SOLIVIA CM

Operation and installation manual
SOLIVIA CM EU G3

EU

The manual is subject to change.
Please check our website at www.solar-inverter.com
for the most up-to-date manual version.

Table of contents

1 Scope of supply

- 1 x SOLIVIA CM EU G3 (central inverter cabinet) Delta P/N EOE98030176
- 1 - 9 x SOLIVIA 11 EU G3 R (solar inverter racks 11 kW) Delta P/N EOE47030001
- Cabinet key
- Fan tray

1.1 Optional accessories

- Cabinet base 200 mm height
- Blank panels
- Monitoring system (according to customer order: Web'log Pro with analog modem; ISDN modem; GPRS modem or DSL/Ethernet)

2 General information

Congratulations on the purchase of this high-quality SOLIVIA CM EU G3 central inverter and thank you for your confidence in Delta.

These instructions will help you to familiarise yourself with this product.

Please follow the safety instructions at all times. Handling your product carefully will ensure that it will give you good quality and reliable service for a long time. This is essential for excellent results.

3 Safety

3.1 Standards, guidelines and regulations

The central inverter complies with all the currently required standards and regulations, such as the following:

- 2004/108/EG:
  Council directive on the harmonisation of laws of the member states relating to electromagnetic compatibility.
- 2006/95/EG:
  Council directive on the harmonisation of laws of member states relating to electrical equipment designed for use within certain voltage limits.
- Electromagnetic compatibility (EMC):
  EN 55022: 2006 (Class B) (Limits and methods of measurement of radio interference characteristics of information technology equipment)
- General safety standards:
  EN 60950-1 (Safety of Information Technology Equipment)
  EN 50178 (Electronic equipment for use in power installations)
  Draft IEC 62109-1 (Safety of power converters for use in photovoltaic power systems)
  Draft IEC 62109-2 (Safety of power converters for use in photovoltaic power systems)
  IEC 62103 (Electronic equipment for use in power installations)
- Standards for electric immunity:
  EN61000-6-2 (Immunity for industrial environments)
- Standards for electric emissions:
  EN61000-6-3 (Emission standard for residential, commercial and light-industrial environments)
- Standards for harmonic current emissions / flicker:
  EN 61000-3-12 (Limits - limits for harmonic current emissions)
  EN 61000-3-11(Limits - limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply grids, for equipment with rated current <= 75A per phase and not subject to conditional connection)

3.2 Standards, guidelines and regulations which must also be followed

- Guidelines for connecting generating plants to medium voltage networks and operating them in parallel, including supplementary instructions (published by: BDEW, VDN and FNN)
- Technical requirements for connection to low voltage networks (TAB 2007, published by: BDEW, VDN and FNN)
- Relevant regulations of the trade unions

Rules of the technology:
The installation must comply with the client's conditions, the local regulations and the technical rules and standards. In particular:

- Electrical connection
- VDE 0100 Construction of power installations with low voltages up to 1000 Volts
- VDE 0105 Part 100 Operation of electrical systems
- VDE 0185 General information on the construction of lightning protection systems
- VDE 0190 Main equipotential bonding of electrical systems
- VDE 0298 Part 4 Use of cables and insulated lines for power installations
- DIN 18382 Electrical cable and line system in buildings

Accident prevention regulations:
The inverters must be installed by a certified electrician who is also licensed by the supply network operator. The certified electrician is responsible for making sure the system complies with the current standards and regulations.

3.3 Warnings

Here, you will find explanations for the symbols used in these operating instructions:

DANGER!
Signifies a danger which is an immediate threat. If not prevented, this will result in death or serious injury.

WARNING!
Signifies a situation which may be dangerous. If not prevented, this may result in death or serious injury.

CAUTION!
Signifies a situation which may be dangerous. If not prevented, this may result in light injury.

Warning of electrical voltage!
The safety instructions in this operation manual, which, if not followed, may put persons at risk and are marked by the symbol for electrical voltages when there is a warning for such.

Measures for prevention:
Do not touch live parts.
Immediately report damaged cables to the maintenance staff.

Measures for prevention:
Read the operating instructions carefully and thoroughly and follow all the points!

Measures for prevention:
In order to avoid damage to property or personal injury, only qualified, trained electricians may work on the equipment. The qualified electrician must familiarise himself/herself with the operating instructions.

3.4 General safety instructions

- When electrical equipment is in operation, certain parts carry dangerous voltages. Even if DC and AC switches have been turned off, dangerous voltages are still present.
- Once the equipment (cabinet and racks) has been disconnected from the grid power and the PV modules, dangerous voltages will remain inside the equipment for at least 10 minutes!
- Not handling the equipment properly can lead to physical injury and damage to property!
- Isolate the equipment from the grid and from the PV modules before working on it.
- At high power, the cabinet surface and the surface of the inverter racks may become hot.
- The equipment must be provided with sufficient cooling.
- Please read the operating instructions carefully and thoroughly and follow all points!
- Never open the central inverter while they are in operation.
- Check and make sure that the equipment is not live according to the applicable guidelines before carrying out electrical work.
- The operating instructions must always be kept where the central inverter is in use.
- All work on the equipment must only be carried out by certified electricians.
- Any safety claims will be voided if the equipment is used incorrectly.
- The SOLIVIA CM central inverter has a high leakage current (< 25 mA). Before connecting the equipment to the supply, it must be earthed at the PE connection provided.

3.5 Personal protection

Personnel are protected by electrically isolating the PV module from the grid. In order to provide maximum protection to personnel, a higher level of insulation is provided between the grid, PV modules and interfaces which can be touched (display, RS485 interface and fan connection).

The relevant standards concerning electromagnetic compatibility (EMC) and safety have been met.

The central inverter can only operate in parallel with the grid. An automatic isolation device which has been approved by a certification authority ensures safe disconnection when the grid supply to the equipment is isolated or interrupted and prevents stand-alone operation.

4 Description of the SOLIVIA CM central inverter

4.1 Mode of operation

The CM is a high-quality central inverter which is used to supply photovoltaically converted solar energy from PV modules to low-voltage networks.

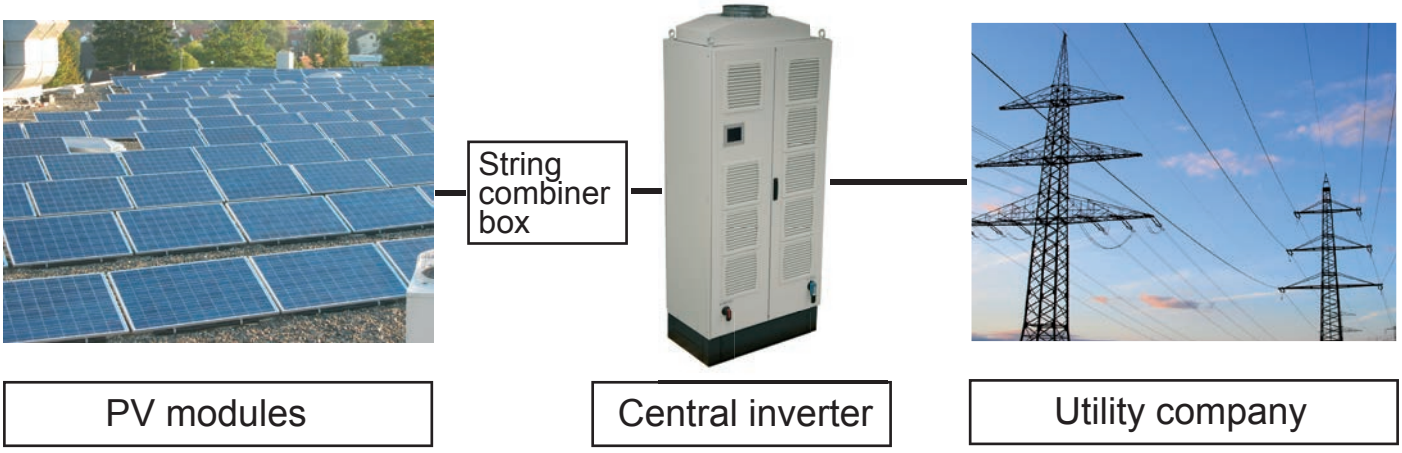
The central inverter converts the direct current generated in PV cells into alternating current. This enables you to feed the solar electricity which you have generated into the public electricity grid of the utility company.

The efficient MPP tracking system ensures that the PV plant operates at maximum efficiency, even on dull days when the sky is cloudy.

With the MPPT concept, PV modules connected in series (strings) or strings at the same voltage connected in parallel are always connected to the central inverter so that the amount of wiring in the photovoltaic plant is substantially reduced. The photovoltaic plant can also be optimised to the input voltage range of the central inverter by the interconnection in the strings.

The modular design of the central inverter takes into account the market requirements for flexible inverter solutions with higher output ranges. At the heart of the inverter system are up to nine inverter racks which deliver 11 kW nominal output power in each case.

The CM is connected to the PV modules via a string combiner box.



4.1.1 MPP-Tracking

MPP is the abbreviation for Maximum Power Point.

The point of maximum power for a PV cell slowly changes throughout the day. The morning - noon - evening characteristic resembles a half sinewave. Short-term changes also occur due to weather conditions etc. MPP Tracking is the ability of an inverter to adjust itself repeatedly to the constantly changing MPP of the PV module. It is possible to draw the maximum energy from the PV modules if the solar inverter constantly readjusts itself to the MPP.

MPP is achieved through the software. The central inverter easily changes its operating point again and again and compares the new output with that of the previous operating point. The software then decides whether the new operating point is better than the old one. This procedure is also known as the „Hill Climber“ method. However, it must also be taken into consideration that there may be more than one maximum output power. This happens if one string is shaded when strings are connected in series or parallel. Strategies are then needed to find the genuine MPP, so as not to remain at one local maximum.

The central inverter is delivered as 1 MPP tracker version. For 2 MPP trackers refer to § 6.3.3.2 2 MPPT version.

4.1.2 Controller / control function

Inverter racks

The inverter racks are based on a 3-phase solar inverter. Each phase in the inverter rack has a master controller and 3 slave controllers. These slave controllers send all the data, measurements and status to the master controller which then passes this information to the system controller.

Backplane controller

All inverter racks are connected to the backplane controller. It is the interface between the inverter racks and the system controller.
The backplane controller is used to connect the system controller, SOLIVIA 11 EU G3 R inverter racks and other cabinet components:

- It sends information concerning which inverter rack is connected in the SOLIVIA CM central inverter.
- It takes over control of the roof fans.

System controller
The system controller is the interface to the user. It collects all the data from the inverter racks and the backplane as well as some signals from the backplane controller via the RS485 interface.

4.1.3 Monitoring system

For analyzing, monitoring and power control, each installation of a CM system requires the installation of a monitoring system (refer to § 6.3.9 to get more details about location and installation of the monitoring system).

To monitor the power generation, the SOLIVIA CM inverter is using a data logger with one of the following modems / communication protocols: Web'log Pro with analog modem; ISDN modem; GPRS modem or DSL/Ethernet.

The data logger stores all the operating values available.

- It acts as the interface for external temperature and insolation sensors.
- It acts as the interface for the external string monitoring and overvoltage protection (typically installed in the string combiner box).
- It acts as the interface for the power control option necessary to reduce the AC output power.

4.1.4 Lifecycle management of the inverter racks

- System solutions from 77 kW to 100 kW can be set up quickly and cheaply.
- Maximum reliability is ensured due to N+1 redundancy of SOLIVIA 11 EU G3 R inverter racks connected in parallel. If an inverter rack fails, the system continues to operate, power continues to be fed into the grid and there is no interruption to earnings.
- Increased service life due to intelligent disconnection of inverter racks when solar insolation decreases and the use of a rolling master module principle (an algorithm decides which inverter racks is to take over control of the entire system by the produced energy of each of the inverter racks – this considerably increases the service life of the inverter racks of the system).
- Easy to service since the SOLIVIA 11 EU G3 R inverter racks are quickly and easily replaced. Each inverter rack is connected to the system via just one plug connector at the back. The system enables the AC side to be de-energised selectively via automatic circuit breakers.

4.2 System layout

4.2.1 Block circuit diagram

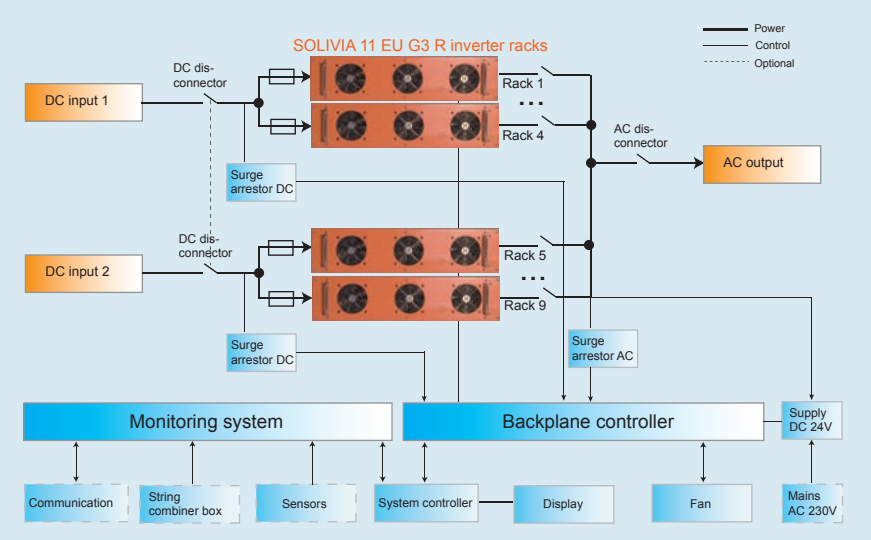
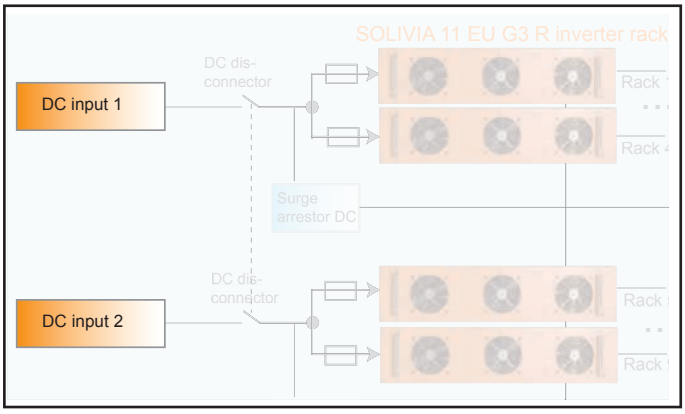


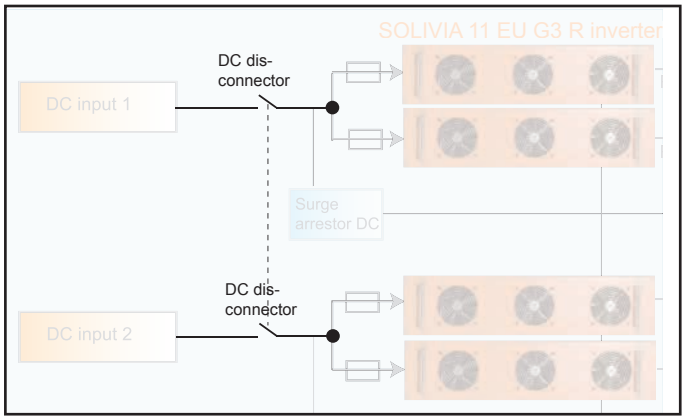
Figure: Block circuit diagram

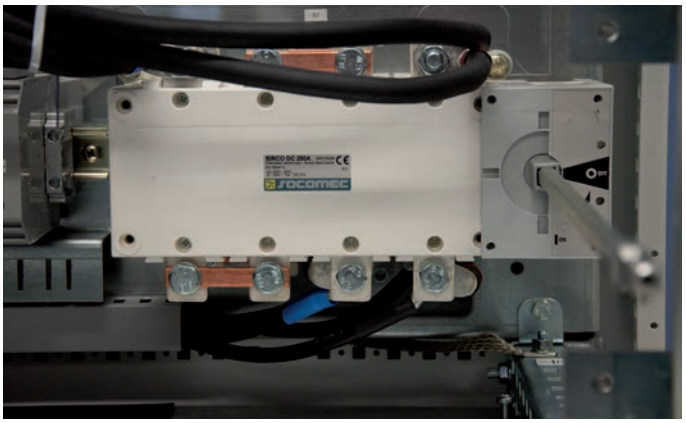
4.2.2 Description of the block circuit diagram

The basic function of the solar inverter is implemented by up to 9, redundant operating SOLIVIA 11 EU G3 R inverter racks connected in parallel. Each SOLIVIA 11 EU G3 R inverter rack operates as a complete solar inverter on its own. However, it can and must not be operated outside the CM cabinet.

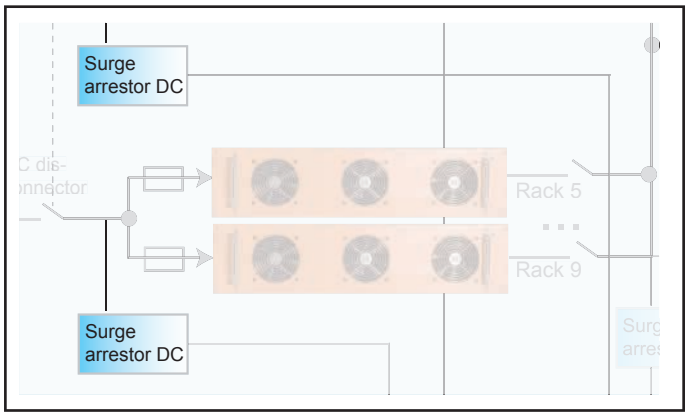


The DC inputs are the connection point for DC input voltage which is provided by the PV plant via generator connection boxes for the cabinet. Two DC inputs #1 and #2 are provided to create a 1 MPPT or 2 MPPT version. The MPPT version is created via MPP bus addressing (delivery status: 1 MPPT version).

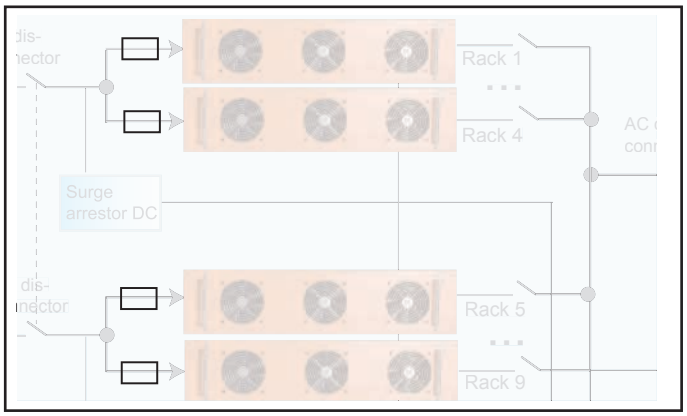




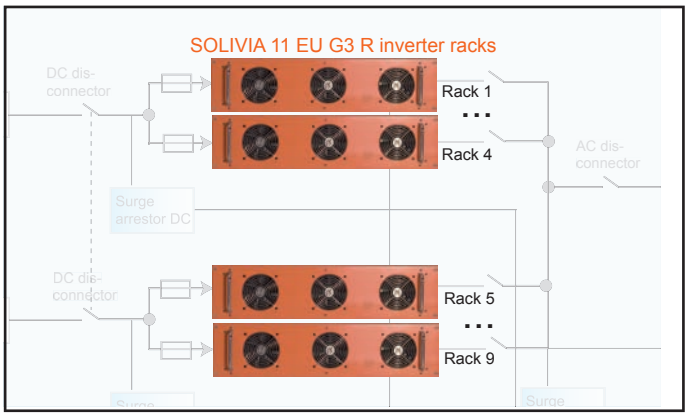
A common DC disconnector is arranged downstream of the input terminals. This is an all-pole isolating switch which opens both input paths simultaneously on DC plus and DC minus side.



Surge arrestors on the DC side (arrestor type II) separated for both DC inputs.



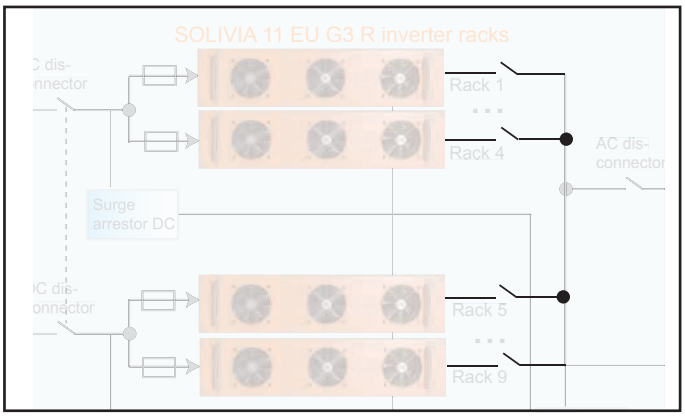
Each SOLIVIA 11 EU G3 R inverter rack has a backup fuse on the input side, in the DC+ path in each case.



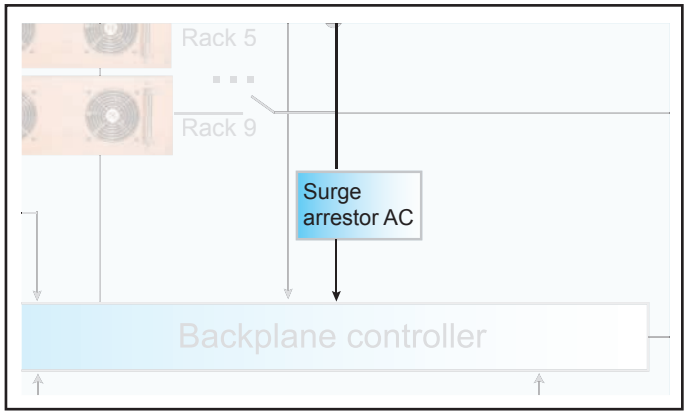
The SOLIVIA 11 EU G3 R inverter racks in the 2 MPPT version are divided on the input side as follows:

- Up to 4 inverter racks SOLIVIA 11 EU G3 R are supplied from DC input #1
- Up to 5 inverter racks SOLIVIA 11 EU G3 R are supplied from DC input #2

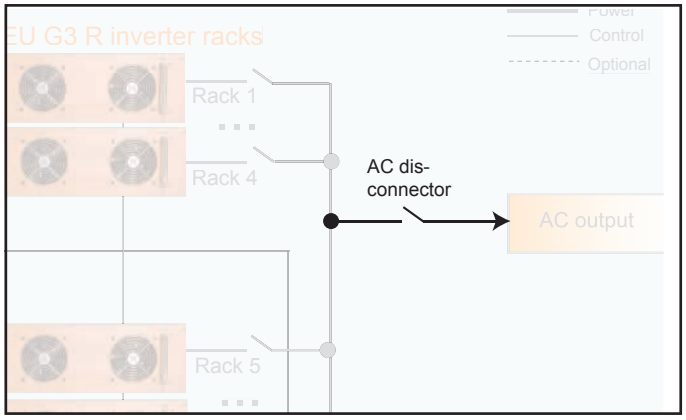
This allocation can be waived for the 1 MPPT version (which is the state of delivery) so that all SOLIVIA 11 EU G3 R inverter racks are supplied from a common DC input.



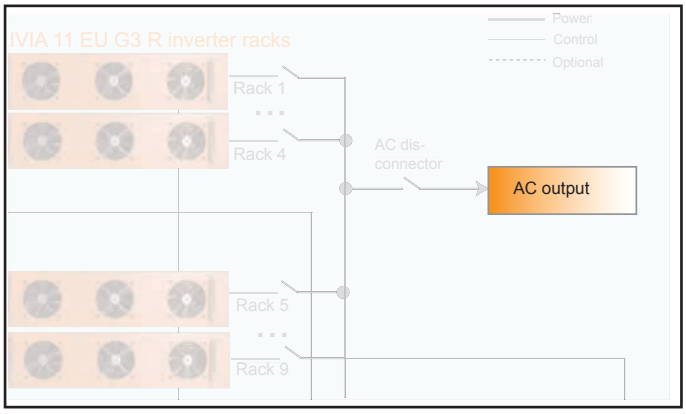
Each SOLIVIA 11 EU G3 R inverter rack is provided with an AC line-protection breaker on the output which enables the inverter rack to be isolated for servicing or replacement purposes.



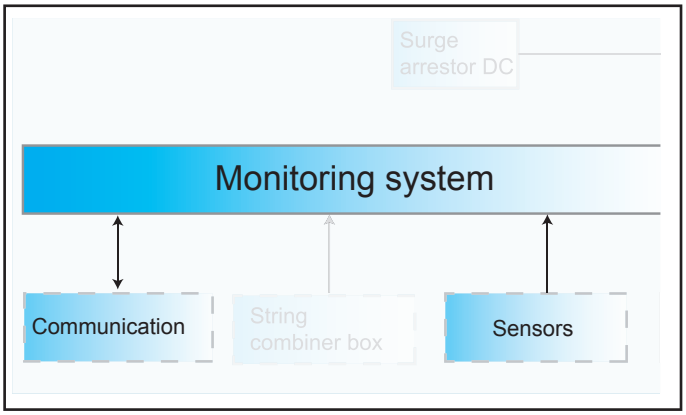
Surge arrestor on the AC side (arrestor type II) for the common AC output.



The entire AC string (an assembly of all nine SOLIVIA 11 EU G3 R inverter racks) is provided with an AC line breaker. With this AC power switch, the entire cabinet can be isolated from the grid.

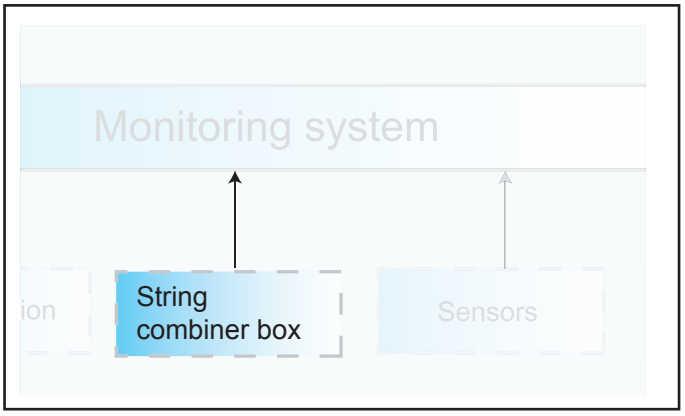


The AC output is the connection point for AC output voltage which is fed into the grid.

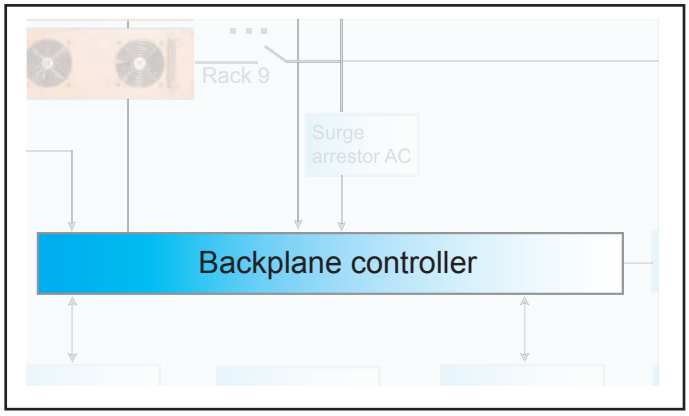


To monitor the power generation, the SOLIVIA CM inverter is using a data logger with one of the following modems / communication protocols: Web'log Pro with analog modem; ISDN modem; GPRS modem or DSL/Ethernet (refer to § 6.3.9 to get more details about location and installation of the monitoring system).
The data logger stores all the operating values available.

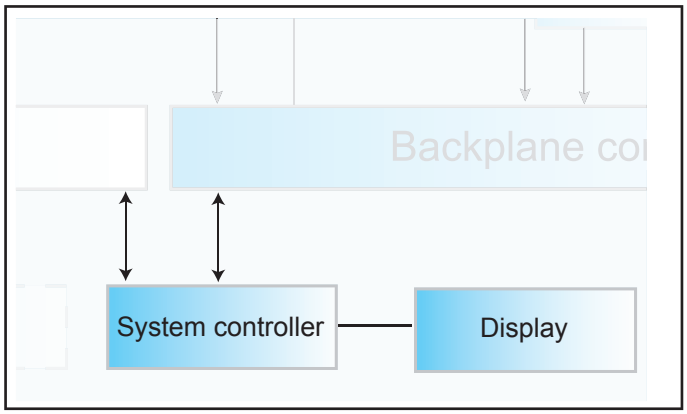
- Interface for external temperature and insolation sensors.
- Interface for the external string combiner box.
- Interface for the power control option necessary to reduce the AC output power.
- Status and error situation, actual data, statistics data.
- Communication interface through different modem types.



The string combiner box is used to connect many strings of PV modules, which are connected in parallel, to the SOLIVIA CM central inverter. It also monitors these strings externally (The string combiner box is not included with the cabinet. It can be obtained from an appropriate supplier if necessary).

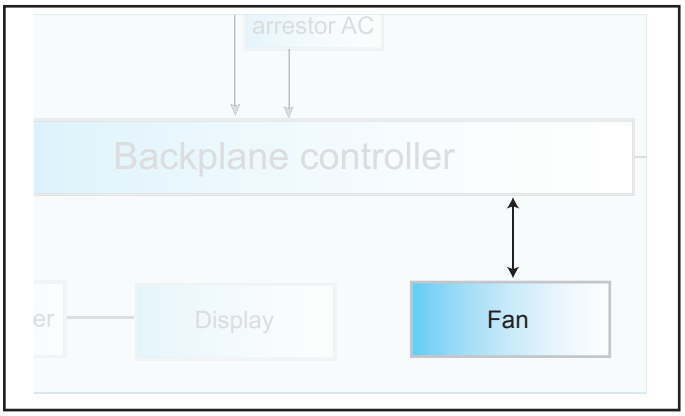


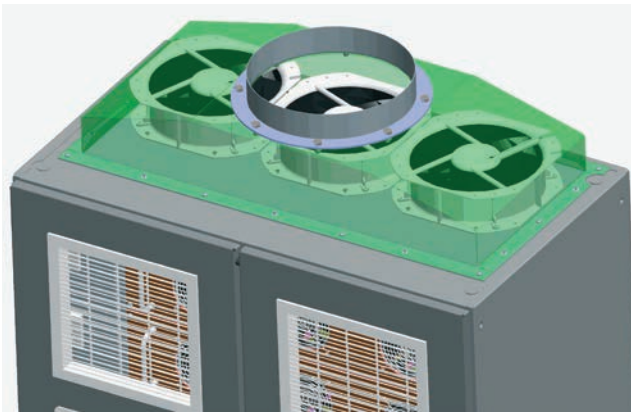
The backplane controller is used to connect the system controller, SOLIVIA 11 EU G3 R inverter racks and other cabinet components: The backplane controller evaluates the status signals of the surge arrestors and supplies the three roof fans with 24 V DC supply voltage from the AC/DC DIN rail power supplies. It sends information concerning which inverter rack is assembled in the CM central inverter. It takes over the control of the roof fans.



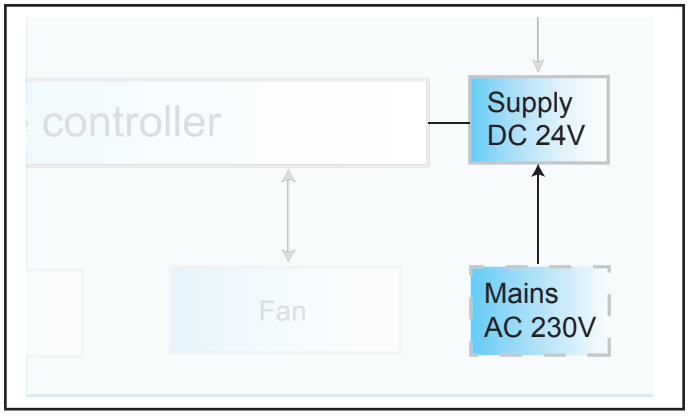
The brain of the CM is the system controller which takes on the following tasks:

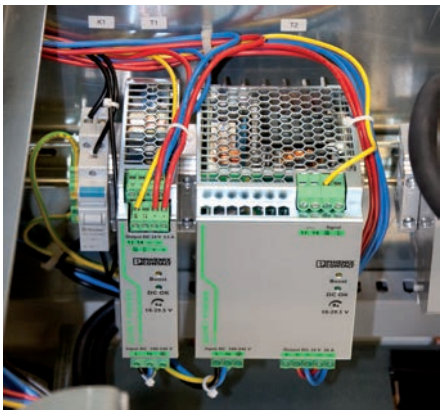
- **Configuration:**
  Start-up procedures, MPPT controller, temperature monitoring, data acquisition
- **Extended current monitoring:**
  Prevents non-uniform power output (different power outputs for each AC phase).
  Activates / deactivates the SOLIVIA 11 EU G3 R inverter racks, depending on solar insolation.
  Lifecycle management of the inverter rack by switching on/off the SOLIVIA 11 EU G3 R inverter racks which are not necessary.
  Diagnosis for CM system and for each SOLIVIA 11 EU G3 R inverter rack.
  Error handling.





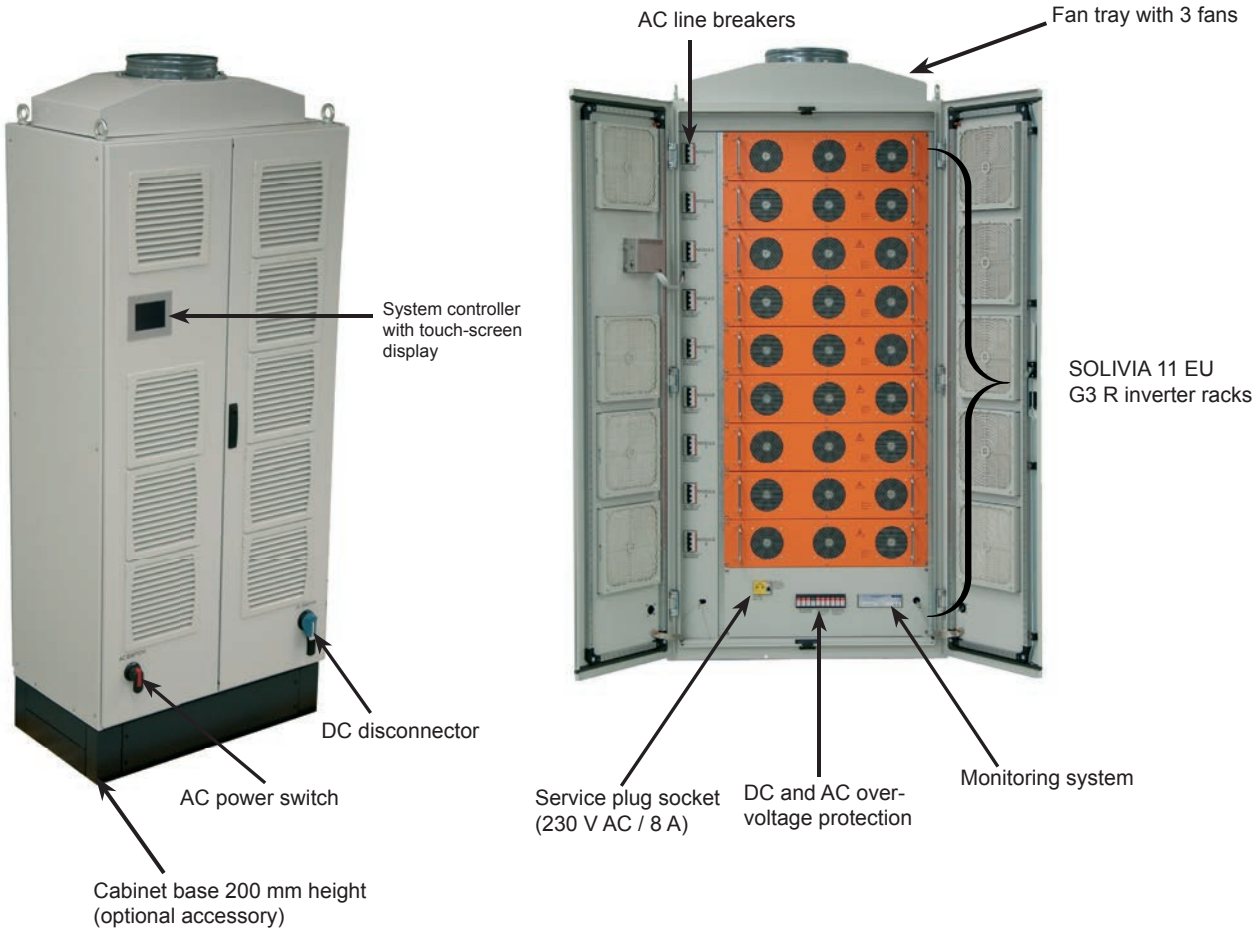
- The central inverter cabinet is cooled by air circulation using 3 temperature controlled axial DC fans located under the fan tray on the cabinet.
- Room air at ambient temperature is used for cooling.
- The room air is supplied through perforated front doors in the central inverter cabinet.
- Exhaust air escapes upwards via the three fans at the top.





The external supply is provided by two AC/DC DIN rail power supplies which convert the input voltage, potentially-isolated, from 230 V AC to the 24 V DC used to supply the various components on the controller side.

4.3 Equipment overview



4.4 Control concept

4.4.1 System controller with touch-screen display

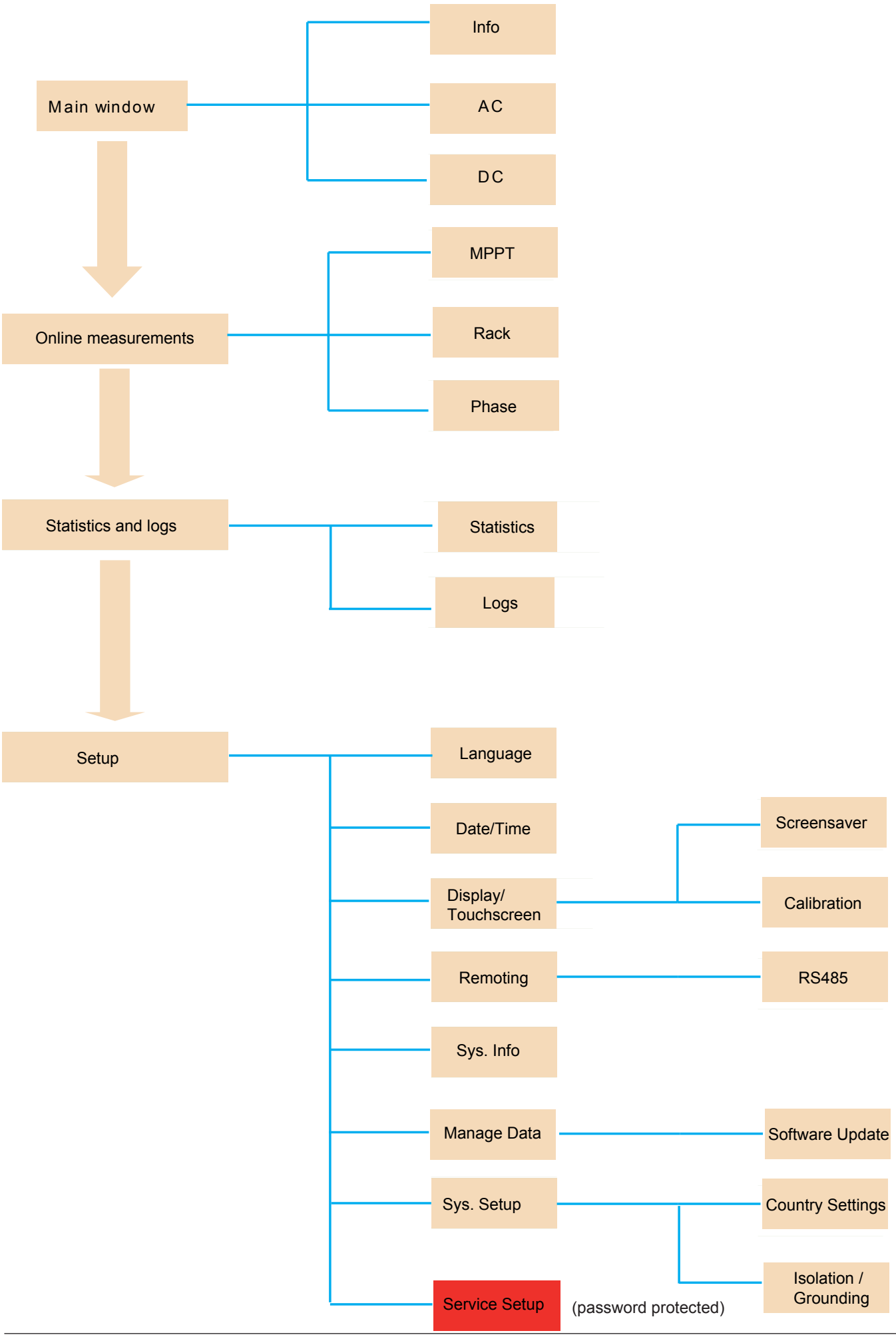
The user-friendly menu navigation is via the touch-screen display on the front door.
All operating conditions and error messages of the SOLIVIA CM central inverter or PV plant are shown on the illuminated display.

The touch-screen display shows various types of information.

Please note that the values shown on the display are not callibrated measurements, but can deviate by a few percentrage points from the actual value!

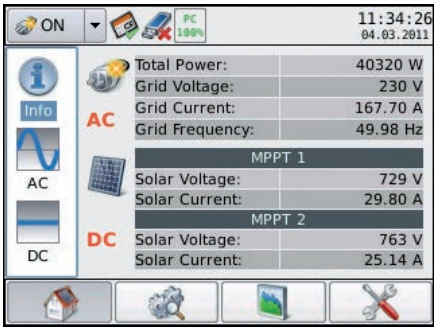
4.4.2 Main menu

The main menu contains different menu options which are then subdivided into submenus.
The menu structure is as follows:



4.4.3 Menu: Common to every window

Some common characteristics of every window as follows:



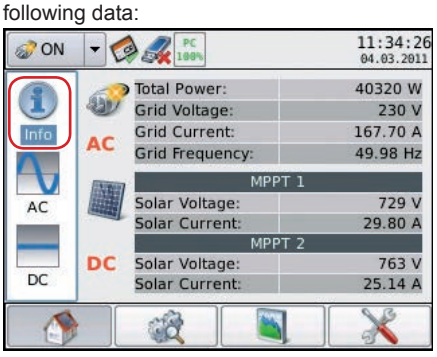
At the top of the screen we have a status bar providing: the current date and time, an indicator of unread errors/warnings, the status of power control, the status of the compact flash and of the memory stick, an On/Off button to connect/disconnect the inverter from the grid.

At the bottom we have a button-bar providing the possibility to switch between the four main menus: Main window, online measurements, statistics and logs and finally setup.

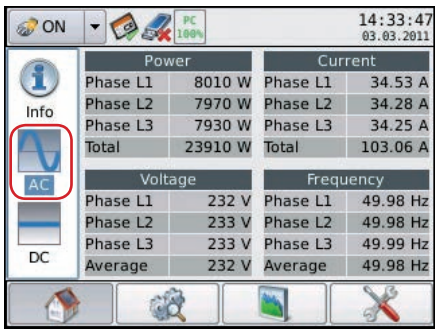
4.4.4 Menu: Main window

The most important measurements appear under the menu option „Main window“ which is divided into 3 submenus.

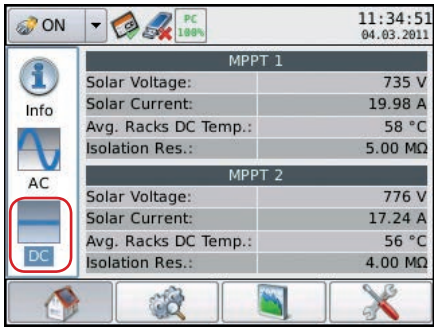
In the submenu „Info” you can call up the following data:



From the submenu „AC“, you can call up the following data:



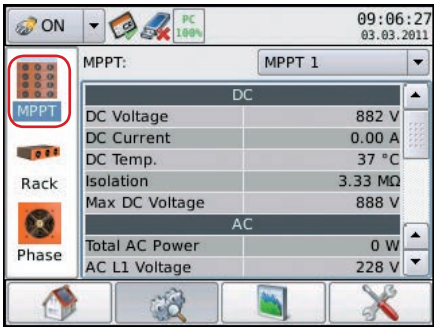
In the submenu „DC“, you can call up the following data:



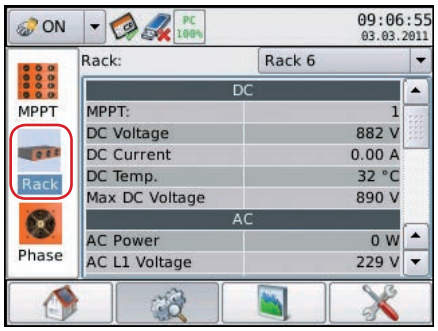
4.4.5 Menu: Online measurements

You can call up more detailed information from the menu option „Online measurements“, which is divided into 3 submenus.

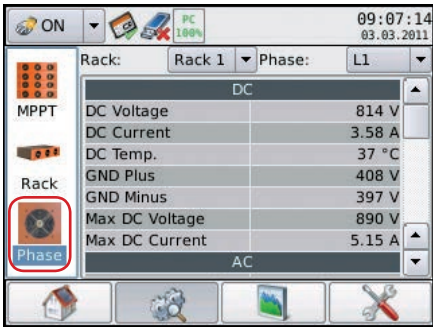
In the submenu „MPPT“, you can call up the following data:



In the submenu „Rack“, you can call up the following data for the SOLIVIA 11 EU G3 R inverter racks:

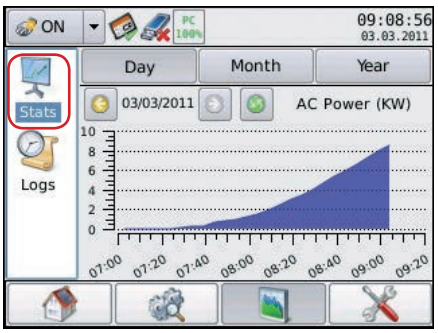


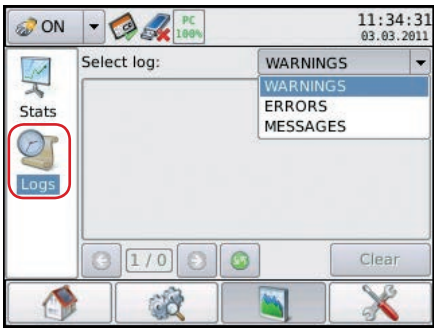
In the submenu „Phase“, you can call up the following data:



4.4.6 Menu: Statistics and logs

Further information can be called up from the menu option „Statistics and logs“.

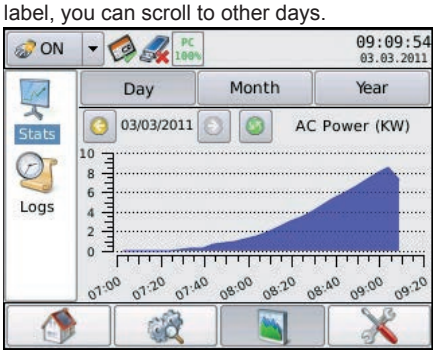




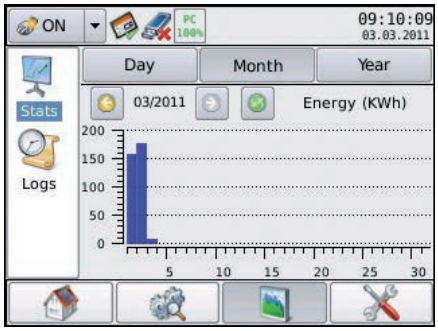
Statistics are only done of the output power and of the delivered energy.

In the submenu „Statistics“, the following data can be called up:

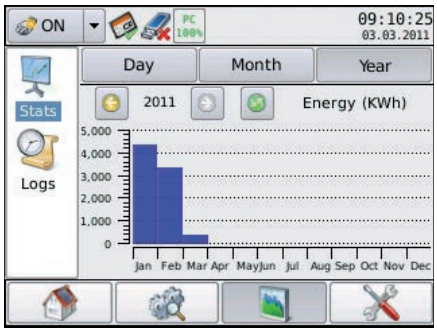
By pressing the tab „Day“, you can call up statistics data of the day. By using the two yellow arrows or by pressing on the date label, you can scroll to other days.



By pressing the tab „Month“, you can call up statistics data of the month. By using the two yellow arrows, you can scroll to other months.

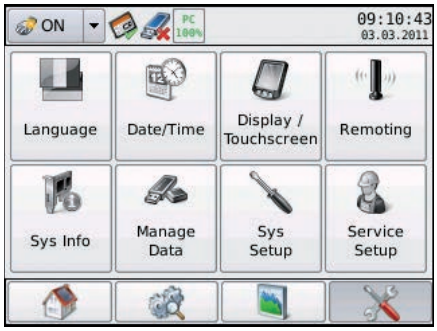


By pressing the tab „Year“, you can call up statistics data of the year. By using the two yellow arrows, you can scroll to other years.



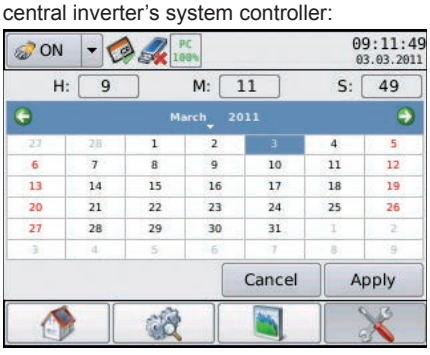
4.4.7 Menu: Setup

You can carry out fundamental settings from the menu option „Setup“, which is divided into 8 submenus.



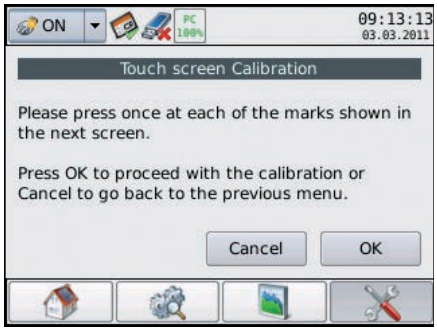
In the submenu „Language“, you can set the language of the user interface (German, English, Italian):

In the submenu „Date/Time“, you can set the date and time of the internal clock of the central inverter’s system controller:

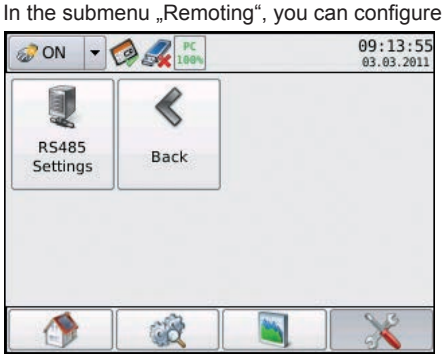


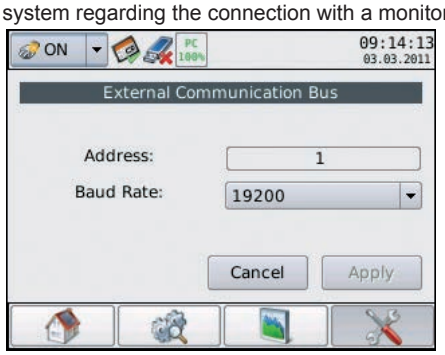
Please note:
Changing the date/time can affect the statistics. We recommend to always set the current date/time.

In the submenu „Display/Touchscreen“, you can calibrate the touch-screen and set the display screensaver timeout:



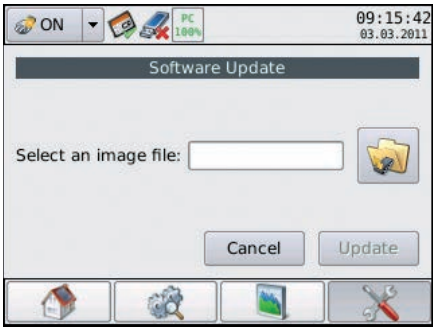
In the submenu „Remoting“, you can configure the system regarding the connection with a monitoring device and Ethernet settings:



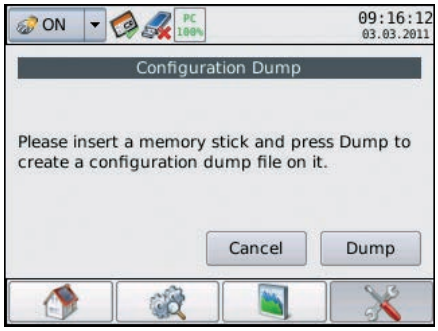


In the submenu „Sys Info“, you can find some generic info like SW/HW version of the system controller, SW/HW version of the backplane controller, etc.:

The submenu „Manage Data“ allow the user to save data from the system controller to an USB memory stick for example, or to load data from an USB memory stick to the system controller (e.g for firmware update).



By using the function “Configuration dump” the configuration information of the cabinet can be stored in a file on an USB memory stick that is connected to the system controller. The information in this file can be used by Delta support personnel to have precise information about the installation.



In the submenu „Sys Setup“, you can configure the system regarding its country settings and its isolation/grounding settings. Available countries are Germany, Italy (continent/island), Spain (continent/island), France, Greece (continent/island), Czech Republic, Belgium.

The CM central inverter has an isolation and grounding monitoring on the DC side.

The insulation monitoring has two modes:
- ISO ERROR (the CM inverter is disconnected from the grid in the event of an isolation fault)
- ISO WARNING (the CM inverter indicates the fault but is not disconnected from the grid).

Deltas CM inverters are factory-set to ISO WARNING mode on delivery.

The grounding monitoring has two modes:
- PV+ GROUNDED (grounding monitoring of the positive pole of the PV generator)
- PV- GROUNDED (grounding monitoring of the negative pole of the PV generator)

In these modes the CM inverter remains in feed-in operation and will not be disconnected from the grid in case of a fault. The error message will be logged in the WARNINGS section of the “Logs” menu.

If you need to connect the positive or negative pole of the PV system to meet requirements set out by the module manufacturer, please refer to § 6.3.3.3 DC Plus / Minus grounding.

Alternatively, it is possible to turn off the isolation- and grounding monitoring:
- ISO / GND OFF.

From the submenu „Service Setup“, you can adjust the parameter of the inverter racks. These settings must only be carried out by qualified personnel and are therefore password-protected.

4.4.8 LED messages and display diagnostics

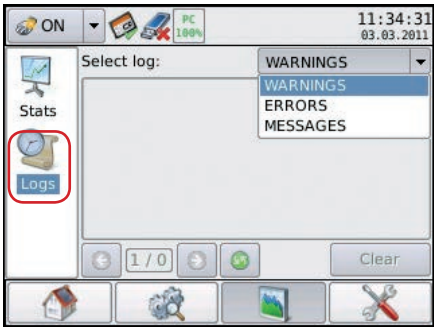
Three light emitting diodes (LEDs) which indicate the operating state of the central inverter are integrated in the touch-screen display in the front door and on each individual inverter rack.

4.4.8.1 LED messages on the system controller

- LEDs dark: The system controller is either off (AC is missing) or is not correctly working
- All 3 LEDs on: Initialization of the system controller.
- LED green on: Normal status of the SC
- Yellow LED on: There are some unread errors or warnings in the log (the LED turn off as soon as the user looks in the logs).
- Red LED on: There is a serious error that prevents the inverter from delivering energy to the grid.

4.4.8.2 Error codes in the menu „Logs“

Please select the menu „Statistics and logs“ and activate „Logs“ button on the left hand side. Then, select „Errors“ in the pull down menu on the right hand side to make the following screen appear.



The following tables show the possible error codes including error message, error description and elimination.

Possible cabinet errors:

ERROR MESSAGE	ERROR DESCRIPTION	SOLUTION
BPC Communication error	There is no communication with the backplane controller.	Please inform your service technician.
Power supply 3.5A error	The backplane controller and system controller power supply signal an error.	Power Supply T1 is defective. It needs to be exchanged.
Power supply 20A error	The extra power supply for the cabinet's fans signals an error: The backplane controller would not able to turn on the fans of the cabinet (limited output power).	Power Supply T2 is defective. It needs to be exchanged.
Varistor AC damaged	The AC varistor is broken and has to be substituted.	F20 is defective. It needs to be exchanged.
Varistor DC damaged	The DC varistor is broken and has to be substituted.	F14 / F15 are defective. They need to be exchanged.
Cabinet Temperature error	The internal temperature sensor has a problem and has to be substituted.	Check air exhaust system and operation of the 3 fans. If the fault persists, please inform your service technician.
Fan x blocked	The fan x (1, 2 or 3) of the cabinet is blocked.	Check air exhaust system and operation of the 3 fans. • Exchange defect fans • If the fault persists, please inform your service technician.

Possible MPPT errors:

ERROR MESSAGE	ERROR DESCRIPTION	SOLUTION
Isolation error on MPPT x	This error happens only if the system is configured as "ISO ERROR" in the Isolation/grounding settings. It says that the isolation resistance is under the isolation limit. For the other configurations it is only a warning.	Please check the isolation resistance on the DC side of the PV modules. Solar inverter is still feeding

Possible rack errors:

ERROR MESSAGE	ERROR DESCRIPTION	SOLUTION
AC NTC Over Temperature	Internal AC side over temperature.	If the fault persists after the device has been reset (by turning off the DC main switch), please inform your service technician.
AC High Frequency	AC high frequency error.	Please check phase-measurement system controller. If the fault persists, please inform your service technician.
AC Low Frequency	AC low frequency error.	Please check corresponding AC breaker of the rack. Please check phase-measurement system controller If the fault persists, please inform your service technician.
AC Critical Overvoltage	AC critical overvoltage error.	Please check phase-measurement system controller. If the fault persists, please inform your service technician.
AC Overvoltage	AC overvoltage error.	Please check phase-measurement system controller. If the fault persists, please inform your service technician.
AC Undervoltage	AC undervoltage error.	Please check corresponding AC breaker of the rack. Please check phase-measurement system controller. If the fault persists, please inform your service technician.

ERROR MESSAGE	ERROR DESCRIPTION	SOLUTION
Input under voltage	PV voltage is < 450 V.	Solar voltage too low. • Check PV voltage and MPPT configuration. • Check phase-measurement system controller. • If the fault persists, please inform your service technician.
Input Voltage start-up	PV voltage is < 400 V.	Solar voltage too low. • Check PV voltage and MPPT configuration. • Check phase-measurement system controller. • If the fault persists, please inform your service technician.
Input Overvoltage	PV voltage is > 900 V.	Solar voltage too high. • Check PV voltage and MPPT configuration. • Check phase-measurement system controller. • If the fault persists, please inform your service technician.
RACK not responding	All the 3 phases of a rack are not responding.	If the fault persists after the device has been reset (by turning off the DC main switch), please inform your service technician.
Phase not responding	One or two phases of a module rack are not responding.	If the fault persists after the device has been reset (by turning off the DC main switch), please inform your service technician.

This is only a reduced list of possible error messages. If needed contact your service technician.

4.4.8.3 On the inverter racks

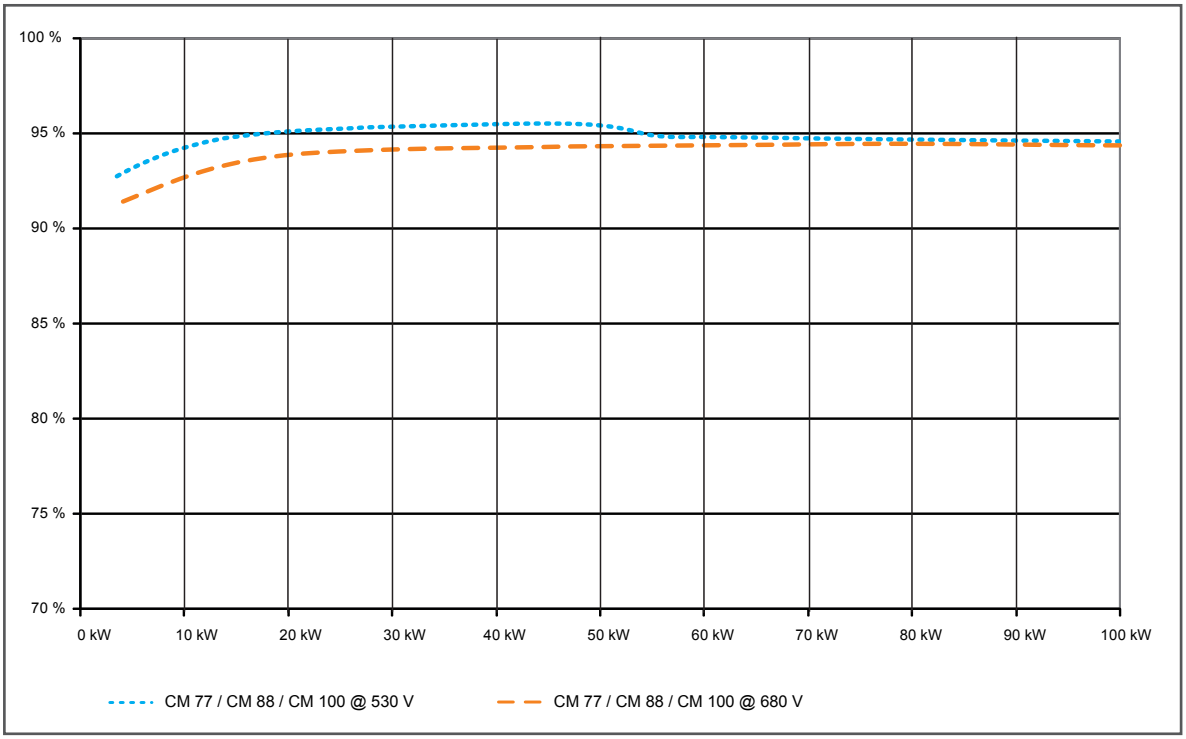
- LED (A), green: „Operation“ shows the operating state.
- LED (B), red: „Earth Fault” shows an insulation resistance fault or a PV earth fault (GND) on the DC side.
- LED (C), yellow: „Failure“ indicates internal or external faults and whether the grid feed-in is interrupted.

DC INPUT VOLTAGE	RELATED ACTION	LED COLOR	REMARKS TO OPERATION OF SOLIVIA 11 EU G3 R
≤ 400 V	Under voltage	No LED	SOLIVIA 11 EU G3 R rack inverter is turned off.
≥ 400 V	Stand-by mode	Green: Flashing, Yellow: On	Auxiliary power supply is running, but no transfer of power to grid yet. Communication to system controller is enabled.
≥ 450 V ± 3%	Power turn-on, MPP lower limit	Green: Flashing / On Yellow: Off	Power transfer to AC grid starting at ≥ 450 V. Lower limit of MPP range.
430 V ± 3%	Power turn-off	Green: Flashing	If PV voltage decreases from 450 V downwards, power can be transferred to AC grid down to 430 V DC.
800 V	MPP upper limit	---	MPP tracker is able to work up to this limit.
900 V	Absolute maximum PV voltage	---	Usually the voltage of 900 V is specified under no load and for lowest temperature.
> 900 V	Over voltage	---	Not allowed input voltage range.

4.4.9 System settings for more than one cabinet per system

Each CM system is working as slave on the communication bus.
Please take care that each central inverter should have a unique address [1 ... 254] on the bus (avoid any conflict with I‘checker addresses, etc.).

4.5 Efficiency



5 Transport and installation

5.1 Transport and storage

The SOLIVIA CM central inverter may only be transported and set up by persons who are authorised by the operator to do so.
Please observe the following important safety instructions:

- Transportation must be done with empty cabinet (without any racks inside)
- Make sure that the transport is vibration free.
- Make sure that the equipment is not exposed to large fluctuations in temperature or particularly high humidities during storage and transport.
- When using a crane or forklift, put the equipment down carefully and avoid impact effects.
- Weight can easily be reduced by removing all side and rear panels as well as the cabinet doors.

WARNING!
Incorrect transport conditions may result in damage to property and personal injury!

Only use approved steel cables when transporting the CM by crane. Using non-standard cables which are not approved for transporting the tensile load specific for the equipment may result in the load dropping and causing damage to property and personal injury.

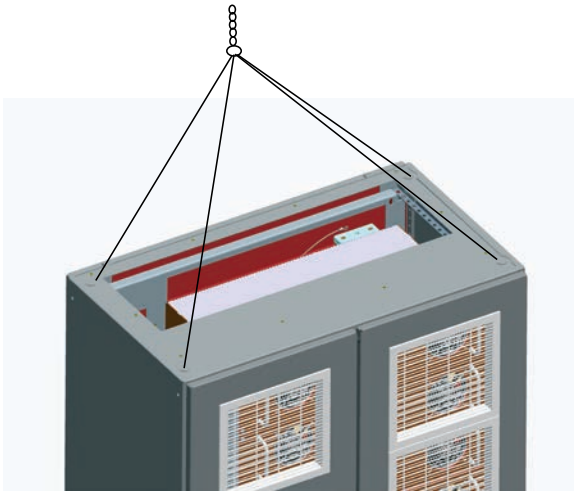


Figure: Crane transport with the approved steel cables

Figure: Transport using a forklift approved for the weight

WARNING!
Not taking into consideration the centre of gravity may result in damage to property and personal injury!

During transport, take into account the centre of gravity of the SOLIVIA CM central inverter when empty (without inverter racks). Not taking into consideration the centre of gravity of the central inverter may result in tipping over and causing damage to property and personal injury.

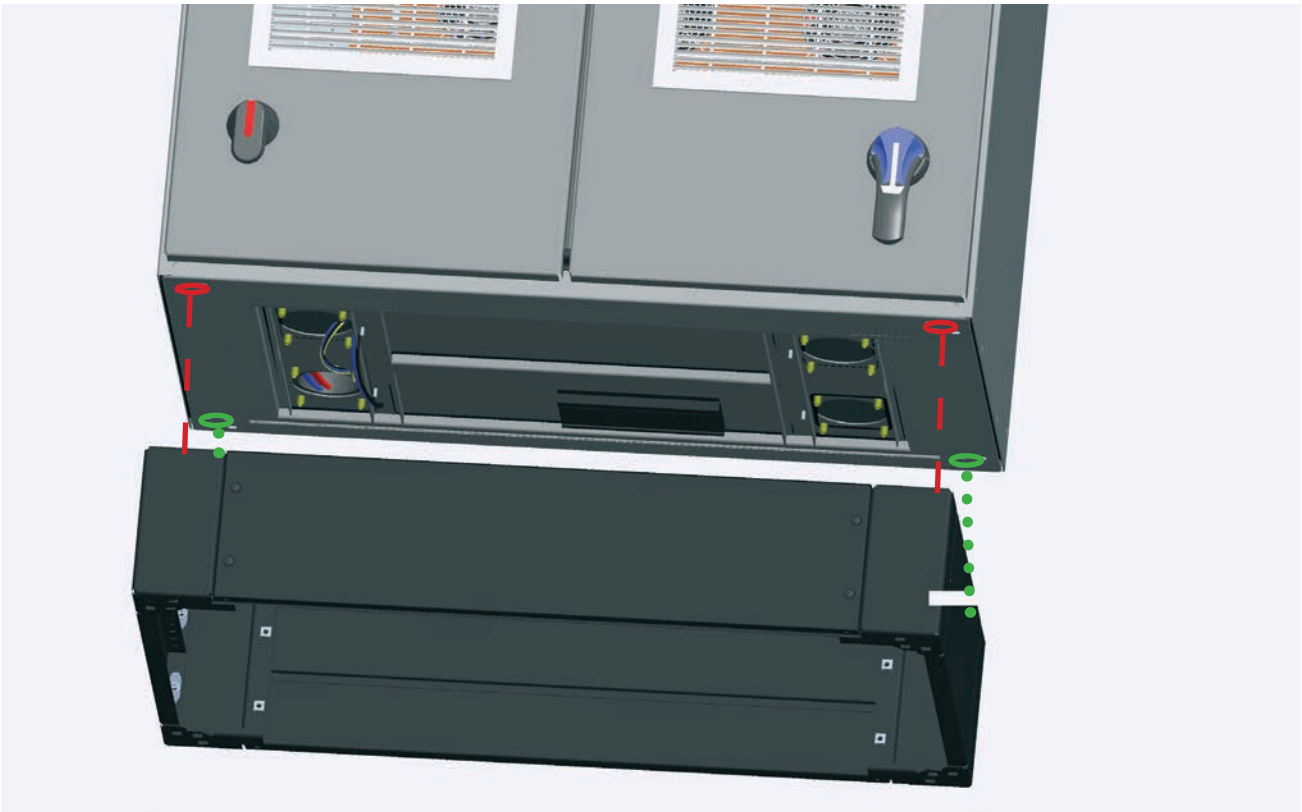
When storing the central inverter the following conditions should be taken into consideration:
- The internal areas should be protected.
- The rooms should be ventilated.
- The humidity should not exceed 95 % (non-condensing).

5.2 Site of installation and minimum requirements
- The equipment must be set up on a floor which is not combustible, non-slip and level.
- The load carrying capacity of the floor must be appropriate for the weight of the equipment in relation to its surface area.
- The central inverter must only be installed indoors.
- The cooling air and air of the environment must be free of corrosive substances and combustible and explosive gases.
- The air exchange required is 3000 m³/h.
- The ambient temperature must be between -10 °C and +50 °C (refer to § 12 Technical data).
- Keep air grills unobstructed; check air filters regularly and clean them if necessary (refer to § 9 Maintenance).
- The supply and exhaust air flows for the CM must not become restricted.
- The specified installation position must be maintained (vertical).
- Doors must not be obstructed and must be easy to open at all times.

5.3 Installing the cabinet base (optional)
The SOLIVIA CM central inverter is normally dispatched without a cabinet base.
If cable routing from below is not possible, it will be necessary to use a cabinet base (3461304600).

The base is supplied packed in individual parts in a cardboard box. The box also contains assembly instructions (refer to § 14 Appendix). It is also possible to fasten the base to the cabinet with four hex-head screws DIN 933 M8x16; M8x20 and M8x25. Mounting points see picture.

Use anchor bolts FAZ 10/30C to fix the cabinet base to the floor.



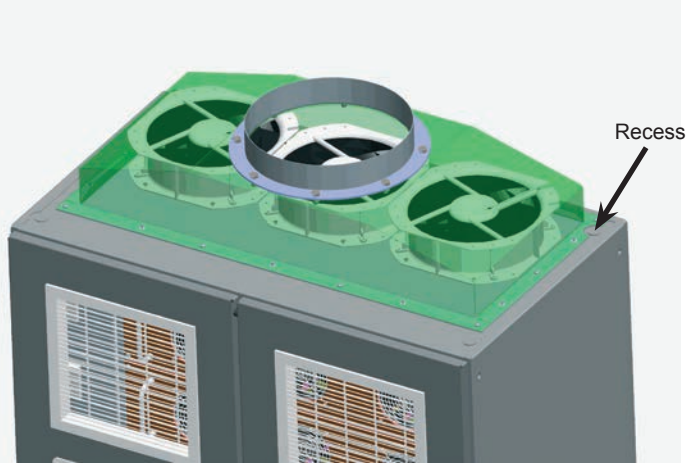
5.4 Setting up the central inverter

WARNING!
If the central inverter tips over, this may result in damage to property and personal injury!

The client should fasten the floor plate of the central inverter to the floor using screws and dowels. This is the only way to make sure that the cabinet is stable and not able to tip over.

5.5 Fitting the fan tray

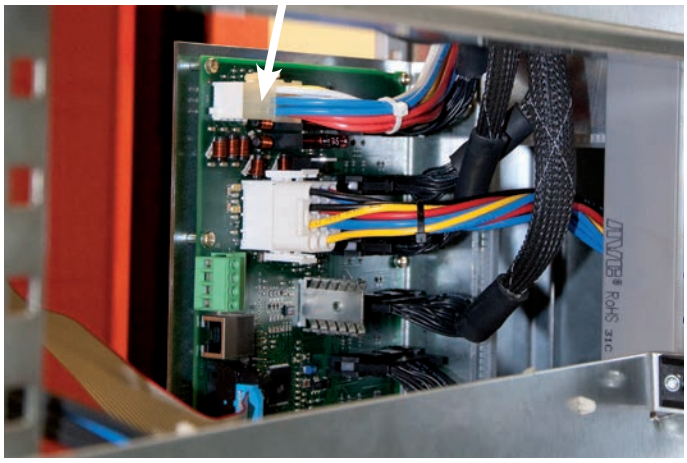
When delivered, the fan tray is inside the cabinet.



Fan cable

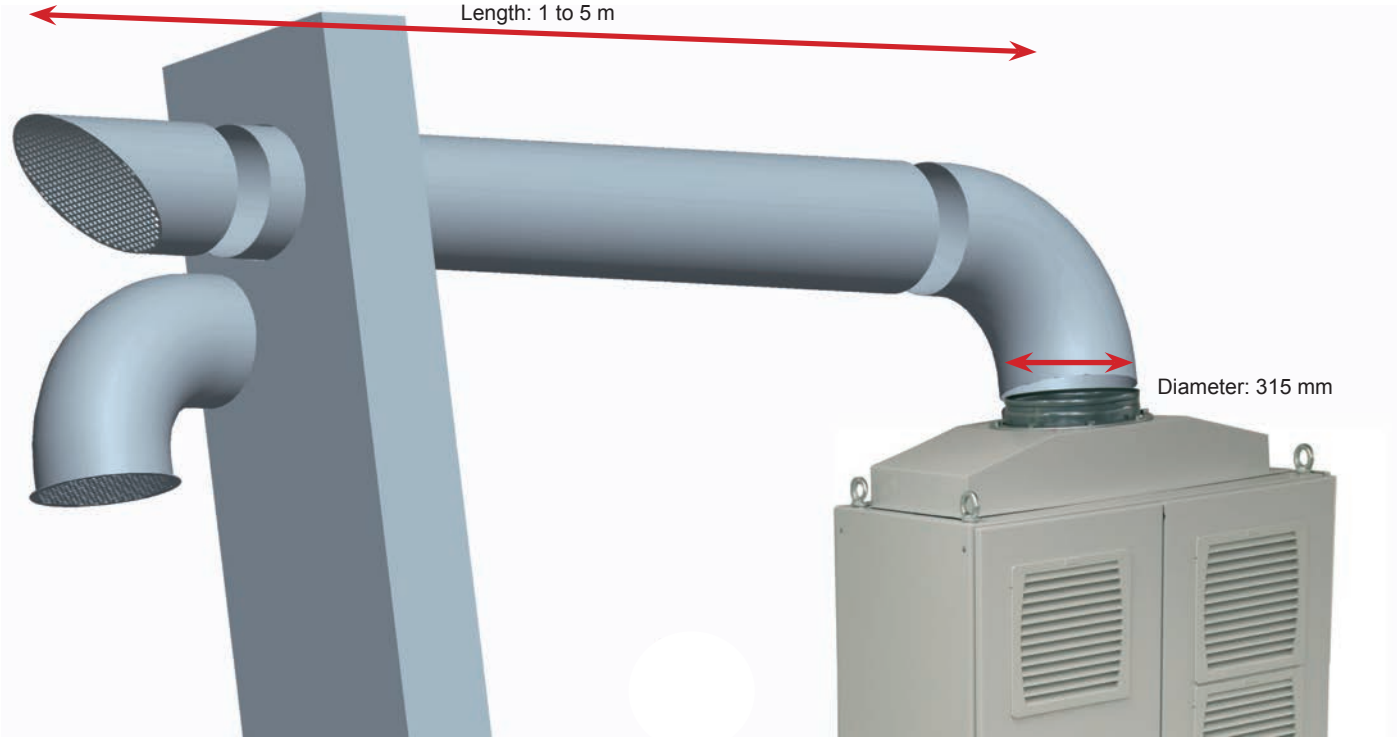
- Remove the fan tray from the packing and place it on the cabinet with the recesses on the side facing the back. At the same time, make sure that the fan cable is simultaneously fed downwards into the channel on the left. The fan cable must not be damaged.
- Place the cable in the cable clamps provided and lock them.
- Pin the fan cables on the backplane controller.
- Now use a crosshead screwdriver to fix the fan tray to the mounting holes provided. Ten M5 x 8 cross-slot pan-head screws have been provided.

Backplane controller with fan cables pinned on



5.5.1 Installing the exhaust air duct

- The exhaust air duct must be provided by the client.
- Use a folded spiral-seam tube with a nominal diameter of 315 mm.
- Maximum duct length for folded spiral-seam tubes: 5 m.
- Maximum hose length for flexible hoses: 5 m.
- Fix the exhaust air duct to the fan tray using sheet-metal screws for folded tubes or a hose clamp for flex tubes and then seal it.
- Exhaust openings must be fitted with grilles so that the exhaust air will not be blocked in any circumstances (by animals, etc.) (refer to § 14 Appendix).
- Recommendation for assembly: Connect the ducts with self-tapping screws and seal the seams with cold shrink tape or cold welding tape.



6 Electrical installation

6.1 Requirements

Heed the following points before putting the CM central inverter into operation:

- Take into account the local conditions
- Adjust settings according to national regulations
- Adjust settings according to the technical requirements for electrical connections

6.2 Safety instructions

WARNING!
Operating the equipment at the wrong grid voltage will result in damage to property!

Make sure that the grid voltage setting is correct since exceeding the specified limits will result in substantial damage to property!

- The grid voltage must be within the specified limits (refer to § 12 Technical data). You can check this by measuring the grid voltage at the feed-in point.
- Also note that the grid overvoltage and grid impedance are interdependent. Here, the maximum permissible grid overvoltage determines the necessary grid impedance value.

CAUTION!
Using the wrong backup fuse will result in damage to property!

Comply with both the rating and the type of backup fuse, since the wrong backup fuse can cause substantial damage to the equipment!

- Only use an NH fuse with trip characteristic gG.
- Fuse ratings: 200 A
- We recommend a backup fuse of at least 20 A for the auxiliary voltage supply.

Warning about electrical voltage!
Special expertise is required for working on electrical systems.
This work may therefore be only performed by certified electricians.

Follow the procedure described in these operating instructions and the safety instructions for the electrical installation. Not following the procedures can result in the central inverter being destroyed and lead to electrical accidents resulting in serious damage to health.

Work on electrical systems must not start until the safety rules have been correctly applied:

- Isolate
  - Examine the connection diagrams and familiarise yourself with the layout of the switchgear.
  - Only deal with the devices which relate to safety after consulting with the person in charge of them.
  - Create isolation paths which are visible.
  - Wait for the necessary discharge time for any capacitors to discharge.
- Secure any switches from being switched on again.
  - Lock switches mechanically (e.g. by using locks).
  - Pull out any fuse links.
- Establish that the equipment is not live.
  - Only use voltage testers which are suitable for the voltage.
  - Test the voltage tester to make sure it is working.
  - Establish that the work place is not live.
- Earth and short circuits
  - The earth connection and short circuit device are necessary on plants with voltage ratings above 1 kV.
  - The earth and short circuit device must be appropriate for the potential short circuit current which is expected.
- Always connect the device to the earth first.
- Cover or enclose neighbouring parts which are live.
- Live parts must be protected from accidental contact by sufficiently solid and reliably attached covers.

6.3 Connection

6.3.1 Overview of the connection cross sections

CAUTION!
§ 6.3.1 to § 6.3.4
The cable cross section ranges and torques indicated in § 6.3.1 are applicable exclusively to copper wires.

We would like to draw our customer‘s attention to the fact that it is necessary to inspect existing PV installations with the modular Central Inverter SOLIVIA CS / CM EU G3 and ensure that they comply with the torque limits set out in § 6.3.1. When employing other conductors, the changes in the cable cross-sections, affixing procedures and torques need to be observed (see the current standards for correct and appropriate treatment and handling).

For more details, please consult the technical application notice on our homepage www.solar-inverter.com

CONNECTION TYPE	CABLE CROSS SECTIONAL AREA (COPPER WIRE)	TORQUE
DC cable from the string combiner box (DC, 1 MPPT)	95 ... 150 mm²	28 ... 30 Nm
DC cable from the string combiner box (DC, 2 MPPT)	50 ... 95 mm²	28 ... 30 Nm
AC cable (AC 400 V / 3 NPE) *	50 ... 95 mm²	15 ... 20 Nm
Auxiliary voltage supply (AC 230 V)	2.5 mm²	0.6 ... 0.8 Nm

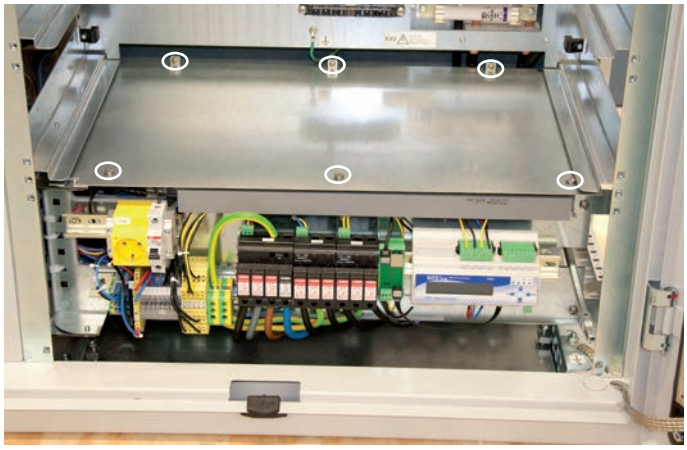
* Cabinet must be connected to a 3-phase Wye (star) configuration grid.

6.3.2 Work which must be carried out before electrical connection

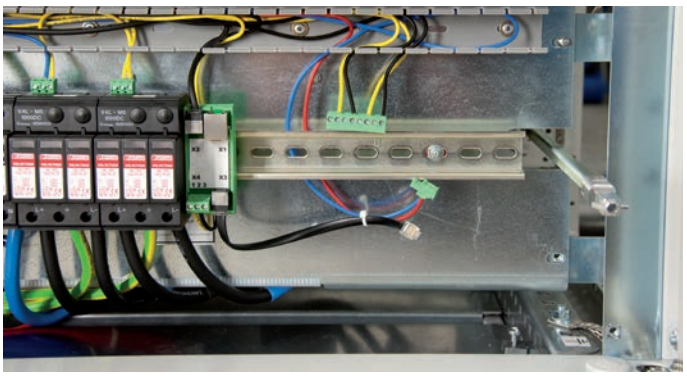
Carry out the following points for connecting the SOLIVIA CM central inverter. Please note the SOLIVIA CM cabinets arrive without the monitoring system being installed.

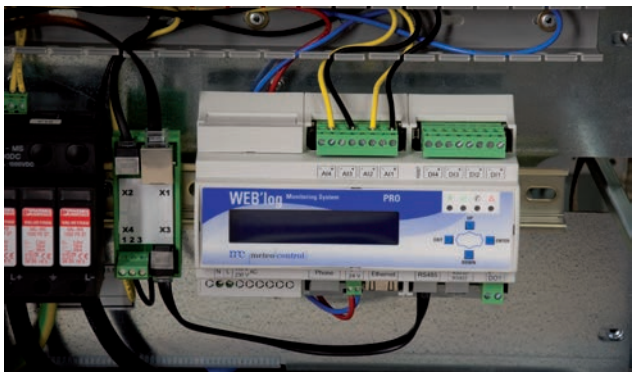
1. Condition on arrival:
Connection area before removing the front panel. Undo the four screws at the corners of the panel to remove it. This will expose the connection area.

2. Front connection area:
Connection area after removing the front panel and before removing the intermediate panel. Undo the six screws at the corners and in the middle of the intermediate panel to remove it. This will expose the rear connection area.

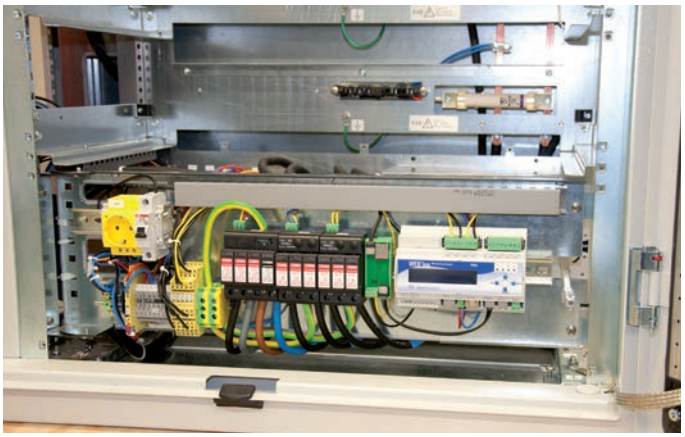


3. Location and installation of monitoring system:
The installation location of the monitoring system is shown on the following pictures. Please take the data logger from the separate package and hook it to the DIN rail. Then, please connect the three cables using the preassembled cable wires.

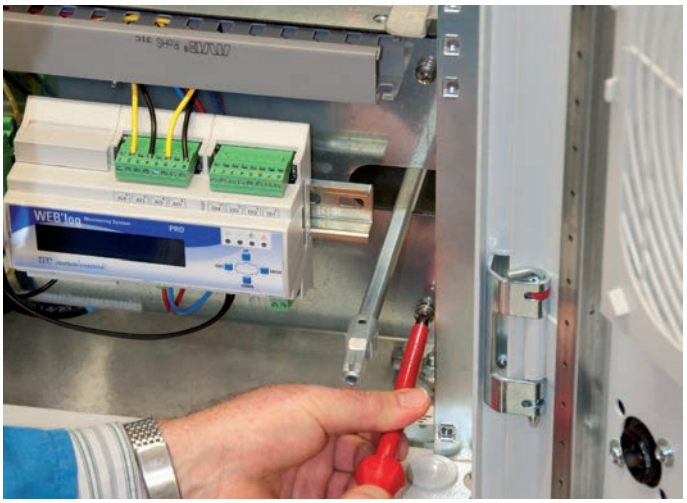


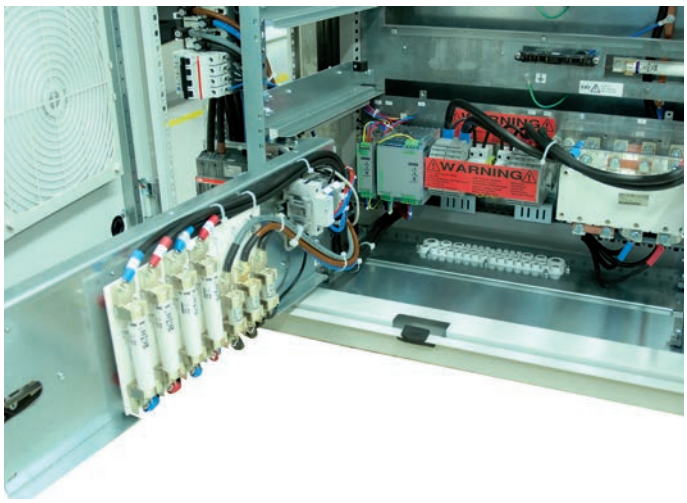


4. Connection area after removing the intermediate panel.



5. Swivel frame of the front connection area:
Now unscrew the two screws on the right and move the swivel frame forward 90°.





6.3.3 Connecting the DC cables from the string combiner box

Before starting work on the string combiner box, please read the warning label attached to the DC terminal block carefully and follow all points listed on it for your own safety.

WARNING

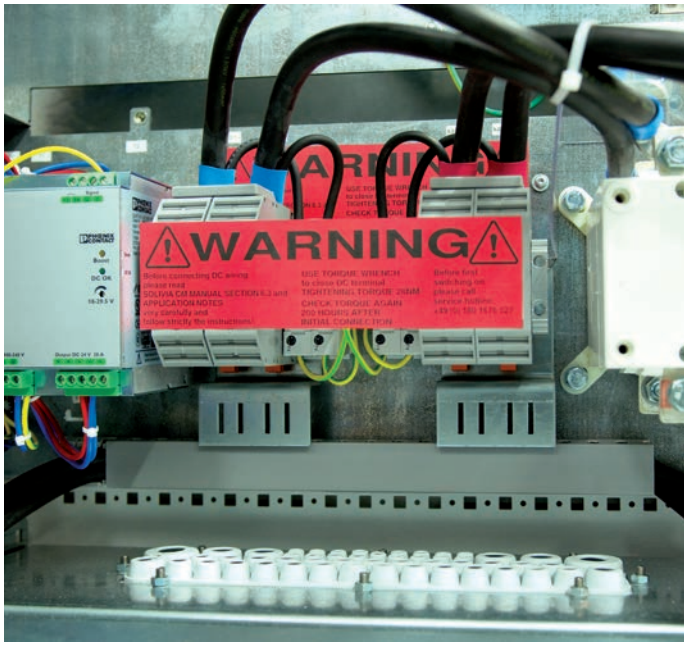
Before connecting DC wiring please read SOLIVIA CM MANUAL SECTION 6.3 and APPLICATION NOTES very carefully and follow strictly the instructions!

USE TORQUE WRENCH to close DC terminal TIGHTENING TORQUE 28NM

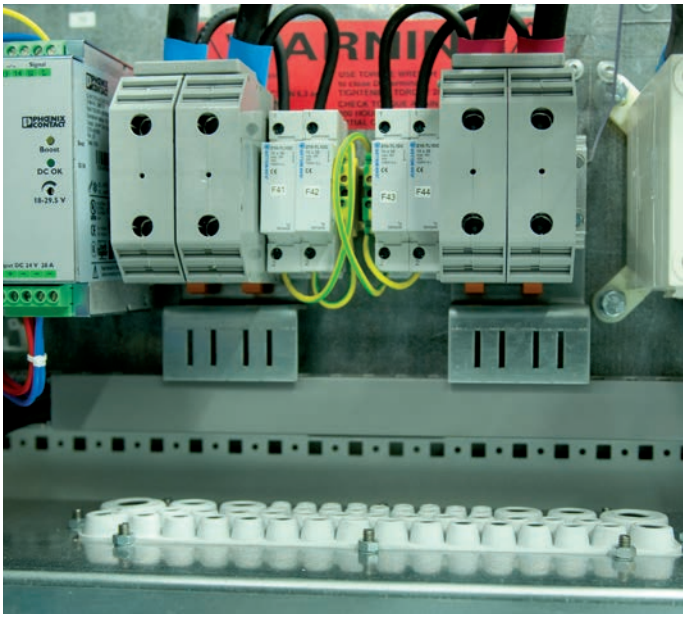
CHECK TORQUE AGAIN 200 HOURS AFTER INITIAL CONNECTION

Before first switching on please call service hotline: +49 (0) 180 1676 527

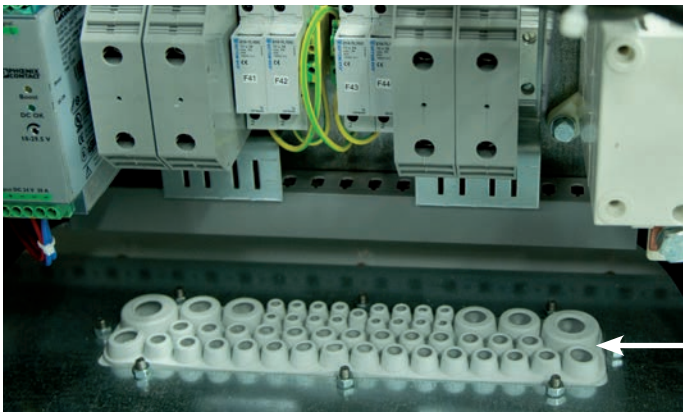
1. Before starting the wiring of the DC cables, please read § 6.3 in this Operating Instruction and the related application notes carefully and follow all instructions contained therein.
2. Use a torque spanner to tighten the DC terminals.
3. Torque: 28 Nm.
4. Recheck the torque 200 hours after first switchin on.
5. Before the first switching on, please call our Service Hotline at +49 (0) 180 1676 527.



Once you have read the warning notes carefully, you can remove the label and start connecting the DC cables from the string combiner box.

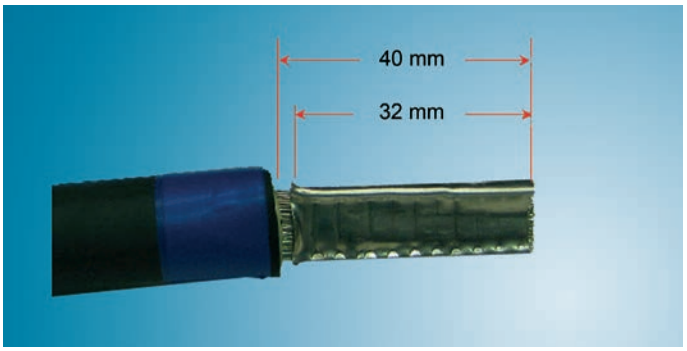


Insert the DC cable through the cable gland plate fixed to the floor of the cabinet (see figure below).



Cable gland plate

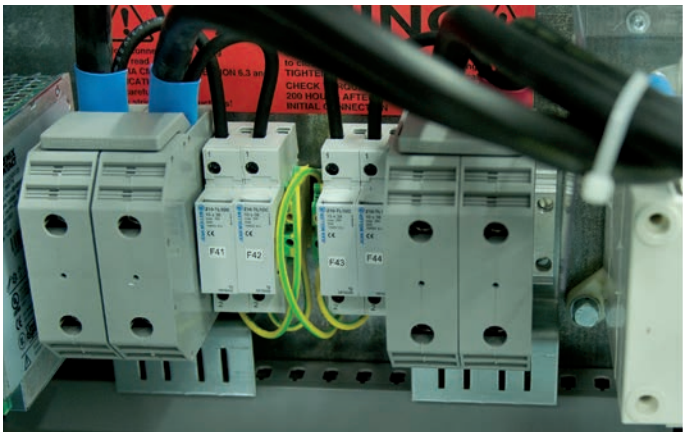
Remove the insulation from the ends of the cable up to a length of 40 mm. After this, crimp on core-end sleeves 32 mm long:

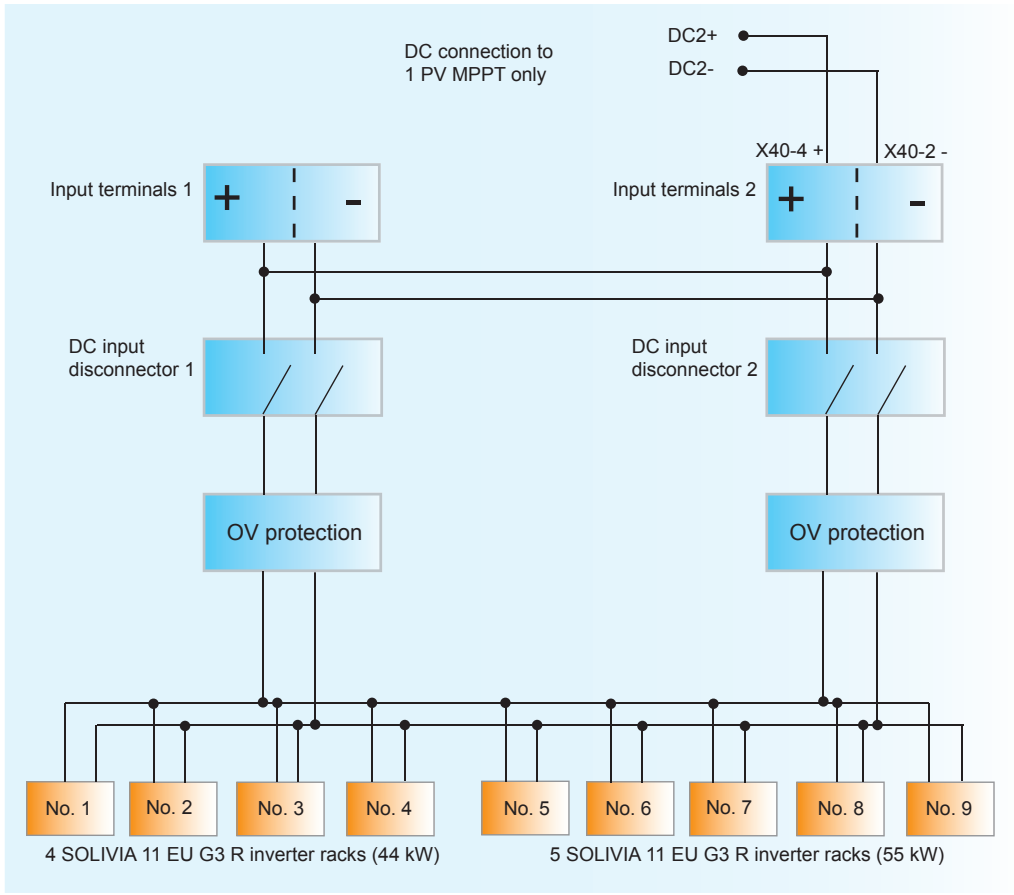


6.3.3.1 1 MPPT version (factory setting)

In the 1 MPPT version, connect the main DC cable from the generator connection box to the DC INPUT 2 of the central inverter by using the terminals X40-2 and X40-4 specified on the circuit diagram (refer to § 11 Circuit diagrams).
Do not remove the terminal bridges!

CONNECTION	TERMINAL
Plus line	X40-4 +
Minus line	X40-2 –



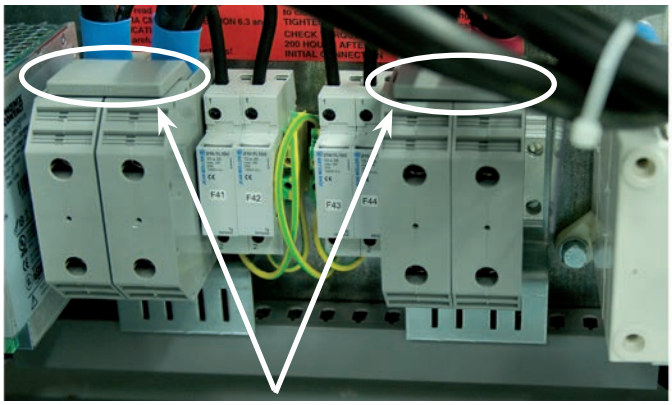


6.3.3.2 2 MPPT version

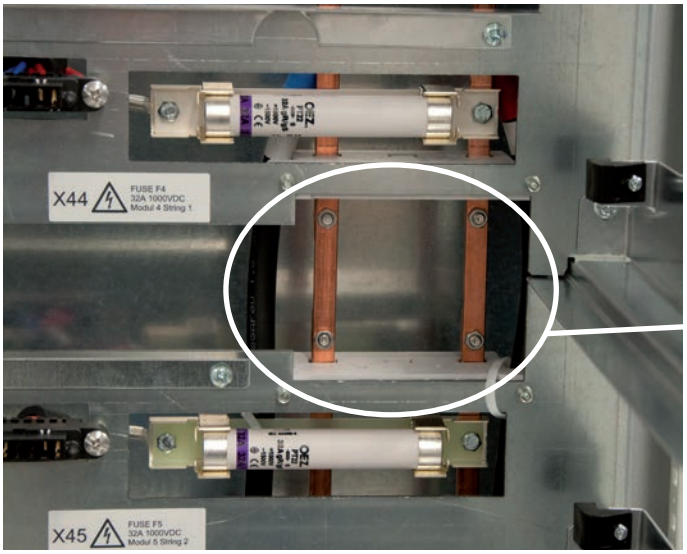
In the 2 MPPT version, connect two separate main DC cables to the DC input terminals of the central inverter by using the terminal INPUT DC 1 (terminals X40-1 and X40-3) and INPUT DC 2 (terminals X40-2 and X40-4) specified on the circuit diagram (refer to § 11 Circuit diagrams).

CONNECTION	TERMINAL
MPPT 1: Plus line	X40-3 +
MPPT 1: Minus line	X40-1 –
MPPT 2: Plus line	X40-4 +
MPPT 2: Minus line	X40-2 –

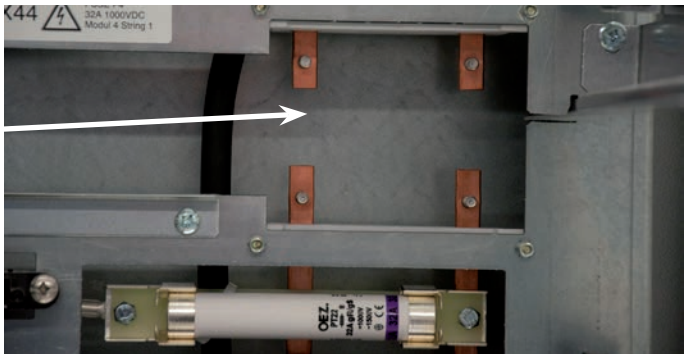
Before installing the inverter racks, remove the terminal bridges and the short-circuit bridges for the internal DC rail system between inverter rack 4 and 5.



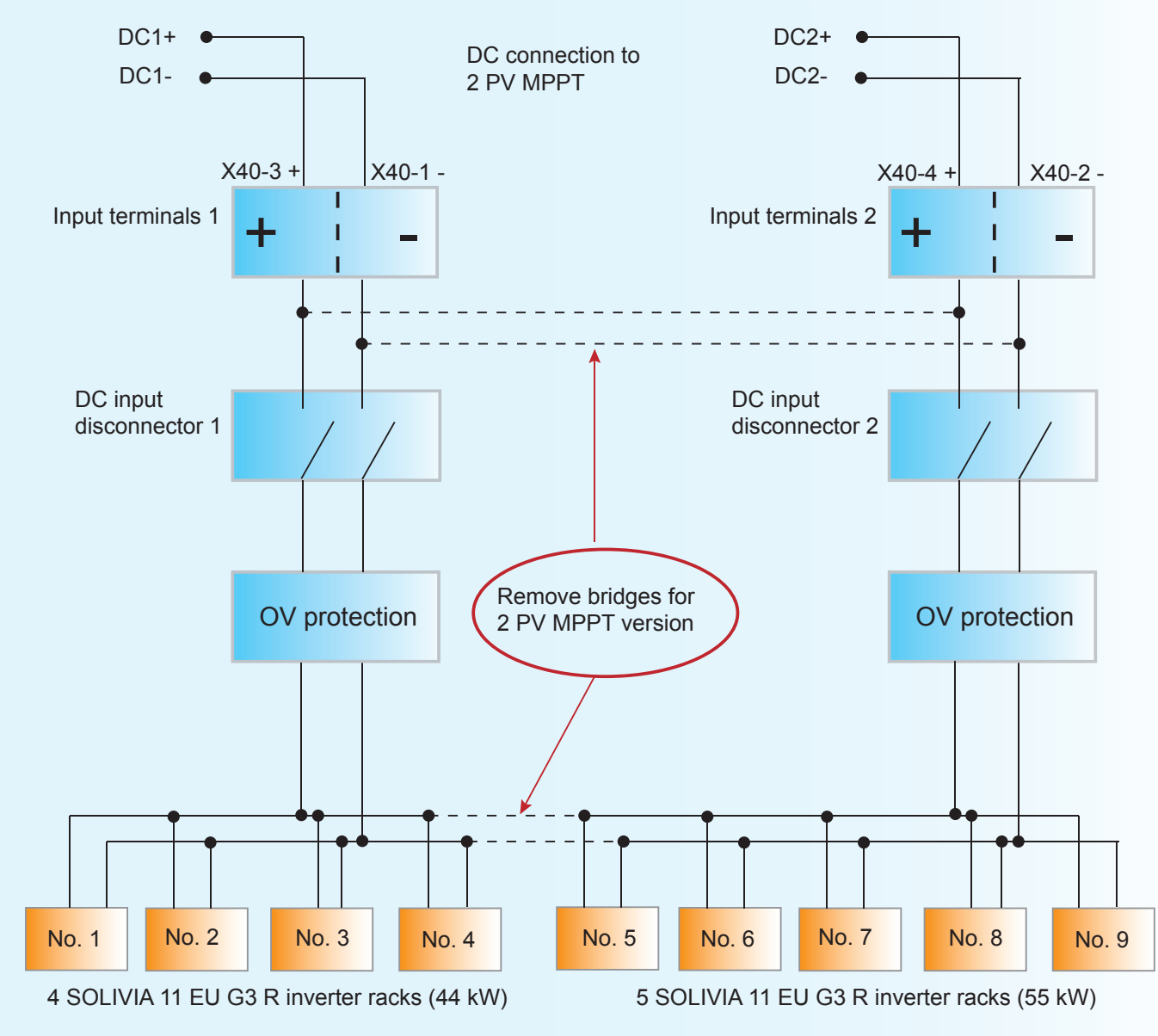
Picture showing the terminal bridges which need to be removed for the 2 MPPT version.



Picture showing the location of the short-circuit bridges before being removed.



Picture showing the short-circuit after being removed from the internal DC rail system between inverter rack 4 and 5.



6.3.3.3 DC Plus / Minus grounding

Some manufacturers of thin-film and back-contact PV modules require the PV generator to be grounded at the positive or negative pole. This is intended to compensate the effects of ageing and degradation caused by ionic migration and charging.

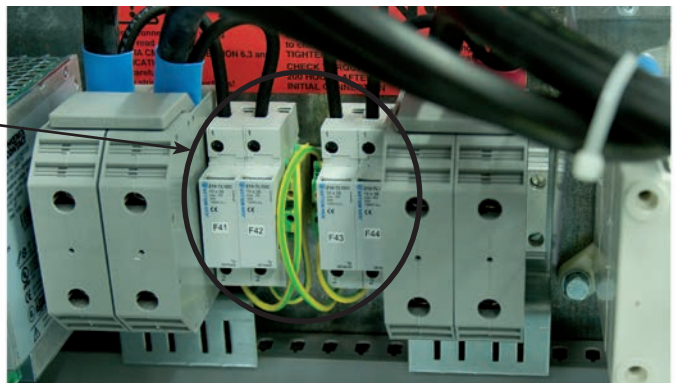
Attention: Using the DC Plus / Minus grounding to earth, an initially ungrounded PV generator will disable its insulation. In other words, an important protection function is taken away from the PV installation. The DC Plus / Minus grounding can be used to implement either positive or negative generator grounding.

Positive grounding is recommended for PV module with back-contact solar cells, for example.
Negative grounding is recommended for thin-film modules (CdTe, CIS, aSi), for example.

Please ask the manufacturer of the PV modules if and with which polarity the module type you are using needs to be grounded.

If applicable to your PV module installation please insert fuse links into following fuse holders:

- 1 MPPT Minus (-) grounded: F41
- 1 MPPT Plus (+) grounded: F44
- 2 MPPT Minus (-) grounded: F41, F42
- 2 MPPT Plus (+) grounded: F43, F44



For disabling the DC grounding, please remove fuse links.

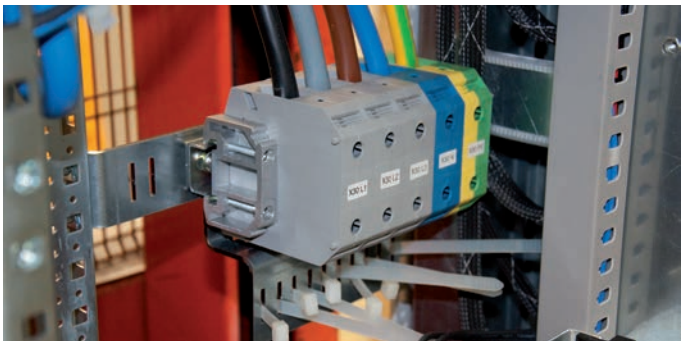
6.3.4 Connecting to the grid

CAUTION!
Damage to property may be caused by the high leakage current!

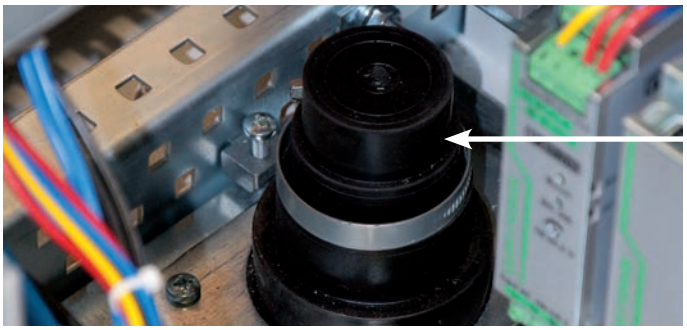
The SOLIVIA CM central inverter has a high leakage current (< 25 mA). Before connecting the equipment to the supply, it must be earthed at the PE connection provided.

Connection to the public grid is carried out via the AC output terminals. The cross section of the connection must be provided according to table 6.3.1. Comply with the additional regulations of your local electricity supplier where necessary.

For the connection, first remove the left support rails of the SOLIVIA 11 EU G3 R inverter racks on position no. 8 and 9. The AC connection area is now visible.



Now feed the AC cable into the cabinet upwards from underneath through the inlet grommet at the rear left of the cabinet. To allow a better insertion of the AC cable through the grommet we recommend to remove the insulation from the cable ends.



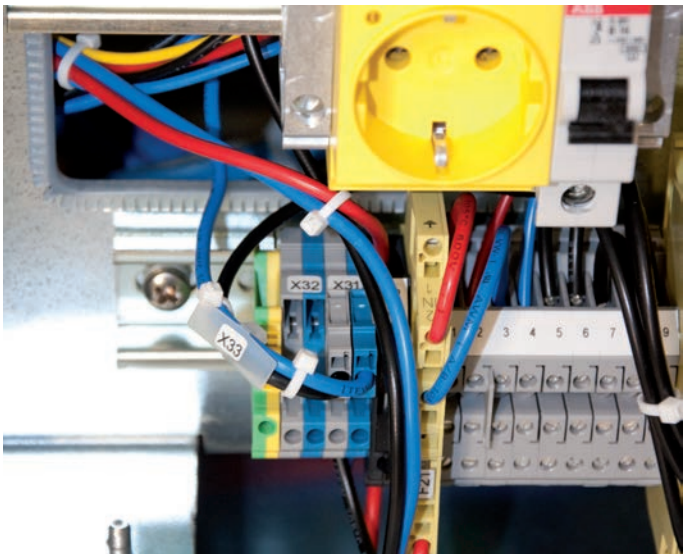
inlet grommet

Clamp the AC cable on the terminal block X30 according to the correct phases. Ensure the AC cable against slipping out of the inlet grommet with a hose clamp (strain relief).

6.3.5 Connection to the auxiliary power supply

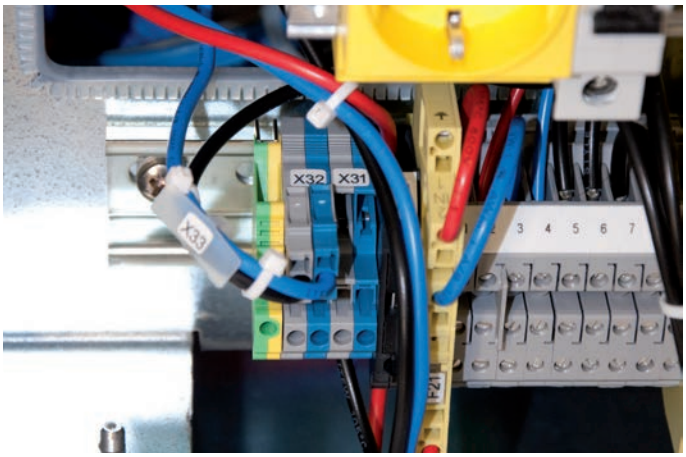
There are two options for supplying the internal auxiliary power supply circuits of the central inverter:

Option 1: Supply from the AC grid.



Option 2: Supply from an additional external AC grid (UPS: Uninterruptable Power Supply).

WARNING!
When choosing option 2 and turning off the main AC power switch, hazardous grid voltage will remain present inside the cabinet circuitry.



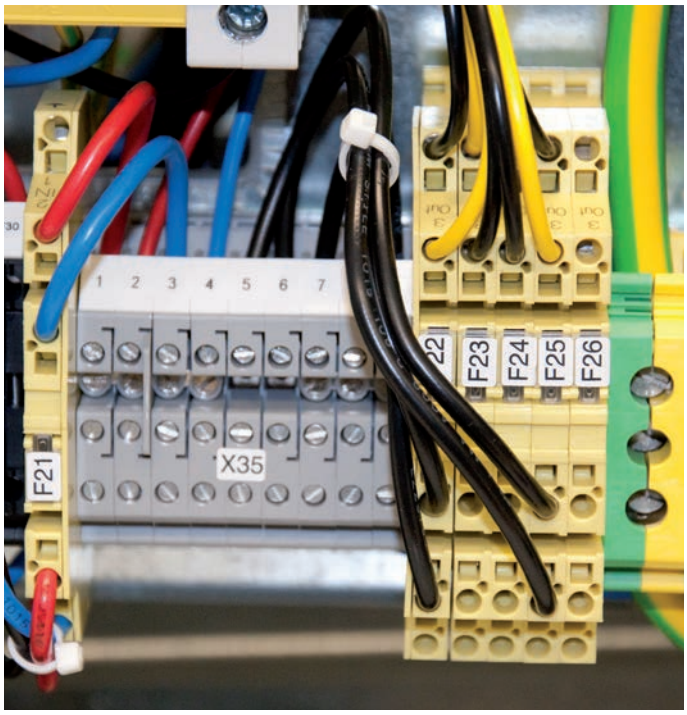
It is only necessary to connect an external auxiliary voltage (230 V AC) for option 2. Connect this to terminal X32 according to the correct phase. We recommend a backup fuse rated at 20 A at most for the auxiliary voltage supply. Pull off the internal supply plug X33 from terminal X31 and plug it onto terminal X32 according to the correct phase. This modification will change the auxiliary power supply being fed from the AC grid to being fed from the additional external AC grid (UPS: Uninterruptable Power Supply).

Note:
Before making any changes please switch off the AC line protection breaker F16!
For operation of the auxiliary power supply and for both options, the AC line protection breaker F16 has to be switched on!

6.3.6 Connecting the temperature and insolation sensors (optional)

Connect the optional insolation or temperature sensors according to the circuit diagram (refer to § 12 Circuit diagram) (sensor panel 1 and sensor panel 2).

CONNECTION	MEASUREMENT RANGE	TERMINAL
Supply (24 V)		X35.2
Supply (return)		X35.4
Insolation measurement	0 - 10V corresp. 0 - 1200W/m²	F23.1
Temperature measurement	0 - 9.2V corresp. –20 - +80°C	F23.2



6.3.7 Current sensors in string combiner box

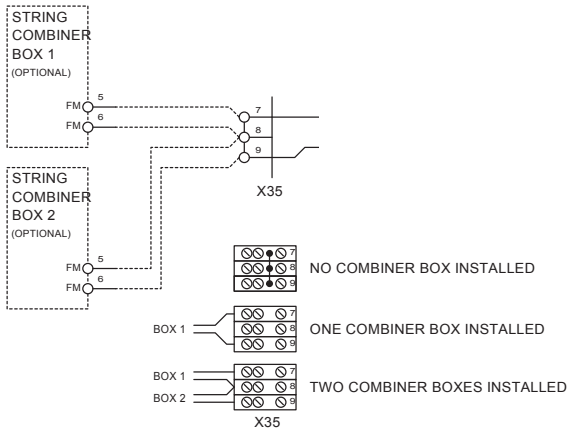
The CM has the possibility to connect current sensors located inside the string combiner box to the data logger. It does allow the monitoring of current signals for different PV strings.

CONNECTION (RS485)	FUNCTION	TERMINAL
Supply (24 V)	Supply voltage (for current sensors only)	X35.1
Supply (return)	Reference potential	X35.3
a = Data Plus	RS 485 data line	X35.5
b = Data Minus	RS 485 data line	X35.6

6.3.8 Overvoltage protection in string combiner box

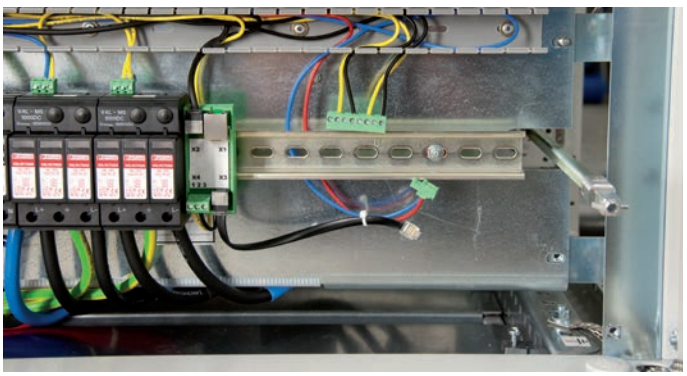
Connect feedback signal of overvoltage arrestor.
The CM has the possibility to connect the overvoltage protection feedback signals inside the string combiner box to the data logger.

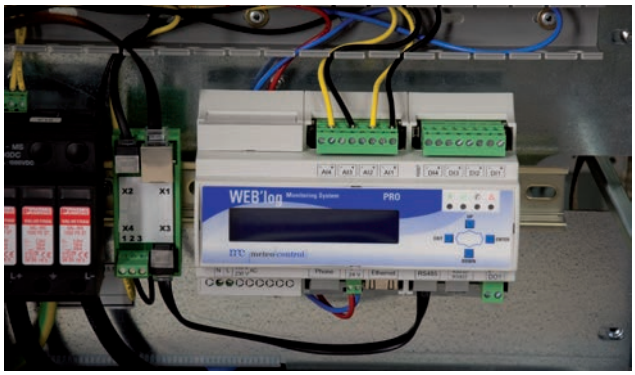
CONNECTION	FUNCTION	TERMINAL
String combiner box 1/2	Normally closed contact of one or two string combiner boxes (refer to § 11 Circuit diagrams).	X35.7/8/9



6.3.9 Location and installation of monitoring system

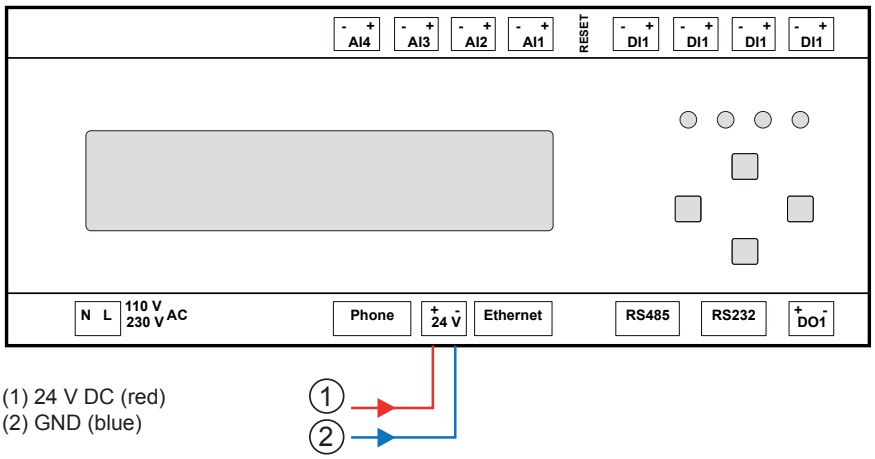
The installation location of the monitoring system is shown on the following pictures. Please take the data logger from the separate package and hook it to the DIN rail. Then, please connect the three cables using the preassembled cable wires.





Note:
A separate connection for the AC 230 V supply to the Web' loggers power supply is not required. Parallel supply with AC and DC is not permitted. (For further information, please refer to the User Manual from Meteocontrol for WEB'log Pro (www.meteocontrol.de)).

24 V voltage input / 24 V voltage output



(1) 24 V DC (red)
(2) GND (blue)

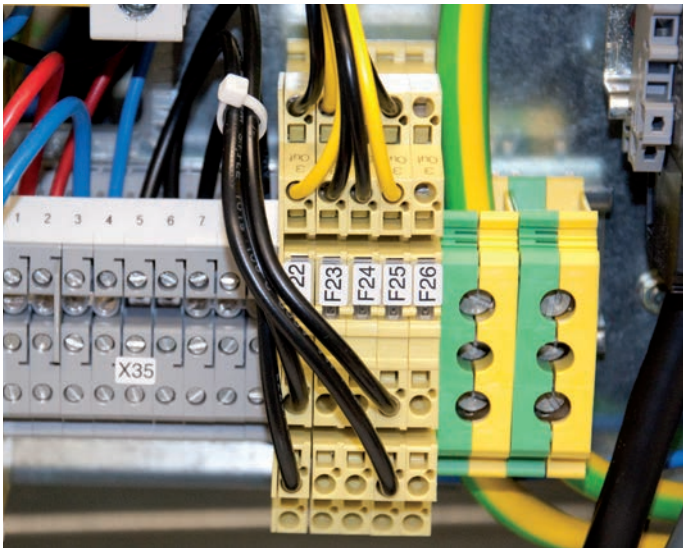
6.3.10 Connection to analog, ISDN, GPRS, DSL/Ethernet

The equipment is fitted with an internal telephone modem (analog or ISDN modem) or connection to GPRS modem or DSL/Ethernet network (according to customer order). The cable connection for the communication is not included in the scope of supply.

CONNECTION	TERMINAL	CABLE TYPE
Analog	Phone port of data logger	2-wire telephone cable (La, Lb)
ISDN	Phone port of data logger	4-wire ISDN telephone cable
DSL	Ethernet port of data logger	Cat5 cable
Ethernet	Ethernet port of data logger	Cat5 crossed cable

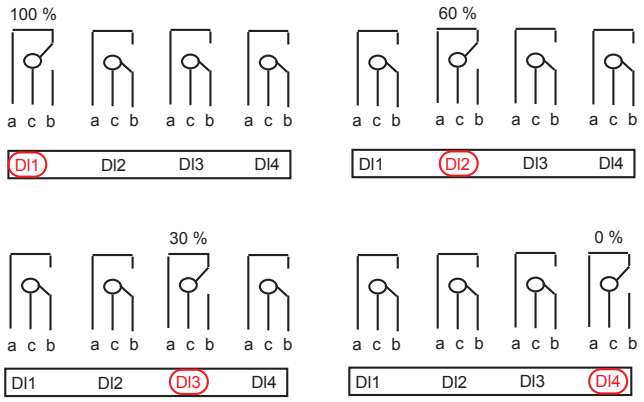
Overvoltage protection module F26 could optionally be inserted into analog telephone line (refer to § 11 Circuit diagrams).

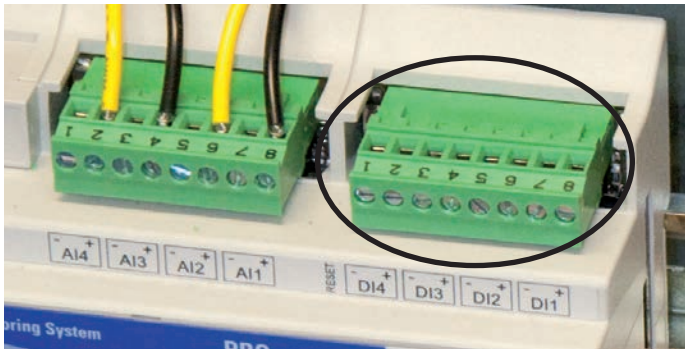
CONNECTION (ANALOG)	TERMINAL
La	F26.1
Lb	F26.2
Phone port of data logger (pin 4)	F26.3
Phone port of data logger (pin 5)	F26.4



6.3.11 Load management by electric utility

Connect digital load management signals to following inputs allowing active power control by the utility with levels of 100 % / 60 % / 30 % / 0 % of the output power.





6.3.12 Overvoltage protection

The central inverter is provided with surge arrestors on the DC and AC side according to the following table.

PROTECTION AREA	OVERVOLTAGE PROTECTION
DC side	IEC Class II, EN Type T2, 1000 V DC
AC side	IEC Class II, EN Type T2, 230 / 400 V AC

Additional overvoltage or lightning protection must be provided according to the local conditions and regulations.

The surge arrestors are provided with additional backup fuses (see figure below):

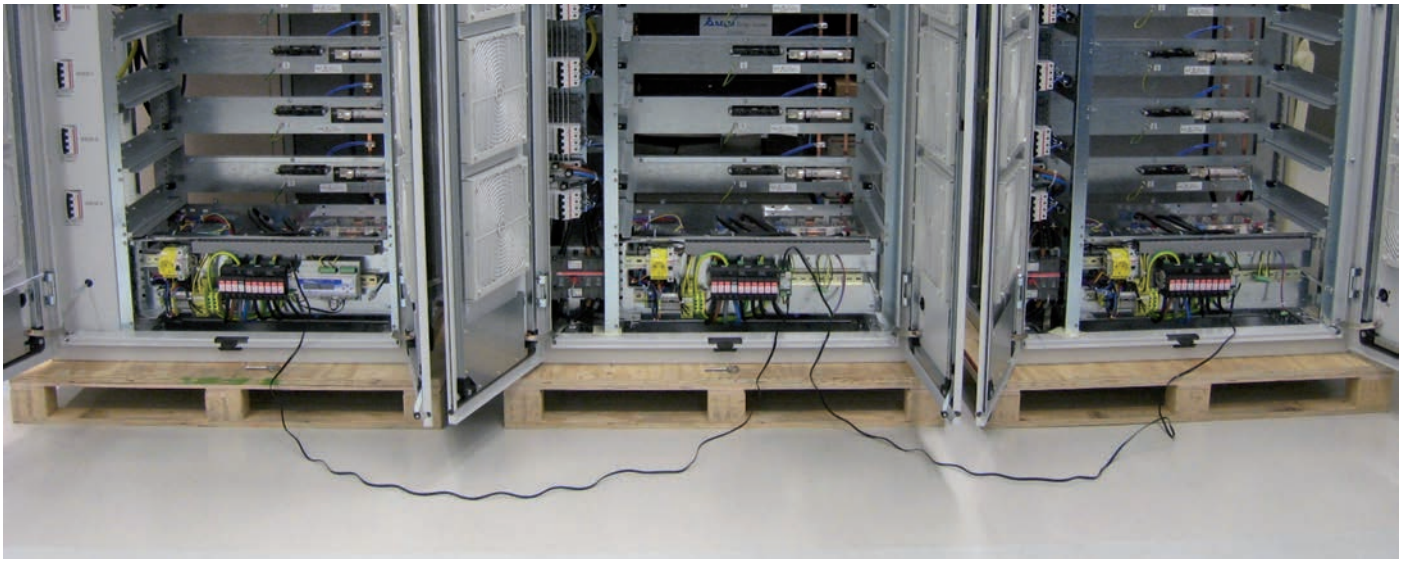
6.3.13 Installation of more than one cabinet per system

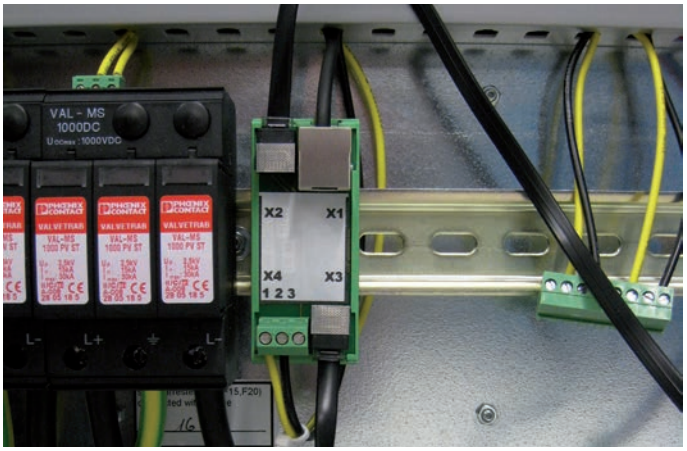
Only one datalogger will be needed per system which will be installed in cabinet # 1.

Further cabinets (cabinet #2, 3 etc.) should be connected via RS485 bus as follows:

CABINET	TERMINAL (RS485 BUS BOARD)	CONNECTION	TERMINAL (RS485 BUS BOARD)
# 1	X3	Datalogger	
	X2	Cabinet #2	X3
# 2	X2	Cabinet #3	X3
# 3	X2	Cabinet #4 ...	X3

Needed cable for interconnection: RJ12 cable, straight through wired, 6P6C





6.3.14 Work which must be carried out after electrical connection

After the central inverter has been connected, carry out the following points:

1. Swivel frame of the front connection area:
Move the swivel frame back 90° into its initial position and fix it in position with the two screws on the right.

2. Front connection area:
Reattach the intermediate panel on the front connection area using the six M6x12 crosshead pan-head screws.

3. Final condition before inserting the inverter racks:
Reattach the front panel to the front connection area using the four M6x12 crosshead pan-head screws.

6.3.15 Inserting the SOLIVIA 11 EU G3 R inverter racks

- Because of the weight of the SOLIVIA 11 EU G3 R inverter racks (30 kg each), they should be lifted by at least 2 people.
- Always insert the inverter racks in the cabinet upwards from below. Since all inverter racks are identical, each position is equivalent (refer to § 4.2.1 Block circuit diagram). Nevertheless, follow how the inverter racks are grouped on 1 or 2 MPPT.
- Push the inverter racks into their slots smoothly and horizontally up to the end stop.
- Then screw them firmly in position using the lock washers and crosshead screws provided.

7 Start-up and configuration

CAUTION!
Water condensation may cause damage to property!

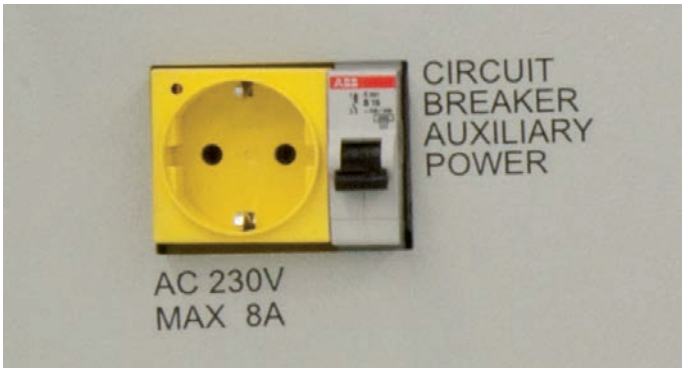
Before starting the SOLIVIA CM central inverter, make sure that it is absolutely dry. We recommend waiting at least two hours after setting up the equipment at the site of operation before starting it up.

7.1 Switching on the AC line-protection breaker for the inverter racks

Before closing the doors, switch on line-protection breakers for the inverter racks 1-9.

7.2 Switching on the AC line-protection breaker for the auxiliary power supply

Before closing the doors, switch on the line-protection breaker F16 for the auxiliary power supply.



7.3 Closing the doors

Close the doors using the cabinet key provided.

7.4 Switching on the grid voltage and the PV generator

Switch on the grid voltage via the AC power switch in the left door.

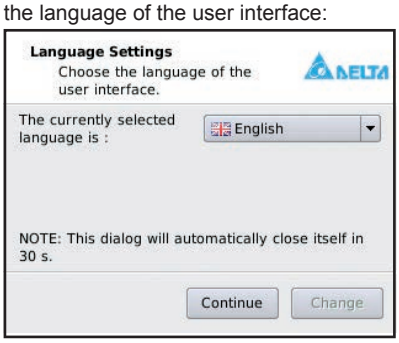
Switch on the PV generator via the DC disconnector in the right door.

For the purpose of maintenance and service it is also possible to open the cabinet doors during operation. The AC and DC switches have hidden locks which can be pushed down by using a small screw driver (refer to pictures below). This will disable the locking of the AC and DC switches and allow the opening of the two cabinet doors.

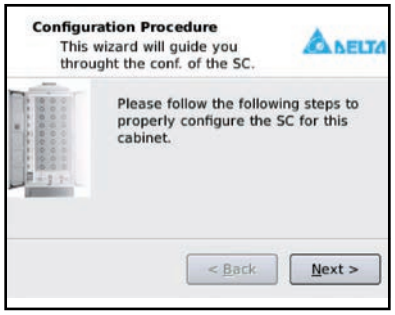
7.5 Initial start-up

When starting up the SOLIVIA CM central inverter for the first time, you will first see a message on the touch-screen display on the door requesting you to configure some parameters. Proceed as follows:

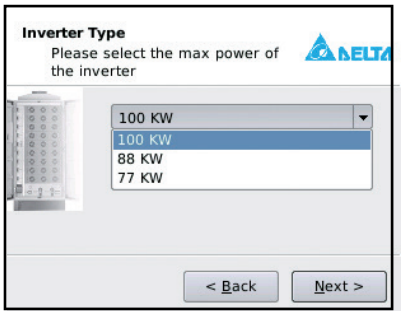
1. At the first start-up of the system controller you will be asked to choose the language of the user interface:



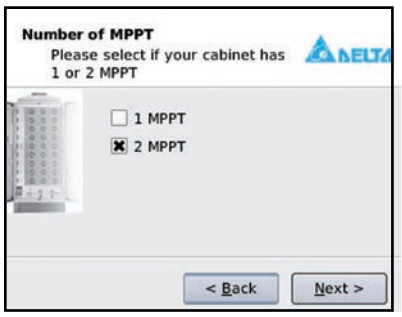
2. Now you are requested to enter data to configure the SOLIVIA CM and the SOLIVIA 11 EU G3 R inverter racks:



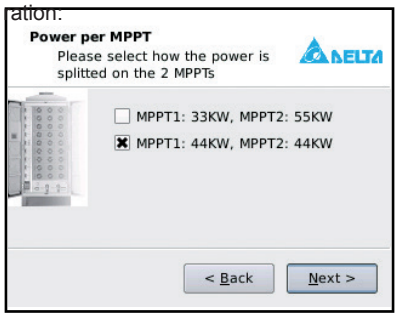
3. Now, the maximum possible power of the CM needs to be selected (77 kW, 88 kW or 100 kW):



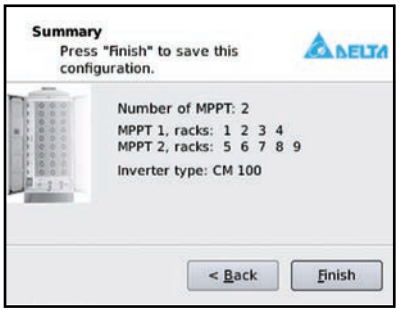
4. First, you must define how many MPPTs are connected to the CM (1 or 2 MPPT version):



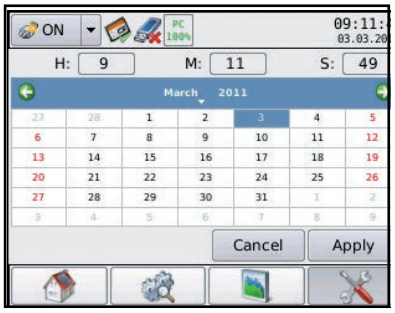
5. In case of a 2 MPPTs configuration the user has to specify how the input power is split on the 2 MPPTs. Here for example for a 88 kW 2 MPPTs configuration:



6. Then you are requested to confirm the settings you have entered:



7. Next, you are requested to set the date and time:



8. Finally you must select the country settings:

In case of a central anti-islanding monitoring device is installed on request of the utility, the internal anti-islanding of the CM can become disabled by activating the external grid monitor function.

Now the system controller will turn into operation and release the start-up for the internal inverter racks (1-9) - one after the other. This procedures will take up to 15 minutes.

8 Monitoring system

Each installation of a CM system requires the installation of one monitoring system.
Delta is offering different types of data loggers:
- Meteocontrol: Web'log Pro with analog modem; ISDN modem; GPRS modem or DSL/Ethernet (www.meteocontrol.de)
- Solare Datensysteme for Solar-Log (www.solar-log.com).

For further information, please refer to the User Manual of your selected data logger.

9 Maintenance

The CM inverter system must be maintained at regular intervals.
Maintenance includes:
• Inspection of wearing parts, and replacement thereof if necessary
• Functionality test of components
• Inspection of contact joints
• Cleaning of cabinet interior, if necessary
The maintenance interval depends on the location and the ambient conditions. A device installed in an environment with very dusty ambient air requires more frequent maintenance than indicated in the following table.

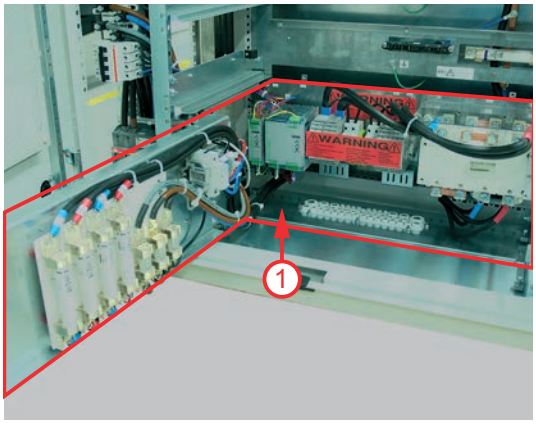
MAINTENANCE WORK ONCE EVERY MONTH
Read out long-term data and error memory.

MAINTENANCE WORK ONCE EVERY YEAR
The filters in the doors should be cleaned or replaced if necessary
Check the air circulation (contamination of air grills, foreign matter).
Check the exhaust duct for leaks.
Check the inside of the cabinet for heavy dust deposits, dirt, moisture, and water penetration from outside. If there are thick dust deposits, clean the equipment with a vacuum cleaner.
Check that all cable connections are tight (torque) and free of corrosion. Visually inspect the cable (discolorations, scorches or mechanical defects). Replace damaged cables immediately.
Check the adhesive warning labels and replace them if necessary.
Check all fans for functionality and operating noise.
Functionality test of all protective equipment present by means of manual activation • Line circuit breaker • Power switch • Motor overload switch.
Visually inspect all fuses and disconnectors, and lubricate the contacts if necessary.
Check overvoltage protectors.
Check the 230 V und 24 V control and auxiliary voltages.
Check the covers and function of the locks.
Check the overvoltage protectors for deterioration and replace them if necessary.

10 Spare parts list

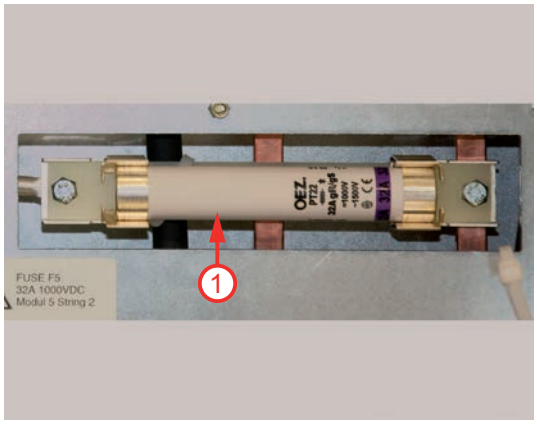
NO.	DESCRIPTION	DESCRIPTION CIRCUIT DIAGRAM	SAP NO. DELTA	RATINGS
1	SOLIVIA 11 EU G3 R (inverter rack 11 kW)	Rack 1…9	EOE47030001	
2	Input terminals	X40-1…4	307343300T	
3	Overvoltage arrestor DC side	F14, F15	0921020571	
4	Backup fuses overvoltage arrestor DC	F10…13	0890291148	50 A / 1500 V
5	Overvoltage arrestor AC side	F20	0921420071	
6	Backup fuses overvoltage arrestor AC	F17…19	0890290847	125 A / 400 V
7	AC/DC power supply	T1	EOE11010001	24 V / 3.5 A
8	AC/DC power supply	T2	EOE14010001	24 V / 20 A
9	Monitoring system (analog)	A3	5040007100	
10	Monitoring system (ISDN)		5040007200	
11	Monitoring system (GPRS)		5040007300	
12	Monitoring system (DSL/Ethernet)		5040007400	
13	DC disconnector	S1	3000741486	8 x 250 A / 1000 V
14	Line-protection breaker SOLIVIA 11 EU G3 R AC side	Q1…9	0830567028	25 A
15	Line-protection breaker SOLIVIA 11 EU G3 R AC side	S3	3000742200	160 A
16	Plug Tyco Multibeam XL	X41…49	3671294400	
17	PWB assembly backplane	A1	5501200005	
18	System controller	A2	5040003500	
19	Overvoltage arrestor	F21	0923300072	
20	Overvoltage arrestor	F22-25	0921400572	
21	Overvoltage arrestor	F26	0921711072	
22	Backup fuse AC 230 V	F30	0805041602	630 mA / 250 V 5 x 20 mm
23	Cabinet key front doors		3460040300	
24	Filter fan Outlet filter PFA 60000		3791218800	
25	Filter mats for PFA 60000		3243185500	
26	Cabinet base 200 mm		3461304600	
27	Blank panels RAL2011 orange		3303048400	

Auxiliary unit complete



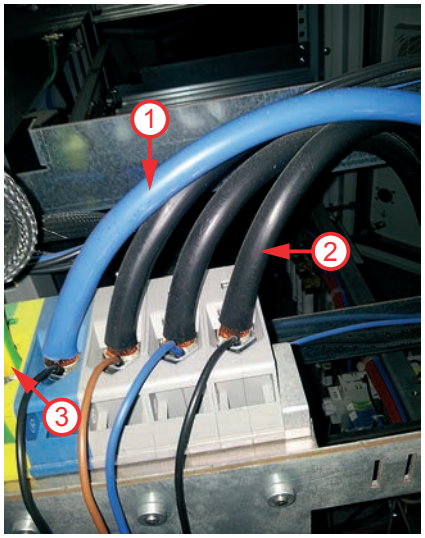
① - Auxiliary unit complete 3791037000

DC Backup fuse



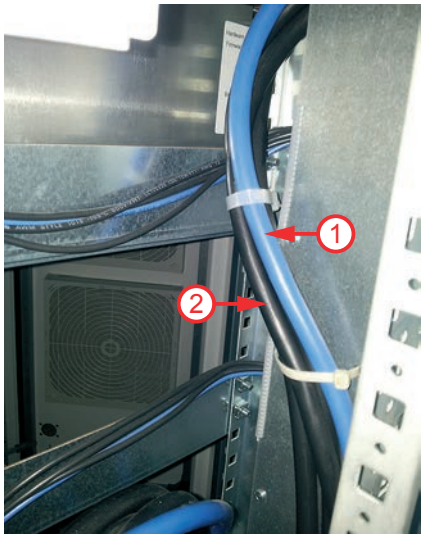
① - DC backup fuse SOLIVIA 11 EU G3 TR
1) OEZ (Order No. 0890291048)
2) SIBA (Order No. 0891040642)
3) FERRAZ (Order No. 0891040637)

AC cables (from AC input terminal to AC main switch)



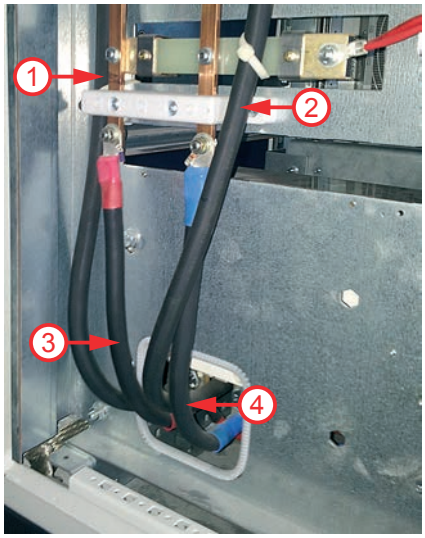
① - AC cable blue 3643832505
② - AC cable black 3643833002 (3x)
③ - AC cable green/yellow 3643832601

AC cables (from AC main switch to AC bus bar)



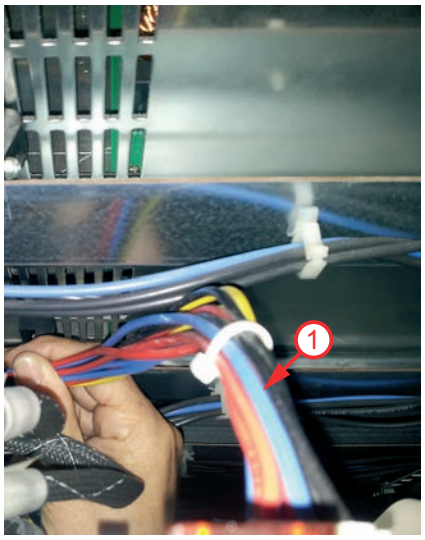
① - AC cable blue 3643832505
② - AC cable black 3643833102 (3x)

DC cables



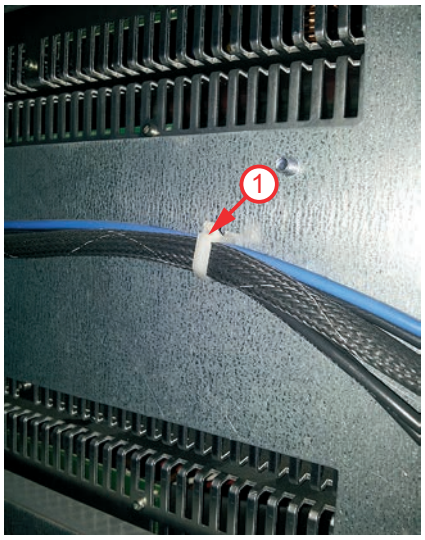
① - DC cable plus (long) 3643831502
② - DC cable minus (long) 3643831202
③ - DC cable plus (short) 3643831102
④ - DC cable minus (short) 3643831602

Cables at swivel frame-BPC



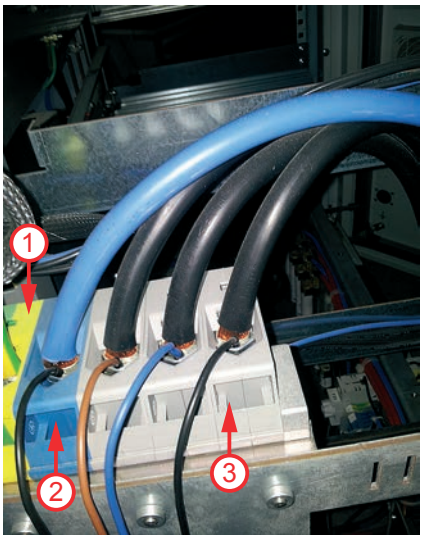
① - 12-wire cable 3671316102
① - 4-wire cable 3671404402

Mounting clips



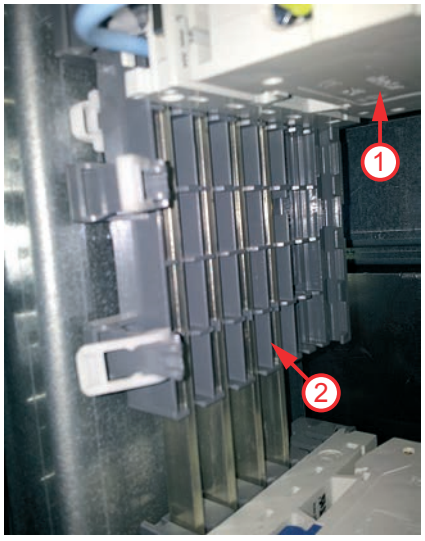
① - Mounting clip 3470335600

Terminal blocks



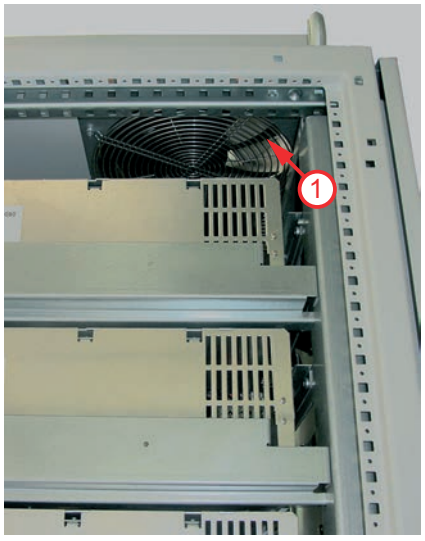
① - Terminal block green/yellow 307341530T
② - Terminal block blue 307341510T
③ - Terminal block grey (3x) 307304090T

AC switch and adapter board



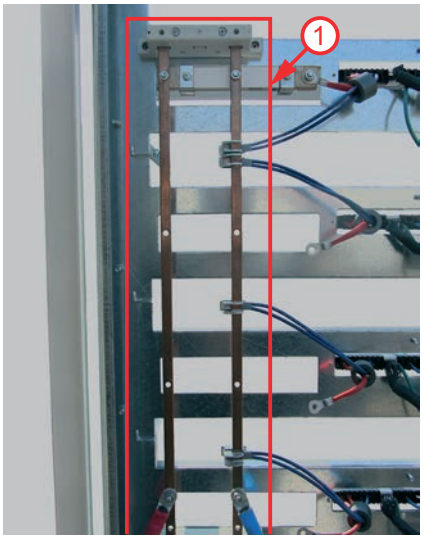
① - AC switch 0830265337
② - Adapter board 307980907

Fan tray



① - Fan tray complete 3791062200

DC rail system



① - DC rail system, complete with 4 mounting brackets

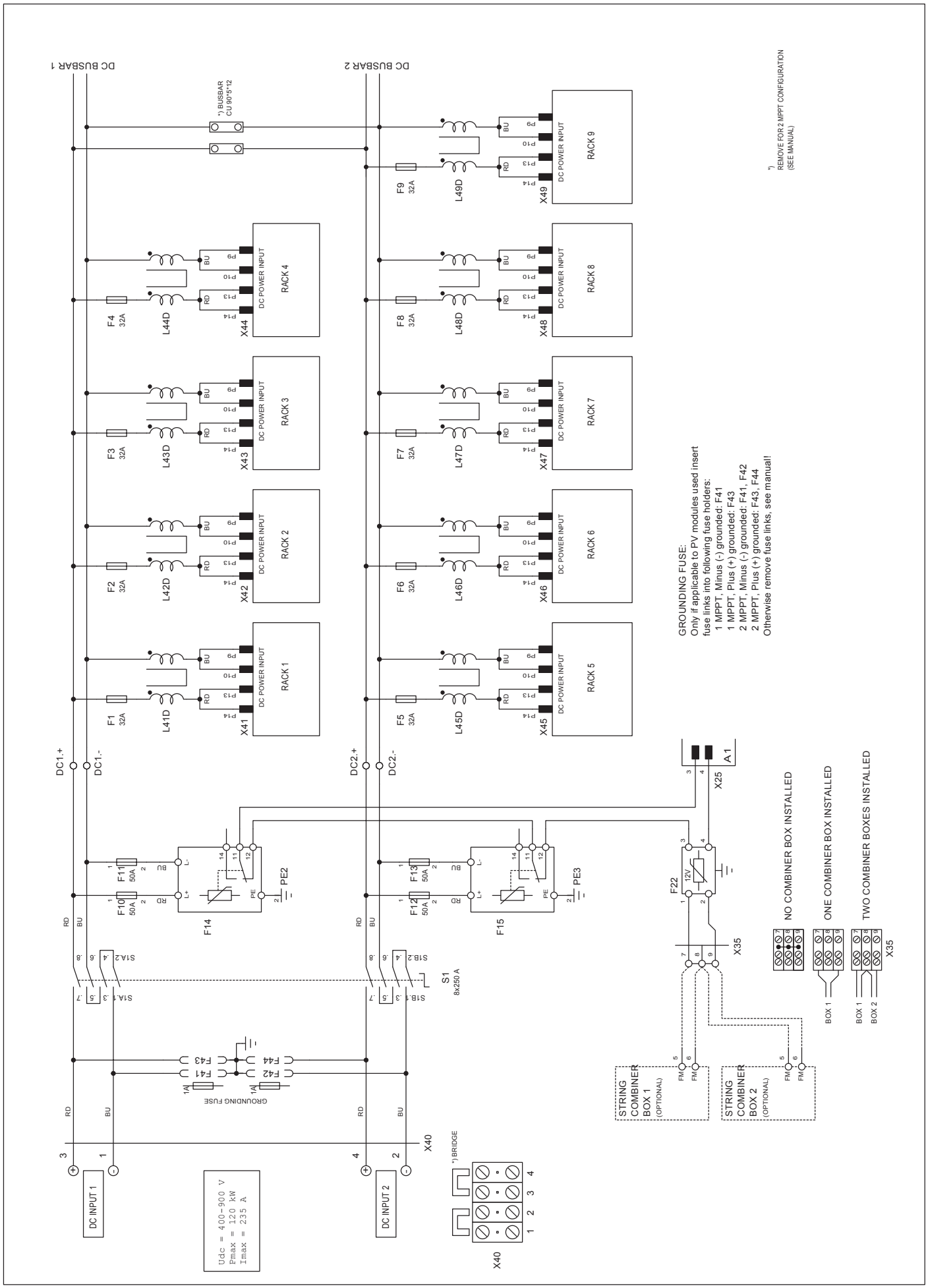


Figure 11-1: Circuit diagram, DC side

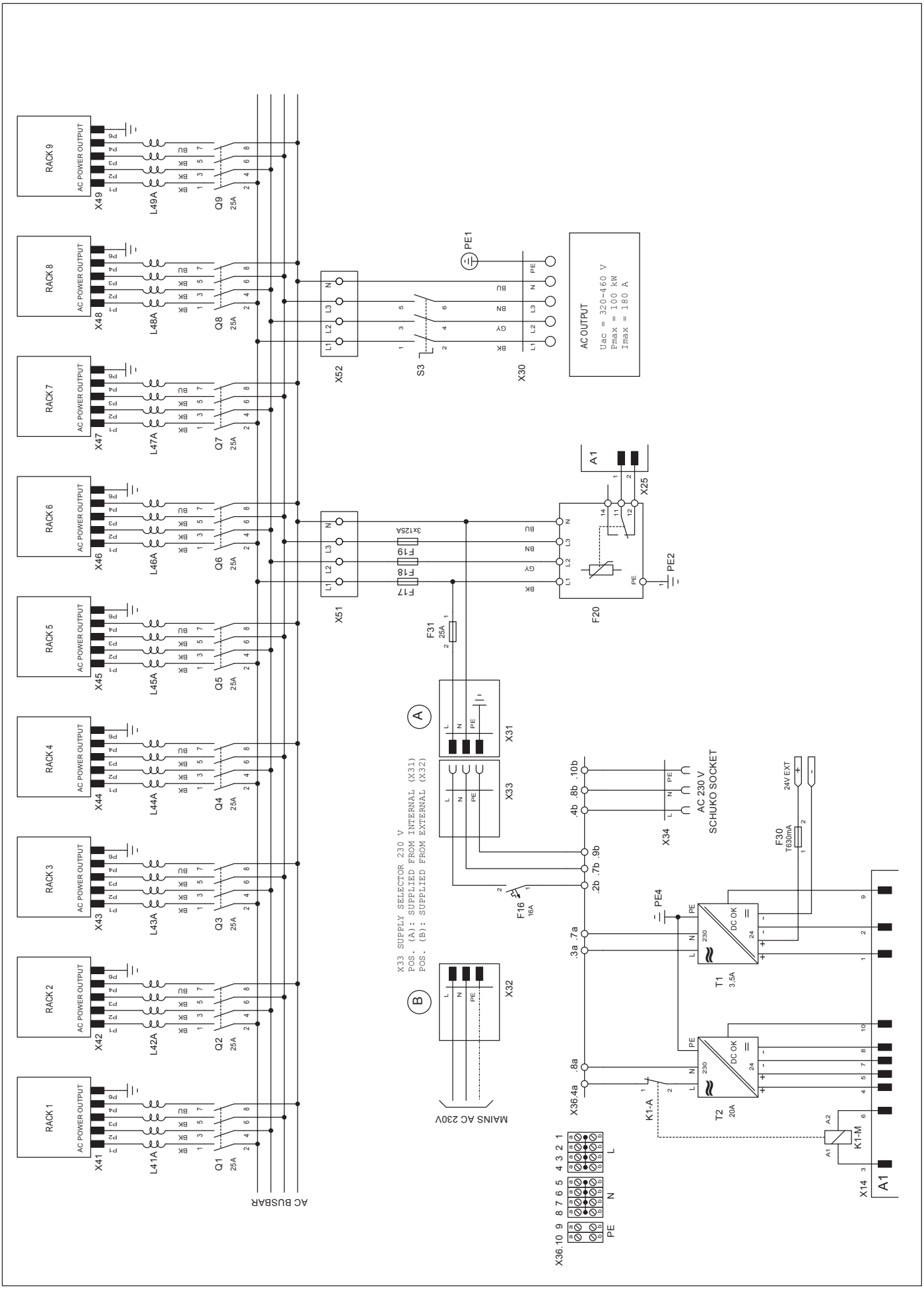


Figure 11-2: Circuit diagram, AC side

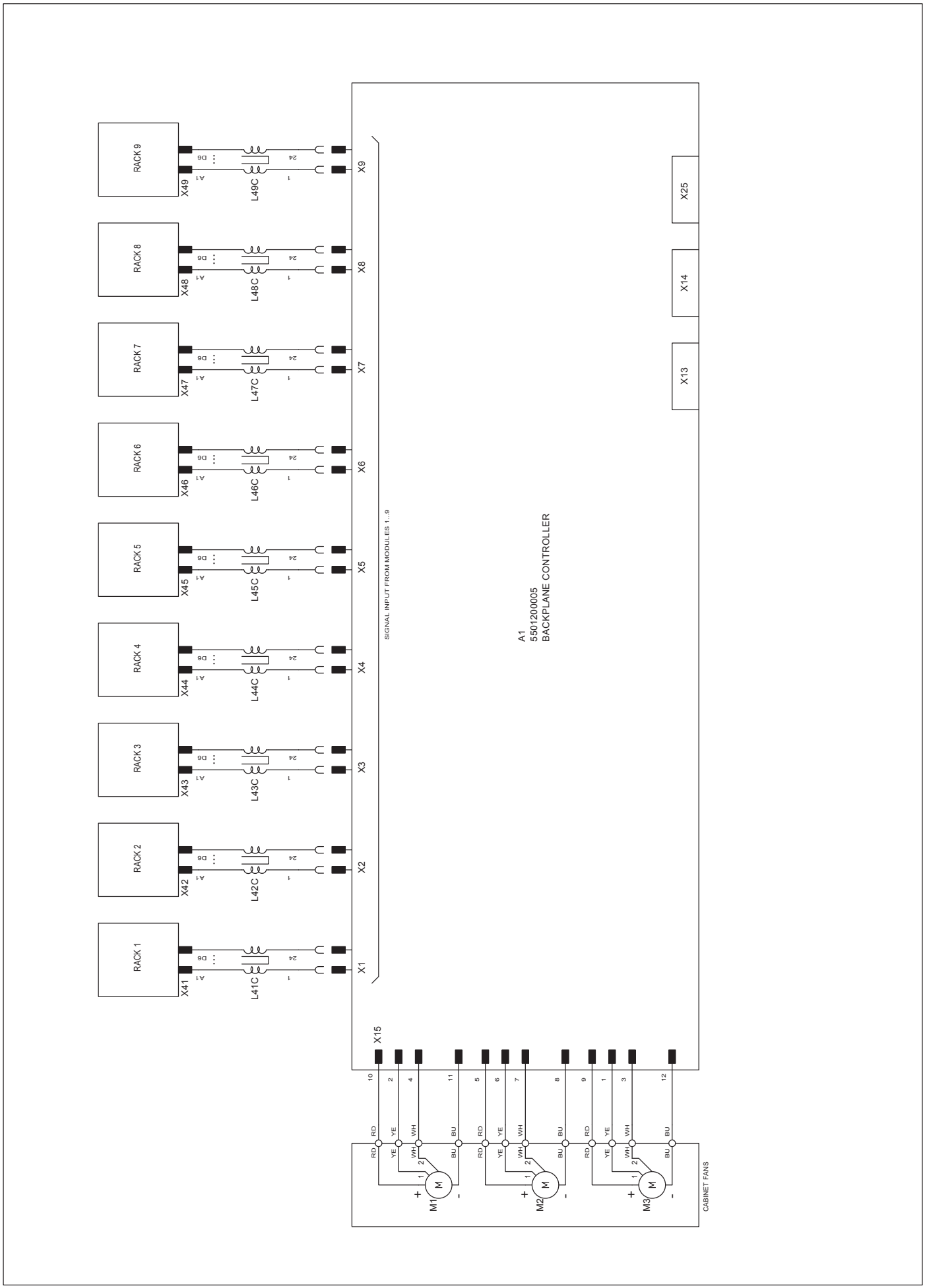


Figure 11-3: Circuit diagram, backplane controller

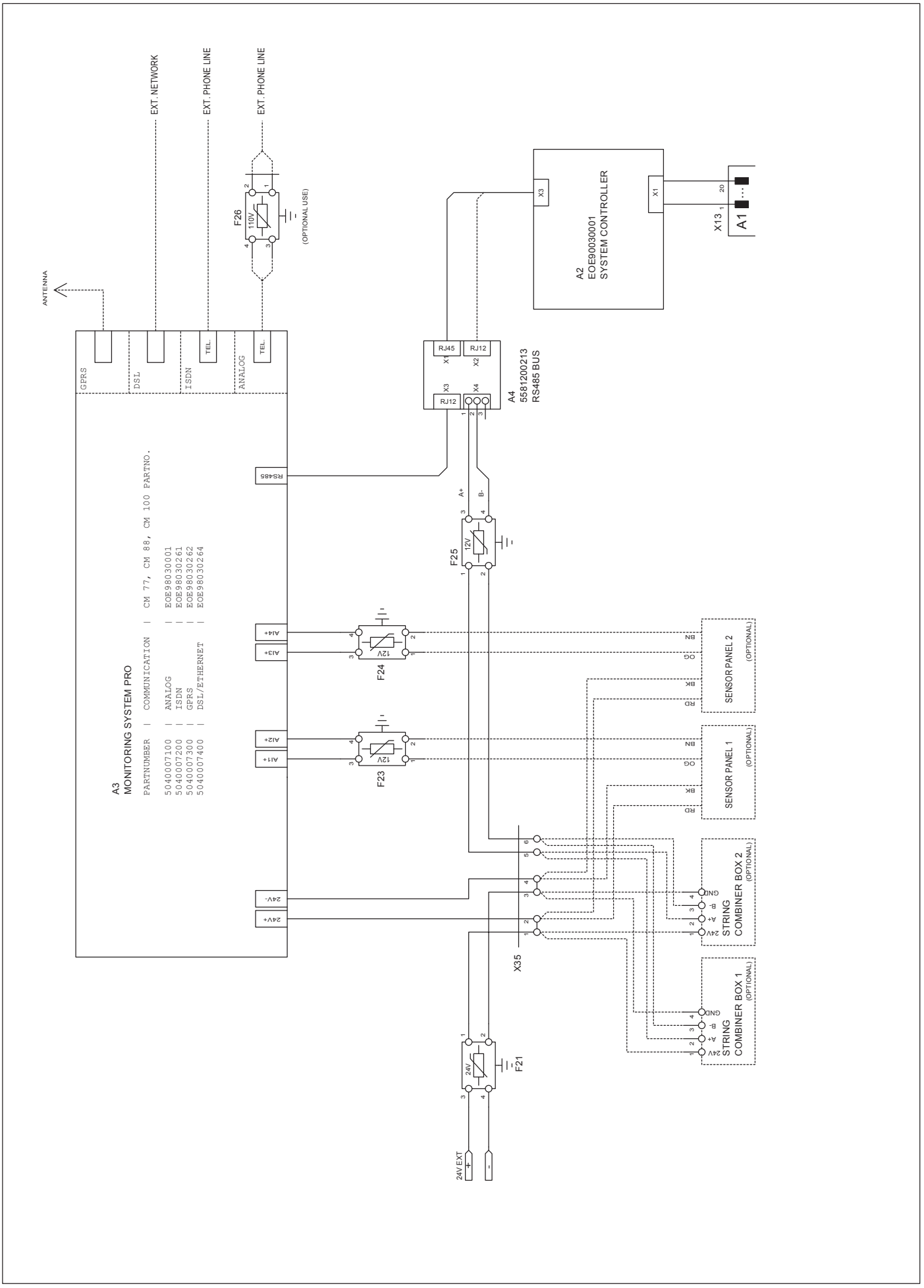


Figure 11-4: Circuit diagram, monitoring system

12 Technical data

INPUT (DC)	CM 77	CM 88	CM 100
Max. recommended PV power	94 kW	106 kW	120 kW
Nominal power	82 kW	93 kW	105 kW
Voltage range	400 ... 900 V		
MPP range	450 ... 800 V		
Full power MPP range	450 ... 800 V		
Max. current	185 A	210 A	235 A
Max. short-circuit current	350 A		
Max. power recovery of DC	1 A		
Power feed-in from	140 W	160 W	180 W
Power transfer starting	> 170 W	> 190 W	> 210 W
Max. no. of MPP trackers [1]	2		

OUTPUT (AC)	CM 77	CM 88	CM 100
Nominal power	77.7 kW (7 x 11 kW)	88.8 kW (8 x 11 kW)	100 kW (9 x 11 kW)
Max. power [2]	77.7 kW (7 x 11 kW)	88.8 kW (8 x 11 kW)	100 kW (9 x 11 kW)
Nominal voltage [3]	3 NPE 400 V / 230 V		
Voltage range [3]	320 ... 460 V		
Nominal current (per phase)	113 A	128 A	145 A
Max. current	140 A	160 A	180 A
Backup fuse	max. 200 A gG		
Max. current when switching on	0 A		
Nominal frequency	50 Hz		
Frequency range [3]	47.5 ... 52.5 Hz		
Stand-by power	25 W		
Leakage current	< 25 mA		
Voltage recording tolerance	< 1 % (after calibration)		
Frequency recording tolerance	< 0.2 %		
DC detection on AC tolerance	< 10 %		
Tripping times tolerance	< 1 %		

STANDARDS / DIRECTIVES	CM 77	CM 88	CM 100
Protection type	IP54		
Protection Class	1		
Configurable trip parameters	Yes		
Insulation monitor	Yes		
Overload behaviour	Current limitation; power limitation		
Safety	EN60950-1; EN50178; IEC 62103; IEC62109-1 / -2		
Anti-islanding protection [4]	DIN VDE 0126-1-1; RD 1663; EN50438; ENEL G.L. 12/2008		
EMC	EN61000-6-2; EN61000-6-3; EN61000-3-11; EN61000-3-12		

MECHANICAL DESIGN	CM 77	CM 88	CM 100
Size (H x W x D)	2000 x 1000 x 600mm (without fan tray / without cabinet base)		
Size (H x W x D)	2215 x 1000 x 600mm (with fan tray / without cabinet base)		
Size (H x W x D)	2411 x 1000 x 600mm (with fan tray / with cabinet base)		
Diagonal height (without cabinet base)	2236 mm		
Diagonal height (with cabinet base)	2416 mm		
Weight (with inverter racks)	510.0 kg	540.0 kg	570.0 kg
Weight (without inverter racks)	301.0 kg		
Weight (net) [5]	210.0 kg		
Cooling	Fan cooling, 3000m³/h		
AC connector	Terminal connection		
DC connector	Terminal connection		
DC disconnector	Integrated		
AC disconnector	Integrated		
Display	5.7” touch-screen		

GENERAL DESCRIPTION	CM 77	CM 88	CM100
Model name	SOLIVIA CM 77 EU G3	SOLIVIA CM 88 EU G3	SOLIVIA CM 100 EU G3
Part number Delta	EOE98030176		
Max. efficiency	95.6 %		
EU efficiency	95.0 %		
Operating temperature range	-10 ... +50 °C		
Storage temperature range	-25 ... +60 °C		
Humidity	0 ... 95 % (non-condensing)		

1) Delivery status: 1 MPP tracker; for 2 MPP trackers see § 6.3.3.2.
2) The maximum AC power value indicates the power an inverter might be able to deliver. However, such a maximum AC power may not necessarily be achieved.
3) AC voltage and frequency range will be programmed according to the individual country requirements.
4) Country-specific regulations:
   - Germany: DIN V VDE 0126-1-1 / Feb. 2006
   - Spain: RD 1663 / 2000 + RD 661/2007
   - Italy: ENEL G.L. 12/2008
   - Greece: DIN V VDE 0126-1-1 / Feb. 2006 with amendments
   - France: DIN V VDE 0126-1-1 / Feb. 2006 with amendments
   - Czech Republic: DIN V VDE 0126-1-1 / Feb. 2006 with amendments
5) Weight without inverter racks, doors, back and rear side panels

13 Certificates

EC Declaration of Conformity

Producer: Delta Energy Systems (Germany) GmbH
Address: Tscheulinstr. 21, D - 79331 Teningen, Germany

Product description: **Solar Inverter for Grid operation**

Model: **SOLIVIA11EUG3R** [1] **SOLIVIACMEUG3** [2]

The product described above in the form as delivered is in conformity with the provisions of the following European Directives:

2004/108/EG Council Directive on the approximation of the laws of the Member States relating to electromagnetic compatibility

Immunity	EN 61000-6-2 : 2005
Emission	EN 61000-6-3 : 2007
Harmonics / Flicker	EN 61000-3-2 : 2006 [1]
	EN 61000-3-3 : 1995 + A1 : 2001 + A2 : 2005 [1]
	EN 61000-3-12 : 2005 + EN 61000-3-11 : 2000 [2]

2006/95/EC Council Directive on the approximation of the laws of the Member States related to electrical equipment designed for use within certain voltage limits

Safety	EN 60950-1 : 2006
	Draft IEC 62109-1 : 2003
	Draft IEC 62109-2 : 2005
	IEC 62103 : 2003
	EN 50178 : 1997

The product described above does also comply with the VDEW/BDEW Publication:
"Richtlinie für Anschluss und Parallelbetrieb von Eigenerzeugungsanlagen am Niederspannungsnetz"

Teningen, April 1st 2010

Klaus Gremmelspacher
R&D – Senior Manager
Name, Function Signature

Dr. Mathias Emsermann
General Manager
Name, Function Signature

This declaration certifies the conformity to the specified directives but contains no assurance of properties. The safety documentation accompanying the product shall be considered in detail.

EG-Konformitätserklärung

Hersteller: Delta Energy Systems (Germany) GmbH
Adresse: Tscheulinstr. 21, D - 79331 Teningen, Germany

Produkt: **Zentralinverter für den Netzbetrieb**

Modell: **SOLIVIA11EUG3R** [1] **SOLIVIACMEUG3** [2]

Das oben beschriebene Produkt ist im gelieferten Zustand konform mit folgenden Richtlinien:

2004/108/EG Richtlinie des Rates zur Angleichung der Rechtsvorschriften der Mitgliedstaaten über die elektromagnetische Verträglichkeit

Störfestigkeit	EN 61000-6-2 : 2005
EMV	EN 61000-6-3 : 2007
Oberschwingungsströme / Flicker	EN 61000-3-2 : 2006 [1]
	EN 61000-3-3 : 1995 + A1 : 2001 + A2 : 2005 [1]
	EN 61000-3-12 : 2005 + EN 61000-3-11 : 2000 [2]

2006/95/EC Richtlinie des Rates zur Angleichung der Rechtsvorschriften der Mitgliedstaaten betreffend elektrische Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen

Sicherheit	EN 60950-1 : 2006
	Draft IEC 62109-1 : 2003
	Draft IEC 62109-2 : 2005
	IEC 62103 : 2003
	EN 50178 : 1997

Das oben beschriebene Produkt entspricht zudem der VDEW/BDEW-Publikation
"Richtlinie für Anschluss und Parallelbetrieb von Eigenerzeugungsanlagen am Niederspannungsnetz"

Teningen, 01. April 2010

Klaus Gremmelspacher
R&D – Senior Manager
Name, Function Signature

Dr. Mathias Emsermann
General Manager
Name, Function Signature

Mit dieser Konformitätserklärung wird die Konformität des Produktes mit den angegebenen Richtlinien bescheinigt, jedoch werden keine Produkteigenschaften zugesichert. Die dem Produkt beiliegende Sicherheitsdokumentation ist sorgfältig zu lesen.

Dichiarazione di conformità CE

Produttore: Delta Energy Systems (Germany) GmbH
Indirizzo: Tscheulinstr. 21, D - 79331 Teningen, Germany

Descrizione del prodotto: **Inverter solare per il funzionamento in rete**

Modello: **SOLIVIA11EUG3R** [1] **SOLIVIACMEUG3** [2]

Il prodotto sopra indicato, così come fornito, è conforme alle seguenti direttive europee:

2004/108/EG Direttiva del Consiglio in materia di ravvicinamento delle legislazioni degli Stati membri relative alla compatibilità elettromagnetica

immunità elettromagnetica	EN 61000-6-2 : 2005
compatibilità elettromagnetica (EMC)	EN 61000-6-3 : 2007
Armoniche / Flicker	EN 61000-3-2 : 2006 [1]
	EN 61000-3-3 : 1995 + A1 : 2001 + A2 : 2005 [1]
	EN 61000-3-12 : 2005 + EN 61000-3-11 : 2000 [2]

2006/95/EC Direttiva del Consiglio in materia di ravvicinamento delle legislazioni degli Stati membri relative al materiale elettrico destinato ad essere utilizzato entro taluni limiti di tensione

Sicurezza	EN 60950-1 : 2006
	Draft IEC 62109-1 : 2003
	Draft IEC 62109-2 : 2005
	IEC 62103 : 2003
	EN 50178 : 1997

Il prodotto sopra indicato, così come fornito, è inoltre conforme a quanto stabilito nella pubblicazione VDEW/BDEW "Direttiva sul collegamento e l'utilizzo degli impianti di produzione dell'energia in parallelo alla rete di bassa tensione".

Teningen, 1 d'aprile 2010

Klaus Gremmelspacher
R&D – Senior Manager
Nome, funzione Firma

Dr. Mathias Emsermann
Direttore Generale
Nome, funzione Firma

La presente dichiarazione certifica la conformità del prodotto alle norme specificate, ma non offre alcuna garanzia in merito alle sue caratteristiche. Si raccomanda di leggere attentamente la documentazione sulla sicurezza in dotazione al prodotto.

Déclaration de conformité CE

Fabricant: Delta Energy Systems (Germany) GmbH
Adresse: Tscheulinstr. 21, D - 79331 Teningen, Germany

Description du produit: **Onduleur solaire couplé au réseau**

Modèle: **SOLIVIA11EUG3R** [1] **SOLIVIACMEUG3** [2]

Le produit mentionné ci-dessus, tel qu'il est livré, est conforme aux dispositions des Directives Européennes suivantes:

2004/108/EG Directive du Conseil concernant le rapprochement des législations des États membres relatives à la compatibilité électromagnétique

Immunité	EN 61000-6-2 : 2005
CEM	EN 61000-6-3 : 2007
Harmoniques / Fliquer	EN 61000-3-2 : 2006 [1]
	EN 61000-3-3 : 1995 + A1 : 2001 + A2 : 2005 [1]
	EN 61000-3-12 : 2005 + EN 61000-3-11 : 2000 [2]

2006/95/EC Directive du Conseil concernant le rapprochement des législations des États membres relatives au matériel électrique destiné à être employé dans certaines limites de tension

Sécurité	EN 60950-1 : 2006
	Draft IEC 62109-1 : 2003
	Draft IEC 62109-2 : 2005
	IEC 62103 : 2003
	EN 50178 : 1997

Le produit mentionné ci-dessus, tel qu'il est livré, est également conforme à la publication du VDEW/BDEW: «Directive pour la connexion et le fonctionnement en parallèle des générateurs autonomes couplés au réseau basse tension».

Teningen, le 1 avril 2010

Klaus Gremmelspacher
R&D – Senior Manager
Nom, fonction Signature

Dr. Mathias Emsermann
Directeur général
Nom, fonction Signature

Cette déclaration certifie la conformité aux directives spécifiées mais ne contient aucune assurance de propriété. La documentation de sécurité jointe au produit doit être étudiée en détail.

Declaración de Conformidad CE

Fabricante: Delta Energy Systems (Germany) GmbH
Dirección: Tscheulinstr. 21, D - 79331 Teningen, Germany

Descripción del producto: **Inversor solar para operación con rejilla**

Modelo: **SOLIVIA11EUG3R** [1] **SOLIVIACMEUG3** [2]

El producto descrito, en la forma en la que se suministra, cumple con las disposiciones de las siguientes Directivas Europeas:

2004/108/EG Directiva del Consejo relativa a la aproximación de las legislaciones de los Estados Miembros sobre la compatibilidad electromagnética

Inmunidad	EN 61000-6-2 : 2005
CEM	EN 61000-6-3 : 2007
Armonías / flicker	EN 61000-3-2 : 2006 [1]
	EN 61000-3-3 : 1995 + A1 : 2001 + A2 : 2005 [1]
	EN 61000-3-12 : 2005 + EN 61000-3-11 : 2000 [2]

2006/95/EC Directiva del Consejo relativa a la aproximación de las legislaciones de los Estados Miembros sobre el material eléctrico destinado a utilizarse con determinados límites de tensión

Seguridad	EN 60950-1 : 2006
	Draft IEC 62109-1 : 2003
	Draft IEC 62109-2 : 2005
	IEC 62103 : 2003
	EN 50178 : 1997

El producto descrito también cumple con la publicación VDEW/BDEW:
"Richtlinie für Anschluss und Parallelbetrieb von Eigenerzeugungsanlagen am Niederspannungsnetz" (Directiva para la conexión y la operación en paralelo de instalaciones generadoras de energía en la red de bajo voltaje)

Teningen, 1 de abril 2010

Klaus Gremmelspacher
R&D – Senior Manager .....
Nombre, función Firma

Dr. Mathias Emsermann
Director general .....
Nombre, función Firma

Esta declaración certifica la conformidad con las directivas especificadas pero no contiene ningún aseguramiento de características. Se deberá observar detalladamente la documentación de seguridad que acompaña al producto.

ES – Prohlášení o shodě

Výrobce: Delta Energy Systems (Germany) GmbH
Adresa: Tscheulinstr. 21, D - 79331 Teningen, Germany

Výrobek: **Centrální invertor pro napájení ze sítě**

Model: **SOLIVIA11EUG3R** [1] **SOLIVIACMEUG3** [2]

Výše uvedený výrobek je v dodaném stavu shodný s následujícími směrnicemi:

2004/108/ES Směrnice Rady k úpravě právních předpisů členských států o elektromagnetické kompatibilitě

Odolnost proti rušení	EN 61000-6-2 : 2005
Elektromagnetická kompatibilita	EN 61000-6-3 : 2007
Horní kmitavé proudy/kolísání napětí	EN 61000-3-2 : 2006 [1]
	EN 61000-3-3 : 1995 + A1 : 2001 + A2 : 2005 [1]
	EN 61000-3-12 : 2005 + EN 61000-3-11 : 2000 [2]

2006/95/ES Směrnice Rady k úpravě právních předpisů členských států ve vztahu k elektrickým provozním prostředkům k použití v rámci určitých hranic napětí

Bezpečnost	EN 60950-1 : 2006
	Draft IEC 62109-1 : 2003
	Draft IEC 62109-2 : 2005
	IEC 62103 : 2003
	EN 50178 : 1997

Výše uvedený výrobek odpovídá kromě toho také publikaci VDEW/BDEW „Směrnice k připojení a paralelnímu provozu vlastních generujících zařízení na síti nízkého napětí".

Teningen, 1. dubna 2010

Klaus Gremmelspacher
R&D – senior manager .....
jméno, funkce podpis

Dr. Mathias Emsermann
generální manager .....
jméno, funkce podpis

Tímto prohlášením o shodě je potvrzena shoda výrobku s uvedenými směrnicemi, nejsou však zaručeny žádné vlastnosti výrobku. Přečtěte si důkladně bezpečnostní dokumentaci, která je přiložena k výrobku.

ES – Prehlásenie o zhode

Výrobca: Delta Energy Systems (Germany) GmbH
Adresa: Tscheulinstr. 21, 79331 Teningen, Germany

Výrobok: **Centrálny invertor pre napájanie zo siete**

Model: **SOLIVIA11EUG3R** [1] **SOLIVIACMEUG3** [2]

Hore opísaný výrobok je v dodanom stave zhodný s nasledujúcimi smernicami:

2004/108/ES Smernica Rady na úpravu právnych predpisov členských štátov o elektromagnetickej znášanlivosti

Odolnosť proti rušeniu	EN 61000-6-2 : 2005
Elektromagnetická znášanlivosť	EN 61000-6-3 : 2007
Horné kmitavé prúdy/kolísanie napätia	EN 61000-3-2 : 2006 [1]
	EN 61000-3-3 : 1995 + A1 : 2001 + A2 : 2005 [1]
	EN 61000-3-12 : 2005 + EN 61000-3-11 : 2000 [2]

2006/95/ES Smernica Rady na úpravu právnych predpisov členských štátov vo vzťahu k elektrickým prevádzkovým prostriedkom na používanie v rámci určitých hraníc napätia

Bezpečnosť	EN 60950-1 : 2006
	Draft IEC 62109-1 : 2003
	Draft IEC 62109-2 : 2005
	IEC 62103 : 2003
	EN 50178 : 1997

Hore opísaný výrobok zodpovedá popri tom aj publikácii VDEW/BDEW „Smernica pre pripojenie a paralelnú prevádzku vlastných generovacích zariadení na sieti nízkeho napätia".

Teningen 1. apríla 2010

Klaus Gremmelspacher
R&D – senior manažér .....
meno, funkcia podpis

Dr. Mathias Emsermann
generálny manažér .....
meno, funkcia podpis

Týmto prehlásením o zhode sa potvrdzuje zhoda výrobku s uvedenými smernicami, ale nezaručujú sa žiadne vlastnosti výrobku. Dôkladne si prečítajte bezpečnostnú dokumentáciu, ktorá je priložená k výrobku.

Bureau Veritas Consumer Product Services GmbH
Businesspark A96
86842 Türkheim
Germany
+ 49 (0) 8245 96810-0
cps-tuerkheim@de.bureauveritas.com

Certificate of compliance

Applicant: **Delta Energy Systems (Germany) GmbH**
Tscheulinstr. 21
79331 Teningen
Germany

Product: **Automatic disconnection device between a generator and the public low-voltage grid**

Model: **SOLIVIACMEUG3**

Use in accordance with regulations:

Automatic disconnection device with three-phase mains surveillance in accordance with DIN V VDE V 0126-1-1:2006-02 for photovoltaic systems with a three-phase parallel coupling via an inverter in the public mains supply. The automatic disconnection device is an integral part of the aforementioned inverter. This serves as a replacement for the disconnection device with insulating function which the distribution network provider can access at any time.

Applied rules and standards:

DIN V VDE V 0126-1-1 (VDE V 0126-1-1):2006-02 and „Generator at the public low-voltage grid, 4th edition 2001, guideline for connection and parallel operation of generators in the public low-voltage grid" with VDN additions (2005) from the German Electricity Association (VDEW) and Association of network operator (VDN).

The safety concept of an aforementioned representative product corresponds at the time of issue of this certificate to the valid safety specifications for the specified use in accordance with regulations.

Report number: **08TH0195-VDE0126**
Certificate nummer: **U10-214**
Date of issue: **2010-05-05** **Valid until:** **2012-03-10**

Achim Hänchen

Bureau Veritas Consumer Product Services GmbH
Businesspark A96
86842 Türkheim
Deutschland
+ 49 (0) 8245 96810-0
cps-tuerkheim@de.bureauveritas.com

Unbedenklichkeitsbescheinigung

Antragsteller: **Delta Energy Systems (Germany) GmbH**
Tscheulinstr. 21
79331 Teningen
Deutschland

Erzeugnis: **Selbsttätige Schaltstelle zwischen einer netzparallelen Eigenerzeugungsanlage und dem öffentlichen Niederspannungsnetz**

Modell: **SOLIVIACMEUG3**

Bestimmungsgemäße Verwendung:

Selbsttätige Schaltstelle mit dreiphasiger Netzüberwachung gemäß DIN V VDE V 0126-1-1:2006-02 für Photovoltaikanlagen mit einer dreiphasigen Paralleleinspeisung über Wechselrichter in das Netz der öffentlichen Versorgung. Die selbsttätige Schaltstelle ist integraler Bestandteil des oben angeführten Wechselrichters mit Trenntrafo. Diese dient als Ersatz für eine jederzeit dem Verteilungsnetzbetreiber (VNB) zugängliche Schaltstelle mit Trennfunktion.

Prüfgrundlagen:

DIN V VDE V 0126-1-1 (VDE V 0126-1-1):2006-02 und „Eigenerzeugungsanlagen am Niederspannungsnetz, 4. Ausgabe 2001, Richtlinie für Anschluss und Parallelbetrieb von Eigenerzeugungsanlagen am Niederspannungsnetz" mit VDN Ergänzungen, Stand 2005 vom Verband der Elektrizitätswirtschaft (VDEW) und vom Verband der Netzbetreiber (VDN).

Ein repräsentatives Testmuster der oben genannten Erzeugnisses entspricht den zum Zeitpunkt der Ausstellung dieser Bescheinigung geltenden sicherheitstechnischen Anforderungen der aufgeführten Prüfgrundlagen für die bestimmungsgemäße Verwendung.

Bericht Nummer: **08TH0195-VDE0126**
Zertifikat Nummer: **U10-213**
Datum: **2010-05-05** **Gültig bis:** **2012-03-10**

Achim Hänchen

Bureau Veritas Consumer Product Services GmbH
Businesspark A96
86842 Türkheim
Germania
+ 49 (0) 8245 96810-0
cps-tuerkheim@de.bureauveritas.com

Dichiarazione di conformità

NOME ORGANISMO CERTIFICATORE: **Bureau Veritas Consumer Product Services GmbH**
ACCREDITAMENTO n° ZLS II6/G3933-1/8/09
Rif. DIN EN 45011
Data validità: 30-Giugno-2013

OGGETTO: **GUIDA PER LE CONNESSIONI ALLA RETE ELETTRICA DI ENEL DISTRIBUZIONE, Ed. I, dicembre 2008**
REGOLE TECNICHE DI CONNESSIONE DI CLIENTI PRODUTTORI ALLE RETI ENEL IN BASSA TENSIONE

TIPOLOGIA APPARATO A CUI SI RIFERISCE LA DICHIARAZIONE:			
DISPOSITIVO DI INTERFACCIA	PROTEZIONE DI INTERFACCIA	DISPOSITIVO DI CONVERSIONE STATICA	DISPOSITIVO DI GENERAZIONE ROTANTE
		X	

COSTRUTTORE: **Delta Energy Systems (Germany) GmbH**
Tscheulinstr. 21
79331 Teningen
Germania

MODELLO:	SOLIVIACMEUG3-11	SOLIVIACMEUG3-22	SOLIVIACMEUG3-33
POTENZA NOMINALE:	11kW	22kW	33kW

MODELLO:	SOLIVIACMEUG3-44	SOLIVIACMEUG3-55	SOLIVIACMEUG3-66
POTENZA NOMINALE:	44kW	55kW	66kW

MODELLO:	SOLIVIACMEUG3-77	SOLIVIACMEUG3-88	SOLIVIACMEUG3
POTENZA NOMINALE:	77kW	88kW	100kW

VERSIONE FIRMWARE: **IT SysControl V0.2.0**

NUMERO DI FASI: **trifase**

RIFERIMENTO: Il dispositivo non e equipaggiato con trasformatore di isolamento a bassa frequenza.
Il dispositivo necessita di essere abbinato ad un trasformatore di isolamento esterno.

RIFERIMENTI DEI LABORATORI CHE HANNO ESEGUITO LE PROVE:

Bureau Veritas Consumer Product Services GmbH
ACCREDITAMENTO n° ZLS II6/G3933-1/7/09
Rif. DIN EN ISO/IEC 17025
Data validità: 30-Giugno-2013

Esaminati i Fascicoli Prove n°08TH0195-SOLIVIACMEUG3-DK5940, emessi dal laboratorio Bureau Veritas Consumer Product Services GmbH

Si dichiara che il prodotto indicato è conforme alle prescrizioni ENEL

Numero di certificato: **U10-479**
Data di emissione: **2010-11-12**

Achim Hänchen
FIRMA RESPONSABILE

Bureau Veritas Consumer Product Services GmbH
Businesspark A96
86842 Türkheim
Allemagne
+ 49 (0) 8245 96810-0
cps-tuerkheim@de.bureauveritas.com

Certificat de conformité

Demandeur: **Delta Energy Systems (Germany) GmbH**
Tscheulinstr. 21
79331 Teningen
Allemagne

Produit: **Dispositif de déconnexion automatique entre un générateur et le réseau public à basse tension**

Modèle: **SOLIVIACMEUG3**

À utiliser conformément aux réglementations:

Dispositif de coupure automatique avec une surveillance du réseau triphasé, conformément à DIN V VDE V 0126-1-1:2006-02 (déviation: Limite de fréquence supérieure 51Hz), pour des systèmes photovoltaïques avec un couplage parallèle triphasé, via un convertisseur dans l'alimentation électrique publique. Le dispositif de coupure automatique fait partie intégrante de ce convertisseur. Il remplace l'appareil de déconnexion avec une fonction isolante, auquel le fournisseur du réseau de distribution peut accéder à tout moment.

Réglementations et normes appliquées:

DIN V VDE V 0126-1-1:2006-02 et «générateur au réseau électrique basse tension public, quatrième édition 2001, le guide de connexion et d'utilisation parallèle des générateurs dans le réseau électrique basse tension » avec les additions de VDN (2005), provenant de l'Association allemande du service public de l'énergie «VDEW» et l'Association d'opérateur d'un réseau «VDN».

Un échantillon représentatif des produits mentionnés ci-dessous correspond avec exigences de sécurité technique en vigueur à la date d'émission de ce certificat pour l'usage spécifié et conformément avec réglementation.

Numéro de rapport: **08TH0195-VDE0126_FR**
Numéro de certificat: **U10-215**
Délivré le: **2010-05-05** **Valide jusqu'au :** **2012-03-10**

Achim Hänchen

Bureau Veritas Consumer Product Services GmbH
Businesspark A96
86842 Türkheim
Alemania
+ 49 (0) 8245 96810-0
cps-tuerkheim@de.bureauveritas.com

Solicitante: **Delta Energy Systems (Germany) GmbH**
Tscheulinstr. 21
79331 Teningen
Alemania

Producto: **Inversor fotovoltaico**

Modelo: **SOLIVIACMEUG3**

Certificado de conformidad

Que los inversores de conexión a la red citados en este documento cumplen con la normativa española sobre conexión de instalaciones fotovoltaicas a la red de baja tensión.

El inversor dispone de separación galvánica entre la red de distribución y la instalación fotovoltaica.

El tiempo de reconexión de los inversores es de al menos 3 minutos conforme a la norma IEC 61727:2001 una vez que los parámetros de la red vuelven a estar dentro de los márgenes permitidos.
Las funciones de protección para la interconexión de máxima y mínima frecuencia conforme al Real Decreto 661/2007 (51 y 48Hz, respectivamente) y de máxima y mínima tensión (1,1 y 0,85 U_m, respectivamente) están integradas en el equipo inversor, existiendo imposibilidad de modificar los valores de ajuste de las protecciones por el usuario mediante software.
Los equipos disponen de protección frente a funcionamiento en isla.

Bases de certificación:

RD 1663/2000, RD 661/2007

El concepto de seguridad de un producto representativo ya mencionado, corresponde en el momento de la emisión de este certificado de especificaciones válidas de seguridad para el empleo especificado conforme a reglamentaciones.

Número de informe: **08TH0195-RD1663**
Número de certificado: **U10-221**
Fecha: **2010-05-05** **Valedero hasta:** **2012-03-02**

Achim Hänchen

Bureau Veritas Consumer Product Services GmbH
Businesspark A96
86842 Türkheim
Duitsland
+ 49 (0) 8245 96810-0
cps-tuerkheim@de.bureauveritas.com

Potvrzení o nezávadnosti

Žadatel: **Delta Energy Systems (Germany) GmbH**
Tscheulinstr. 21
79331 Teningen
Německo

Výrobek: **Samostatná spínací stanice mezi síťově paralelním vlastním výrobním zařízením a veřejnou sítí nízkého napětí.**

Model: **SOLIVIACMEUG3**

Používaní podle určení:

Samostatná spínací stanice s třífázovou kontrolou sítě dle DIN V VDE V 0126-1-1:2006-02 (s ČR odchylkami podle EN 50438:2007, Annex A*) pro fotovoltaická zařízení s třífázovým paralelním napájením pomocí měniče do sítě veřejného napájení. Samostatná spínací stanice je integrační součástí výše uvedených měničů s oddělovacím transformátorem. Tato slouží jako náhrada za spínací stanici s dělicí funkcí, která je kdykoli přístupná provozovateli rozvodné sítě (VNB).
** 85%<V<115%*
49,5Hz<f<50,5Hz

Zkušební podklady:

DIN V VDE V 0126-1-1 (VDE V 0126-1-1):2006-02, EN 50438:2007 a „Vlastní výrobní zařízení u sítě nízkého napětí, 4. vydání 2001, směrnice pro připojení a paralelní provoz vlastních výrobních zařízení u sítě nízkého napětí" s doplňky VDN, stav 2005, od elektrárenského svazu (VDEW) a od svazu provozovatelů sítě (VDN).

Reprezentativní zkušební vzorek výše jmenovaného výrobku odpovídá bezpečnostně technickým požadavkům platným v okamžiku vydání tohoto certifikátu, uvedených zkušebních podkladů pro používání podle určení.

Číslo zprávy: **08TH0195-VDE0126_CZ**
Číslo certifikátu: **U10-217**
Datum: **2010-05-05** **Platnost do:** **2012-11-26**

Andreas Aufmuth

Bureau Veritas Consumer Product Services GmbH
Businesspark A96
86842 Türkheim
Germany
+ 49 (0) 8245 96810-0
cps-tuerkheim@de.bureauveritas.com

Certifikát o zhode

Žiadateľ: **Delta Energy Systems (Germany) GmbH**
Tscheulinstr. 21
79331 Teningen
Nemecko

Produkt: **Zariadenie na automatické odpojenie medzi generátorom a verejnou elektrickou sieťou s nízkym napätím**

Model: **SOLIVIACMEUG3**

Použitie v súlade s predpismi:

Zariadenie na automatické odpojenie s dohľadom nad trojfázovým napájaním v súlade s normou DIN V VDE V 0126-1-1:2006-02 pre fotonapäťové systémy s trojfázovým paralelným spojením prostredníctvom prevodníka v rámci napájania z verejnej elektrickej siete. Zariadenie na automatické odpojenie je neoddeliteľnou súčasťou uvedeného prevodníka.

Použité pravidlá a štandardy:

Norma DIN V VDE V 0126-1-1 (VDE V 0126-1-1):2006-02 a predpis „Generator at the public low-voltage grid, 4th edition 2001, guideline for connection and parallel operation of generators in the public low-voltage grid" (Generátor vo verejnej elektrickej sieti s nízkym napätím, 4. vydanie, 2001, predpis na pripojenie a paralelnú prevádzku generátorov vo verejnej elektrickej sieti s nízkym napätím) s dodatkami asociácie VDN (2005) od nemeckej asociácie pre elektrinu (VDEW) asociácie sieťových operátorov (VDN).

Koncepcia bezpečnosti uvedeného reprezentatívneho produktu zodpovedá v čase vystavenia tohto certifikátu platným bezpečnostným požiadavkám na určený spôsob použitia v súlade s predpismi.

Číslo správy: **08TH0195-VDE0126**
Číslo certifikátu: **U10-220**
Dátum vystavenia: **2010-05-05** **Platnosť do:** **2012-03-10**

Achim Hänchen

Bureau Veritas Consumer Product Services GmbH
Businesspark A96
86842 Türkheim
Germany
+ 49 (0) 8245 96810-0
cps-tuerkheim@de.bureauveritas.com

Πιστοποιητικό ελλείψεως κωλυμάτων

Εντολοδότης: **Delta Energy Systems (Germany) GmbH**
Tscheulinstr. 21
79331 Teningen
Γερμανία

Παραγόμενο προϊόν: **Ανεξάρτητη διεπαφή μεταξύ μιας δικτυακά παράλληλης αυτοτροφοδοτούμενης εγκατάστασης και του δημόσιου δικτύου χαμηλής τάσης**

Μοντέλο: **SOLIVIACMEUG3**

Προβλεπόμενη χρήση:

Ανεξάρτητη διεπαφή με τριφασική επιτήρηση δικτύου σύμφωνα με το DIN V VDE V 0126-1-1:2006-02* για φωτοβολταϊκές εγκαταστάσεις με τριφασική παράλληλη τροφοδοσία μέσω αναστροφέα στο δίκτυο της δημόσιας παροχής. Η ανεξάρτητη διεπαφή είναι απαραίτητο εξάρτημα για τον προαναφερθέντα αναστροφέα. Λειτουργεί εφεδρικά για την περίπτωση διεπαφής ανοιχτής στην εταιρεία διανομής δικτύου (εταιρεία ηλεκτρισμού) με λειτουργία απόζευξης.
** with a de-injection <0,5% of $I_{AC,nom}$*
49,5Hz<f<50,5Hz (Continent)
47,5Hz<f<51Hz (Island)
Disconnection time <500ms
Reconneciton time >180s

Βασικά στοιχεία ελέγχου:

DIN V VDE V 0126-1-1:2006-02 και „Οδηγία για σύνδεση και παράλληλη λειτουργία από αυτοτροφοδοτούμενη εγκατάσταση σε δίκτυο χαμηλής τάσης" της „Ένωσης ηλεκτρολογικών έργων Γερμανίας- VDEW-".

Η έννοια της ασφάλειας ενός προαναφερθέντος αντιπροσωπευτικού προϊόντος αντιστοιχεί στις προδιαγραφές που ισχύουν τη στιγμή έκδοσης αυτού του πιστοποιητικού έγκυρων προδιαγραφών ασφαλείας για τη συγκεκριμένη χρήση σύμφωνα με τους κανονισμούς.

Αριθμός αναφοράς: **08TH0195-VDE0126_GR**
Αριθμός ιστοποίησης: **U10-216**
Ημερομηνία: **2010-05-05** **Ισχύει μέχρι:** **2012-03-02**

Achim Hänchen

Bureau Veritas Consumer Product Services GmbH
Businesspark A96
86842 Türkheim
Duitsland
+ 49 (0) 8245 96810-0
cps-tuerkheim@de.bureauveritas.com

Verklaring van geen bezwaar

Aanvrager: **Delta Energy Systems (Germany) GmbH**
Tscheulinstr. 21
79331 Teningen
Duitsland

Product: **Automatisch schakelstation tussen een netparallelle zelfopwekinstallatie en het openbare laagspanningsnet**

Model: **SOLIVIACMEUG3**

Reglementair voorgeschreven gebruik:

Automatisch schakelstation met driefasige netwerkbewaking conform DIN V VDE V 0126-1-1:2006-02 (afwijkende grenswaarden voor België op basis van EN 50438:2007, Annex A*) voor fotovoltaïsche installaties met een driefasige parallelvoeding door middel van gelijkstroom-wisselstroommutator in het net van de openbare voorziening. Het automatische schakelstation vormt een integraal bestanddeel van hoger vermelde gelijkstroom-wisselstroommutator met scheidingstransformator. Deze dient als vervangmiddel voor een te allen tijde voor de distributienetexploitant ("VNB") toegankelijk schakelstation met scheidingsfunctie.
**85%<V<106%*
49,7Hz<f<50,3Hz

Controlebasis:

DIN V VDE V 0126-1-1 (VDE V 0126-1-1):2006-02, EN 50438:2007 en „Zelfopwekinstallaties aan het laagspanningsnet, 4de uitgave 2001, richtlijn voor aansluiting en parallelle verwerking van zelfopwekinstallaties aan het laagspanningsnet" met VDN supplementen, stand 2005 van de „Verband der Elektrizitätswirtschaft" (VDEW) en van de „Verband der Netzbetreiber" (VDN).

Een representatief testpatroon van het hoger vermelde product voldoet aan de op het moment van de uitreiking van dit attest geldende veiligheidstechnische eisen van de vermelde controlegrondbeginselen voor een reglementair voorgeschreven gebruik.

Rapportnummer: **08TH0195-VDE0126_BE**
Certificaatnummer: **U10-219**
Datum: **2010-05-05** **Geldig tot:** **2012-11-27**

Achim Hänchen

Bureau Veritas Consumer Product Services GmbH
Businesspark A96
86842 Türkheim
Allemagne
+ 49 (0) 8245 96810-0
cps-tuerkheim@de.bureauveritas.com

Certificat de conformité

Demandeur: **Delta Energy Systems (Germany) GmbH**
Tscheulinstr. 21
79331 Teningen
Allemagne

Produit: **Dispositif de déconnexion automatique entre un générateur et le réseau public à basse tension**

Modèle: **SOLIVIACMEUG3**

À utiliser conformément aux réglementations:

Dispositif de coupure automatique avec une surveillance du réseau triphasé, conformément à DIN V VDE V 0126-1-1:2006-02 (déviation Belgique conforme EN 50438 :2007, appendice A*), pour des systèmes photovoltaïques avec un couplage parallèle triphasé, via un convertisseur dans l'alimentation électrique publique. Le dispositif de coupure automatique fait partie intégrante de ce convertisseur. Il remplace le appareil de déconnexion avec une fonction isolante, auquel le fournisseur du réseau de distribution peut accéder à tout moment.
**85%<V<106%*
49,7Hz<f<50,3Hz

Réglementations et normes appliquées:

DIN V VDE V 0126-1-1:2006-02 et «générateur au réseau électrique basse tension public, quatrième édition 2001, le guide de connexion et d'utilisation parallèle des générateurs dans le réseau électrique basse tension » avec les additions de VDN (2005), provenant de l'Association allemande du service public de l'énergie «VDEW» et l'Association d'opérateur d'un réseau «VDN».

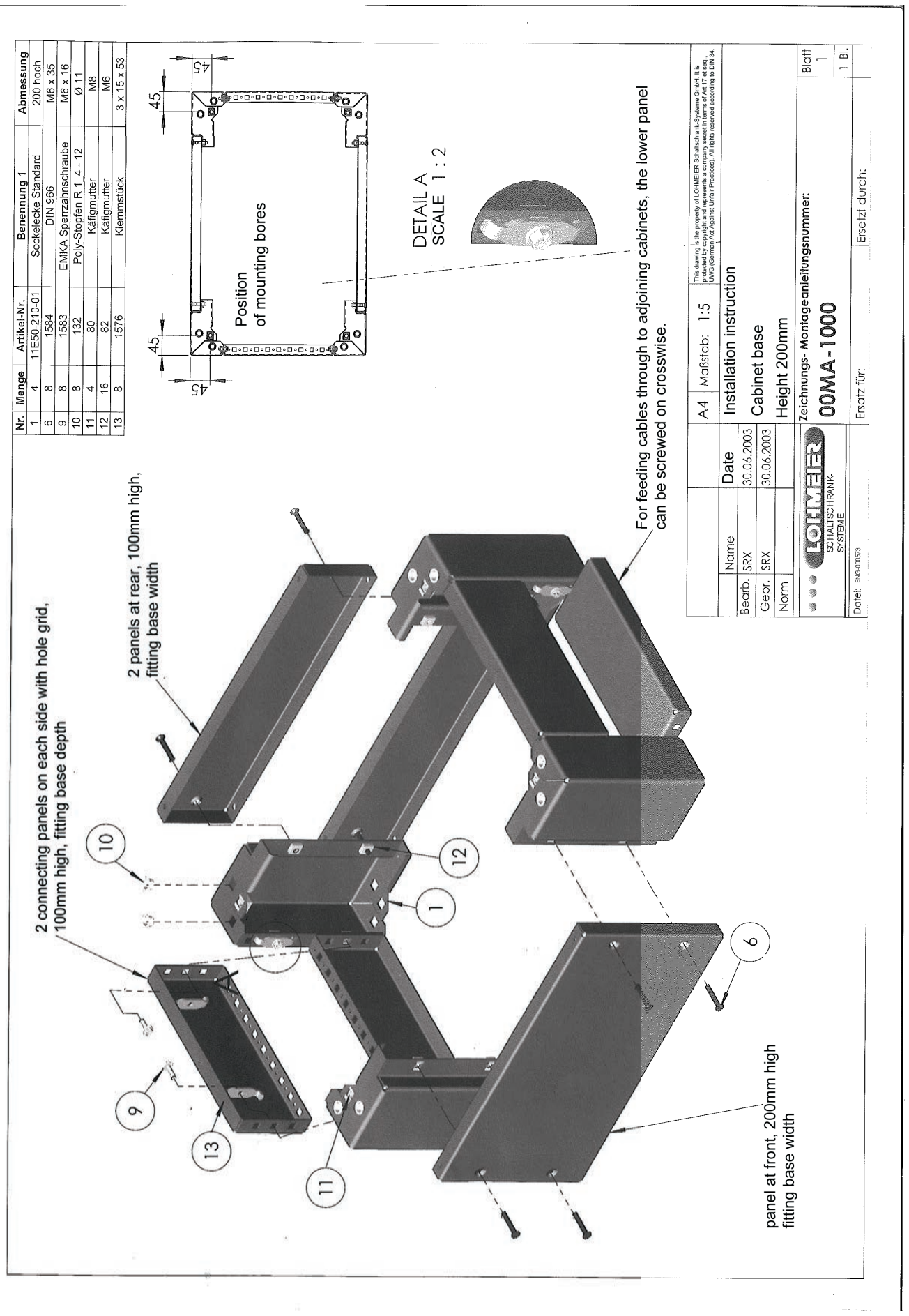
Un echantillon représentatif des produits mentionnés ci-dessus correspond à la date de la delivrance de ce certificat en vigueur des exigences de sécurité technique et pour l´utilisation conformément à sa destination.

Numéro de rapport: **08TH0195-VDE0126_BE**
Numéro de certificat: **U10-218**
Délivré le: **2010-05-05** **Valide jusque le:** **2012-11-27**

Achim Hänchen

14 Appendix

14.1 Installation instructions for the cabinet base

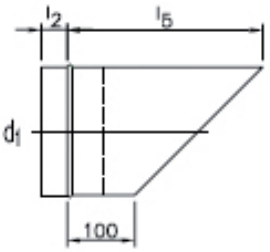


LBF LUFTTECHNIK GMBH

KL 17.1

Auslassstutzen, schräg mit Schutzgitter

Inclined exhaust coupling with protection grid
Manchons d'échappement oblique, avec grille de protection



Artikel ALSEL

d_1	l_5	Oberfläche m² mit Steckst.	Oberfläche m² ohne Steckst.	kg
71	171	0,046	0,033	0,2
80	180	0,053	0,038	0,2
90	190	0,061	0,044	0,3
100	200	0,069	0,051	0,3
112	212	0,080	0,059	0,4
125	225	0,091	0,068	0,4
140	240	0,105	0,079	0,5
150	250	0,115	0,087	0,6
160	260	0,125	0,095	0,6
180	280	0,147	0,113	0,7
200	300	0,170	0,132	0,8
224	324	0,198	0,156	1,0
250	350	0,247	0,184	1,2
280	380	0,290	0,220	1,4
300	400	0,321	0,246	1,6
315	415	0,344	0,265	1,9
355	455	0,410	0,321	2,3
400	500	0,515	0,389	2,9
450	550	0,614	0,473	3,4
500	600	0,723	0,566	4,0
560	660	0,861	0,685	4,9
600	700	0,960	0,772	5,5
630	730	1,038	0,841	8,0
710	810	1,303	1,036	10,0
800	900	1,582	1,281	12,2
900	1000	1,922	1,583	16,8
1000	1100	2,292	1,915	20,1
1120	1220	2,848	2,356	25,0
1250	1350	3,435	2,885	30,3
1400	1500	4,220	3,561	45,7
1600	1700	5,326	4,572	57,9
1800	1900	6,557	5,709	84,5

Vogelschutzgitter bis d_1 = 500 eingeschweißt
ab d_1 = 560 eingeschraubt mit Flansch

freier Querschnitt ca. 80%

36341 Lauterbach • Industriestraße 15 • Tel.: 06641/84-0 • Fax: 06641/2932 • e-mail: info@lbf-it.de • internet: www.lbf-it.de

14.3 Guarantee and exchange conditions

Please refer to our website www.solar-inverter.com for our guarantee and exchange conditions.

14.4 5-Year guarantee certificate

5-YEAR GUARANTEE CERTIFICATE

Congratulations on the purchase of the high efficient solar inverter from Delta!

This is a 5-year standard guarantee certificate, which is automatically activated and valid from date of purchase by the end customer. We would kindly ask you to keep this certificate with your invoice.

The standard warranty term is 24 months, starting from the date on which the inverter is purchased by the end customer. Delta Energy Systems (Germany) GmbH usually grants customers, who purchase an inverter of the SOLIVIA series an extended guarantee period of 60 months from the date of purchase of the inverter by the end customer. This period is however limited to 66 months maximum from the date of manufacture (according to the date code of the equipment).

When requesting a replacement inverter, copies of the purchase invoice and guarantee certificate must be enclosed. The name plate on the defective solar inverter must be readable and must not have sustained any permanent damage. In the event of any failure to meet this requirement, Delta reserves the right to refuse requests.

Before requesting a replacement inverter, please contact our solar support team or arrange for your installer to do this on your behalf:

Support Hotline: +49 (0) 180 16 SOLAR (76527) or
Fax: +49 (0) 7641 455-208 or via
E-mail: support@solar-inverter.com
Mondays to Fridays from 8 am to 5 pm (apart from official Bank Holidays)

We require the following details from the name plate of the defective solar inverter:

Inverter type	SOLIVIACMEUG3
Part number	EOE98030176
Revision	____ ____
Date code	____ ____ ____ ____
Serial number	_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
Error messages shown on the solar inverter's display	
General details about the layout of the installation	

SOLIVIACMEUG3
EOE98030176
Rev: XX
Date code: YYWW
S/N: LLLMMMXXYYWWZZZZZZ

Detailed information about Delta's Guarantee and Exchange Conditions can be seen on our website www.solar-inverter.com.

Delta Energy Systems (Germany) GmbH
Plant Teningen
Dept. Solar Support Team
Tscheulinstrasse 21
79331 Teningen
GERMANY

www.solar-inverter.com

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Tscheulinstrasse 21
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Support Email: support@solar-inverter.com
Support Hotline: +49 180 16 SOLAR (76527)
Mondays to Fridays from 8 am to 5 pm (CET - apart from offical Bank Holidays)
(3,9 ct/min)

Delta Energy Systems (Italy) Srl
Via I Maggio 6
40011 Anzola dell'Emilia (BO)
ITALY
Phone: +39 051 733045
Fax: +39 051 731838
Email: support.italy@solar-inverter.com

Delta Energy Systems (France) SA
ZI du Bois Chaland 2 - 15 rue des Pyrénées
Lisses 91056 Evry Cedex
FRANCE
Phone: +33 6 83 93 05 00
Email: support.france@solar-inverter.com

Delta Energy Systems (Spain) S.L.
Calle Luis I, nº 60, Nave 1A. P.I. de Vallecas
28031 Madrid
SPAIN
Phone: +34 91 223 74 27
Fax: +34 91 332 90 38
Email: support.spain@solar-inverter.com

Delta Electronics (Slovakia) s.r.o.
Priemyselna ulica 4600/1
018 41 Dubnica nad Vahom
SLOVAKIA
Phone: +421 42 4661 230
Fax: +421 42 4661 131
Email: support.slovakia@solar-inverter.com

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