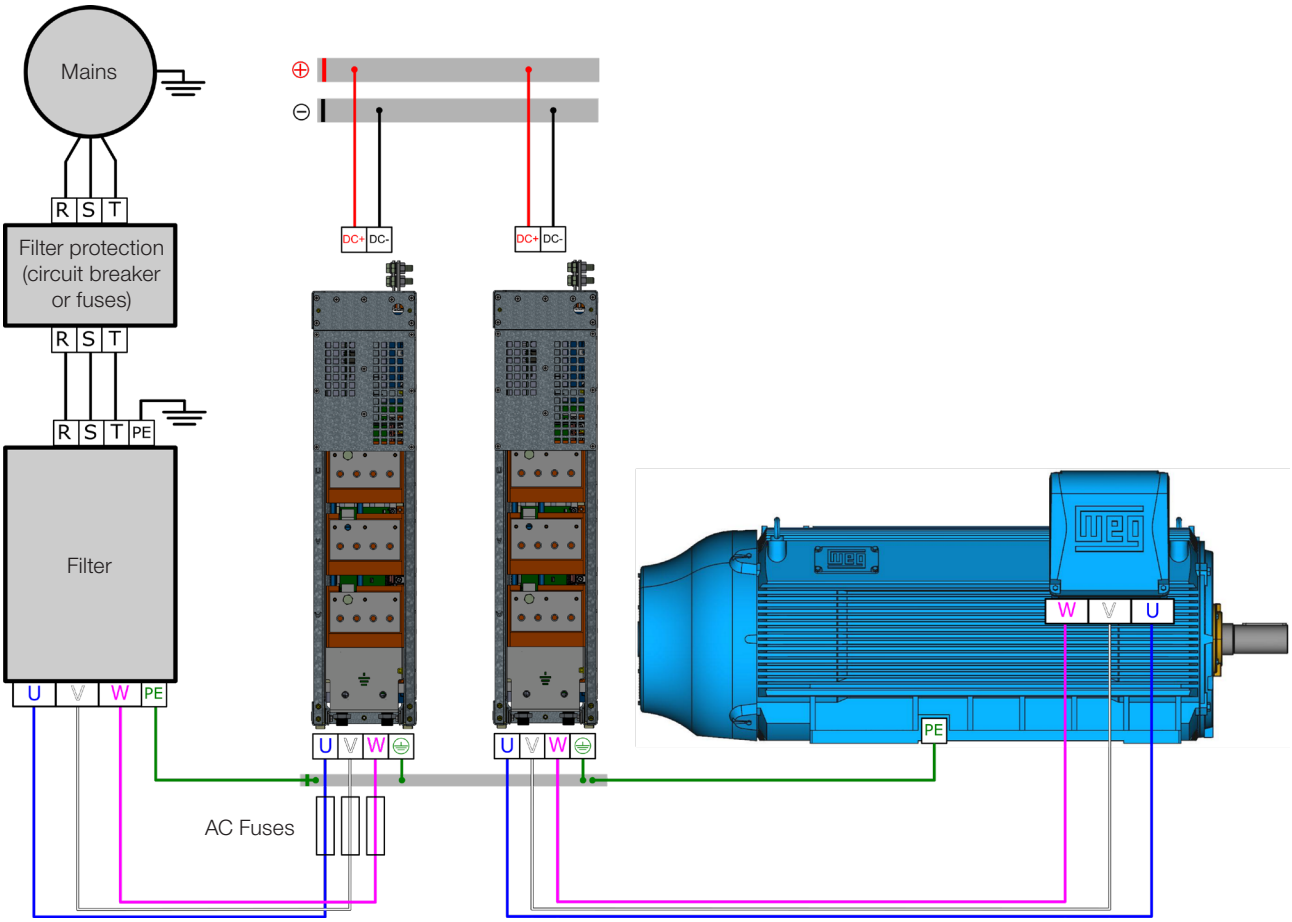


Figure 3.29: *Fuse connection diagram for one regenerative UP11 plus one output UP11*

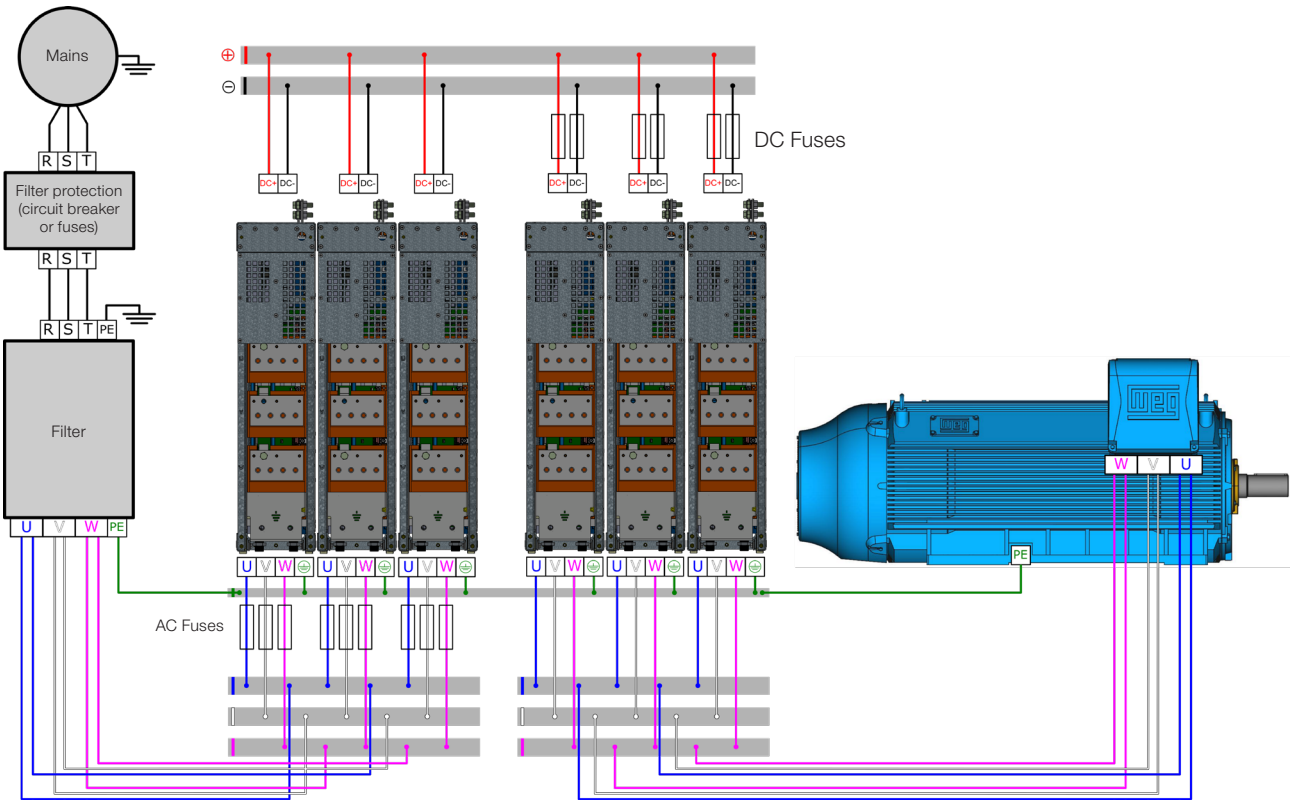


Figure 3.30: *Fuse connection diagram for three regenerative UP11s plus three output UP11s*

3.4.4 General Wiring Diagram

Figure 3.31 on page 3-26 shows the general diagram for a converter with five Power Units (UP11). It shows the connections between the Control Unit UC11RB and the PUs (Connectors DB25 XC40 and Fiber Optics), power connections of the PUs (DC+, DC-, U, V, W and GND), and auxiliary power supply connections of the cooling (220 V), of the UP11 (24 Vdc) and of the UC11 (24 Vdc). For a reduced number of UP11, connect them in increasing order (1, 2, 3, etc.), leaving the last positions without connection. This diagram is valid for both air-cooled UP11 G2 and water-cooled UP11W G2, except for the XC33 connector (fan connection), which does not exist on the UP11W G2.

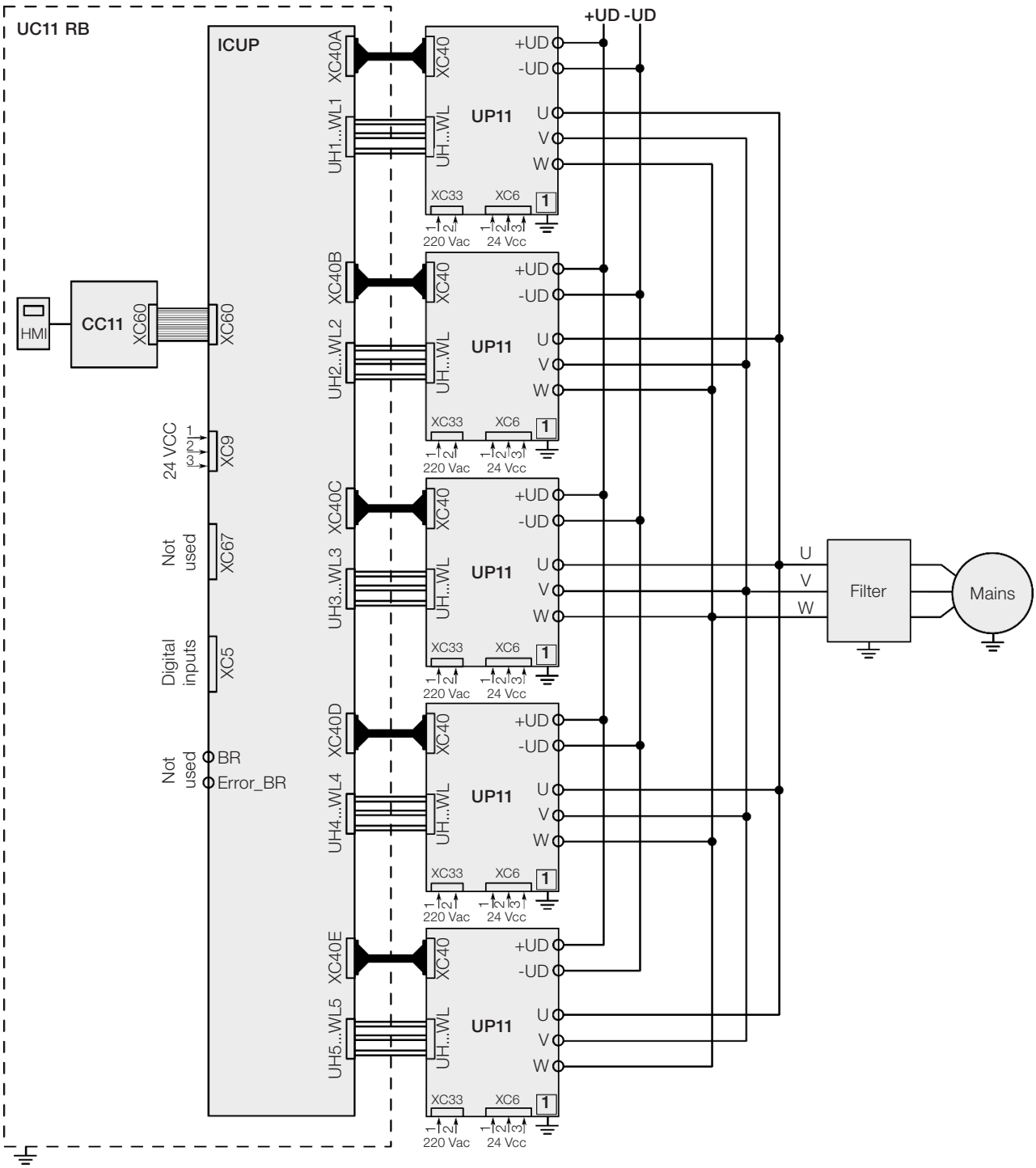


Figure 3.31: *General wiring diagram*

3.4.5 Power Connections

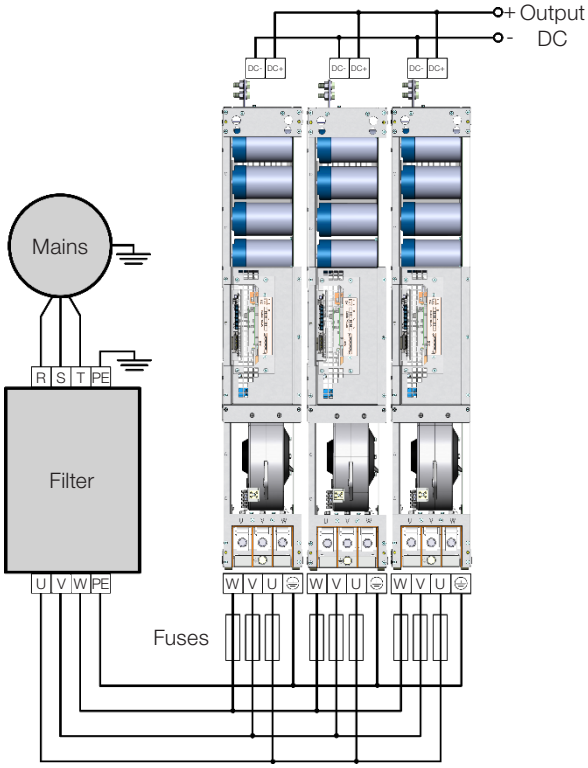


Figure 3.32: *Power and grounding connections*

The DC+ and DC- connections of the UP11 G2 and UP11W G2 are fastened with 4 screws M12X35 (recommended torque: 60 N.m); see Figure 3.33 on page 3-27 and Figure 3.34 on page 3-28.

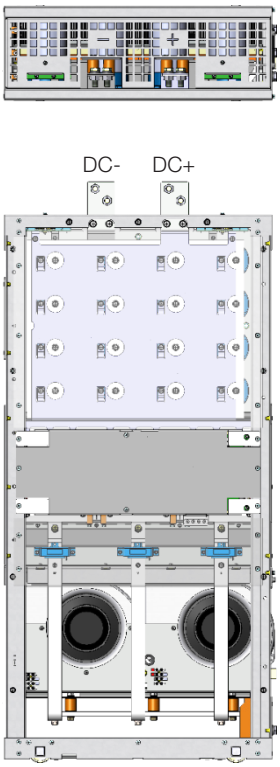


Figure 3.33: *DC output terminals of the UP11 G2*

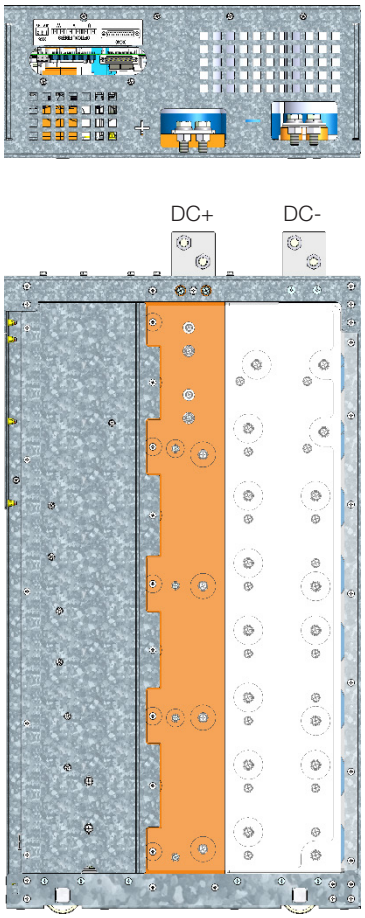


Figure 3.34: *DC output terminals of the UP11W G2*

DC+: Positive pole of the DC output voltage.

DC-: Negative pole of the DC output voltage.

On the UP11 G2 (air-cooled), the U, V and W connections are made through 3 screws M12X45 (recommended torque: 60 N.m; see Figure 3.35 on page 3-29. The screw used to fasten the grounding cable of the UP11 G2 is M12X25 (recommended torque: 60 N.m).

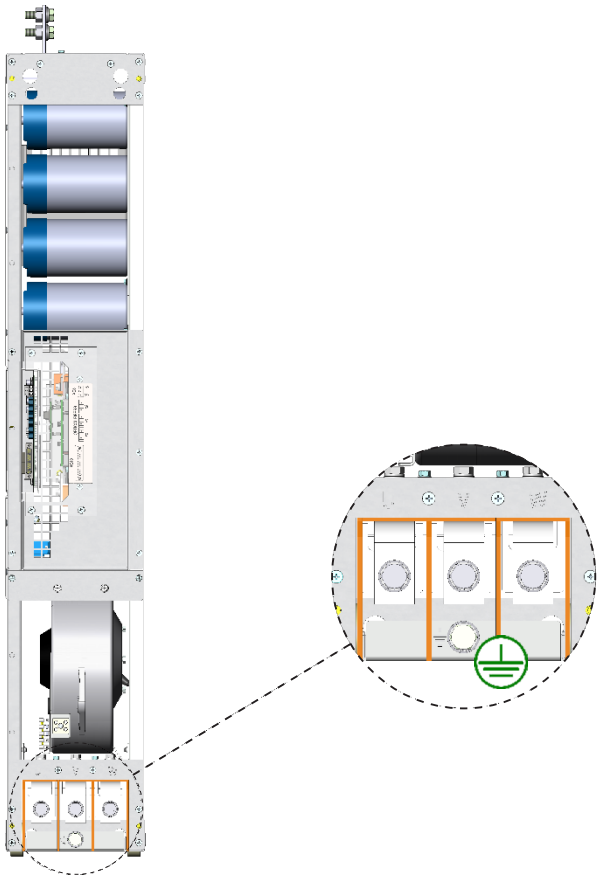


Figure 3.35: *Input terminals U, V, W and ground on the UP11 G2*

On the UP11W G2 (water-cooled), the U, V and W connections are made through 12 screws M12X25 (recommended torque: 60 N.m; see Figure 3.36 on page 3-30). Two screws M12X25 (recommended torque: 60 N.m) are used to fasten the grounding cable of the UP11W G2.

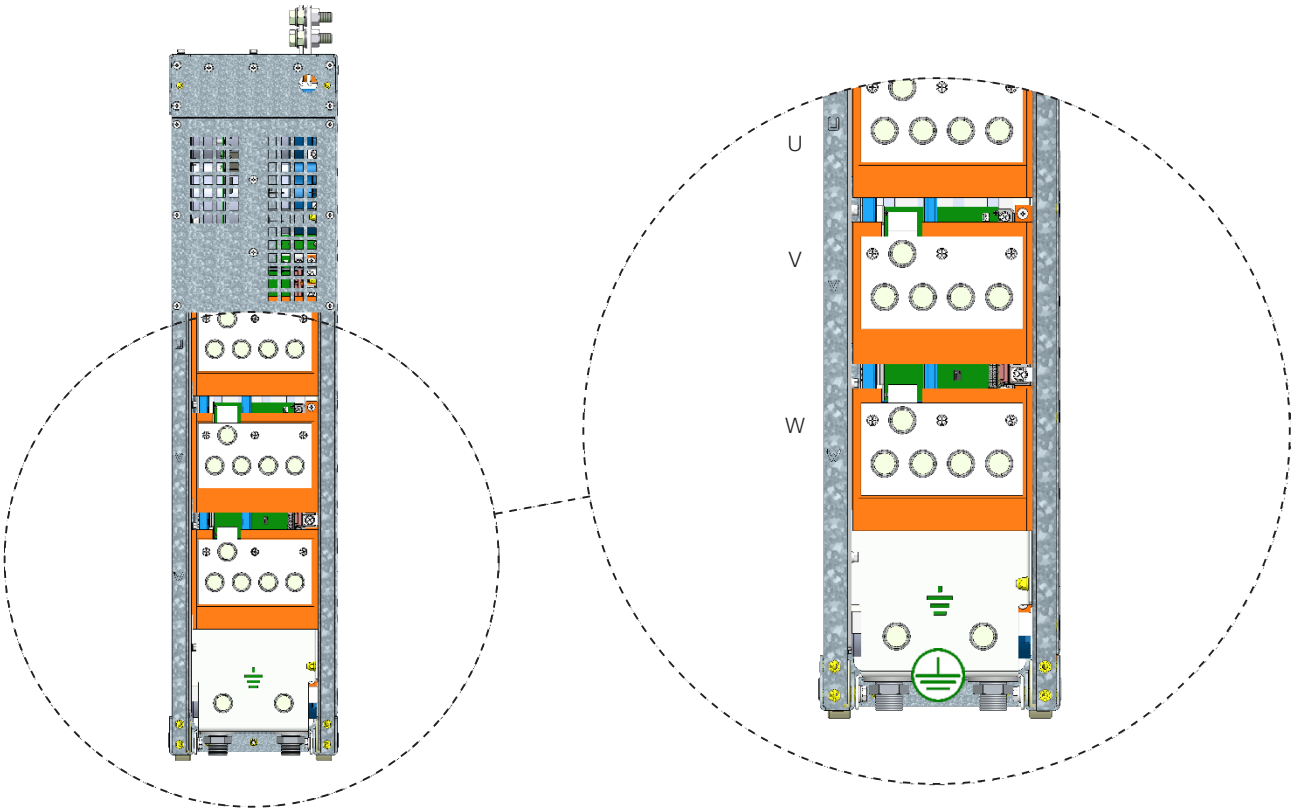


Figure 3.36: *Input terminals U, V, W and ground on the UP11W G2*

U, V and W: connections to the filter.

: Grounding cable connection.

For a better current distribution between the UP11 G2 or UP11W, it is recommended that their output connections be interconnected through a single paralleling busbar. The length of the cables between the UP11 G2 or UP11W and the paralleling busbar must be as short as possible.

ATTENTION!
The output cables U, V and W of the UP11 G2 and UP11W G2 must have the same length.

ATTENTION!
If a busbar is used for parallelism of the power units, the filter cables must be distributed as evenly as possible in the connection to the paralleling busbar, as shown in Figure 3.37 on page 3-31. Distance "L" must be kept constant.

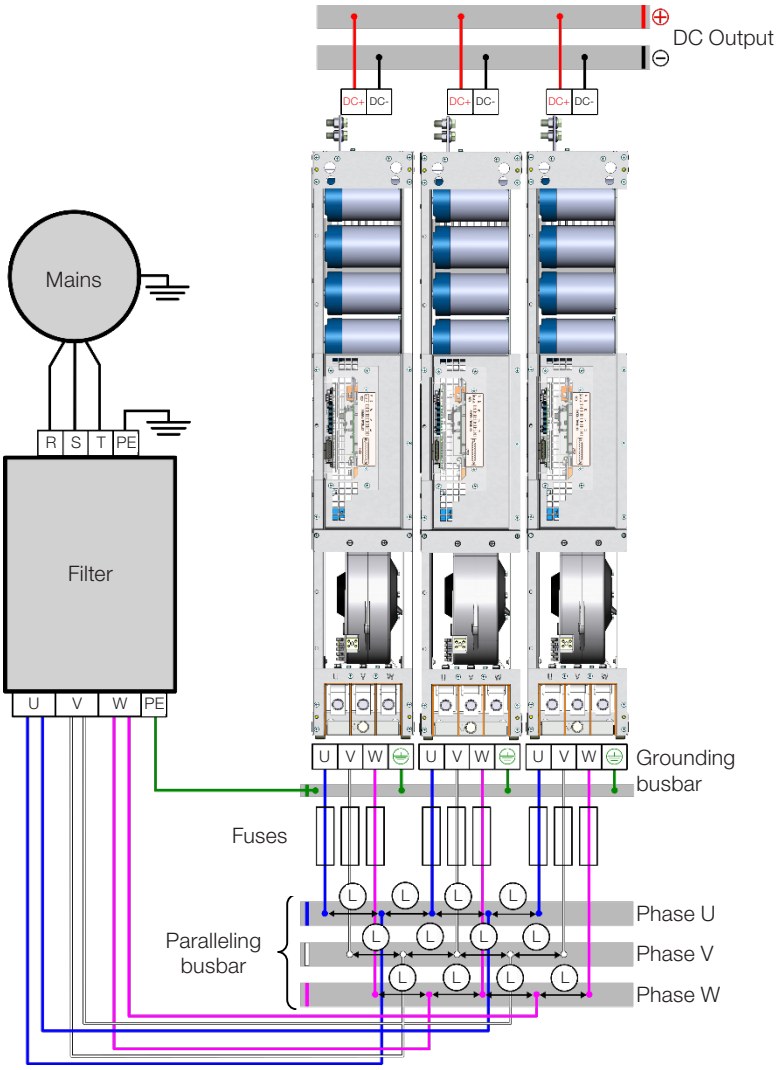


Figure 3.37: *Recommended distribution for the filter cables*

3.4.6 Input and Grounding Connections

ATTENTION!
Use proper lugs for the power and grounding connection cables.

ATTENTION!
Sensitive equipment, such as PLCs, temperature controllers and thermocouple cables, should be at least 0.25 m away from the converter and from the cables connecting the input filter to the converter.

DANGER!
Incorrect cable connection:
- Check all the connections before energizing the converter.
- In case of replacement of an existing converter by a CFW-11M G2 RB, check if all the installation and wiring connected to it complies with the instructions of this manual.

DANGER!
Provide a disconnecting device for the converter power supply. This device must cut off the inverter power supply whenever necessary (during maintenance, for instance).

ATTENTION!
The supply voltage must not exceed the converter rated values (see Table 8.1 on page 8-2 and Table 8.2 on page 8-3).

ATTENTION!
Capacitors for power factor correction must not be used at the input (U, V, W).

NOTE!
The gauges indicated in Table 3.18 on page 3-32 and Table 3.19 on page 3-33 are reference values only. For the proper wiring sizing, consider the installation conditions and the maximum permissible voltage drop.

Use two parallel cables with the gauge indicated in Table 3.18 on page 3-32 to interconnect connections U, V and W of the UP11 with the paralleling busbar (filter output).

Table 3.18: *Connection cables U, V and W*

Model	Current (A)	Voltage (V)	Duty	Minimum Cable Cross Section (mm²)
UP11-02 G2	634	380-480	ND	(2X) 300
	515		HD	(2X) 185
UP11-01 G2	496	500-600	ND	(2X) 185
	380		HD	(2X) 120
	439	660-690	ND	(2X) 150
	340		HD	(2X) 120
UP11W-01 G2	780	500-690	ND	(4X) 120
	640		HD	(4X) 95

ATTENTION!
Cables U, V and W of all phases of all UP11 G2 and UP11W G2 must have the same length to prevent current unbalance.

The characteristics of the cable used to connect the converter to the filter, as well as its interconnection and routing, are extremely important to avoid electromagnetic interference in other devices.

DANGER!
Do not share the grounding wiring with other devices that operate with high currents (e.g., high power motors, welding machines, etc.).

ATTENTION!
The neutral conductor of the line that powers up the converter must be solidly grounded; however, this conductor must not be used to ground the converter.

DANGER!
The converter must be connected to a protection grounding (PE).
Observe the following:
- Connect the converter grounding points to a specific grounding rod or specific grounding point or to the general grounding point (resistance ≤ 10 Ω).
- Use a minimum cable gauge for connection to the ground as indicated in Table 3.19 on page 3-33. if local standards require different gauges, they must be observed.
- For compatibility with IEC 61800-5-1, use at least one 10 mm² copper cable to connect the converter to the protective earth, since the leakage current is higher than 3.5 mA AC.

Use the cables with the gauge indicated in Table 3.19 on page 3-33 to ground the UP11 power units.

Table 3.19: Grounding cables

Model	Current (A)	Voltage (V)	Duty	Minimum Cable Cross Section (mm²)
UP11-02 G2	634	380-480	ND	300
	515		HD	185
UP11-01 G2	496	500-600	ND	185
	380		HD	120
	439	660-690	ND	150
	340		HD	120
UP11W-01 G2	780	500-690	ND	(2X) 120
	640		HD	(2X) 95

3.4.7 Terminals Recommended for Power Cables

Table 3.20: Terminals recommended for power cables

Cable Gauge [mm²]	Screw	Manufacturer	Lug Terminal, Code	Crimping Tool, Code	Number of Crimps
95	M12	Hollingsworth	RM95-12	Hydraulic tool H6-500	1
		Tyco	XCT 95-12	UNIPRESS 6/120 +COF+CHARG Item TE: 2107475-2	1
120	M12	Hollingsworth	RM120-12	Hydraulic tool H6-500	1
		Burndy (FCI)	YA28L	Tool without die: MY29-3 or Y644 or Y81 Tool+die: Y35 or Y750 / U29RT	1
150	M12	Hollingsworth	RM150-12	Hydraulic tool H6-500	1
		Burndy (FCI)	YA30L	Tool without die: Y644 or Y81 Tool+die: Y35 or Y750 / U30RT	1
185	M12	Hollingsworth	RM185-12	Hydraulic tool H6-500	1
		Burndy (FCI)	YA31L	Tool without die: Y644 or Y81 Tool+die: Y35 or Y750 / U31RT	1
300	M12	Hollingsworth	RM300-12	Hydraulic tool H6-500	1
		Burndy (FCI)	YA36L2	Tool without die: Y644 or Y81 Tool+die: Y35 or Y750 / U36RT	1

3.4.8 Output Connections

The DC link and each UP11 G2 or UP11W G2 can be interconnected with flexible braids as in the example of Figure 3.38 on page 3-34, sized to withstand the DC link current, according to Table 8.1 on page 8-2. Figure 3.39 on page 3-34 shows an example of a flexible braid used by WEG.

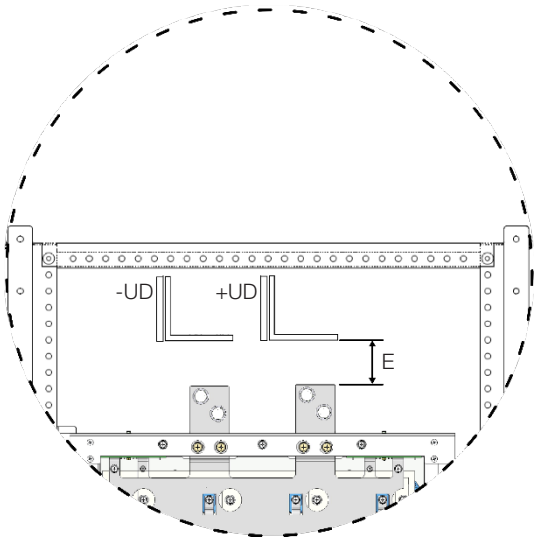


Figure 3.38: *Side view of the connections of the flexible braids and fuses*

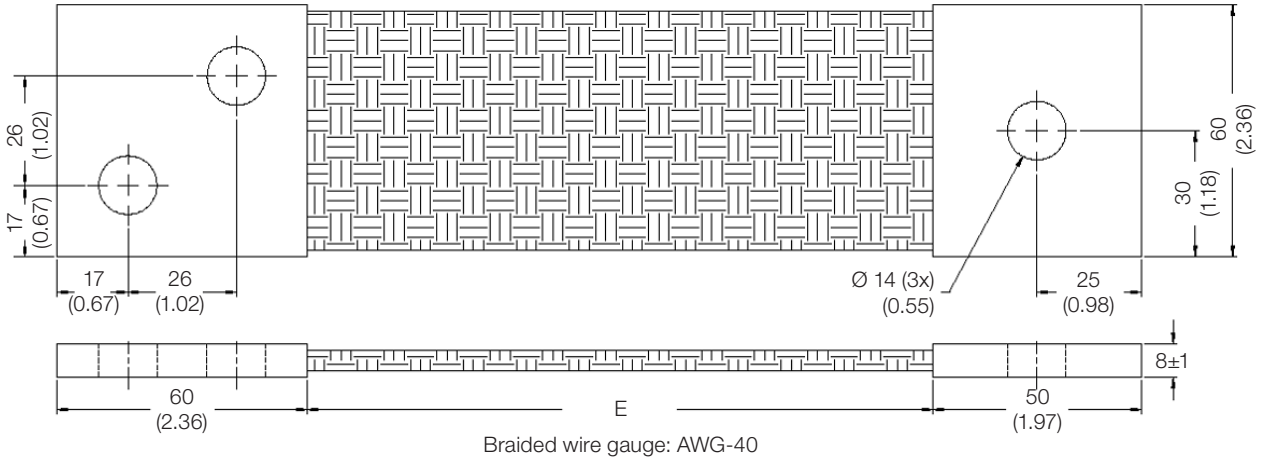


Figure 3.39: *Example of flexible braid - mm (in)*

NOTE!
It is important that all the flexible braids have the same length (defined by dimension "E"), which will depend on the panel construction.

3.4.9 Input Filters

3.4.9.1 Basic Definitions

For the operation of the regenerative frequency converter, it is necessary to use an input filter to eliminate the circulation of high frequency currents generated by the switching of the regenerative frequency converter IGBTs on the power grid. In this manual, input filters are the components connected between the power grid and the regenerative frequency converter input.

3.4.9.2 How to Specify the Filter Model

WEG has input filters ready to be used with each of its regenerative frequency converters. To specify the model of the input filter, enter the voltage and current values into the respective smart code fields for rated supply voltage and rated input current, as in the example of Table 3.21 on page 3-35.

Table 3.21: Smart code of the input filters

Example	WLCL	0634	T	4
Field denomination	WEG filter	Filter rated current	Number of phases	Rated voltage
Available options		Check Table 3.22 on page 3-35 and Table 3.23 on page 3-35	T = three-phase	4 = 380...480 V 5 = 500...600 V 6 = 660...690 V

Table 3.22: Rated current of the input filters for the UP11 G2 (air cooling)

380-480 V	500-600 V	660-690 V
0634 = 634 A	0496 = 496 A	0439 = 439 A
1205 = 1205 A	0942 = 942 A	0834 = 834 A
1807 = 1807 A	1414 = 1414 A	1251 = 1251 A
2409 = 2409 A	1885 = 1885 A	1668 = 1668 A
3012 = 3012 A	2356 = 2356 A	2085 = 2085 A

Table 3.23: Rated current of the input filters for the UP11W G2 (water cooling)

500-690 V
0780 = 780 A
1482 = 1482 A
2223 = 2223 A
2964 = 2964 A
3705 = 3705 A

3.4.10 Synchronism

The CFW-11M G2 RB and the CFW-11W G2 RB monitor the line voltage (R, S and T) at the converter input by means of a synchronism board and two transformers. The signals obtained are used in the control of the regenerative frequency converter.

The synchronism circuit wiring diagram can be seen in Figure 3.28 on page 3-23. The KSINC contactor must be closed together with the main contactor K1. It is recommended to use a circuit breaker (QSINC) to protect the synchronism transformers.

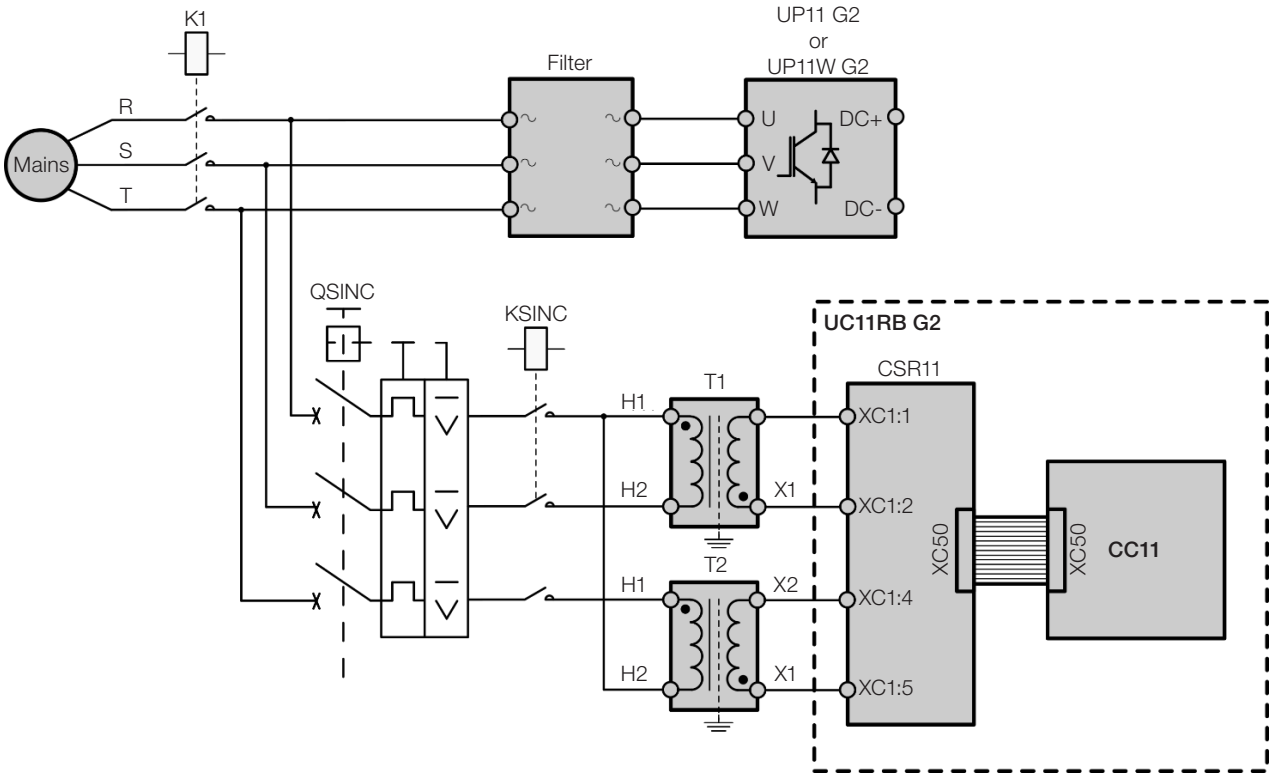


Figure 3.40: Synchronism wiring diagram

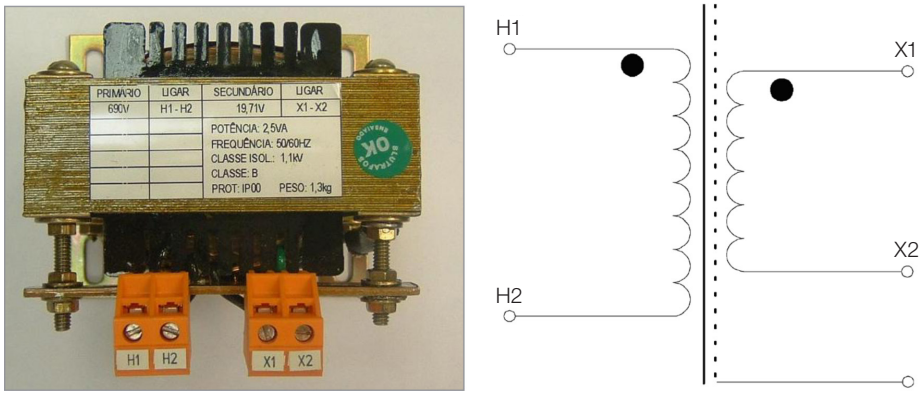


Figure 3.41: *Synchronism transformer*

WEG supplies the synchronism transformers for panel mounting. Figure 3.42 on page 3-36 shows this mounting.

ATTENTION!
The shield of the synchronism transformers must be grounded.

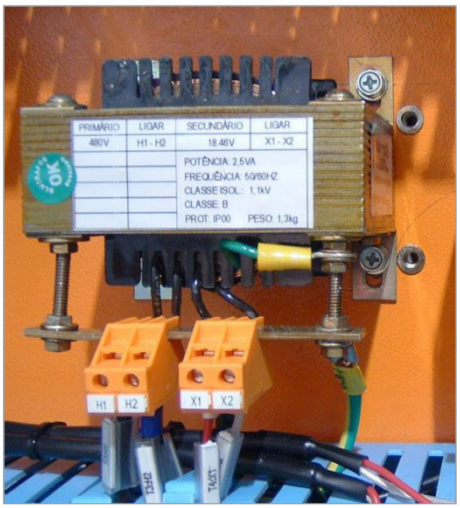


Figure 3.42: *Mounting example of the transformers*

Table 3.14 on page 3-22 shows the specification of the synchronism transformer

Table 3.24: *Synchronism transformer specifications*

Input Voltage of CFW11-11M/W G2 RB	380 V - 480 V	500 V - 690 V
Rated voltage of the primary H1-H2	480 V	690 V
Transformer ratio N_S/N_P	1/26	1/35
f (frequency)	50 Hz/60 Hz	
S (power)	2.5 VA	
Voltage tolerance	± 1 %	
Steady state overvoltage	10 %	
Insulation Class	1.1 kV	
Class	B	
Insulation		
Primary to secondary	3000 Vca / 1 min	
Primary to shield	3000 Vca / 1 min	
Primary to enclosure	3000 Vca / 1 min	
Be in accordance wit UL508 standard as the insulation material and manufacturing		
Keep the core with low saturation to mantain good linearity between the primary and secondary		
Shielding between the primary and secondary: metallic ribbon		

Figure 3.43 on page 3-37, showing the CSR11 synchronism board, displays connector XC1, which receives the signals coming from the synchronism transformers. Connector XC50, which makes the interconnection with the CC11 RB control board, is also shown. Figure 3.44 on page 3-37 shows this connection and Figure 3.45 on page 3-38 shows the board assembly inside the UC11RB G2.

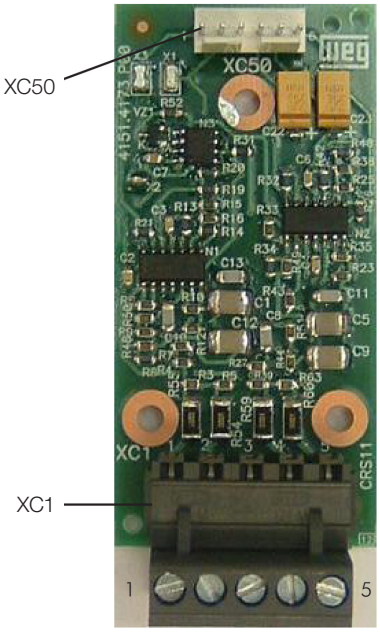
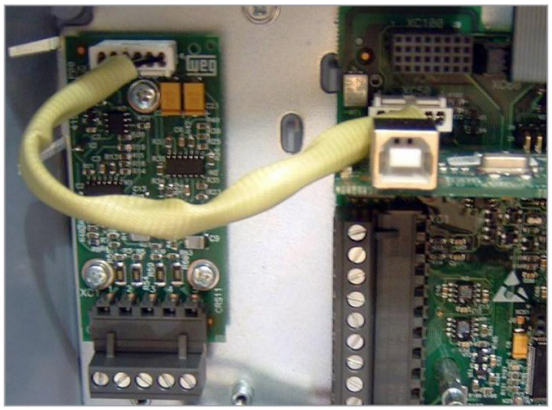


Figure 3.43: *Synchronism board*

ATTENTION!
Shielded cables must be used to connect the signals to connector XC1 of the synchronism board. It is recommended to ground the cable shield according to Item 3.4.11.3 CC11 Connections on page 3-46.



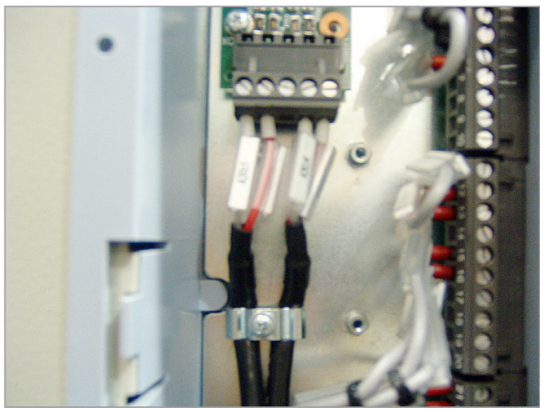


Figure 3.44: *Connection of the CSR11 synchronism board*

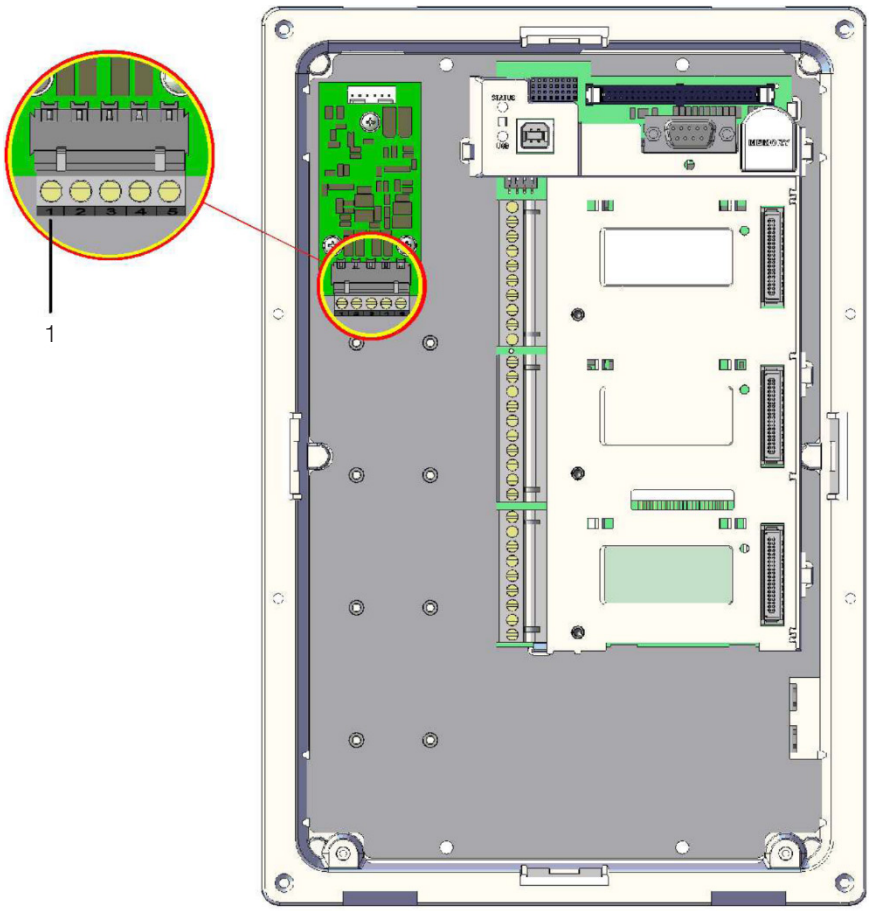


Figure 3.45: *Assembly of the CSR11 board in the UC11RB G2*

3.4.11 Control Connections

3.4.11.1 UP11 G2 and UP11W G2 Connections

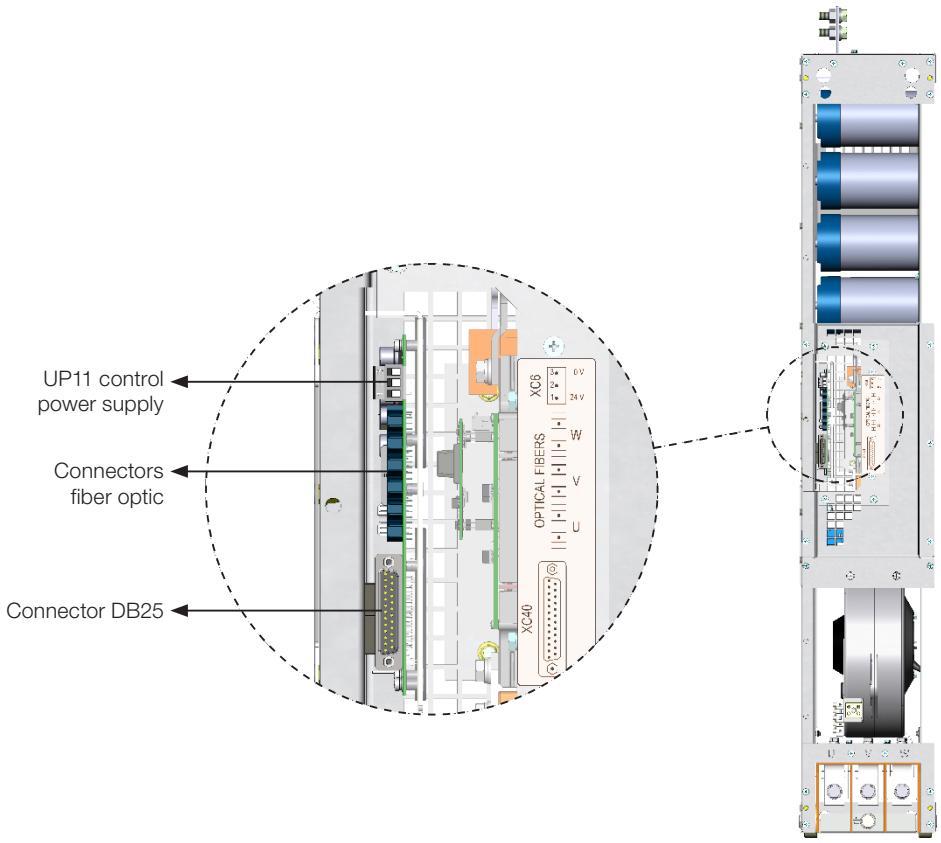


Figure 3.46: *Control cable connection points on the UP11 G2*

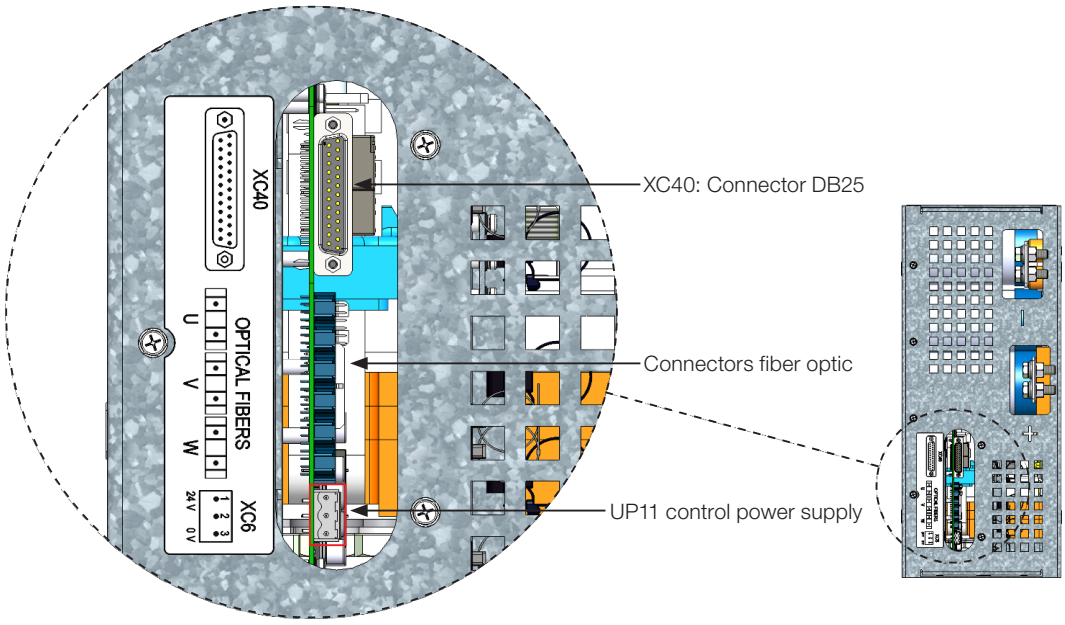


Figure 3.47: *Control cable connection points on the UP11W G2*

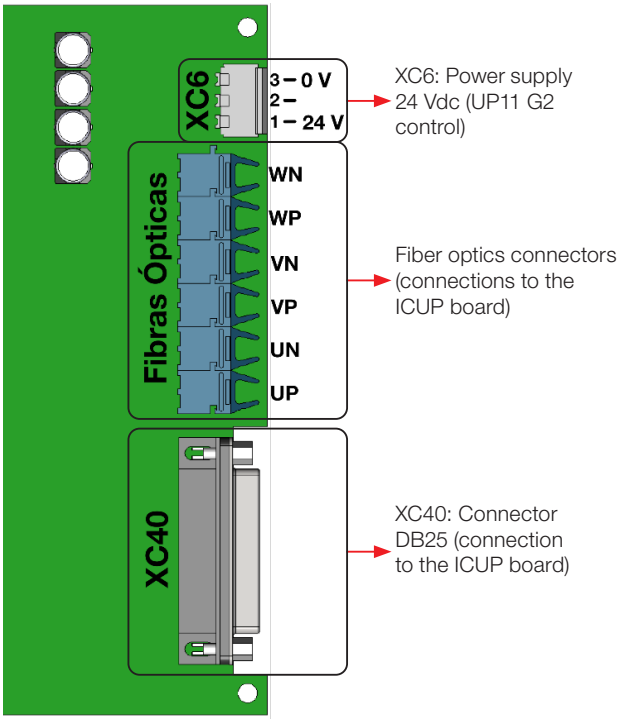


Figure 3.48: *Identification of the control connections*

The electronics of the UP11 G2 and UP11W G2 is powered via connector XC6, located on the IUP board; it is described in Table 3.25 on page 3-40.

Table 3.25: *Description of connector XC6*

XC6		Function	Specifications
1	+24 Vdc	Positive pole of the +24 Vdc power supply	24 Vdc power supply(± 3 %) Consumption: 750 mA per UP11 G2
2	NC	Not connected	
3	GND	Reference of the +24 Vdc power supply	

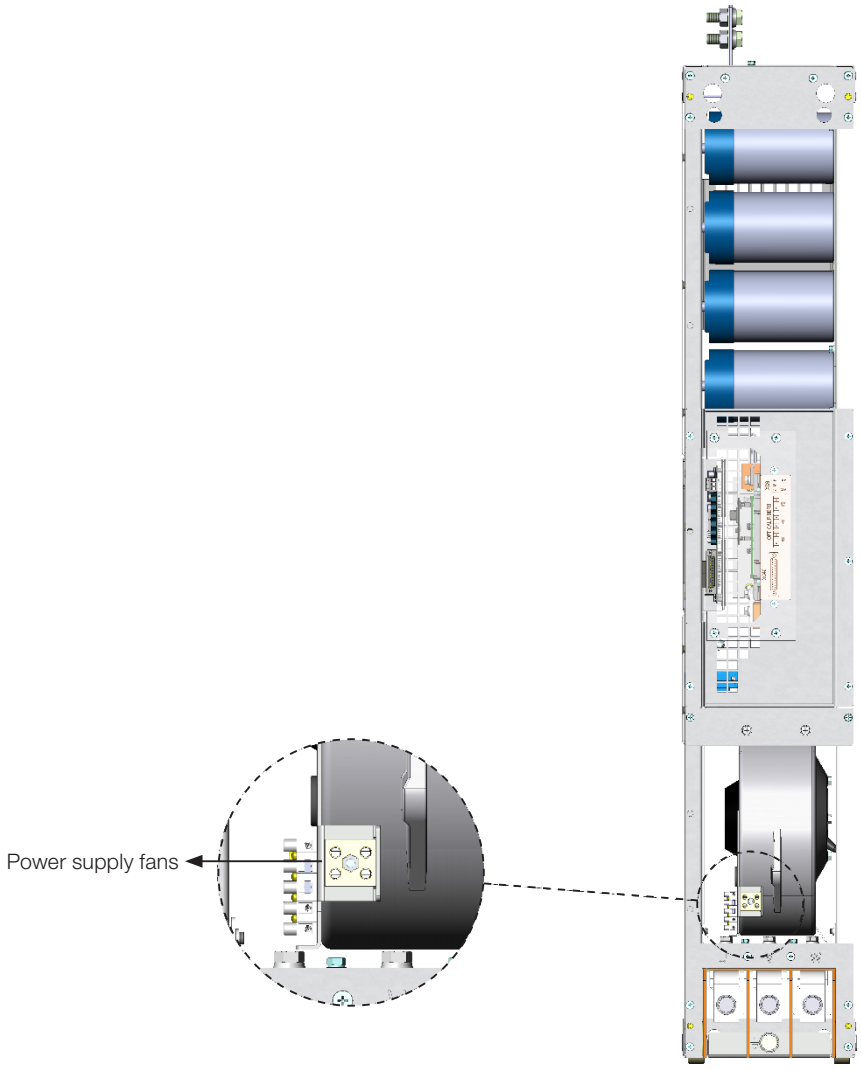


Figure 3.49: *Terminals to power the UP11 G2 fans*

Table 3.26: *Specification of the power supply of the fans*

Voltage	Frequency	Current
220 Vac	50 / 60 Hz	4 Aac

3.4.11.2 UC11RB G2 Connections

DIM1 and DIM2 digital inputs located on the ICUP board (Table 3.27 on page 3-41) can be programmed via parameters P0832 and P0833 respectively.

Table 3.27: *Function of the signals on the connector XC5*

Connector XC5		Factory Default Function	Specifications
1	DIM1	DIM1 isolated digital input, programmable in (P0832). Refer to the programming manual	High level ≥ 18 V Low level ≤ 3 V Maximum input voltage: 30 V Input current: 11 mA @ 24 Vdc
2	DIM2	DIM2 isolated digital input, programmable in (P0833). Refer to the programming manual	
3	COM	Common point of the digital inputs of the ICUP1 board	
4	+24 V	24 Vdc power supply	Isolated power supply 24 Vdc ± 8 % Capacity: 600 mA **Note 1:** This power supply can be used to power DIM1 (ISOL) and DIM2 (ISOL) digital inputs of the ICUP1 board **Note 2:** This power supply is isolated from the 24 Vdc input used to power ICUP1 **Note 3:** This is the same power supply available on the CC11 board
5	GND_24	0 V reference for the 24 Vdc power supply	

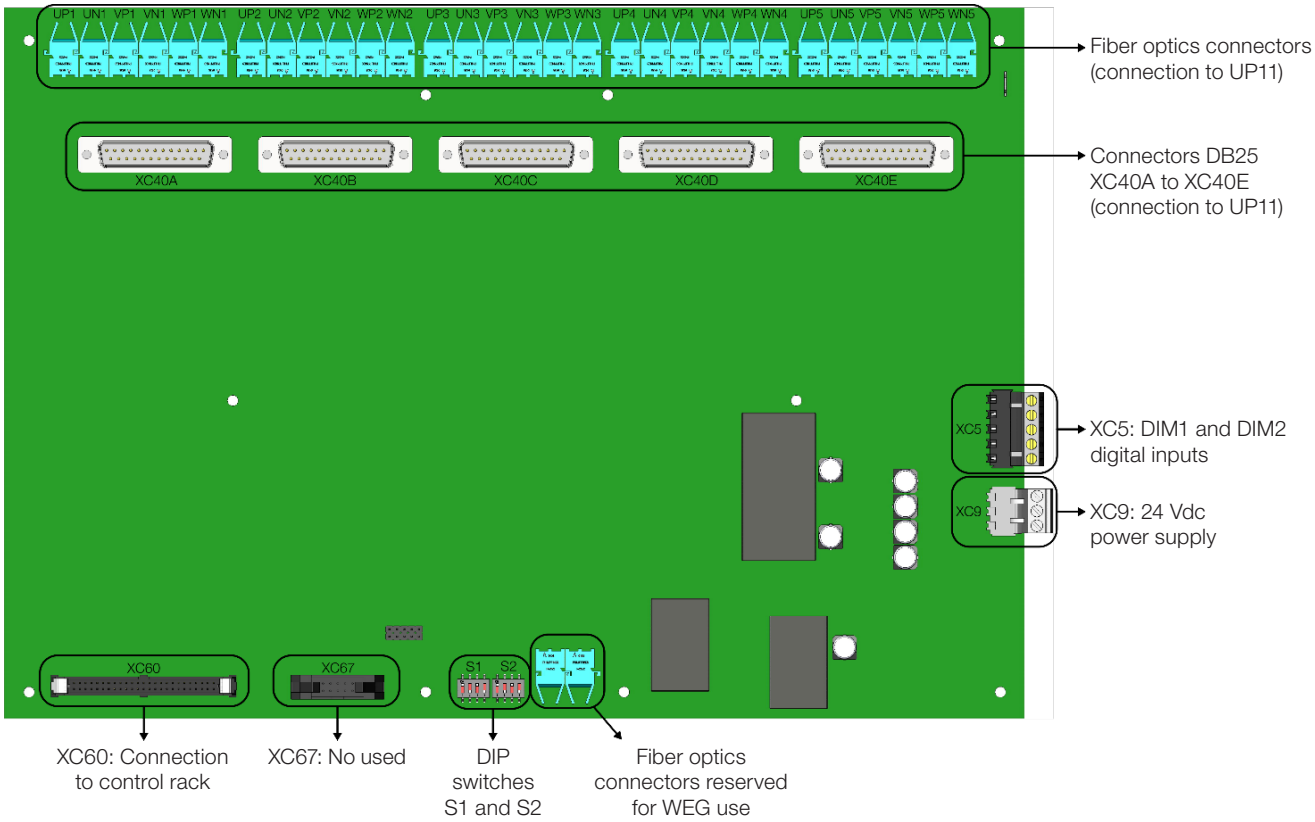


Figure 3.50: *ICUP board connection points*

The control rack is powered via connector XC9, located on the ICUP board; it is described in Table 3.28 on page 3-42.

Table 3.28: *Description of connector XC9*

XC9		Function	Specifications
1	+24 Vdc	Positive pole of the +24 Vdc power supply	24 Vdc power supply (± 3 %) Consumption: 1.25 A
2	NC	Not connected	
3	GND	Reference of the +24 Vdc power supply	

DIP switches S1 and S2, Figure 3.51 on page 3-42, have the function, respectively, to select the level of the inverter alternating supply voltage and the number of UP11 G2 or UP11W G2 connected.

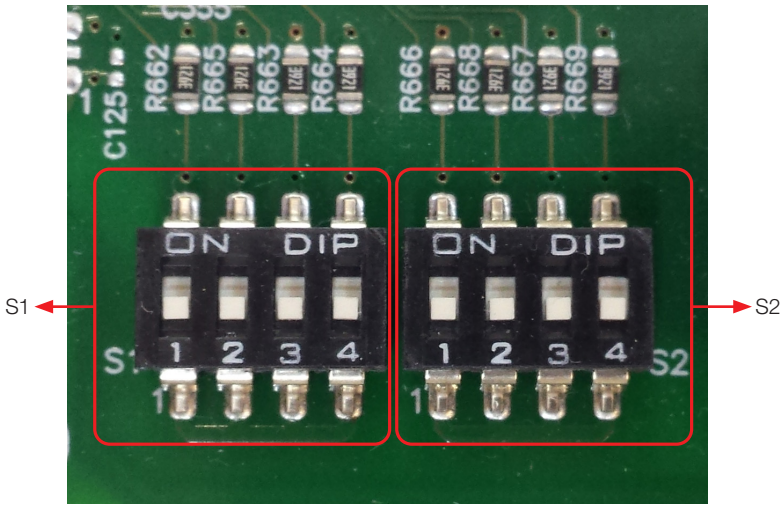


Figure 3.51: *Detail of DIP switches S1 and S2*

Table 3.29: DIP switch S1:1 - S1:3 configuration

S1:3	S1:2	S1:1	Model	Alternate Supply Voltage
ON	OFF	ON	UP11-02 G2	380 - 480 V
ON	OFF	OFF	UP11-01 G2	500 - 690 V
OFF	OFF	OFF	UP11W-01 G2	500 - 690 V

Table 3.30: DIP switch S1:4 configuration

S1:4	Operating Mode
OFF	Normal
ON	Reduced power

The operating mode with reduced power is detailed in Section 5.7 OPERATION WITH A REDUCED NUMBER OF POWER UNITS on page 5-6.

Table 3.31: DIP switch S2 configuration

S2:4	S2:3	S2:2	S2:1	Number of UP11 or UP11W Connected
OFF	OFF	OFF	OFF	1
OFF	OFF	OFF	ON	2
OFF	OFF	ON	ON	3
OFF	ON	ON	ON	4
ON	ON	ON	ON	5

The UP11 G2 or UP11W G2 plus UC11RB G2 must be grounded according to the diagram shown in Figure 3.52 on page 3-44.

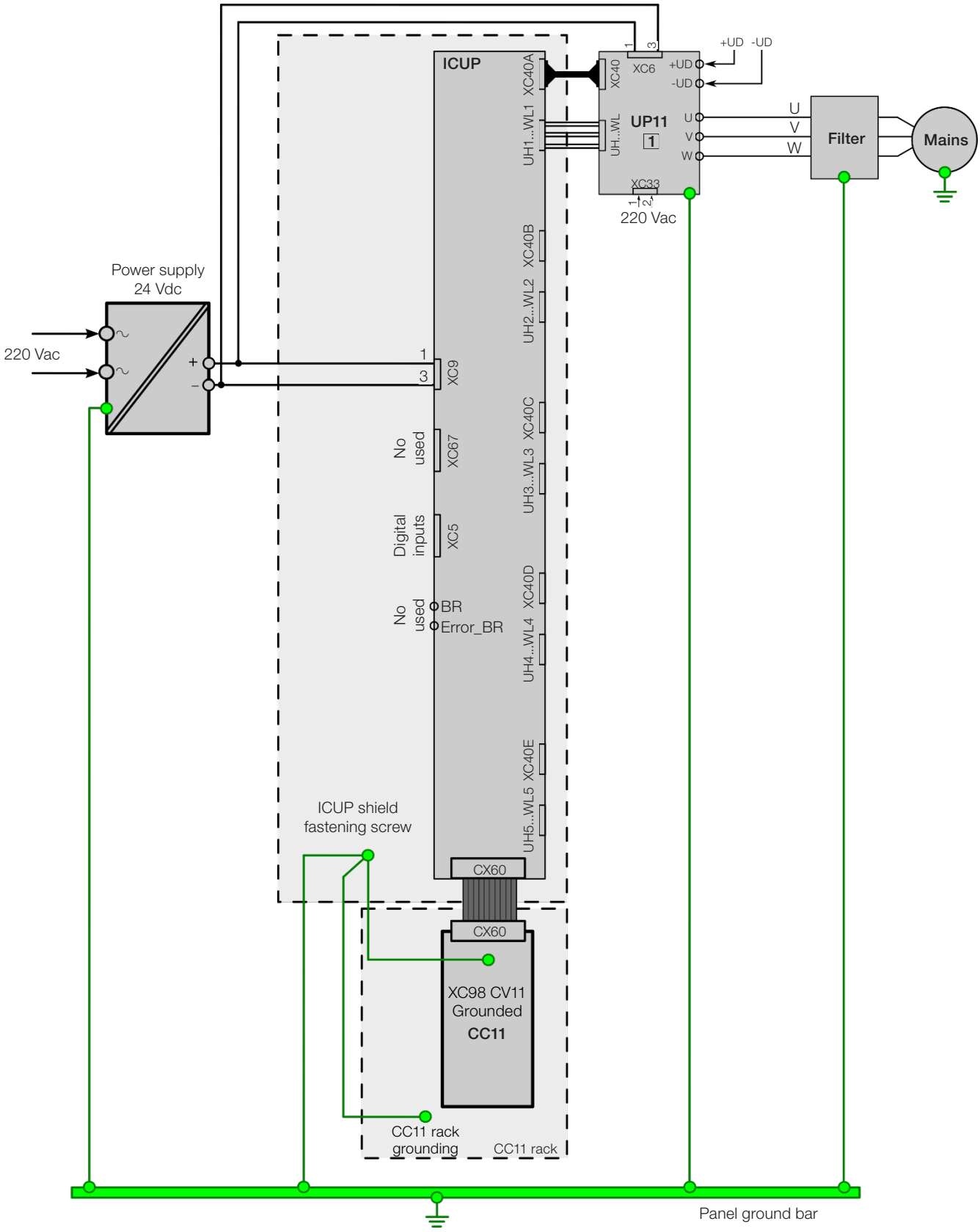


Figure 3.52: *Grounding diagram of the UP11 plus UC11, in case of only one UP11*

The screws to fasten the ICUP shield to the panel must ensure the electrical contact between the shield and the panel for grounding.

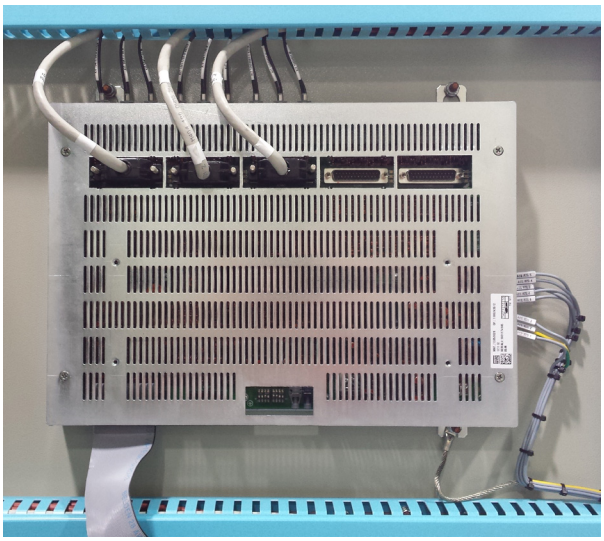


Figure 3.53: *ICUP shield fastened to the panel*

The control rack must be grounded using a flat flexible braid with minimum width of 5 mm and minimum section of 3 mm² with standard FASTON terminal 6.35 mm (E.g.: TYCO 735075-0 and 180363-2) and lug terminal M4; see Figure 3.54 on page 3-45.

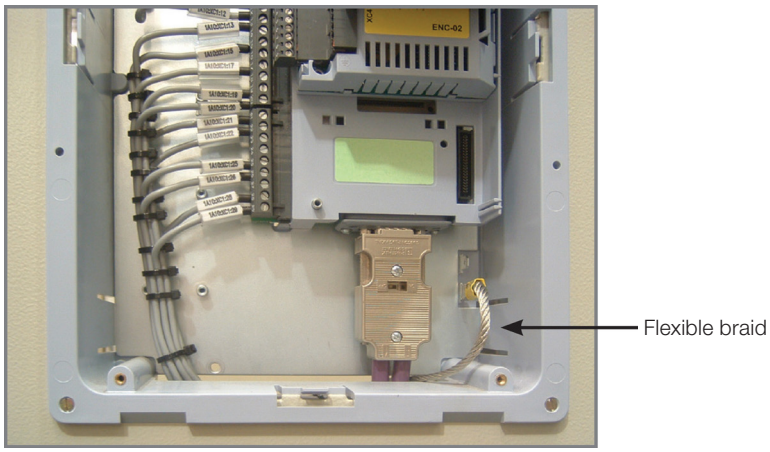


Figure 3.54: *Control rack grounding*

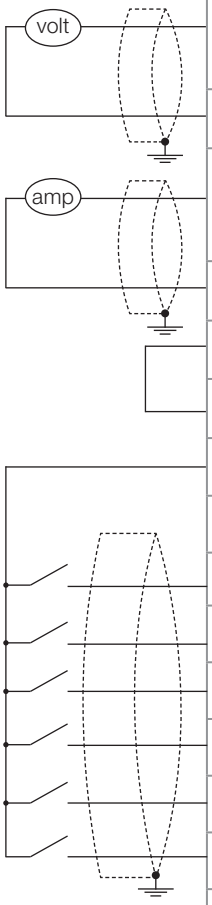
The panel door must be grounded with a flexible braid.

Figure 3.55: *Grounding of the panel door*

3.4.11.3 CC11 Connections

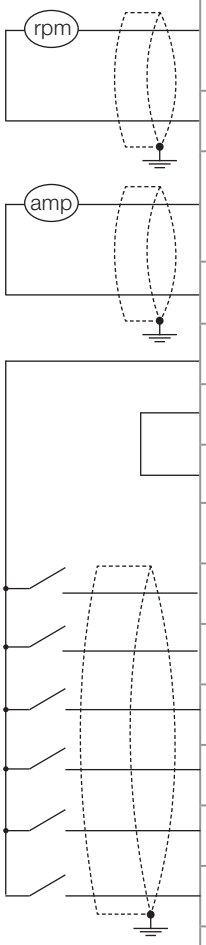
The control connections (analog inputs/outputs, digital inputs/outputs) must be done to connector XC1 of the CC11 Control Electronic Board.

The typical connections and functions are shown in Figure 3.56 on page 3-46 and Figure 3.57 on page 3-47.



XC1 Connector		Factory Default Function	Specifications
7	AO1	Analog output 1: DC Link voltage	Galvanic isolation Resolution: 11 bits Signal: 0 to 10 V (R_L ≥ 10 kΩ) / 0 to 20 mA / 4 to 20 mA (R_L ≤ 500 Ω) Protected against short-circuit
8	AGND (24 V)	Reference (0 V) for the analog outputs	Connected to the ground (frame) through impedance: 940 Ω resistor in parallel with a 22 nF capacitor
9	AO2	Analog output 2: AC current	Galvanic isolation Resolution: 11 bits Signal: 0 to 10 V (R_L ≥ 10 kΩ) / 0 to 20 mA / 4 to 20 mA (R_L ≤ 500 Ω) Protected against short-circuit
10	AGND (24 V)	Reference (0 V) for the analog outputs	Connected to the ground (frame) through impedance: 940 Ω resistor in parallel with a 22 nF capacitor
11	DGND*	24 Vdc power supply	Connected to the ground (frame) through impedance: 940 Ω resistor in parallel with a 22 nF capacitor
12	COM	Digital inputs common point connection	
13	24 Vcc	24 Vdc power supply	24 Vdc power supply, ±8 % Capacity: 500 mA
14	COM	Digital inputs common point connection	
15	DI1	Digital input 1: General enable	6 isolated digital inputs High level ≥ 18 V Low level ≤ 3 V Maximim input voltage ≤ 30 V Input current: 11 mA @ 24 Vdc
16	DI2	Digital input 2: No function	
17	DI3	Digital input 3: No function	
18	DI4	Digital input 4: No function	
19	DI5	Digital input 5: No function	
20	DI6	Digital input 6: No function	
21	NF1	Digital output 1 DO1 (RL1): Pre-charge OK	Contact rating: Maximum voltage: 240 Vac Maximum current: 1 A NC - Normally closed contact C - Common NO - Normally open contact
22	C1		
23	NA1		
24	NF2	Digital output 2 DO2 (RL2): RUN	
25	C2		
26	NA2		
27	NF3	Digital output 3 DO3 (RL3): No fault	
28	C3		
29	NA3		

Figure 3.56: *Signals of connector XC1 - Digital inputs as active high*



XC1 Connector		Factory Default Function	Specifications
7	AO1	Analog output 1: DC Link voltage	Galvanic isolation Resolution: 11 bits Signal: 0 to 10 V ($R_L \geq 10$ kΩ) / 0 to 20 mA / 4 to 20 mA ($R_L \leq 500$ Ω) Protected against short-circuit
8	AGND (24 V)	Reference (0 V) for the analog outputs	Connected to the ground (frame) through impedance: 940 Ω resistor in parallel with a 22 nF capacitor
9	AO2	Analog output 2: AC current	Galvanic isolation Resolution: 11 bits Signal: 0 to 10 V ($R_L \geq 10$ kΩ) / 0 to 20 mA / 4 to 20 mA ($R_L \leq 500$ Ω) Protected against short-circuit
10	AGND (24 V)	Reference (0 V) for the analog outputs	Connected to the ground (frame) through impedance: 940 Ω resistor in parallel with a 22 nF capacitor
11	DGND*	24 Vdc power supply	Connected to the ground (frame) through impedance: 940 Ω resistor in parallel with a 22 nF capacitor
12	COM	Digital inputs common point connection	
13	24 Vcc	24 Vdc power supply	24 Vdc power supply, ±8 % Capacity: 500 mA
14	COM	Digital inputs common point connection	
15	DI1	Digital input 1: General enable	6 isolated digital inputs High level ≥ 18 V Low level ≤ 3 V Maximim input voltage ≤ 30 V Input current: 11 mA @ 24 Vdc
16	DI2	Digital input 2: No function	
17	DI3	Digital input 3: No function	
18	DI4	Digital input 4: No function	
19	DI5	Digital input 5: No function	
20	DI6	Digital input 6: No function	
21	NF1	Digital output 1 DO1 (RL1): Pre-charge OK	Contact rating: Maximum voltage: 240 Vac Maximum current: 1 A NC - Normally closed contact C - Common NO - Normally open contact
22	C1		
23	NA1		
24	NF2	Digital output 2 DO2 (RL2): RUN	
25	C2		
26	NA2		
27	NF3	Digital output 3 DO3 (RL3): No fault	
28	C3		
29	NA3		

Figure 3.57: *Signals of connector XC1 - Digital inputs as active low*

NOTE!
To use the digital inputs as active low, it is necessary to remove the jumper between XC1: 11 and 12 and change it to XC1: 12 and 13.

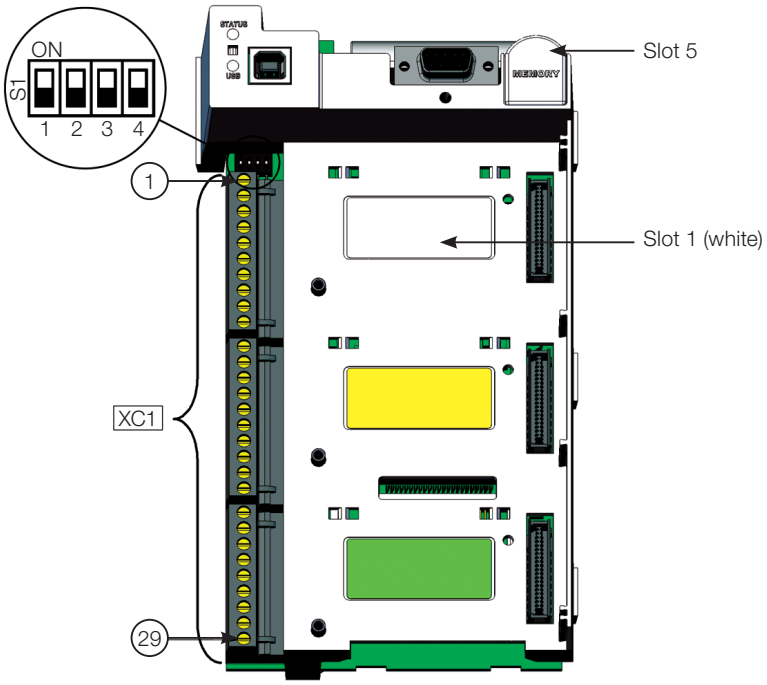


Figure 3.58: *Connector XC1 and switches to select the signal type of the analog inputs and outputs*

As factory default, the analog inputs and outputs are selected within the range from 0 to 10 V; they can be changed using switch S1.

Table 3.32: *Configurations of the switches to select the signal type of the analog inputs and outputs*

Signal	Factory Default Function	Setting Element	Selection	Factory Setting
AO1	DC Link voltage	S1.1	OFF: 4 to 20 mA / 0 to 20 mA ON: 0 to 10 V (factory default)	ON
AO2	Input current	S1.2	OFF: 4 to 20 mA / 0 to 20 mA ON: 0 to 10 V (factory default)	ON

The parameters related to AO1 and AO2 must also be set according to the selection of the switches and desired values.

For the correct connection of the control, use:

1. Gauge of the cables: 0.5 mm² (20 AWG) to 1.5 mm² (14 AWG).
2. Maximum torque: 0.5 N.m (4.50 lbf.in).
3. Wiring on XC1 must be done with shielded cables separated from the other wiring (power, control in 110/220V, etc.), according to Table 3.33 on page 3-48. If those cables must cross other cables, it must be done perpendicularly, keeping the minimum separation distance of 5 cm at the crossing point.

Table 3.33: *Wiring separation distance*

Wiring Length	Minimum Separation Distance
≤ 30 m	≥ 10 cm
> 30 m	≥ 25 cm

4. The correct connection of the cable shield is shown in Figure 3.59 on page 3-49. Check connection example of the shield to the ground in Figure 3.60 on page 3-49.

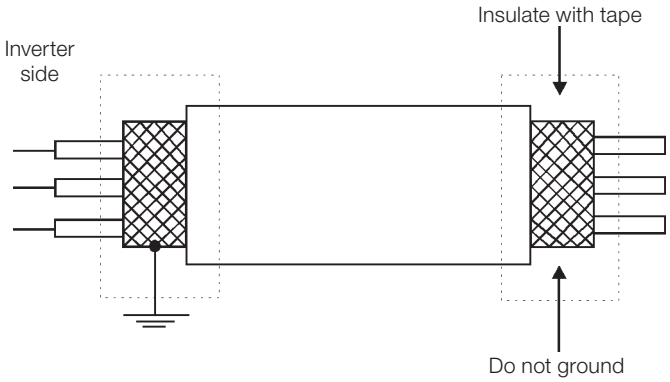


Figure 3.59: *Connection of the shield*

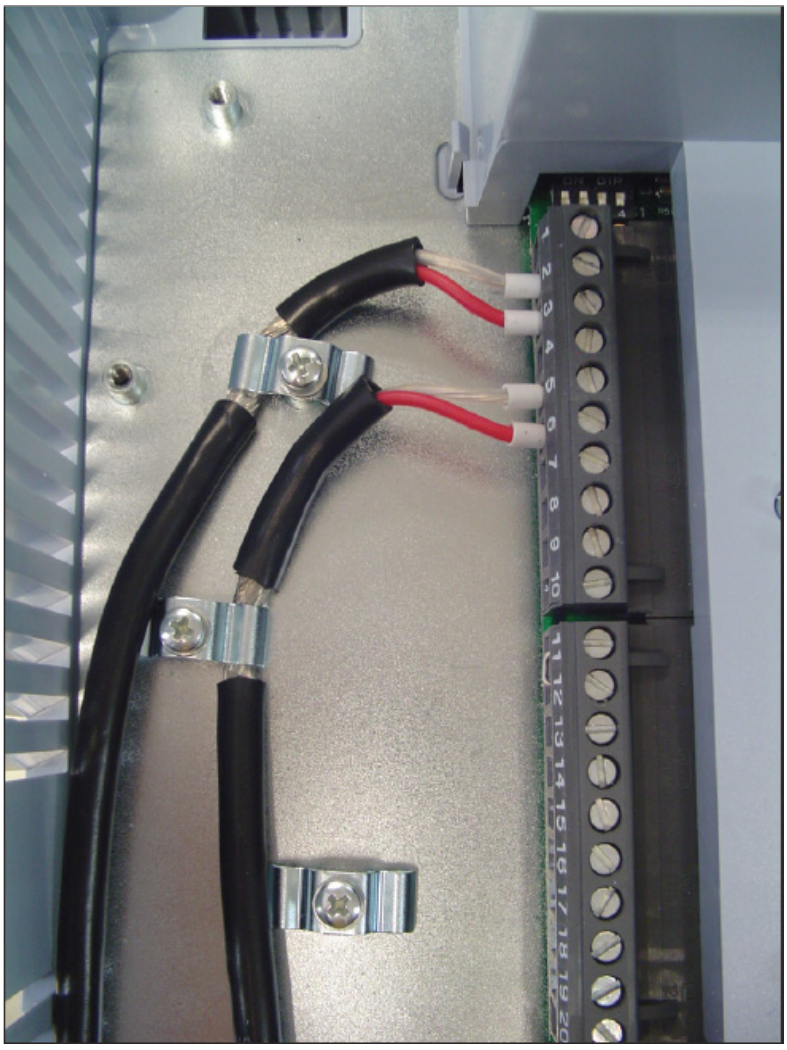


Figure 3.60: *Example of connection of the control cable shield*

5. Relays, contactors, solenoids or electromechanical braking coils installed close to the converters may generate interference in the control circuit. To eliminate this effect, RC suppressors must be connected in parallel to the coils of those devices in case of AC power supply, and freewheel diodes in case of DC power supply.

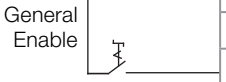
3.4.11.4 Typical Drives

Drive 1 - Command via HMI (Local Mode) with General Enable function.

With the factory default setting, it is possible to operate the converter in the local mode. This operating mode is recommended for users that are using the converter for the first time, as a form of learning.

To start in this operating mode, follow the directions available in Chapter 5 ENERGIZATION AND START-UP on page 5-1

The DI1 is already programmed to General Enable as a factory default setting (P0263 = 2).



Conector XC1		
7	AO1	
8	AGND (24 V)	
9	AO2	
10	AGND (24 V)	
11	DGND*	
12	COM	
13	24 Vcc	
14	COM	
15	DI1	
16	DI2	
17	DI3	
18	DI4	
19	DI5	
20	DI6	
21	NF1	DO1 (RL1)
22	C1	
23	NA1	
24	NF2	DO2 (RL2)
25	C2	
26	NA2	
27	NF3	DO3 (RL3)
28	C3	
29	NA3	

Figure 3.61: *Connections in XC1 for drive 1*

3.5 INSTALLATIONS ACCORDING TO THE EUROPEAN ELECTROMAGNETIC COMPATIBILITY DIRECTIVE

The CFW-11M G2 RB and CFW-11W G2 RB converters, when correctly installed, meet the requirements of the EMC Directive 2014/30/EU.

The CFW-11M G2 RB and CFW-11W G2 RB converters were developed for professional applications only. Therefore, the limits for emission of harmonic currents established by the IEC/EN 61000-3-2 e IEC/EN 61000-3-12 standards are not applicable.

3.5.1 Conformal Installation

For conformal installation, use:

- Standard CFW-11M G2 RB and CFW-11W G2 RB converter for emission levels according to IEC/EN61800-3 "Adjustable Speed Electrical Power Drive Systems", category C4.

- Shielded control cables, keeping the separation distance from other cables according to Item 3.4.11.3 CC11 Connections on page 3-46.
- Grounding of the inverter according to instructions of Item 3.4.6 Input and Grounding Connections on page 3-31 and Item 3.4.11.2 UC11RB G2 Connections on page 3-41.
- Instructions for conformal installations applicable to inverters that drive the motor.

3.5.2 Definition of the Standards

IEC/EN 61800-3: "Adjustable Speed Electrical Power Drives Systems".

Environments:

First Environment: environments that include residential premises, as well as establishments directly connected without intermediate transformers to the low voltage power line which supplies installations used for residential purposes.

Example: houses, apartments, commercial installations or offices located in residential buildings.

Second Environment: environments that include all the buildings other than those directly connected to the low voltage power line which supplies buildings used for domestic purposes.

Example: industrial areas, technical areas of any building supplied by a dedicated transformer.

Categories:

Category C1: converters with voltage rating below 1000 V and intended for use in the First Environment.

Category C2: converters with a voltage rating below 1000 V intended for use in the First Environment, not provided with a plug connector or movable installations, must be installed and commissioned by a professional.

Note: a professional is a person or organization familiar with the installation and/or start-up of converters, including their EMC aspects.

Category C3: converters with voltage ratings below 1000 V developed for application in the "Second Environment" and not designed for application in the "First Environment".

Category C4: converters with voltage rating equal to or higher than 1000 V, or with a current rating equal to or higher than 400 A or intended for use in complex systems in the Second Environment.

3.5.3 Emission and Immunity Levels Met

Table 3.34: *Emission and immunity levels met*

EMC Phenomenon	Basic Standard	Level
Emission:		
Mains terminal disturbance voltage Frequency range: 150 kHz to 30 MHz)	IEC/EN61800-3	Category C3
Electromagnetic radiation disturbance Frequency range: 30 kHz to 1 GHz		Category C4
Immunity:		
Electrostatic discharge (ESD)	IEC/EN61000-4-2	4 kV discharge per contact and 8 kV discharge through the air
Fast transient-burst	IEC/EN61000-4-4	2 kV/5 kHz (coupling capacitor) input cables 1 kV/5 kHz control cables 2 kV/5 kHz (coupling capacitor) motor cables
Conducted radio-frequency common mode	IEC/EN61000-4-6	0.15 to 80 Mhz; 10 V; 80 % AM (1 kHz) Motor and control cables
Surges	IEC/EN61000-4-5	1.2/50 µs, 8/20 µs 1 kV line-to-line coupling 2 kV line-to-ground coupling
Radio-frequency electromagnetic field	IEC/EN61000-4-3	80 to 1000 MHz 10 V/m 80 % AM (1 kHz)

4 HMI

This chapter contains the following information:

- HMI keys and functions.
- Indications on the display.
- Parameter structure.

4.1 HMI-CFW11M G2 HUMAN MACHINE INTERFACE

Through the HMI, it is possible to control the converter, view and adjust all the parameters. The navigation has the option of sequential access to the parameters or by groups (Menu).

Figure 4.1: *HMI Keys*

Battery:

NOTE!
The battery is only necessary to maintain the operation of the internal clock when the inverter is deenergized. In case the battery is low, or not installed on the HMI, the clock time becomes incorrect and alarm A181 – "Clock with invalid value" will be indicated every time the inverter is turned on.

The life expectation of the battery is approximately 10 years. Replace the battery, when necessary, by a CR2032 battery.

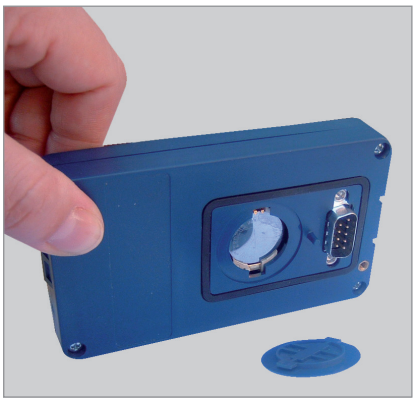
1

Cover for battery access

2

Press the cover and rotate it counterclockwise

3



Remove the cover

4

Remove the battery with the help of a screwdriver positioned in the right side

5

HMI without the battery

6

Install the new battery positioning it first at the left side

7

Press the battery for its insertion

8

Put the cover back and rotate it clockwise

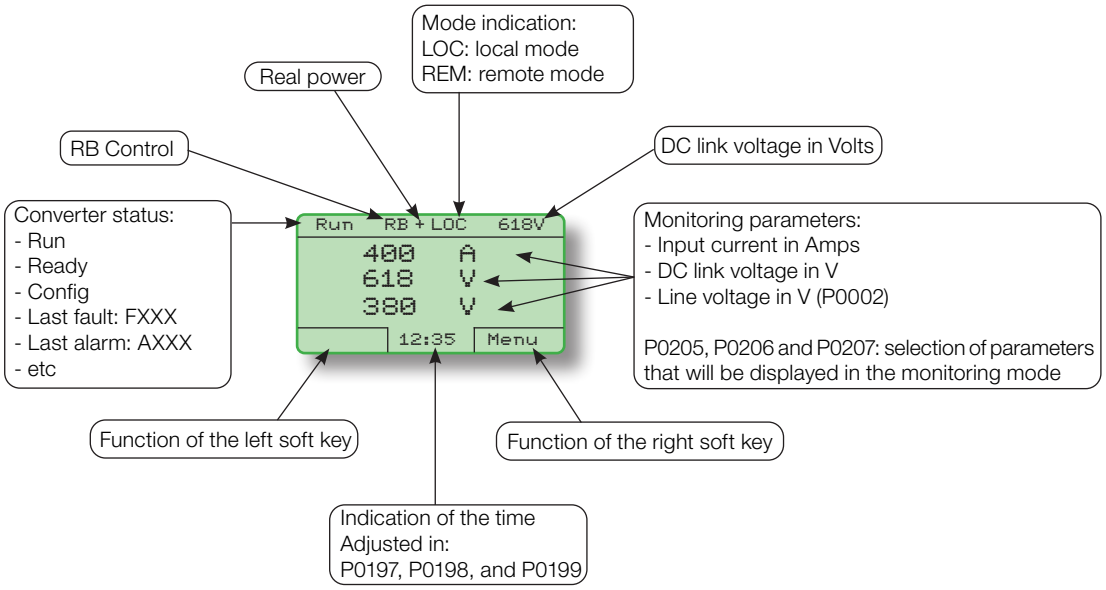
Figure 4.2: *HMI battery replacement*

NOTE!
At the end of the battery useful life, do not dispose it in common garbage, but in a proper place for batteries.

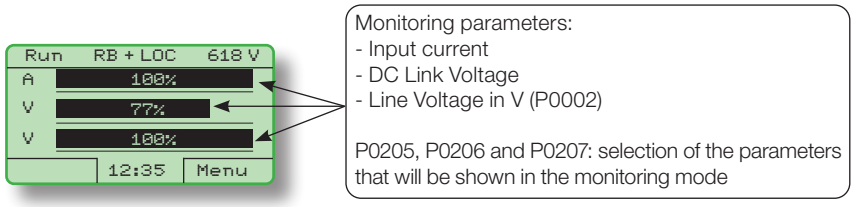
Installation:

The HMI can be installed or removed from the converter with the converter turned on or off.

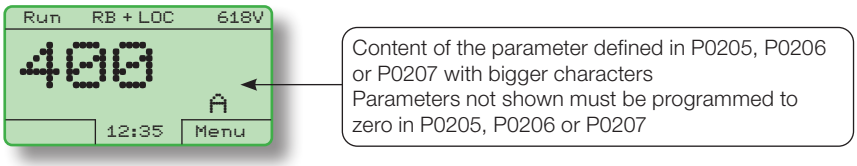
Whenever the converter is turned on, the display goes to the Monitoring Mode. For the factory setting, a screen similar to Figure 4.3 on page 4-3 (a) will be shown. By setting proper parameters, other variables can be shown in the monitoring mode or the content of the parameters can be presented as bar graphs or larger characters as shown inFigure 4.3 on page 4-3 (b) and (c).



(a) Monitoring mode screen at the factory setting



(b) Example of a screen in monitoring mode by bar graph



(c) Example of a screen in monitoring mode with a variable in bigger letters

Figure 4.3: *(a) to (c) Monitoring modes of the HMI display*

4.2 PARAMETER STRUCTURE

When the right soft key is pressed in the monitoring mode ("Menu"), the first four parameter groups are shown on the display. An example of parameter group structure is shown in Table 4.1 on page 4-4. The number and name of the groups may change depending on the software version used. For further details on the existing groups in the software version in use, refer to the programming manual.

Table 4.1: *Parameter groups*

Level 0	Level 1	Level 2	Level 3
Monitoring	00 ALL PARAMETERS		
	01 PARAMETER GROUPS	20 Link Voltage	
		21 Control	90 Current Regulator
			91 Reactive Regulator
			92 Current Limits
			93 DC Link Regulator
		22 HMI	
		24 Analog Outputs	
		25 Digital Inputs	
		26 Digital Outputs	
		27 Converter Data	
		28 Protections	
	02 ORIENTED START-UP		
	03 CHANGED PARAMETERS		
	04 BACKUP PARAMETERS		
	05 I/O CONFIGURATION	24 Analog Outputs	
		25 Digital Inputs	
		26 Digital Outputs	
	06 FAULT HISTORY		
	07 READ ONLY PARAMETERS		

5 ENERGIZATION AND START-UP

This chapter explains:

- How to check and prepare the converter before energizing it.
- How to energize and check the success of the energization.

5.1 PREPARATION AND ENERGIZATION

The converter must have already been installed according to Chapter 3 INSTALLATION AND CONNECTION on page 3-1. If the drive design is different from the typical drives suggested, the steps below may also be followed.

DANGER!
Always disconnect the general power supply before making any connections.

1. Configure DIP switch S1 located on the ICUP board, according to the rated voltage of the UP11 G2 or UP11W G2 used on the drive, Table 3.29 on page 3-43.
2. Configure the number of UP11 G2 or UP11W G2 connected in parallel through DIP switch S2 located on the ICUP board, according to Table 3.31 on page 3-43.
3. Check if the power, grounding and control connections are correct and firm.
4. Remove all the materials left inside the drive.
5. Check all grounding connections (panel, door where the control is installed, etc.).
6. In the case of UP11W G2 (water-cooled):
   a. Make a pressure test on the Cooling System to check for leaks.
   b. Turn on the Cooling System and set the flow and the incoming water temperature according to the values of Table 3.19 on page 3-33.
   c. Keep the water flowing for five minutes and check for leaks on the hydraulic connections.
7. Energize the control (supply +24 Vdc).
8. Close the panel doors.
9. The HMI must indicate undervoltage with the electronics energized and the power units de-energized. Parameter P0004 (Voltage on the DC Link) will indicate approximately 15 Vdc.
10. Measure the voltage of the line and check if it is within the allowed range, according to Chapter 8 TECHNICAL DATA on page 8-1.
11. Check that the automatic hardware identification has recognized the converter current properly, parameter P0295. The converter current must be compatible with the number of power units installed.
12. Set parameter P0296 according to the rated voltage of the input line.
13. Command the drive, pre-charge the link, and close the main circuit breaker/contactor.
14. Enable the PWM pulses via DI.
15. Check that the DC link voltage indicated in P0004 is close to the P0151 value.
16. Check the success of the energization.

17. The display must show the standard monitoring screen (Figure 4.3 on page 4-3 (a)), the status LED must turn on and remain on in green.

18. Follow the start-up routine of the output inverters according to the directions contained in the specific manual.

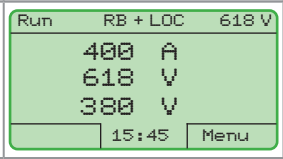
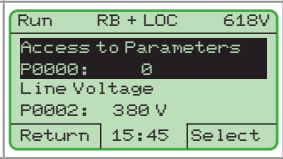
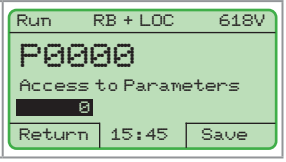
5.2 START-UP

The start-up can be simply explained in three steps, using the programming resources with the existing parameter groups **Oriented Start-Up** and **Basic Application**.

Sequence:

1. Set the password to change parameters.
2. Execution of the **Oriented Start-Up** routine.
3. Setting the parameters of the **Basic Application** group.

5.2.1 Password Setting in P0000

Step	Action/Result	Display Indication
1	■ Monitoring Mode ■ Press **"Menu"** (right soft key)	
2	■ Group **"00 ALL PARAMETERS"** is already selected ■ Press **"Select"**	
3	■ Parameter **"Access to Parameters P0000: 0"** is already selected ■ Pressione **"Select"**	
4	■ To set the password, press the Up Arrow  until number **5** is displayed in the keypad	

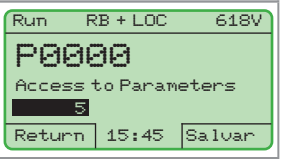
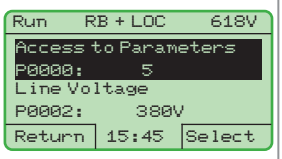
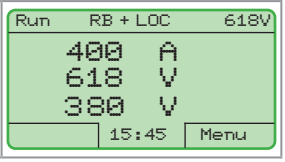
Step	Action/Result	Display Indication
5	■ When number **5** is displayed in the keypad, press **"Save"**	
6	■ If the setting has been properly performed, the keypad should display **"Access to Parameters P0000: 5"** ■ Press **"Return"** (left soft key)	
7	■ Press **"Return"**	
8	■ The display returns to the Monitoring Mode	

Figure 5.1: *Sequence for allowing parameter change via P0000*

5.2.2 Oriented Start-up

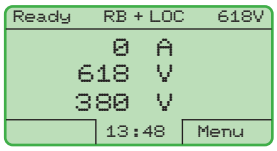
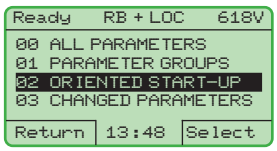
To simplify the setting of the converter, there is a parameter group called Oriented Start-Up. Within this group is parameter P0317, which can be used to access the Oriented Start-Up.

The Oriented Start-up routine shows the main parameters on the HMI in a logical sequence, so that their setting, according to the operating conditions, prepares the inverter for operation according to the line used.

In order to enter the Oriented Start-Up routine, follow the sequence shown in Figure 5.2 on page 5-3, first changing P0317 = 1, and then setting the other parameters as they are displayed on the HMI.

The setting of the parameters displayed in this operating mode automatically changes the content of other internal variables and/or parameters of the converter.

During the Oriented Start-Up routine, the "Config" (Configuration) status will be indicated on the top left part of the HMI.

Step	Action/Result	Display Indication
1	■ Monitoring Mode ■ Press **"Menu"** (right soft key)	
2	■ Group **"00 ALL PARAMETERS"** is already selected	
3	■ Group **"01 PARAMETER GROUPS"** is selected	
4	■ Group **"02 ORIENTED START-UP"** is then selected ■ Press **"Select"**	
5	■ Parameter **"Oriented Start-Up P0317: No"** is already selected ■ Press **"Select"**	
6	■ The value of **"P0317 = [000] No"** is displayed	

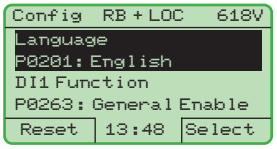
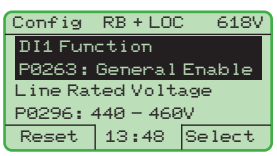
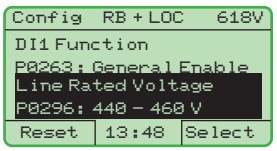
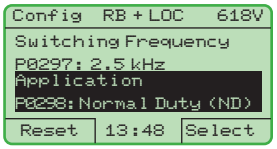
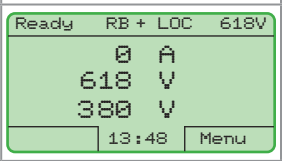
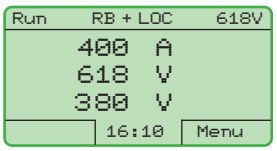
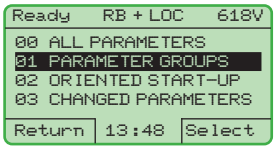
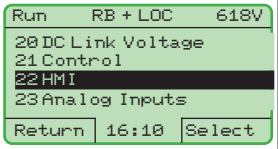
Step	Action/Result	Display Indication
7	■ The parameter value is modified to **"P0317 = [001] Yes"** ■ Press **"Save"**	
8	■ At this point the Oriented Start-up routine starts and the **"Config"** status is displayed at the top left corner of the keypad. ■ The parameter **"Language P0201: English"** is already selected ■ If needed, change the language by pressing **"Select"**. Then, press or to scroll through the available options and press **"Save"** to select a different language	
9	■ If needed, change the value of P0263 according to the application. To do so, press **"Select"** ■ It is necessary to have one DI set to General Enable in order the regenerative converter can be enabled	
10	■ If needed, change the value of P0296 according to the line voltage. To do so, press **"Select"**. This change will affect P0151	
11	■ If needed, change the value of P0298 according to the application. To do so, press **"Select"**. The time and the activation level of the IGBT's overload protection will be affected as well ■ To complete the Oriented Start-Up routine, press **"Reset"** (left soft key)	
12	■ After few seconds, the display returns to the Monitoring Mode	

Figure 5.2: Oriented start-up

5.3 DATE AND TIME SETTING

Step	Action/Result	Display Indication
1	■ Monitoring Mode ■ Press **"Menu"** ("right soft key")	
2	■ Group **"00 ALL PARAMETERS"** is already selected 	
3	■ Group **"01 PARAMETER GROUPS"** is selected ■ Press **"Select"** 	
4	■ A new list of groups is displayed and group **"20 DC Link Voltage"** is selected ■ Press  until you reach group **"22 HMI"**	
5	■ Group **"22 HMI"** is selected ■ Press **"Select"**	

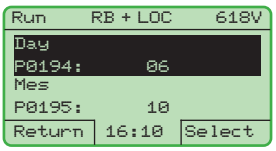
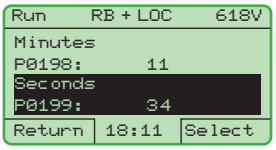
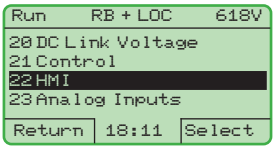
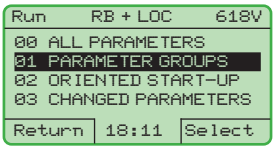
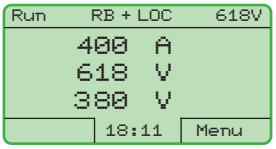
Step	Action/Result	Display Indication
6	■ Parameter **"Day P0194"** is already selected ■ If needed, set P0194 according to the actual day. To do so, press "Select" and then  or  to change P0194 value ■ Follow the same steps to set parameters **"Month P0195"** to **"Seconds P0199"**	
7	■ Once the setting of P0199 is over, the Real Time Clock is now updated. ■ Press **"Return"** (left soft key)	
8	■ Press **"Return"**	
9	■ Press **"Return"**	
10	■ The display returns to the Monitoring Mode	

Figure 5.3: *Date and time setting*

5.4 LOCKING OF PARAMETER MODIFICATION

In case you want to prevent unauthorized people from changing parameters, just change the content of P0000 to a value different from 5. Follow the same procedure presented in Item 5.2.1 Password Setting in P0000 on page 5-2. To change the password, refer to P0200 in the programming manual.

5.5 HOW TO CONNECT A PC

NOTE!

- Always use standard host/device shielded USB cable. Cables without shield may cause communication errors.
- Example of cables: Samtec:
  - USBC-AM-MB-B-B-S-1 (1 meter).
  - USBC-AM-MB-B-B-S-2 (2 meters).
  - USBC-AM-MB-B-B-S-3 (3 meters).
- The USB connection is galvanically isolated from the electric line and other high voltages inside the inverter. However, it is not isolated from the protective earth (PE). Use an isolated laptop to hook the USB connector or desktop with connection to the same protective earth of the inverter.

5.6 FLASH MEMORY MODULE

Location according to Figure 5.4 on page 5-5.

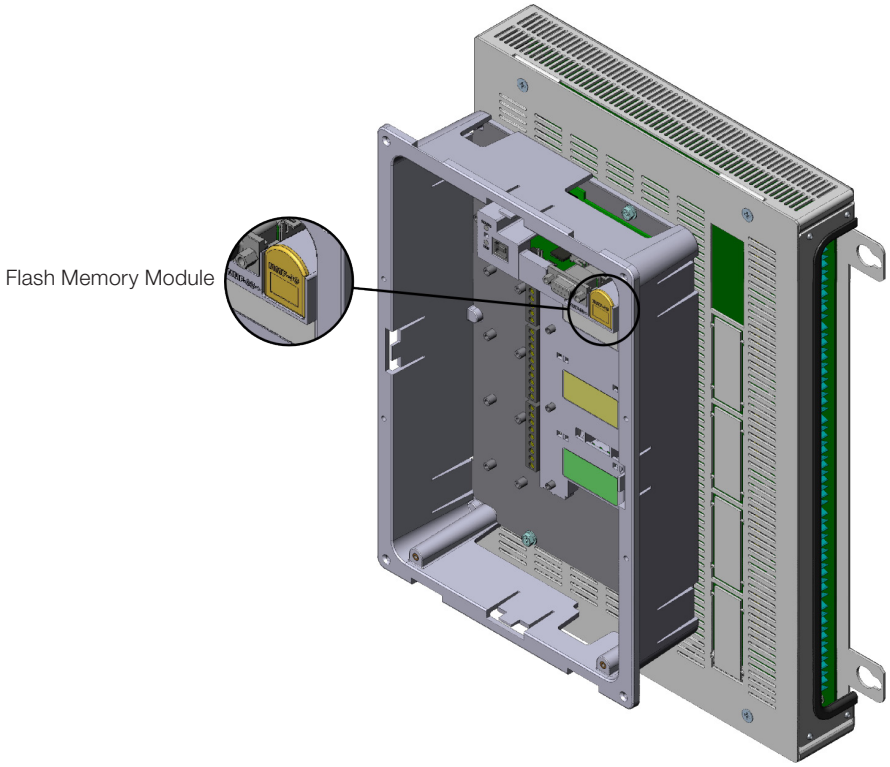


Figure 5.4: *Detail of location of the flash memory module*

Functions:

- It stores an image of the converter parameters.
- It allows transferring parameters stored in the flash memory module to the converter.
- It allows transferring firmware stored in the flash memory module to the converter.

For further details, refer to the Programming Manual of the CFW-11 RB.

ATTENTION!
To connect or disconnect the flash memory module, first turn off the converter, wait for the discharge of the capacitors and then turn off the electronics power supply (+24 V).

5.7 OPERATION WITH A REDUCED NUMBER OF POWER UNITS

The CFW-11M G2 RB and the CFW-11W G2 RB can operate with a reduced number of power units and reduced power for a short time. That operating mode is called "Reduced Power Mode". It may be used in critical processes in which you do not want a whole machine to stop when one power unit fails, enabling the operation with reduced power until you have a power unit for replacement.

The general scheme of a drive with 5 UP11 is shown in Figure 3.31 on page 3-26. The reduced power mode works as a drive of up to 2 UP11.

Assume that in the drive of Figure 3.31 on page 3-26, composed of 5 UP11, UP11 number4 fails. To reestablish the drive operation with reduced power (Reduced Power Mode), you must follow the steps below:

1. Disconnect the power supply from the drive.
2. Identify the defective UP11 (in this case, number 4).
3. Disconnect the power and control of UP11 number4, according to Figure 5.5 on page 5-7.
4. Move the control connections on the ICUP board, as shown in Figure 5.6 on page 5-8. Connect the control cables of UP11 number 5 to position 4 of the ICUP board. Thus, UP11 5 becomes UP11 4.
5. Configure the new number of UP11 through DIP switch S2 located on the ICUP board, according to Table 3.31 on page 3-43.
6. Change DIP switch S1:4 to ON; thus, the control will be informed that the CFW-11M G2 RB or CFW-11W G2 RB drive is operating with a reduced number of UP11.

ATTENTION!
It is recommended that the drive operate short of one UP11 at most.

7. Reconnect only the power supply of the drive control.
8. Alarm A420 will be indicated (Reduced Power Mode), informing that the CFW-11M G2 RB or CFW-11W G2 RB is operating in the reduced power mode.
9. Check if parameters P0295 (Rat. Curr. ND/HD Inv.) and P0296 (Rated Line Voltage) are according to the voltage and the number of connected UP11.

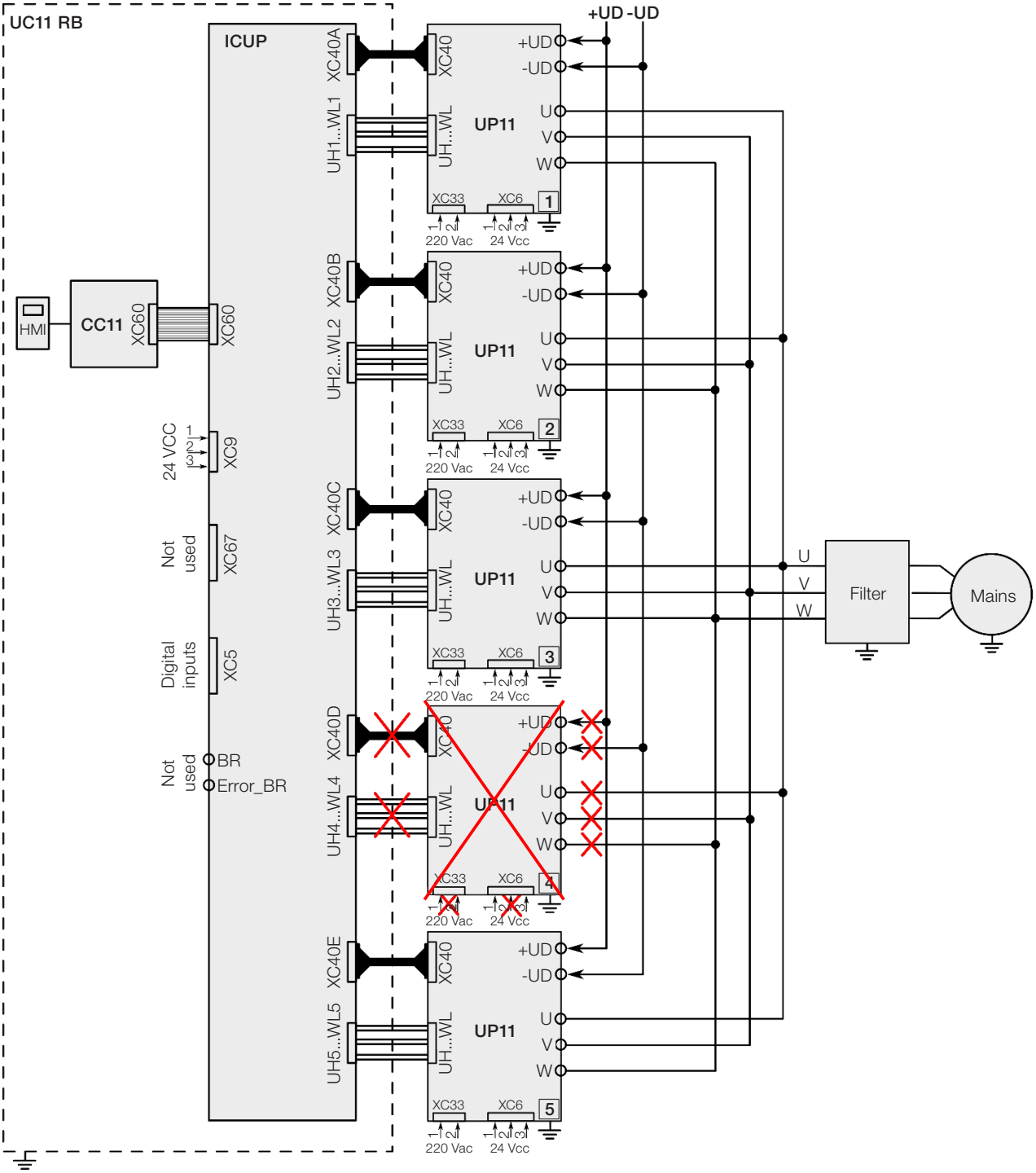


Figure 5.5: *Disconnection of the power and control cables of UP11 number 4*

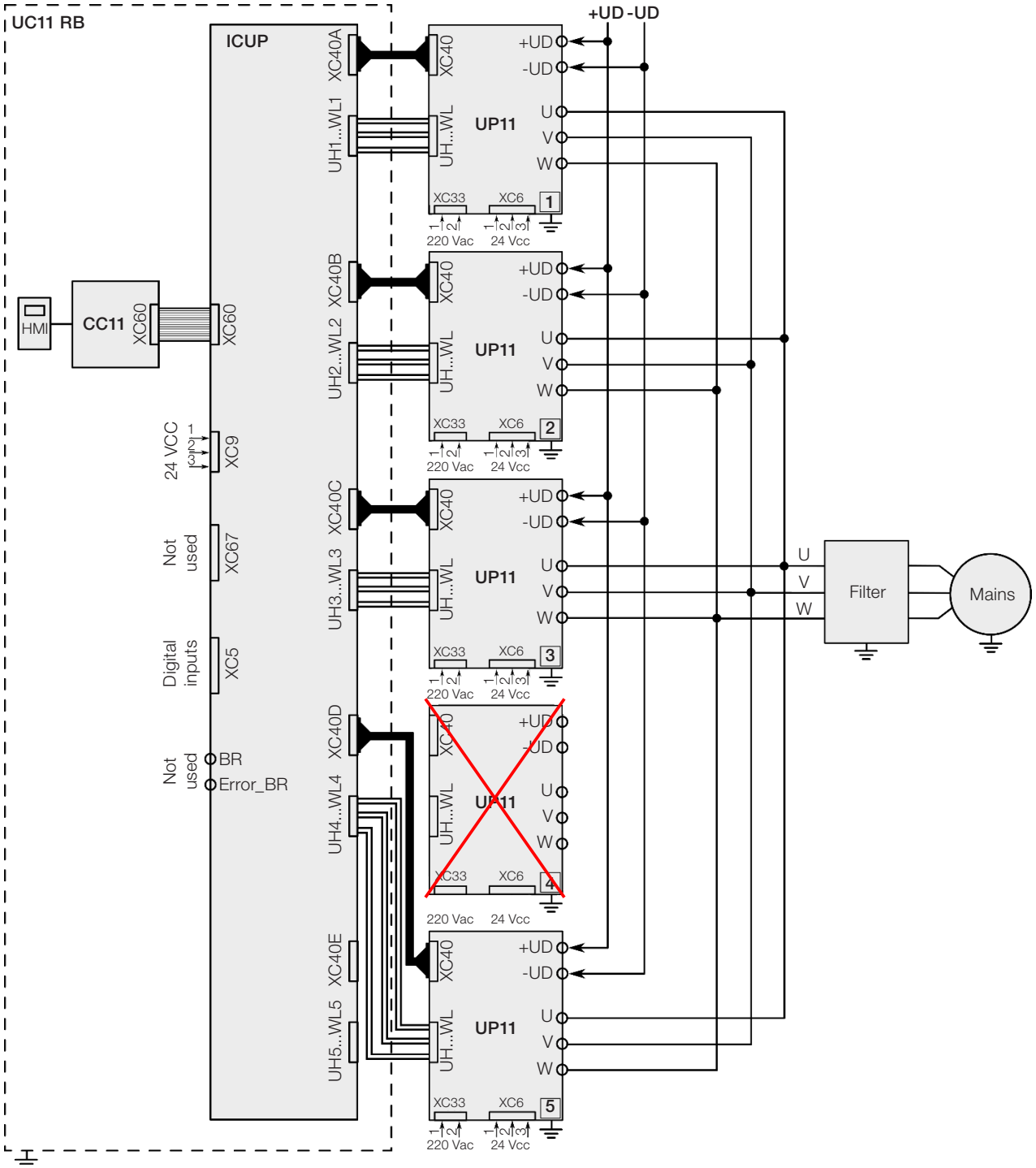


Figure 5.6: Moving the control connections on the ICUP board

6 TROUBLESHOOTING AND MAINTENANCE

This chapter presents:

- The list of all faults and alarms.
- Most probable causes for each fault and alarm.
- The list of the most common problems and corrective actions.
- Instructions for periodical inspections of the product and preventive maintenance.

6.1 OPERATION OF THE FAULTS

When a fault (FXXX) is identified, what occurs is:

- Locking of the PWM pulses.
- Indication on the display of the fault description and code.
- The "STATUS" LED flashes red.
- The relay programmed for "NO FAULTS" is turned off.
- Saving of some data on the EEPROM of the control circuit:
  - The fault or alarm code occurred (it moves the nine previous faults).
  - The status of the hours enabled (P0043) and energized (P0042) counter.
- For the converter to return to normal operation right after the occurrence of a fault, it is necessary to reset it, which can be done as follows:
  - Switching off the power supply and switching it back on (power-on reset).
  - Pressing the O (manual reset) key.
  - Via soft key "Reset".
  - Automatically by means of the P0340 setting (auto-reset).
  - Via digital input: DIx = 20 (P0263 to P0270).

When an alarm (AXXX) is identified, what occurs is: re:

- Indication on the display of the alarm description and code.
- The "STATUS" LED becomes yellow.
- The PWM pulses are not blocked and the converter remains in operation.

6.2 ALARMS, FAULTS AND POSSIBLE CAUSES

Table 6.1: Alarms, faults and possible causes

Fault/Alarm	Description	Possible Causes
F006 Grid Phase Fault/Unbal.	Phase loss fault on the grid or wrong phase sequence.	■ Check connections of CSR11 board. ■ Check connections of the synchronization transformers. ■ Check connection with the grid.
F020 24 Vdc Power Supply Undervoltage	Undervoltage on the 24 Vdc power supply that feeds the control.	■ Voltage on the power supply below 22.8 Vdc.
F021 DC Link Undervoltage	Undervoltage on the DC link.	■ Supply voltage too low, producing voltage on the DC link below the minimum value (read the value in parameter P0004): Ud < 385 V - Supply voltage 380 V (P0296 = 1). Ud < 405 V - Supply voltage 400-415 V (P0296 = 2). Ud < 446 V - Supply voltage 440-460 V (P0296 = 3). Ud < 487 V - Supply voltage 480 V (P0296 = 4). Ud < 530 V – Supply voltage 500-525 V (P0296 = 5). Ud < 696 V – Supply voltage 550-575 V (P0296 = 6). Ud < 605 V - Supply voltage 600 V (P0296 = 7). Ud < 696 V – Supply voltage 660-690 V (P0296 = 8). ■ Phase loss at the input. ■ Fault on the pre-charge circuit. ■ Parameter P0296 selected for use above the rated line voltage.
F022 DC Link Overvoltage	Overvoltage on the DC link.	■ Supply voltage too high, producing voltage on the DC link above the maximum value: Ud > 800 V - Models 380 - 480 V (P0296 = 1, 2, 3 and 4). Ud > 1000 V - Models 500-600 V (P0296 = 5, 6 and 7). Ud > 1200 V - Models 660-690 V (P0296 = 8). ■ Driven load inertia too high or deceleration ramp too fast. ■ Setting of P0151 too high.
F030 (1) Arm U Fault	Desaturation on the IGBTs of arm U.	■ Short-circuit between phases U and V or U and W of the input.
F034 (1) Arm V Fault	Desaturation on the IGBTs of arm V.	■ Short-circuit between phases V and U or V and W of the input.
F038 (1) Arm W Fault	Desaturation on the IGBTs of arm W.	■ Short-circuit between phases W and U or W and V of the input.
A047 Overload on the IGBTs	IGBT overload alarm.	■ High current at the converter input.
F048 Overload on the IGBTs	IGBT overload fault.	■ High current at the converter input.
F070 Overcurr. / Short circ.	Overcurrent or short circuit at the input, DC link.	■ IGBT modules short circuited.
F071 Overcurrent at the Input	Input overcurrent fault.	■ Input reactance too low. ■ Setting of P0169 or P0170 too high. ■ Synchronization circuit connection with one or more inverted phases.
F074 Ground Fault	Overcurrent to ground fault. **Note:** - It may be disabled by setting P0343 = 0.	■ Short-circuit to ground in + UD or -UD.
F080 CPU Fault (Watchdog)	Watchdog fault on the microcontroller.	■ Electric noise.
F082 Copy Function Fault	Fault in the copy of parameters.	■ Attempt to copy parameters from the HMI to the inverter with incompatible software versions.
F084 Self-Diagnostics Fault	Self-Diagnostics Fault.	■ Defect on the inverter internal circuits.
A088 Communication Lost	Fault in the communication of the HMI with the control board.	■ Poor contact on the HMI cable. ■ Electric noise on the installation.
A090 External Alarm	External alarm via DI. **Note:** - It is necessary to program DI for "without external fault".	■ Wiring at the DI1 to DI8 inputs open (programmed for "without external alarm").

Fault/Alarm	Description	Possible Causes
F091 External Fault	External alarm via DI. **Note:** - It is necessary to program DI for "without external fault".	■ Wiring at the DI1 to DI8 inputs open (programmed for "without external fault").
F099 Invalid Current Offset	Current measurement circuit has a value out of the standards for zero current.	■ Defect on internal circuits of the converter.
F101 Invalid Voltage Offset	Offset calculation error in the reading of the input voltage (synchronism).	■ Main contactor closed before the pre-charge is completed. ■ CPU was reset and the main contactor did not open.
A105 Injection of Reactive Power in the Line	Alarm of injection of reactive current in the line.	■ Line voltage too above the rated value. ■ P0180 too low.
F151 Flash Memory Module Fault	Fault on the Flash Memory Module (MMF-01).	■ Flash memory module defective. ■ Flash memory module not well fitted.
A152 High Internal Air Temperature	High internal air temperature alarm. Measured temperature above 75 °C (167 °F). **Note:** - It can be disabled by setting P0353 = 1 or 3.	■ High ambient temperature around the converter (> 30 °C (86 °F)). ■ High temperature inside the panel (> 45 °C (113 °F)).
F153 Internal Air Overtemp.	Internal air overtemperature fault. Measured temperature above 80 °C.	
A156 Undertemperature	Only one sensor indicates temperature below -30° C (-22 °F).	■ Ambient temperature around the converter ≤ -30 °C (-22 °F).
F156 Undertemperature	Undertemperature fault measured on the IGBT temperature sensors.	■ Ambient temperature around the converter ≤ -30 °C (-22 °F).
A177 Fan Replacement	Alarm to replace the fan (P0045 > 50000 hours). **Note:** - It may be disabled by setting P0354 = 0.	■ Maximum number of the heatsink fan operating hours exceeded.
A181 Clock with Invalid Value	Alarm of clock with wrong time.	■ Necessary to set the date and time in P0194 to P0199 ■ HMI battery low, defective or not installed.
F182 Pulse Feedback Fault	Pulse feedback fault.	■ Defect on the internal circuits of the converter. ■ Defect on the fiber optic. ■ Defect on cables XC10A, B, C, D or E.
F183 Overload IGBTs+Temperature	Overtemperature related to IGBT overload protection.	■ High ambient temperature around the converter. ■ Operation with overload.
A300 High Temperature IGBT U B1	Alarm of high temperature measured on the temperature sensor (NTC) of the IGBT of phase U of book 1. Measured temperature above 110 °C (230 °F).	■ High ambient temperature (> 45 °C (113 °F)) and high output current. ■ Locked or defective fan. ■ Book heatsink fins too dirty, hindering the air flow. ■ High coolant temperature (> 45 °C (113 °F) see Item 3.2.6 Cooling System on page 3-17) and high output current. ■ Coolant flow < 20 l/min or clogged tubing. ■ UP11W heatsink or system heat exchanger rust inside due to coolant out of the specifications (see Item 3.2.6 Cooling System on page 3-17). ■ Fault in the pumps.
F301 Overtemperature IGBT U B1	Fault of overtemperature measured on the temperature sensor (NTC) of the IGBT of phase U of book 1. Measured temperature above 115 °C (239 °F).	
A303 High Temperature IGBT V B1	Alarm of high temperature measured on the temperature sensor (NTC) of IGBT of phase V of book 1. Measured temperature above 110 °C (230 °F).	
F304 Overtemperature IGBT V B1	Fault of overtemperature measured on the temperature sensor (NTC) of IGBT of phase V of book 1. Measured temperature above 115 °C (239 °F).	
A306 High Temperature IGBT W B1	Alarm of high temperature measured on the temperature sensor (NTC) of IGBT of phase W of book 1. Measured temperature above 110 °C (230 °F).	
F307 Overtemperature IGBT W B1	Fault of overtemperature measured on the temperature sensor (NTC) of IGBT of phase W of book 1. Measured temperature above 115 °C (239 °F).	
A309 High Temperature IGBT U B2	Alarm of high temperature measured on the temperature sensor (NTC) of IGBT of phase U of book 2. Measured temperature above 110 °C (230 °F).	

Fault/Alarm	Description	Possible Causes
F310 Overtemperature IGBT U B2	Fault of overtemperature measured on the temperature sensor (NTC) of the IGBT of phase U of book 2. Measured temperature above 115 °C (239 °F).	■ High ambient temperature (> 45 °C (113 °F)) and high output current. ■ Locked or defective fan. ■ Book heatsink fins too dirty, hindering the air flow. ■ High coolant temperature (> 45 °C (113 °F) see Item 3.2.6 Cooling System on page 3-17) and high output current. ■ Coolant flow < 20 l/min or clogged tubing. ■ UP11W heatsink or system heat exchanger rust inside due to coolant out of the specifications (see Item 3.2.6 Cooling System on page 3-17). ■ Fault in the pumps.
A312 High Temperature IGBT V B2	Alarm of high temperature measured on the temperature sensor (NTC) of IGBT of phase V of book 2. Measured temperature above 110 °C (230 °F).	
F313 Overtemperature IGBT V B2	Fault of overtemperature measured on the temperature sensor (NTC) of IGBT of phase V of book 2. Measured temperature above 115 °C (239 °F).	
A315 High Temperature IGBT W B2	Alarm of high temperature measured on the temperature sensor (NTC) of IGBT of phase W of book 2. Measured temperature above 110 °C (230 °F).	
F316 Overtemperature IGBT W B2	Fault of overtemperature measured on the temperature sensor (NTC) of IGBT of phase W of book 2. Measured temperature above 115 °C (239 °F).	
A318 High Temperature IGBT U B3	Alarm of high temperature measured on the temperature sensor (NTC) of IGBT of phase U of book 3. Measured temperature above 110 °C (230 °F).	
F319 Overtemperature IGBT U B3	Fault of overtemperature measured on the temperature sensor (NTC) of the IGBT of phase U of book 3. Measured temperature above 115 °C (239 °F).	
A321 High Temperature IGBT V B3	Alarm of high temperature measured on the temperature sensor (NTC) of IGBT of phase V of book 3. Measured temperature above 110 °C (230 °F).	
F322 Overtemperature IGBT V B3	Fault of overtemperature measured on the temperature sensor (NTC) of IGBT of phase V of book 3. Measured temperature above 115 °C (239 °F).	
A324 High Temperature IGBT W B3	Alarm of high temperature measured on the temperature sensor (NTC) of IGBT of phase W of book 3. Measured temperature above 110 °C (230 °F).	
F325 Overtemperature IGBT W B3	Fault of overtemperature measured on the temperature sensor (NTC) of IGBT of phase W of book 3. Measured temperature above 115 °C (239 °F).	
A327 High Temperature IGBT U B4	Alarm of high temperature measured on the temperature sensor (NTC) of IGBT of phase U of book 4. Measured temperature above 110 °C (230 °F).	
F328 Overtemperature IGBT U B4	Fault of overtemperature measured on the temperature sensor (NTC) of the IGBT of phase U of book 4. Measured temperature above 115 °C (239 °F).	
A330 High Temperature IGBT V B4	Alarm of high temperature measured on the temperature sensor (NTC) of IGBT of phase V of book 4. Measured temperature above 110 °C (230 °F).	
F331 Overtemperature IGBT V B4	Fault of overtemperature measured on the temperature sensor (NTC) of IGBT of phase V of book 4. Measured temperature above 115 °C (239 °F).	
A333 High Temperature IGBT W B4	Alarm of high temperature measured on the temperature sensor (NTC) of IGBT of phase W of book 4. Measured temperature above 110 °C (230 °F).	
F334 Overtemperature IGBT W B4	Fault of overtemperature measured on the temperature sensor (NTC) of IGBT of phase W of book 4. Measured temperature above 115 °C (239 °F).	
A336 High Temperature IGBT U B5	Alarm of high temperature measured on the temperature sensor (NTC) of IGBT of phase U of book 5. Measured temperature above 110 °C (230 °F).	
F337 Overtemperature IGBT U B5	Fault of overtemperature measured on the temperature sensor (NTC) of the IGBT of phase U of book 5. Measured temperature above 115 °C.	
A339 High Temperature IGBT V B5	Alarm of high temperature measured on the temperature sensor (NTC) of IGBT of phase V of book 5. Measured temperature above 110 °C (230 °F).	
F340 Overtemperature IGBT V B5	Fault of overtemperature measured on the temperature sensor (NTC) of IGBT of phase V of book 5. Measured temperature above 115 °C (239 °F).	
A342 High Temperature IGBT W B5	Alarm of high temperature measured on the temperature sensor (NTC) of IGBT of phase W of book 5. Measured temperature above 110 °C (230 °F).	
F343 Overtemperature IGBT W B5	Fault of overtemperature measured on the temperature sensor (NTC) of IGBT of phase W of book 5. Measured temperature above 115 °C (239 °F).	

Fault/Alarm	Description	Possible Causes
A345 High Load IGBT U B1	Alarm of overload on the IGBT of phase U of book 1.	■ High current at the converter input (see Figure 8.1 on page 8-4).
F346 Overload on IGBT U B1	Fault of overload on the IGBT of phase U of book 1.	
A348 High Load IGBT V B1	Alarm of overload on the IGBT of phase V of book 1.	
F349 Overload on IGBT V B1	Fault of overload on the IGBT of phase V of book 1.	
A351 High Load IGBT W B1	Alarm of overload on the IGBT of phase W of book 1.	
F352 Overload on IGBT W B1	Alarm of overload on the IGBT of phase W of book 1.	
A354 High Load IGBT U B2	Alarm of overload on the IGBT of phase U of book 2.	
F355 Overload on IGBT U B2	Fault of overload on the IGBT of phase U of book 2.	
A357 High Load IGBT V B2	Alarm of overload on the IGBT of phase V of book 2.	
F358 Overload on IGBT V B2	Fault of overload on the IGBT of phase V of book 2.	
A360 High Load IGBT W B2	Alarm of overload on the IGBT of phase W of book 2.	
F361 Overload on IGBT W B2	Fault of overload on the IGBT of phase W of book 2.	
A363 High Load IGBT U B3	Alarm of overload on the IGBT of phase U of book 3.	
F364 Overload on IGBT U B3	Fault of overload on the IGBT of phase U of book 3.	
A366 High Load IGBT V B3	Alarm of overload on the IGBT of phase V of book 3.	
F367 Overload on IGBT V B3	Fault of overload on the IGBT of phase V of book 3.	
A369 High Load IGBT W B3	Alarm of overload on the IGBT of phase W of book 3.	
F370 Overload on IGBT W B3	Fault of overload on the IGBT of phase W of book 3.	
A372 High Load IGBT U B4	Alarm of overload on the IGBT of phase U of book 4.	
F373 Overload on IGBT U B4	Fault of overload on the IGBT of phase U of book 4.	
A375 High Load IGBT V B4	Alarm of overload on the IGBT of phase V of book 4.	
F376 Overload on IGBT V B4	Fault of overload on the IGBT of phase V of book 4.	
A378 High Load IGBT W B4	Alarm of overload on the IGBT of phase W of book 4.	
F379 Overload on IGBT W B4	Fault of overload on the IGBT of phase W of book 4.	
A381 High Load IGBT U B5	Alarm of overload on the IGBT of phase U of book 5.	
F382 Overload on IGBT U B5	Fault of overload on the IGBT of phase U of book 5.	
A384 High Load IGBT V B5	Alarm of overload on the IGBT of phase V of book 5.	
F385 Overload on IGBT V B5	Fault of overload on the IGBT of phase V of book 5.	
A387 High Load IGBT W B5	Alarm of overload on the IGBT of phase W of book 5.	
F388 Overload on IGBT W B5	Fault of overload on the IGBT of phase W of book 5.	

Fault/Alarm	Description	Possible Causes
A390 Current Unbalance Phase U B1	Alarm of current unbalance of phase U book 1. It indicates an unbalance of 20 % in the current distribution between this phase and the smallest current of the same phase in another book, only when the current in this phase is higher than 75 % of its rated value.	■ Poor electrical connection between the DC link and the power unit. ■ Poor electrical connection between input U, V and W of the power unit and the filter. **Note:** In case of quick accelerations and brakes, this alarm may be momentarily indicated, disappearing after some seconds. This does not indicate a malfunction of the inverter. In case this alarm persists when the motor is operating at constant speed, it is an indication of abnormal current distribution between the power units.
A391 Current Unbalance Phase V B1	Alarm of current unbalance of phase V book 1. It indicates an unbalance of 20 % in the current distribution between this phase and the smallest current of the same phase in another book, only when the current in this phase is higher than 75 % of its rated value.	
A392 Current Unbalance Phase W B1	Alarm of current unbalance of phase W book 1. It indicates an unbalance of 20 % in the current distribution between this phase and the smallest current of the same phase in another book, only when the current in this phase is higher than 75 % of its rated value.	
A393 Current Unbalance Phase U B2	Alarm of current unbalance of phase U book 2. It indicates an unbalance of 20 % in the current distribution between this phase and the smallest current of the same phase in another book, only when the current in this phase is higher than 75 % of its rated value.	
A394 Current Unbalance Phase V B2	Alarm of current unbalance of phase V book 2. It indicates an unbalance of 20 % in the current distribution between this phase and the smallest current of the same phase in another book, only when the current in this phase is higher than 75 % of its rated value.	
A395 Current Unbalance Phase W B2	Alarm of current unbalance of phase W book 2. It indicates an unbalance of 20 % in the current distribution between this phase and the smallest current of the same phase in another book, only when the current in this phase is higher than 75 % of its rated value.	
A396 Current Unbalance Phase U B3	Alarm of current unbalance of phase U book 3. It indicates an unbalance of 20 % in the current distribution between this phase and the smallest current of the same phase in another book, only when the current in this phase is higher than 75 % of its rated value.	
A397 Current Unbalance Phase V B3	Alarm of current unbalance of phase V book 3. It indicates an unbalance of 20 % in the current distribution between this phase and the smallest current of the same phase in another book, only when the current in this phase is higher than 75 % of its rated value.	
A398 Current Unbalance Phase W B3	Alarm of current unbalance of phase W book 3. It indicates an unbalance of 20 % in the current distribution between this phase and the smallest current of the same phase in another book, only when the current in this phase is higher than 75 % of its rated value.	
A399 Current Unbalance Phase U B4	Alarm of current unbalance of phase U book 4. It indicates an unbalance of 20 % in the current distribution between this phase and the smallest current of the same phase in another book, only when the current in this phase is higher than 75 % of its rated value.	
A400 Current Unbalance Phase V B4	Alarm of current unbalance of phase V book 4. It indicates an unbalance of 20 % in the current distribution between this phase and the smallest current of the same phase in another book, only when the current in this phase is higher than 75 % of its rated value.	

Fault/Alarm	Description	Possible Causes
A401 Current Unbalance Phase W B4	Alarm of current unbalance of phase W book 4. It indicates an unbalance of 20 % in the current distribution between this phase and the smallest current of the same phase in another book, only when the current in this phase is higher than 75 % of its rated value.	■ Poor electrical connection between the DC link and the power unit. ■ Poor electrical connection between input U, V and W of the power unit and the filter. **Note:** In case of quick accelerations and brakes, this alarm may be momentarily indicated, disappearing after some seconds. This does not indicate a malfunction of the inverter. In case this alarm persists when the motor is operating at constant speed, it is an indication of abnormal current distribution between the power units.
A402 Current Unbalance Phase U B5	Alarm of current unbalance of phase U book 5. It indicates an unbalance of 20 % in the current distribution between this phase and the smallest current of the same phase in another book, only when the current in this phase is higher than 75 % of its rated value.	
A403 Current Unbalance Phase V B5	Alarm of current unbalance of phase V book 5. It indicates an unbalance of 20 % in the current distribution between this phase and the smallest current of the same phase in another book, only when the current in this phase is higher than 75 % of its rated value.	
A404 Current Unbalance Phase W B5	Alarm of current unbalance of phase W book 5. It indicates an unbalance of 20 % in the current distribution between this phase and the smallest current of the same phase in another book, only when the current in this phase is higher than 75 % of its rated value.	
F408 Fault on the Cooling System	This fault/alarm is linked to the configuration of parameters P0832 and P0833. ■ Function of input DIM 1. ■ Function of input DIM 2.	■ Fault on pumps (drives with water cooling). ■ Fault on the panel ventilation. **Note:** Check the drive used in the application.
F410 External Fault		■ Input DIM1 or DIM2 open. Check the drive used in the application.

(1) For the CFW11M G2 RB or CFW11W G2 RB, the HMI does not indicate in which UP11 G2 (UP11W G2) the fault occurred. LEDs on the ICUP board indicate which UP11 (UP11W) caused the fault, Figure 6.1 on page 6-7. When the reset is executed, the LEDs turn off and turn back on if the fault persists.

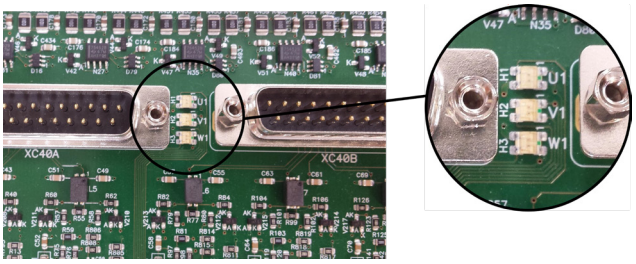


Figure 6.1: *LEDs that indicate fault on the arms of the power units (desaturation)*

6.3 TROUBLESHOOTING THE MOST COMMON PROBLEMS

Table 6.2: *Troubleshooting the most common problems*

Problem	Point to Be Checked	Corrective Action
DC link will not reach value programmed in P0151	Wrong wiring	1. Check all the power and control connections. For example, the DIx digital inputs programmed as general enable or without external fault must be connected to the 24 Vdc or DGND* (see Figure 3.46 on page 3-39 and Figure 3.47 on page 3-39)
	Wrong programming	1. Check if the parameters have correct values for the application
	Fault	1. Check if the converter is not disabled due to a fault condition 2. Check if there is a short circuit between terminals XC1:13 and 11 (short circuit in the 24 Vdc power supply)
Display off	HMI connections	1. Check the HMI connections outside the inverter
	ICUP supply voltage of 24 Vdc	1. Check the connections of the control 24 Vdc power supply 2. Check if the power supply limits are according to Table 3.28 on page 3-42

6.4 INFORMATION NECESSARY FOR CONTACTING TECHNICAL SUPPORT

NOTE!
For technical support or queries, it is important to have the following data at hand:
- Converter model.
- Serial number, manufacturing date and hardware revision indicated on the nameplate of the product (see Chapter 2 GENERAL INFORMATION on page 2-1).
- Installed software version (see P0023).
- Application and programming data.

6.5 PREVENTIVE MAINTENANCE

DANGER!
- Always disconnect the general power supply before touching any electrical component connected to the converter.
- High voltages may still be present even after disconnecting the power supply.
- Wait at least 10 minutes for the complete discharge of the power capacitors.
- Always connect the equipment frame to the protective earth (PE) at the proper terminal.

6

ATTENTION!
Electronic boards have components sensitive to electrostatic discharges.
Do not touch the components or connectors directly. If necessary, first touch the grounded metallic frame or wear a grounding strap.

Do not carry out any applied potential test on the converter!
If necessary, contact WEG.

When installed in proper environments and operating conditions, the converters require little maintenance. Table 6.3 on page 6-8 presents the main procedures and time intervals for preventive maintenance. Table 6.4 on page 6-9 contains the recommended inspections to be performed every 6 months after the start-up.

Table 6.3: *Preventive maintenance*

Maintenance	Interval	Instructions
HMI battery replacement	Every 10 years	See Chapter 4 HMI on page 4-1
Fan replacement (UP11 G2)	After 50,000 hours of operation (1)	Fan replacement procedure indicated in Figure 6.2 on page 6-9
Cleaning the cooling system and changing the coolant (UP11W G2)	Every 5 years	Contact WEG
Monthly inspection (UP11W G2)	Once a month	Open the panel and check for leaks. If present, it must be corrected
Refill 1.5 % of Inhibitor CorteC VpCI-649 (UP11W G2)	Once a year	Contact WEG

(1) The converters are programmed at the factory for automatic control of the fans (P0352 = 2) so that they only start when the temperature of the heatsink increases. Therefore, the number of operating hours of the fans will depend on the operating conditions (motor current, output frequency, temperature of the cooling air, etc.). The converter records in parameter P0045 the number of hours that the fan remained running. When the fan reaches 50,000 hours of operation, the HMI display will show alarm A177.

The following refrigeration system parameters must be registered annually:

- Measure the ethylene glycol concentration using a refractometer. If the concentration is below the recommended level, ethylene glycol must be replaced in the system.

- Measure the pH of the solution. The pH of the solution should be between 8.2 ... 10. If the pH is outside this range, a complete fluid change must be made.

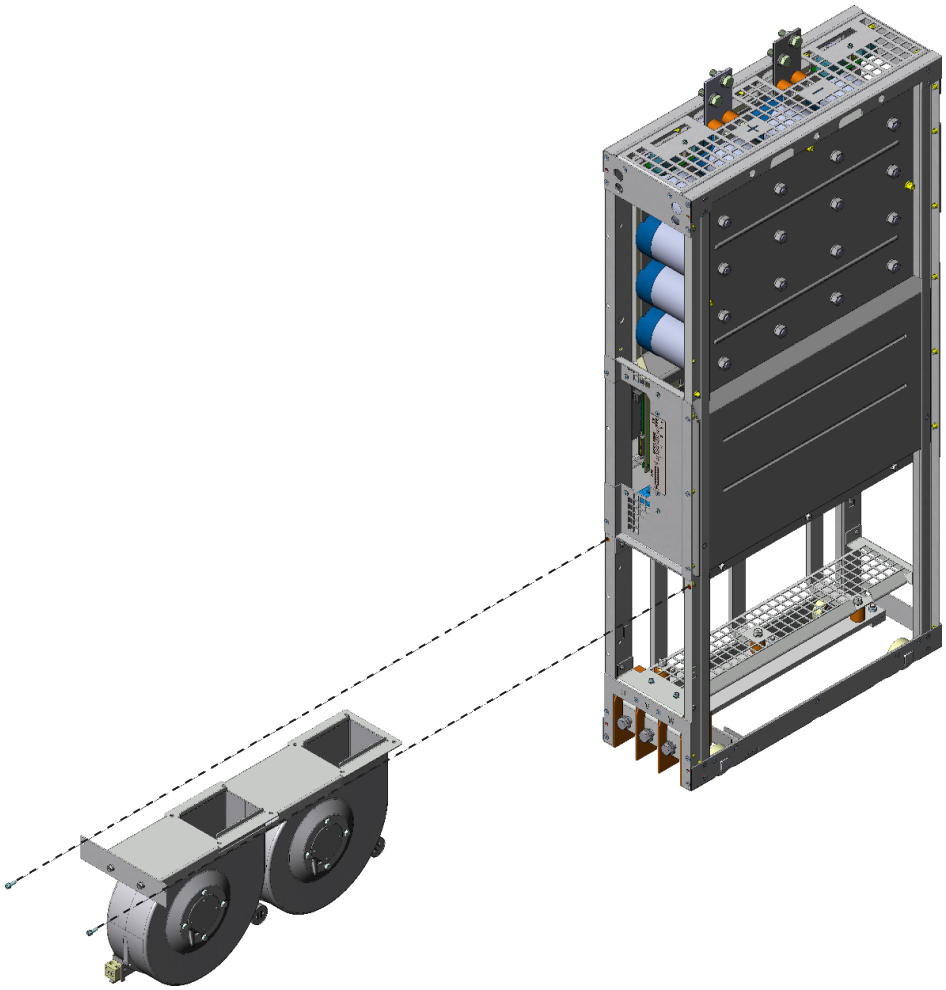


Figure 6.2: *Change the fans of UP11 G2 (air cooling))*

Table 6.4: *Periodic inspections every six months*

Component	Anomalies	Corrective Action
Terminals, connectors	Loose Screws	Tighten
	Loose Connectors	
Fans/Ventilation systems	Dirt on the fans	Clean
	Abnormal noise	Replace fan Refer to Figure 6.2 on page 6-9. Check fan connections
	Fan stopped	
	Abnormal vibration	
	Dust on the panel air filters	Clean or replace
Printed circuit boards	Buildup of dust, oil, moisture, etc.	Clean
	Smell	Replace
Power module/Power connections	Buildup of dust, oil, moisture, etc.	Clean
	Loose connection screws	Tighten
Power resistors	Discoloration	Replace
	Smell	
Heatsink	Dust buildup	Clean
	Dirt	

6.5.1 Cleaning Instructions

When it is necessary to clean the converter, follow the instructions below:

Ventilation system:

1. Disconnect the converter power supply and wait for 10 minutes.
2. Remove all the dust settled on the ventilation inlets using a plastic brush or soft cloth.
3. Remove the dust accumulated on the heatsink fins and fan blades using compressed air.

Electronic boards:

1. Disconnect the power supply of the inverter and wait for 10 minutes.
2. Remove the dust accumulated on the boards using an anti-static brush or ion compressed air gun (Example: Charges Burtes Ion Gun (non-nuclear) reference A6030-6DESCO).
3. If necessary, remove the boards from the inverter.
4. Always wear a grounding strap.

7 OPTIONAL ITEMS AND ACCESSORIES

This chapter contains:

- Optional devices that may come from the factory with the converters.
- The accessories that may be incorporated to the converters.

The installation, operation and programming details of the accessories are described in the respective manuals and are not included in this chapter.

7.1 OPTIONAL ITEMS

7.1.1 Connections of the Cooling System with Quick Couplings

Inverters with the following coding: CFW11WG2...O...QC...

This optional item is used when you want the coolant inlet and outlet fittings to be quick couplings with check valve. Figure 7.1 on page 7-1 shows a UP11W G2 with quick couplings installed.

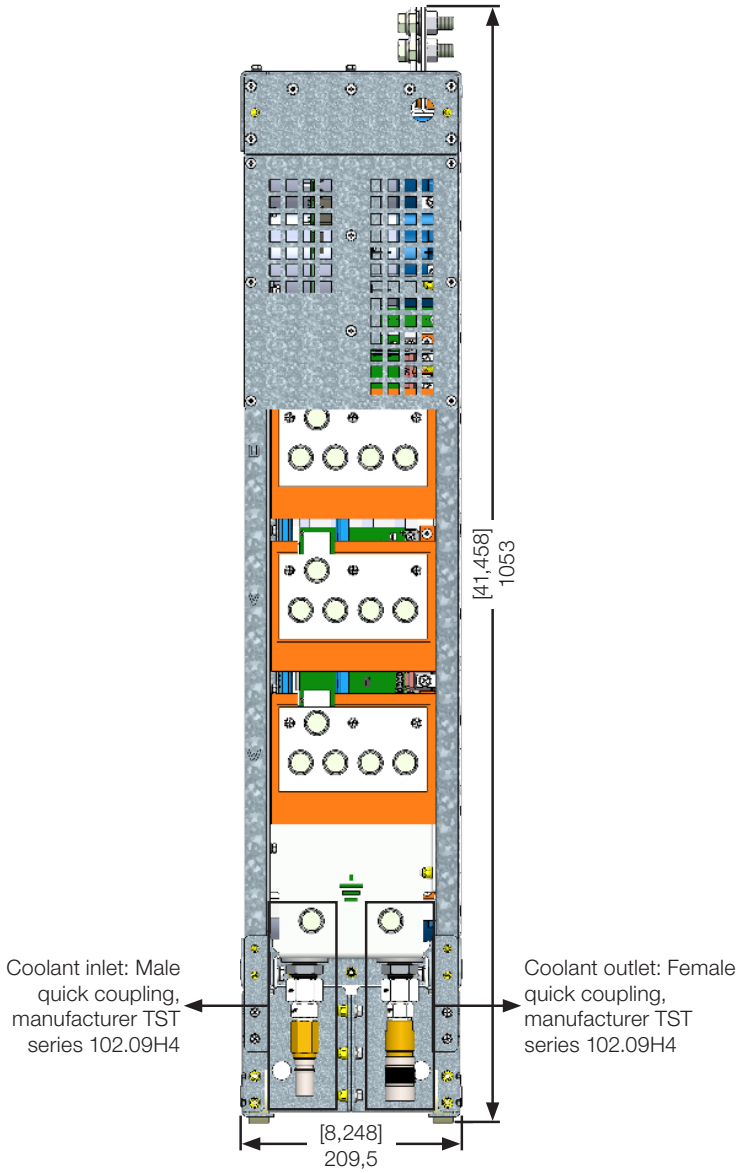


Figure 7.1: *UP11W with the coolant inlet and outlet fittings of the quick coupling type. Dimensions in mm [pol]*

ATTENTION!
The UP11W G2 becomes 120 mm higher with the quick couplings in the coolant inlet and outlet fittings.

ATTENTION!
The addition of quick couplings increases de pressure drop in the UP11W G2 by 1.55 bar. Considering the 20 l/min flow and the composition of 88,5 % of water, 10 % de glycol and 1,5 % of inhibitor CorteC VpCI-649 in the coolant.

7.2 ACCESSORIES

The accessories are easy and quickly installed on the inverters using the plug-and-play concept. When an accessory is connected to the slots, the control circuit identifies the model and informs the code of the accessory connected in P0027 or P0028. The accessory must be installed with the inverter power supply disconnected.

The code and models available of each accessory are presented in Table 7.1 on page 7-3. They may be ordered separately and will be shipped in individual packages containing the components and the manuals with detailed instructions for the product installation, operation and programming.

ATTENTION!
Only one module can be used at a time in each slot 1 or 5.

Table 7.1: Accessory models

WEG Item (material number)	Name	Description	Slot	Identification Parameters	
				P0027	P0028
Control Accessories to Install in Slot 1					
11008162	IOA-01	IOA Module: 1 analog 14-bit input in voltage and current; 2 digital inputs; 2 analog 14-bit outputs in voltage and current; 2 open collector digital outputs	1	FD--	----
11008099	IOB-01	IOB Module: 2 isolated analog inputs in voltage and current; 2 digital inputs; 2 isolated analog outputs in voltage and current (same output programming as the standard CFW-11); 2 open-collector digital outputs	1	FA--	----
Flash Memory Module to Install in Slot 5 - Included in Standard Models					
11719952	MMF-03	Flash memory module	5	----	--xx (1)
Separate HMI, Blind Cover and Frame for External HMI					
11008913	HMI-01	Separate HMI (2)	HMI	-	-
11010521	RHMIF-01	Frame kit for HMI remote (IP56 protection rating)	-	-	-
11010298	HMID-01	Blind cover for HMI slot	HMI	-	-
10950192	HMI CAB-RS-1M	Serial cable for remote HMI 1 m	-	-	-
10951226	HMI CAB-RS-2M	Serial cable for remote HMI 2 m	-	-	-
10951223	HMI CAB-RS-3M	Serial cable for remote HMI 3 m	-	-	-
Others					
10960846	CONRA-01	Control rack (containing the CC11 control board)	-	-	-
10960847	CCS-01	Shield kit for control cables (supplied with the product)	-	-	-
13555095	Cabos Fibra/Sinal 2,5 m	Fiber and Signal Cable Set - 2.5 m	-	-	-
13555150	Cabos Fibra/Sinal 3,0 m	Fiber and Signal Cable Set - 3.0 m	-	-	-
13555151	Cabos Fibra/Sinal 3,6 m	Fiber and Signal Cable Set - 3.6 m	-	-	-
13353317	RACK G2 2 UP11	Rack for panel mounting of 2 UP11 G2 units (3)	-	-	-
13353316	RACK G2 3 UP11	Rack for panel mounting of 3 UP11 G2 units (3)	-	-	-
14235116	RACK G2 2 UP11W	Rack for panel mounting of 2 UP11W G2 units (3)			
14235117	RACK G2 3 UP11W	Rack for panel mounting of 3 UP11W G2 units (3)			
14267304	CTSRB-T4	Synchronism transformer set: input voltage 380 - 480 V			
14267307	CTSRB-T6	Synchronism transformer set: input voltage 500 - 690 V			

(1) Refer to the programming manual.
(2) Use cable to connect the HMI to the inverter with D-Sub9 (DB-9) male and female connectors with pin to pin connection (mouse extension type) or Null-Modem type. Maximum length 3 m.
Examples:
- Mouse extension cable - 1.80 m; Manufacturer: Clone.
- Belkin pro series DB9 serial extension cable 5 m; Manufacturer: Belkin.
- Cables Unlimited PCM195006 cable, 6 ft DB9 m/f; Manufacturer: Cables Unlimited.

(3) Refer to the rack mounting guide.

8 TECHNICAL DATA

This chapter describes the technical specifications (electrical and mechanical) of the CFW-11M G2 and CFW-11W G2 RB.

8.1 POWER DATA

Power supply:

- Maximum rated line voltage: 480 V for models 380...480 V, 600 V for models 500...600 V and 690 V for models 660...690 V, for altitude up to 2000 m. For higher altitudes, the rated line voltage derating will be 1.1 % for each 100 m above 2000 m – maximum altitude: 4000 m.
- Voltage tolerance: -15 % to +10 %.
- Frequency: 50/60 Hz (48 Hz to 62 Hz).
- Phase imbalance: ≤ 3 % of the rated phase-phase input voltage.
- Overvoltages according to Category III (EN 61010/UL 508C).
- Transient voltages according to Category III.
- Typical efficiency: ≥ 97 %.
- Typical input power factor: 0.99 at rated condition.
- Typical Harmonics Distortion rate of the input current: 4 % at rated condition.

Model	Power Supply [Vrms]	Nº. of UP11	Use Under Normal Duty (ND)						Use Under Heavy Duty (HD)					
			Rated Input Current [Arms]	Overload Current (3) [Arms]		Switching Frequency [kHz]	Rated Output Current [Acc]	Dissipated Power (4) [kW]	Rated Input Current [Arms]	Overload Current (3) [Arms]		Switching Frequency [kHz]	Rated Output Current [Acc]	Dissipated Power (4) [kW]
				1 min	3 s					1 min	3 s			
CFW11M G2 0634 T 4 O RB	380...480	1	634	697	951	2.5	729	4.8	515	773	1030	2.5	592	3.8
CFW11M G2 1205 T 4 O RB		2	1205	1325	1807	2.5	1385	9.7	979	1468	1957	2.5	1125	7.7
CFW11M G2 1807 T 4 O RB		3	1807	1988	2710	2.5	2078	14.5	1468	2202	2936	2.5	1688	11.5
CFW11M G2 2409 T 4 O RB		4	2409	2650	3614	2.5	2771	19.3	1957	2936	3914	2.5	2251	15.3
CFW11M G2 3012 T 4 O RB		5	3012	3313	4517	2.5	3463	24.1	2446	3669	4893	2.5	2813	19.1
CFW11M G2 0496 T 6 O RB	500...600	1	496	546	744	2.5	570	6.9	380	570	760	2.5	437	5.5
CFW11M G2 0942 T 6 O RB		2	942	1037	1414	2.5	1084	13.9	722	1083	1444	2.5	830	10.9
CFW11M G2 1414 T 6 O RB		3	1414	1555	2120	2.5	1626	20.8	1083	1625	2166	2.5	1245	16.4
CFW11M G2 1885 T 6 O RB		4	1885	2073	2827	2.5	2168	27.8	1444	2166	2888	2.5	1661	21.9
CFW11M G2 2356 T 6 O RB		5	2356	2592	3534	2.5	2709	34.7	1805	2708	3610	2.5	2076	27.3
CFW11M G2 0496 T 6 O RB	660...690	1	439	483	659	2.5	505	7.1	340	510	680	2.5	391	5.7
CFW11M G2 0942 T 6 O RB		2	834	918	1251	2.5	959	14.2	646	969	1292	2.5	743	11.4
CFW11M G2 1414 T 6 O RB		3	1251	1376	1877	2.5	1439	21.3	969	1454	1938	2.5	1114	17.2
CFW11M G2 1885 T 6 O RB		4	1668	1835	2502	2.5	1918	28.4	1292	1938	2584	2.5	1486	22.9
CFW11M G2 2356 T 6 O RB		5	2085	2294	3128	2.5	2398	35.5	1615	2423	3230	2.5	1857	28.6

Table 8.1: *Technical data of the CFW11M G2 RB converter*

Table 8.2: Technical data of the CFW11W G2 RB converter

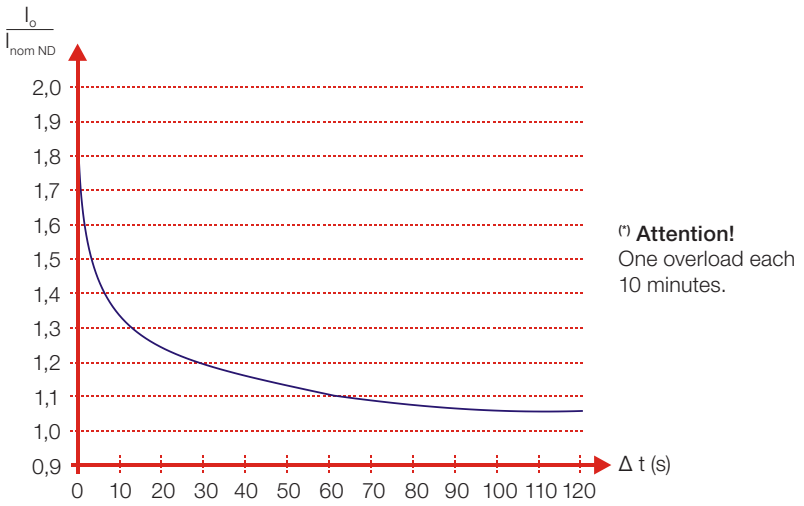
Model			CFW11W G2 0780 T 6 O RB	CFW11W G2 1482 T 6 O RB	CFW11W G2 2223 T 6 O RB	CFW11W G2 2964 T 6 O RB	CFW11W G2 3705 T 6 O RB
Power Supply [Vrms]			500...690				
Nº of UP11			1	2	3	4	5
Normal Duty (ND	Rated Input Current [Arms]		780	1482	2223	2964	3705
	Overload Current (3) [Arms]	1 min	858	1630	2445	3260	4076
		3 s	1170	2223	3335	4446	5558
	Switching Frequency [kHz]		2.5	2.5	2.5	2.5	2.5
	Rated output current [Acc]		897	1704	2556	3409	4261
	Dissipated Power (4) [kW]	For the Coolant	11.7	23.4	35.1	46.8	58.5
		For the Air	0.2	0.4	0.6	0.8	1.0
Heavy Duty (HD)	Rated Input Current [Arms]		640	1216	1824	2432	3040
	Overload Current (3) [Arms]	1 min	960	1824	2736	3648	4560
		3 s	1280	2432	3648	4864	6080
	Switching Frequency [kHz]		2.5	2.5	2.5	2.5	2.5
	Rated Output Current [Acc]		736	1398	2098	2797	3496
	Dissipated Power (4) [kW]	For the coolant	9.2	18.4	27.6	36.8	46.0
		For the air	0.2	0.4	0.6	0.8	1.0

Note:

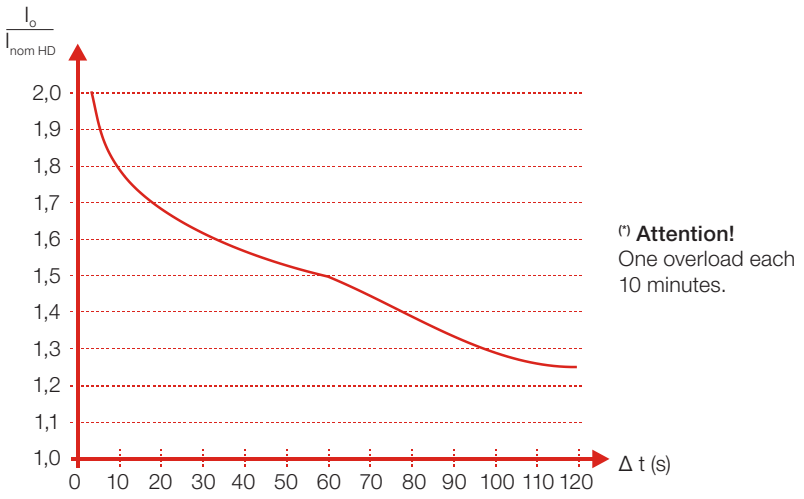
(1) For the CFW11M G2 RB converter, steady-state rated current in the following conditions:
- Indicated switching frequency. It is not possible to use the CFW-11M G2 RB converter with switching frequency of 2.0 kHz, 5 kHz and 10 kHz.
- Ambient temperature around the converter as specified in Chapter 3 INSTALLATION AND CONNECTION on page 3-1. For higher temperatures, limited to 55 ° C, the output current must be derated by 2 % for each ºC above the maximum temperature specified.
- Air relative humidity: 5 % to 95 % non-condensing.
- Altitude: 1000 m. Above 1000 m up to 4000 m, the output current must be derated by 1 % for each 100 m above 1000 m.
- Environment with pollution degree 2 (as per EN50178 and UL508C).

(2) For the CFW11W G2 RB converter, steady-state rated current in the following conditions:
- Indicated switching frequency. It is not possible to use the CFW-11W G2 RB converter with switching frequency of 2.0 kHz, 5 kHz and 10 kHz.
- Ambient temperature around the converter as specified in Chapter 3 INSTALLATION AND CONNECTION on page 3-1. For higher temperatures, limited to 55 ° C, the output current must be derated by 0.5 % for each ° C above the maximum temperature specified.
- Coolant input temperature as specified in Chapter 3 INSTALLATION AND CONNECTION on page 3-1. For higher temperatures, limited to 55 ° C, the output current must be derated by 1 % for each ° C above the maximum temperature specified.
- Coolant flow as specified in Chapter 3 INSTALLATION AND CONNECTION on page 3-1.
- Air relative humidity: 5 % to 95 % non-condensing.
- Altitude: 1000 m. Above 1000 m up to 4000 m, the output current must be derated by 1 % for each 100 m above 1000 m.
- Environment with pollution degree 2 (as per EN50178 and UL508C).

(3) One overload every 10 minutes. Table 8.1 on page 8-2 and Table 8.2 on page 8-3 contain only two points of the overload curve (actuation time of 1 min and 3 s). The complete overload curves of the IGBTs for Normal Duty (ND) and Heavy Duty (HD) are presented in Figure 8.1 on page 8-4. Depending on the converter operating conditions, such as air temperature around the converter or coolant temperature, the maximum time for operation of the converter under overload may reduce.



(a) IGBTs overload curve for the Normal Duty (ND) cycle



(b) IGBTs overload curve for the Heavy Duty (HD) cycle

Figure 8.1: *(a) and (b) Overload curves of the IGBTs for operation under normal duty (ND) and operation under heavy duty (HD)*

(4) All dissipated powers were obtained using the maximum input voltage, rated current (ND or HD), maximum output voltage and switching frequency of 2.5 kHz. All indicated losses are for the worst case.

8.2 ELECTRONICS/GENERAL DATA

Table 8.3: General data regarding the converter control and electronics

Control	**Method**	■ PWM SVM (Space Vector Modulation) ■ Current regulators, DC link voltage and reactive power
Inputs (CC11 board)	**Digital**	■ 6 insulated digital inputs, 24 Vdc, programmable functions
Outputs (CC11 board)	**Analog**	■ 2 isolated outputs, (0 to 10) V, RL ≥ 10 kΩ (max. load), 0 to 20 mA / 4 to 20 mA, (RL ≤ 500 Ω) resolution: 11 bits, programmable functions
	Relay	■ 3 relays with NO/NC contacts, 240 Vac, 1 A, programmable functions
Safety Human Machine Interface HMI	**Protection**	■ Overcurrent/short circuit at the input ■ Under/overvoltage in the power ■ Phase loss ■ Overtemperature ■ Overload on the IGBTs ■ External fault / alarm ■ Fault on the CPU or memory ■ Phase-ground short circuit on the DC link
	Standard HMI	■ 4 keys: Active: Increment, Decrement, right Soft key and left Soft key Inactive: General Enable/ Disable, Direction of rotation, JOG, Local/Remote ■ Graphic LCD display ■ It enables to access/change all the parameters ■ Precision of the indications: – Current: 5 % of the rated current ■ Option of external mounting
Protection Rating	**IP00**	■ Standard
USB Connector for Programming	**USB Connector**	■ Standard USB Rev. 2.0 (basic speed) ■ USB plug type B "device" ■ Interconnecting cable: standard host/device shielded USB cable

8.2.1 Codes and Standards

Safety Standards	■ UL 61800-5-1 – Adjustable Speed Electrical Power Drive Systems - Part 5-1: Safety Requirements - Electrical, Thermal and Energy ■ IEC/EN 61800-5-1 - Adjustable Speed Electrical Power Drive Systems - Part 5-1: Safety Requirements - Electrical, Thermal and Energy
Electromagnetic Compatibility Standards (EMC)	■ IEC/EN 61800-3 - Adjustable speed electrical power drive systems - Part 3: EMC product standard including specific test methods ■ IEC/EN 61000-4-2 - Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 2: Electrostatic discharge immunity test ■ IEC/EN 61000-4-3 - Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 3: Radiated, radio-frequency, electromagnetic field immunity test ■ IEC/EN 61000-4-4 - Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 4: Electrical fast transient/burst immunity test ■ IEC/EN 61000-4-5 - Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 5: Surge immunity test ■ IEC/EN 61000-4-6 - Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 6: Immunity to conducted disturbances, induced by radio-frequency fields
Mechanical Construction Standards	■ IEC/EN 60529 - Degrees of protection provided by enclosures (IP code) ■ UL 50 - Enclosures for electrical equipment

8.3 MECHANICAL DATA

The UP11 G2 module has a total mass of 94 Kg. Its dimensions are shown in Figure 8.2 on page 8-6.

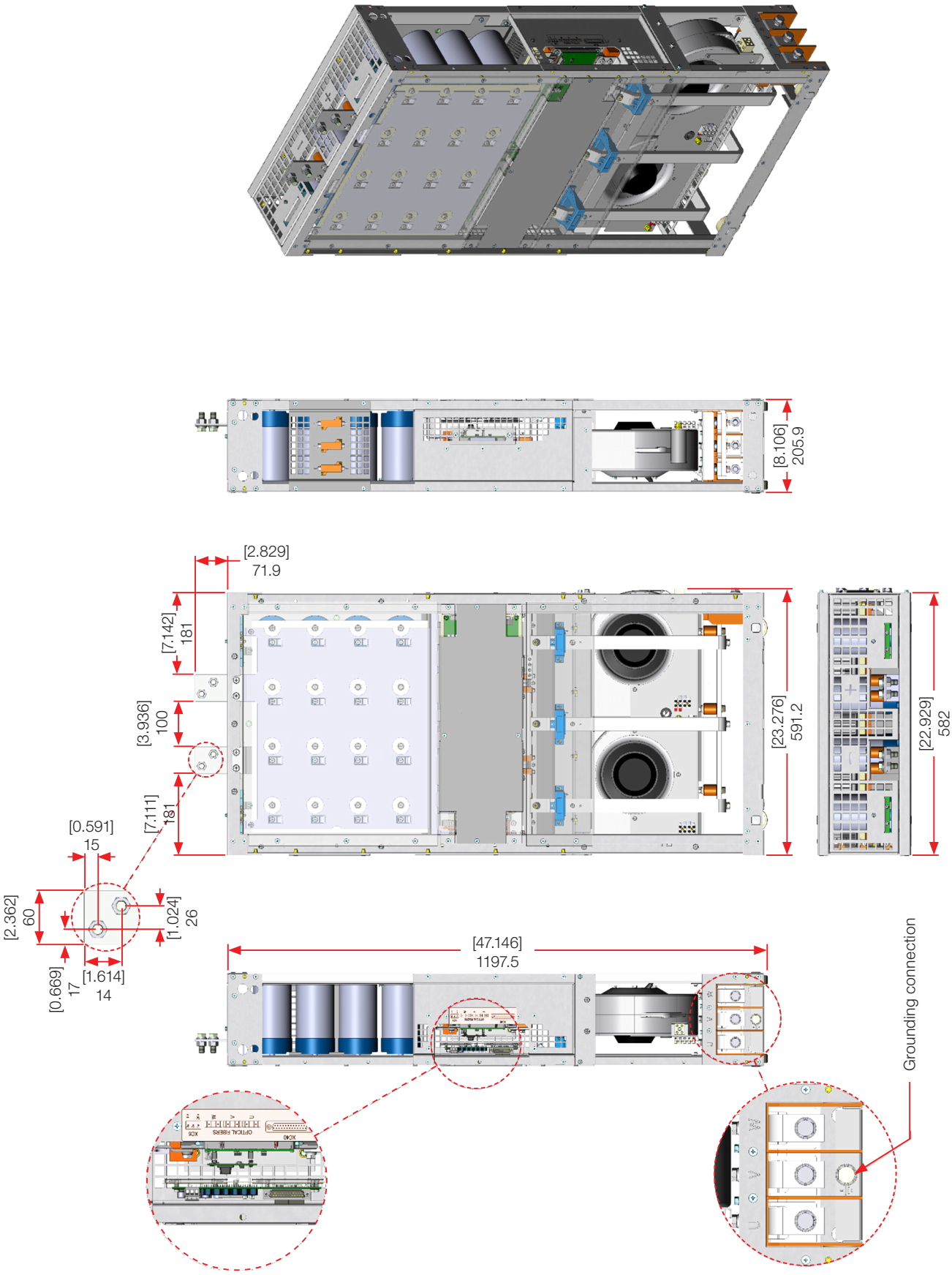


Figure 8.2: *Mechanical dimensions of the UP11 G2 in mm [in]*

The UP11W G2 module has a total mass of 67 Kg. Its dimensions are shown in Figure 8.3 on page 8-7.

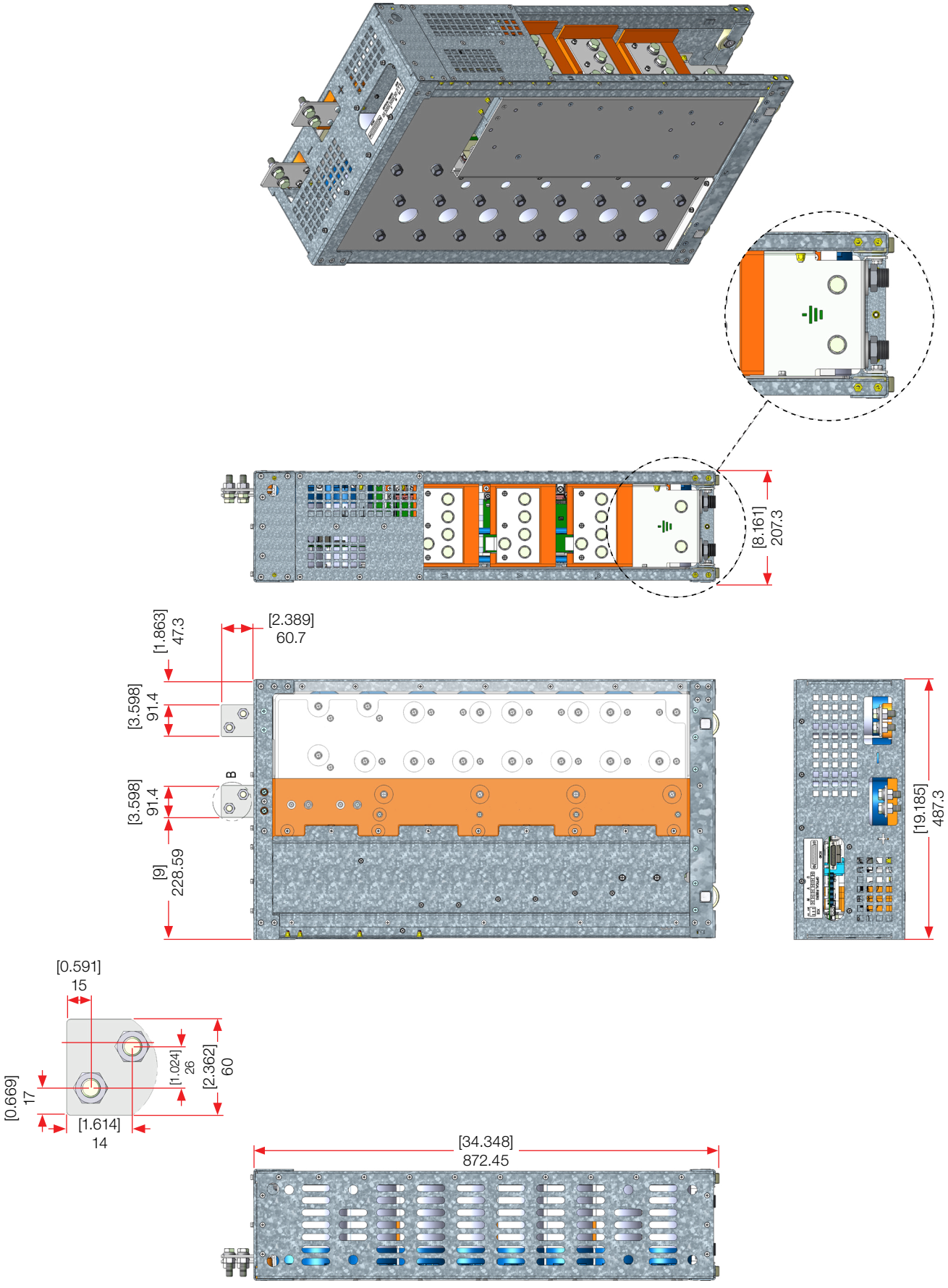


Figure 8.3: *Mechanical dimensions of the UP11W G2 in mm [pol]*

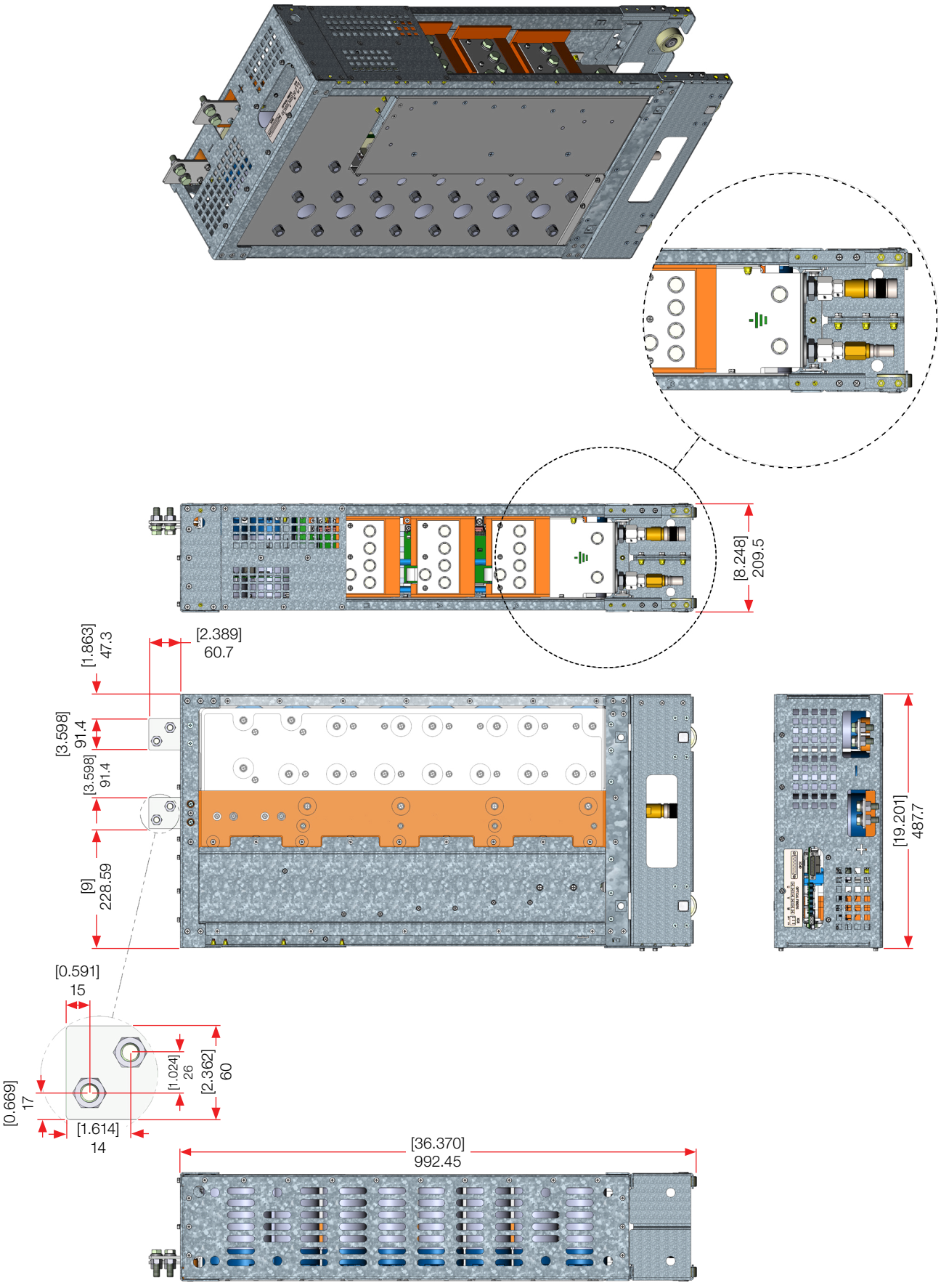


Figure 8.4: *Mechanical dimensions of the UP11W G2 with quick couplings in the hydraulic fittings in mm [pol]*

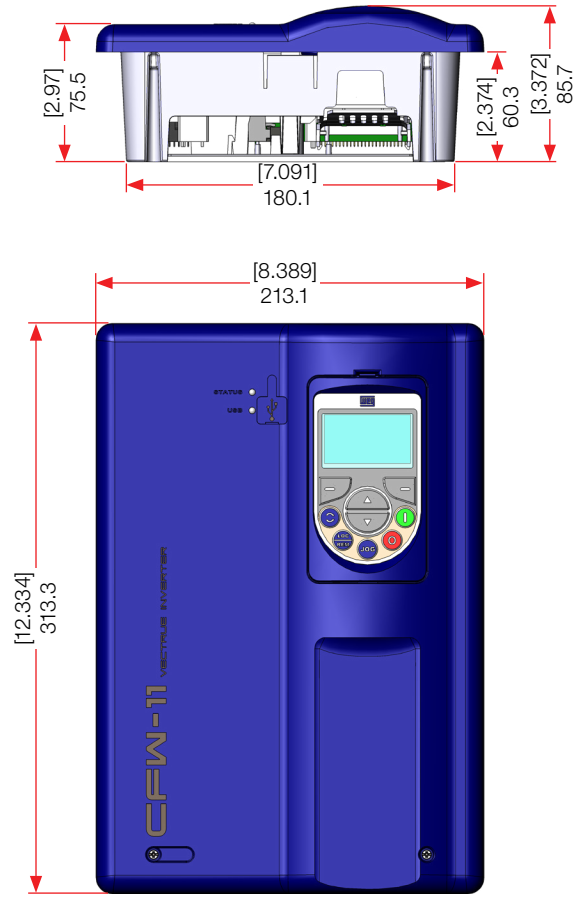


Figure 8.5: *Control rack dimensions in mm [in]*

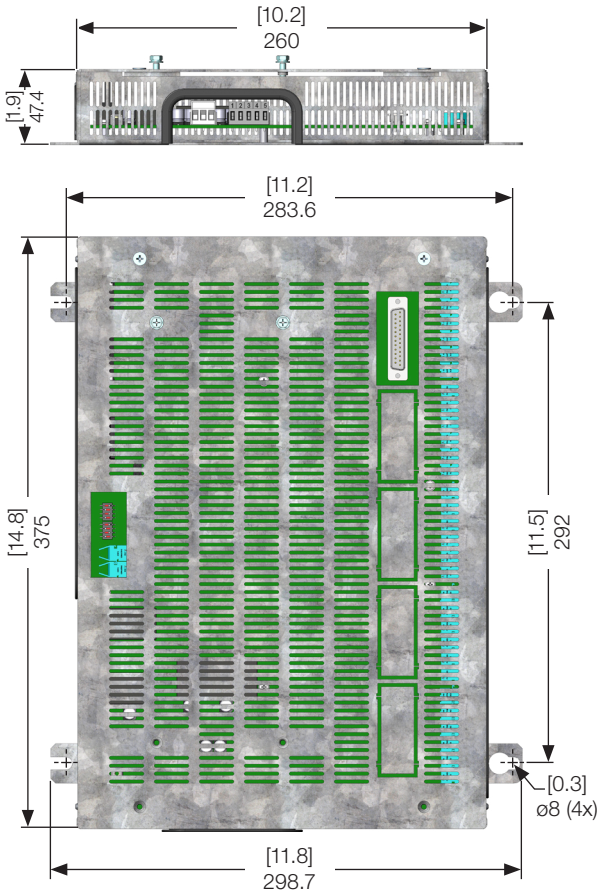
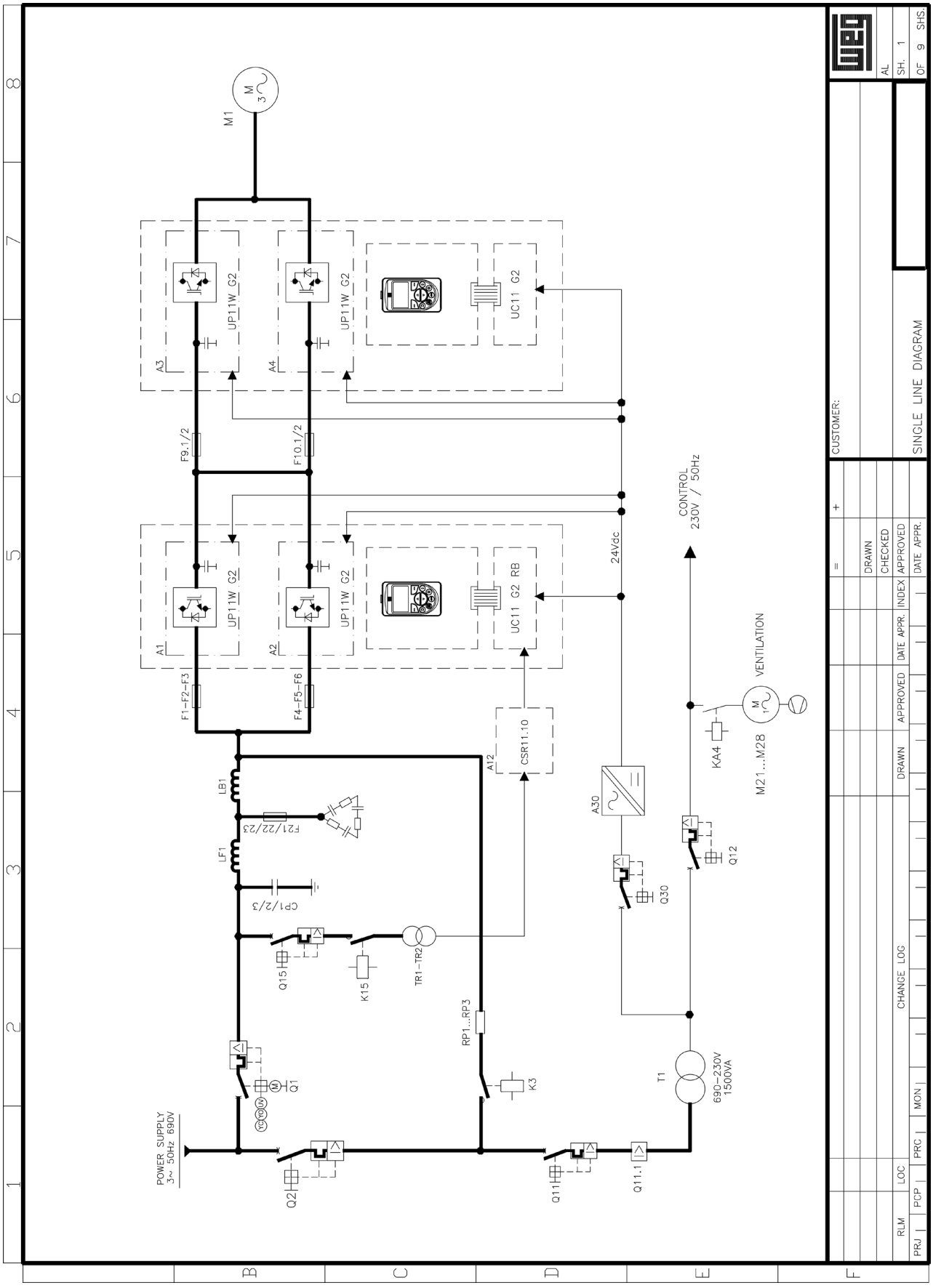
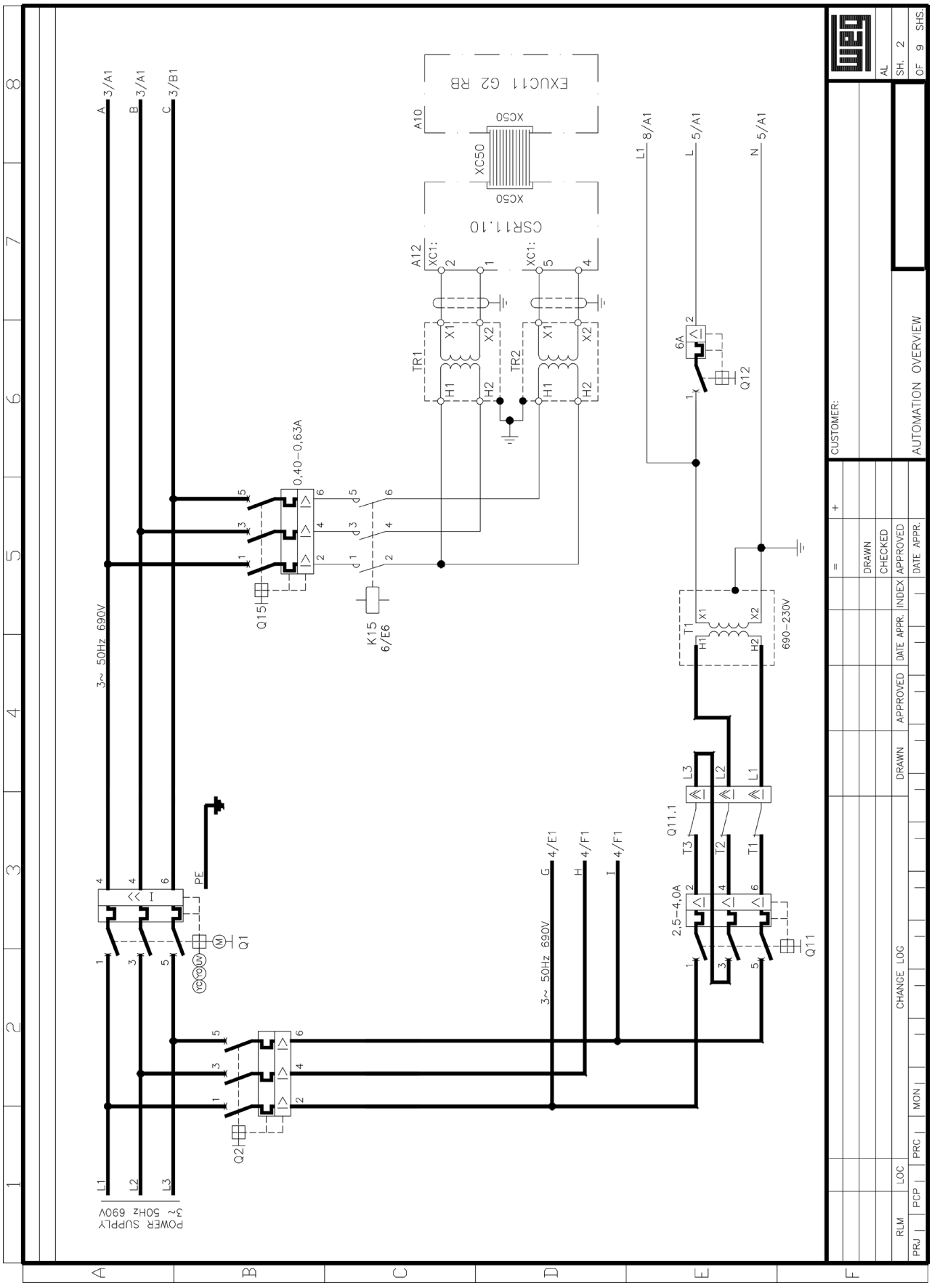


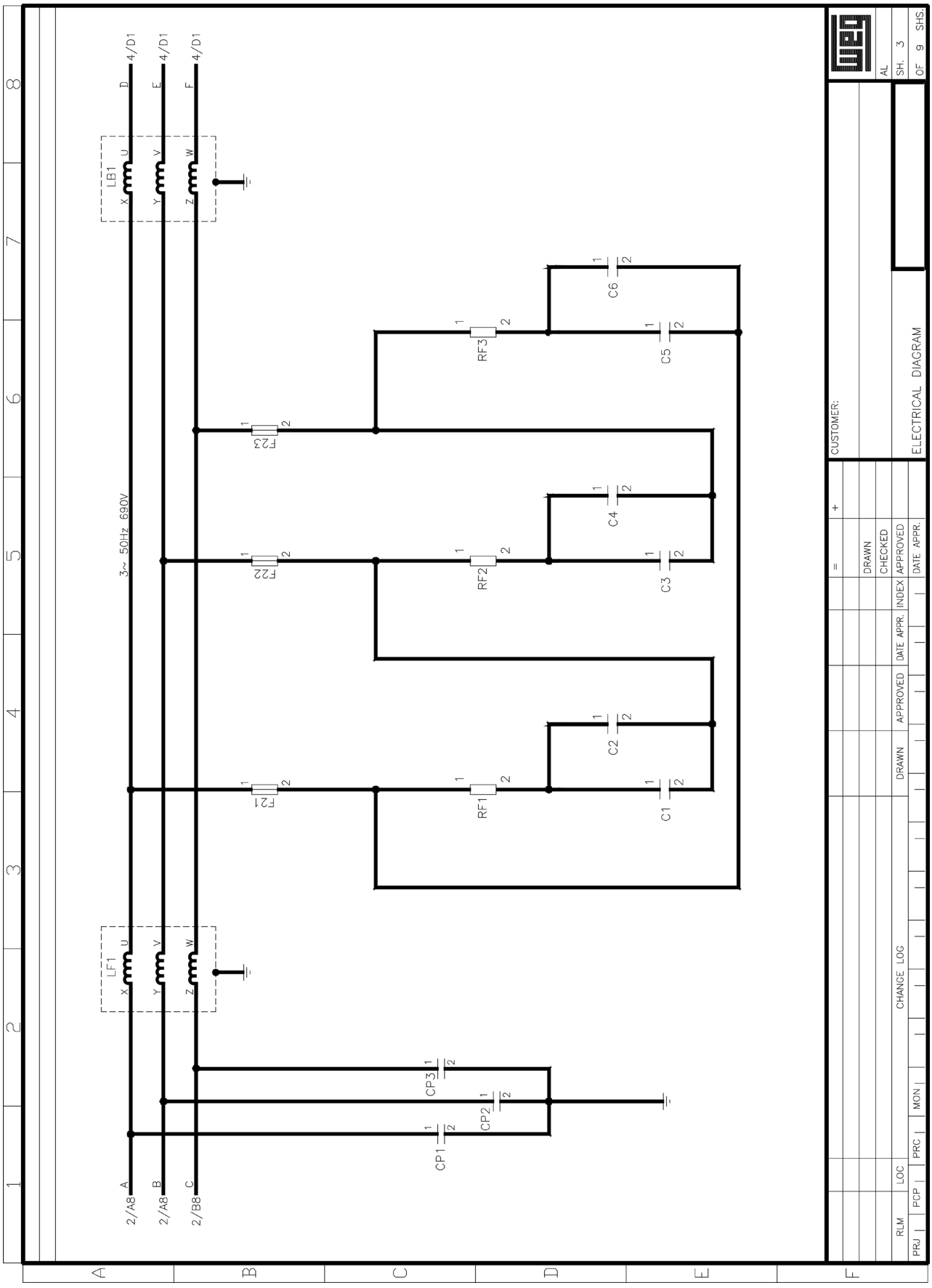
Figure 8.6: *Dimensions of the ICUP board metallic enclosure in mm [in]*

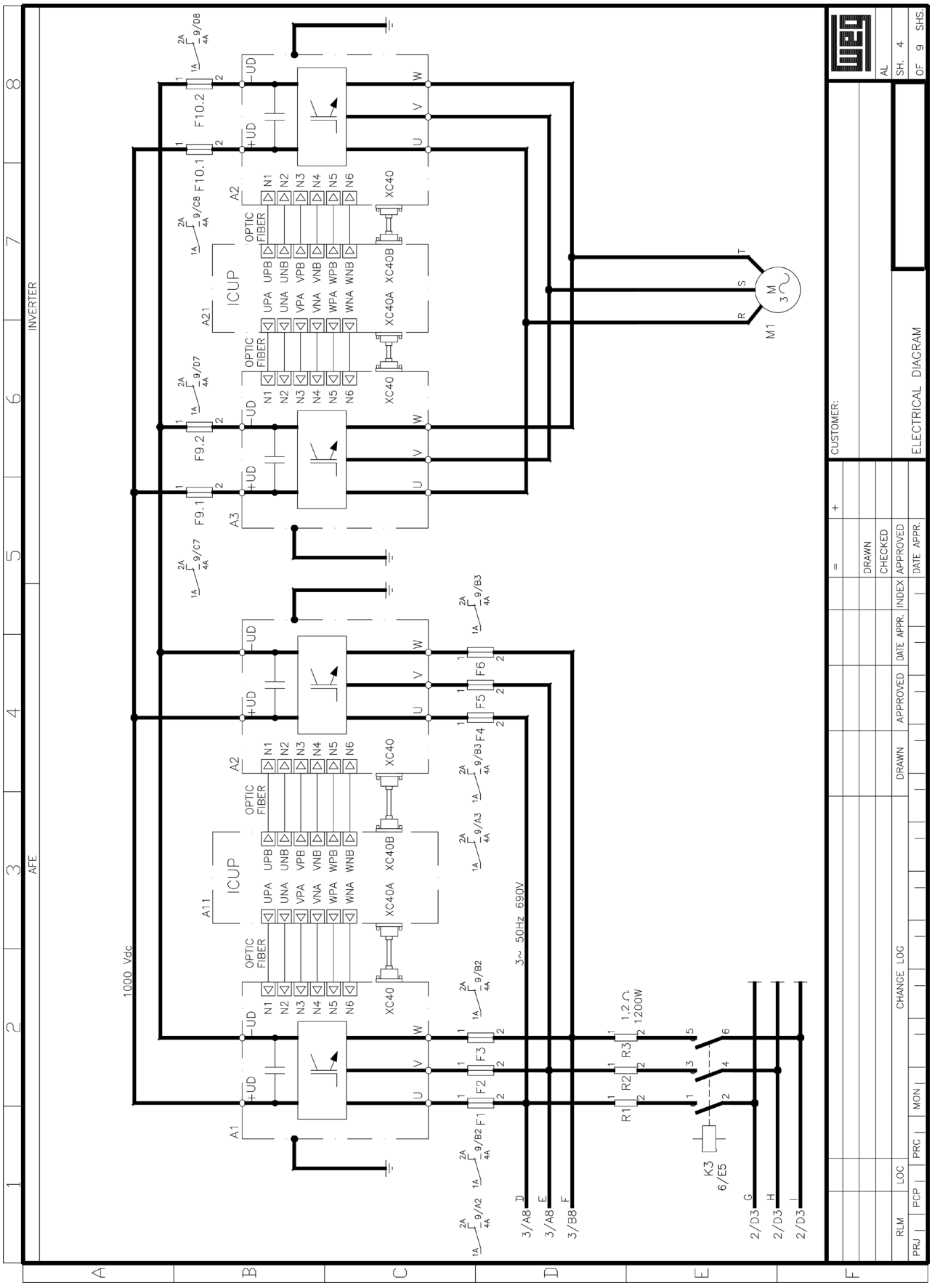
8.4 CIRCUIT DIAGRAM EXAMPLE

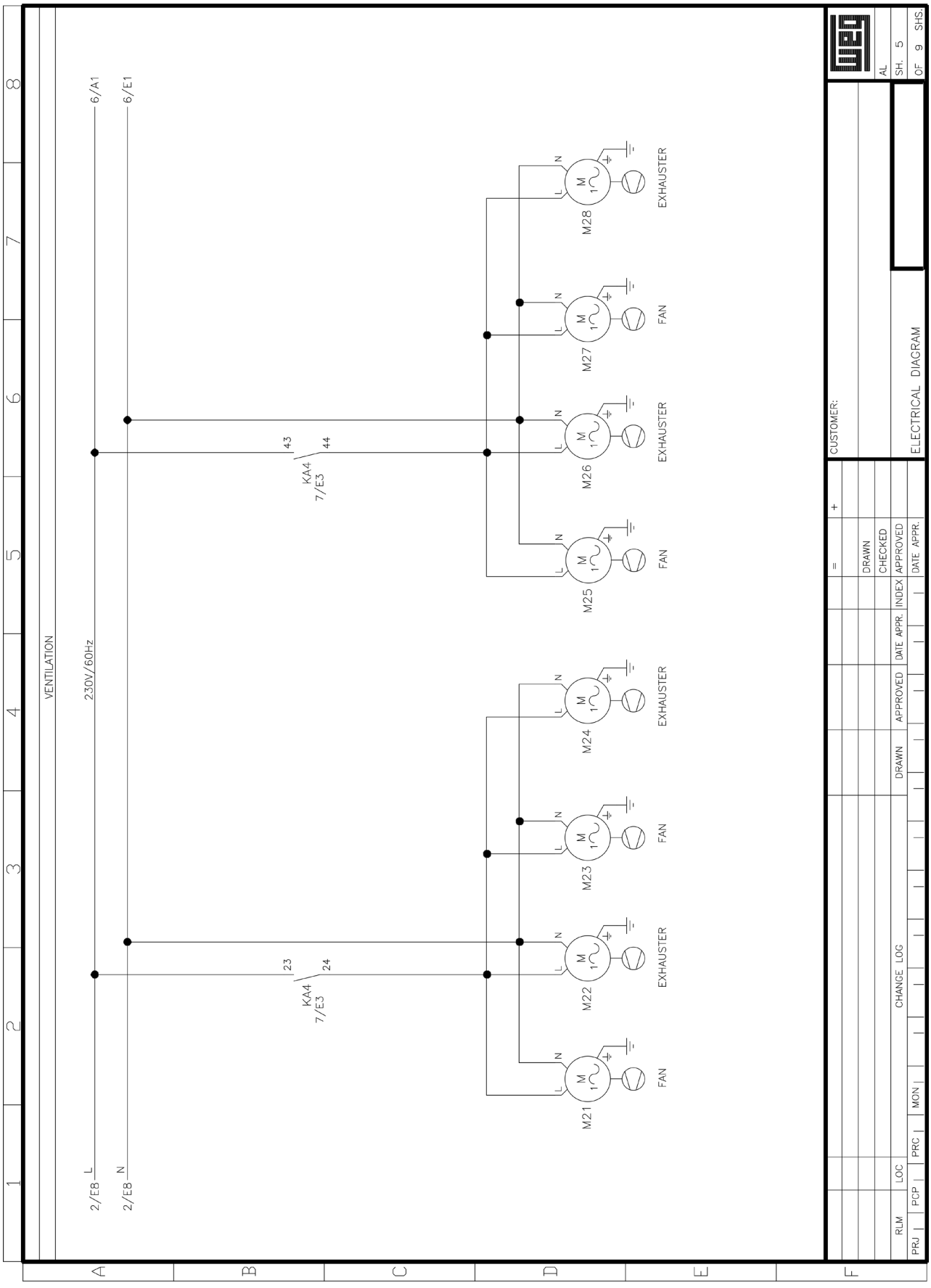
This chapter contains a connection diagram example for the whole water cooled regenerative converter system.

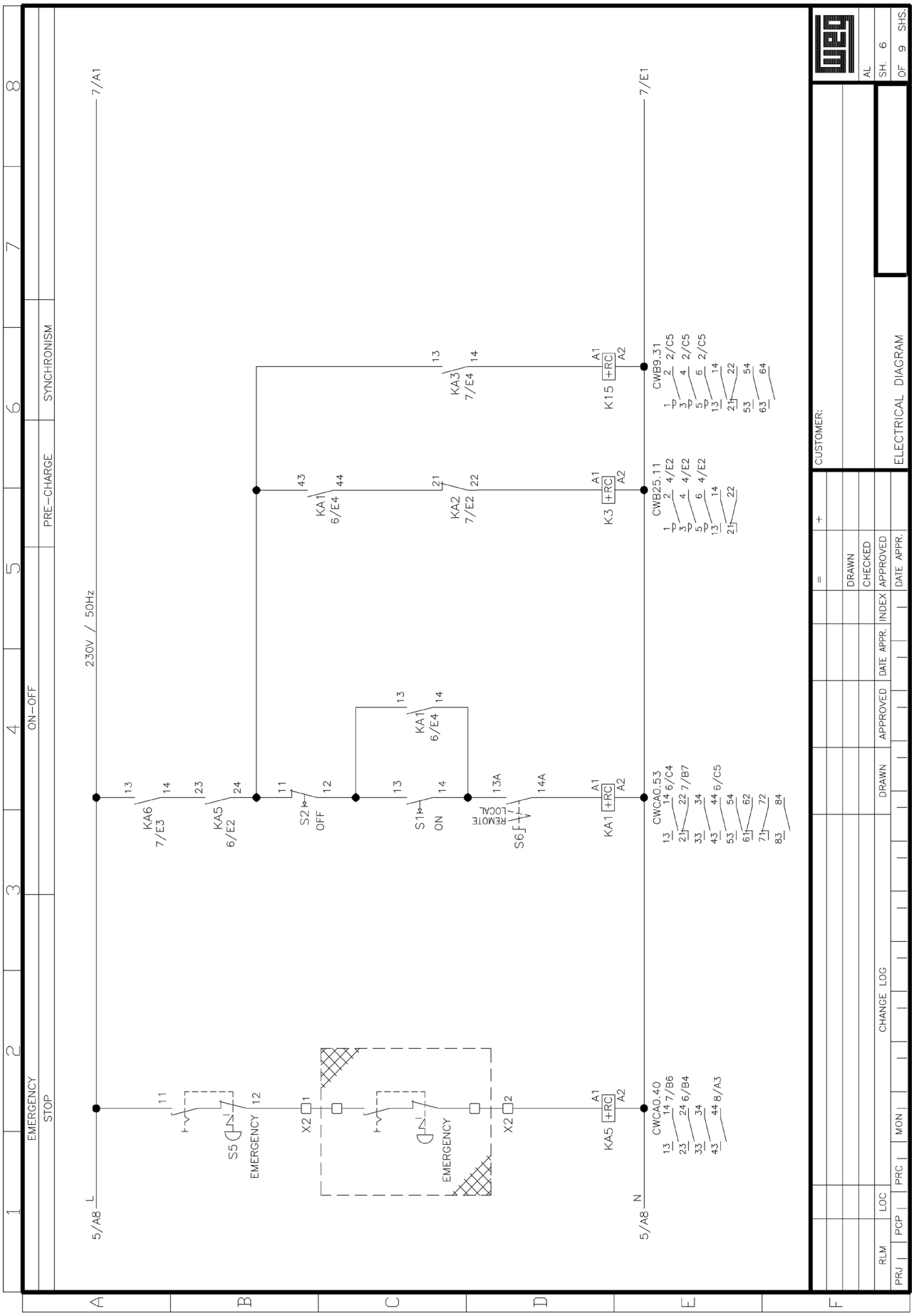


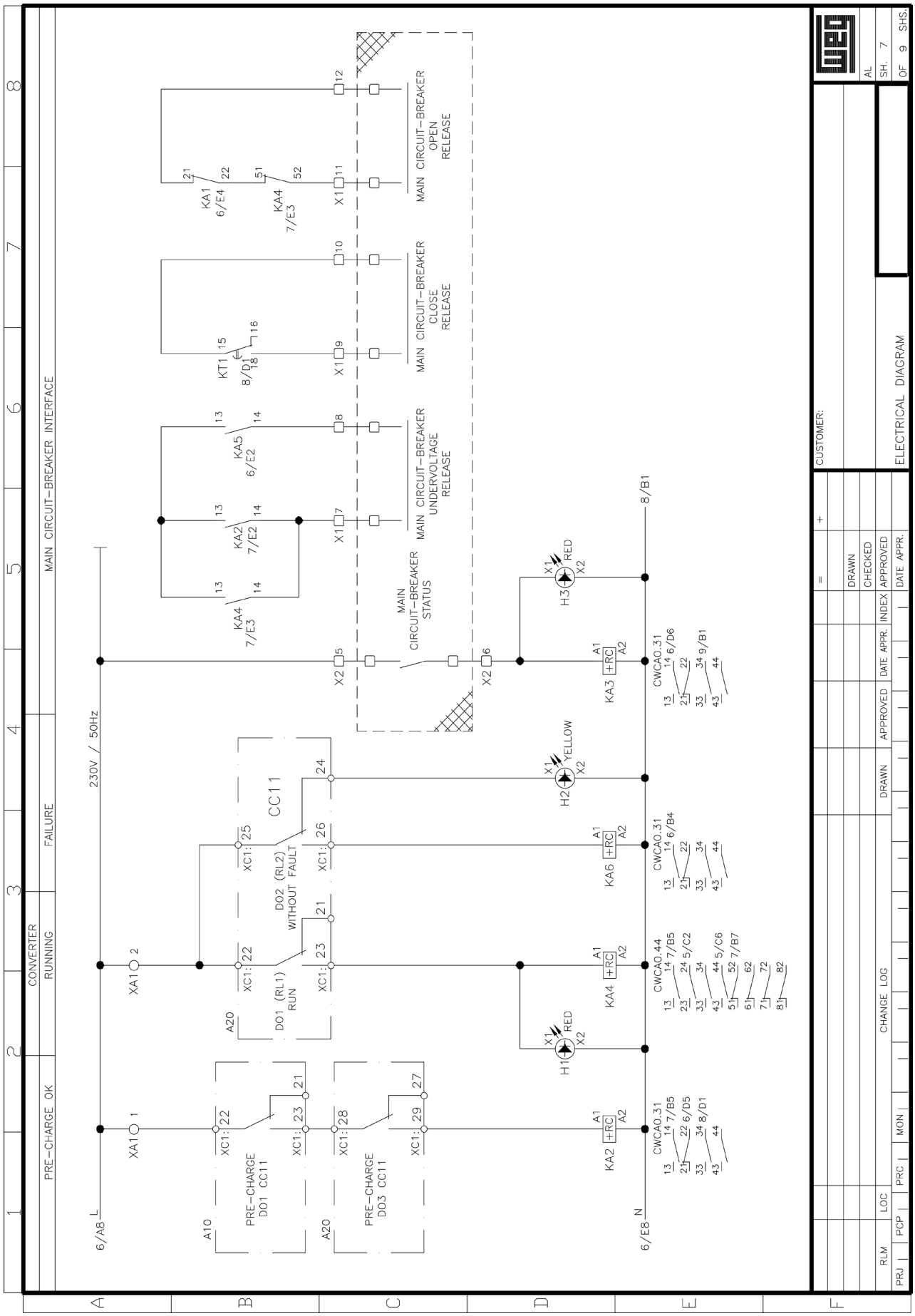

AUTOMATION OVERVIEW
CUSTOMER:
EXUC11 G2 RB
CSR11.10
XC50
TR1
TR2
Q1
Q2
Q11
Q11.1
Q12
Q15
K15
6/E6
T1
690-230V
0,40-0,63A
2,5-4,0A
6A
3~ 50Hz 690V
POWER SUPPLY
3~ 50Hz 690V
DRAWN
CHECKED
APPROVED
DATE APPR.
INDEX
CHANGE LOG
LOC
PRC
MON
PCP
RLM
PRJ

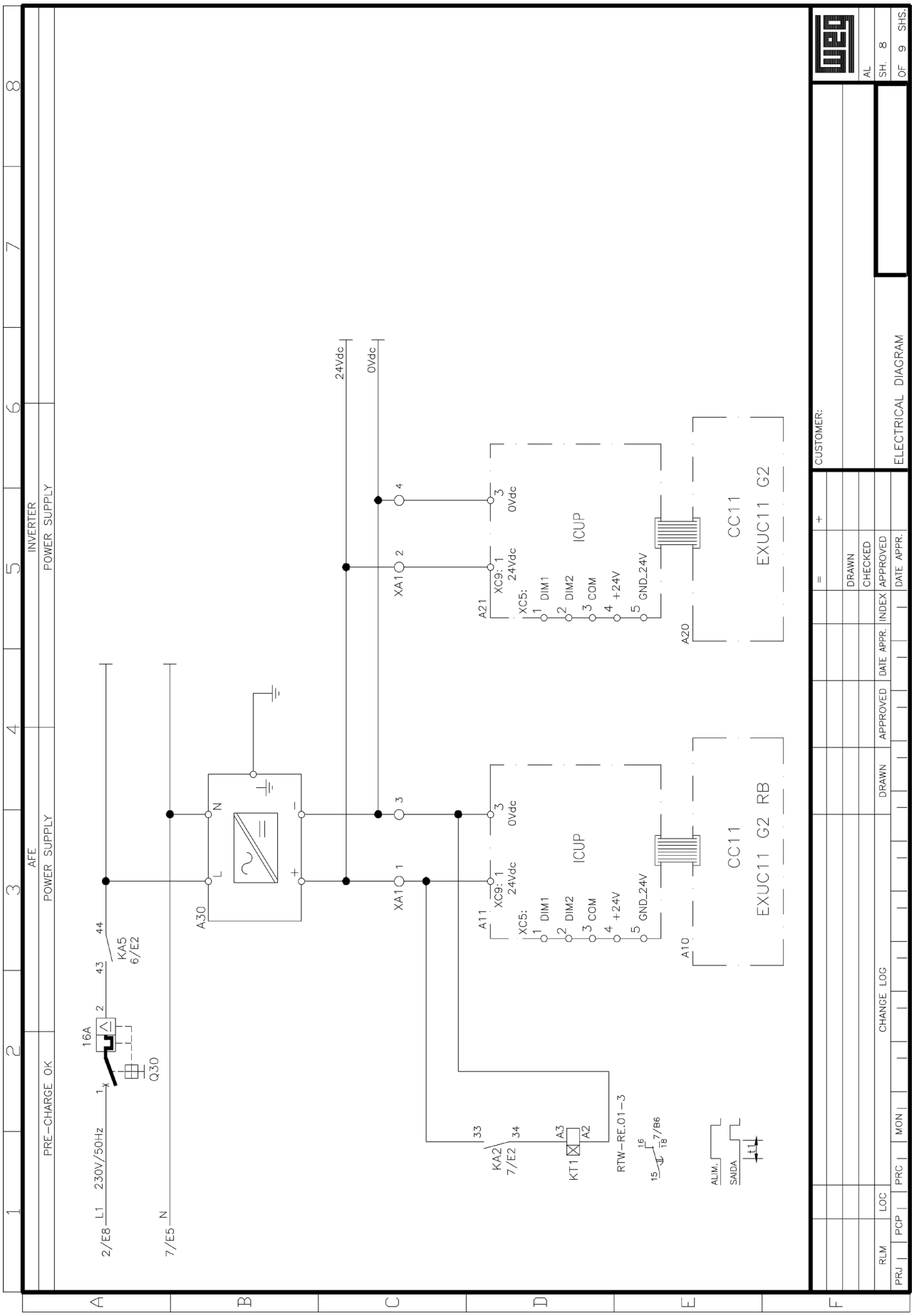

3~ 50Hz 690V
LB1
LF1
RF1
RF2
RF3
F21
F22
F23
C1
C2
C3
C4
C5
C6
CP1
CP2
CP3
2/A8
2/A8
2/B8
4/D1
4/D1
4/D1
CUSTOMER:
ELECTRICAL DIAGRAM
DRAWN
CHECKED
APPROVED
DATE APPR.
INDEX
CHANGE LOG
SH. 3
OF 9 SHS.

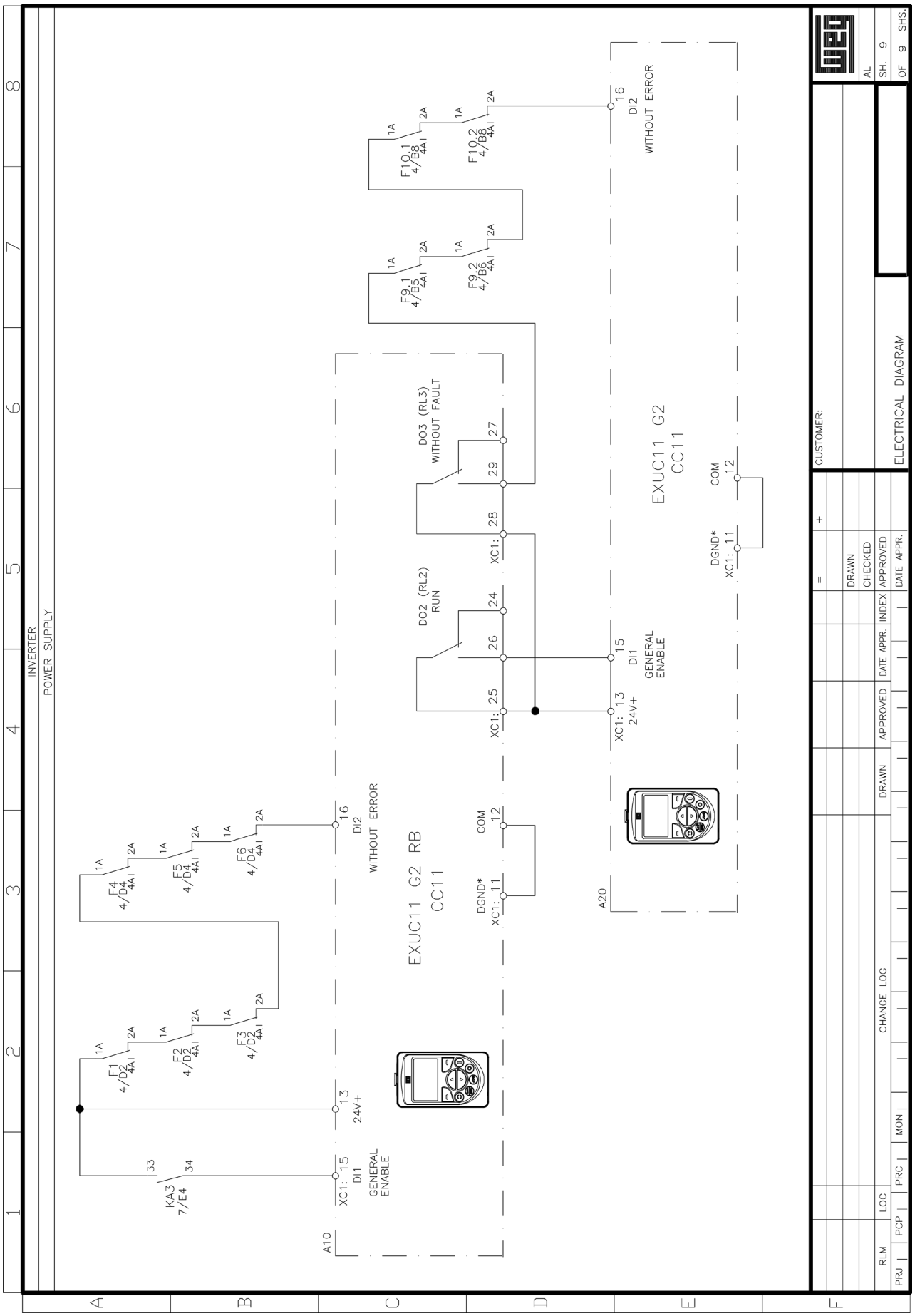

INVERTER
AFE
A1
A2
A3
A11
A21
ICUP
XC40
XC40A
XC40B
OPTIC FIBER
F1
F2
F3
F4
F5
F6
F9.1
F9.2
F10.1
F10.2
R1
R2
R3
1,2 Ω 1200W
1000 Vdc
3~ 50Hz 690V
M1
K3
CUSTOMER:
ELECTRICAL DIAGRAM
DRAWN
CHECKED
APPROVED
DATE APPR.
INDEX
CHANGE LOG
LOC
PRC
MON
PCP
RLM
PRJ
SH. 4
OF 9 SHS.


VENTILATION
230V/60Hz
6/A1
6/E1
2/E8 L
2/E8 N
KA4 7/E3 43 44
KA4 7/E3 23 24
M21 FAN
M22 EXHAUSTER
M23 FAN
M24 EXHAUSTER
M25 FAN
M26 EXHAUSTER
M27 FAN
M28 EXHAUSTER
CUSTOMER:
ELECTRICAL DIAGRAM
DRAWN
CHECKED
APPROVED
DATE APPR.
INDEX
CHANGE LOG
SH. 5
OF 9 SHS.


EMERGENCY
STOP
ON-OFF
PRE-CHARGE
SYNCHRONISM
230V / 50Hz
5/A8 L
5/A8 N
7/A1
7/E1
KA6 7/E3
KA5 6/E2
S2 OFF
S1 ON
KA1 6/E4
S6 REMOTE LOCAL
KA1 +RC A1 A2
KA2 7/E2
KA3 7/E4
K3 +RC A1 A2
K15 +RC A1 A2
S5 EMERGENCY
X2 1
X2 2
EMERGENCY
KA5 +RC A1 A2
CWCA0.53 14 6/C4 22 7/B7 34 6/C5 44 6/C5 54 62 72 84
CWCA0.40 14 7/B6 24 6/B4 34 44 8/A3
CWB25.11 2 4/E2 4 4/E2 6 4/E2 14 22
CWB9.31 2 2/C5 4 2/C5 6 2/C5 14 22 54 64
CUSTOMER:
ELECTRICAL DIAGRAM
AL
SH. 6
OF 9 SHS.
CHANGE LOG
DRAWN
CHECKED
APPROVED
DATE APPR.
INDEX
PRJ
PCP
PRC
MON
LOC
RLM


MAIN CIRCUIT-BREAKER INTERFACE
PRE-CHARGE OK
CONVERTER RUNNING
FAILURE
230V / 50Hz
PRE-CHARGE DO1 CC11
PRE-CHARGE DO3 CC11
DO1 (RL1) RUN
DO2 (RL2) WITHOUT FAULT
CC11
MAIN CIRCUIT-BREAKER STATUS
MAIN CIRCUIT-BREAKER UNDERVOLTAGE RELEASE
MAIN CIRCUIT-BREAKER CLOSE RELEASE
MAIN CIRCUIT-BREAKER OPEN RELEASE
KA1 6/E4
KA2 7/E2
KA3
KA4 7/E3
KA5 6/E2
KA6
KT1 8/D1
H1 RED
H2 YELLOW
H3 RED
CWCAO.31
CWCAO.44
CUSTOMER:
ELECTRICAL DIAGRAM
DRAWN
CHECKED
APPROVED
INDEX
DATE APPR.
CHANGE LOG
SH. 7
OF 9 SHS.


AFE
POWER SUPPLY
PRE-CHARGE OK
INVERTER
POWER SUPPLY
2/E8 L1 230V/50Hz
7/E5 N
16A
Q30
KA5 6/E2
A30
XA1
24Vdc
0Vdc
A11
A21
XC9: 1 24Vdc 3 0Vdc
XC5: 1 DIM1 2 DIM2 3 COM 4 +24V 5 GND_24V
ICUP
A10
A20
CC11
EXUC11 G2 RB
EXUC11 G2
KA2 7/E2
KT1
RTW-RE.01-3
7/B6
ALIM.
SAIDA
CUSTOMER:
ELECTRICAL DIAGRAM
CHANGE LOG
DRAWN
APPROVED
DATE APPR.
CHECKED
INDEX APPROVED
DATE APPR.
SH. 8
OF 9 SHS.


INVERTER
POWER SUPPLY
A10
KA3
7/E4
33
34
XC1: 15
DI1
GENERAL
ENABLE
13
24V+
F1
4/D2
4AI
F2
4/D2
4AI
F3
4/D2
4AI
F4
4/D4
4AI
F5
4/D4
4AI
F6
4/D4
4AI
1A
2A
16
DI2
WITHOUT ERROR
EXUC11 G2 RB
CC11
DGND*
XC1: 11
COM
12
A20
XC1: 25
XC1: 26
XC1: 24
XC1: 28
XC1: 29
XC1: 27
DO2 (RL2)
RUN
DO3 (RL3)
WITHOUT FAULT
EXUC11 G2
CC11
XC1: 13
24V+
15
DI1
GENERAL
ENABLE
F9.1
4/B5
4AI
F9.2
4/B6
4AI
F10.1
4/B8
4AI
F10.2
4/B8
4AI
CUSTOMER:
ELECTRICAL DIAGRAM
DRAWN
CHECKED
APPROVED
DATE APPR.
INDEX
CHANGE LOG
SH. 9
OF 9 SHS.