

## **CBL-DC-CMB1-10**

### **Quick start guide**

UM QS EN CBL-DC-CMB1-10

# Quick start guide

## CBL-DC-CMB1-10

2014-11-05

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Designation: UM QS EN CBL-DC-CMB1-10

Revision: 00

This quick start guide is valid for:

Designation	Revision	Order No.
CBL-DC-CMB1-10	00	2400474

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## Please observe the following notes

### User group of this manual

The use of products described in this manual is oriented exclusively to:

- Qualified electricians or persons instructed by them, who are familiar with applicable standards and other regulations regarding electrical engineering and, in particular, the relevant safety concepts.
- Qualified application programmers and software engineers, who are familiar with the safety concepts of automation technology and applicable standards.

### Explanation of symbols used and signal words



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety measures that follow this symbol to avoid possible injury or death.

There are three different categories of personal injury that are indicated with a signal word.

**DANGER** This indicates a hazardous situation which, if not avoided, will result in death or serious injury.

**WARNING** This indicates a hazardous situation which, if not avoided, could result in death or serious injury.

**CAUTION** This indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.



This symbol together with the signal word **NOTE** and the accompanying text alert the reader to a situation which may cause damage or malfunction to the device, hardware/software, or surrounding property.



This symbol and the accompanying text provide the reader with additional information or refer to detailed sources of information.

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# 1 General safety notes

Observe the country-specific installation, safety, and accident prevention regulations.

During startup and servicing, observe the five safety rules according to DIN EN 50110-1. Generally speaking, the rules are to be adhered to in the specified order:

- Disconnect safely
- Ensure power cannot be switched on again
- Verify safe isolation from the supply
- Ground and short circuit
- Cover or safeguard adjacent live parts

Once the work is complete, perform the above steps again in reverse order.



**Important:** Read the instruction manual carefully before mounting, installing, and starting up the CBL-DC-CMB1-10. Pay particular attention to the safety notes in this document. Store the document in a safe place for later use.

## Intended use of the Phoenix Contact product



**WARNING: Incorrect handling of the CBL-DC-CMB1-10 can pose serious risks for the user.**

The Phoenix Contact product may only be operated in accordance with the information in this instruction manual. The use of third-party products and components must be recommended or approved by Phoenix Contact with reference to the associated technical documentation.

The error-free and safe operation of the product can only be guaranteed with proper transport, proper storage, assembly, mounting, installation, startup, operation, and servicing. The permitted ambient conditions must be adhered to. All information in the associated documentation must be observed. Otherwise there is a risk of electric shock or material damage.



**WARNING: Dangerous contact voltage**

- **Never open the lever-type fuse terminal blocks under load!**
- All work on the device must only be carried out by qualified personnel who are familiar with the necessary safety precautions.
- Before working on the device, disconnect the power.
- Do not open the CBL-DC-CMB1-10 during operation. The device or device components are live.
- The CBL-DC-CMB1-10 must not be used in grounded PV systems.
- Protect the CBL-DC-CMB1-10 against reverse currents from the inverter. A maximum reverse current equal to the nominal current of the string combiner box is permitted. Make sure that the documented technical data is observed.
- The connecting cables of the photovoltaic system may still be live even when the switch disconnecter (if present) is open. Make sure that the power is disconnected when carrying out installation and servicing work.



**WARNING: Risk of burns**

Under full load, the internal components or cables can become very hot (> 50°C).



**NOTE: Electrostatic discharge**

The device contains components that can be damaged or destroyed by electrostatic discharge. When handling the device, observe the necessary safety precautions against electrostatic discharge (ESD) according to EN 61340-5-1 and IEC 61340-5-1.



**Installation site**

- The national laws, directives, ordinances, and regulations for the installation of electrical equipment which are valid at the installation site must be adhered to.
- The product has been designed for stationary use and for fixed wall or floor mounting.
- The switching device combination must be freely accessible at all times in case of emergency, for operation, and for servicing work.
- Protect the switching device combination against direct sunlight.
- Install the CBL-DC-CMB1-10 in a wind-protected and weatherproof location. Provide sufficient protection against moisture, snow load, and storms. The string combiner box must be situated under a canopy.

**Only operate the device in the approved environment.**



## 2 Description

The CBL-DC-CMB1-10 switching device combination is a string combiner box for up to 12 or 14 photovoltaic strings. The solar string cables are guided through cable glands and into the housing. The positive pole of the solar strings is connected to the UK 10,3-HESI 1000V fuse modular terminal blocks and the negative pole of the solar strings is connected to the STU 35/4x10 BU feed-through terminal blocks or as well to UK 10,3-HESI 1000V fuse modular terminal blocks. The output cables are connected to the UKH 150 and UKH 150 BU high-current terminal blocks or to the load break switch.

### Properties

- Degree of protection: IP65
- Housing: polycarbonate
- Connection of up to 12 or 14 solar strings
- UK 10.3 HESI 1000V fuse modular terminal blocks

## 3 Transport

The CBL-DC-CMB1-10 is delivered in cardboard packaging. Where necessary, the packaging features information on how to handle the packaged products as well as shock, tilt, moisture, and temperature indicators. In order to avoid damage, this information must be observed during both transport and storage.

The CBL-DC-CMB1-10 may only be transported to its destination in its original packaging. Please observe the notes on the packaging. Secure the CBL-DC-CMB1-10 during transport, taking into account the center of gravity of the device. The same applies when relocating, moving or returning the equipment.

Internal transport is only permitted if the transport goods are adequately secured against slipping and falling. Only use suitable floor conveyor vehicles.

### 3.1 Transportation method

The device must be kept horizontal during transport. The maximum permissible deviation from the horizontal position is 15°. Only suitable and approved hoisting gear may be used to unload and transport the equipment.

Do not climb onto the devices or packaging. However, if it should prove necessary, protect the surfaces and frame to prevent damage. When transporting the equipment or storing it temporarily, make sure that the surfaces are protected from the elements and any external influences, and that they are kept dry and clean.

- Please observe the humidity specifications and the temperature range specified for transport.
- Observe the warnings on the transport packaging.
- Observe the rupture load classes. This means that the least sensitive parts must be placed at the bottom.
- Stretch and strap bulky goods.

## 4 Checking the delivery

### 4.1 Packaging

The contents of the packaging must be checked for completeness immediately upon delivery using the delivery note and/or parts list. The packaging of the CBL-DC-CMB1-10 must not show any signs of external damage caused by transportation. Damaged packaging is an indicator of potential damage to the CBL-DC-CMB1-10 that may have occurred during transportation. This may cause the CBL-DC-CMB1-10 to malfunction.

Check the delivery for transport damage. Report any transport damage immediately.

- Keep the box and packaging material for checking purposes.
- Inform the manufacturer and/or your supplier immediately.
- Inform the transport company immediately.

### 4.2 Packaging when returning equipment

When returning the equipment, always use the original packaging. If the original packaging is no longer available, it is essential to observe the following points. Most of the transport damage that occurs during goods transportation is caused by incorrect handling of the packaging.

- Please observe the humidity specifications and the temperature range specified for storage/transport.
- If necessary, use dehumidifying agents.
- Protect electrostatically sensitive components and secure loose parts.
- Make sure that the packaging you select is large enough and sufficiently thick.
- Only use plastic bubble wrap sheets as wadding.
- Make sure that the goods cannot make contact with the outer walls of the cardboard packaging.
- Attach warnings to the transport packaging so that they are clearly visible.
- Observe the rupture load classes. This means that the least sensitive parts must be placed at the bottom.
- Please be aware that the delivery note is to be placed inside the package in the case of packages that are to remain within the same country. However, if the package is being sent abroad, the delivery note must be placed inside a delivery note pocket and attached to the outside so that it is clearly visible.
- Stretch and strap bulky goods.

## 5 CBL-DC-CMB1-10

### 5.1 Ordering data

#### Products

Description	Type	Order No.	Pcs. / Pkt.
String combiner box for up to 12 photovoltaic strings	CBL-DC-CMB1-10	2400474	1

#### Accessories/replacement parts

Description	Type	Order No.	Pcs. / Pkt.
Fuse, 10.3 mm x 38 mm, up to 1000 V DC, gPV characteristic	FUSE 10,3X38 2A PV	3061295	10
Fuse, 10.3 mm x 38 mm, up to 1000 V DC, gPV characteristic	FUSE 10,3X38 4A PV	3061305	10
Fuse, 10.3 mm x 38 mm, up to 1000 V DC, gPV characteristic	FUSE 10,3X38 6A PV	3061318	10
Fuse, 10.3 mm x 38 mm, up to 1000 V DC, gPV characteristic	FUSE 10,3X38 8A PV	3061321	10
Fuse, 10.3 mm x 38 mm, up to 1000 V DC, gPV characteristic	FUSE 10,3X38 10A PV	3061334	10
Fuse, 10.3 mm x 38 mm, up to 1000 V DC, gPV characteristic	FUSE 10,3X38 12A PV	3061347	10
Fuse, 10.3 mm x 38 mm, up to 1000 V DC, gPV characteristic	FUSE 10,3X38 16A PV	3061350	10
Fuse, 10.3 mm x 38 mm, up to 1000 V DC, gPV characteristic	FUSE 10,3X38 20A PV	3061363	10
Closing cap, for closing unused bore holes in multiple seals and cable glands, diameter 8 mm.	SEALING PLUG 8X16 RD	1400257	10



Make sure you always use the latest documentation. It can be downloaded for the individual components at [phoenixcontact.net/products](https://phoenixcontact.net/products).

### 5.2 Technical data

#### General data

Voltage ( $U_N$ )	DC 830 V
Max. continuous operating voltage ( $U_{CPV}$ )	DC 1000 V
Rated insulation voltage ( $U_i$ )	DC 1000 V
Max. short-circuit current ( $I_{SCSTC}$ )	16 A (per string)
Max. combined short-circuit current ( $I_{SCSTC}$ )	192 A

#### Technical data

Housing	Fibox Arca 405021, polycarbonate
Housing dimensions (W x H x D in mm)	500 x 400 x 210
Mounting plate	MP 5040
Mounting plate dimensions (W x H in mm)	450 x 350
DIN rail	NS 35/15 PERF, steel galvanized and thick layer passivated, perforated, height 15 mm, width 35 mm
Weight	10 kg
Degree of protection	IP65
Protection class (0, I, II, III) according to DIN EN 61140	II (without separate grounding device)
Color (RAL)	RAL 7035

<b>Technical data</b>	
Type of cable entry	Cable glands
Torques	See "Torques for conductive connections" on page 16
Information on the installation location	See installation site information in section "General safety notes" on page 7
Ambient temperature (operation)	-25°C ... 60°C (derating above +45°C)
Ambient temperature (storage/transport)	-40°C ... 60°C
Humidity (operation/storage/transport)	5 ... 95 %, non-condensing
Altitude	≤ 2000 m (amsl (above mean sea level))
<b>DC input</b>	
Number of strings	12
Fuse holder	12 x UK 10,3-HESI 1000 V
Fuse type	10.3 x 38 fuses for DC 1000 V
Fuse size	2 A ... 20 A
Terminals for + side	3 x STU 35/ 4X10
Terminals for - side	3 x STU 35/ 4X10 BU
Cable glands	24 x M16
Clamping area	5 ... 10 mm
Conductor cross section	4 ... 6 mm <sup>2</sup>
Terminal type for + side	Screw connection with M5 screws (see "Torques for conductive connections" on page 16)
Terminal type for - side	Spring connection
<b>DC output</b>	
Cable glands	2 x M32
Clamping area	18 ... 25 mm
Conductor cross section solid	35 ... 95 mm <sup>2</sup>
Conductor cross section solid AWG	2 - 4/0
Conductor cross section stranded	50 ... 95 mm <sup>2</sup>
Conductor cross section stranded AWG	1/0 - 4/0
Conductor material	Copper or aluminum When connecting aluminum conductors, please refer to the "Notes and product release list for connecting aluminum conductors" document. This can be found at phoenixcontact.com in the download area for article 3010110.
Terminal type	Screw connection with M10 screws (see "Torques for conductive connections" on page 16)
Terminal output for + side	1 x UKH 150
Terminal output for - side	1 x UKH 150 BU

### 5.3 Derating diagram

The current per string must be decreased as shown in the derating diagram below, depending on ambient temperatures higher than +45°C. For each +1°C temperature increase, the current per string must be decreased with 0,24A. The calculated derating is 1,5 % per +1°C, in relation to the nominal current.

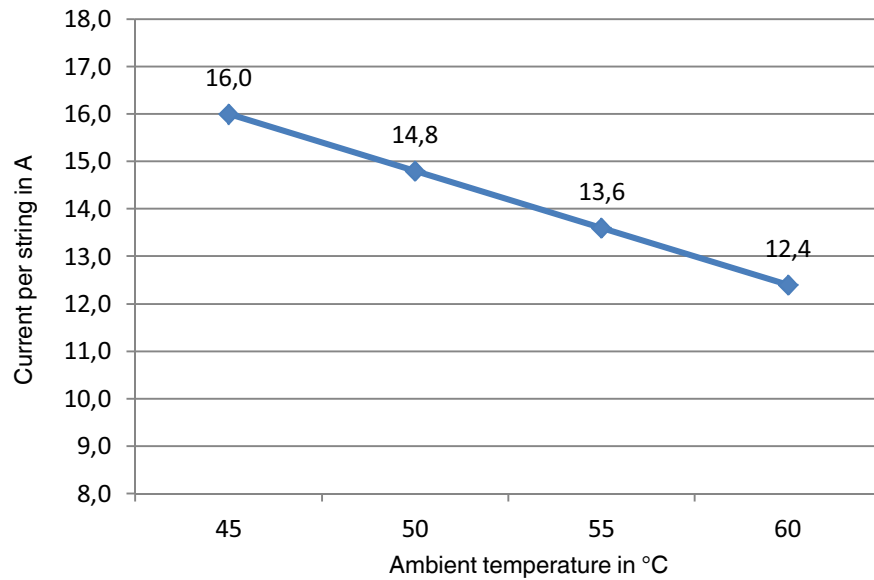


Figure 5-1 Current per string

◆ Current per string

### 5.4 Housing dimensions

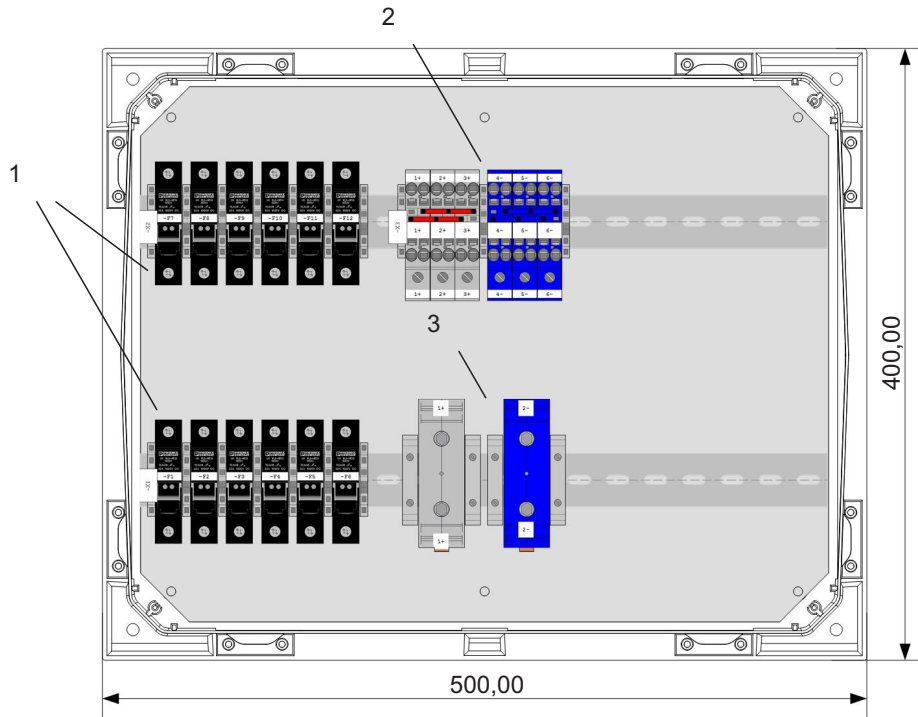


Figure 5-2 Housing dimensions/mounting plate layout - view from the front

Number	BMK	Component
1	F1 - F12	Fuse modular terminal block - UK 10,3-HESI 1000V
2	1+, 2+, 3+ 4-, 5-, 6-	Feed-through terminal block - STU 35/ 4X10 Feed-through terminal block - STU 35/ 4X10 BU
3	L+, L-	High-current connector - UKH 150/UKH 150 BU

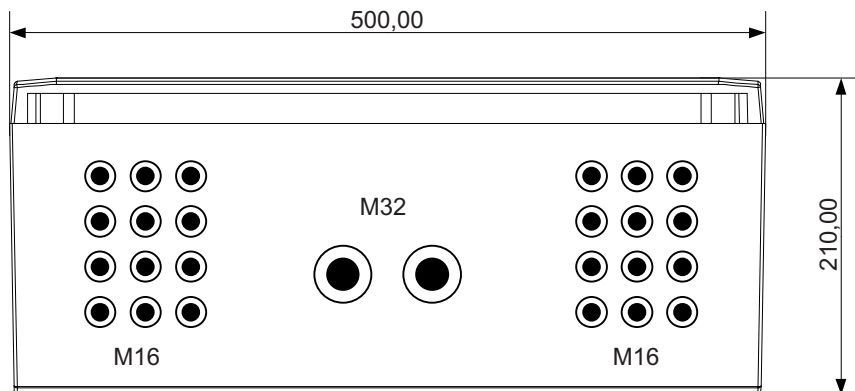


Figure 5-3 Housing dimensions - view from below

## 5.5 Connection notes for mounting and installation



### **WARNING: Dangerous contact voltage**

This work may only be carried out by qualified personnel who are familiar with the necessary safety precautions.

The electrical equipment for your system must be implemented in accordance with EN 60204 and the EMC Directive. Safety shoes must always be worn during mounting and removal. During mounting, the device must be held by a second person to prevent it from falling.

### 5.5.1 Space limits

When working on the CBL-DC-CMB1-10, make sure that there is sufficient room to move and sufficient space available for the following activities:

- Mounting (W x H x D in mm): 1000 x 2000 x 1000
- Operation (W x H x D in mm): 1000 x 2000 x 1000
- Maintenance (W x H x D in mm): 1000 x 2000 x 1000

### 5.5.2 Mounting



#### **WARNING: Risk of injury**

- Mounting must always be carried out by two people.
- Observe the information on intended use in section “General safety notes” on page 7 of this quick start guide.



The switching device combination must not be installed on pulsating or vibrating machinery or equipment parts. Observe the maximum permissible attenuation according to the transmission medium.



Protect bore holes and bare machining areas against corrosion.  
Switching device combinations with a damaged housing must not be started up.

#### **Mounting the switching device combination**

Mount the switching device combination in the installation location using the four fixing clips supplied as standard (Fibox MF CAB).

Check that the switching device combination is fixed securely.

### 5.5.3 Installation


**DANGER: Return of the supply voltage**

Make sure that switching on the input voltage cannot lead to hazardous situations.


**DANGER: Please observe the following when wiring inside the switching device combination**

- Check the fuse protection inside the switching device combination.
- If accessing the wiring, check the marking of the individual wires and the equipment identification in accordance with the circuit diagram and check the contact assignment in accordance with the switches and all other equipment.

#### Torques for conductive connections

Before establishing the supply voltage and starting up for the first time, check all conductive connections in the CBL-DC-CMB1-10. If necessary, retighten these connections using a torque screwdriver taking into account the torque values. When doing so, observe the information in the following table.

BMK	Type	Tightening torque	
		Min.	Max.
-X1/2: -F1 ... -F12	UK 10,3-HESI 1000V	2 Nm	2.5 Nm
-X3: 1+ ... 3+ -X3: 4- ... 6-	STU 35/ 4X10 STU 35/ 4X10 BU	3.2 Nm	3.7 Nm
-X4: L+; L-	UKH 150/BU	25 Nm	25 Nm

#### Connection

Installation must be performed by a skilled electrical engineer.

1. Open the switching device combination.
2. Release the cable entries.
3. Guide the cables into the cable entries.
4. Place filler plugs in unused cable entries.
5. Tighten the cable entries.
6. Strip the wires.
7. Connect the conductors. When doing so, refer to the circuit diagram and the information under "Connections" on page 17.
8. Check and document the wiring.
9. Close the switching device combination.



## 5.5.4 Connections



### WARNING: Dangerous contact voltage

Disconnect the power supply before starting work.

### Cable feed-throughs

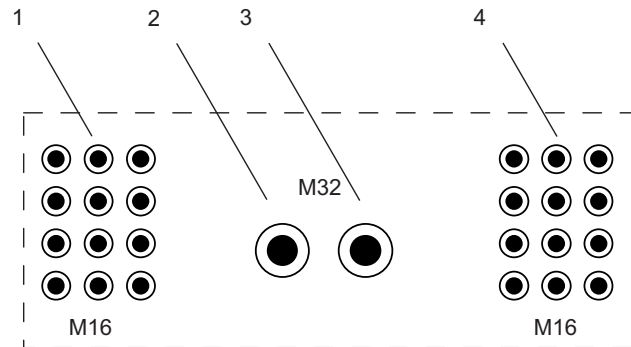


Figure 5-4 Cable feed-throughs on the underside of the housing (2 x M32, 24 x M16)

Table 5-1 Assignment of the cable feed-throughs

Number	Connection/cable feed-through
1	Solar strings input (+)
2	DC 1000 V output (+)
3	DC 1000 V output (-)
4	Solar strings input (-)

### Screw connection:

- For wiring use a screwdriver with the correct blade width.
- For a reliable and touch-proof connection, use a suitable cable cross section and insulate the cable ends according to the above-mentioned specifications.

Table 5-2 Connection terminal blocks

Terminal block	Solid conductor [mm <sup>2</sup> ]	Stranded conductor [mm <sup>2</sup> ]	Stripping length [mm]	Torque [Nm]
UK 10,3-HESI 1000V	1.5 ... 25	0.75 ... 25	11	2 ... 2.5
UKH 150/BU	35 ... 150	50 ... 150	40	25 ... 30

### Spring-cage connection:

Terminal block	Solid conductor [mm <sup>2</sup> ]	Stranded conductor [mm <sup>2</sup> ]	Stripping length [mm]
STU 35/ 4X10 BU	0.2 ... 10	0.2 ... 6	12

**Connecting the output cables**



Use copper or aluminum cables to connect the outlets.

Note the following when using aluminum conductors:  
 When connecting aluminum conductors, a non-conductive oxide film forms when the conductors are stripped. Aluminum conductors are only suitable for installation locations that are free from humidity or aggressive atmospheres where possible.

- Separate the stripped end of the aluminum conductor from the oxide film using a blade and immediately dip it in non-acid and non-alkali Vaseline.
- When connecting aluminum conductors, the screws must be tightened with the maximum permissible tightening torque (see table "Connection terminal blocks" on page 17).

- Guide the cables through the cable entries and into the housing.
  - Connect the conductors to terminals L+ and L-.
- When doing so, refer to the figure and table below.

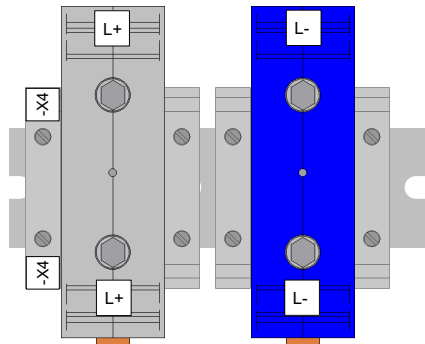


Figure 5-5 -X4: Terminals L+ and L- for output cables

Table 5-3 -X4: Terminals L+ and L-

BMK	Description
-X4.L+	DC 1000 V (+)
-X4.L-	DC 1000 V (-)

**Connecting the PV strings**

- Guide the cables through the cable entries and into the housing.
  - Connect the conductors to the corresponding terminals.
- When doing so, refer to the following figures and tables.

**Connecting the positive solar strings**

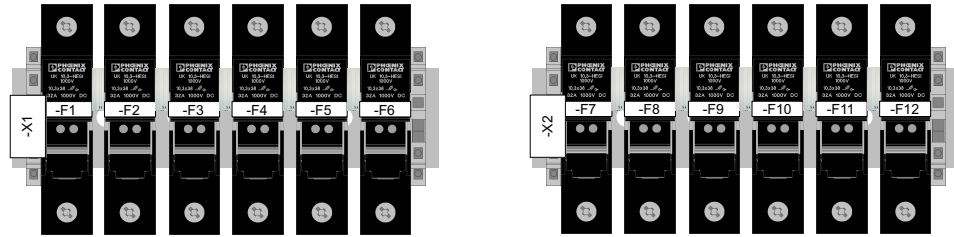


Figure 5-6 Fuse modular terminal blocks -F1 ... -F12

Table 5-4 Fuse modular terminal blocks -F1 ... -F12

BMK	Description	BMK	Description
-F1	(+) cable string 1	-F7	(+) cable string 7
-F2	(+) cable string 2	-F8	(+) cable string 8
-F3	(+) cable string 3	-F9	(+) cable string 9
-F4	(+) cable string 4	-F10	(+) cable string 10
-F5	(+) cable string 5	-F11	(+) cable string 11
-F6	(+) cable string 6	-F12	(+) cable string 12

**Connecting the negative solar strings**

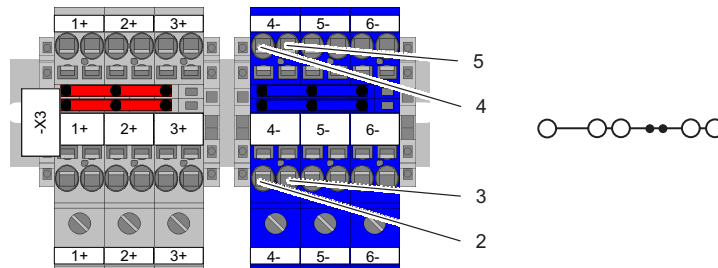


Figure 5-7 Terminal strip -X3 and circuit diagram STU 35/ 4X10 BU

Table 5-5 Terminal strip -X3

BMK	Description	BMK	Description
4- (2)	(-) cable string 1	5- (4)	(-) cable string 9
4- (3)	(-) cable string 2	5- (5)	(-) cable string 10
4- (4)	(-) cable string 7	6- (2)	(-) cable string 5
4- (5)	(-) cable string 8	6- (3)	(-) cable string 6
5- (2)	(-) cable string 3	6- (4)	(-) cable string 11
5- (3)	(-) cable string 4	6- (5)	(-) cable string 12



## 6 Startup



### **DANGER: Return of the supply voltage**

Make sure that switching on the input voltage cannot lead to unexpected hazardous situations.

All work on the CBL-DC-CMB1-10 must only be carried out by qualified personnel who are familiar with the necessary safety precautions.

Do not start up the CBL-DC-CMB1-10 until it has been properly mounted and installed. Make sure that all of the necessary steps described in section „Connection notes for mounting and installation“ have been performed.

## 7 Servicing/cleaning



### **WARNING: Dangerous contact voltage**

All servicing work must only be carried out by qualified personnel who are familiar with the necessary safety precautions.

All electrical equipment must be kept in good condition as stipulated by the relevant standards and regulations, e.g., DIN VDE 0105-100 and accident prevention regulation BGV A3 (electrical systems and equipment).

Check the CBL-DC-CMB1-10 at regular intervals, at least once a year. The servicing interval also depends on the usage and ambient conditions. Parts and components that are subject to frequent use/loads must be checked at shorter intervals. Any defects to the CBL-DC-CMB1-10 must be eliminated as soon as they are identified. If a defective electrical system poses an immediate danger, it must not continue to be operated.

If there is any risk of material damage or personal injury, the CBL-DC-CMB1-10 must be stopped immediately. Before it can be started up again, the CBL-DC-CMB1-10 must be returned to a safe condition. Before carrying out any servicing work with the power supply disconnected, observe the five basic safety rules, provided these apply to your application:

- Disconnect safely
- Ensure power cannot be switched on again
- Verify safe isolation from the supply
- Ground and short circuit
- Cover or safeguard adjacent live parts

Document all servicing steps performed. Example information:

- Date/serial or device number/equipment identification
- State of the object undergoing the check
- Activity carried out
- Repairs/adjustments/replacement/settings, etc.
- Skilled electrical engineer carrying out the work



When carrying out regular checks and servicing work on the CBL-DC-CMB1-10, observe the points described in the following sections in particular and also the specifications from the corresponding standards and guidelines.

## 7.1 Servicing with the power supply disconnected



### **WARNING: Dangerous contact voltage**

- Before carrying out any servicing work on the device, disconnect the power.
  - **With load break switch:**  
Turn the load break switch to position „0 OFF“. This interrupts the DC current of the CBL-DC-CMB1-10.
  - **Without load break switch:**  
Disconnect the DC circuit at the inverter. This interrupts the DC current of the CBL-DC-CMB1-10. Please note the instructions in the manual of the manufacturer.
  - Open the fuse holder of the fuse modular terminal blocks in the CBL-DC-CMB1-10 to disconnect the corresponding string current.  
**Warning: Never open the fuse terminal blocks under load.**
  - Check the fuses and replace them when necessary.
- All servicing work must only be carried out by qualified personnel who are familiar with the necessary safety precautions.

### **Visual inspection of cabling and components**

- Check the CBL-DC-CMB1-10 for visible damage. Only operate the device in a fault-free state that ensures operational reliability.
- Check all components, cables, terminal points, conductor connections, and markings regularly and compare these to the circuit diagram and associated documentation.
- Check the strain relief of the cables.
- Check that all cable glands are fixed securely and sealed.
- Check the cable routing and bending radii.
- Check the cables, cable connections, and components for signs of overheating, e.g., discoloration or deformation. Replace any affected components and cables where necessary. The source/trigger of overheating must be identified before the device can be started up again and returned to a safe condition.
- Check the tightening torques of all connections.  
Tighten any loose connections taking into account the maximum torque (see „Torques for conductive connections“).
- Check all connections for a secure fit and correct functioning.
- Perform this check at least once a year.
- Parts and components that are subject to frequent use/loads must be checked at shorter intervals.

### **Housings and seals**

- Check the housing for visible damage and corrosion.
- Remove any soiling. Refer to the information in the Cleaning section.
- Check that the housing doors lock correctly and also check the function of the lock.
- Check that the doors open and close correctly. If necessary, lubricate the hinges.
- Check that the housing is sealed and ensure that there is no condensation in the interior.
- All seals must be maintained at regular intervals to ensure that the housing offers the appropriate degree of protection.
- Check the seals for deformation, cracks, and soiling.

- Use warm soapy water and a soft brush to clean the seals.
- Do not use any aggressive cleaning agents.
- Condition the seals with suitable care products.
- Observe the servicing schedule in the manufacturer's mounting and instruction manual.

**Space limits/safe mounting/installation site**

- Check the space limits at the installation location. The prescribed space limits for operation and servicing must be observed to ensure safety and must be restored if necessary.
- Check that the CBL-DC-CMB1-10 is securely fixed in the installation location (e.g., screw connection in the case of wall fastening).
- Ensure that the CBL-DC-CMB1-10 is suitable for the conditions at the installation site.

## 7.2 Maintenance



**WARNING: Dangerous contact voltage**

- Before carrying out maintenance work on the device, disconnect the power.
- All maintenance work must only be carried out by qualified personnel who are familiar with the necessary safety precautions.

### 7.2.1 Corrective maintenance

For corrective maintenance, proceed as follows:

1. The voltage must be disconnected by the user/a skilled electrical engineer.
2. Open the switching device combination.
3. Replace the faulty equipment.
4. The voltage must be switched on by the user/a skilled electrical engineer.
5. Close the switching device combination.

### 7.2.2 Troubleshooting/error removal

For troubleshooting/error removal, proceed as follows:

1. Open the switching device combination.
2. Troubleshooting inside the switching device combination.
3. Perform a visual inspection.
4. If necessary, perform voltage measurements.
5. Once all errors have been detected, proceed as described in Section 7.2.1, "Corrective maintenance".
6. Close the switching device combination.

## 7.3 Cleaning

### Cleaning the housing

Clean the outside surfaces of the housing with a damp cloth. Do not use any corrosive cleaning agents, thinners, abrasive cleaners or hard objects that could damage the surface.

## 8 Removal/disposal

To decommission a system, proceed according to the procedures specified by the machine or system manufacturer. When decommissioning the switching device combination or parts thereof, ensure that the components used:

- Are correctly reused in another system.  
Or
- Are disposed of according to the applicable environmental regulations, and in this case can never be reused.

Safety shoes must always be worn during mounting and removal. During removal, the switching device combination must be held by a second person to prevent it from falling.

During decommissioning/removal, make sure that there is sufficient space available.

Removal procedure:

- The voltage must be disconnected by the user/a skilled electrical engineer.
- Open the CBL-DC-CMB1-10.
- Loosen the wires.
- Release the cable entries and pull out the cables.
- Close the CBL-DC-CMB1-10.
- Secure the CBL-DC-CMB1-10 to prevent it from falling.
- Release the mounting screws on the CBL-DC-CMB1-10.
- Remove the CBL-DC-CMB1-10.

## 9 Storage and storage conditions

The storage location should be dry and protected against harmful environmental influences such as UV light.

- Temperature range: -40°C ... 60°C
- Air pressure: 2000 m above sea level, maximum
- Permissible humidity (storage/transport): 5% ... 95%