

ABB INDUSTRIAL DRIVES

# ACS880-907 regenerative rectifier units

## Hardware manual



# List of related manuals

## General manuals

	Code (English)
Safety instructions for ACS880 multidrive cabinets and modules	<a href="#">3AUA0000102301</a>
Electrical planning instructions for ACS880 multidrive cabinets and modules	<a href="#">3AUA0000102324</a>
Mechanical installation instructions for ACS880 multidrive cabinets	<a href="#">3AUA0000101764</a>
BCU-02/12/22 control units hardware manual	<a href="#">3AUA0000113605</a>

## Supply unit manuals

ACS880-207 IGBT supply units hardware manual	<a href="#">3AUA0000130644</a>
ACS880 IGBT supply control program firmware manual	<a href="#">3AUA0000131562</a>
ACS880-307 +A003 diode supply units hardware manual	<a href="#">3AUA0000102453</a>
ACS880-307 +A018 diode supply units hardware manual	<a href="#">3AXD50000011408</a>
ACS880 diode supply control program firmware manual	<a href="#">3AUA0000103295</a>
ACS880-907 regenerative rectifier units hardware manual	<a href="#">3AXD50000020546</a>
ACS880 regenerative rectifier control program firmware manual	<a href="#">3AXD50000020827</a>
Parallel-connected ACS880-207 IGBT supply units system description	<a href="#">3AXD50000032517</a>
Parallel-connected ACS880-307 +A018 diode supply units system description	<a href="#">3AXD50000032421</a>
Parallel-connected ACS880-907 regenerative rectifier units system description	<a href="#">3AXD50000036609</a>

## Inverter unit manuals and guides

ACS880-107 inverter units hardware manual	<a href="#">3AUA0000102519</a>
ACS880 primary control program firmware manual	<a href="#">3AUA0000085967</a>
ACS880 primary control program quick start-up guide	<a href="#">3AUA0000098062</a>

## Brake unit and DC/DC converter unit manuals

ACS880-607 1-phase brake units hardware manual	<a href="#">3AUA0000102559</a>
ACS880-607 3-phase brake units hardware manual	<a href="#">3AXD50000022034</a>
ACS880 brake control program firmware manual	<a href="#">3AXD50000020967</a>
ACS880-1607 DC/DC converter units hardware manual	<a href="#">3AXD50000023644</a>
ACS880 DC/DC converter control program firmware manual	<a href="#">3AXD50000024671</a>

## Option manuals and guides

ACS-AP-x assistant control panels user's manual	<a href="#">3AUA0000085685</a>
Drive composer start-up and maintenance PC tool user's manual	<a href="#">3AUA0000094606</a>
Manuals and quick guides for I/O extension modules, fieldbus adapters, safety options etc.	

You can find manuals and other product documents in PDF format on the Internet. See section [Document library on the Internet](#) on the inside of the back cover. For manuals not available in the Document library, contact your local ABB representative.

# Hardware manual

ACS880-907 regenerative rectifier units

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## **Further information**



# 1

## Introduction to the manual

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### Contents of this chapter

This chapter gives basic information on the manual.

### Applicability

The manual is applicable to the cabinet-installed ACS880-907 regenerative rectifier units that form a part of an ACS880 multidrive system.

### Safety instructions

Follow all safety instructions delivered with the drive.

- Read the **complete safety instructions** before you install, commission, use or service the drive. The complete safety instructions are given in *ACS880 multidrive and multidrive modules safety instructions* [3AUA0000102301 (English)].
- Read the **software-function-specific warnings and notes** before changing the default settings of the function. For each function, the warnings and notes are given in the section describing the related user-adjustable parameters.
- Read the **task-specific safety instructions** before starting the task. See the section describing the task.

### Target audience

This manual is intended for people who plan the use of, install, commission or service multidrives. Read the manual before working on the drive. You are expected to know the fundamentals of electricity, wiring, electrical components and electrical schematic symbols.

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## Contents of the manual

- [Introduction to the manual](#)
- [Operation principle and hardware description](#)
- [Electrical installation](#)
- [Installation checklist](#)
- [Start-up](#)
- [Maintenance](#)
- [Technical data](#)
- [Control unit.](#)

## Related documents

The multidrive user documentation consists of technical drawings and a set of manuals. The technical drawings are tailor-made for each drive. The composition of the manual set depends on the composition of the drive, eg, which rectifier unit type, options and control program has been ordered by the customer. The main manuals have been listed on the back of the front cover.

## Categorization by unit and frame size and option code

The instructions and technical data which concern only certain unit or frame sizes are marked with the size identifier.

The unit size can be identified from the basic code visible on the type designation label, for example, ACS880-907-0600A-5 where 0600A is the unit size. The option codes of the unit are listed after the plus sign. Section [Type designation keys](#) on page [36](#) explains the type designation code in detail.

The frame size of the regenerative rectifier module is R8i. See the [Ratings](#) table on page [110](#).

## Use of component designations

Some device names in the manual include the component designations in brackets, for example [Q1] to make it possible to identify the components in the circuit diagrams of the drive.

## Terms and abbreviations

Term/Abbreviation	Description
BCON	Type of a control board
BCU	Type of a control unit (contains BCON)
BDFC	DOL fan control board
BL	See <a href="#">L-filter</a> . L-filters ACS880-BL-15-7 and ACS880-BL-25-7 are used with ACS880-904 regenerative rectifier modules.
Control board	Circuit board in which the control program runs
Control unit	Control board built in a rail-mountable housing

Term/Abbreviation	Description
Cubicle	One section of a cabinet-installed drive. A cubicle is typically behind a door of its own.
CVAR	Varistor board (for UL/CSA installations)
DC link	DC circuit between rectifier and inverter
DI	Digital input
DOL fan	Direct-on-line fan, constant-speed fan
Drive	Frequency converter for controlling AC motors
EMC	Electromagnetic compatibility
FCAN-01	Optional CANopen® adapter module
FCNA-01	Optional ControlNet™ adapter module
FDNA-01	Optional DeviceNet™ adapter module
FDPI-02	Diagnostics and panel interface
FEA-03	Optional option module extension adapter
FECA-01	Optional EtherCAT® adapter module
FENA-11	Optional high-performance Ethernet/IP™, Modbus/TCP and PROFINET adapter module
FENA-21	Optional high-performance Ethernet/IP™, Modbus/TCP and PROFINET adapter module
FEPL-01	FEPL-01 Ethernet POWERLINK adapter module
FIO-01	Optional digital I/O extension module
FIO-11	Optional analog I/O extension module
FPBA-01	Optional PROFIBUS DP® adapter module
FSCA-01	Optional Modbus/RTU adapter module
FSO-xx	Optional functional safety modules
Frame (size)	Physical size of the regenerative rectifier module, that is, R8i.
IGBT	Insulated-gate bipolar transistor
Incoming cubicle	In cabinet-installed drives, the incoming unit (cubicle) contains main circuit breaker and the busbars for the input power cable.
Intermediate circuit	<a href="#">DC link</a>
Inverter	Converts direct current and voltage to alternating current and voltage.
Inverter module	Inverter bridge, related components and drive DC link capacitors enclosed inside a metal frame or enclosure. Intended for cabinet installation.
Inverter unit	Inverter module(s) under control of one control board, and related components. One inverter unit typically controls one motor. See <a href="#">Inverter module</a> .
I/O	Input/Output
L-filter	Filter for reducing current spikes and allowing "normal" harmonic content for regenerative use. See <a href="#">BL</a> .
Multidrive	Drive for controlling several motors which are typically coupled to the same machinery. Includes one supply/rectifier unit, and one or several inverter units.

Term/Abbreviation	Description
Parameter	In the control program, user-adjustable operation instruction to the drive, or signal measured or calculated by the drive
RDCO-0x	Optional DDCS communication module
Regenerative rectifier	A supply unit that converts alternating current and voltage from AC power line to direct current and voltage to drive DC link. Regenerative rectifier can also convey power from the drive DC link back to the power line.
Regenerative rectifier module	A rectifier and related components enclosed inside a metal frame or enclosure. Intended for cabinet installation.
Regenerative rectifier unit	Regenerative rectifier modules under control of one control board, and related components such as L-filters, main contactor, fuses etc.
RRU	See <a href="#">Regenerative rectifier unit</a> .
Single drive	Drive for controlling one motor

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# Operation principle and hardware description

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## Contents of this chapter

This chapter describes the operation basics and the hardware of the ACS880-907 regenerative rectifier unit.

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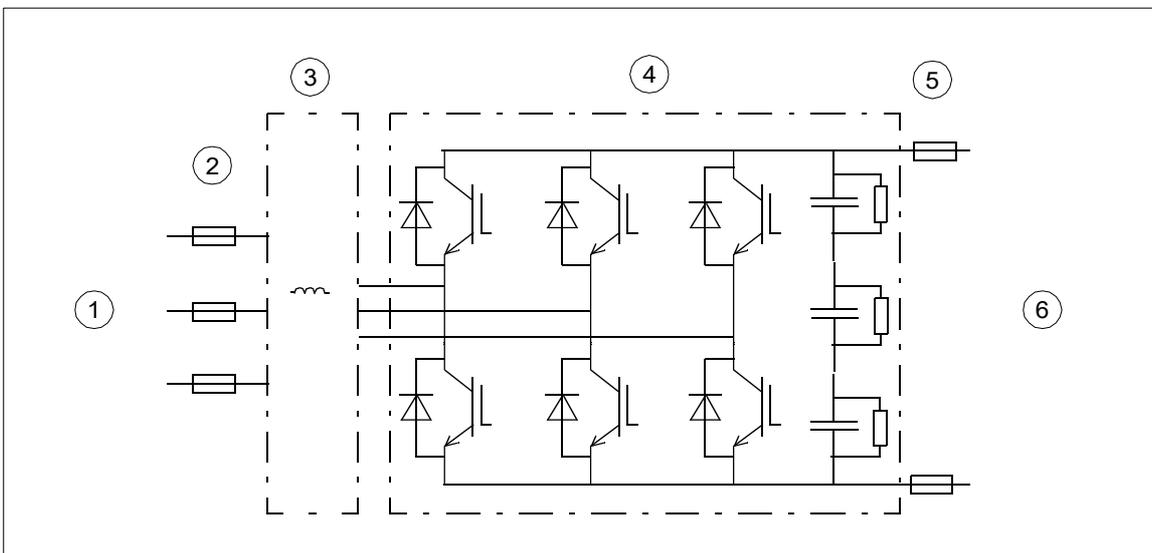
## Operation principle

The regenerative rectifier unit (RRU) consists of one or more rectifier modules ( $n \times R8i$ ) and an L-filter. Each R8i module consists of six IGBT components and six diodes connected in anti-parallel. In motoring mode, current flows from an AC supply through the diodes to a DC bus. In regenerating mode, current flows from the DC bus through the IGBTs to the supply network.

The IGBTs of the regenerative rectifier unit are switched, conducting only once during each network voltage half-cycle, which is comparable to a 6-pulse diode supply unit. This reduces switching losses and allows higher power ratings for the power module. Because the IGBTs can be switched off at any time, RRU – unlike a thyristor bridge – is reliable also during supply network failures when in regenerating mode.

### ■ Main circuit diagram

The following figure shows the simplified main circuit diagram of the rectifier.



	Description
1.	AC input
2.	AC fuses
3.	L-filter
4.	Regenerative rectifier module
5.	DC fuses
6.	DC output

## ■ Charging

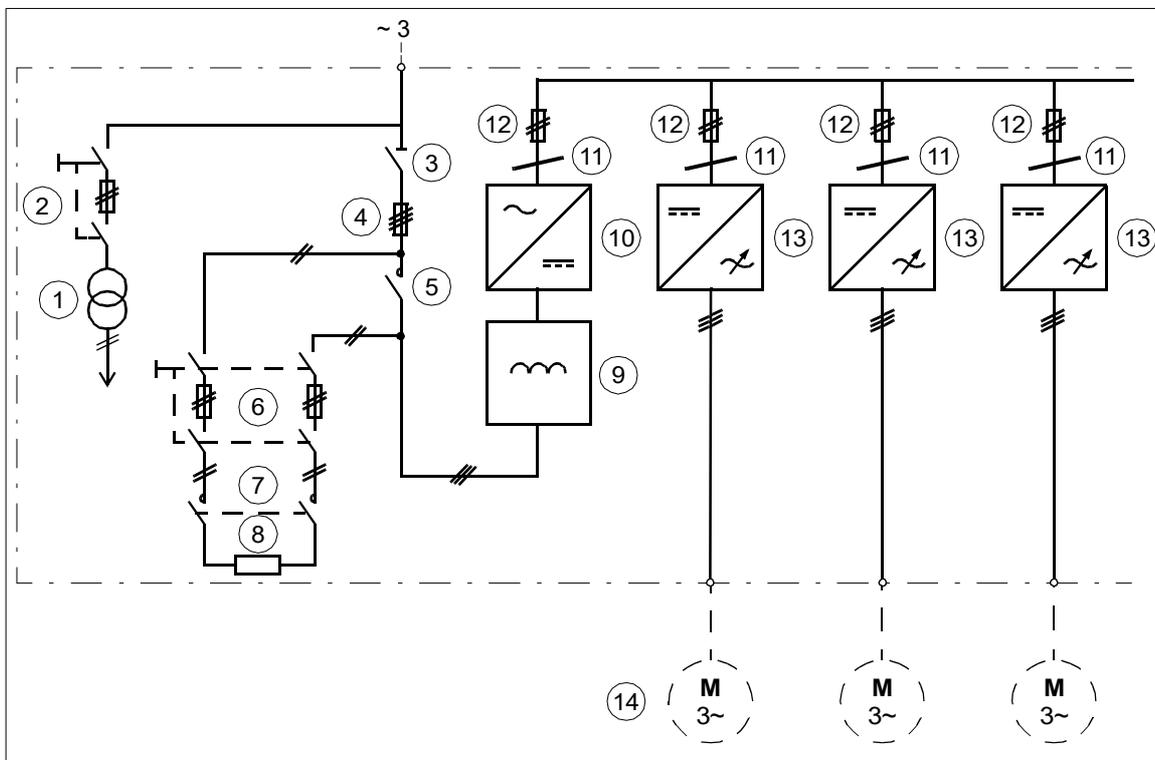
Charging is always needed to power up the DC link capacitors smoothly. Discharged capacitors cannot be connected to the full supply voltage. The voltage must be increased gradually until the capacitors are charged and ready for normal use. In ACS880-907 regenerative rectifier units, a resistive charging circuit consisting of fuses, a contactor and charging resistors is used. The resistive charging circuit is in use after power-up as long as DC voltage has risen to a predefined level.

The control program has a function for controlling the charging circuit in the rectifier unit. For further information, see the firmware manual.

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## Overview diagram of the drive system

The following figure shows a single-line diagram of a drive with a regenerative rectifier unit.

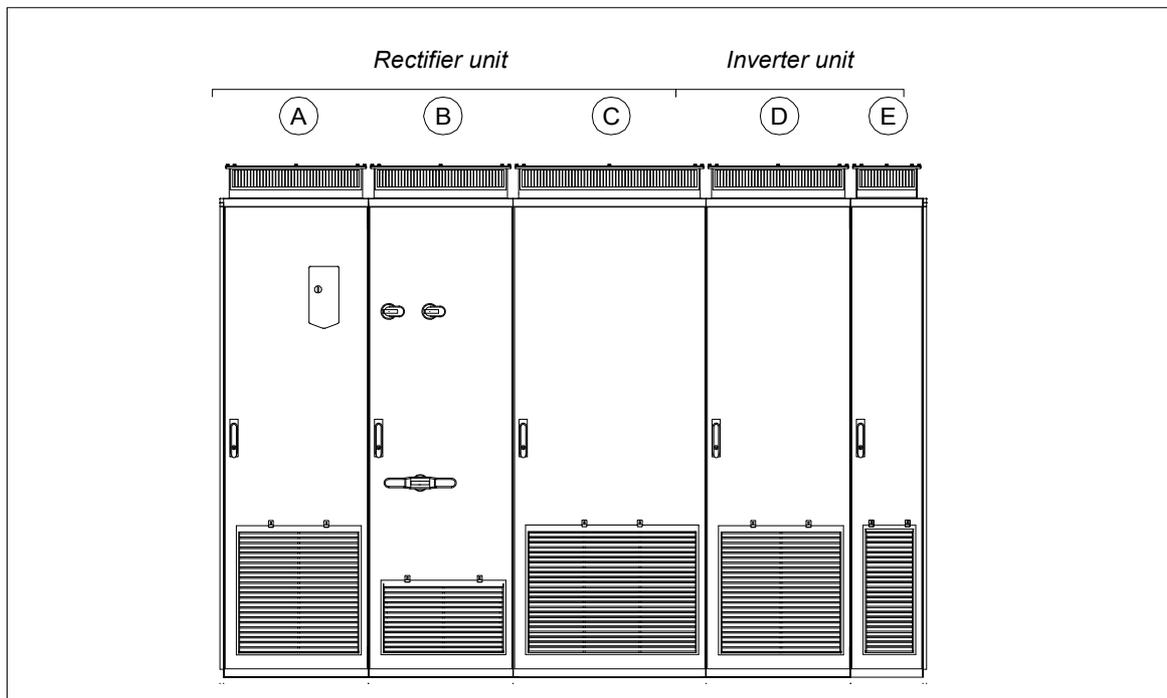


The figure includes:

	Description
1.	Auxiliary voltage transformer ([T21], option +G344)
2.	Auxiliary voltage switch [Q21]
3.	Main switch-disconnector ([Q1], option +F253) (standard, always with +F250)
4.	AC fuses [F1]
5.	Main contactor ([Q2], option +F250) (standard, always with +F250)
6.	Charging switch fuse [Q3]
7.	Charging contactor [Q4]
8.	Charging resistors [R1]
9.	L-filter [R03]
10.	Regenerative rectifier module [T01]
11.	Common mode filter [R1]
12.	DC fuses [F2]
13.	Inverter modules [T11]
14.	Motor(s)

## Overview drawing of a drive

This drawing shows an example of a drive with a regenerative rectifier unit and an inverter unit. Cables enter the cabinet through the bottom.



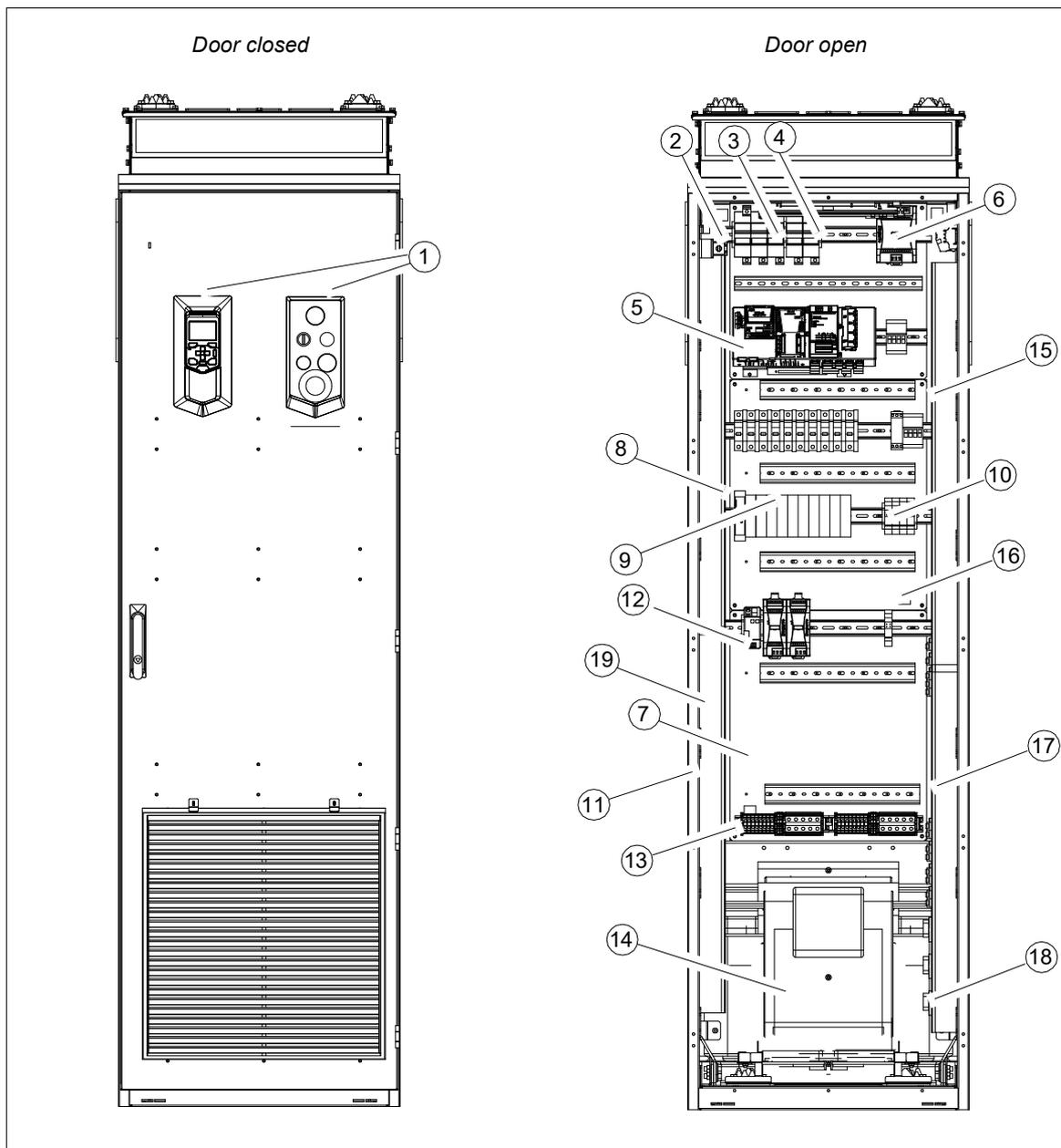
	Description
A	Auxiliary control cubicle. Contains control electronics and customer I/O connections. See page <a href="#">18</a> .
B	Incoming cubicle. Contains the power input cable terminals and switchgear. See page <a href="#">20</a> .
C	Rectifier module cubicle. Contains regenerative rectifier modules and a filter module. See page <a href="#">25</a> .
D	Inverter module cubicle. Contains inverter modules.
E	Inverter control cubicle. Contains inverter control unit.

## Layout drawings of the cubicles in the rectifier unit

This section contains layout drawings of cubicles that are included in a rectifier unit: auxiliary control cubicle, incoming cubicle and rectifier cubicle. The components, layout and size of the cubicles vary depending on the rectifier unit options.

### Layout drawing of an auxiliary control cubicle

This is an example of a 600 mm wide auxiliary control cubicle. The control unit of the rectifier unit, and auxiliary and control devices of the whole drive are located in the auxiliary cubicle, as well as the auxiliary voltage transformer(s) that supply the auxiliary circuits. The composition and size of the cubicle vary depending on the selected options.



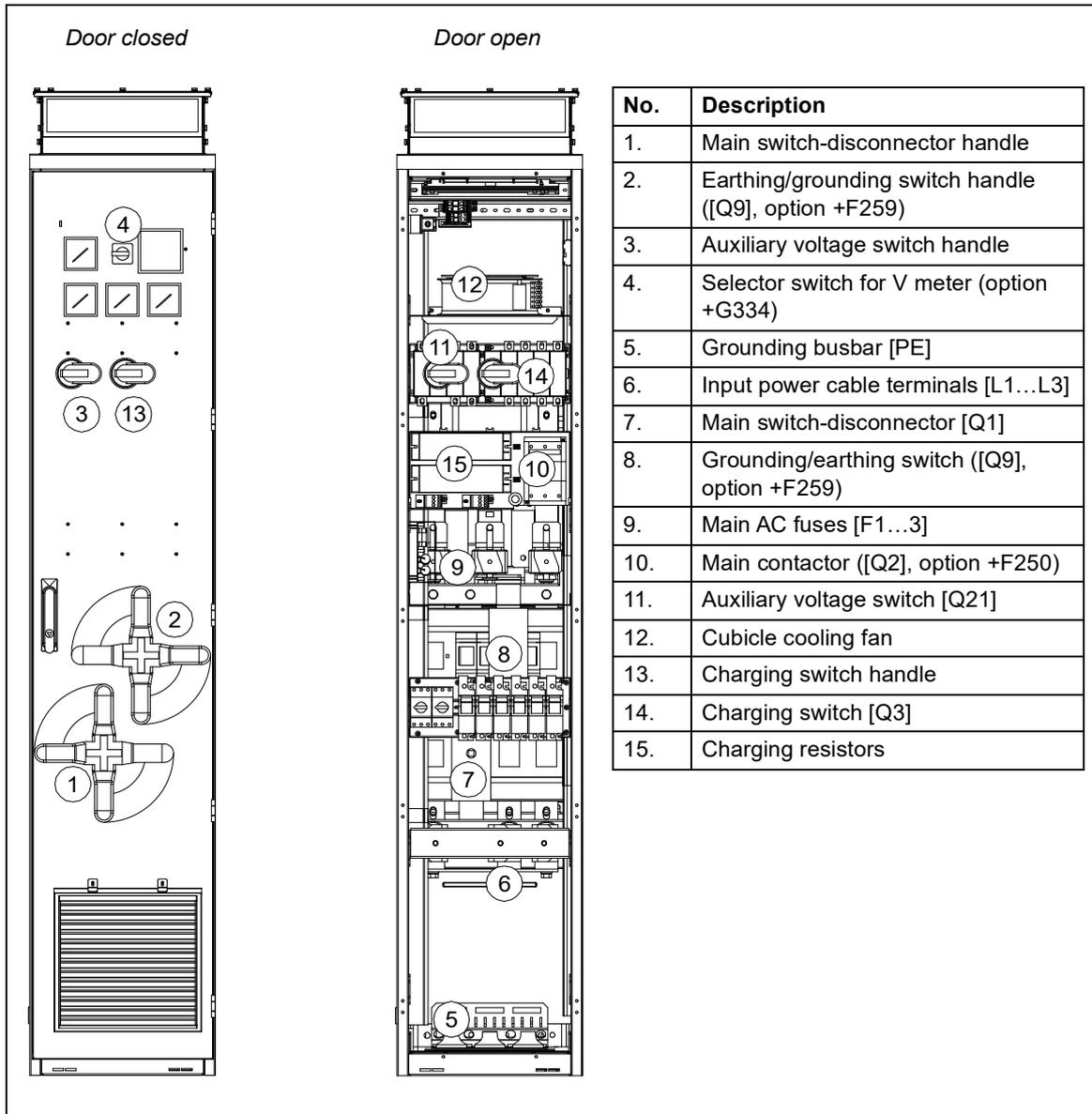
No.	Desig.	Description
1	S21, etc.	Control panel and operating switches. See section <a href="#">Rectifier unit control devices</a> on page 30.
2	F111.1... F111.3	Fuses, direct-on-line module cooling fans (option +C188)
3	F101	Fuses, IP54 roof fans (option +B055)
4	F21	Fuses, auxiliary voltage transformer
5	A51	Control unit (BCU)
6	T130	24 V DC power supply for cabinet lighting (option +G301)
7		Reserved space for customer-defined equipment
	T21	<u>At the backside of the assembly plate:</u> Auxiliary voltage transformer. <b>Note:</b> Connections are accessible from front. (Terminal block is at the lower part of cubicle.). Supplies control circuitry, cabinet fans (except for IP54 roof fan) and BL-1x-x filter module 1-phase fan.
	T101	<u>At the backside of the assembly plate:</u> Auxiliary voltage transformer. <b>Note:</b> Connections are accessible from front. (Terminal block is at the lower part of cubicle.) Supplies IP54 roof fan (option +B055).
8	A61	Main safety relay (optional)
	A62	Safety relay (optional)
	A63	Safety relay (optional)
9	A611	Safety relay (optional)
	A612	
	A613	
	A614	
	A621	
	A622	
	A623	
	A624	
10	K61...K66	Relays (optional)
11	X60	Terminal block, emergency stop circuit (optional)
12	T61	Power supply, safety circuit (optional)
	T62	Power supply, safety circuit (optional)
	F61	Protection switch, safety circuit (optional)
13	T21X1, T101X1	Terminal blocks, auxiliary voltage transformers T21 and T101 connections
14	T111	Auxiliary voltage transformer. Supplies direct-on-line fans (option +C188) of R8i and BL-2x-x modules.
15	X22	Auxiliary circuit terminal block (on side plate)
16	T22, X21	24 V DC power supply (on side plate)
17	F20, F22	Circuit breakers, auxiliary voltage circuits (on side plate)
18	Q20	Connections and switches for external auxiliary voltage supplies (UPS), (option +G307, on side plate)
	Q95	
	Q130	
19	X60, X61	Terminal blocks, emergency stop circuits (option, on side plate)

## Layout drawings of incoming cubicles

This section shows examples of the incoming cubicle layouts. The input power cables are connected to the incoming cubicle and it contains the main switching and disconnecting devices. The components, layout and size vary depending on the rectifier unit size and options.

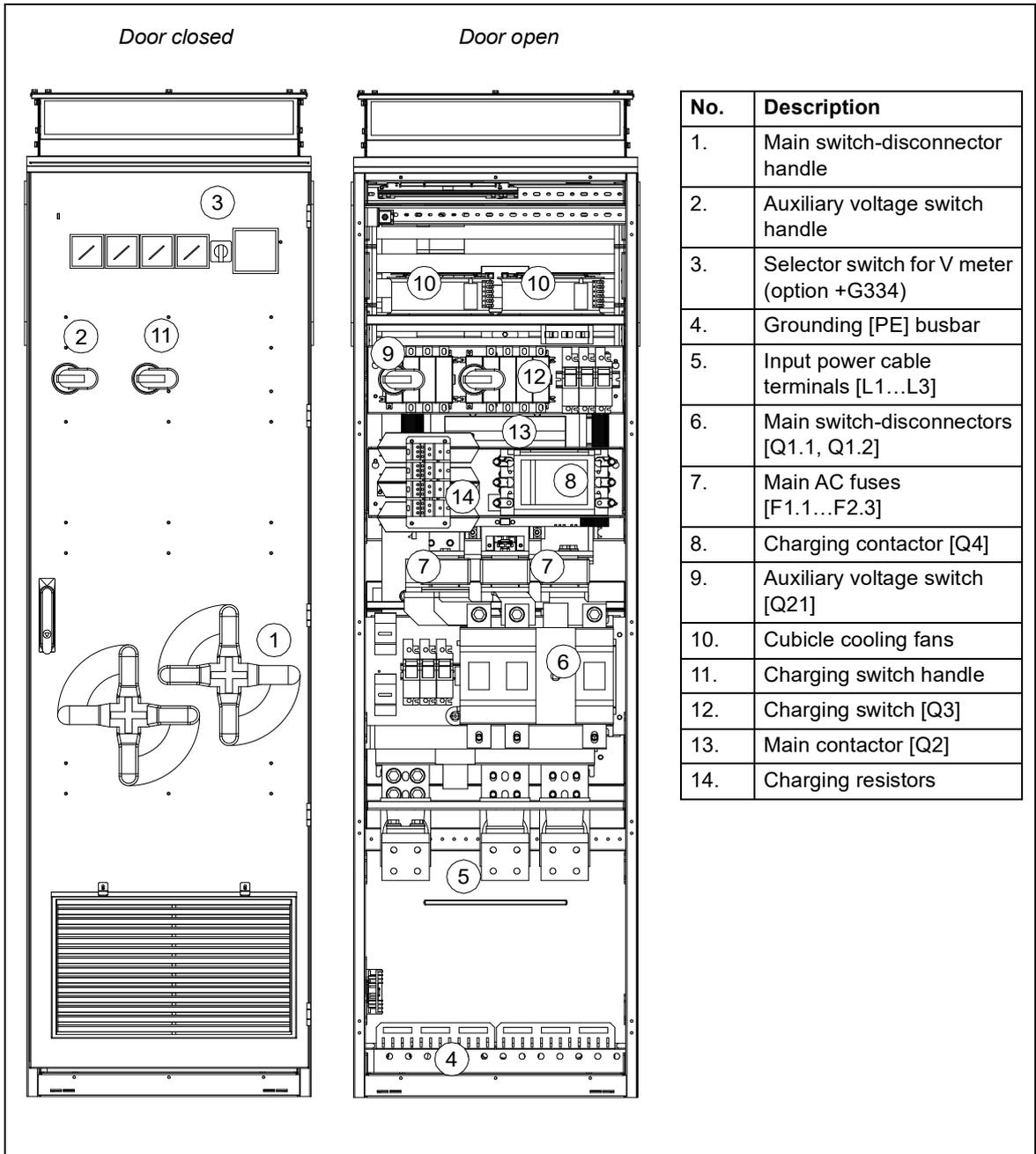
### Layout drawing of a 400 mm incoming cubicle

These layout drawings show a 400 mm wide incoming cubicle with cabling through the bottom (option +H350).



### Layout drawing of a 600 mm incoming cubicle

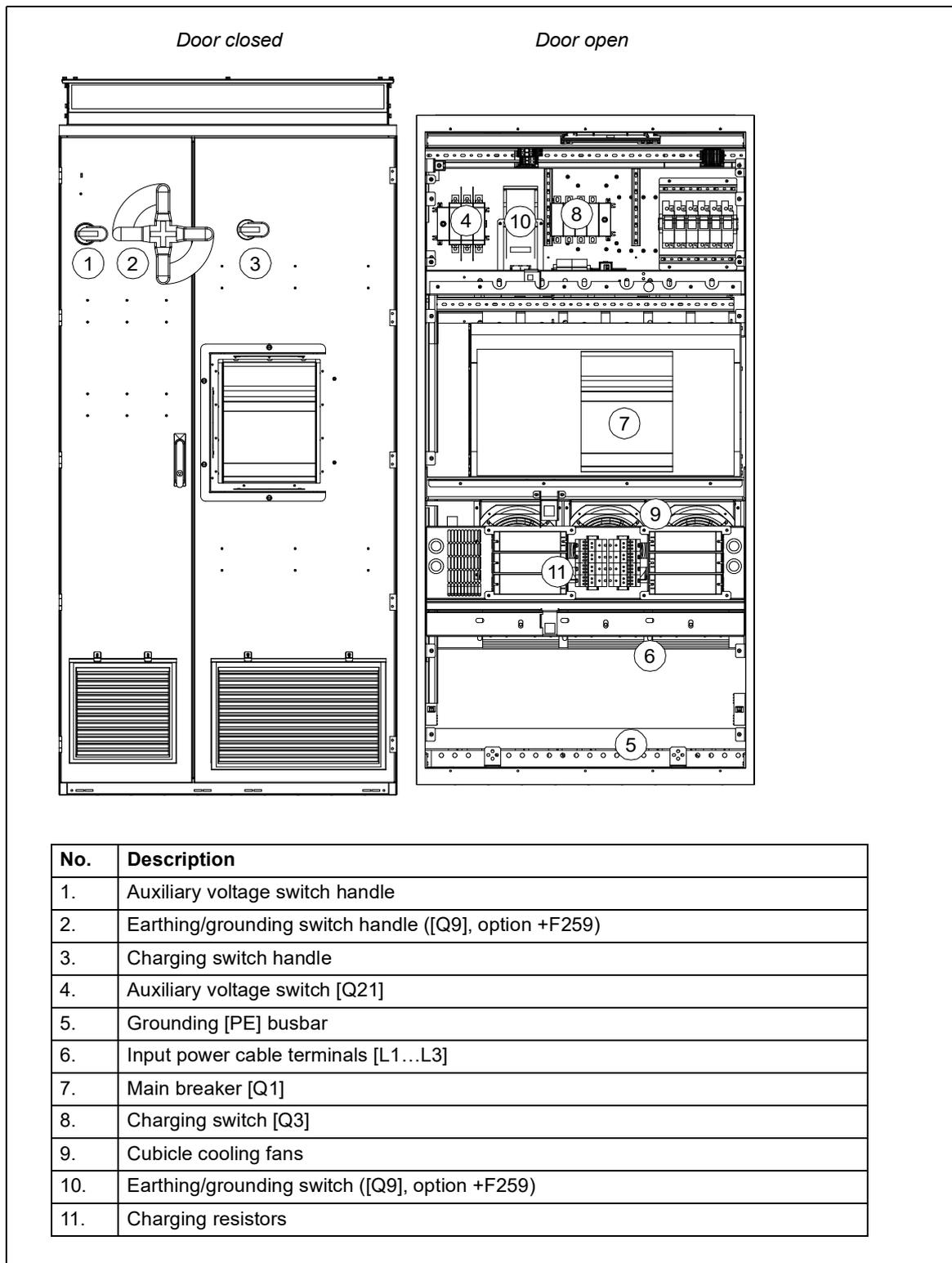
These layout drawings show a 600 mm wide incoming cubicle. Options used with this cubicle are bottom cable entry (options +H350 and +H367) and main switch-disconnector (option +F253).



No.	Description
1.	Main switch-disconnector handle
2.	Auxiliary voltage switch handle
3.	Selector switch for V meter (option +G334)
4.	Grounding [PE] busbar
5.	Input power cable terminals [L1...L3]
6.	Main switch-disconnectors [Q1.1, Q1.2]
7.	Main AC fuses [F1.1...F2.3]
8.	Charging contactor [Q4]
9.	Auxiliary voltage switch [Q21]
10.	Cubicle cooling fans
11.	Charging switch handle
12.	Charging switch [Q3]
13.	Main contactor [Q2]
14.	Charging resistors

### Layout drawing of a 1000 mm incoming cubicle

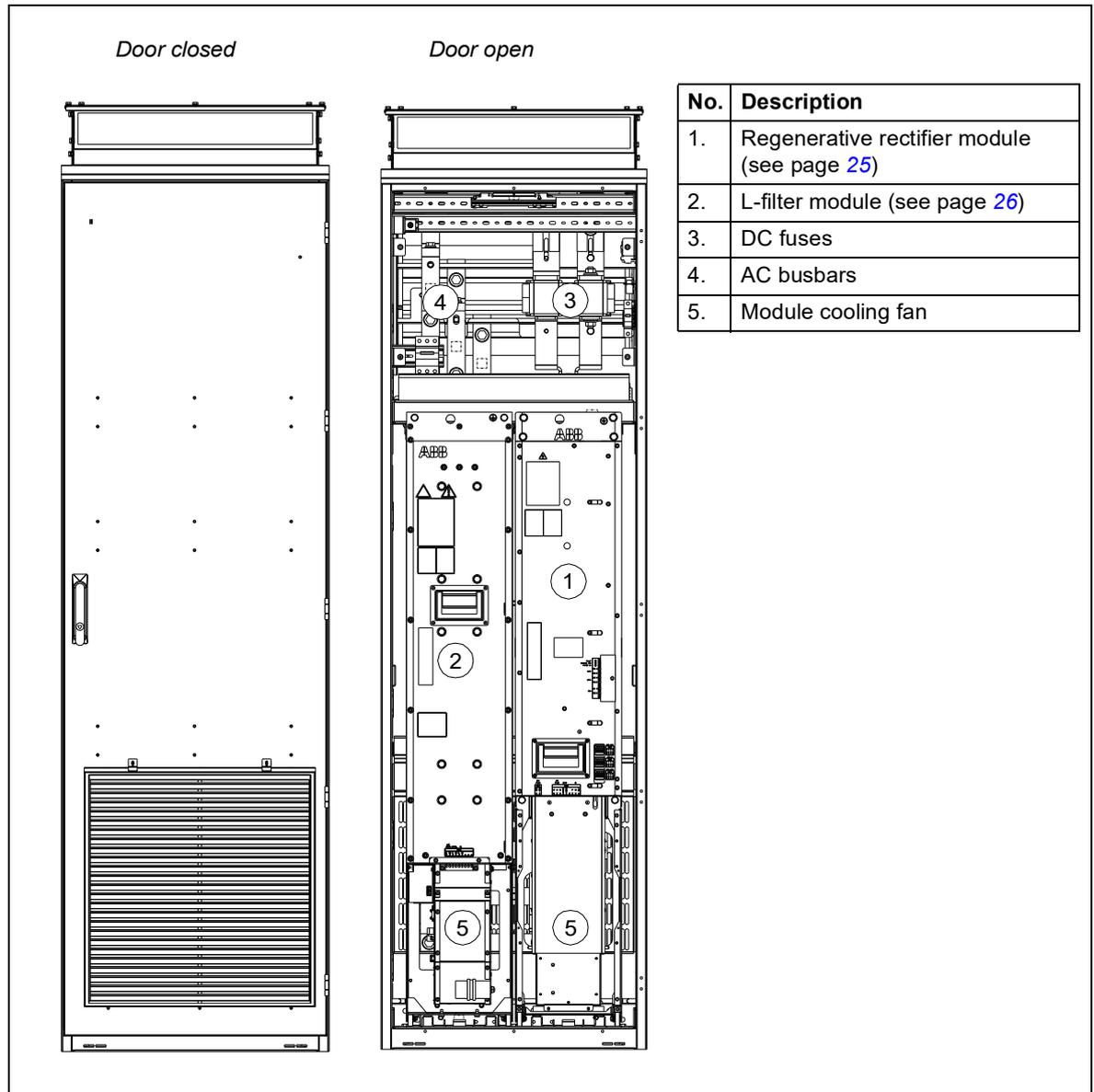
These layout drawings show a 1000 mm wide incoming cubicle with cabling through the bottom (option +H350).



## Layout drawing of rectifier module cubicles

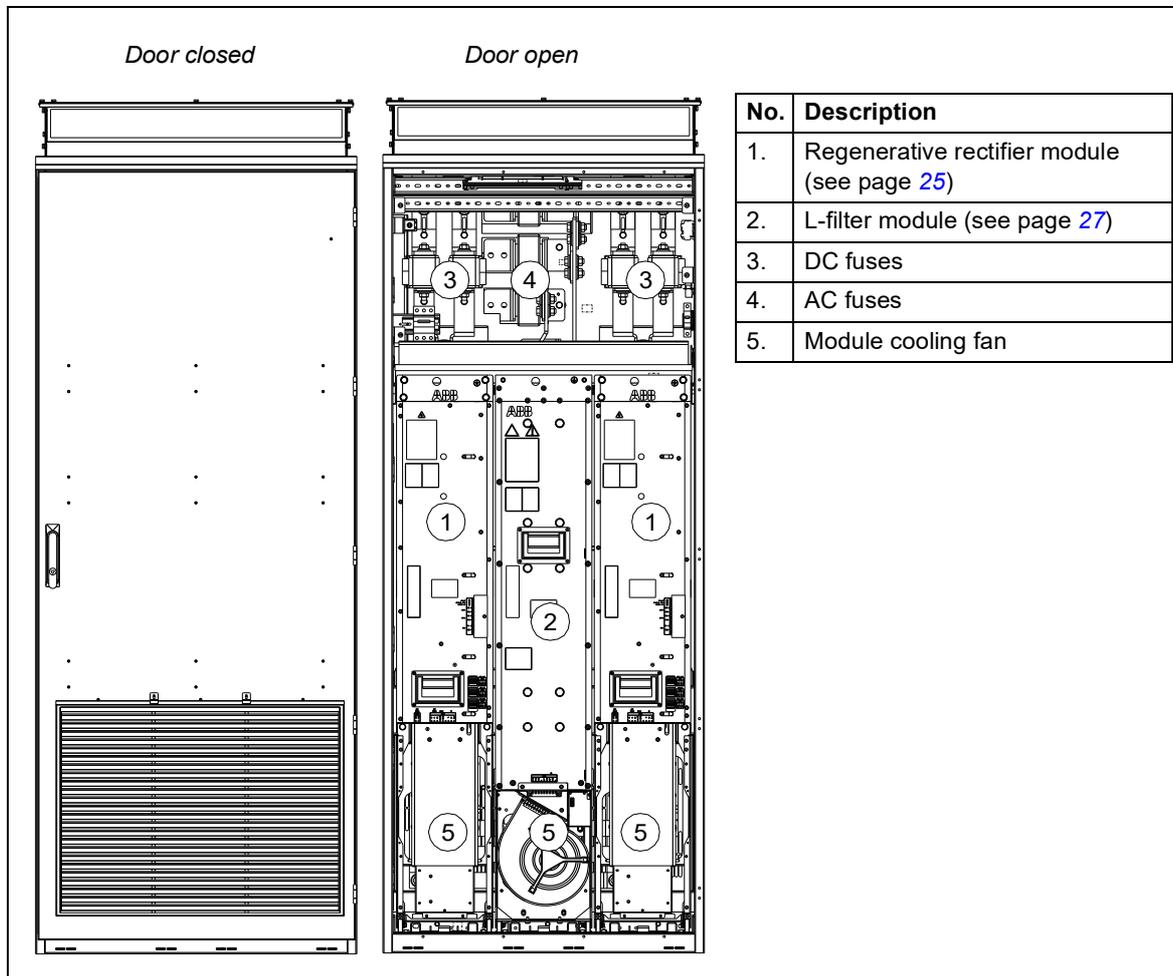
### ■ Layout drawing of a rectifier module cubicle 1×R8i

These layout drawings show the regenerative rectifier module cubicle. The cubicle contains regenerative rectifier module(s) and L-filter module(s).



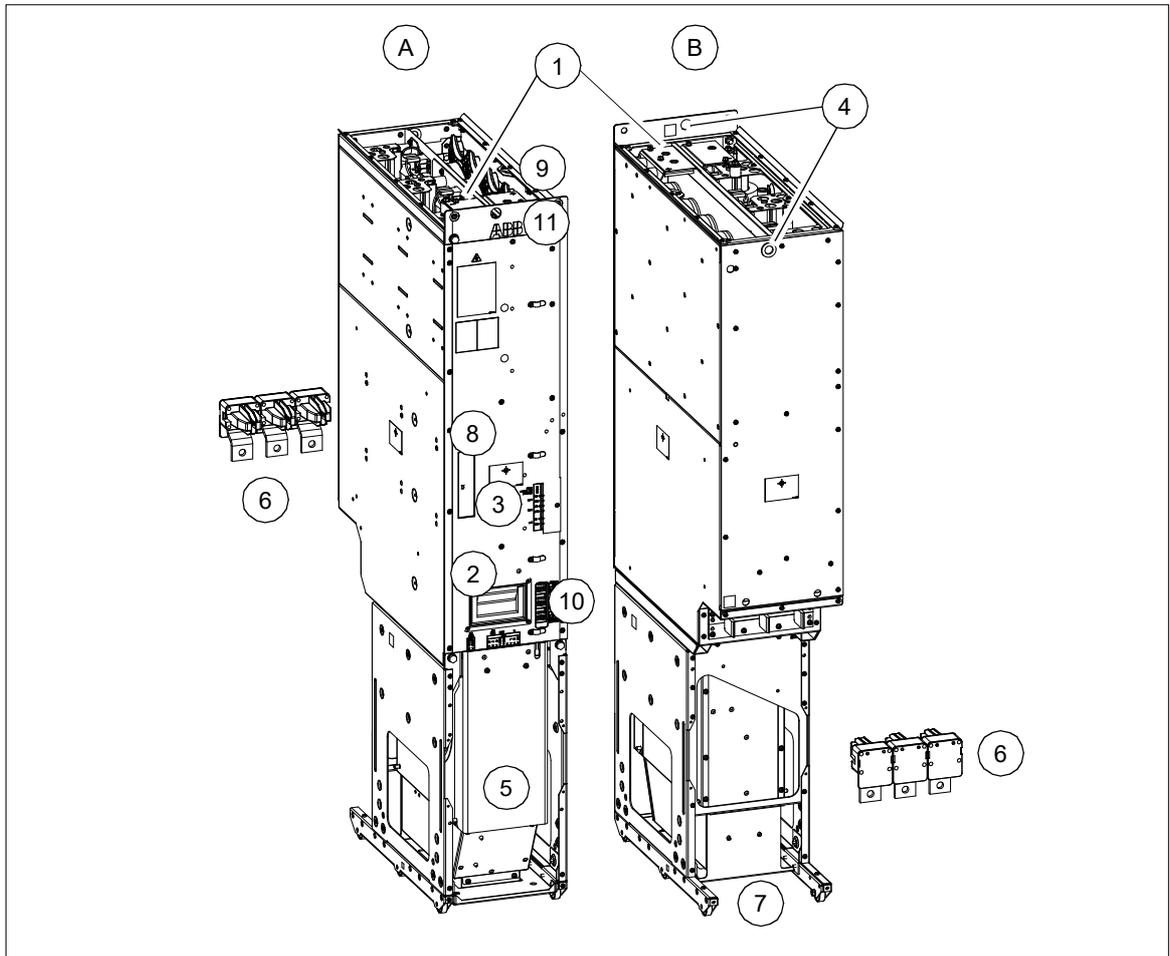
**Layout drawing of a rectifier module cubicle 2×R8i**

These layout drawings show the regenerative rectifier module cubicle. The cubicle contains regenerative rectifier module(s) and L-filter module(s).



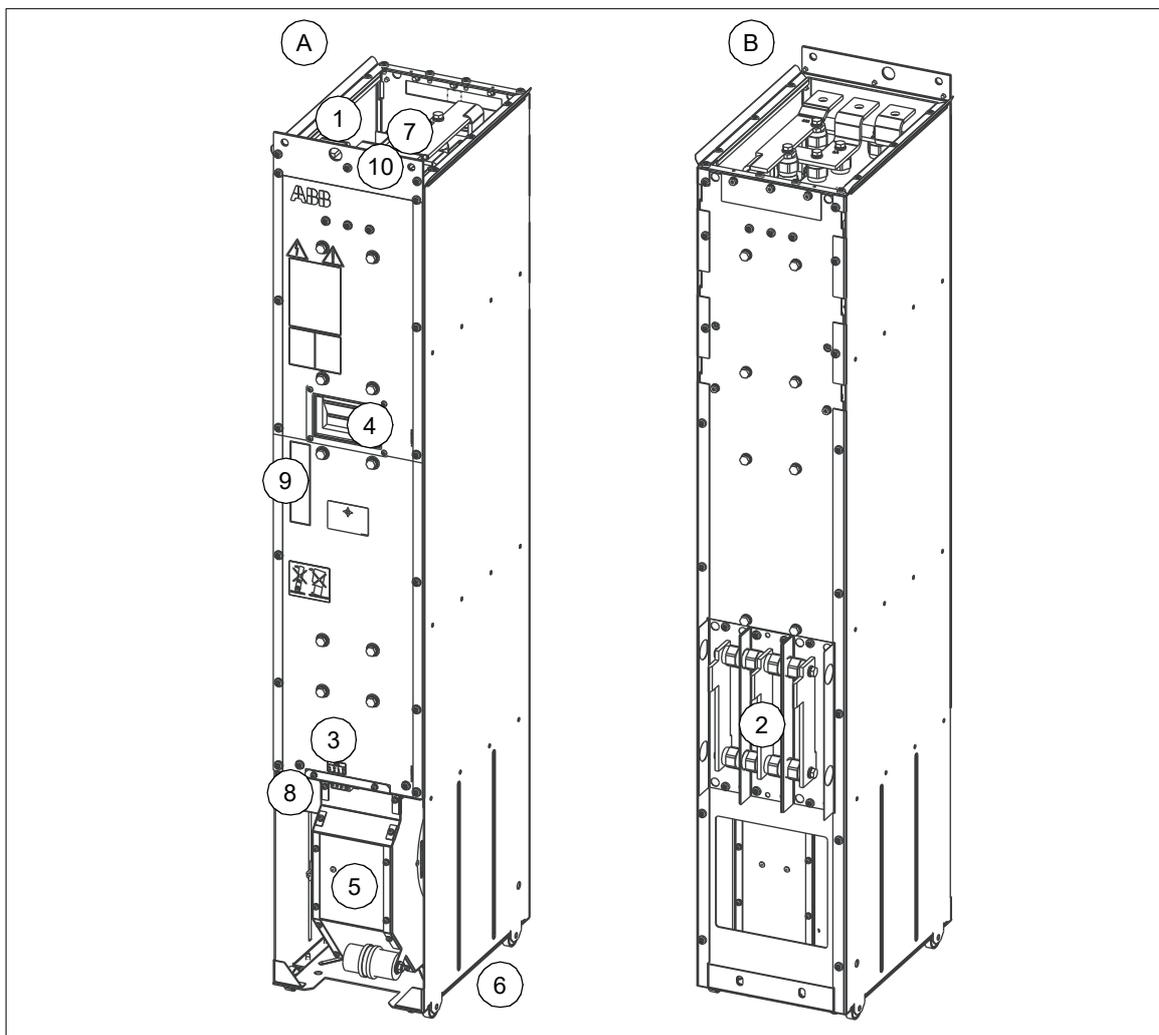
## Layout drawings of rectifier and L-filter modules

### ■ Regenerative rectifier module



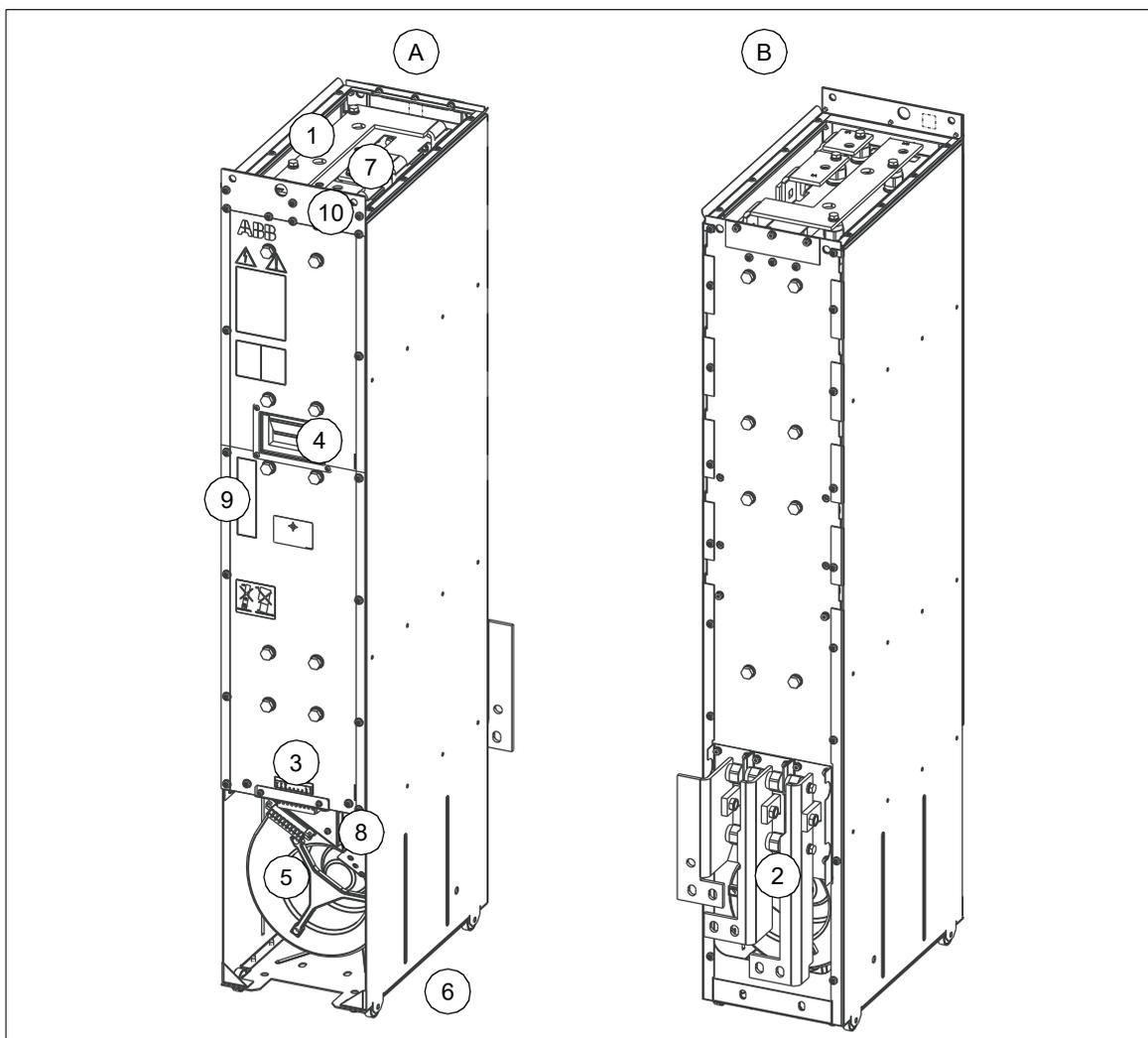
	Description
A	Regenerative rectifier module, frame size R8i, front
B	Regenerative rectifier module, frame size R8i, back
1.	DC output busbars
2.	Handle
3.	Fiber optic connectors of the module (wired to the control unit)
4.	Lifting eyes
5.	Fan
6.	Quick connector (AC input) (The counterpart fastened to the cabinet behind the module.)
7.	Wheels
8.	Type designation label of the module
9.	Terminal block [X50] (power supply for internal boards and module heating element, option +C183; DOL fan supply, option +C188)
10.	Connectors [X52], [X53]
11.	The unpainted grounding point (PE) between module frame and cabinet frame.

**L-filter module (BL-1x-x)**



	Description
A	L-filter module, front
B	L-filter module, back
1.	Input (AC) connection
2.	Output (AC) connection
3.	Terminal block [X55] (power supply for module heating element, option +C183; DOL fan supply, option +C188) (ready-connected)
4.	Handle
5.	Fan
6.	Wheels
7.	Terminal block [X30] (power supply for module DOL fan, option +C188 and heating element, option +C183; module thermal cutoff circuit)
8.	Fiber optic connections and LEDs of the BDFC board
9.	Type designation label
10.	The unpainted grounding point (PE)

■ L- filter module (BL-2x-x)



	Description
A	L-filter module, front
B	L-filter module, back
1.	Input (AC) connection
2.	Output (AC) connection
3.	Terminal block [X55] (power supply for module heating element, option +C183; DOL fan supply, option +C188) (ready-connected)
4.	Handle
5.	Fan
6.	Wheels
7.	Terminal block [X30] (power supply for module DOL fan, option +C188 and heating element, option +C183; module thermal cutoff circuit)
8.	Fiber optic connections and LEDs of the BDFC board
9.	Type designation label
10.	The unpainted grounding point (PE)

## Overview of power and control connections

Input power connections of the regenerative rectifier unit are terminals L1, L2 and L3 located in the lower part of the incoming cubicle. Power cables enter the cabinet via lead-throughs on the floor of the cubicle as standard. For further details, see section [Terminal and lead-through data for the input power cable](#) on page 118.

A cabinet-installed rectifier unit is typically controlled using the local control devices installed on the cabinet door. No additional control connections are needed. However, it is possible to:

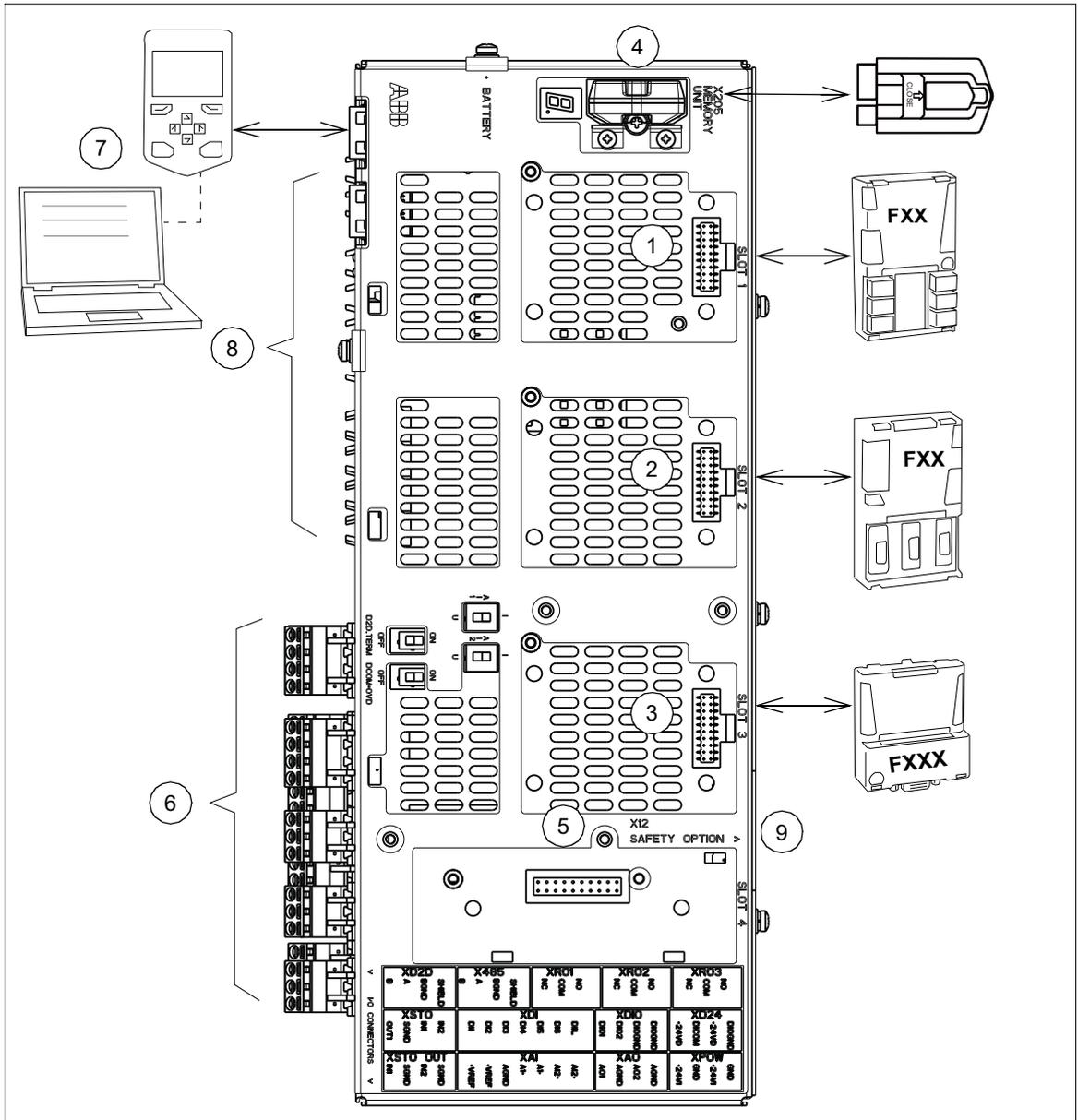
- control the unit through the control panel and fieldbus
- read the status information through the control panel, fieldbus and relay output
- stop the unit with an externally wired emergency stop button (if the unit is equipped with an emergency stop option).

The rectifier unit I/O control interface is mostly in internal use.

---

■ **Overview of the control connections on the BCU control unit**

The diagram shows the control connections and interfaces of the BCU control unit.



No.	Description
1 2 3	Analog and digital I/O extension modules and fieldbus communication modules can be inserted into slots 1, 2 and 3.
4	Memory unit
5	Slot 4 for RDCO-0x
6	Terminal blocks. See chapter <a href="#">Control unit</a> on page 133.
7	Control panel or PC
8	Fiber optic links to the rectifier modules
9	Not in use in rectifier/supply modules

## ■ Rectifier unit control devices

For examples of the door control devices of the regenerative rectifier unit, see [Layout drawing of an auxiliary control cubicle](#) on page 18 and [Layout drawings of incoming cubicles](#) on page 20.

The selection and exact location of control devices varies in different deliveries. The purpose of the devices is explained in the following sections.

### Main switch-disconnector / main breaker

The rectifier unit is equipped either with a main switch-disconnector ([Q1], option +F253) or withdrawable main breaker in high powers ([Q1], option +F255) as standard. With this device, you can isolate the main circuit of the drive from the power line. The switch has an operating handle on the cabinet door. The main breaker is withdrawable: you can disconnect the drive by cranking the breaker out with a separate loose handle (included in the delivery).



**WARNING!** The switch/breaker does not isolate the input power terminals, AC voltage meters ([P5], option +G334) or the auxiliary circuit from the power line. To isolate auxiliary voltage, use the auxiliary voltage switch [Q21]. To isolate the input power terminals and AC voltage meters, open the main breaker of the supply transformer. Especially in case of a main breaker, the main circuit breaker does not isolate the charging circuit. To isolate the charging circuit, use the charging switch [Q3].

---

**Note:** The grounding switch ([Q9], option +F259) and the main switch-disconnector are electrically interlocked: Only one of the switches can be closed at a time. To close the switches, you must also have the auxiliary control voltage on.

### Auxiliary voltage switch

The rectifier unit is equipped with an auxiliary voltage switch [Q21] as standard. Using the switch, you can disconnect the auxiliary circuit from the power line. The switch has an operating handle on the cabinet door.

### Grounding switch

The rectifier unit can be equipped with an optional grounding switch ([Q9], option +F259)). Using the switch, you can temporarily ground the main AC busbars of the rectifier unit during the maintenance work. The switch has an operating handle on the cabinet door.

---



**WARNING!** The grounding switch [Q9] grounds the main AC busbars between the main breaker and the L-filter module. It does not ground the input power terminals or auxiliary circuits.

---

**Note:** The grounding switch and the main switch-disconnector ([Q1], option +F253) are electrically interlocked: Only one of the switches can be closed at a time. To close the switches, you must also have the auxiliary control voltage on.

### Charging switch

The charging switch [Q3] is a standard device.

To charge the drive, the charging switch must be closed. The charging switch does not control the charging circuit, it just provides power to the charging circuitry. The charging circuit is controlled by the charging contactor [Q4], which is controlled by the control unit.

The charging switch has an operating handle on the cabinet door.

---

## Operating switch

The operating switch [S21] is a standard device.

By default, the operating switch controls the unit as follows:

- The ENABLE/RUN position: The control program closes the charging contactor [Q4] and the main DC link is charged via the charging circuit. After the DC link is charged, the main contactor [Q2] will be closed and the charging contactor [Q4] opened. The rectifier module starts operating.
- The OFF position: The control program opens the main contactor [Q2] and the rectifier module stops rectifying.

## Emergency stop button

The emergency stop button is an optional device ([S61], option +G331). Pressing the button activates the emergency stop function of the rectifier unit. The button locks to open position automatically. You must release the button before you can return to the normal operation. Before the restart, you also need to reset the emergency stop circuit with a separate reset button [S62]. See the section [E-stop reset button](#) (included in all emergency stop options) below.

## E-stop reset button

The emergency stop reset button [S62] is automatically installed on the door when the rectifier unit is equipped with an emergency stop function (options +Q951, +Q952, +Q963, +Q964 or +Q979). You can reset the emergency stop circuit with the button.

The emergency stop options are described in separate option manuals.

## Other door controls

- A voltage meter is an optional device ([P5], option +G334). There is a meter on the door and a switch [S5] with which you can select which phase voltage value to display.
- An AC phase current meter is an optional device ([P2.1, P2.2, P2.3], option +G335). It is also possible to have three meters on the door - one for each phase currents (option +3G335).
- Tripping button for the supply breaker ([S22], option +Q959) is a push button on the cabinet door for the user-defined use, for example, for tripping the breaker of the supply transformer of the drive. The button is wired to a terminal block at the factory. The user connects the external circuit to be controlled on site.
- An electrical on/off push button ([S23], option +G332) on the cabinet door for tripping the rectifier unit. The button is connected in series with the operating switch. The button trips the Run enable signal and further the main contactor of the drive.

## The ACS-AP-x control panel (option +J400)

With the control panel, you can:

- start and stop the rectifier unit
- view and reset the fault and warning messages, and view the fault history
- view actual signals
- change parameter settings
- change between local and external control.

The Run enable command (by default digital input DI2) must be on (1) so that the rectifier unit can be started and stopped with the control panel in the local mode. That is the case when the operating switch S21 is switched to the on (1) position.

---

To change between local and remote control mode, press the Loc/Rem key of the control panel. For the instructions on the use of the panel, see *ACS-AP-x assistant control panels user's manual* (3AUA0000085685 [English]). For the parameter settings, see *ACS880 regenerative rectifier control program firmware manual* (3AXD50000020827[English]).

### **PC connection**

There is a USB connector on the front of the control panel that can be used to connect a PC to the drive. When a PC is connected to the control panel, the control panel keypad is disabled. See also section [Connecting a PC](#) on page 55.

### **Fieldbus control**

You can control the rectifier unit through a fieldbus interface if the unit is equipped with an optional fieldbus adapter (for example, option +K454), and when you have configured the control program for the fieldbus control with the parameters. For information on the parameters, see *ACS880 regenerative rectifier control program firmware manual* (3AXD50000020827 [English]).

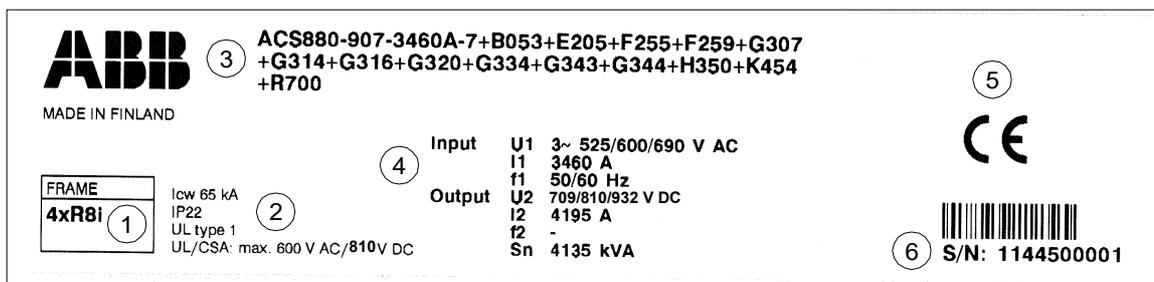
**Note:** To be able to switch the main contactor [Q2] and the rectifier unit on and off (Run enable signal) through the fieldbus, the Run enable command (by default digital input DI2) must be on (1). That is the case when the operating switch [S21] is switched to the on (1) position.

## Type designation labels

### ■ Type designation label of the regenerative rectifier unit

Each regenerative rectifier unit has a type designation label attached onto the inside of the cubicle door. The type designation label includes the ratings, appropriate markings, a type designation and a serial number of the unit.

An example label is shown below.



No.	Description
1.	Frame size
2.	Degree of protection
3.	Type designation. See section <a href="#">Type designation keys</a> on page 36.
4.	Ratings. See also section <a href="#">Ratings</a> on page 110, <a href="#">Electrical power network specification</a> on page 125 and <a href="#">DC connection data</a> on page 125.
5.	Valid markings. See <a href="#">Electrical planning instructions for ACS880 multidrive cabinets and modules (3AUA0000102324 [English])</a> .
6.	Serial number. The first digit of the serial number refers to the manufacturing plant. The next four digits refer to the unit's manufacturing year and week, respectively. The remaining digits complete the serial number so that there are no two units with the same number.

## ■ Type designation labels of the regenerative rectifier module

Each regenerative rectifier module also has type designation labels attached to it. The type designation stated on the labels contains information on the specifications and configuration of the module.

		<b>3</b> ACS880-104-0640A-3+E205		<b>5</b> 	
MADE IN FINLAND ABB Oy Hiomotie 13 00380 Helsinki Finland		<b>4</b> <b>INVERTER</b> Input U1 566 VDC I1 720 A f1 - Output U2 3~ 0...400 VAC I2 640 A fL 0...500 Hz Sn 443 kVA		<b>LINE CONVERTER</b> 3~ 400 VAC 576 A 50/60 Hz 566 VDC 698 A - 399 kVA	
FRAME R8i <b>1</b>				 <b>6</b> S/N: 1183300407	
Air cooling IP00 UL open type <b>2</b>					

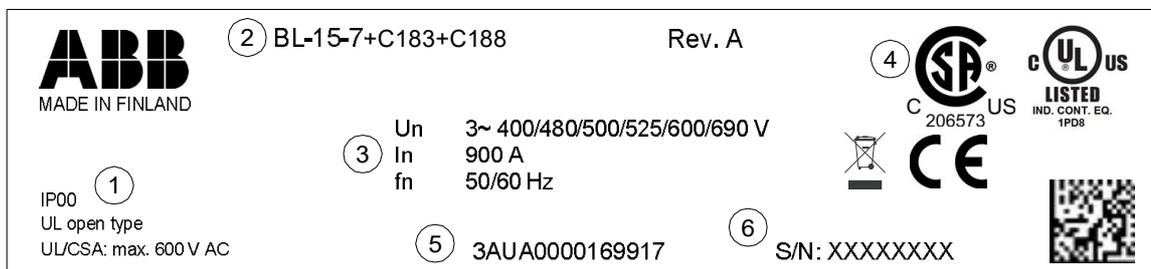
		<b>3</b> ACS880-104-0600A-7+E205		 S/N: 1150502323	
Input U1 I1 f1 Output U2 I2 I2 Sn		<b>4</b> <b>BRAKE CHOPPER</b> 742/849/976 V DC 1171 A - 3x 0...742/849/976 V DC 3x 465 A - 1300 kVA		<b>REGENERATIVE RECTIFIER</b> 3~ 525/600/690 V AC 900 A 50/60 Hz 709/810/932 V DC 1091 A - 1076 kVA	

No.	Description
1.	Frame size
2.	Degree of protection
3.	Type designation. See section <a href="#">Type designation keys</a> on page 36.
4.	Ratings. See also section <a href="#">Ratings</a> on page 110, <a href="#">Electrical power network specification</a> on page 125 and <a href="#">DC connection data</a> on page 125.
5.	Valid markings. See <a href="#">Electrical planning instructions for ACS880 multidrive cabinets and modules</a> (3AUA0000102324 [English]).
6.	Serial number. The first digit of the serial number refers to the manufacturing plant. The next four digits refer to the unit's manufacturing year and week, respectively. The remaining digits complete the serial number so that there are no two units with the same number.

## ■ Type designation label of the L-filter module

Each L-filter module has a type designation label attached to it.

An example label is shown below.



No.	Description
1.	Degree of protection
2.	Type designation
3.	Ratings
4.	Valid markings. See <i>Electrical planning instructions for ACS880 multidrive cabinets and modules</i> (3AUA0000102324 [English]).
5.	Code of the L-filter 3AUA0000180868 = BL-15-5+C183+C188 3AUA0000180869 = BL-25-5+C183+C188 3AUA0000169917 = BL-15-7+C183+C188 3AUA0000169919 = BL-25-7+C183+C188
6.	Serial number. The first digit of the serial number refers to the manufacturing plant. The next four digits refer to the unit's manufacturing year and week, respectively. The remaining digits complete the serial number so that there are no two units with the same number.

## Type designation keys

### ■ Type designation key of the regenerative rectifier unit

Type designation describes the composition of the unit in short. The type designation is visible on the label (sticker) which is attached to the cabinet. The complete designation code is divided in subcodes:

- The first 1...18 digits form the basic code. It describes the basic construction of the unit. The fields in the basic code are separated by hyphens.
- The option codes follow the basic code. Each option code starts with an identifying letter (common for the whole product series), followed by descriptive digits. The option codes are separated by plus signs.

The following table lists the basic code and option codes of the regenerative rectifier unit.

Code	Description
<b>Basic codes</b>	
ACS880	Product series
907	Construction: cabinet-installed regenerative rectifier unit. When no options are selected: Supply frequency 50 Hz, control voltage 230 V AC, IP22 (UL type 1), regenerative rectifier control program, EN/IEC industrial cabinet construction, power and control cabling through the bottom of the cabinet, cable lead through (European), input power connection by cabling, DC busbar material aluminum and copper, standard wiring material, speed-controlled fan, complete documentation in English in memory stick.
<b>Size</b>	
3460A	Refer to the rating tables on page <a href="#">110</a> .
<b>Voltage range</b>	
3	380...415 V. This is indicated in the type designation label as typical input voltage level 3 ~ 400 V AC.
5	380...500 V. This is indicated in the type designation label as typical input voltage levels 3 ~ 400/480/500 V AC.
7	525...690 V (525...600 V AC for UL/CSA). This is indicated in the type designation label as typical input voltage levels 3 ~ 525/600/690 V AC (600 V AC for UL/CSA).

This is a list of options codes. The standard features are marked with \*.

Code	Description	
+A012	Supply Frequency	Supply Frequency 50 Hz *
+A013	Supply Frequency	Supply Frequency 60 Hz
+B053	Degree of Protection	IP22, UL type 1 *
+B054	Degree of Protection	IP42, UL type 1
+B055	Degree of Protection	IP54, UL type 12
+C121	Cabinet Construction	Marine Construction
+C128	Channeled Air	Cooling air through bottom
+C129	Standards	UL-approved
+C130	Channeled Air	Channeled Air Outlet
+C134	Standards	CSA-approved
+C164	Cabinet options	Plinth height 1 (100 mm)
+C176	Cabinet options	Door hinges on left side
+C179	Cabinet options	Plinth height 2 (200 mm)
+C180	Cabinet Construction	Seismic design
+C188	DOL cooling fan	DOL cooling fan
+E210	EMC	2nd Environment

Code	Description		
+F250	Line Options	Line Contactor, standard in small power, (always with disconnecter F253)	*
+F253	Line Options	Disconnecter switch (door interlocked), standard in small power, (always with line contactor F250)	*
+F255	Breaker Option	Circuit Breaker, standard in high power	*
+F259	Earthing Switch	Earthing Switch	
+G300	Cabinet Options	Cabinet Heater	
+G301	Cabinet Options	Cabinet Lighting	
+G304	Control Voltage for Relays and Fans	115 VAC	
+G307	Terminals for External Control Voltage	Terminals for External Control Voltage (for UPS)	
+G314	DC Bus Material	Aluminium (standard up to 3200A)	*
+G315	DC Bus Material	Tin plated copper (option up to 3200ADC, standard above)	*
+G316	Supply Conductor Type	Cable Supply Conductors	*
+G317	Supply Conductor Type	Busbar Supply Conductors	
+G320	Control Voltage for Relays and Fans	230 VAC	*
+G330	Wiring materials	Halogen free wiring	
+G331	Emergency Stop	Emergency Stop Push button on the door (red)	
+G332	Electrical Disconnect Button	Electrical disconnect push button on the door (black, opens main contactor / ACB)	
+G333	Meters	kW-meter	
+G334	Meters	V-meter with selector switch	
+G335	Meters	A-meter in one phase	
+3G335	Meters	A-meter in three phases	
+G336	Arc Monitoring	Arc monitoring unit, 1 loop, Rea 101, including cable	
+G367	Arc Monitoring	Arc monitoring with current monitoring	
+G343	Special Options	Corrosion Classification Coupon in ACU (Purafil 3AUA64044052)	
+G344	Auxiliary Transformer	Auxiliary transformer	*
+G426	Arc Monitoring	Arc monitoring unit, extension for 2 loops, Rea 103, including cable	
+H350	Power Cabling Entry	Bottom Entry	*
+H351	Power Cabling Entry	Top Entry	
+H358	Motor Cabling	Cable gland plates (Steel 3mm, undrilled)	
+H364	Motor Cabling	Cable gland plates (Aluminium 3mm, undrilled)	
+H365	Motor Cabling	Cable gland plates (Brass 6mm, undrilled)	
+H367	Control Cabling	Control cable Bottom	*
+H368	Control Cabling	Control cable Top	
+J400	CDP-panel	Control Panel	
+J401	LMD-panel	Drive Monitoring Display	
+J410	Panels	Drive control panel connection kit	
+J412	Panels	Common control panel for a line-up	
+K450	Panels	Panel Bus, built with Ethernet cable, needs FDPI option board in each unit, max. 32	
+K451	FieldBus1	FDNA-01 (DeviceNet)	
+K454	FieldBus1	FPBA-01 (PROFIBUS)	
+K457	FieldBus1	FCAN-01 (CANopen)	

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Code	Description	
+K458	FieldBus1	FSCA-01 (Modbus RTU)
+K462	FieldBus1	FCNA-01 (ControlNet)
+K469	FieldBus1	FECA-01 (EtherCAT)
+K470	FieldBus1	FEPL-01 (Ether POWERLINK)
+K473	FieldBus1	FENA-11 (Ethernet (EtherNet/IP, Modbus/TCP, PROFINET))
+K475	FieldBus1	FENA-21 (High performance Ethernet (EtherNet/IP, Modbus/TCP, PROFINET) Daisy chain)
+K480	Ethernet switch	Ethernet switch for PC tool and control network
+K483	Ethernet switch	Ethernet switch with optical link for PC tool or control network
+L500	I/O-Options 2	FIO-11, Analogue I/O extension
+L501	I/O-Options 1	FIO-01, Digital I/O extension
+L509	DDCS	RDCO-04 DDCS communication for BCU-xx (4xTransmitter/Receiver)
+L515	I/O-Options 4	FEA-03 option module extension adapter
+L525	I/O-Options3	FAIO-01 Analog I/O Extension 2
+P913	Cabinet options	Special color
+Q951	Emergency Stop	Emergency stop, cat 0 with opening main contactor with safety relay
+Q952	Emergency Stop	Emergency stop, cat 1 with opening main contactor with safety relay
+Q954	Earth Fault Monitoring	Earth Fault Monitoring, Unearthed Mains IT
+Q959	Electrical Disconnect Button	Supply transformer breaker disconnect push button (red, wired to terminals) on the door
+Q963	Emergency stop	Emergency stop, stop cat 0, with STO with safety relay
+Q964	Emergency stop	Emergency stop, cat 1 with STO with safety relay
+Q979	Emergency stop	Emergency Stop, configurable stop cat 0 or 1 with FSO with STO
+R700	Language	English
+R701	Language	German manuals
+R702	Language	Italian manuals
+R705	Language	Swedish manuals
+R706	Language	Finnish manuals
+R707	Language	French manuals
+R708	Language	Spanish manuals
+R711	Language	Russian manuals
+R716	Documentation	User's Manuals paper copy, one set
+R717	Documentation	Paper copy, circuit diagrams and dimension drawings A3, other A4, complete documentation 2 and user manuals / Drive Unit

\*

## ■ Type designation key of the regenerative rectifier module

Type designation describes the composition of the module in short. The type designation is visible on the label (sticker) which is attached to the module. The complete designation code is divided in subcodes:

- The first 1...18 digits form the basic code. It describes the basic construction of the unit. The fields in the basic code are separated by hyphens.
- The plus codes follow the basic code. Each plus code starts with an identifying letter (common for the whole product series), followed by descriptive digits. The plus codes are separated by plus signs.

The following table lists the basic code and plus codes of the regenerative rectifier module.

CODE	DESCRIPTION
<b>Basic codes</b>	
ACS880	Product series
104	Construction: Regenerative rectifier module. The module delivery includes a speed-controlled cooling fan as standard.
<b>Size</b>	
1180A	Refer to the rating tables on page <a href="#">110</a> .
<b>Voltage range</b>	
3	380...415 V. This is indicated in the type designation label as typical input voltage level 3 ~ 400 V AC.
5	380...500 V. This is indicated in the type designation label as typical input voltage levels 3 ~ 400/480/500 V AC.
7	525...690 V (525...600 V AC for UL/CSA). This is indicated in the type designation label as typical input voltage levels 3 ~ 525/600/690 V AC (600 V AC for UL/CSA).
<b>Plus codes</b>	
C183	Internal heating element
C188	Direct-on-line (DOL) cooling fan
E205	Internal du/dt filters (When the module is used as an RRU, it must always be ordered with +E205.)
G304	115 V auxiliary voltage supply

## ■ Type designation key of the L-filter module

The designation code of the L-filter is divided in subcodes:

- The first 2 letters give the type of the L-filter, for example, **BL**-15-7. The numbers after the letters describe the rectifier modules with which the filter is used.
- The plus codes follow the basic code. Each plus code starts with an identifying letter (common for the whole product series), followed by descriptive digits. The plus codes are separated by plus signs.

CODE	DESCRIPTION
<b>Basic codes</b>	
BL-15	L-filter for frame 1×R8i rectifier module
BL-25	L-filter for frame 2×R8i
<b>Voltage range</b>	
5	Voltage rating: 380 ... 500 V. This is indicated in the type designation label as typical input voltage level 400/480/500 V AC.
7	Voltage rating: 525...690 V. This is indicated in the type designation label as typical input voltage 525/600/690 V AC (600 V AC UL/CSA).
<b>Plus codes</b>	
C183	Heating element (included in the delivery as standard)
C188	Direct-on-line (DOL) cooling fan (included in the delivery as standard)
G304	BL-1x-x only: 115 V AC 1-phase fan supply



## 3

# Electrical installation

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## Contents of this chapter

This chapter instructs how to check the insulation of the assembly and how to install the input power cables and control cables. The information is valid for cabinet-installed ACS880-907 rectifier units.

For more information on cable selection, protections, etc, see *Electrical planning instructions for ACS880 multidrive cabinets and modules* (3AUA0000102324 [English]).

---



**WARNING!** Only qualified electricians are allowed to do the work described in this chapter. Read the safety instructions given in *Safety instructions for ACS880 multidrive cabinets and modules* (3AUA0000102301 [English]) before you install, commission, use or service the drive.

---

## Electrical safety precautions

This information is for all personnel who do work on the drive, motor cable or motor.

---



**WARNING!** Obey these instructions. If you ignore them, injury or death, or damage to the equipment can occur. If you are not a qualified electrician, do not do installation or maintenance work. Go through these steps before you begin any installation or maintenance work.

---

1. Keep the cabinet doors closed when the drive is powered. With the doors open, a risk of a potentially fatal electric shock, arc flash or high-energy arc blast exists.
2. Clearly identify the work location.
3. Disconnect all possible voltage sources. Lock and tag.
  - Open the main disconnecting device of the drive.
  - If the main disconnecting device does not disconnect the voltage from AC input power busbars of the drive cabinet, open the disconnecter of the supply unit transformer.
  - Open the auxiliary voltage switch-disconnector (if present), and all the other possible disconnecting devices that isolate the drive from dangerous voltage sources.
  - If you have a permanent magnet motor connected to the drive, disconnect the motor from the drive with a safety switch or by other means.
  - Make sure that re-connection is not possible.
  - Disconnect any external power sources from the control circuits.
  - After you disconnect the drive, always wait for 5 minutes to let the intermediate circuit capacitors discharge before you continue.
4. Protect any other energized parts in the work location against contact.
5. Take special precautions when close to bare conductors.
6. Measure that the installation is de-energized. If the measurement requires removal or disassembly of shrouding or other cabinet structures, obey the local laws and regulations applicable to live working (including – but not limited to – electric shock and arc protection).
  - Use a multimeter with an impedance of at least 1 Mohm.



**WARNING!** The busbars inside the cabinet are partially coated. Measurements made through the coating are potentially unreliable, so only measure at uncoated portions. Note that the coating does not constitute a safe or touch-proof insulation.

---

- Make sure that the voltage between the drive input power terminals and the grounding (PE) busbar is close to 0 V.
  - Make sure that the voltage between the drive DC busbars (+ and -) and the grounding (PE) busbar is close to 0 V.
  - If you have a permanent magnet motor connected to the drive, make sure that the voltage between the drive output terminals and the grounding (PE) busbar is close to 0 V.
-

7. Install temporary grounding as required by the local regulations.
8. Ask for a permit to work from the person in control of the electrical installation work.

## General notes

### ■ Static electricity

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**WARNING!** Circuit boards contain components sensitive to electrostatic discharge (ESD). Wear a grounding wrist band when handling the boards. Do not touch the boards unnecessarily.

---

### ■ Optical components

Handle fiber optic cables with care. When unplugging optic cables, always grab the connector, not the cable itself. Do not touch the ends of the fibers with bare hands as the fiber is extremely sensitive to dirt.

## Checking the insulation of the assembly

### ■ Rectifier unit

Do not make any voltage tolerance or insulation resistance tests on the rectifier unit. Every drive system has been insulation tested between the main circuit and the chassis at the factory. Also, there may be voltage-limiting circuits inside the drive system which cut down the testing voltage automatically.

### ■ Input power cable

Check the insulation of the supply (input) cable according to local regulations before connecting it to the drive.



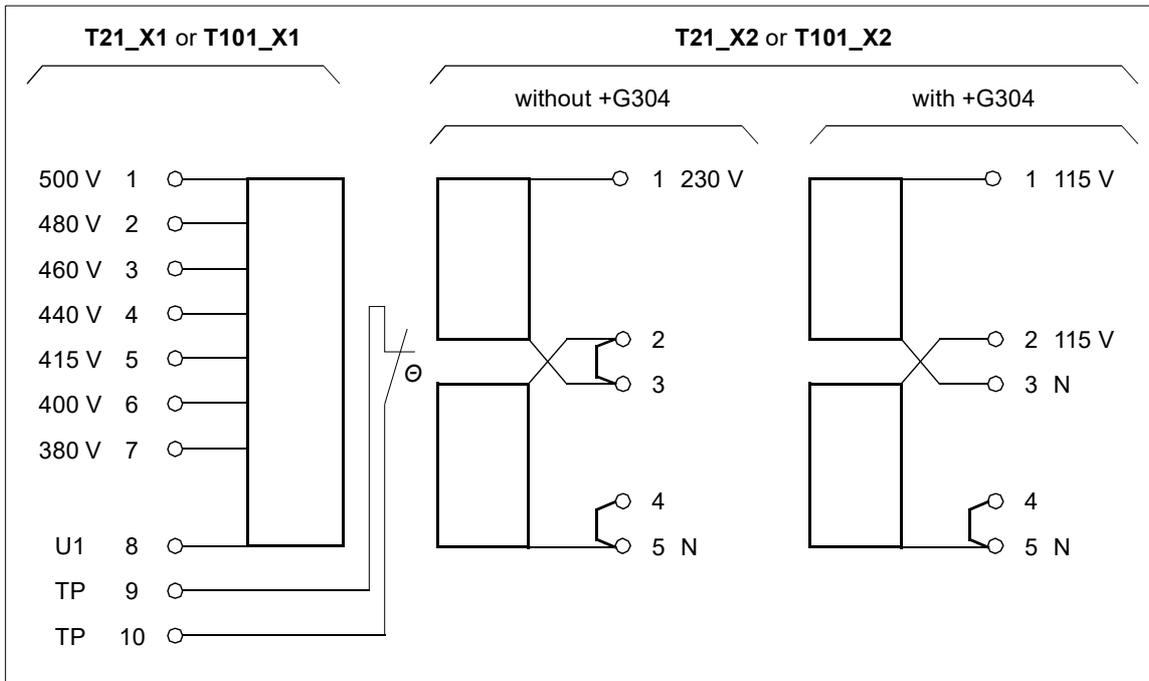
## Setting the voltage range of auxiliary voltage transformers [T21, T101, T111]

Auxiliary voltage transformer [T21, T101, T111] connections are made at the factory according to the supply voltage and desired output voltage and you do not need to change the settings during the installation. If needed (for example, due to a later part replacement), check the connections using the diagrams below.

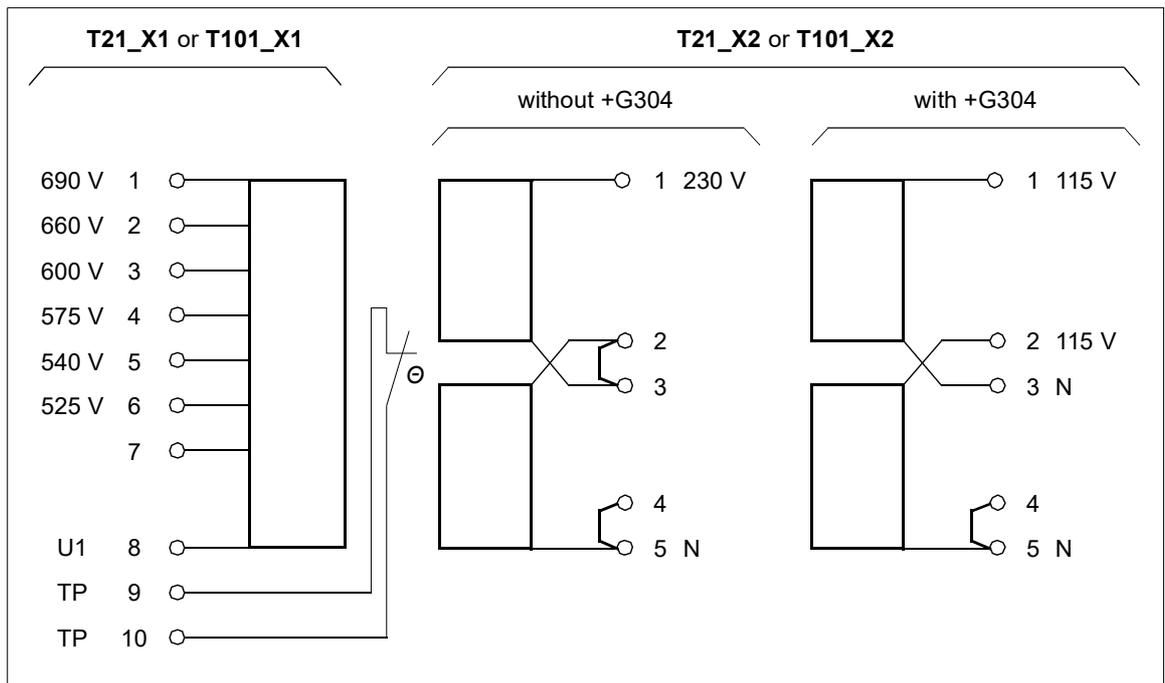
Transformer [T21] is a standard equipment. Transformers [T101] and [T111] are present if required by the options specified by the customer.

The voltage settings of transformers [T21] and [T101] are made at terminal blocks [T21\_X1/X2] and [T101\_X1/X2] respectively. The settings of transformer [T111] are made on the transformer itself. The locations of the transformers and the terminal blocks are shown in section [Layout drawing of an auxiliary control cubicle](#) on page 18 and the circuit diagrams delivered with the drive.

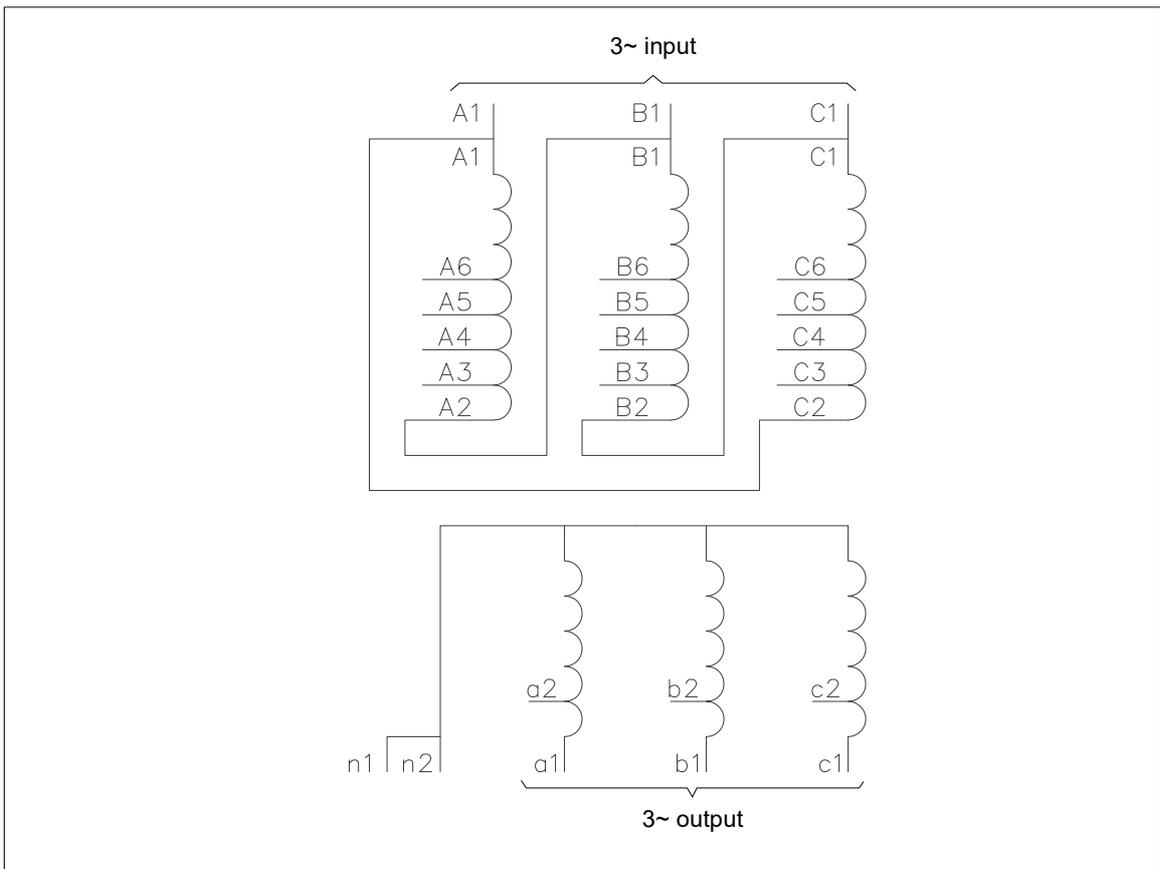
### ■ [T21/T101] connections (400...500 V units)



■ [T21/T101] connections (690 V units)



**[T111] connections**



Supply voltage	3~ input			3~ output		
	Terminals	Tap settings			Terminals	
		A1-	B1-	C1-	400 V (50 Hz)	320/340 V (60 Hz)
690 V	A1, B1, C1	C2	A2	B2	a1, b1, c1	a2, b2, c2
660 V	A1, B1, C1	C2	A2	B2	a1, b1, c1	a2, b2, c2
600 V	A1, B1, C1	C3	A3	B3	a1, b1, c1	a2, b2, c2
575 V	A1, B1, C1	C3	A3	B3	a1, b1, c1	a2, b2, c2
540 V	A1, B1, C1	C4	A4	B4	a1, b1, c1	a2, b2, c2
525 V	A1, B1, C1	C4	A4	B4	a1, b1, c1	a2, b2, c2
500 V	A1, B1, C1	C4	A4	B4	a1, b1, c1	a2, b2, c2
480 V	A1, B1, C1	C5	A5	B5	a1, b1, c1	a2, b2, c2
460 V	A1, B1, C1	C5	A5	B5	a1, b1, c1	a2, b2, c2
440 V	A1, B1, C1	C5	A5	B5	a1, b1, c1	a2, b2, c2
415 V	A1, B1, C1	C6	A6	B6	a1, b1, c1	a2, b2, c2
400 V	A1, B1, C1	C6	A6	B6	a1, b1, c1	a2, b2, c2
380 V	A1, B1, C1	C6	A6	B6	a1, b1, c1	a2, b2, c2

## Connecting the control cables for the supply unit

### ■ Default I/O connection diagram

See chapter [Control unit](#).

### ■ Connection procedure



**WARNING!** Only qualified electricians are allowed to do this work. Read the complete safety instructions of the drive. Ignoring the instructions can cause physical injury or death, or damage to the equipment.

---



**WARNING!** With aluminum cables, apply grease to stripped conductors before attaching them to non-coated aluminum cable lugs. Obey the grease manufacturer's instructions. Aluminum-aluminum contact can cause oxidation in the contact surfaces.

---

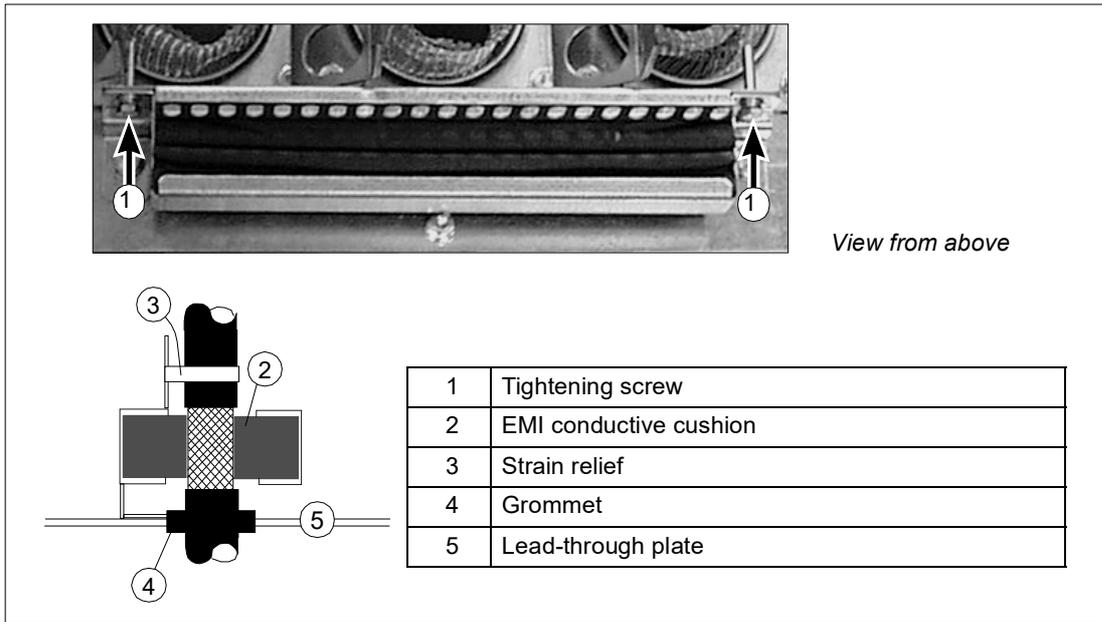
1. Disconnect the drive from the AC power line and make sure it is safe to start the work. Obey the instructions in section [Electrical safety precautions](#) on page 42.
2. Route the control cables to the control connection terminals. Use the existing trunking in the cabinet wherever possible. Use sleeving if cables are laid against sharp edges.
3. Run the control cables into the auxiliary control cubicle as described in section [Grounding the outer shields of the control cables at the cabinet lead-through](#) below.
4. Connect the control cables. See the circuit diagrams delivered with the drive.

### Grounding the outer shields of the control cables at the cabinet lead-through

Ground the outer shields of all control cables 360 degrees at the EMI conductive cushions as follows:

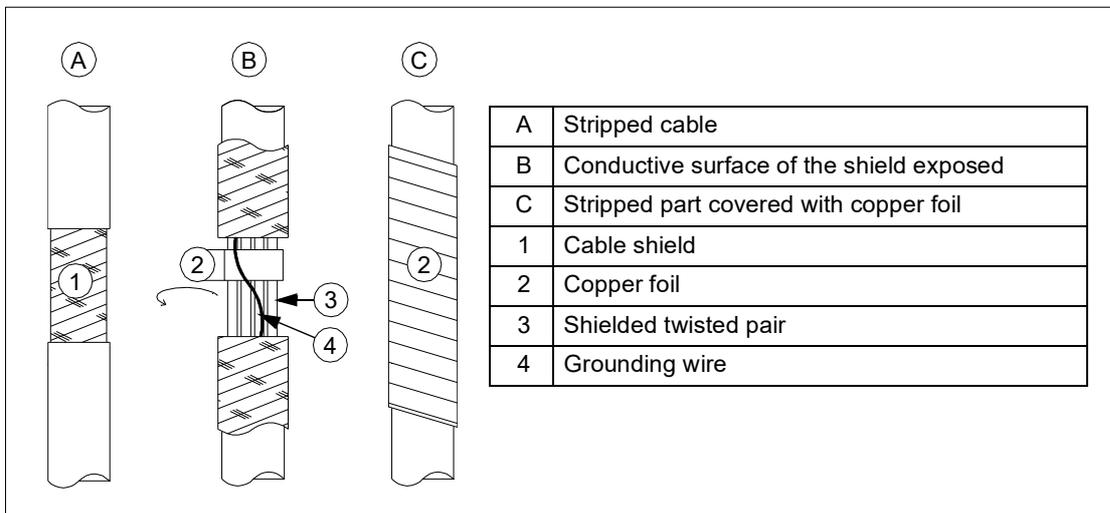
1. Loosen the tightening screws of the EMI conductive cushions and pull the cushions apart.
  2. Cut adequate holes to the rubber grommets in the lead-through plate and lead the cables through the grommets and the cushions into the cabinet.
  3. Strip off the cable plastic sheath above the lead-through plate just enough to ensure proper connection of the bare shield and the EMI conductive cushions.
  4. Tighten the two tightening screws so that the EMI conductive cushions press tightly round the bare shield.
  5. Secure the cables mechanically at the lead-through strain relief.
  6. Keep the shields continuous as close to the connection terminals as possible.
- 





**Note:** If the outer surface of the shield is non-conductive:

- Cut the shield at the midpoint of the bare part. Be careful not to cut the conductors or the grounding wire (if present).
- Turn the shield inside out to expose its conductive surface.
- Cover the turned shield and the stripped cable with copper foil to keep the shielding continuous.



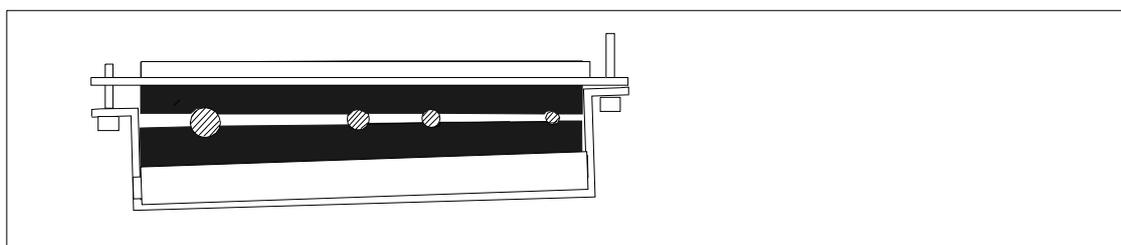
**Note for top entry of cables:** When each cable has its own rubber grommet, sufficient IP and EMC protection can be achieved. However, if very many control cables come to one cabinet, plan the installation beforehand as follows:

1. Make a list of the cables coming to the cabinet.
2. Sort the cables going to the left into one group and the cables going to the right into another group to avoid unnecessary crossing of cables inside the cabinet.
3. Sort the cables in each group according to size.

- Group the cables for each grommet as follows ensuring that each cable has a proper contact to the cushions on both sides.

Cable diameter in mm	Max. number of cables per grommet
$\leq 13$	4
$\leq 17$	3
$< 25$	2
$\geq 25$	1

- Arrange the bunches according to size from thickest to the thinnest between the EMI conductive cushions.



- If more than one cable go through a grommet, seal the grommet by applying Loctite 5221 (catalogue number 25551) inside the grommet.

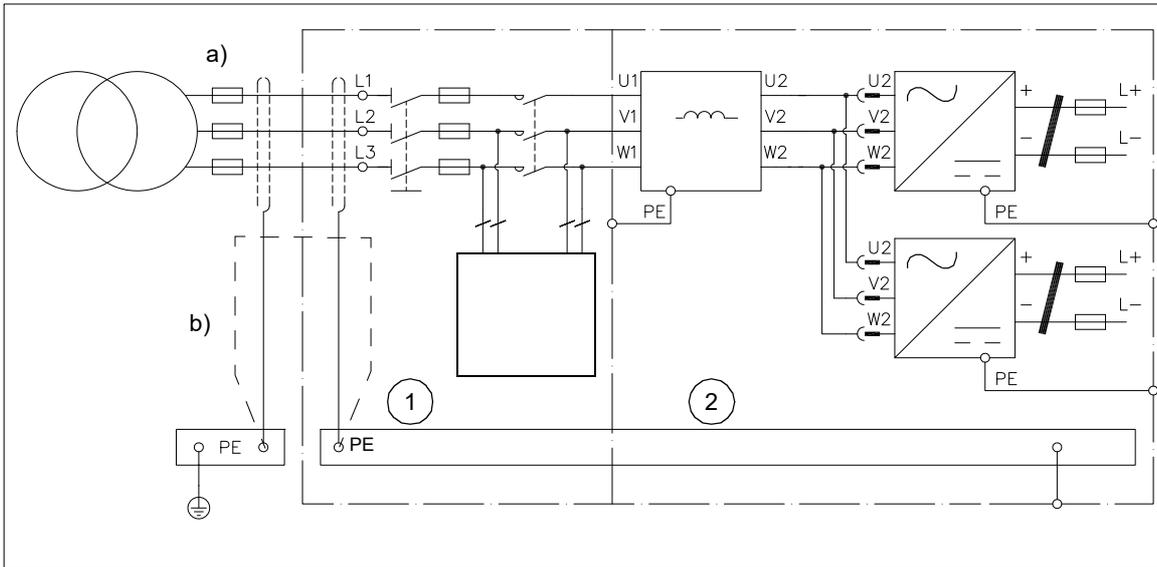
## Wiring the functional safety options

The wiring instructions for the functional safety options such as +Q951, +Q952, etc are in separate option manuals.



## Connecting the input power cables

### ■ Connection diagram of R8i and multiples



	Description
1.	Incoming cubicle
2.	Rectifier cubicle

#### Notes:

a) Fuses or other protection means.

b) Use a separate PE conductor in addition if the conductivity of the shield does not meet the requirement for the PE conductor. See *Electrical planning instructions for ACS880 multidrive cabinets and modules* [3AUA0000102324 (English)].

For the cable selection instructions, see *Electrical planning instructions for ACS880 multidrive cabinets and modules* [3AUA0000102324 (English)].

## ■ Connection procedure

The cable entry details, and cable connection details are shown in chapter [Terminal and lead-through data for the input power cable](#) page 118.



**WARNING!** Only qualified electricians are allowed to do this work. Read the complete safety instructions of the drive. Ignoring the instructions can cause physical injury or death, or damage to the equipment.

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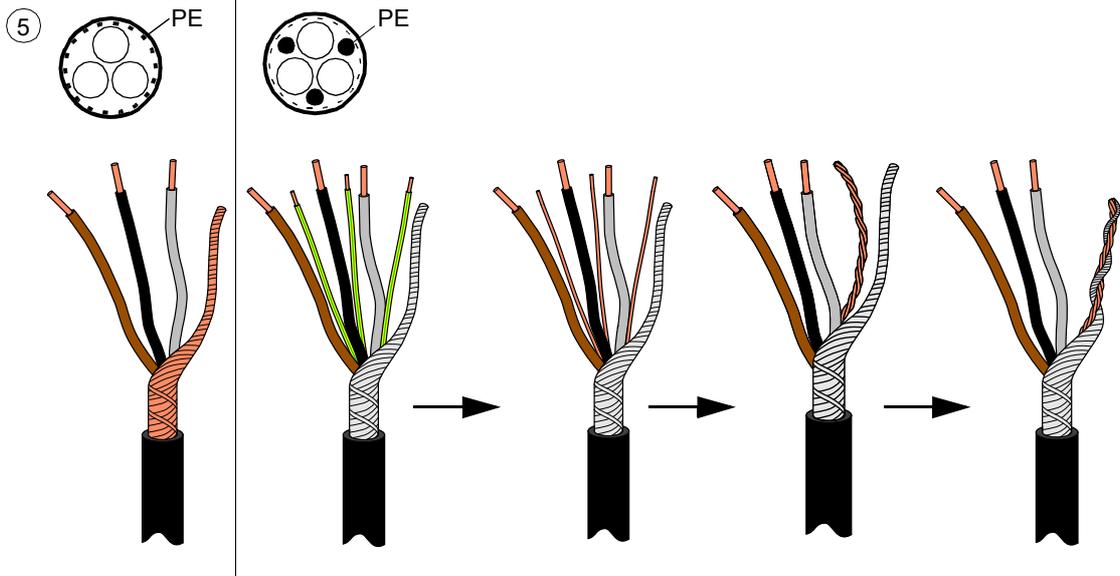
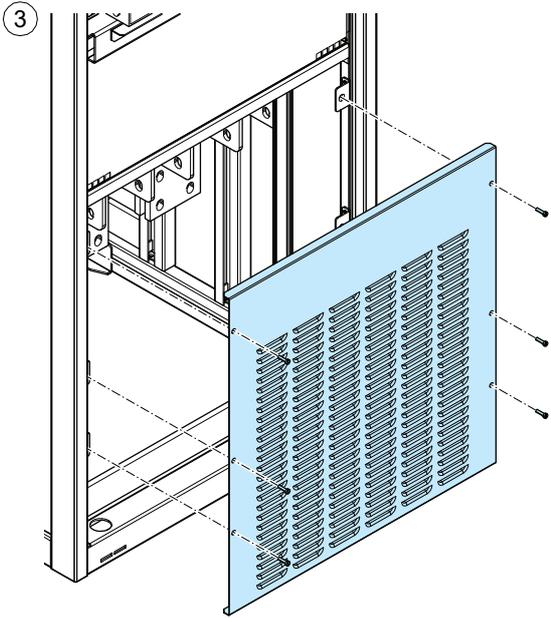


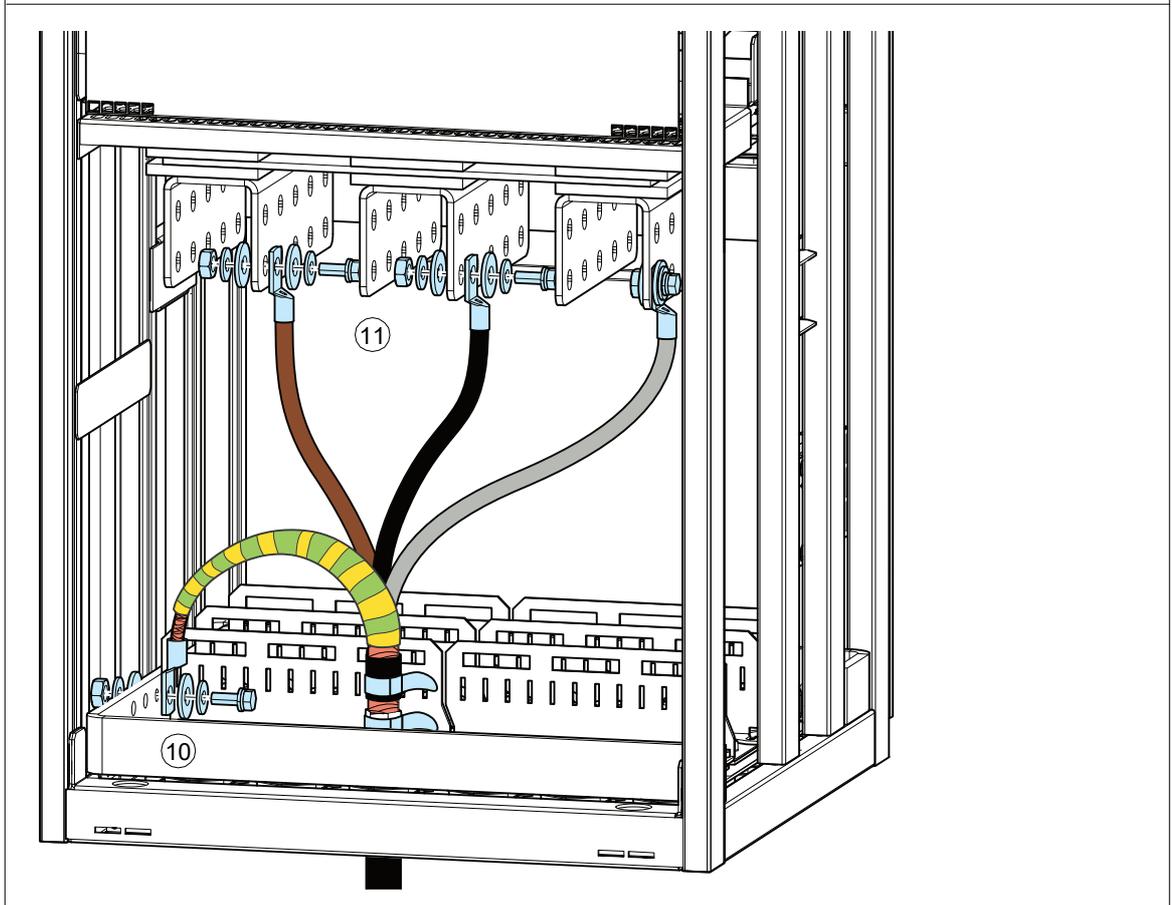
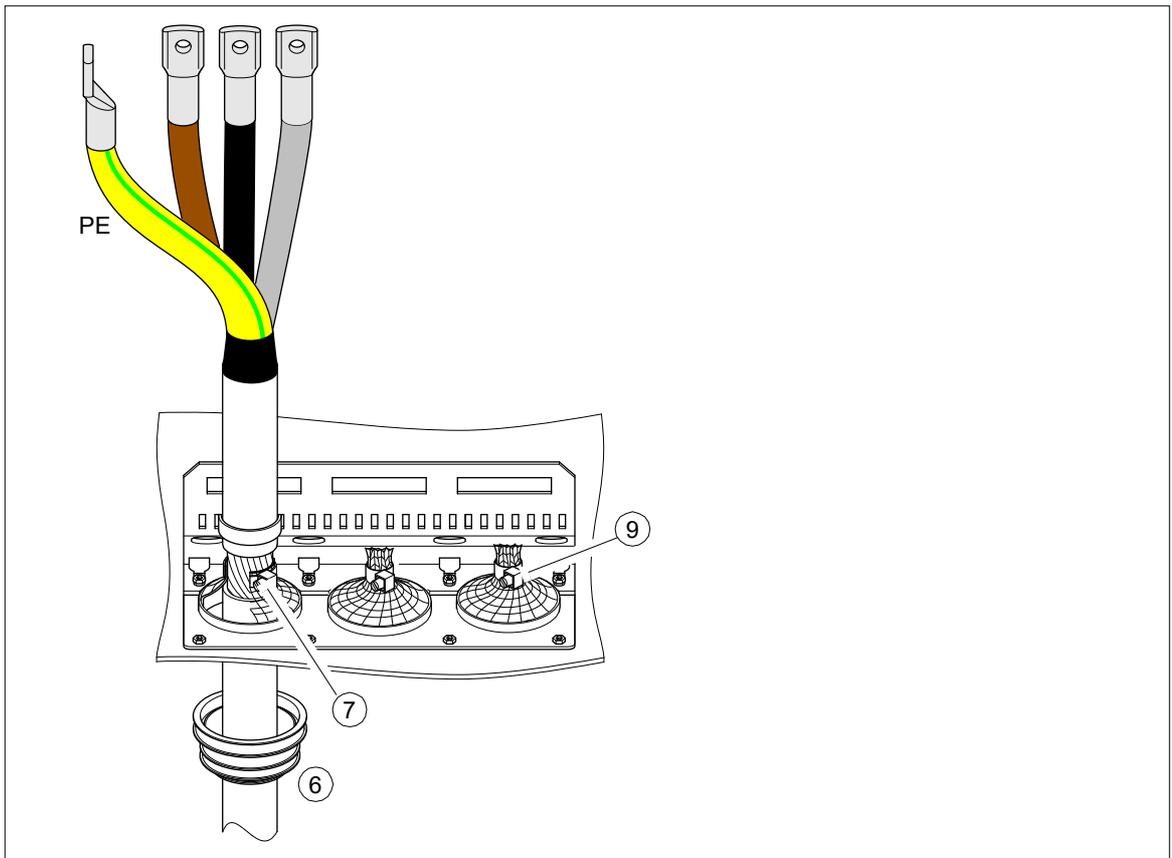
**WARNING!** Apply grease to stripped aluminum conductors before attaching them to non-coated aluminum cable lugs. Obey the grease manufacturer's instructions. Aluminum-aluminum contact can cause oxidation in the contact surfaces.

---

1. Disconnect the drive from the AC power line and make sure it is safe to start the work. Obey the instructions in section [Electrical safety precautions](#) on page 42.
2. Open the door of the incoming cubicle.
3. Remove the shrouding covering the input terminals.
4. Peel off the outer insulation of the cables above the lead-through plate for 360° high-frequency grounding.
5. Prepare the ends of the conductors.
6. Remove the rubber grommets from the lead-through plate for the cables to be connected. Cut adequate holes into the rubber grommets. Slide the grommets onto the cables. Slide the cables through the lead-throughs with the conductive sleeves and attach the grommets to the holes.
7. Fasten the conductive sleeves to the cable shields with cable ties.
8. Seal the slot between the cable and mineral wool sheet (if used) with sealing compound (eg, CSD-F, ABB brand name DXXT-11, code 35080082).
9. Tie up the unused conductive sleeves with cable ties.
10. Connect the twisted shields of the cables to the PE busbar of the cabinet. Tighten the screws to the torque given under [Tightening torques](#) (page 124).
11. Connect the phase conductors of the input cable to the L1, L2 and L3 terminals. Tighten the screws to the torque given under [Tightening torques](#) (page 124).
12. Reinstall the shrouding removed earlier.
13. Close the door.







## Installing optional modules

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**WARNING!** Repeat the steps described in section [Electrical safety precautions](#) on page 42. The complete safety instructions are given in *Safety instructions for ACS880 multidrive cabinets and modules* (3AUA0000102301 [English]). If you ignore them, injury or death, or damage to the equipment can occur.

---

1. Obey the instructions in section [Electrical safety precautions](#) on page 42.
2. Ensure by measuring that the I/O terminals of the control unit (especially the relay output terminals) are safe.
3. Insert the module carefully into a free option module slot on the control unit. Refer to chapter [Control unit](#).
4. Fasten the module. For instructions, see the documentation of the module.
5. Connect the necessary wiring to the module following the instructions given in the documentation of the module and section [Connecting the control cables for the supply unit](#) on page 47.
6. Check the installation and that it is safe to reconnect power.
7. Configure the module. Refer to the instructions given in the documentation of the module as well as the appropriate firmware manual.



## Connecting a PC

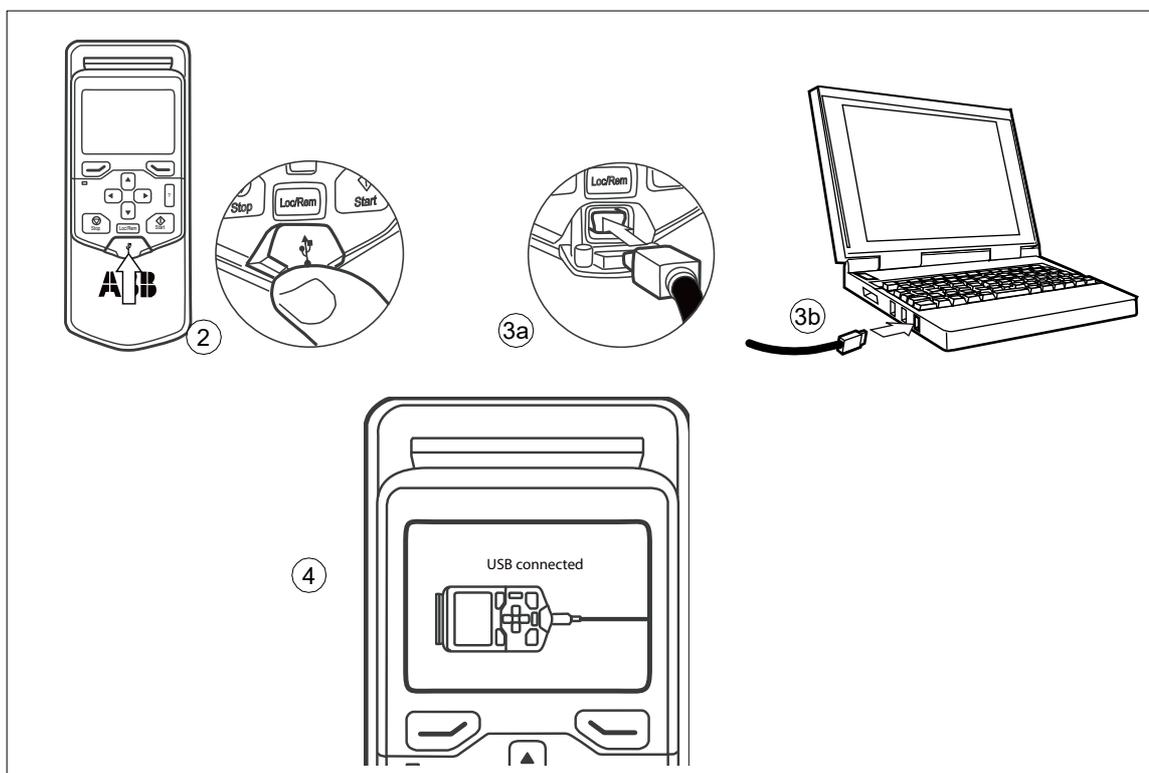
A PC (with eg. the Drive composer PC tool) can be connected to the rectifier unit as follows:

1. Connect an ACS-AP-x control panel to the rectifier control unit either by using an Ethernet (eg. CAT5E) networking cable, or by inserting the panel into the panel holder (if present).



**WARNING!** Do not connect the PC directly to the control panel connector of the regenerative rectifier unit as this can cause damage.

2. Remove the USB connector cover on the front of the control panel.
3. Connect an USB cable (Type A to Type Mini-B) between the USB connector on the control panel (3a) and a free USB port on the PC (3b).
4. The panel displays an indication whenever the connection is active.
5. See the documentation of the PC tool for setup instructions.





## 4

# Installation checklist

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## Contents of this chapter

This chapter contains a list for checking the installation of the ACS880-907 regenerative rectifier unit.

## Checklist

Check the mechanical and electrical installation of the drive before start-up. Go through the checklist together with another person.

---



**WARNING!** Only qualified electricians are allowed to do the work described below. Read the complete safety instructions in *Safety instructions for ACS880 multidrive cabinets and modules* (3AUA0000102301 [English]) before you install, commission, use or service the drive. Ignoring the instructions can cause physical injury or death, or damage to the equipment.

---

<b>Make sure that...</b>	<input checked="" type="checkbox"/>
The ambient operating conditions meet the specifications given in chapter <i>Technical data</i> .	<input type="checkbox"/>
The drive cabinet has been fixed to the floor, and if necessary due to vibration etc, also from top to the wall or roof. See <i>Mechanical installation instructions for ACS880 multidrive cabinets</i> (3AUA0000101764 [English]).	<input type="checkbox"/>
The cooling air flows freely in and out of the drive.	<input type="checkbox"/>
<b>If the drive is connected to an IT (ungrounded) or a corner grounded network:</b> The EMC filter of the drive has been disconnected. Contact your local ABB representative for instructions.	<input type="checkbox"/>

---

58 Installation checklist

<b>Make sure that...</b>	<input checked="" type="checkbox"/>
There is sufficient free space around the unit. See <i>Mechanical installation instructions for ACS880 multidrive cabinets</i> (3AUA0000101764 [English]).	<input type="checkbox"/>
If the drive has not been powered (either in storage or unused) for over one year: The electrolytic DC capacitors in the DC link of the drive have been reformed. See the separate reforming instructions (available in the Internet or from your local ABB representative).	<input type="checkbox"/>
There is an adequately sized protective earth (ground) conductor between the drive and the switchboard, and the conductor has been connected to the appropriate terminal and tightened. (Pull the conductor(s) to check.). Proper grounding has also been measured according to the regulations.	<input type="checkbox"/>
The supply voltage matches the nominal input voltage of the unit. Check the type designation label.	<input type="checkbox"/>
The input power cable has been connected to the appropriate terminals, the phase order is right, and the terminals have been tightened. (Pull the conductors to check.)	<input type="checkbox"/>
The control cables (if any) have been connected to the appropriate terminals, and the terminals have been tightened. (Pull the conductors to check.)	<input type="checkbox"/>
The supply voltage matches the nominal input voltage of the drive. Check the type designation label.	<input type="checkbox"/>
The voltage setting of the auxiliary voltage transformers (if any) is correct. See chapter <i>Electrical installation</i> .	<input type="checkbox"/>
There are no tools, foreign objects or dust from drilling inside the cabinet. There is no dust or loose dirt in front of the cabinet (from where the cooling fans could suck it inside the cabinet).	<input type="checkbox"/>
The area in front of the drive is clean: the drive cooling fan cannot draw any dust or dirt inside.	<input type="checkbox"/>
All shrouds and covers are in place. Cabinet doors have been closed.	<input type="checkbox"/>

## 5

# Start-up

---

## Contents of this chapter

This chapter describes the start-up procedure of the regenerative rectifier unit. The information is valid for cabinet-installed ACS880-907 rectifier units.

The underlined tasks are needed for certain cases only. The option codes (if any) are given in brackets. The default device designations (if any) are given in square brackets. For example: Rectifier unit with the grounding switch ([Q9], option +F259). The same device designations are also used in the circuit diagrams, typically.

These instructions do not cover all possible start-up tasks of a customized drive. Always refer to the delivery-specific circuit diagrams when proceeding with the start-up.



**WARNING!** Only qualified electricians are allowed to do the work described in this chapter. Read the complete safety instructions and repeat the steps described in section [Electrical safety precautions](#) on page 42. The complete safety instructions are given in *Safety instructions for ACS880 multidrive cabinets and modules* (3AUA0000102301 [English]). Ignoring the instructions can cause physical injury or death, or damage to the equipment.

**Note:** For the functional safety options (for example, options +Q952, +Q957, +Q963 and +Q964), the start-up instructions are given in separate option manuals, not in this chapter. Reserve the necessary option manuals at hand before performing the rectifier unit start-up and follow also their instructions.

---



## Start-up procedure

Tasks	<input checked="" type="checkbox"/>
<b>Safety</b>	
 <b>WARNING!</b> Follow the safety instructions during the start-up procedure. See <i>Safety instructions for ACS880 multidrive cabinets and modules</i> (3AUA0000102301 [English]). Only qualified electricians are allowed to do the work described in this chapter.	<input type="checkbox"/>
<b>Checks/Settings with no voltage connected</b>	
Make sure that it is safe to start the work. Obey the work instructions for switching off and disconnecting in <i>Safety instructions for ACS880 multidrive cabinets and modules</i> (3AUA0000102301 [English]).	<input type="checkbox"/>
Ensure that the disconnecter of the supply transformer is locked to the <i>off</i> (0) position, that means no voltage is, or cannot be connected to drive inadvertently.	<input type="checkbox"/>
<u>Drives with a main switch-disconnector ([Q1], option +F253):</u> Open and lock the main switch-disconnector of the drive. <u>Drives with a main breaker ([Q1], option +F255):</u> Crank the main breaker to <i>DISCONNECTED</i> position.	<input type="checkbox"/>
<p>If the unit is equipped with a main breaker, set the current trip limits of the breaker. The trip limits have been preset to generic values by the breaker manufacturer. The generic limits do not correspond the protection requirements of the application.</p> <p>For the limit rules, see below.</p> <p><b>General rules</b></p> <p>Make sure that the selectivity condition is fulfilled, that is the breaker trips at the lower current than the protection device of the supplying network, and that the limit is high enough not to cause unnecessary trips during the intermediate DC circuit load peak at start.</p> <p><b>Long term current limit</b></p> <p>Rule of thumb: Set to the rated AC current of the module.</p> <p><b>Peak current limit</b></p> <p>Rule of thumb: Set to a value 3...4 times the rated AC current of the module.</p>	<input type="checkbox"/>
<u>Supply unit with the grounding switch ([Q9], option +F259):</u> Close the grounding switch.  <b>WARNING!</b> Do not use excessive force. See <i>Safety instructions for ACS880 multidrive cabinets and modules</i> (3AUA0000102301[English]).	<input type="checkbox"/>
Open the auxiliary voltage switch [Q21].	<input type="checkbox"/>
Open the charging circuit switch fuse [Q3].	<input type="checkbox"/>
Check the mechanical and electrical installation. See <i>Installation checklist</i> on page 57.	<input type="checkbox"/>
Check the settings of breakers/switches in the auxiliary circuits. See delivery-specific circuit diagrams.	<input type="checkbox"/>
Check the voltage settings of the auxiliary voltage transformers (if any) are according to the actual power line voltage. See the final circuit diagrams by the designer of the cabinet-installed drive.	<input type="checkbox"/>
Disconnect the unfinished or unchecked 230 V AC cables that lead from the terminal blocks to the outside of the equipment.	<input type="checkbox"/>
<b>Powering up the auxiliary circuit of the rectifier unit</b>	
<p>Make sure that it is safe to connect voltage. Ensure that:</p> <ul style="list-style-type: none"> <li>nobody is working on the unit or circuits that are wired from outside into the cabinets.</li> <li>covers of the motor terminal boxes are on.</li> </ul>	<input type="checkbox"/>



Tasks	<input checked="" type="checkbox"/>
<u>Rectifier unit with voltage meters [P5] on door (option +G344):</u> Close the circuit breaker [F5] for the meters.	<input type="checkbox"/>
Close the circuit breakers supplying the auxiliary circuits [F22,..., Fxx].	<input type="checkbox"/>
Close the cabinet doors.	<input type="checkbox"/>
Close the main breaker of the supply transformer.	<input type="checkbox"/>
Close the auxiliary voltage switch [Q21].	<input type="checkbox"/>
<b>Setting up the supply unit parameters</b>	
Check the correct voltage range, parameter <i>195.01 Supply voltage</i> . If you need more information on the use of the control panel, see <i>ACS-AP-x assistant control panels user's manual</i> (3AUA0000085685 [English]).	<input type="checkbox"/>
Switch the control panel to the remote mode (Loc/Rem key) to enable control of the rectifier unit with the operating switch [S21].	<input type="checkbox"/>
<u>Drives with a fieldbus adapter (optional):</u> Activate the fieldbus adapter module in the control program. Set the fieldbus parameters. See the user's manual of the fieldbus adapter module, and <i>ACS880 regenerative rectifier control program firmware manual</i> (3AXD5000020827 [English]).	<input type="checkbox"/>
<ul style="list-style-type: none"> <li>• <u>If your rectifier unit consists of more than one module:</u> Make sure that the value of parameter <i>195.31 Parallel connection rating id</i> corresponds to the actual number of parallel-connected rectifier modules in the supply unit. Select the correct voltage range with parameter <i>195.30 Parallel type filter</i>.</li> <li>• Then select the correct rectifier unit type with parameter <i>195.31 Parallel connection rating id</i>.</li> <li>• Reboot the control unit by parameter <i>196.08 Control board boot</i>.</li> <li>• Check the correct voltage range, parameter <i>195.01 Supply voltage</i>.</li> <li>• Reboot the control unit by parameter <i>196.08 Control board boot</i>.</li> </ul> If you need more information on the use of the control panel, see <i>ACS-AP-x assistant control panels user's manual</i> (3AUA0000085685 [English]).	<input type="checkbox"/>
<b>Powering up the main circuit of the drive</b>	
<u>Rectifier unit with the grounding switch ([Q9], option +F259):</u> Open the grounding switch. <b>Note:</b> The grounding switch ([Q9], option +F259) must be open before you can close the main switch-disconnector.	<input type="checkbox"/>
<u>Drives with a main switch-disconnector [Q1]:</u> Close the main switch-disconnector. <b>Note:</b> The grounding switch ([Q9], option +F259) must be open before you can close the main switch-disconnector.	<input type="checkbox"/>
<u>Drives with a main circuit breaker [Q1]:</u> Crank the breaker in.  <b>WARNING!</b> Never use the start button of the breaker to close it. If you do, the fuses will blow and you may damage the module.	<input type="checkbox"/>
Close the charging circuit switch fuse [Q3].	<input type="checkbox"/>
Turn the operating switch [S21] to on (1) position to activate the Run enable signal of the rectifier unit. Now, the rectifier unit starts and the control program steps through the power-up sequence: 1. charging contactor [Q4] closing, 2. charging (until the DC link voltage rises high enough), 3. main contactor [Q2] closing, 4. start of the rectifier module rectifying, 5. charging contactor [Q4] opening.	<input type="checkbox"/>
<b>On-load checks</b>	
Check that the rectifier module cooling fan rotates freely in the right direction. The fans run noiselessly.	<input type="checkbox"/>



Tasks	<input checked="" type="checkbox"/>
Validate the operation of safety functions (for example, emergency stop). See the function-specific manual for the validation tasks  <b>WARNING!</b> The safety functions are not safe before they are validated according to the instructions. Safety functions are optional.	<input type="checkbox"/>



## Switching the unit off

1. Stop the motors connected to inverter units. See the *Inverter unit firmware manual*.
2. Turn the operating switch [S21] to the off (0) position to deactivate the Run enable signal of the supply unit and to switch the main contactor [Q2] off.

## Disconnecting and temporary grounding the drive

### ■ Disconnecting – excluding the input power terminals

1. Switch off the unit. See section [Switching the unit off](#) above.
2. Open the main switch-disconnector [Q1].
3. Temporary ground the rectifier unit when necessary. Refer to local regulations and EN 50110-1:2004.

#### Rectifier unit with the earthing/grounding switch ([Q9], option +F259):

- Close the earthing/grounding switch ([Q9], option +F259).



**WARNING!** Do not use excessive force. There is electromagnetic interlocking in use. You cannot close the earthing/grounding switch [Q9] before the main switch-disconnector [Q1] is open.

#### Rectifier unit without the earthing/grounding switch (no option +F259):

- Connect a temporary grounding set to the main AC busbars after the main switch-disconnector and to the grounding (PE) busbar of the drive.



**WARNING!** Despite of the temporary grounding of the AC busbars after the main switch-disconnector [Q1], the input power cable terminals are under voltage. Disconnect and ground them separately when necessary. Do not remove the shroud in front of the busbars.



### ■ Disconnecting – including the input power terminals

1. Do the tasks listed in section [Disconnecting and temporary grounding the drive](#) on page 63.
2. Switch off and disconnect the breaker of the supply transformer.
3. Secure against reconnection: Lock the disconnectors and attach warning signs.
4. Open the door of the incoming cubicle and make sure by measuring that the input busbars are not under voltage.
5. If temporary grounding of the input power terminals is needed, connect a temporary grounding set to the input power terminals and to the grounding (PE) busbar of the drive. See the local regulations and EN 50110-1: 2004.





# Maintenance

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## Contents of this chapter

This chapter instructs how to maintain the regenerative rectifier unit and how to interpret its fault indications. The information is valid for cabinet-installed ACS880-907 regenerative rectifier units.



**WARNING!** Only qualified electricians are allowed to do the work described in this chapter. Read the complete safety instructions before you install, commission, use or service the drive. The complete safety instructions are given in *Safety instructions for ACS880 multidrive cabinets and modules* (3AUA0000102301 [English]).

---

## Maintenance intervals

The table below shows the maintenance tasks which can be done by the end user. The complete maintenance schedule is available on the Internet ([www.abb.com/drivesservices](http://www.abb.com/drivesservices)). For more information, consult your local ABB Service representative ([www.abb.com/searchchannels](http://www.abb.com/searchchannels)).

Maintenance task/object	Years from start-up													
	0	1	2	3	4	5	6	7	8	9	10	11	12	...
<b>Cooling fans</b>														
Main cooling fan (speed-controlled)										R				
Main cooling fan (direct-on-line, 50 Hz)										R				
Main cooling fan (direct-on-line, 60 Hz)										R				
L-filter cooling fan (DOL, 50 Hz)										R				
L-filter cooling fan (DOL, 60 Hz)										R				
Cooling fan for circuit boards										R				
Cabinet cooling fan, internal (50 Hz)										R				
Cabinet cooling fan, internal (60 Hz)							R						R	
Cabinet cooling fan, IP54 (50 Hz)										R				
Cabinet cooling fan, IP54 (60 Hz)							R						R	
<b>Batteries</b>														
Control panel battery										R				
Control unit battery							R						R	
<b>Connections and environment</b>														
Cabinet door filters IP54		R	R	R	R	R	R	R	R	R	R	R	R	R
Quality of supply voltage		P	P	P	P	P	P	P	P	P	P	P	P	P
<b>Spare parts</b>														
Spare part stock		I	I	I	I	I	I	I	I	I	I	I	I	I
Reforming of DC circuit capacitors (spare modules and spare capacitors)		P	P	P	P	P	P	P	P	P	P	P	P	P
<b>Other useful tasks</b>														
Cleaning IP22 and IP44 air inlet and outlet meshes		I	I	I	I	I	I	I	I	I	I	I	I	I
Checking tightness of cable and busbar terminals. Tightening if needed.		I	I	I	I	I	I	I	I	I	I	I	I	I
Checking ambient conditions (dustiness, moisture, temperature)		I	I	I	I	I	I	I	I	I	I	I	I	I
Cleaning heatsinks of rectifier unit		I	I	I	I	I	I	I	I	I	I	I	I	I
ABB-SACE Air circuit breaker maintenance		I	I	I	I	I	I	I	I	I	I	I	I	I

**Symbols**

**I Inspection** (visual inspection and maintenance action if needed)

**P Performance** of on/off-site work (commissioning, tests, measurements or other work)

**R Replacement**

Recommended maintenance intervals and component replacements are based on specified operational and environmental conditions. ABB recommends annual drive inspections to ensure the highest reliability and optimum performance. More detailed maintenance information can be found in maintenance instructions, product manuals and on the Internet.

[www.abb.com/drives](http://www.abb.com/drives)

**Note:** Long term operation near the maximum specified ratings or environmental conditions may require shorter maintenance intervals for certain components. Check the device specific technical specifications in the relevant hardware manual and consult your local ABB Service for maintenance recommendations at:

[www.abb.com/searchchannels](http://www.abb.com/searchchannels)

## Maintenance timers and counters

The control program has maintenance timers or counters that can be configured to generate a warning when a pre-defined limit is reached. Each timer/counter can be set to monitor any parameter. This feature is especially useful as a service reminder. For more information, see the firmware manual.

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## Cabinet

### ■ Cleaning the interior of the cabinet

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**WARNING!** Only qualified electricians are allowed to do the work described below. Read the complete safety instructions given in *Safety instructions for ACS880 multidrive cabinets and modules*

(3AUA0000102301 [English]) before you service the drive. Ignoring the instructions can cause physical injury or death, or damage to the equipment.

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**WARNING!** Use a vacuum cleaner with an antistatic hose and nozzle, and wear a grounding wristband. Otherwise an electrostatic charge might build up and damage the circuit boards.

---

1. Disconnect the drive from the AC power line and make sure it is safe to start the work. Obey the instructions in section [Electrical safety precautions](#) on page 42.
  2. Open the cabinet door.
  3. Clean the interior of the cabinet. Use a vacuum cleaner and a soft brush.
  4. Clean the air inlets of the fans and air outlets of the module (top).
  5. Clean the air inlet grating of the door (see section [Cleaning the air inlet meshes – IP22 and IP42 \(option +B054\)](#) on page 69).
  6. Close the door.
-

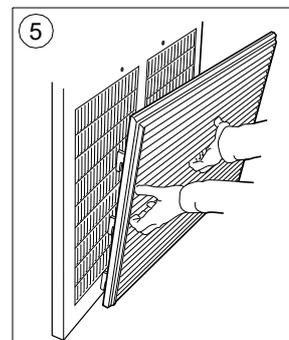
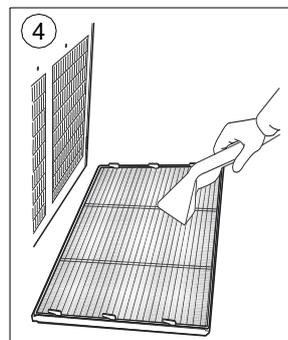
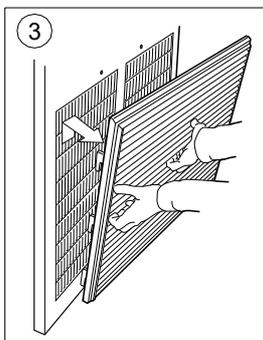
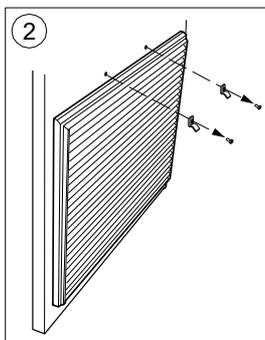
## ■ Cleaning the air inlet meshes – IP22 and IP42 (option +B054)



**WARNING!** Use a vacuum cleaner with an antistatic hose and nozzle. Using a normal vacuum cleaner creates static discharges which can damage circuit boards.

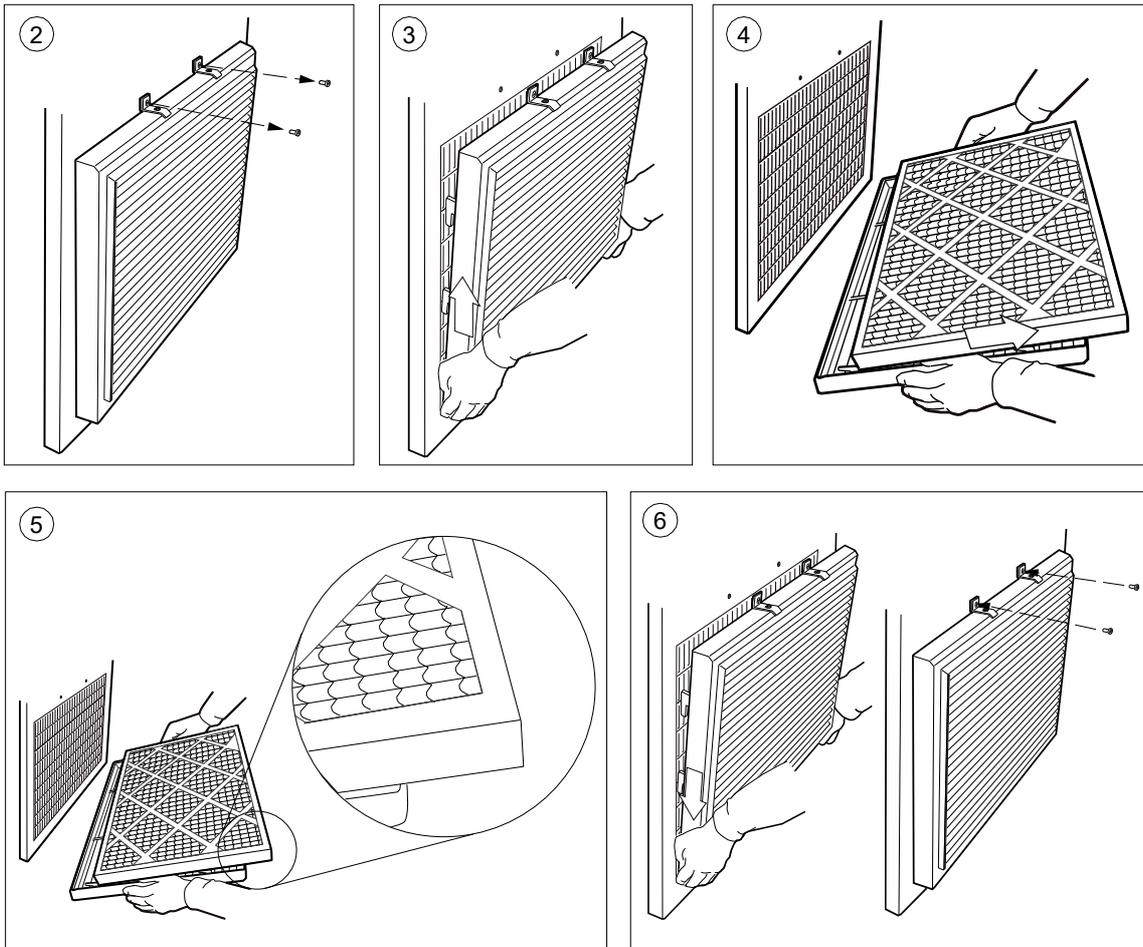
Check the dustiness of the air inlet meshes. If the dust cannot be removed by vacuum cleaning from outside through the grating holes with a small nozzle, proceed as follows:

1. Recommendation: De-energize the fans by switching off the rectifier unit. Obey the instructions in section [Electrical safety precautions](#) on page 42.
2. Remove the fasteners at the top of the grating.
3. Lift the grating and pull it away from the door.
4. Vacuum clean or wash the grating on both sides.
5. Reinstall the grating in reverse order.



### ■ Replacing the inlet (door) filters – IP54 (option +B055)

1. Recommendation: De-energize the fans by switching off the rectifier unit. Obey the instructions in section [Electrical safety precautions](#) on page 42.
2. Remove the fasteners at the top of the grating.
3. Lift the grating and pull it away from the door.
4. Remove the air filter mat.
5. Place the new filter mat in the grating the metal wire side facing the door.
6. Reinstall the grating in reverse order.



### ■ Cleaning the outlet (roof) filters (IP54)

The outlet (roof) filter in IP54 units can be accessed by pulling the grating upwards.

## ■ Replacing the outlet (roof) filters – IP54 (option +B055)

---



**WARNING!** De-energize the fans by switching off the rectifier unit. Obey the instructions in section [Electrical safety precautions](#) on page 42. Make sure that no restart is possible during the maintenance work. Rotating fan blades can cause serious hand injury.

---

1. Remove the front and back gratings of the fan cubicle by lifting them upwards
2. Remove the air filter mat.
3. Place the new filter mat in the grating.
4. Reinstall the grating in reverse order.

## Power connections

### ■ Retightening the power connections

---



**WARNING!** Only qualified electricians are allowed to do this work. Read the complete safety instructions given in *Safety instructions for ACS880 multidrive cabinets and modules* (3AUA0000102301 [English]) before you service the drive. Ignoring the instructions can cause physical injury or death, or damage to the equipment.

---

1. Disconnect the drive from the AC power line and make sure it is safe to start the work. See section [Electrical safety precautions](#) on page 42.
  2. Check the tightness of the cable connections. Use the tightening torques given in section [Tightening torques](#) on page 124.
-

## Fans

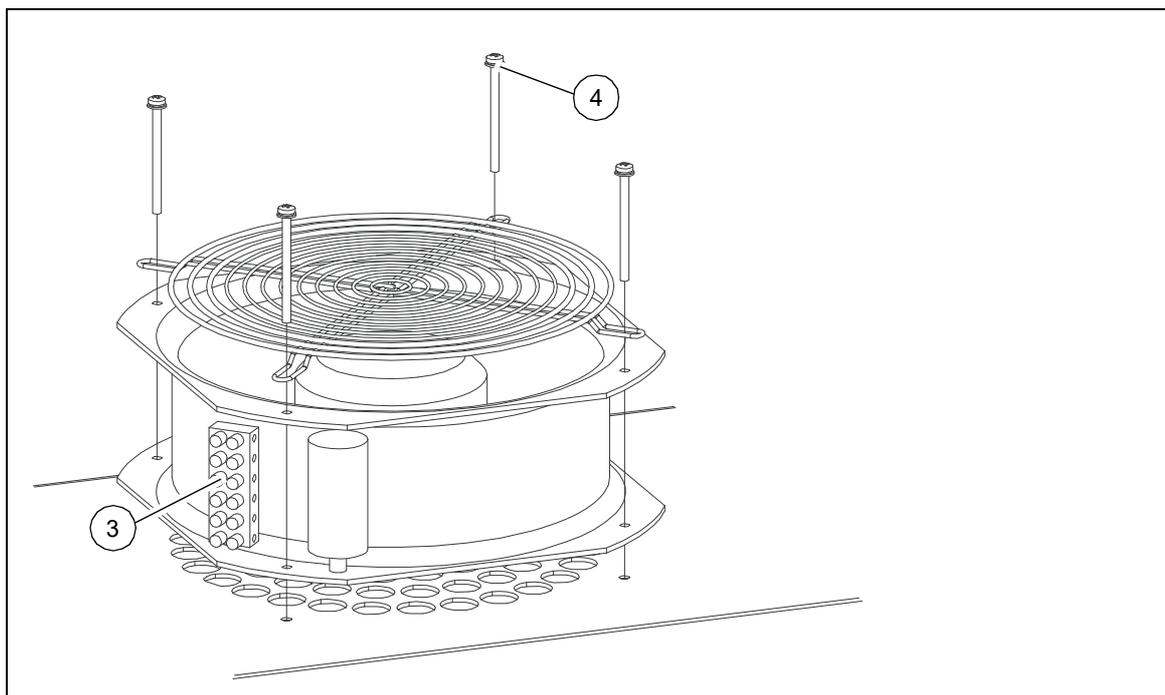
The lifespan of the cooling fan depends on the running time of the fan, ambient temperature and dust concentration. Replacement fans are available from ABB. Do not use other than ABB specified spare parts.

### ■ Replacing the fan in the auxiliary control cubicle



**WARNING!** Only qualified electricians are allowed to do this work. Read the complete safety instructions given in *Safety instructions for ACS880 multidrive cabinets and modules* (3AUA0000102301 [English]) before you service the drive. Ignoring the instructions can cause physical injury or death, or damage to the equipment.

1. Disconnect the drive from the AC power line and make sure it is safe to start the work. See section [Electrical safety precautions](#) on page 42.
2. Remove the shrouding from in front of the fan.
3. Unplug the power supply cable of the fan.
4. Remove the fastening screws of the fan.
5. Install the new fan in reverse order. Check that the arrow indicating the air flow direction points away from the mounting base.

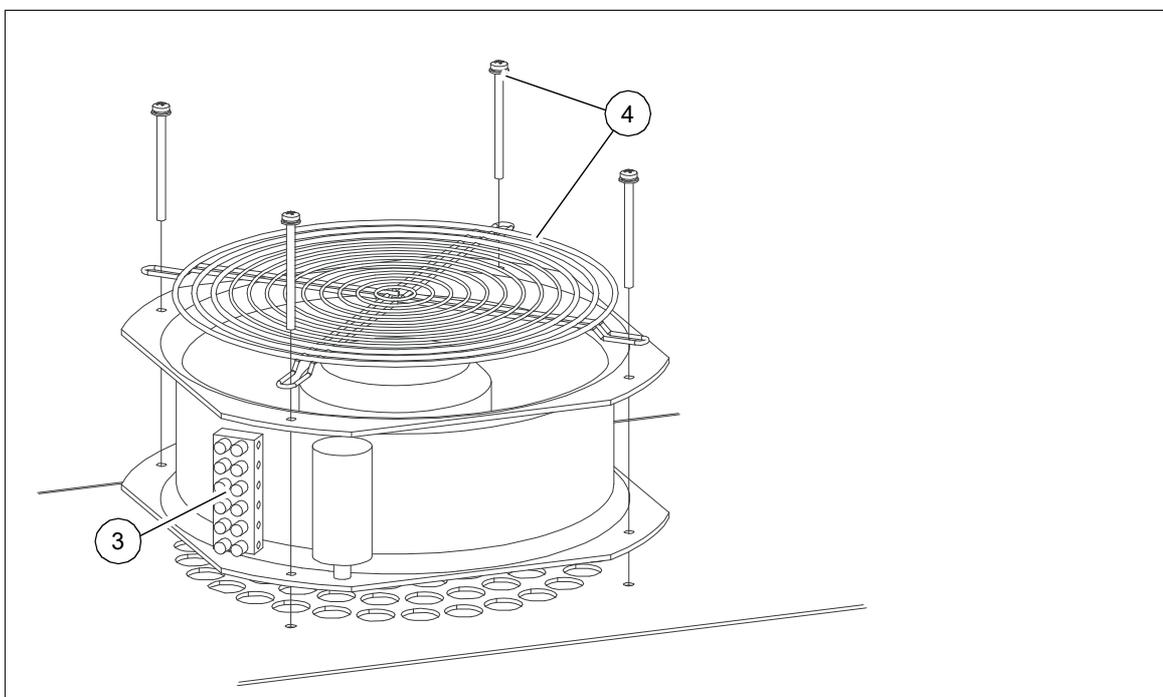


## ■ Replacing a fan in the incoming cubicle



**WARNING!** Only qualified electricians are allowed to do this work. Read the complete safety instructions given in *Safety instructions for ACS880 multidrive cabinets and modules* (3AUA0000102301 [English]) before you service the drive. Ignoring the instructions can cause physical injury or death, or damage to the equipment.

1. Disconnect the drive from the AC power line and make sure it is safe to start the work. See section [Electrical safety precautions](#) on page 42.
2. Remove the shrouding in front of the fan (if any).
3. Disconnect the fan wiring.
4. Remove the fastening screws and the finger guard of the fan.
5. Install the new fan in reverse order. Check that the arrow indicating the air flow direction points upwards.



## ■ Replacing the cooling fan of rectifier module

If the module is equipped with a direct-on-line cooling fan (option +C188), see page [76](#).

---



**WARNING!** Only qualified electricians are allowed to do this work. Read the complete safety instructions given in *Safety instructions for ACS880 multidrive cabinets and modules* (3AUA0000102301 [English]) before you service the drive. Ignoring the instructions can cause physical injury or death, or damage to the equipment.

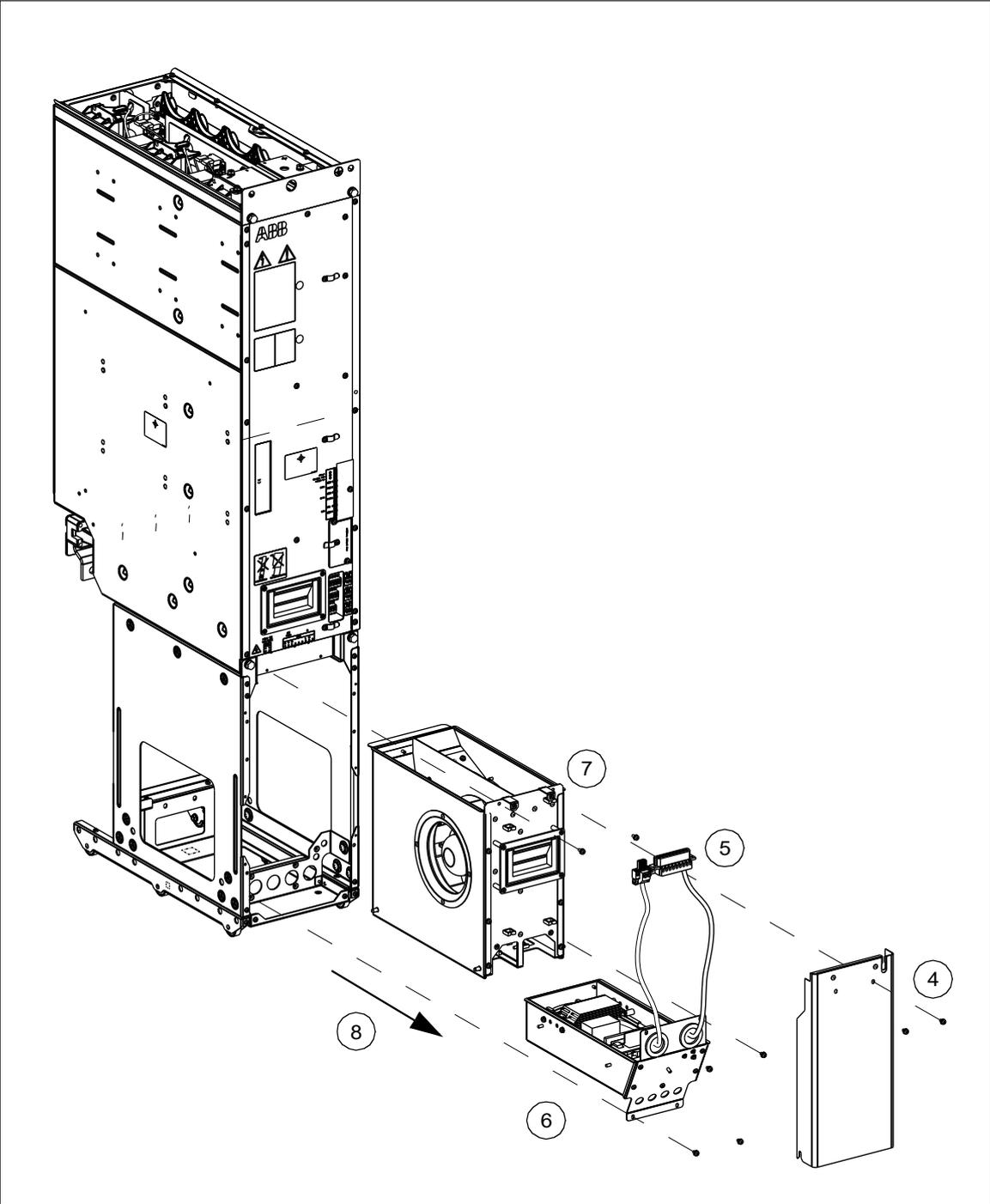
---



**WARNING!** Wear protective gloves and long sleeves! Some parts have sharp edges.

---

1. Disconnect the drive from the AC power line and make sure it is safe to start the work. See section *Electrical safety precautions* on page [42](#).
  2. Open the door.
  3. Remove the shroud in front of the fan.
  4. Remove the cover panel in front of the fan.
  5. Unplug the wiring of the fan.
  6. Remove the fan control box.
  7. Undo the screws of the fan unit.
  8. Pull the fan unit out.
  9. Replace the fan and install in reverse order.
-



## ■ Replacing the direct-on-line (option +C188) rectifier module fan

If the module is equipped with a standard speed-controlled cooling fan, see page 74.



**WARNING!** Only qualified electricians are allowed to do this work. Read the complete safety instructions given in *Safety instructions for ACS880 multidrive cabinets and modules* (3AUA0000102301 [English]) before you service the drive. Ignoring the instructions can cause physical injury or death, or damage to the equipment.

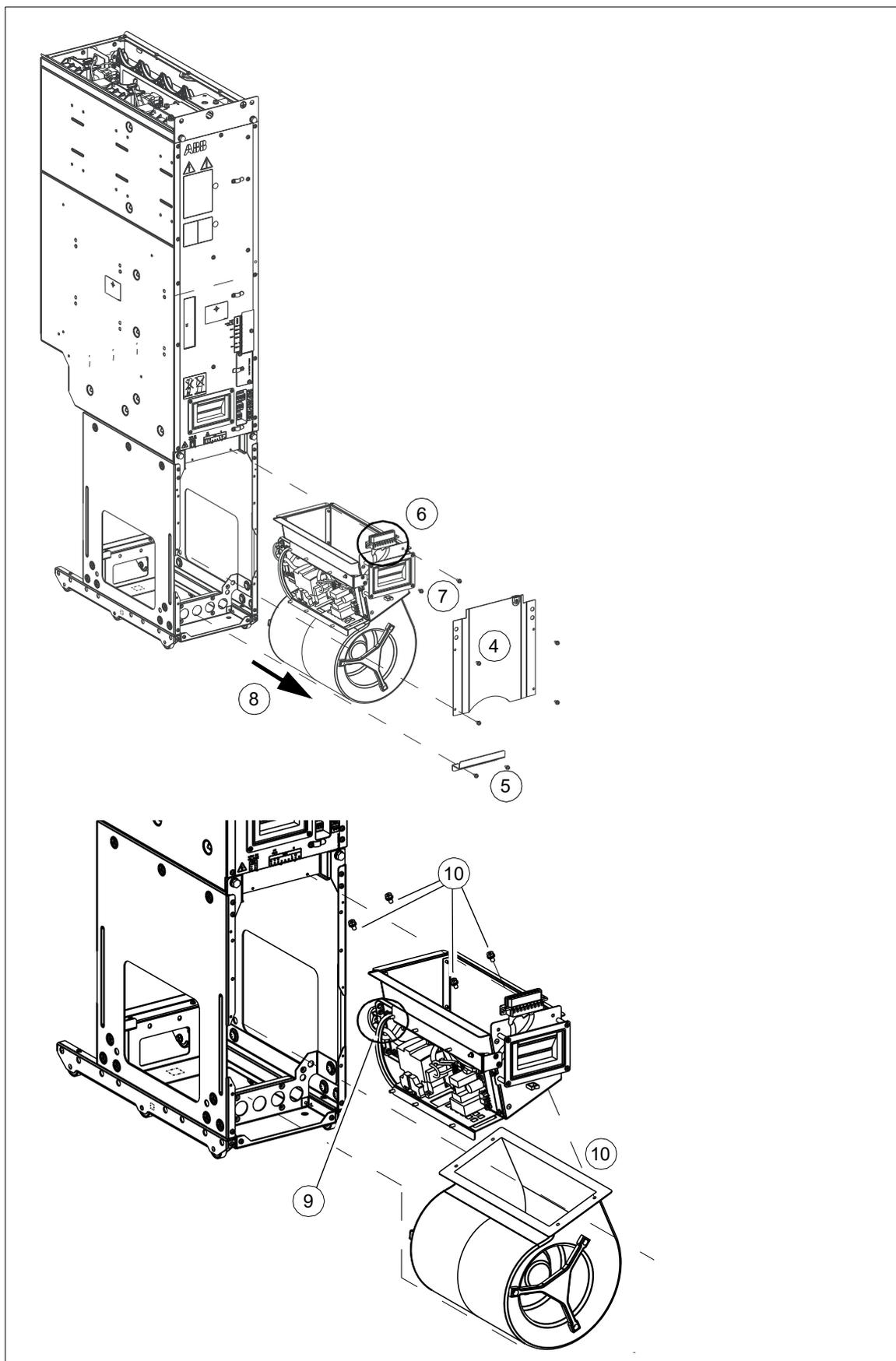
---



**WARNING!** Wear protective gloves and long sleeves! Some parts have sharp edges.

---

1. Disconnect the drive from the AC power line and make sure it is safe to start the work. See section *Electrical safety precautions* on page 42.
  2. Open the door.
  3. Remove the shroud in front of the fan.
  4. Remove the cover panel.
  5. Remove the bracket.
  6. Unplug the wiring of the fan assembly.
  7. Undo the screws of the fan assembly.
  8. Pull out the fan assembly.
  9. Unplug fan wire from the fan assembly.
  10. Undo the screws of the fan.
  11. Install a new fan in reverse order.
-



## ■ Replacing the circuit board compartment fan of the rectifier module

The regenerative rectifier module is equipped with a fan blowing air through the circuit board compartment. The fan is accessible from the front of the module.

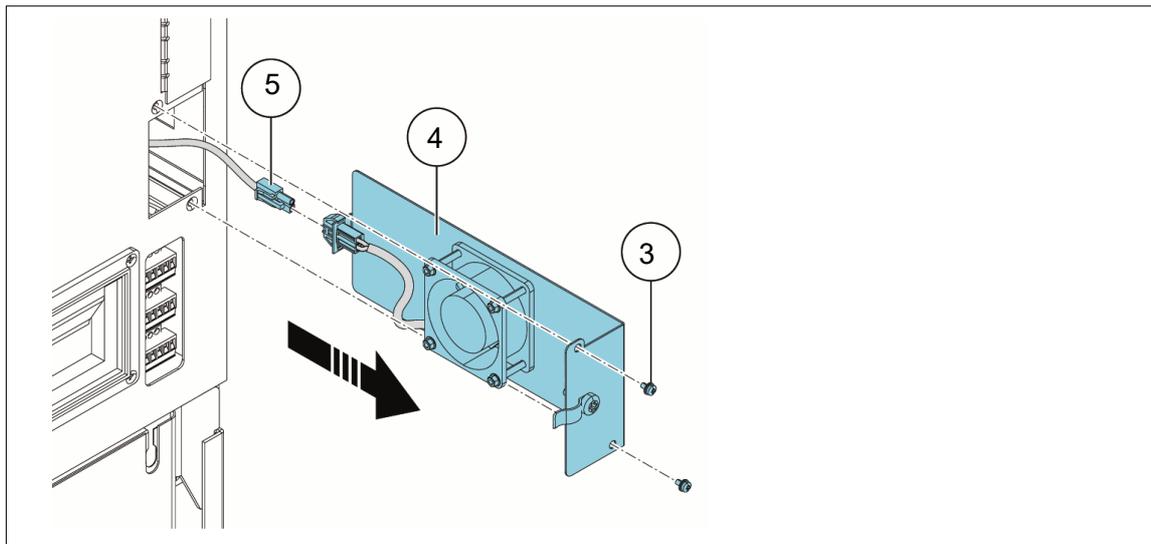


**WARNING!** Only qualified electricians are allowed to do this work. Read the complete safety instructions given in *Safety instructions for ACS880 multidrive cabinets and modules* (3AUA0000102301 [English]) before you service the drive. Ignoring the instructions can cause physical injury or death, or damage to the equipment.

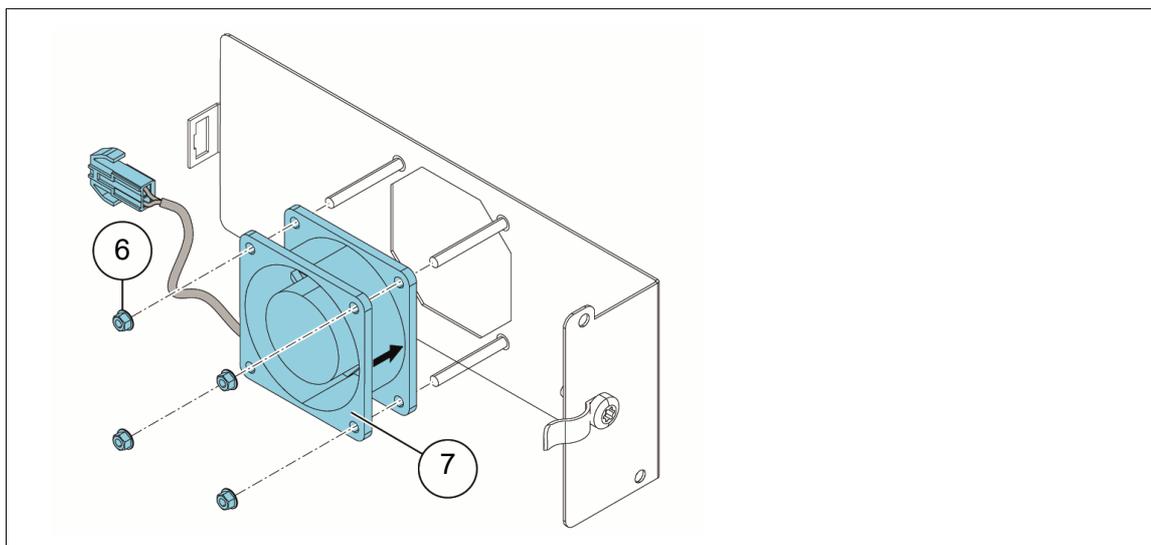


**WARNING!** Wear protective gloves and long sleeves! Some parts have sharp edges.

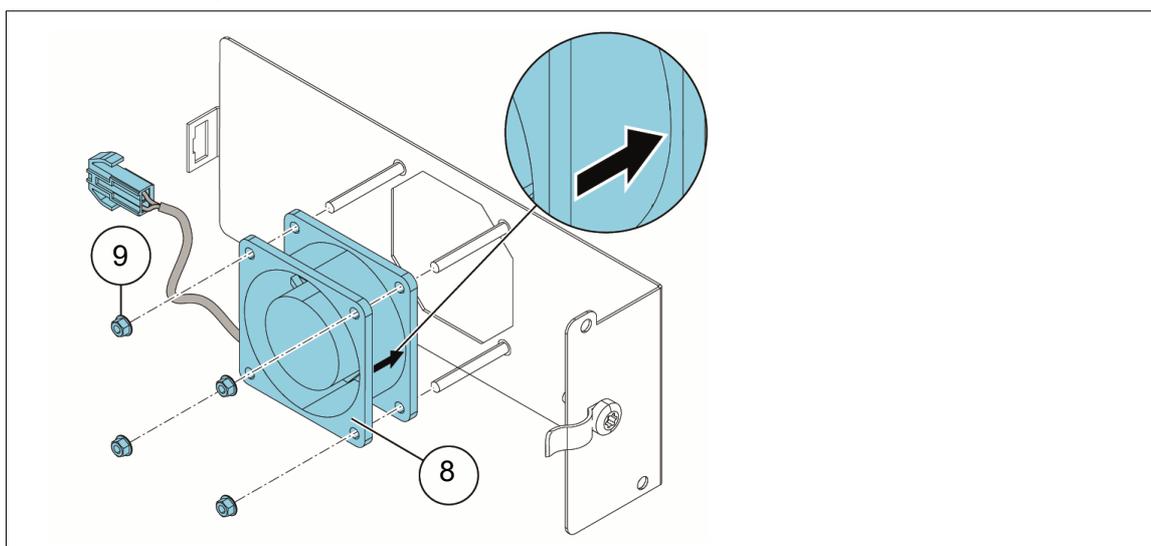
1. Disconnect the drive from the AC power line and make sure it is safe to start the work. See section [Electrical safety precautions](#) on page 42.
2. Open the door of the module cubicle.
3. Remove the two screws which lock the fan holder.
4. Pull the fan holder out of the module.
5. Disconnect the fan cable.



6. Remove the four nuts which hold the fan.
7. Remove the fan from the fan holder.

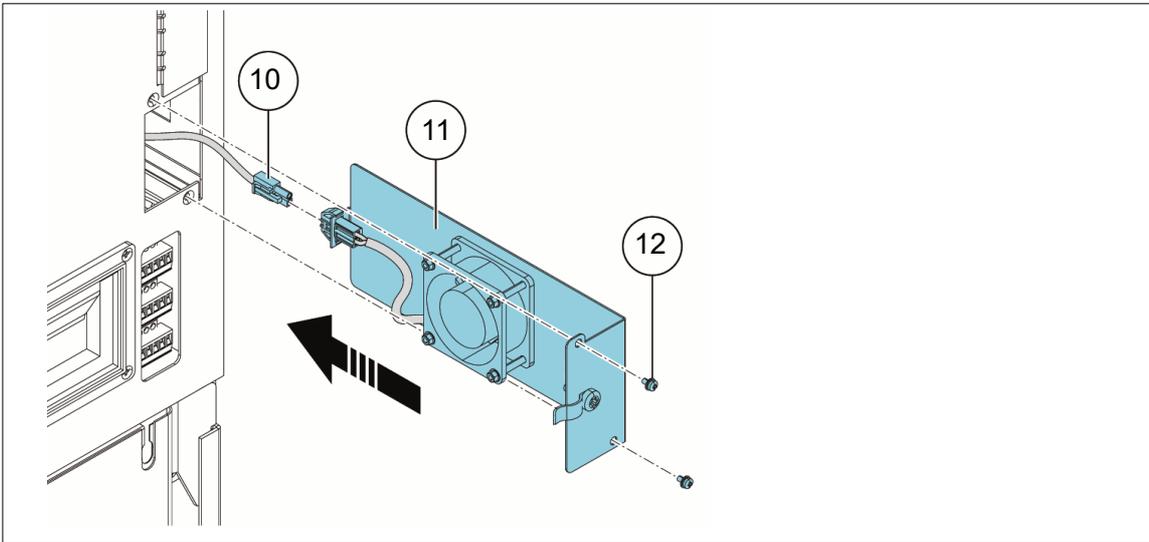


8. Put the fan onto the threaded studs on the fan holder with the airflow direction arrow pointing towards the fan holder.
9. Install and tighten the four nuts removed earlier.



10. Connect the fan cable.

11. Align and push the fan holder into the module.



12. Install and tighten the two screws.

## ■ Replacing the fan of the L-filter (BL-1x-x)

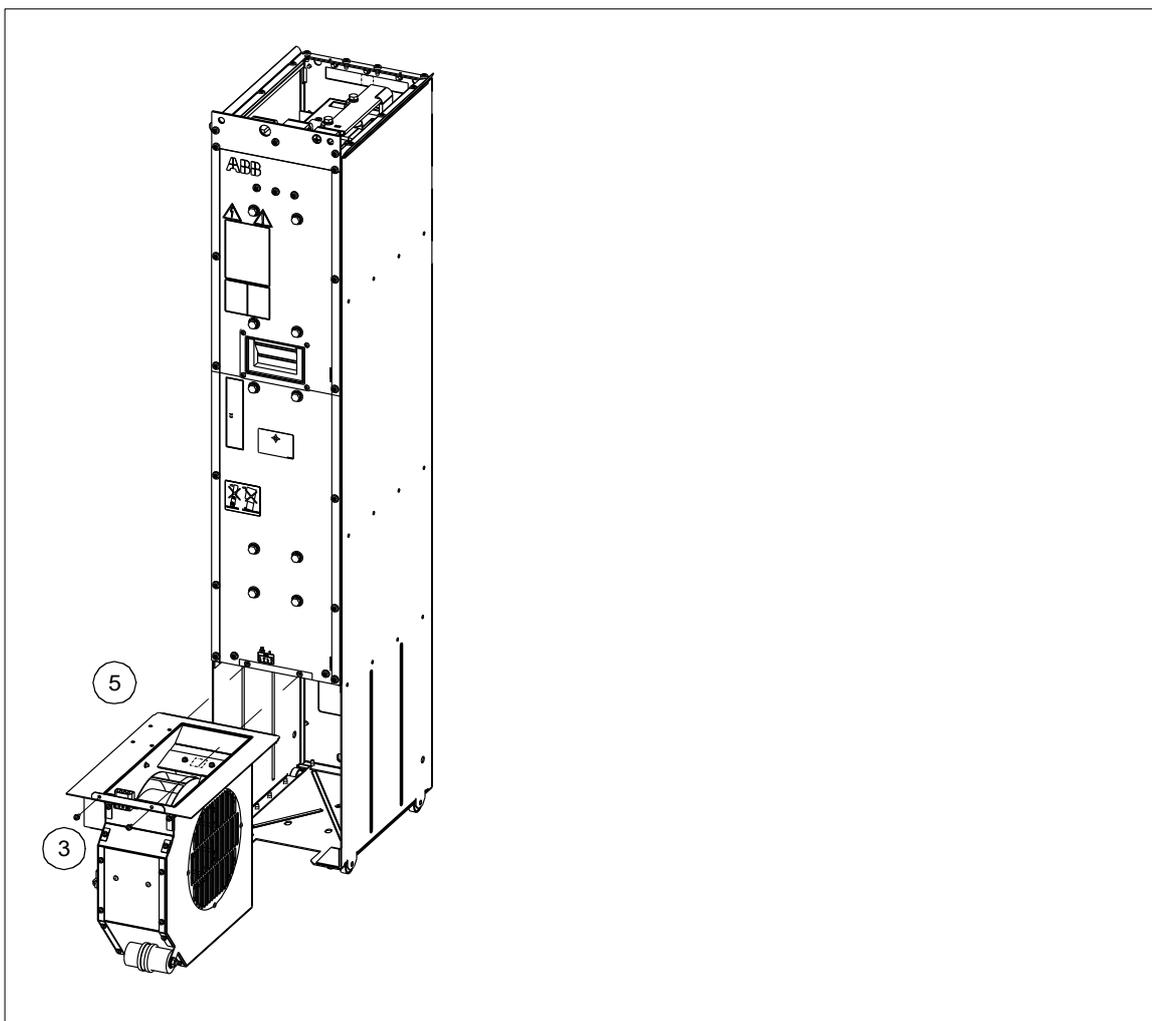


**WARNING!** Only qualified electricians are allowed to do this work. Read the complete safety instructions given in *Safety instructions for ACS880 multidrive cabinets and modules* (3AUA0000102301 [English]) before you service the drive. Ignoring the instructions can cause physical injury or death, or damage to the equipment.



**WARNING!** Wear protective gloves and long sleeves! Some parts have sharp edges.

1. Disconnect the drive from the AC power line and make sure it is safe to start the work. See section [Electrical safety precautions](#) on page 42.
2. Open the door.
3. Remove the two locking screws of fan supply plug connector.
4. Unplug the fan power supply cable.
5. Pull the fan unit out.
6. Install a new fan in reverse order.



## ■ Replacing the fan of the L-filter (BL-2x-x)

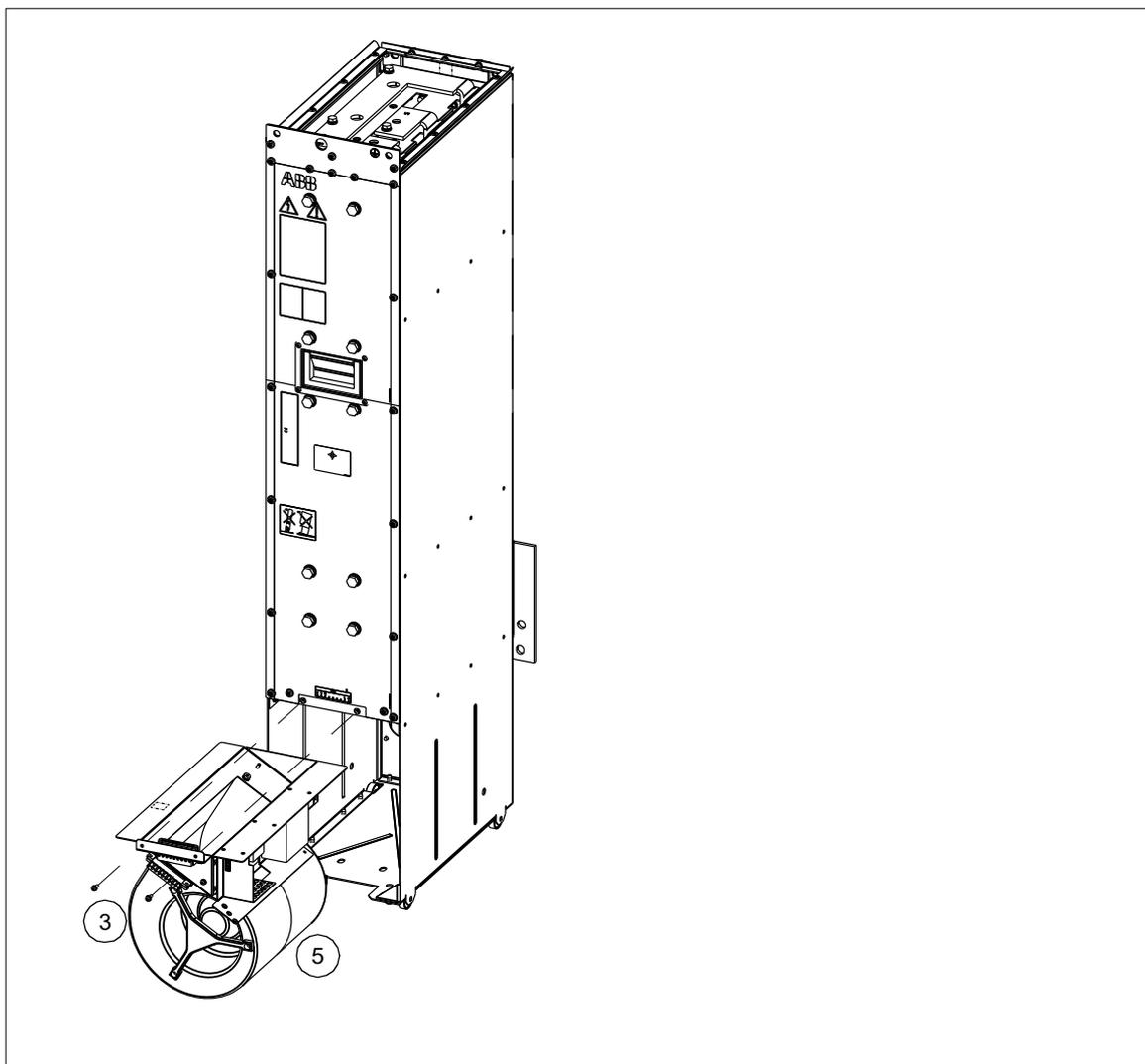


**WARNING!** Only qualified electricians are allowed to do this work. Read the complete safety instructions given in *Safety instructions for ACS880 multidrive cabinets and modules* (3AUA0000102301 [English]) before you service the drive. Ignoring the instructions can cause physical injury or death, or damage to the equipment.



**WARNING!** Wear protective gloves and long sleeves! Some parts have sharp edges.

1. Disconnect the drive from the AC power line and make sure it is safe to start the work. See section [Electrical safety precautions](#) on page 42.
2. Open the door.
3. Remove the two screws in front of the fan unit.
4. Unplug the fan power supply cable.
5. Pull the fan unit out.
6. Install a new fan in reverse order.



## ■ Replacing the roof fan for IP54 cabinet (option +B055)

---



**WARNING!** Only qualified electricians are allowed to do this work. Read the complete safety instructions given in *Safety instructions for ACS880 multidrive cabinets and modules* (3AUA0000102301 [English]) before you service the drive. Ignoring the instructions can cause physical injury or death, or damage to the equipment.

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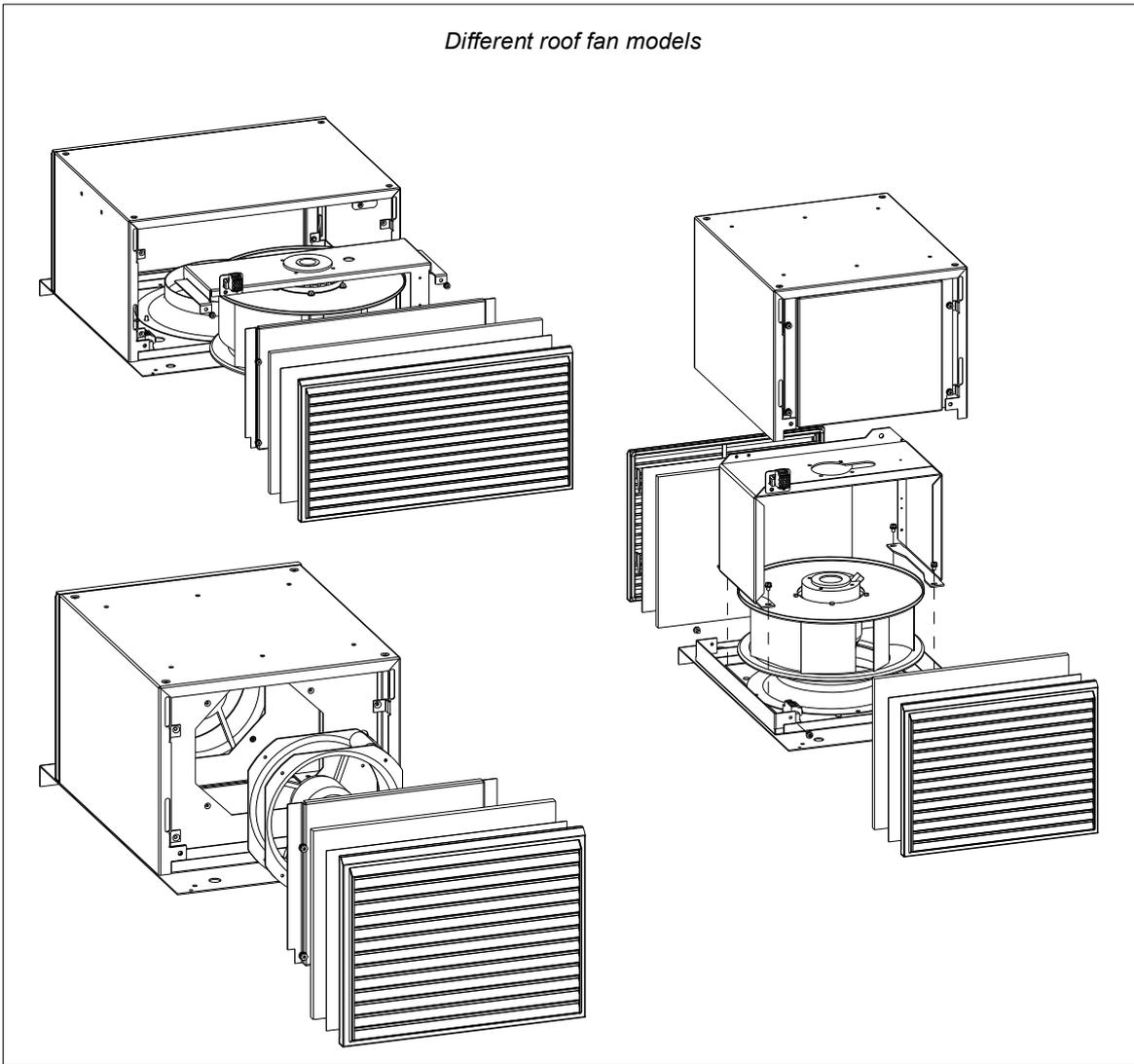


**WARNING!** Wear protective gloves and long sleeves! Some parts have sharp edges.

---

1. Disconnect the drive from the AC power line and make sure it is safe to start the work. See section [Electrical safety precautions](#) on page 42.
  2. Open the door of the cubicle.
  3. Remove the shroud in front of the fan.
  4. Remove all ventilation covers (lift and pull) and filters, and finally remove the roof plate on top of the outlet. Unscrew all necessary screws securing the fan and remove the fan.
  5. Pull the fan unit out.
  6. Install a new fan in reverse order.
-

*Different roof fan models*



## Regenerative rectifier module

### ■ Cleaning the module

The rectifier module heatsink fins pick up dust from the cooling air. Modules run into overtemperature warnings and faults if the heatsink is not clean.



**WARNING!** Only qualified electricians are allowed to do this work. Read the complete safety instructions given in *Safety instructions for ACS880 multidrive cabinets and modules* (3AUA0000102301 [English]) before you service the drive. Ignoring the instructions can cause physical injury or death, or damage to the equipment.

---

1. Disconnect the drive from the AC power line and make sure it is safe to start the work. See section [Electrical safety precautions](#) on page 42.
  2. Remove the cooling fan of the rectifier module as described under section [Fans](#) in this chapter.
  3. Blow clean, dry and oilfree compressed air through the module from bottom to top, simultaneously using a vacuum cleaner at the air outlet to trap the dust.  
**Note:** Prevent the dust from entering adjoining equipment.
  4. Refit the cooling fan.
-

## ■ Replacing the rectifier module

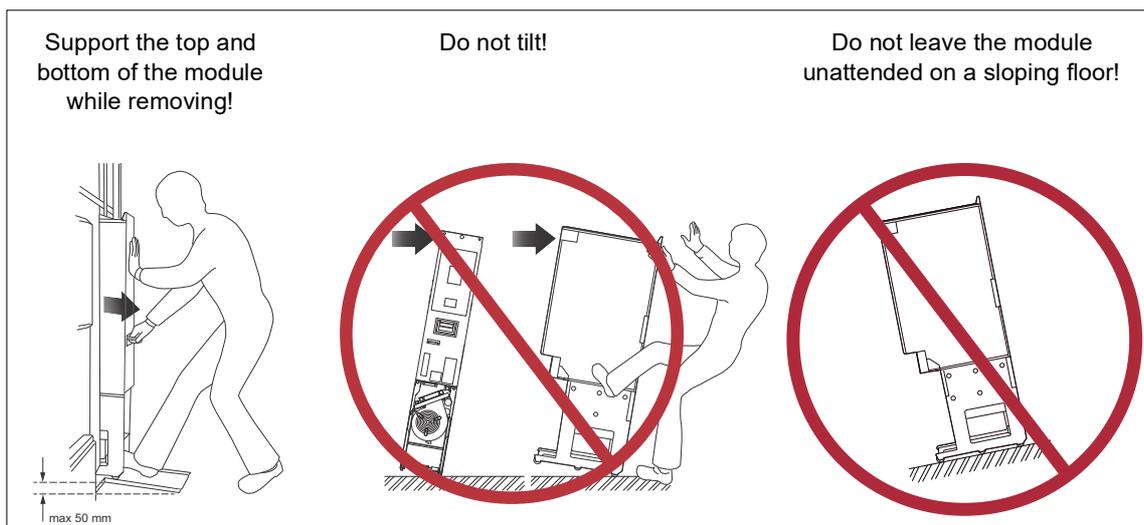


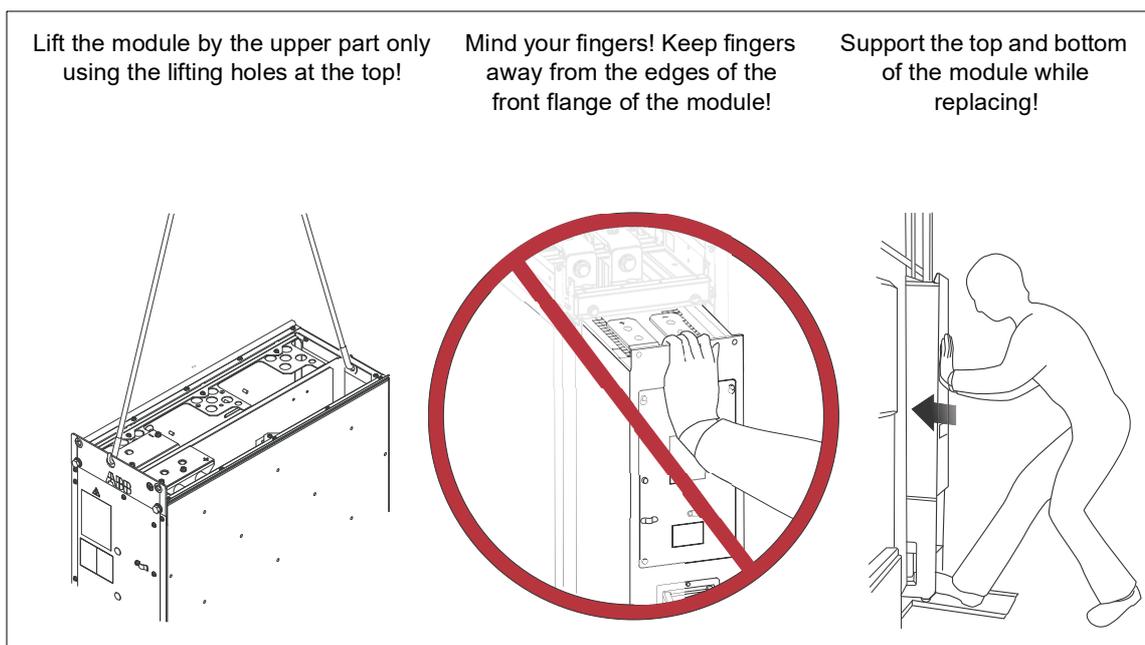
**WARNING!** Only qualified electricians are allowed to do this work. Read the complete safety instructions given in *Safety instructions for ACS880 multidrive cabinets and modules* (3AUA0000102301 [English]) before you service the drive. Ignoring the instructions can cause physical injury or death, or damage to the equipment.



**WARNING!** If you ignore the following instructions, injury or death, or damage to the equipment can occur.

- Use extreme caution when maneuvering a module that runs on wheels. The modules are heavy and have a high center of gravity. They topple over easily if handled carelessly.
- When removing a module which is equipped with wheels, pull the module carefully out of the cubicle along the ramp. While pulling on the handle, keep a constant pressure with one foot on the base of the module to prevent the module from falling on its back.
- When replacing a module, push the module up the ramp and back into the cubicle. Keep your fingers away from the edge of the module front plate to avoid pinching them between the module and the cubicle. Also, keep a constant pressure with one foot on the base of the module to prevent the module from falling on its back.
- Do not tilt the module. Do not leave the module unattended on a sloping floor.
- Wear protective gloves and long sleeves! Some parts have sharp edges.
- Do not use the module pull-out ramp with plinth heights over 50 mm. The ramp supplied with the drive system is designed for a plinth height of 50 mm (the standard plinth height of ABB cabinets).





1. Disconnect the drive from the AC power line and make sure it is safe to start the work. See section [Electrical safety precautions](#) on page 42.
2. Open the cubicle door. Reconnect the fiber optic cables and connector [X53].
3. Undo the screws of the shroud in the upper part of the cubicle. Remove the shroud.
4. Unplug the terminal block [X50] on top of the module.
5. Disconnect the two DC busbars on top of the module. Be careful not to drop the screws inside the module!
6. Remove the cover on the fiber optic connectors in front of the module. Unplug the fiber optic cables and connector [X53].
7. Option +C121, marine construction: If a marine support plate is installed in front of the converter and filter modules, undo the screws that fasten the marine support to the modules. Loosen the screws that fasten the support to the corner posts (do not remove the screws). Remove the support.  
**Note:** Reinstall the converter and filter module screws before removing the modules from the cubicle.
8. Remove the two screws that fasten the bottom of the module to the base of the cabinet.
9. Install the module pull-out ramp: lift the module pull-out ramp against the cabinet base so that the hooks of the base go into the ramp's holes.
10. Remove the two fastening screws that fasten the top of the module to the cabinet frame.
11. Pull the module carefully out of the cabinet along the ramp. While pulling on the handle, keep a constant pressure with one foot on the base of the module to prevent the module from falling on its back.

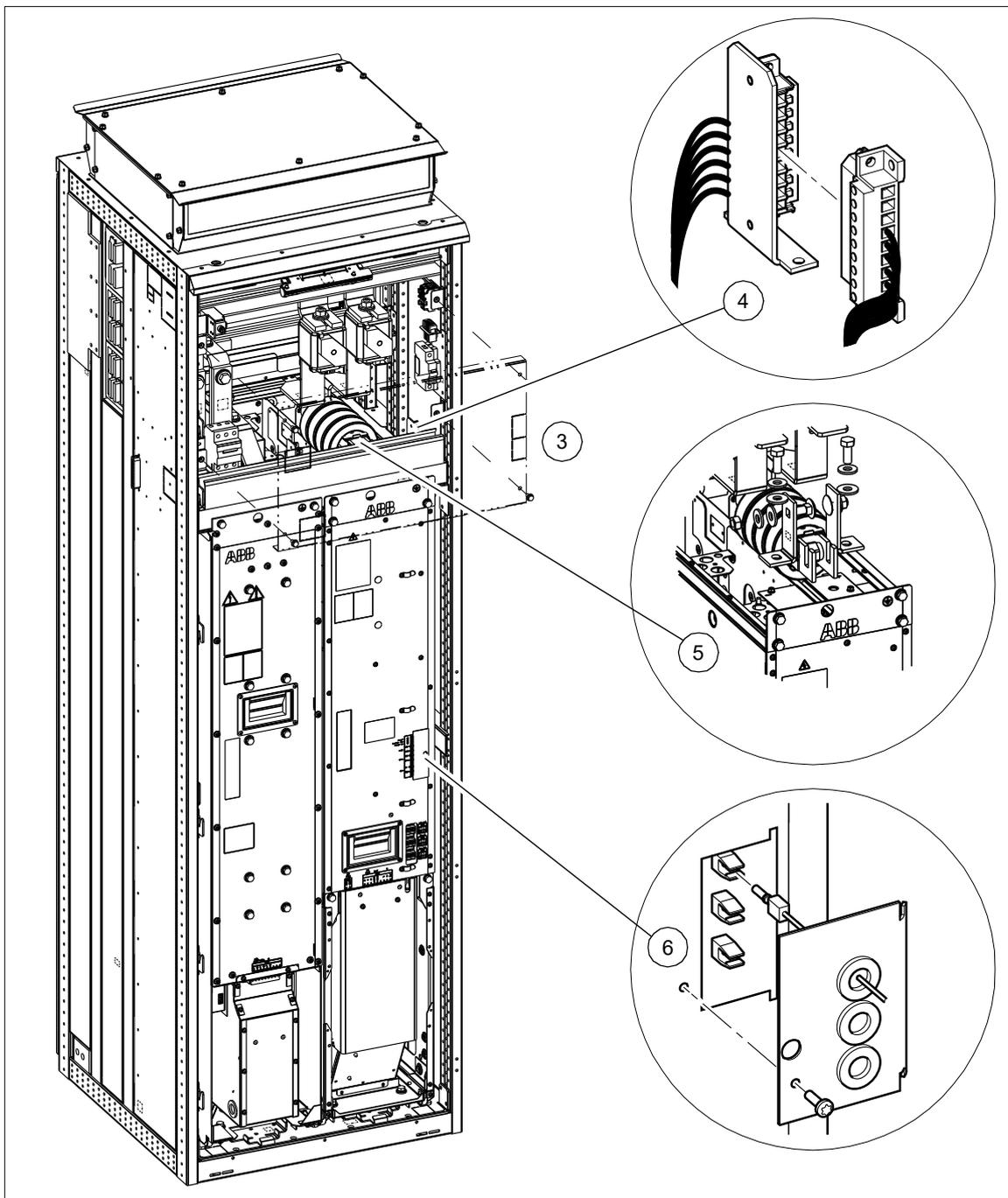
12. Replace the module: install the module in reverse order. Mind you fingers. Keep a constant pressure with one foot on the base of the module to prevent the module from falling on its back.

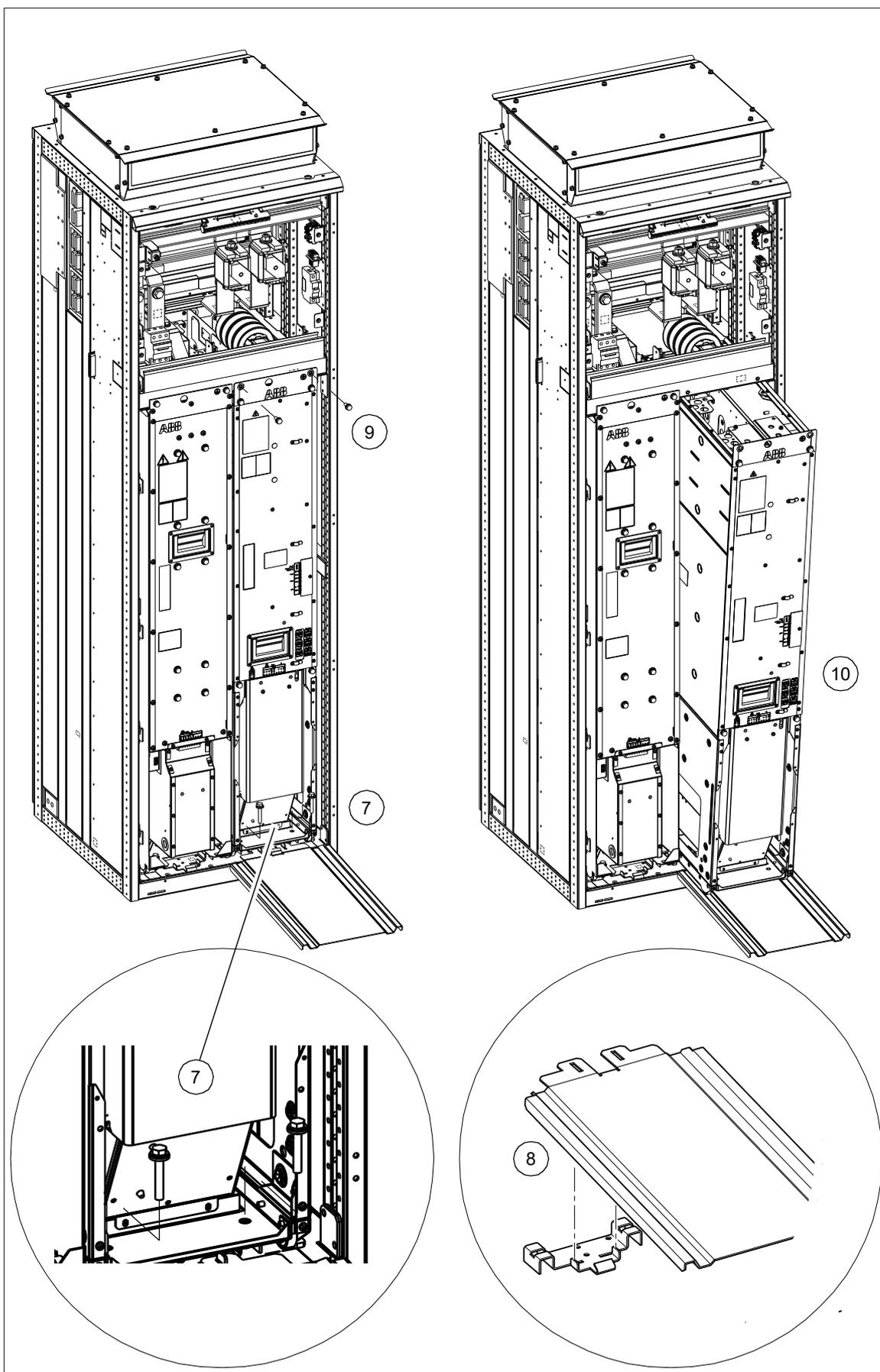
**Note:** Be careful not to break the fastening screws: tighten the fastening screws of the module to 22 N·m (16.2 lbf.ft) and fastening bolts of the DC output busbars to 70 N·m (51.6 lbf.ft).

- Plug the module signal wire set to the module terminal block [X50].
- Reconnect the fiber optic cables.
- Fasten the shrouds.

13. Remove the module pull-out ramp and close the cabinet doors.

The figures show replacement of a 1xR8i module.





## L-filter

### ■ Replacing the L-filter (BL-1x-x)

---



**WARNING!** Only qualified electricians are allowed to do this work. Read the complete safety instructions given in *Safety instructions for ACS880 multidrive cabinets and modules* (3AUA0000102301 [English]) before you service the drive. Ignoring the instructions can cause physical injury or death, or damage to the equipment.

---



**WARNING!** Ignoring the following instructions can cause physical injury, or damage to the equipment (See also [Replacing the rectifier module](#) on page 86.):

- Use extreme caution when maneuvering a module that runs on wheels. The modules are heavy and have a high center of gravity. They topple over easily if handled carelessly.
  - When removing a module which is equipped with wheels, pull the module carefully out of the cubicle along the ramp. While pulling on the handle, keep a constant pressure with one foot on the base of the module to prevent the module from falling on its back.
  - When replacing a module, push the module up the ramp and back into the cubicle. Keep your fingers away from the edge of the module front plate to avoid pinching them between the module and the cubicle. Also, keep a constant pressure with one foot on the base of the module to prevent the module from falling on its back.
  - Wear protective gloves and long sleeves! Some parts have sharp edges.
  - Do not tilt the module. Do not leave the module unattended on a sloping floor.
  - Do not use the ramp with plinth heights over 50 mm. The ramp supplied with the drive system is designed for a plinth height of 50 mm (the standard plinth height of ABB cabinets).
-

1. Disconnect the drive from the AC power line and make sure it is safe to start the work. See section [Electrical safety precautions](#) on page 42.
2. Open the cubicle door.
3. Undo the four screws of the shroud in the upper part of the cubicle. Remove the shroud.
4. Unplug the terminal block [X30] cable on top of the module.
5. Remove the screws in the busbars on top of the L-filter module. Be careful not to drop the screws inside the module!

Option +C121, marine construction: If a marine support plate is installed in front of the converter and filter modules, undo the screws that fasten the marine support to the modules. Loosen the screws that fasten the support to the corner posts (do not remove the screws). Remove the support.

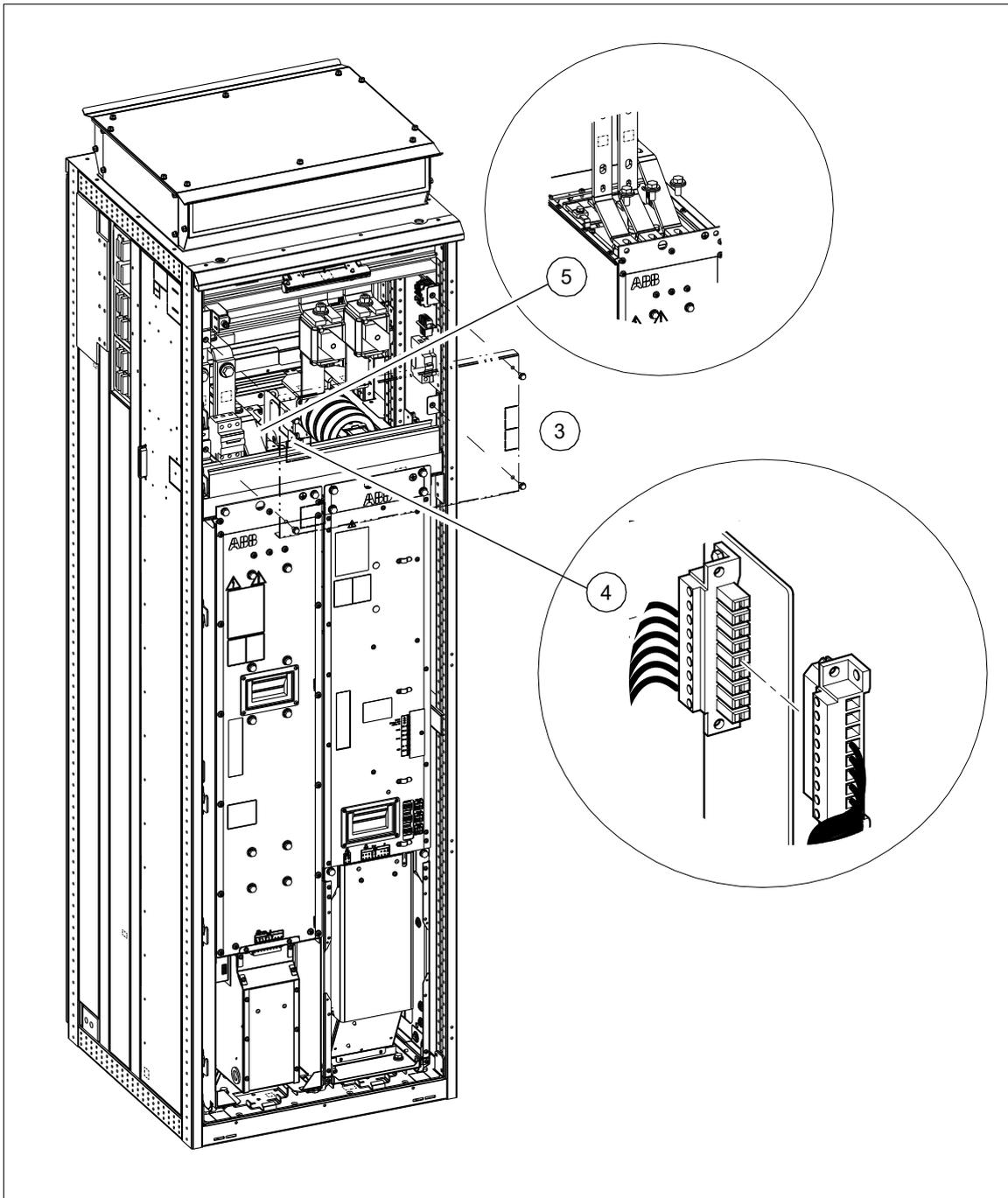
**Note:** Reinstall the converter and filter module screws before removing the modules from the cubicle.

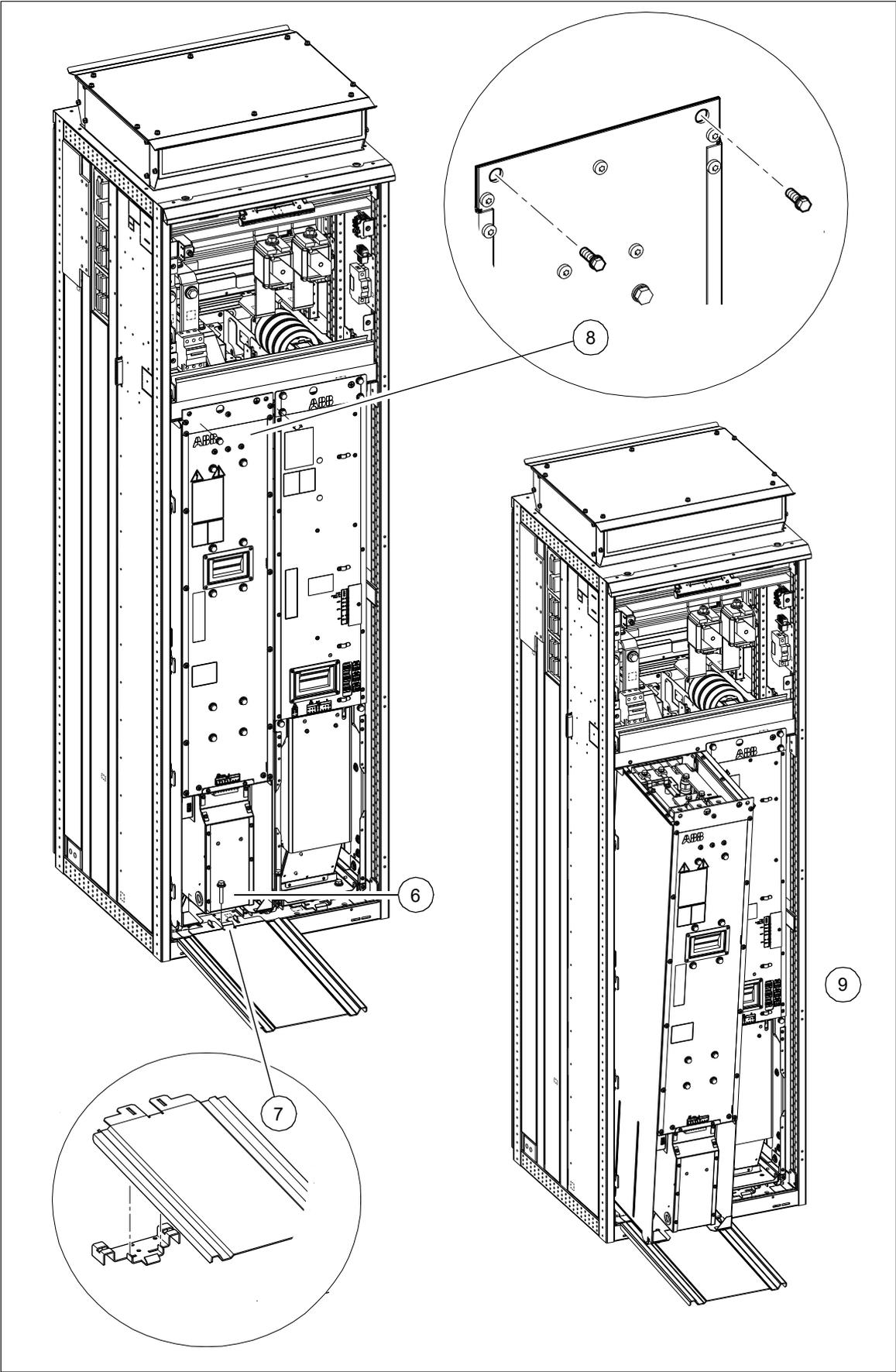
6. Remove the two screws that fasten the bottom of the module to the base of the cabinet.
7. Install the module pull-out ramp: lift the module pull-out ramp against the cabinet base so that the hooks of the base go into the ramp's holes.
8. Remove the two fastening screws that fasten the top of the module to the cabinet frame.
9. Pull the module carefully out of the cabinet along the ramp. While pulling on the handle, keep a constant pressure with one foot on the base of the module to prevent the module from falling on its back.
10. Replace the module: install the module in reverse order. Mind your fingers. Keep a constant pressure with one foot on the base of the module to prevent the module from falling on its back.

**Note:** Be careful not to break the fastening screws: tighten the fastening screws of the module to 22 N·m (16.2 lbf.ft) and fastening bolts of the DC output busbars to 70 N·m (51.6 lbf.ft).

- Plug the module signal wire set to the module signal connector.
- Fasten the shrouds.

11. Remove the module pull-out ramp and close the cabinet doors.
-





## ■ Replacing the L-filter (BL-2x-x)

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**WARNING!** Only qualified electricians are allowed to do this work. Read the complete safety instructions given in *Safety instructions for ACS880 multidrive cabinets and modules* (3AUA0000102301 [English]) before you service the drive. Ignoring the instructions can cause physical injury or death, or damage to the equipment.

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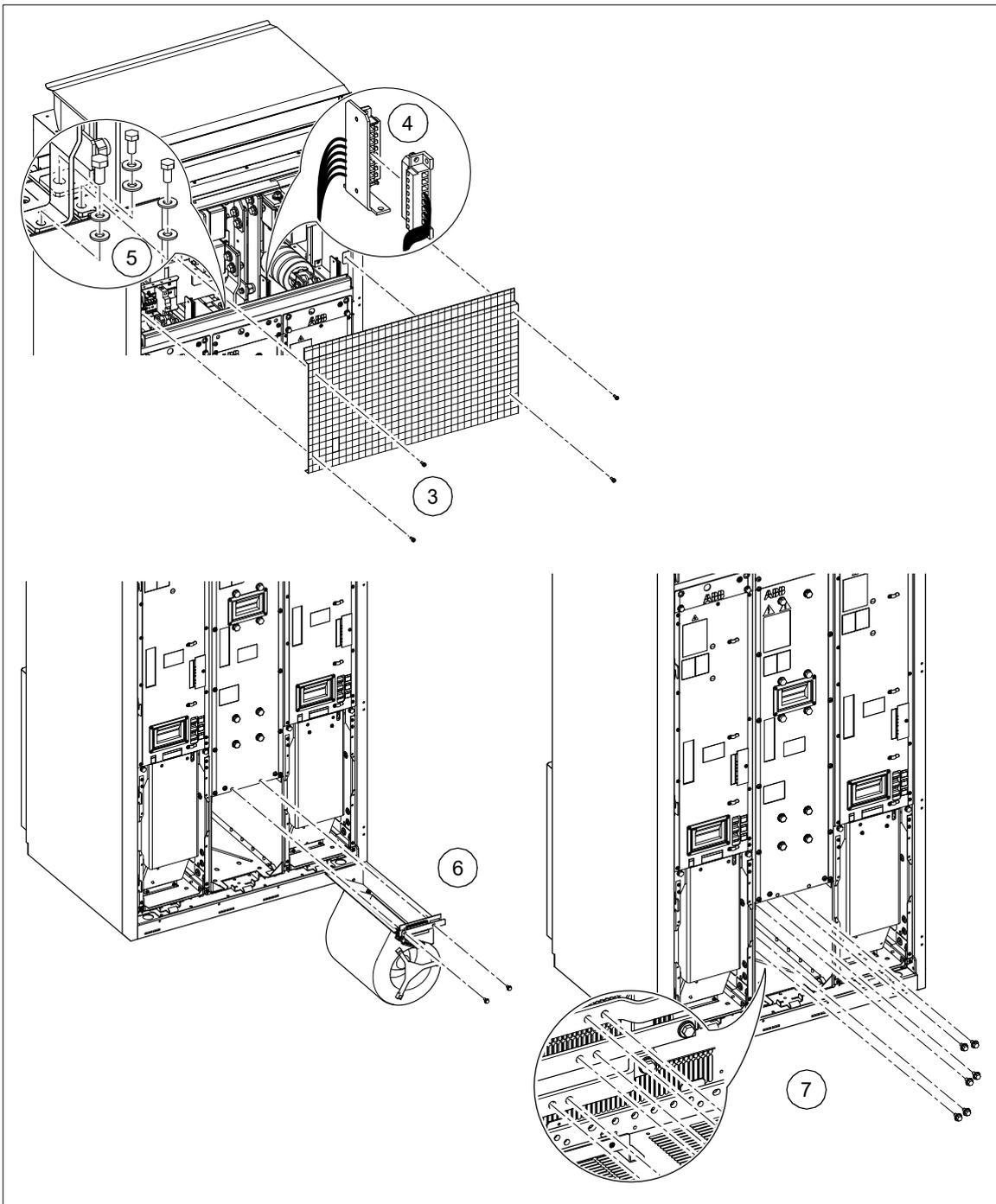
**WARNING!** Ignoring the following instructions can cause physical injury, or damage to the equipment (See also [Replacing the rectifier module](#) on page 86.):

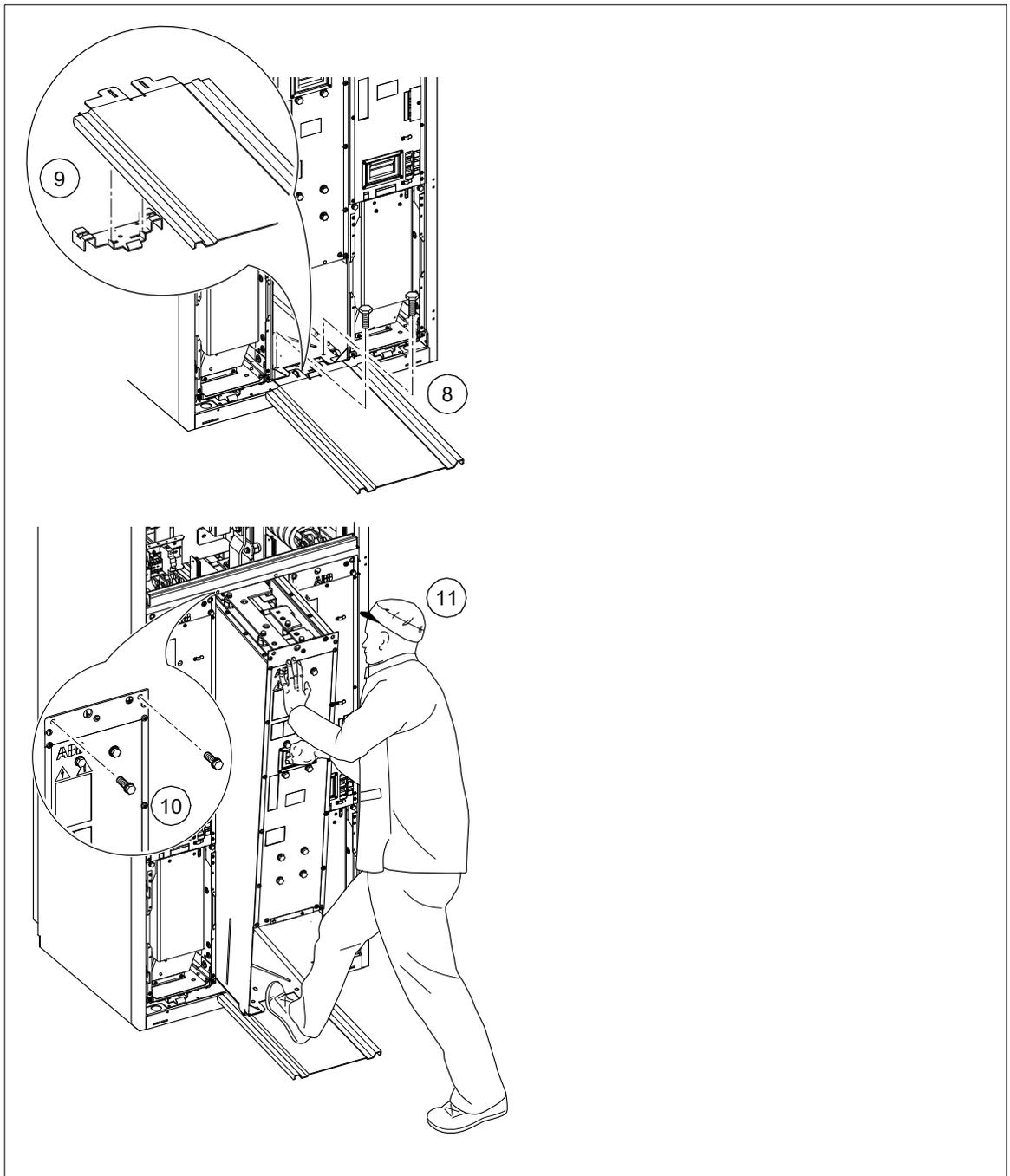
- Use extreme caution when maneuvering a module that runs on wheels. The modules are heavy and have a high center of gravity. They topple over easily if handled carelessly.
  - When removing a module which is equipped with wheels, pull the module carefully out of the cubicle along the ramp. While pulling on the handle, keep a constant pressure with one foot on the base of the module to prevent the module from falling on its back.
  - When replacing a module which is equipped with wheels, push the module up the ramp and back into the cubicle. Keep your fingers away from the edge of the module front plate to avoid pinching them between the module and the cubicle. Also, keep a constant pressure with one foot on the base of the module to prevent the module from falling on its back.
  - Wear protective gloves and long sleeves! Some parts have sharp edges.
  - Do not tilt the module. Do not leave the module unattended on a sloping floor.
  - Do not use the ramp with plinth heights over 50 mm. The ramp supplied with the drive system is designed for a plinth height of 50 mm (the standard plinth height of ABB cabinets).
-

1. Disconnect the drive from the AC power line and make sure it is safe to start the work. See section [Electrical safety precautions](#) on page 42.
  2. Open the cubicle door.
  3. Undo the four screws of the shroud in the upper part of the cubicle. Remove the shroud.
  4. Unplug the terminal block [X30] cable on top of the module.
  5. Remove the screws in the busbars on top of the L-filter module. Be careful not to drop the screws inside the module!
  6. Remove the fan of the L-filter module. Unplug the fan power supply cable and remove the screws in front of the fan. (See [Replacing the fan of the L-filter \(BL-2x-x\)](#) on page 82.)
  7. Remove the fastening screws in the busbar behind the module.
  8. Remove the two screws that fasten the bottom of the module to the base of the cabinet.
  9. Install the module pull-out ramp: lift the module pull-out ramp against the cabinet base so that the hooks of the base go into the ramp's holes.
  10. Remove the two fastening screws that fasten the top of the module to the cabinet frame.
  11. Pull the module carefully out of the cabinet along the ramp. While pulling on the handle, keep a constant pressure with one foot on the base of the module to prevent the module from falling on its back.
  12. Replace the module: install the module in reverse order. Mind you fingers. Keep a constant pressure with one foot on the base of the module to prevent the module from falling on its back.

**Note:** Be careful not to break the fastening screws: tighten the fastening screws of the module to 22 N·m (16.2 lbf.ft) and fastening bolts of the DC output busbars to 70 N·m (51.6 lbf.ft).

    - Plug the module signal wire set to the module the terminal block [X30].
    - Fasten the shrouds.
  13. Remove the module pull-out ramp and close the cabinet doors.
-





## Capacitors

The DC circuit of a rectifier module contains several electrolytic capacitors. Their lifespan depends on the operating time, loading and ambient temperature. Capacitor life can be prolonged by lowering the ambient temperature.

Capacitor failure is usually followed by damage to the unit and an input fuse failure, or a fault trip. Contact ABB if capacitor failure is suspected. Replacements are available from ABB. Do not use other than ABB-specified spare parts. Contact an ABB service representative for spare parts and repair services.

### ■ Reforming the capacitors

The DC circuit capacitors must be reformed if the drive has not been powered (either in storage or unused) for a certain time.

- For drives that have been non-operational for one to three years, reform the capacitors with power on for 30 minutes without a load.
- For drives that have been non-operational for more than three years, use the reforming device where applicable.

See section [Type designation labels](#) on page 33 for information on finding out the manufacturing date.

For information on reforming the capacitors, see *Converter module capacitor reforming instructions* (3BFE64059629 [English]).

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## Fuses

### ■ Checking and replacing the DC fuses

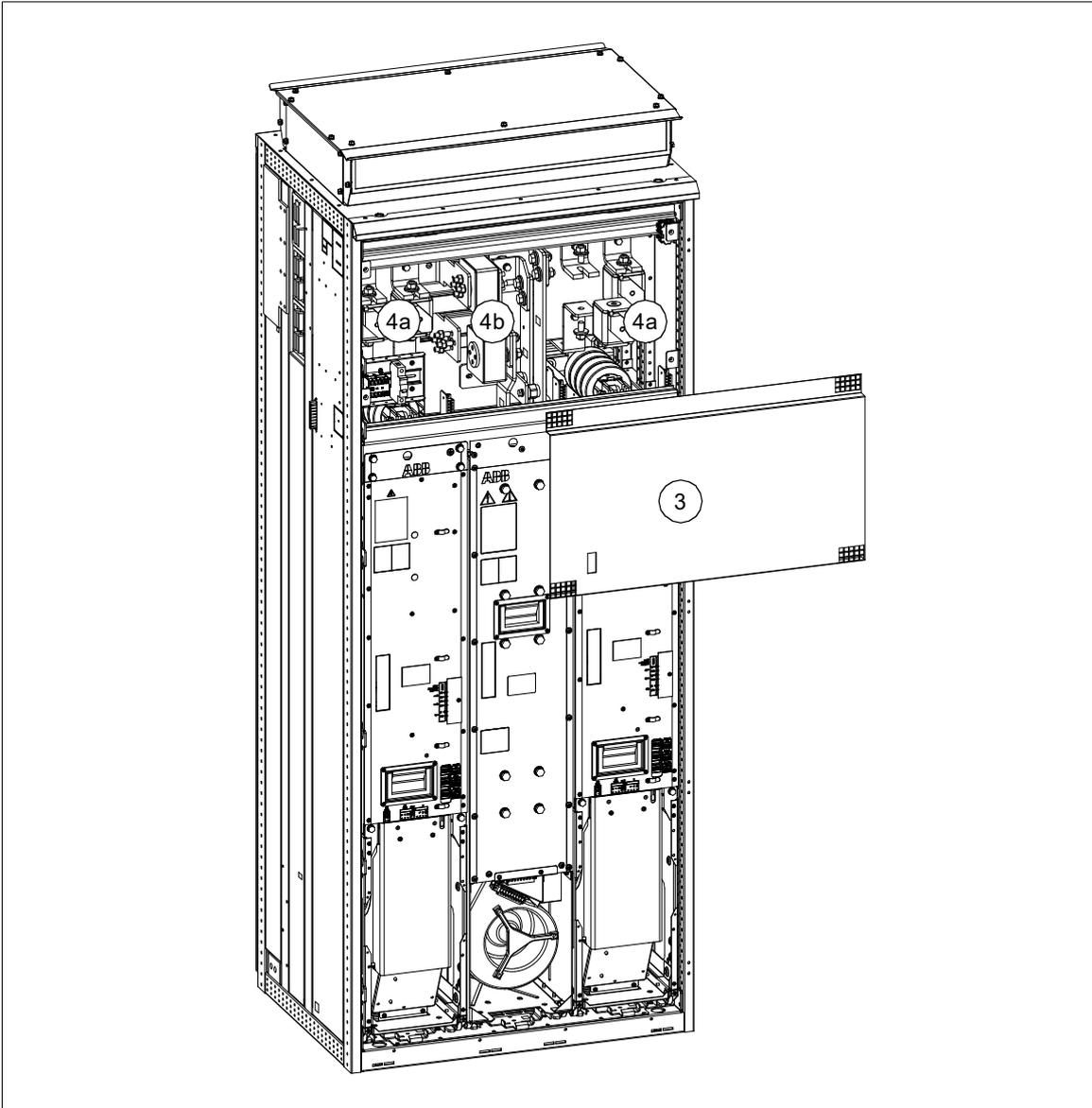


**WARNING!** Only qualified electricians are allowed to do this work. Read the complete safety instructions given in *Safety instructions for ACS880 multidrive cabinets and modules* (3AUA0000102301 [English]) before you service the drive. Ignoring the instructions can cause physical injury or death, or damage to the equipment.

1. Disconnect the drive from the AC power line and make sure it is safe to start the work. See section [Electrical safety precautions](#) on page 42. Switch off the disconnecter of the charging circuit [Q3].
2. Open the rectifier module cubicle door.
3. Undo the screws of the shroud in the upper part of the cubicle. Remove the shroud.
4. DC fuses (a) are located on top of the rectifier module. Check the condition of the fuses. In case of a blown fuse, replace all fuses with similar fuses: slacken the nuts of the fuses and pull the fuses out. Do not unscrew the nuts completely, not to drop them inside the module below. Tighten the nuts by hand or applying maximum 5 N·m force. Tightening torques for nuts are:

Nut	Bussmann fuses	Mersen (Ferraz Shawmut) fuses
M12	50 N·m	46 N·m

5. Attach the shrouds in reverse order and close the door.



## ■ Checking and replacing the AC fuses



**WARNING!** Only qualified electricians are allowed to do this work. Read the complete safety instructions given in *Safety instructions for ACS880 multidrive cabinets and modules* (3AUA0000102301 [English]) before you service the drive. Ignoring the instructions can cause physical injury or death, or damage to the equipment.

1. Disconnect the drive from the AC power line and make sure it is safe to start the work. See section [Electrical safety precautions](#) on page 42.
2. Open the rectifier module cubicle door.
3. Undo the screws of the shroud in the upper part of the cubicle. Lift and remove the shroud.
4. AC fuses (b) are located on top of the L-filter module. Check the condition of the fuses. In case of a blown fuse, replace all fuses with similar fuses: slacken the nuts of the fuses and pull the fuses out. Do not unscrew the nuts completely, not to drop them inside the module below. Tighten the nuts first by hand or applying maximum 5 N·m force. Tightening torques for nuts are:

Nut	Bussmann fuses	Mersen (Ferraz Shawmut) fuses
M12	50 N·m	46 N·m

5. Attach the shroud and close the door.

For the figure, see [Checking and replacing the DC fuses](#).

## Control panel

### ■ Replacing the control panel battery

1. Turn the lid on the back of the panel counter-clockwise until the lid opens.
2. Replace the battery with a new CR2032 battery.
3. Put the lid back and tighten it by turning it clockwise.
4. Dispose of the old battery according to local disposal rules or applicable laws.



### ■ Cleaning the control panel

See *ACS-AP-x assistant control panels user's manual* (3AUA0000085685 [English]).

## Control unit

### ■ BCU control unit types

There are three variants of the BCU control unit used in ACS880 drives: BCU-02, BCU-12 and BCU-22. These have a different number of converter module connections (2, 7 and 12 respectively) but are otherwise identical. The three BCU types are interchangeable as long as the number of connections is sufficient. For example, the BCU-22 can be used as a direct replacement for both BCU-02 and BCU-12.

### ■ Memory unit

After replacing a control unit, the existing parameter settings can be retained by transferring the memory unit from the defective unit to the new unit.



**WARNING!** Only qualified electricians are allowed to do this work. Read the complete safety instructions of the drive. Ignoring the instructions can cause physical injury or death, or damage to the equipment.

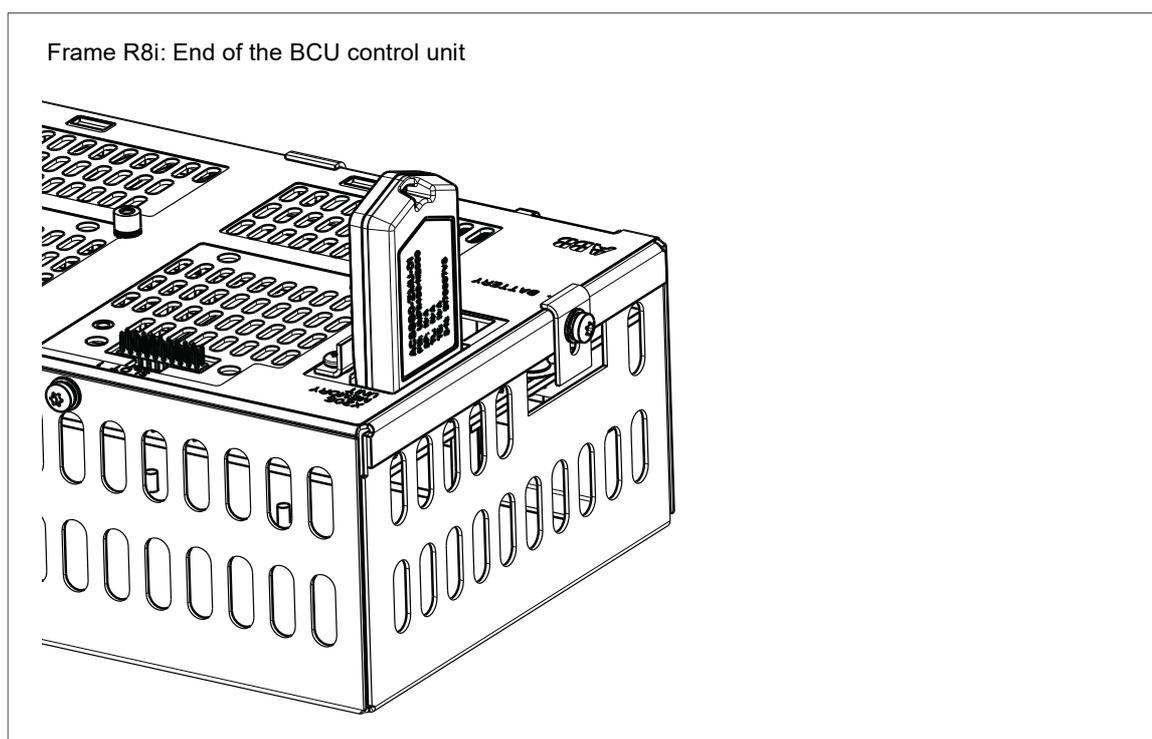
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**WARNING!** Do not remove or insert the memory unit when the control unit is powered.

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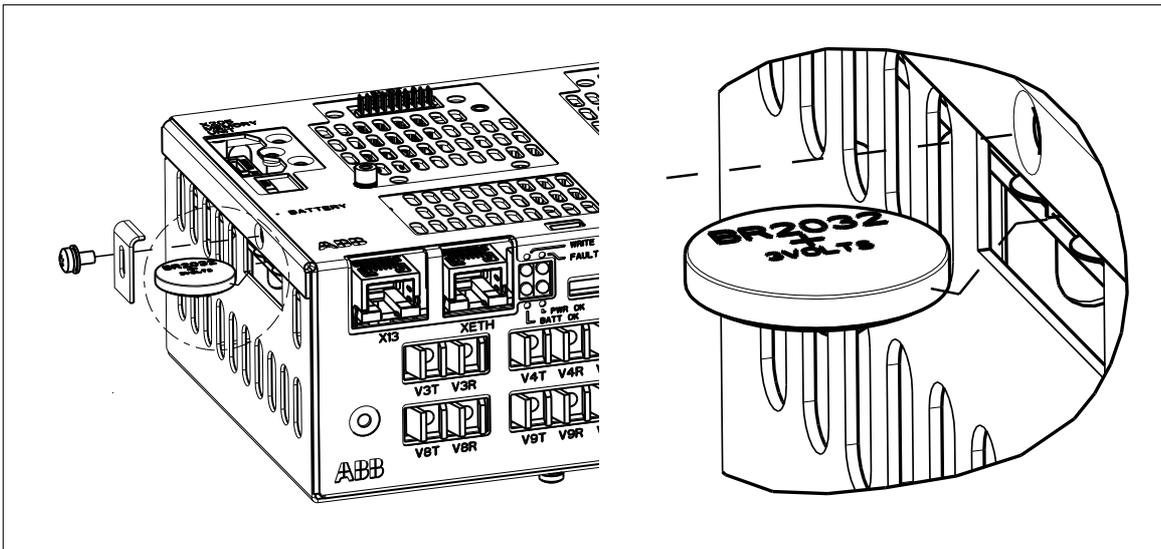
1. Disconnect the drive from the AC power line and make sure it is safe to start the work. See section [Electrical safety precautions](#) on page 42.
2. Make sure that the control unit is not powered.
3. Undo the fastening screw and pull the memory unit out.
4. Install the memory unit to the new control unit in reverse order.



## ■ Control unit battery

Replace the real-time clock battery if the BATT OK LED is not illuminated when the control unit is powered. For information on the LED, see chapter [Layout and connections](#) on page 137.

1. Undo the fastening screw and remove the battery
2. Replace the battery with a new BR2032 battery.
3. Dispose the old battery according to local disposal rules or applicable laws.
4. Set the real-time clock.



## LEDs and other status indicators

This section instructs how to interpret the status indications of the ACS880-907 regenerative rectifier unit.

Warnings and faults reported by the control program are displayed on the control panel on the cabinet door. For further information, see the *Firmware manual* delivered with the regenerative rectifier unit.

The ACS-AP-x control panel has a status LED. The control panel mounting platform has two LEDs - a red and a green one. The regenerative rectifier module has three LEDs. For their indications, see the following table.

Location	LED	Indication
ACS-AP-W control panel (status LED)	Blinking blue	Bluetooth interface is enabled. It is in discoverable mode and ready for pairing.
	Flickering blue	Data is transferred through the Bluetooth interface of the control panel.
Control panel mounting platform (with the control panel removed)	Red	There is an active fault in the regenerative rectifier unit.
	Green	Power supply for the control board of the regenerative rectifier unit is OK.

## Reduced run

The reduced run function is available for regenerative rectifier units consisting of parallel-connected regenerative rectifier modules. The function makes it possible to continue operation with limited current even if one (or more) module is out of service, for example, because of maintenance work.

In principle, reduced run is possible with only one module, but the physical requirements of operating the drive still apply; for example, the modules remaining in use must be able to provide enough current.

4×R8i unit consist of two 2×R8i+BL sets. When one rectifier unit fails, whole set of 2×R8i+BL is first removed as shown below:

4 -> 2 -> 1 RRU modules

that is

4×R8i+2×BL -> 2×R8i+1×BL -> 1×R8i+1×BL

### ■ Starting reduced run operation



**WARNING!** Only qualified electricians are allowed to do this work. Read the complete safety instructions given in *Safety instructions for ACS880 multidrive cabinets and modules* (3AUA0000102301 [English]) before you service the drive. Ignoring the instructions can cause physical injury or death, or damage to the equipment.

---



**WARNING!** Wear protective gloves and long sleeves! Some parts have sharp edges.

---

1. Disconnect the drive from the AC power line and make sure it is safe to start the work. See section [Electrical safety precautions](#) on page 42.
  2. If the regenerative rectifier control unit is powered from the faulty module, connect the control unit to another 24 V DC power supply. We strongly recommend using an external power supply with regenerative rectifier units consisting of parallel-connected modules.
  3. Remove the module to be serviced from its bay.
  4. Install an air baffle (for example, plexiglass) to the top module guide to block the airflow through the empty module bay.
  5. Switch on the power to the regenerative rectifier unit.
  6. Enter the number of regenerative rectifier modules present into parameter 195.13 *Reduced run mode*.
  7. Reset all faults and start the regenerative rectifier unit. The maximum current limit is now automatically set according to the new regenerative rectifier configuration. A mismatch between the number of detected modules (parameter 195.14) and the value set in 195.13 will generate a fault.
-

## ■ Resuming normal operation

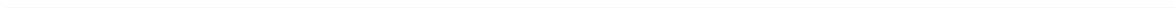
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**WARNING!** Only qualified electricians are allowed to do this work. Read the complete safety instructions given in *Safety instructions for ACS880 multidrive cabinets and modules* (3AUA0000102301 [English]) before you service the drive. Ignoring the instructions can cause physical injury or death, or damage to the equipment.

---

1. Remove the air baffle from the module bay.
  2. Reinstall the module into its bay.
  3. Switch on the power to the regenerative rectifier unit.
  4. Enter "0" into parameter *195.13 Reduced run mode*.
-





# Technical data

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## Contents of this chapter

This chapter contains the technical data valid for the cabinet-installed ACS880-907 regenerative rectifier units.

---

## Ratings

Unit type ACS880- 907-...	Consists of module type ACS880- 104-...	Frame	No-overload use						Light- overload use		Heavy-duty use	
			$I_1$	$I_2$	$I_{max}$	$I_{max}$	$S_N$	$P_N$	$I_{Ld}$	$P_{Ld}$	$I_{Hd}$	$P_{Hd}$
			A (AC)	A (DC)	A (AC)	A (DC)	kVA	kW (DC)	A (DC)	kW	A (DC)	kW
$U_n = 400\text{ V}$												
0600A-3	0640A-3	1×R8i	600	727	780	955	416	393	698	377	544	294
0900A-3	0900A-3	1×R8i	900	1091	1170	1433	624	589	1048	566	816	441
1180A-3	0640A-3	2×R8i	1180	1431	1534	1879	818	773	1374	742	1070	578
1770A-3	0900A-3	2×R8i	1770	2146	2301	2818	1226	1159	2060	1113	1605	867
2310A-3	0640A-3	4×R8i	2310	2801	3003	3678	1600	1512	2689	1452	2095	1131
3460A-3	0900A-3	4×R8i	3460	4195	4498	5509	2397	2265	4027	2175	3138	1695
5130A-3	0900A-3	6×R8i	5130	6220	6669	8168	3554	3359	5971	3225	4653	2512
$U_n = 500\text{ V}$												
0600A-5	0590A-5	1×R8i	600	727	780	955	520	491	698	471	544	367
0900A-5	0810A-5	1×R8i	900	1091	1170	1433	779	737	1047	707	816	551
1180A-5	0590A-5	2×R8i	1180	1431	1534	1879	1022	966	1374	927	1070	722
1770A-5	0810A-5	2×R8i	1770	2146	2301	2818	1533	1449	2060	1391	1605	1084
2310A-5	0590A-5	4×R8i	2310	2801	3003	3678	2001	1891	2689	1815	2095	1414
3460A-5	0810A-5	4×R8i	3460	4195	4498	5509	2996	2832	4027	2719	3138	2118
5130A-5	0810A-5	6×R8i	5130	6220	6669	8168	4443	4199	5971	4031	4653	3141
$U_n = 690\text{ V}$												
0600A-7	0410A-7	1×R8i	600	727	900	1102	717	678	698	651	544	507
0900A-7	0600A-7	1×R8i	900	1091	1350	1653	1076	1016	1048	976	816	760
1180A-7	0410A-7	2×R8i	1180	1431	1770	2168	1410	1333	1374	1279	1070	997
1770A-7	0600A-7	2×R8i	1770	2146	2655	3252	2115	1999	2060	1919	1605	1495
2310A-7	0410A-7	4×R8i	2310	2801	3465	4244	2761	2609	2689	2505	2095	1952
3460A-7	0600A-7	4×R8i	3460	4195	5190	6356	4135	3908	4027	3752	3138	2923
5130A-7	0600A-7	6×R8i	5130	6220	7695	9424	6131	5794	5971	5562	4653	4334

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## Definitions

### Nominal ratings

$U_n$  Nominal input voltage. For  $U_1$ , see [Electrical power network specification](#) on page 125. For output voltage  $U_2$ , see [DC connection data](#) on page 125.

$I_1$  Continuous rms input (AC) current. No overload capability at 40 °C (104 °F)

$I_2$  Continuous rms output (DC) current. No overload capability at 40 °C (104 °F)

$I_{max}$  Maximum output current. Available for 10 s at start, otherwise as long as allowed by module temperature.

$P_N$  Nominal output power

$S_N$  Nominal apparent power

### Light-overload use (10% overload capability) ratings

$I_{Ld}$  Continuous rms current. 10% overload is allowed for one minute every 5 minutes.

$P_{Ld}$  Output power in light-overload use

### Heavy-duty use (50% overload capability) ratings

$I_{Hd}$  Continuous rms current. 50% overload is allowed for one minute every 5 minutes.

$P_{Hd}$  Output power in heavy-duty use

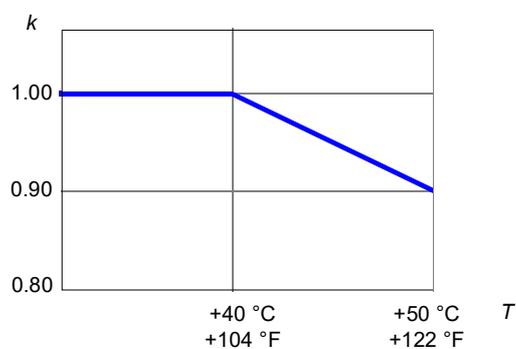
For input frequency  $f_1$ , see [Electrical power network specification](#) on page 125.

**Note:** The ratings apply at an ambient temperature of 40 °C (104 °F).

## ■ Derating

### Temperature derating

In the temperature range +40...50 °C (+104...122 °F), the rated output current is derated by 1% for every added 1 °C (1.8 °F). The output current can be calculated by multiplying the current given in the rating table by the derating factor ( $k$ ):



### Altitude derating

At altitudes 0 ... 2000 m (6561.7 ft), no derating. For derating at altitudes over 2000 m (6561.7 ft), contact ABB.

## Fuses

### ■ Main circuit AC fuses

Unit type ACS880-907-...	Rating	Type	Example (Bussman)	Qty
$U_n = 400\text{ V}$				
0600A-3	1100 A, 690 V, size 3	Flush end type	170M6415	3
0900A-3	1400 A, 690 V, size 3	Flush end type	170M6417	3
1180A-3	2000 A, 690 V, size 4	Flush end type	170M7062	3
1770A-3	3000 A, 690 V, size 4	Flush end type	170M7064	3
2310A-3	2000 A, 690 V, size 4	Flush end type	170M7062	6
3460A-3	3000 A, 690 V, size 4	Flush end type	170M7064	6
5130A-3	3000 A, 690 V, size 4	Flush end type	170M7064	9
$U_n = 500\text{ V}$				
0600A-5	1100 A, 690 V, size 3	Flush end type	170M6415	3
0900A-5	1400 A, 690 V, size 3	Flush end type	170M6417	3
1180A-5	2000 A, 690 V, size 4	Flush end type	170M7062	3
1770A-5	3000 A, 690 V, size 4	Flush end type	170M7064	3
2310A-5	2000 A, 690 V, size 4	Flush end type	170M7062	6
3460A-5	3000 A, 690 V, size 4	Flush end type	170M7064	6
5130A-5	3000 A, 690 V, size 4	Flush end type	170M7064	9
$U_n = 690\text{ V}$				
0600A-7	1100 A, 690 V, size 3	Flush end type	170M6415	3
0900A-7	1400 A, 690 V, size 3	Flush end type	170M6417	3
1180A-7	2000 A, 690 V, size 4	Flush end type	170M7062	3
1770A-7	3000 A, 690 V, size 4	Flush end type	170M7064	3
2310A-7	2000 A, 690 V, size 4	Flush end type	170M7062	6
3460A-7	3000 A, 690 V, size 4	Flush end type	170M7064	6
5130A-7	3000 A, 690 V, size 4	Flush end type	170M7064	9

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## ■ Main circuit DC fuses

Unit type ACS880-907-...	Rating	Type	Example (Bussman)	Qty
$U_n = 400\text{ V}$				
0600A-3	1250 A, 690 V, size 3	Flush end contact	170M6416	2
0900A-3	1800 A, 690 V, size 3	Flush end contact	170M6420	2
1180A-3	1250 A, 690 V, size 3	Flush end contact	170M6416	4
1770A-3	1800 A, 690 V, size 3	Flush end contact	170M6420	4
2310A-3	1250 A, 690 V, size 3	Flush end contact	170M6416	8
3460A-3	1800 A, 690 V, size 3	Flush end contact	170M6420	8
5130A-3	1800 A, 690 V, size 3	Flush end contact	170M6420	12
$U_n = 500\text{ V}$				
0600A-5	1250 A, 690 V, size 3	Flush end contact	170M6416	2
0900A-5	1800 A, 690 V, size 3	Flush end contact	170M6420	2
1180A-5	1250 A, 690 V, size 3	Flush end contact	170M6416	4
1770A-5	1800 A, 690 V, size 3	Flush end contact	170M6420	4
2310A-5	1250 A, 690 V, size 3	Flush end contact	170M6416	8
3460A-5	1800 A, 690 V, size 3	Flush end contact	170M6420	8
5130A-5	1800 A, 690 V, size 3	Flush end contact	170M6420	12
$U_n = 690\text{ V}$				
0600A-7	700 A, 1250 V, size 3	Flush end contact	170M6545	4
0900A-7	900 A, 1100 V, size 3	Flush end contact	170M6547	4
1180A-7	700 A, 1250 V, size 3	Flush end contact	170M6545	8
1770A-7	900 A, 1100 V, size 3	Flush end contact	170M6547	8
2310A-7	700 A, 1250 V, size 3	Flush end contact	170M6545	12
3460A-7	900 A, 1100 V, size 3	Flush end contact	170M6547	12
5130A-7	900 A, 1100 V, size 3	Flush end contact	170M6547	24

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## ■ Fuses on CVAR board

**Note:** The CVAR board is needed in UL/CSA installations only.

The fuse type is Mersen (Ferraz Shawmut) A070GRB10T13/G330010 (10 A 700 V AC).

## L-filters

Unit type ACS880-907-...	Frame	L-filter type	
		230 V auxiliary voltage	115 V auxiliary voltage
$U_n = 400 \text{ V}$			
0600A-3	1×R8i	BL-15-5+C183+C188	BL-15-5+C183+C188+G304
0900A-3	1×R8i	BL-15-5+C183+C188	BL-15-5+C183+C188+G304
1180A-3	2×R8i	BL-25-5+C183+C188	-
1770A-3	2×R8i	BL-25-5+C183+C188	-
2310A-3	4×R8i	2×BL-25-5+C183+C188	-
3460A-3	4×R8i	2×BL-25-5+C183+C188	-
5130A-3	6×R8i	3×BL-25-5+C183+C188	-
$U_n = 500 \text{ V}$			
0600A-5	1×R8i	BL-15-5+C183+C188	BL-15-5+C183+C188+G304
0900A-5	1×R8i	BL-15-5+C183+C188	BL-15-5+C183+C188+G304
1180A-5	2×R8i	BL-25-5+C183+C188	-
1770A-5	2×R8i	BL-25-5+C183+C188	-
2310A-5	4×R8i	2×BL-25-5+C183+C188	-
3460A-5	4×R8i	2×BL-25-5+C183+C188	-
5130A-5	6×R8i	3×BL-25-5+C183+C188	-
$U_n = 690 \text{ V}$			
0600A-7	1×R8i	BL-15-7+C183+C188	BL-15-7+C183+C188+G304
0900A-7	1×R8i	BL-15-7+C183+C188	BL-15-7+C183+C188+G304
1180A-7	2×R8i	BL-25-7+C183+C188	-
1770A-7	2×R8i	BL-25-7+C183+C188	-
2310A-7	4×R8i	2×BL-25-7+C183+C188	-
3460A-7	4×R8i	2×BL-25-7+C183+C188	-
5130A-7	6×R8i	3×BL-25-7+C183+C188	-

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## Dimensions

Unit type	Height 1		Height 2		Width 1		Width 2		Depth 1		Depth 2		Weight	
	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	kg	lbs
<b>ACS880-907-...</b>														
<b><math>U_n = 400\text{ V}</math></b>														
0600A-3	2145	84.4	2315	91.1	1600	63.0	1600	63.0	636	25	756	29.8	1275	2810.9
0900A-3	2145	84.4	2315	91.1	1600	63.0	1600	63.0	636	25	756	29.8	1275	2810.9
1180A-3	2145	84.4	2315	91.1	2000	78.7	2200	86.6	636	25	756	29.8	1615	3560.5
1770A-3	2145	84.4	2315	91.1	2000	78.7	2200	86.6	636	25	756	29.8	1615	3560.5
2310A-3	2145	84.4	2315	91.1	2800	110.2	3000	118.1	744	29.3	864	34	2610	5754.1
3460A-3	2145	84.4	2315	91.1	3200	126.0	3600	141.7	744	29.3	864	34	2850	6283.2
5130A-3	2145	84.4	2315	91.1	4000	147.5	4700	185.0	744	29.3	864	34	3645	8035.8
<b><math>U_n = 500\text{ V}</math></b>														
0600A-5	2145	84.4	2315	91.1	1600	63.0	1600	63.0	636	25	756	29.8	1275	2810.9
0900A-5	2145	84.4	2315	91.1	1600	63.0	1600	63.0	636	25	756	29.8	1275	2810.9
1180A-5	2145	84.4	2315	91.1	2000	78.7	2200	86.6	636	25	756	29.8	1615	3560.5
1770A-5	2145	84.4	2315	91.1	2000	78.7	2200	86.6	636	25	756	29.8	1615	3560.5
2310A-5	2145	84.4	2315	91.1	2800	110.2	3000	118.1	744	29.3	864	34	2610	5754.1
3460A-5	2145	84.4	2315	91.1	3200	126.0	3600	141.7	744	29.3	864	34	2850	6283.2
5130A-5	2145	84.4	2315	91.1	4000	147.5	4700	185.0	744	29.3	864	34	3645	8035.8
<b><math>U_n = 690\text{ V}</math></b>														
0600A-7	2145	84.4	2315	91.1	1600	63.0	1600	63.0	636	25	756	29.8	1275	2810.9
0900A-7	2145	84.4	2315	91.1	1600	63.0	1600	63.0	636	25	756	29.8	1275	2810.9
1180A-7	2145	84.4	2315	91.1	2000	78.7	2200	86.6	636	25	756	29.8	1615	3560.5
1770A-7	2145	84.4	2315	91.1	2000	78.7	2200	86.6	636	25	756	29.8	1615	3560.5
2310A-7	2145	84.4	2315	91.1	2800	110.2	3000	118.1	744	29.3	864	34	2610	5754.1
3460A-7	2145	84.4	2315	91.1	3200	126.0	3600	141.7	744	29.3	864	34	2850	6283.2
5130A-7	2145	84.4	2315	91.1	4000	147.5	4700	185.0	744	29.3	864	34	3645	8035.8

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### Definitions

**Height 1** Normal height

**Height 2** Height with IP54 roof

**Width 1** Normal width

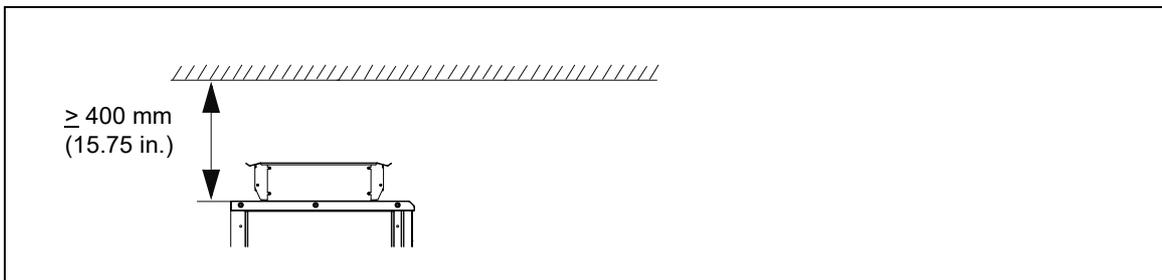
**Width 2** With auxiliary control cubicle and incoming cubicle(s)

**Depth 1** Without option +C128 Cooling air through bottom

**Depth 2** If option +C128 Cooling air through bottom is selected due to extra air inlet channel at the bottom

## Free space requirements

Leave 400.0 mm (15.75 in) free space above the basic roof level of the cabinet for cooling.



For the rest of the free space requirements, see *Mechanical installation instructions for ACS880 multidrive cabinets* (3AUA0000101764 [English]).

## Losses, cooling data and noise

Unit type ACS880-907-...	$P_{\text{lossRRU}}$	$P_{\text{lossL}}$	Air flow		Noise	Efficiency
	kW	kW	m <sup>3</sup> /h	ft <sup>3</sup> /min	dB	%
$U_n = 400 \text{ V}$						
0600A-3	5.4	3.0	2200	1294.9	72	97.9
0900A-3	8.9	4.0	2200	1294.9	72	97.9
1180A-3	10.7	5.0	4100	2413.2	74	98.0
1770A-3	17.7	7.5	4100	2413.2	74	97.9
2310A-3	21.5	10.0	8200	4826.3	76	98.0
3460A-3	35.4	15.0	8200	4826.3	76	97.8
5130A-3	53.1	22.5	12300	7239.5	78	97.8
$U_n = 500 \text{ V}$						
0600A-5	5.5	3.0	2200	1294.9	72	98.3
0900A-5	9.0	4.0	2200	1294.9	72	98.3
1180A-5	11.1	5.0	4100	2413.2	74	98.4
1770A-5	18.1	7.5	4100	2413.2	74	98.3
2310A-5	22.2	10.0	8200	4826.3	76	98.3
3460A-5	36.1	15.0	8200	4826.3	76	98.2
5130A-5	54.2	22.5	12300	7239.5	78	98.2
$U_n = 690 \text{ V}$						
0600A-7	6.8	3.0	2200	1294.9	72	98.6
0900A-7	10.3	4.0	2200	1294.9	72	98.6
1180A-7	13.5	5.0	4100	2413.2	74	98.6
1770A-7	20.6	7.5	4100	2413.2	74	98.6
2310A-7	27.1	10.0	8200	4826.3	76	98.6
3460A-7	41.2	15.0	8200	4826.3	76	98.6
5130A-7	61.8	22.5	12300	7239.5	78	98.6

3AXD00000601909

### Definitions

**$P_{\text{loss}}$**  Heat dissipation. Total losses of the RRU, L-filter and RRU with L-filter at nominal power

**Noise** Noise with direct-on-line fans running at nominal speed

## Terminal and lead-through data for the input power cable

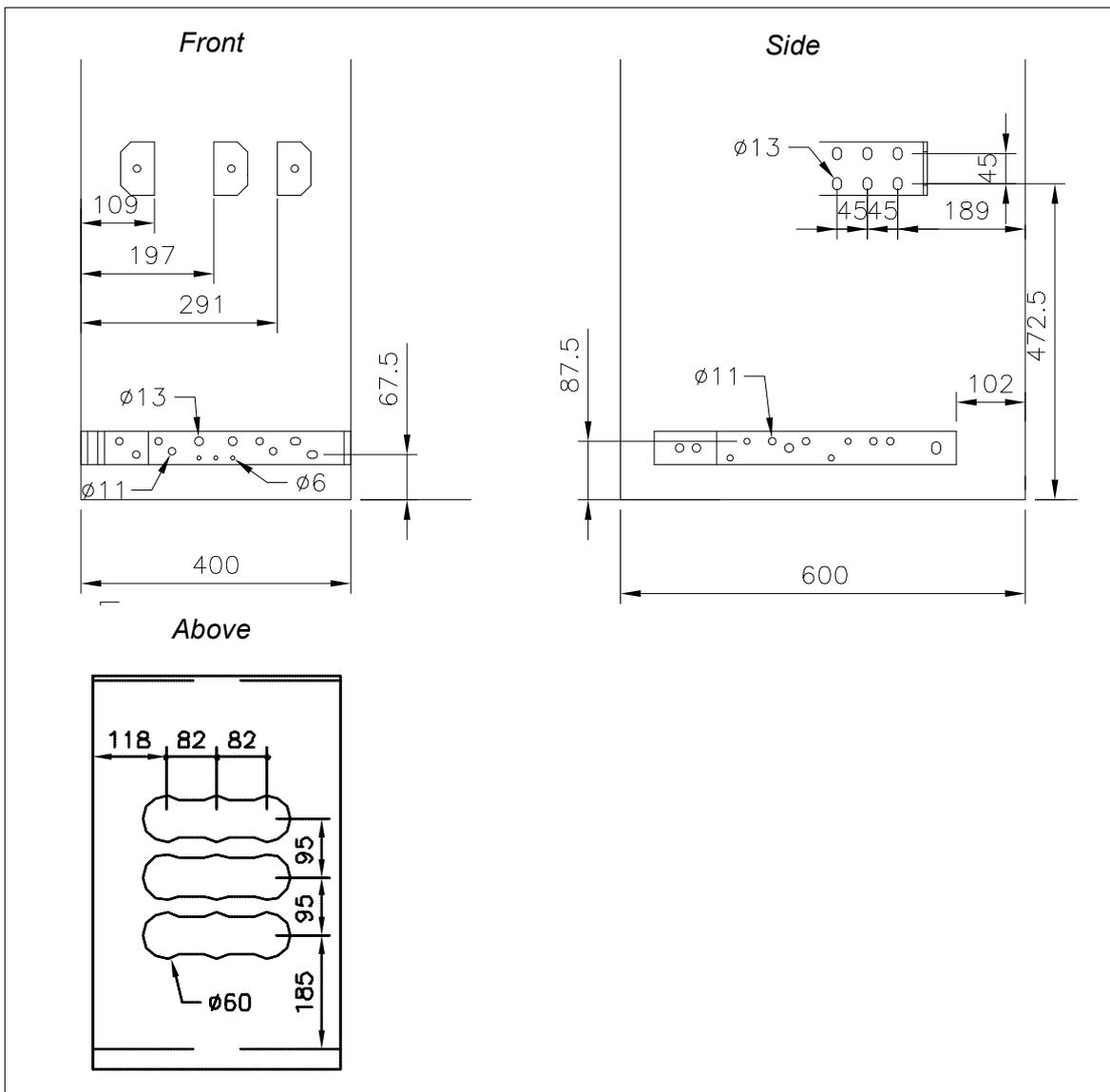
### ■ Frame R8i

Frame	Busbar Qty	Bolt size	Tightening torque		Screw holes			Cable entry holes		
			N·m	lbf·ft	Qty	mm	in	Qty	mm	in
R8i	3	M12 (½")	70	52	6	14	0.55	6	60	2.36

### ■ 400 mm incoming cubicle – main switch (+F253)

These drawings show the terminal and lead-through dimensions for the 400 mm wide incoming cubicle. This cubicle is used in rectifier units with main switch-disconnector (option +F253) and bottom cable entry. See also section [Layout drawing of a 400 mm incoming cubicle](#) on page 20.

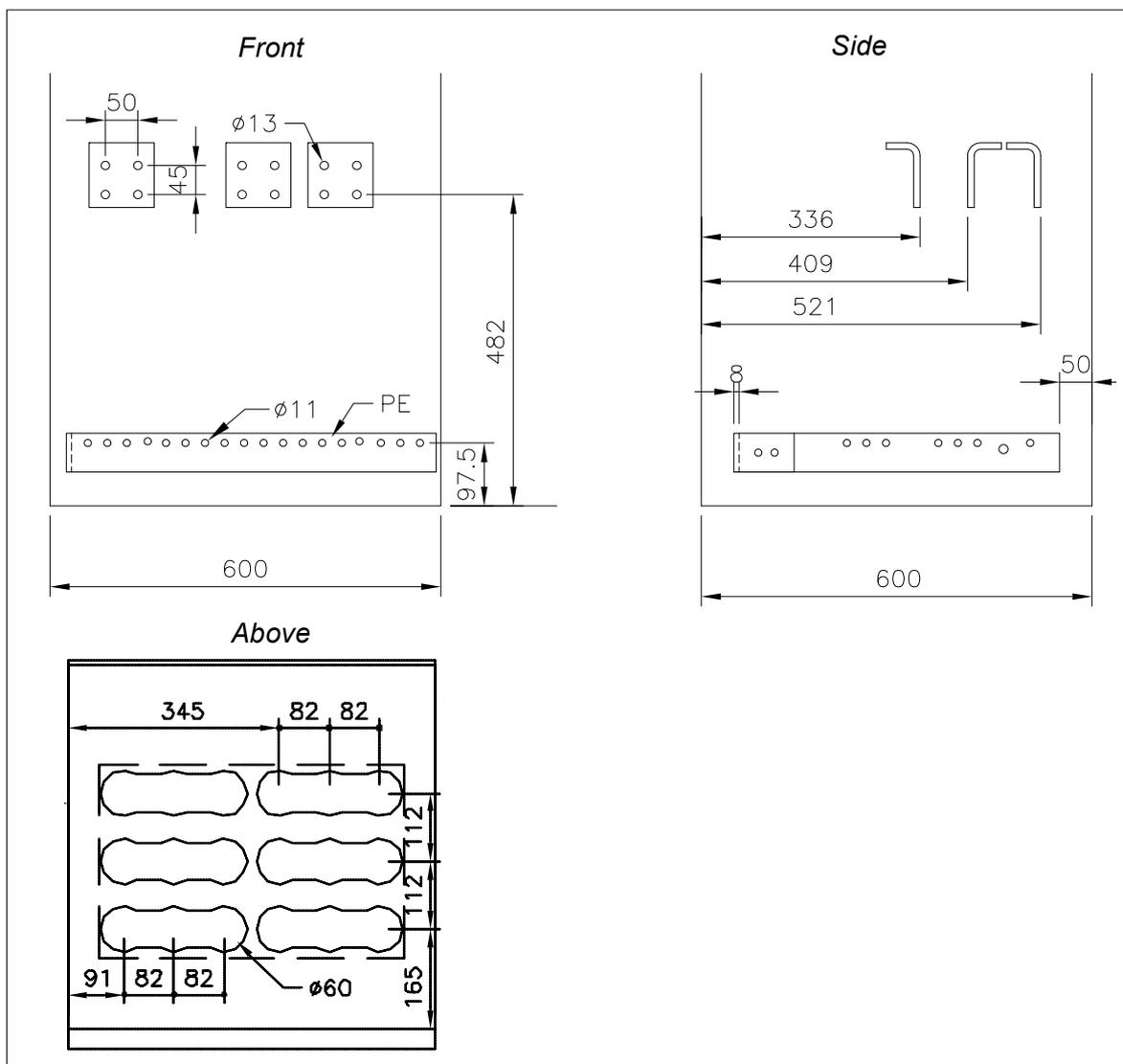
The dimensions are given in millimeters. Tightening torque for the cable lug connection depends on the bolt size and type. See section [Tightening torques](#) on page 124.



■ **600 mm incoming cubicle – main switch (+F253)**

These drawings show the terminal and lead-through dimensions for a 600 mm wide incoming cubicle. This cubicle is used in rectifier units with main switch-disconnector (option +F253) and bottom cable entry.

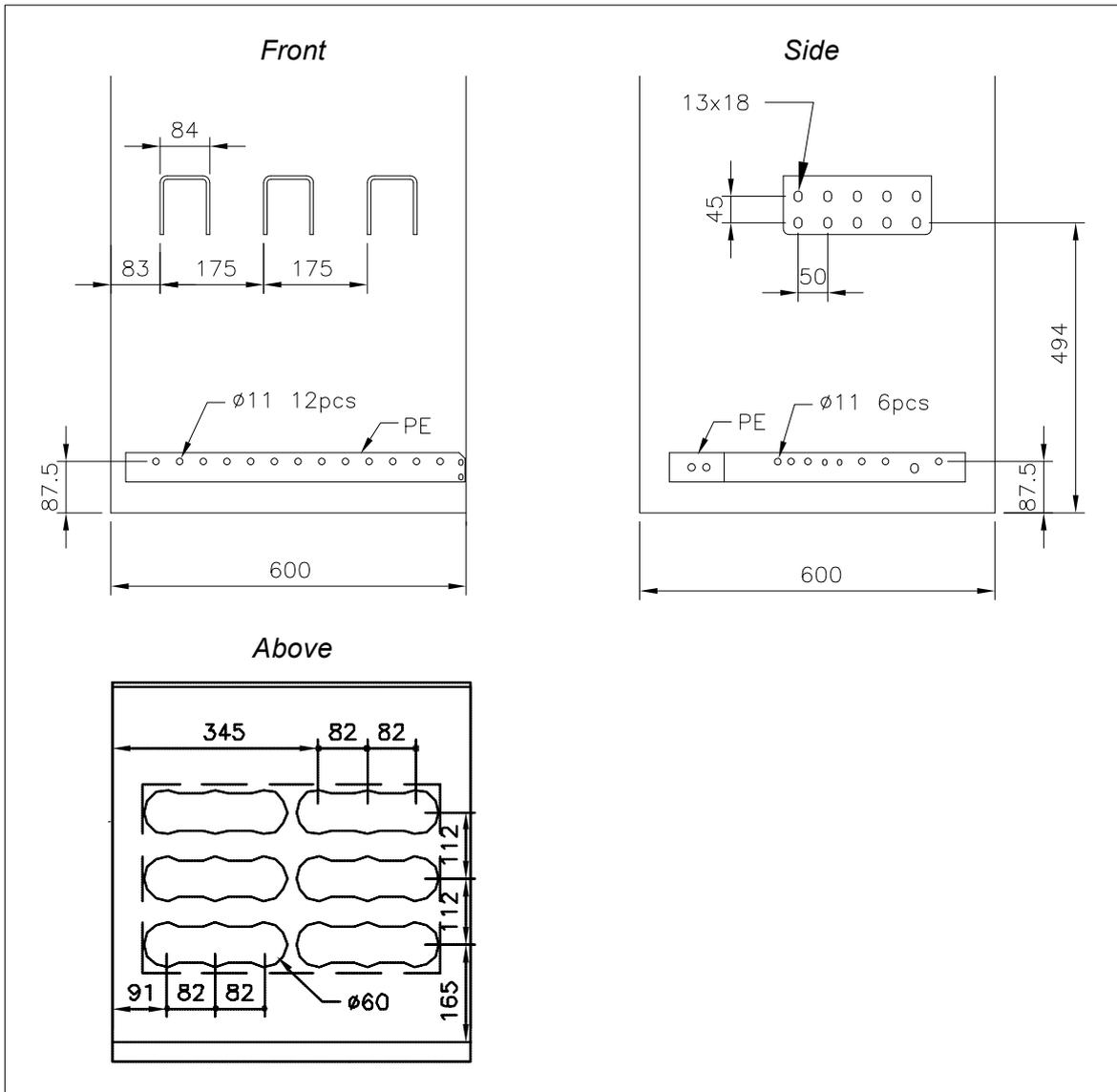
The dimensions are given in millimeters. Tightening torque for the cable lug connection depends on the bolt size and type. See section [Tightening torques](#) on page 124.



■ **600 mm incoming cubicle with main breaker, bottom cable entry**

These drawings show the terminal and lead-through dimensions for a 600 mm wide incoming cubicle. This cubicle is in rectifier units with a main breaker (option +F255) and bottom cable entry.

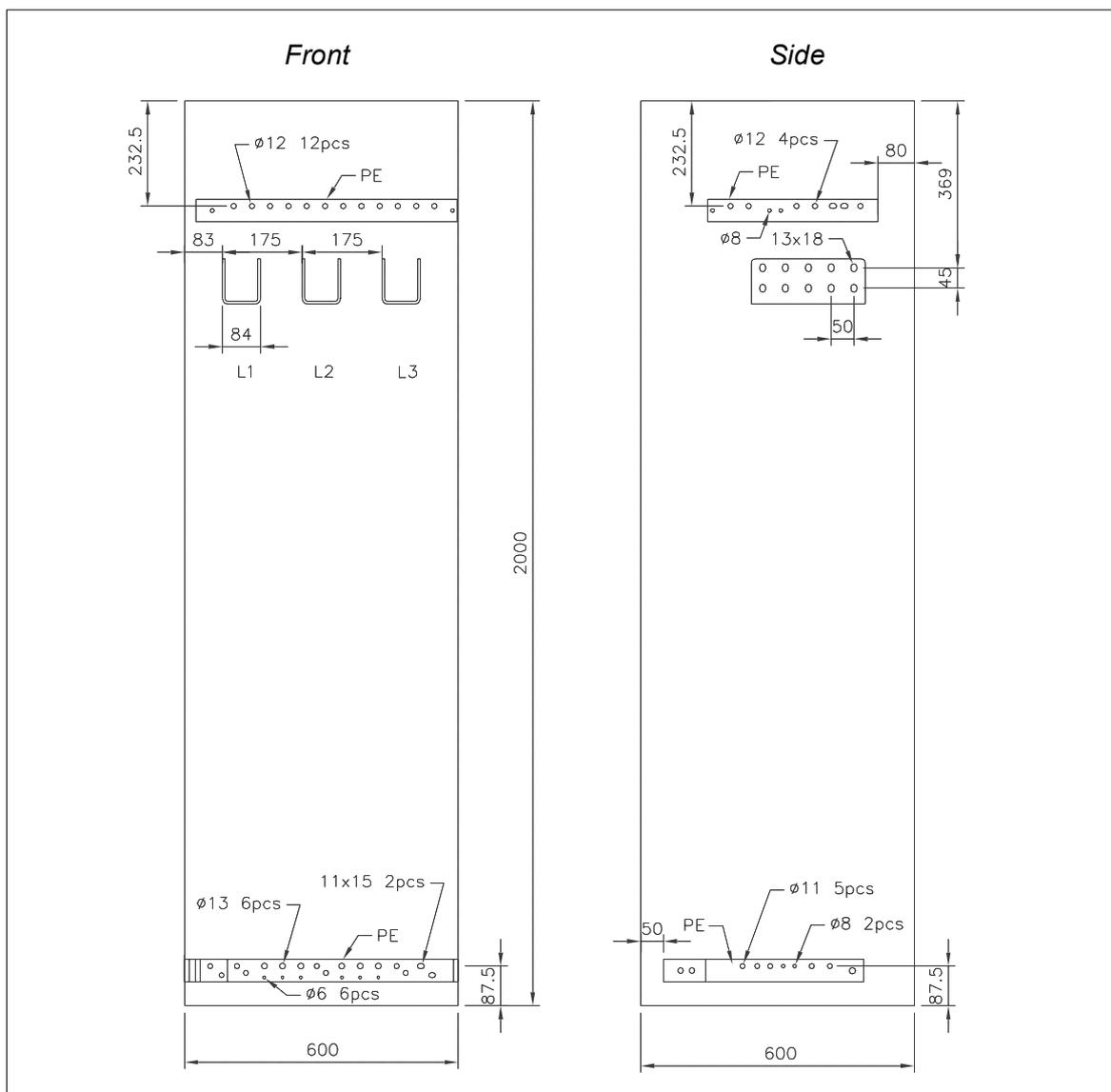
The dimensions are given in millimeters. Tightening torque for the cable lug connection depends on the bolt size and type. See section [Tightening torques](#) on page 124.



■ **600 mm incoming cubicle with main breaker, top cable entry**

These drawings show the terminal and lead-through dimensions for a 600 mm wide incoming cubicle. This cubicle is in supply units with a main breaker (option +F255) and top cable entry.

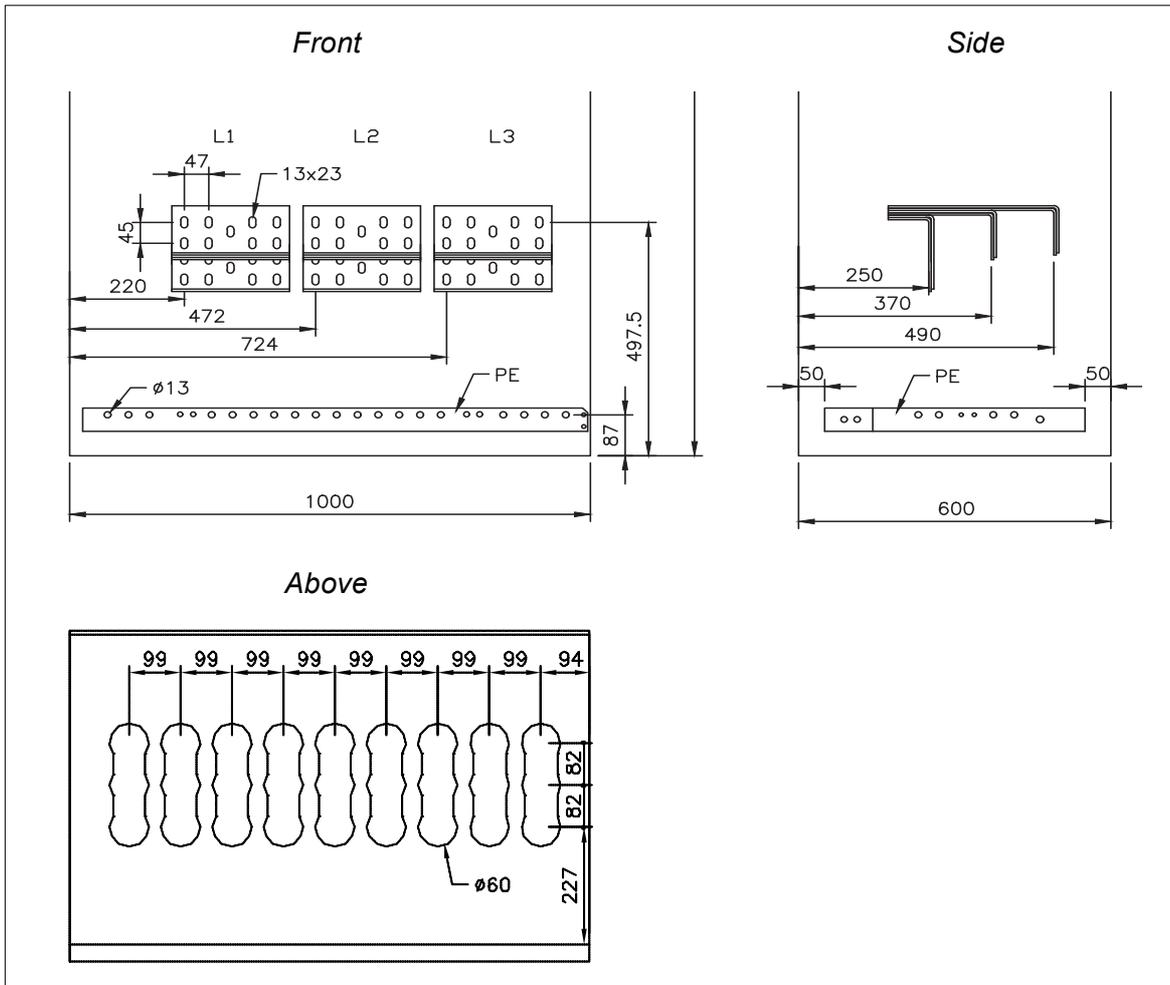
The dimensions are given in millimeters. Tightening torque for the cable lug connection depends on the bolt size and type. See section [Tightening torques](#) on page 124.



■ **1000 mm incoming cubicle with main breaker, bottom cable entry**

These drawings show the terminal and lead-through dimensions for a 1000 mm wide incoming cubicle. This cubicle is in high-power rectifier units with a main breaker (option +F255) and bottom cable entry.

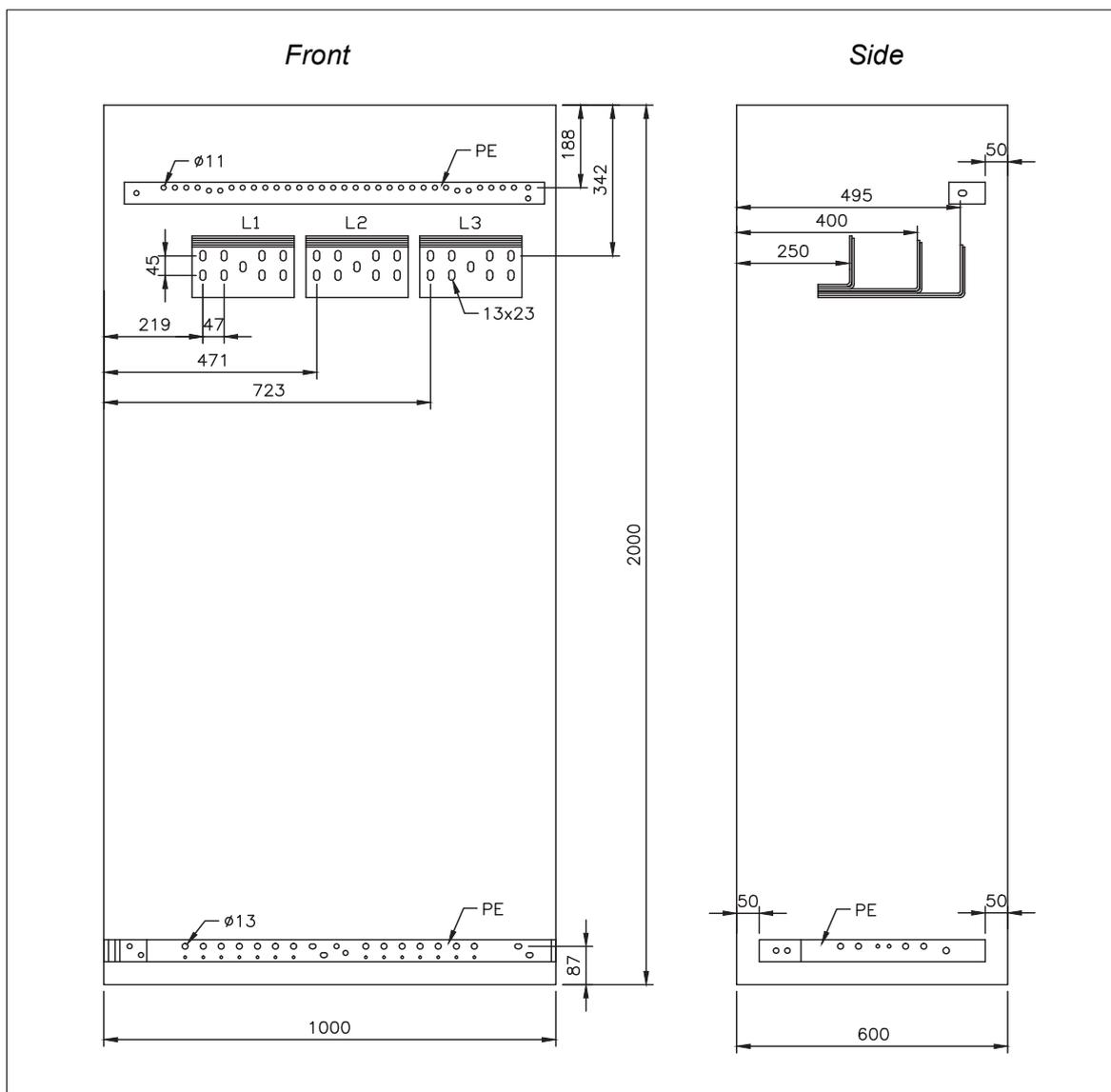
The dimensions are given in millimeters. Tightening torque for the cable lug connection depends on the bolt size and type. See section [Tightening torques](#) on page 124.



■ **1000 mm incoming cubicle with main breaker, top cable entry**

These drawings show the terminal and lead-through dimensions for a 1000 mm wide incoming cubicle. This cubicle is in high-power supply units with a main breaker (option +F255) and top cable entry.

The dimensions are given in millimeters. Tightening torque for the cable lug connection depends on the bolt size and type. See section [Tightening torques](#) on page 124.



## Tightening torques

Unless a tightening torque is specified in the text, the following torques can be used.

### Cable lugs

Size	Max. torque N·m	Note
M8	15	Strength class 8.8
M10	32	Strength class 8.8
M12	50	Strength class 8.8

### Electrical connections

Size	Torque N·m	Note
M3	0.5	Strength class 4.6...8.8
M4	1	Strength class 4.6...8.8
M5	4	Strength class 8.8
M6	9	Strength class 8.8
M8	22	Strength class 8.8
M10	42	Strength class 8.8
M12	70	Strength class 8.8
M16	120	Strength class 8.8

### Mechanical connections

Size	Max. torque N·m	Note
M5	6	Strength class 8.8
M6	10	Strength class 8.8
M8	24	Strength class 8.8

### Insulation supports

Size	Max. torque N·m	Note
M6	5	Strength class 8.8
M8	9	Strength class 8.8
M10	18	Strength class 8.8
M12	31	Strength class 8.8

## Electrical power network specification

<b>Voltage (<math>U_1</math>)</b>	ACS880-907-xxxx-3: 380...415 V AC 3-phase $\pm 10\%$ . This is indicated in the type designation label as typical input voltage level 3 ~ 400 V AC. ACS880-907-xxxx-5: 380...500 V AC 3-phase $\pm 10\%$ . This is indicated in the type designation label as typical input voltage levels 3 ~ 400/480/500 V AC. ACS880-907-xxxx-7: 525...690 V AC (525...600 V AC for UL/CSA) 3-phase $\pm 10\%$ . This is indicated in the type designation label as typical input voltage levels 3 ~ 525/600/690 V AC (600 V AC for UL/CSA).
<b>Frequency</b>	50/60 Hz, Variation $\pm 5\%$ of the nominal frequency
<b>Imbalance</b>	Maximum 3% of nominal phase-to-phase voltage
<b>Network type</b>	TN (grounded) and IT (ungrounded) systems; 525...690 V AC in corner-grounded TN
<b>Short-circuit withstand strength (IEC 61439-1)</b>	<u>Rectifier units with main circuit breaker (option +F255) and without grounding/earthing switch (without option +F259):</u> Rated peak withstand current ( $I_{pk}$ ): 143 kA Rated short-time withstand current ( $I_{cw}$ ): 65 kA/1 s <u>All other rectifier units:</u> Rated peak withstand current ( $I_{pk}$ ): 105 kA Rated short-time withstand current ( $I_{cw}$ ): 50 kA/1 s
<b>Short-circuit current protection (UL 508A)</b>	The drive is suitable for use on a circuit capable of delivering not more than 100,000 rms symmetrical amperes at 600 V maximum when the input cable is protected with T class fuses.
<b>Short-circuit current protection (CSA C22.2 No. 14-13)</b>	The drive is suitable for use on a circuit capable of delivering not more than 100,000 rms symmetrical amperes at 600 V maximum when the input cable is protected with T class fuses.
<b>Overvoltage category</b>	OVCIII
<b>Power factor</b>	Fundamental power factor = 0.98 (at nominal load)

## DC connection data

<b>Voltage (<math>U_2</math>)</b>	ACS880-907-xxxxA-3: 513... 560 V DC. This is indicated in the type designation label as typical output voltage level 540 V DC. ACS880-907-xxxxA-5: 513... 675 V DC. This is indicated in the type designation label as typical output voltage levels 540/648/675 V DC. ACS880-907-xxxxA-7: 709 ... 932 V DC (709 ... 810 V DC for UL/CSA). This is indicated in the type designation label as typical output voltage levels 709/810/932 V DC (810 V DC for UL/CSA).
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## Control unit connection data

See chapter [Control unit](#) on page 133.

## Typical power cable sizes

The tables below give current carrying capacity ( $I_{Lmax}$ ) for aluminum and copper PVC/XLPE insulated cables. A correction factor  $K = 0.70$  is used. Time const is the temperature time constant of the cable.

The cable sizing is based on max. 9 cables laid on the cable trays side by side, three ladder type trays one on top of the other, ambient temperature 30 °C (EN 60204-1 and IEC 60364-5-52).

Aluminium cable		PVC insulation Conductor temperature 70°		XLPE insulation Conductor temperature 90°	
Size	ø [mm]	$I_{Lmax}$ [A]	Time const. [s]	$I_{Lmax}$ [A]	Time const. [s]
3 × 35 + 10 Cu	26	67	736	84	669
3 × 50 + 15 Cu	29	82	959	102	874
3 × 70 + 21 Cu	32	105	1182	131	1079
3 × 95 + 29 Cu	38	128	1492	159	1376
3 × 120 + 41 Cu	41	148	1776	184	1637
3 × 150 + 41 Cu	44	171	2042	213	1881
3 × 185 + 57 Cu	49	196	2422	243	2237
3 × 240 + 72 Cu	54	231	2967	286	2740
3 × 300 + 88 Cu	58	267	3478	330	3229
2 × (3 × 70 + 21 Cu)	2 × 32	210	1182	262	1079
2 × (3 × 95 + 29 Cu)	2 × 38	256	1492	318	1376
2 × (3 × 120 + 41 Cu)	2 × 41	297	1776	368	1637
2 × (3 × 150 + 41 Cu)	2 × 44	343	2042	425	1881
2 × (3 × 185 + 57 Cu)	2 × 49	392	2422	486	2237
2 × (3 × 240 + 72 Cu)	2 × 54	462	2967	572	2740
2 × (3 × 300 + 88 Cu)	2 × 58	533	3478	659	3229
3 × (3 × 150 + 41 Cu)	3 × 44	514	2042	638	1881
3 × (3 × 185 + 57 Cu)	3 × 49	588	2422	728	2237
3 × (3 × 240 + 72 Cu)	3 × 54	693	2967	859	2740
3 × (3 × 300 + 88 Cu)	3 × 58	800	3478	989	3229
4 × (3 × 185 + 57 Cu)	4 × 49	784	2422	971	2237
4 × (3 × 240 + 72 Cu)	4 × 54	924	2967	1145	2740
4 × (3 × 300 + 88 Cu)	4 × 58	1067	3478	1319	3229
5 × (3 × 185 + 57 Cu)	5 × 49	980	2422	1214	2237
5 × (3 × 240 + 72 Cu)	5 × 54	1155	2967	1431	2740
5 × (3 × 300 + 88 Cu)	5 × 58	1333	3478	1648	3229
6 × (3 × 240 + 72 Cu)	6 × 54	1386	2967	1718	2740
6 × (3 × 300 + 88 Cu)	6 × 58	1600	3478	1978	3229
7 × (3 × 240 + 72 Cu)	7 × 54	1617	2967	2004	2740
7 × (3 × 300 + 88 Cu)	7 × 58	1867	3478	2308	3229
8 × (3 × 240 + 72 Cu)	8 × 54	1848	2967	2290	2740
8 × (3 × 300 + 88 Cu)	8 × 58	2133	3478	2637	3229
9 × (3 × 240 + 72 Cu)	9 × 54	2079	2967	2577	2740
9 × (3 × 300 + 88 Cu)	9 × 58	2400	3478	2967	3229
10 × (3 × 240 + 72 Cu)	10 × 54	2310	2967	2867	2740
10 × (3 × 300 + 88 Cu)	10 × 58	2667	3478	3297	3229

Copper cable		PVC insulation Conductor temperature 70°		XLPE insulation Conductor temperature 90°	
Size	ø [mm]	I <sub>Lmax</sub> [A]	Time const. [s]	I <sub>Lmax</sub> [A]	Time const. [s]
3 × 1.5 + 1.5	13	13	85	16	67
3 × 2.5 + 2.5	14	18	121	23	88
(3 × 4 + 4)	16	24	175	30	133
3 × 6 + 6	18	30	251	38	186
3 × 10 + 10	21	42	359	53	268
3 × 16 + 16	23	56	514	70	391
3 × 25 + 16	24	71	791	89	598
3 × 35 + 16	26	88	1000	110	760
3 × 50 + 25	29	107	1308	134	990
3 × 70 + 35	32	137	1613	171	1230
3 × 95 + 50	38	167	2046	209	1551
3 × 120 + 70	41	193	2441	241	1859
3 × 150 + 70	44	223	2820	279	2139
3 × 185 + 95	50	255	3329	319	2525
3 × 240 + 120	55	301	4073	376	3099
3 × 300 + 150	58	348	4779	435	3636
2 × (3 × 70 + 35)	2 × 32	274	1613	342	1230
2 × (3 × 95 + 50)	2 × 38	334	2046	418	1551
2 × (3 × 120 + 70)	2 × 41	386	2441	482	1859
2 × (3 × 150 + 70)	2 × 44	446	2820	558	2139
2 × (3 × 185 + 95)	2 × 50	510	3329	638	2525
2 × (3 × 240 + 120)	2 × 55	602	4073	752	3099
2 × (3 × 300 + 150)	2 × 58	696	4779	869	3636
3 × (3 × 120 + 70)	3 × 41	579	2441	723	1859
3 × (3 × 150 + 70)	3 × 44	669	2820	837	2139
3 × (3 × 185 + 95)	3 × 50	765	3329	957	2525
3 × (3 × 240 + 120)	3 × 55	903	4073	1128	3099
3 × (3 × 300 + 150)	3 × 58	1044	4779	1304	3636
4 × (3 × 150 + 70)	4 × 44	892	2820	1116	2139
4 × (3 × 185 + 95)	4 × 50	1020	3329	1276	2525
4 × (3 × 240 + 120)	4 × 55	1204	4073	1504	3099
4 × (3 × 300 + 150)	4 × 58	1391	4779	1304	3636
5 × (3 × 185 + 95)	5 × 50	1275	3329	1595	2525
5 × (3 × 240 + 120)	5 × 55	1505	4073	1880	3099
5 × (3 × 300 + 150)	5 × 58	1739	4779	2173	3636
6 × (3 × 185 + 95)	6 × 50	1530	3329	1914	2525
6 × (3 × 240 + 120)	6 × 55	1806	4073	2256	3099
6 × (3 × 300 + 150)	6 × 58	2087	4779	2608	3636
7 × (3 × 240 + 120)	7 × 55	2107	4073	2632	3099
7 × (3 × 300 + 150)	7 × 58	2435	4779	3043	3636
8 × (3 × 240 + 120)	8 × 55	2408	4073	3008	3099
8 × (3 × 300 + 150)	8 × 58	2783	4779	3477	3636

## Optical components

The specification for the optic cable are as follows:

- Storage temperature: -55 ... +85 °C
- Installation temperature: -20 ... +70 °C
- Maximum short-term tensile force: 50 N
- Minimum short-term bend radius: 25 mm
- Minimum long-term bend radius: 35 mm
- Maximum long-term tensile load: 1 N
- Flexing: Max. 1000 cycles

ABB drive products in general utilize 5 and 10 MBd (megabaud) optical components from Avago Technologies' Versatile Link range. Note that the optical component type is not directly related to the actual communication speed.

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**Note:** The optical components (transmitter and receiver) on a fiber optic link must be of the same type.

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Plastic optical fiber (POF) cables can be used with both 5 MBd and 10 MBd optical components. 10 MBd components also enable the use of Hard Clad Silica (HCS<sup>®</sup>) cables, which allow longer connection distances thanks to their lower attenuation. HCS<sup>®</sup> cables cannot be used with 5 MBd optical components.

The maximum lengths of fiber optic links for POF and HCS<sup>®</sup> cables are 20 and 200 meters respectively.

## Degree of protection

Degrees of protection (IEC/EN 60529)	IP22 (standard), IP42 (option +B054), IP54 (option +B055)
Enclosure types (UL50)	UL Type 1 (standard), UL Type 1 Filtered (option +B054), UL Type 12 (option +B055). For indoor use only.
Overvoltage category (IEC 60664-1)	III except for auxiliary power connections (fan, control, heating, lighting, cooling unit pump etc) which are of category II.
Protective class (IEC/EN 61800-5-1)	I

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## Ambient conditions

The unit is to be used in a heated indoor controlled environment.

	Operation	Storage	Transportation
<b>Altitude above sea level</b>	0...2000 m (0...6561.7 ft)	-	-
	For altitudes over 2000 m (6561.7 ft), contact ABB.		
<b>Air temperature</b>	0...+40 °C (+32...+104 °F), no condensation allowed	-40...+70 °C (-104...+158 °F)	-40...+70 °C (-104...+158 °F)
	+40...+50 °C (+104...+122 °F) derating 1% /1 °C (+1.8 °F). For more information, see <a href="#">Temperature derating</a> on page 111.		
<b>Relative humidity</b>	Maximum 95%, no condensation allowed	Maximum 95%, no condensation allowed	Maximum 95%, no condensation allowed
<b>Contamination</b>	IEC/EN 60721-3-3:2002: Classification of environmental conditions - Part 3-3: Classification of groups of environmental parameters and their severities Stationary use of weather protected locations	IEC 60721-3-1	IEC 60721-3-2
Chemical gases	Class 3C2	Class 1C2	Class 2C2
Solid particles	Class 3S1	Class 1S3 (packing must support this, otherwise 1S2)	Class 2S2
	No conductive dust allowed.		
<b>Vibration</b>	IEC/EN 60721-3-3:2002 10...57 Hz: max. 0.075 mm amplitude 57...150 Hz: 1 g Units with marine construction (option +C121): Max. 1 mm (0.04 in.) (5 ... 13.2 Hz), max. 0.7 g (13.2 ... 100 Hz) sinusoidal)	IEC/EN 60721-3-1:1997 10...57 Hz: max. 0.075 mm amplitude 57...150 Hz: 1 g	IEC/EN 60721-3-2:1997 2...9 Hz: max. 3.5 mm amplitude 9...200 Hz: 10 m/s <sup>2</sup> (32.8 ft/s <sup>2</sup> )
<b>Shock</b>	Not allowed	With packing max. 100 m/s <sup>2</sup> (330 ft./s <sup>2</sup> ) 11 ms	With packing max. 100 m/s <sup>2</sup> (330 ft./s <sup>2</sup> ) 11 ms
IEC 60068-2-27:2008 EN 60068-2-27:2009 Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock			

## Materials

Module enclosure	Hot-dip zinc coated steel sheet 1.5 ... 3.0 mm, thickness of coating 20 micrometers
Module coating	Lexan 8B35 polycarbonate film, color PMS 1C Cool Gray and PMS Process Black
Cabinet frame and panels	Hot-dip zinc coated steel sheet, thickness of coating 20 micrometers. Doors, panels 1.5 mm, frame beams 2 mm, panels inside the cabinet 1 ... 3 mm.
DC busbars	Aluminum or copper (optional)
AC busbars	Copper
Cabinet paint coating	Polyester thermosetting powder coating (thickness approximately 80 micrometers) on visible surfaces, color RAL 7035 and RAL 9017. PC/ABS 3 mm, color NCS 1502-Y (RAL 9002 / PMS 1C Cool Grey).
Fire safety of materials (IEC 60332-1)	Insulating materials & non-metallic items: Mostly self-extinctive
Package	<p>Standard package:</p> <ul style="list-style-type: none"> <li>• timber, polyethylene sheet (thickness 0.15 mm), stretch film (thickness (0.023 mm), PP tape, PET strap, sheet metal (steel)</li> <li>• for land and air transport when planned storage time is &lt; 2 months or when storage can be arranged in clean and dry conditions &lt; 6 months</li> <li>• can be used when products will not be exposed to corrosive atmosphere during transport or storage</li> </ul> <p>Container package:</p> <ul style="list-style-type: none"> <li>• timber, VCI sheet film (PE, thickness 0.10 mm), VCI stretch film (PE, thickness (0.04 mm), VCI emitter bags, PP tape, PET strap, sheet metal (steel)</li> <li>• for sea transport in containers</li> <li>• recommended for land and air transport when storage time prior to installation exceeds 6 months or storage is arranged in partially weather-protected conditions</li> </ul> <p>Seaworthy package:</p> <ul style="list-style-type: none"> <li>• timber, plywood, VCI sheet film (PE, thickness 0.10 mm), VCI stretch film (PE, thickness (0.04 mm), VCI emitter bags, PP tape, PET strap, sheet metal (steel)</li> <li>• for sea transport with or without containerization</li> <li>• for long storage periods in environments where roofed and humidity-controlled storage cannot be arranged</li> </ul>
Disposal	<p>The main parts of the drive can be recycled to preserve natural resources and energy. Product parts and materials should be dismantled and separated.</p> <p>Generally all metals, such as steel, aluminum, copper and its alloys, and precious metals can be recycled as material. Plastics, rubber, cardboard and other packaging material can be used in energy recovery. Printed circuit boards and large electrolytic capacitors need selective treatment according to IEC 62635 guidelines. To aid recycling, plastic parts are marked with an appropriate identification code.</p> <p>Please contact your local ABB distributor for further information on environmental aspects and recycling instructions for professional recyclers. End of life treatment must follow international and local regulations.</p>

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## Applicable standards

See *Electrical planning instructions for ACS880 multidrive cabinets and modules* (3AUA0000102324 [English]).

## Markings

See *Electrical planning instructions for ACS880 multidrive cabinets and modules* (3AUA0000102324 [English]).

## Disclaimer

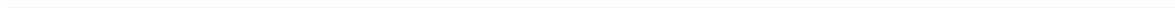
### ■ Generic disclaimer

The manufacturer shall have no obligation with respect to any product which (i) has been improperly repaired or altered; (ii) has been subjected to misuse, negligence or accident; (iii) has been used in a manner contrary to the manufacturer's instructions; or (iv) has failed as a result of ordinary wear and tear.

### ■ Cybersecurity disclaimer

This product is designed to be connected to and to communicate information and data via a network interface. It is the Customer's sole responsibility to provide and continuously ensure a secure connection between the product and Customer network or any other network (as the case may be). The Customer shall establish and maintain any appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of anti-virus programs, etc) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information. ABB Ltd and its affiliates are not liable for damages and/or losses related to such security breaches, any unauthorized access, interference, intrusion, leakage and/or theft of data or information.

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# Control unit

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## Contents of this chapter

This chapter

- describes the connections of the BCU control unit
- contains the specifications of the inputs and outputs of the control units.

The ACS880 drive utilizes BCU-x2 control units. The BCU control unit is built in a metal housing.

The rectifier and inverter units of the ACS880 series are each controlled by a dedicated control unit. The BCU is mounted separately from the rectifier module(s), and connected to the module(s) by fiber optic cables.

**Note:** In this manual, the name “BCU-x2” represents the control unit types BCU-02, BCU-12 and BCU-22. These have a different number of rectifier module connections (2, 7 and 12 respectively) but are otherwise similar.

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## Default I/O connection diagram

<b>XD2D</b>		<b>Drive-to-drive link</b>
1	B	Drive-to-drive link (not in use by default)
2	A	
3	BGND	
4	Shield	
<b>X485</b>		<b>RS485 connection</b>
5	B	Not in use (not in use by default)
6	A	
7	BGND	
8	Shield	
<b>XRO1...XRO3</b>		<b>Relay outputs</b>
11	NC	 XRO1: <b>Charging</b> <sup>1)</sup> (Energized = Closes charging contactor.) 250 V AC / 30 V DC / 2 A
12	COM	
13	NO	
21	NC	 XRO2: <b>Fault(-1)</b> <sup>2)</sup> (Energized = Indicates no fault.) 250 V AC / 30 V DC / 2 A
22	COM	
23	NO	
31	NC	 XRO3: <b>MCB</b> <sup>1)</sup> (Energized = Closes main contactor/breaker.) 250 V AC / 30 V DC / 2 A
32	COM	
33	NO	
<b>XSTO</b>		<b>XSTO connector</b>
1	OUT	 XSTO connector. Both circuits (power module, control unit) must be closed for the rectifier unit to start. (IN1 and IN2 must be connected to OUT.) <sup>8)</sup>
2	SGND	
3	IN1	
4	IN2	
5	IN1	Not in use
6	SGND	
7	IN2	
8	SGND	
<b>XDI</b>		<b>Digital inputs</b>
1	DI1	Temp fault <sup>2)</sup> (0 = overtemperature)
2	DI2	Run / enable <sup>2)</sup> (1 = run / enable)
3	DI3	MCB fb <sup>1)</sup> (0 = main contactor/breaker open)
4	DI4	Auxiliary circuit breaker fault <sup>2)</sup>
5	DI5	Not in use by default. Can be used for eg, earth fault monitoring.
6	DI6	Reset <sup>2)</sup> (0 -> 1 = fault reset)
7	DIIL	Not in use by default. Can be used for eg, emergency stop.
<b>XDIO</b>		<b>Digital input/outputs</b>
1	DIO1	Not in use by default
2	DIO2	Not in use by default
3	DIOGND	Digital input/output ground
4	DIOGND	Digital input/output ground
<b>XD24</b>		<b>Auxiliary voltage output</b>
5	+24VD	+24 V DC 200 mA <sup>6)</sup>
6	DICOM	Digital input ground
7	+24VD	+24 V DC 200 mA <sup>6)</sup>
8	DIOGND	Digital input/output ground
<b>DICOM=DIOGND</b>		<b>Ground selection switch<sup>7)</sup></b>
<b>XAI</b>		<b>Analog inputs, reference voltage output</b>
1	+VREF	10 V DC, $R_L$ 1...10 kohm
2	-VREF	-10 V DC, $R_L$ 1...10 kohm
3	AGND	Ground
4	A11+	Not in use by default.
5	A11-	0(2)...10 V, $R_{in} > 200$ kohm <sup>3)</sup>
6	A12+	Not in use by default.
7	A12-	0(4)...20 mA, $R_{in} = 100$ ohm <sup>4)</sup>
<b>XAO</b>		<b>Analog outputs</b>
1	AO1	<b>Zero</b> <sup>2)</sup> 0...20 mA, $R_L < 500$ ohm
2	AGND	
3	AO2	<b>Zero</b> <sup>2)</sup> 0...20 mA, $R_L < 500$ ohm
4	AGND	
<b>XPOW</b>		<b>External power input</b>
1	+24VI	24 V DC, 2.05 A
2	GND	
3	+24VI	
4	GND	
<b>X12</b>		Not in use in rectifier units
<b>X13</b>		<b>Control panel connection</b>
<b>X205</b>		<b>Memory unit connection</b>

The table above shows the control connections of the regenerative rectifier unit, and the default meaning or use of the signals in the control program. Most I/O connections are reserved and wired for the internal use at the factory. Do not change the connections.

Wire sizes and tightening torques: 0.5 ... 2.5 mm<sup>2</sup> (24...12 AWG) and 0.5 N·m (5 lbf·in) for both stranded and solid wiring.

#### Notes:

- 1) Use of the signal in the control program. XRO1, XRO3: For the cabinet-installed multidrives, ACS880-907, check the delivery-specific use from the delivery-specific circuit diagrams. Do not change the setting if relay output is in use and connected already. DI3 is reserved for main breaker/contactors fault in the control program. Do not select it for any other use.
- 2) Default use of the signal in the control program. The use can be changed by a parameter. For the delivery-specific use, see the delivery-specific circuit diagrams.
- 3) Current [0(4)...20 mA,  $R_{in} = 100 \text{ ohm}$ ] or voltage [0(2)...10 V,  $R_{in} > 200 \text{ kohm}$ ] input selected by switch AI1. Change of setting requires reboot of control unit.
- 4) Current [0(4)...20 mA,  $R_{in} = 100 \text{ ohm}$ ] or voltage [0(2)...10 V,  $R_{in} > 200 \text{ kohm}$ ] input selected by switch AI2. Change of setting requires reboot of control unit.
- 5) Must be set to ON when the drive is the first or last unit on the drive-to-drive (D2D) link.
- 6) Total load capacity of these outputs is 4.8 W (200 mA at 24 V) minus the power taken by DIO1 and DIO2.
- 7) Determines whether DICOM is separated from DIOGND (ie. common reference for digital inputs floats). **DICOM = DIOGND ON:** DICOM connected to DIOGND. **OFF:** DICOM and DIOGND separate.
- 8) The Safe torque off (STO) function is only implemented in the inverter units. In other applications (such as a rectifier/supply or brake unit), de-energizing the IN1 and/or IN2 terminal stops the unit but not constitute a true safety function.

#### ■ SDHC memory card slot

The BCU-x2 has an on-board data logger that collects real-time data from the converter to help fault tracing and analysis. The data is stored onto the SDHC memory card inserted into the SD CARD slot and can be analyzed by ABB service personnel.

#### ■ External power supply for the control unit (XPOW)

The BCU must be powered from a 24 V DC, 2 A power supply. The power supply is connected to terminal block XPOW. A second supply can be connected to the same terminal block for redundancy.

#### ■ Drive-to-drive link (XD2D)

The drive-to-drive link is a daisy-chained RS-485 transmission line that can be used for

- basic master/follower communication with one master drive and multiple followers
- fieldbus control through the embedded fieldbus interface (EFB), and
- drive-to-drive (D2D) communication implemented by application programming.

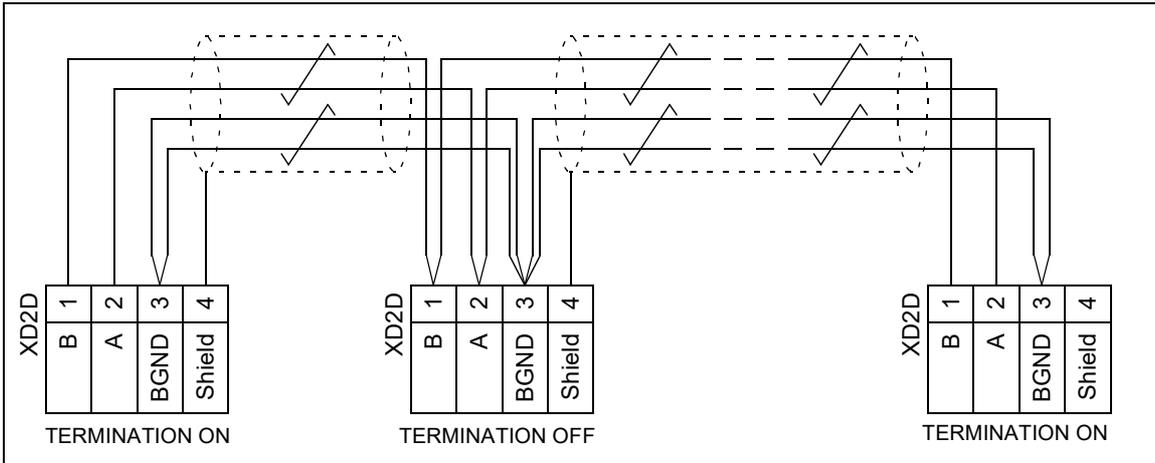
See the firmware manual of the drive for the related parameter settings.

Set termination activation jumper J3 next to this terminal block to the ON position on the drives at the ends of the drive-to-drive link. On intermediate drives, set the jumper to the OFF position.

Use shielded twisted-pair cable with a twisted pair for data and a wire or another pair for signal ground (nominal impedance 100 to 165 ohm, for example Belden 9842) for the wiring. For best immunity, ABB recommends high quality cable. Keep the cable as short as possible. Avoid unnecessary loops and running the cable near power cables (such as motor cables).

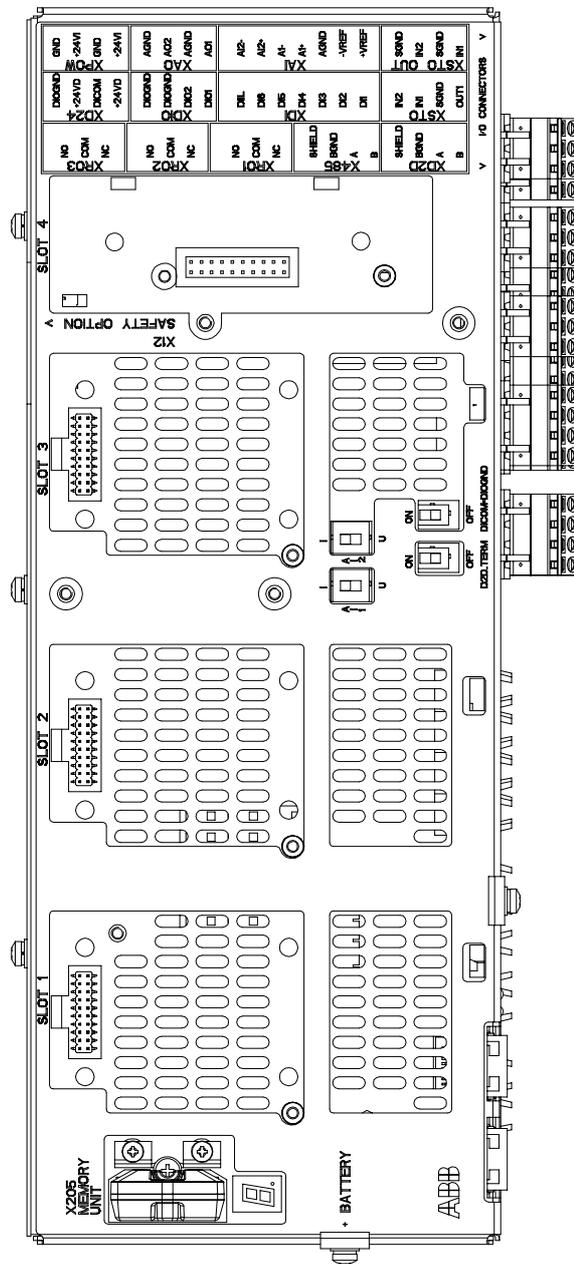
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The following diagram shows the wiring of the drive-to-drive link.

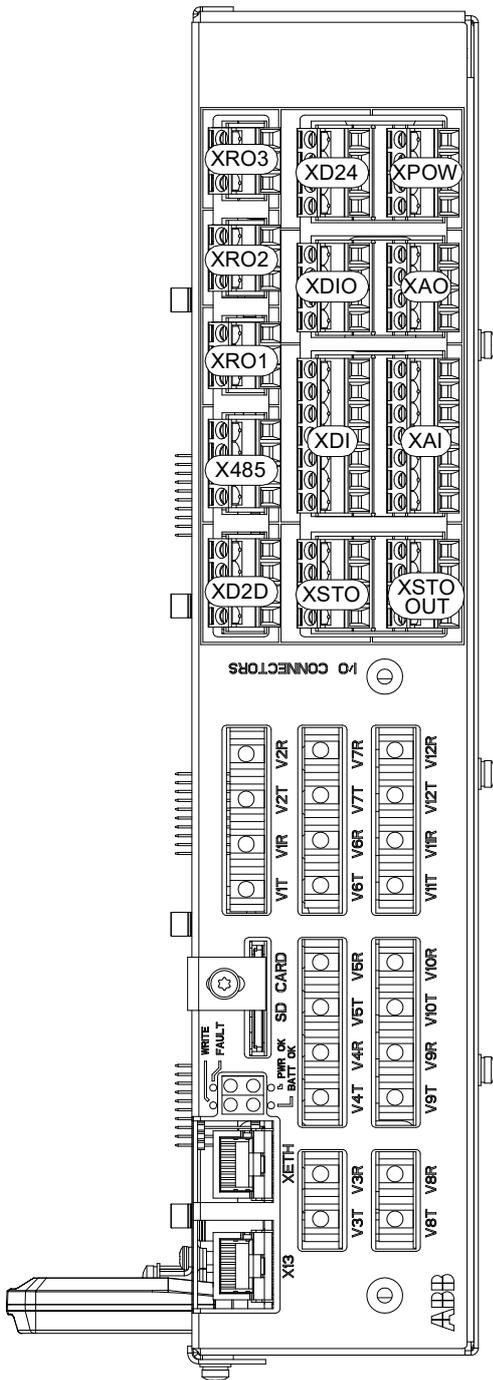


## Layout and connections

The layout and connections of the BCU-x2 are shown below.

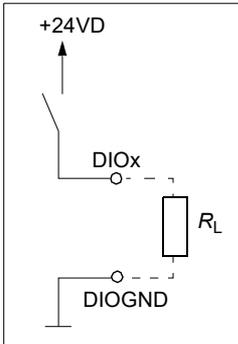


	Description
I/O	I/O terminals (see <a href="#">Default I/O connection diagram</a> )
SLOT 1	I/O extension, encoder interface or fieldbus adapter module connection. (This is the sole location for an FDPI-02 diagnostics and panel interface.)
SLOT 2	I/O extension, encoder interface or fieldbus adapter module connection
SLOT 3	I/O extension, encoder interface, fieldbus adapter or FSO-xx safety functions module connection. FSO is not in use in rectifier units.
SLOT 4	RDCO-0x DDCS communication option module connection
X205	Memory unit connection
BATTERY	Holder for real-time clock battery
AI1	Mode selector for analog input AI1 (I = current, U = voltage)
AI2	Mode selector for analog input AI2 (I = current, U = voltage)
D2D TERM	Termination switch for drive-to-drive link (D2D)
DICOM = DIOGND	Ground selection. Determines whether DICOM is separated from DIOGND (ie. the common reference for the digital inputs floats).
<b>7-segment display</b> Multicharacter indications are displayed as repeated sequences of characters	
	("U" is indicated briefly before "o".) Control program startup in progress
	(Flashing) Firmware cannot be started. Memory unit missing or corrupted
	Firmware download from PC to control unit in progress
	At power-up, the display may show short indications of eg. "1", "2", "b" or "U". These are normal indications immediately after power-up. If the display ends up showing any other value than those described, it indicates a hardware failure.



	Description
XAI	Analog inputs
XAO	Analog outputs
XDI	Digital inputs, Digital input interlock (DIIL)
XDIO	Digital input/outputs
XD2D	Drive-to-drive link
XD24	+24 V output (for digital inputs)
XETH	Ethernet port – Not in use
XPOW	External power input
XRO1	Relay output RO1
XRO2	Relay output RO2
XRO3	Relay output RO3
XSTO	Safe torque off connection (input signals). Safe torque off functionality is not available in the rectifier units. See <a href="#">Default I/O connection diagram</a> on page 134.
XSTO OUT	Safe torque off connection (output for powering XSTO inputs)
X12	(On the opposite side) Connection for FSO-xx safety functions module (not in use in rectifier units).
X13	Control panel / PC connection
X485	Not in use
V1T/V1R, V2T/V2R	Fiber optic connection to converter modules 1 and 2 (VxT = transmitter, VxR = receiver)
V3T/V3R ... V7T/V7R	Fiber optic connection to converter modules 3...7 (BCU-12/22 only) (VxT = transmitter, VxR = receiver)
V8T/V8R ... V12T/V12R	Fiber optic connection to converter modules 8...12 (BCU-22 only) (VxT = transmitter, VxR = receiver)
SD CARD	Data logger memory (SD)
BATT OK	Real-time clock battery voltage is higher than 2.8 V. If the LED is off when the control unit is powered, replace the battery.
FAULT	The control program has generated a fault. See the firmware manual of the rectifier unit.
PWR OK	Internal voltage supply is OK
WRITE	Writing to SD card in progress. Do not remove the SD card.

## Control unit connector data

<b>Power supply (XPOW)</b>	<p>Connector pitch 5 mm, wire size 2.5 mm<sup>2</sup>            24 V (<math>\pm 10\%</math>) DC, 2 A            External power supply in. Two supplies can be connected to BCU for redundancy.</p>
<b>Relay outputs RO1...RO3 (XRO1...XRO3)</b>	<p>Connector pitch 5 mm, wire size 2.5 mm<sup>2</sup>            250 V AC / 30 V DC, 2 A            Protected by varistors</p>
<b>+24 V output (XD24:2 and XD24:4)</b>	<p>Connector pitch 5 mm, wire size 2.5 mm<sup>2</sup>            Total load capacity of these outputs is 4.8 W (200 mA / 24 V) minus the power taken by DIO1 and DIO2.</p>
<b>Digital inputs DI1...DI6 (XDI:1...XDI:6)</b>	<p>Connector pitch 5 mm, wire size 2.5 mm<sup>2</sup>            24 V logic levels: "0" &lt; 5 V, "1" &gt; 15 V  <math>R_{in}</math>: 2.0 kohm            Input type: NPN/PNP (DI1...DI5), NPN (DI6)            Hardware filtering: 0.04 ms, digital filtering up to 8 ms            DI6 (XDI:6) can alternatively be used as an input for a PTC thermistor.            "0" &gt; 4 kohm, "1" &lt; 1.5 kohm  <math>I_{max}</math>: 15 mA (DI1...DI5), 5 mA (DI6)</p>
<b>Start interlock input DIIL (XDI:7)</b>	<p>Connector pitch 5 mm, wire size 2.5 mm<sup>2</sup>            24 V logic levels: "0" &lt; 5 V, "1" &gt; 15 V  <math>R_{in}</math>: 2.0 kohm            Input type: NPN/PNP            Hardware filtering: 0.04 ms, digital filtering up to 8 ms</p>
<b>Digital inputs/outputs DIO1 and DIO2 (XDIO:1 and XDIO:2)</b>	<p>Connector pitch 5 mm, wire size 2.5 mm<sup>2</sup>  <u>As inputs:</u>            24 V logic levels: "0" &lt; 5 V, "1" &gt; 15 V  <math>R_{in}</math>: 2.0 kohm            Filtering: 1 ms  <u>As outputs:</u>            Total output current from +24VD is limited to 200 mA</p>
<p>Input/output mode selection by parameters.            DIO1 can be configured as a frequency input (0...16 kHz with hardware filtering of 4 microseconds) for 24 V level square wave signal (sinusoidal or other wave form cannot be used). DIO2 can be configured as a 24 V level square wave frequency output. See the firmware manual of the rectifier unit, parameter group 111.</p>	
<b>Reference voltage for analog inputs +VREF and -VREF (XAI:1 and XAI:2)</b>	<p>Connector pitch 5 mm, wire size 2.5 mm<sup>2</sup>            10 V <math>\pm 1\%</math> and -10 V <math>\pm 1\%</math>, <math>R_{load}</math> 1...10 kohm</p>
<b>Analog inputs AI1 and AI2 (XAI:4 ... XAI:7).</b>	<p>Connector pitch 5 mm, wire size 2.5 mm<sup>2</sup>            Current input: -20...20 mA, <math>R_{in}</math>: 100 ohm            Voltage input: -10...10 V, <math>R_{in}</math>: 200 kohm            Differential inputs, common mode range <math>\pm 30</math> V            Sampling interval per channel: 0.25 ms            Hardware filtering: 0.25 ms, adjustable digital filtering up to 8 ms            Resolution: 11 bit + sign bit            Inaccuracy: 1% of full scale range</p>

**Analog outputs AO1 and AO2 (XAO)**

Connector pitch 5 mm, wire size 2.5 mm<sup>2</sup>  
 0...20 mA,  $R_{load} < 500 \text{ ohm}$   
 Frequency range: 0...500 Hz  
 Resolution: 11 bit + sign bit  
 Inaccuracy: 2% of full scale range

**Drive-to-drive link (XD2D)**

Connector pitch 5 mm, wire size 2.5 mm<sup>2</sup>  
 Physical layer: RS-485  
 Termination by switch

**Safe torque off connection (XSTO)**

Connector pitch 5 mm, wire size 2.5 mm<sup>2</sup>  
 Input voltage range: -3...30 V DC  
 Logic levels: "0" < 5 V, "1" > 17 V  
 For the drive to start, both connections must be "1"  
 Current consumption: 66 mA (continuous) per STO channel per module.  
**Note:** Safe torque off (STO) functionality is not available in the rectifier units. See [Default I/O connection diagram](#) on page 134.  
 EMC (immunity) according to IEC 61326-3-1

**Safe torque off output (XSTO OUT)**

Connector pitch 5 mm, wire size 2.5 mm<sup>2</sup>  
 Output for powering XSTO inputs. See [Default I/O connection diagram](#) on page 134.

**Control panel connection (X13)**

Connector: RJ-45  
 Cable length < 3 m

**Ethernet connection (XETH)**

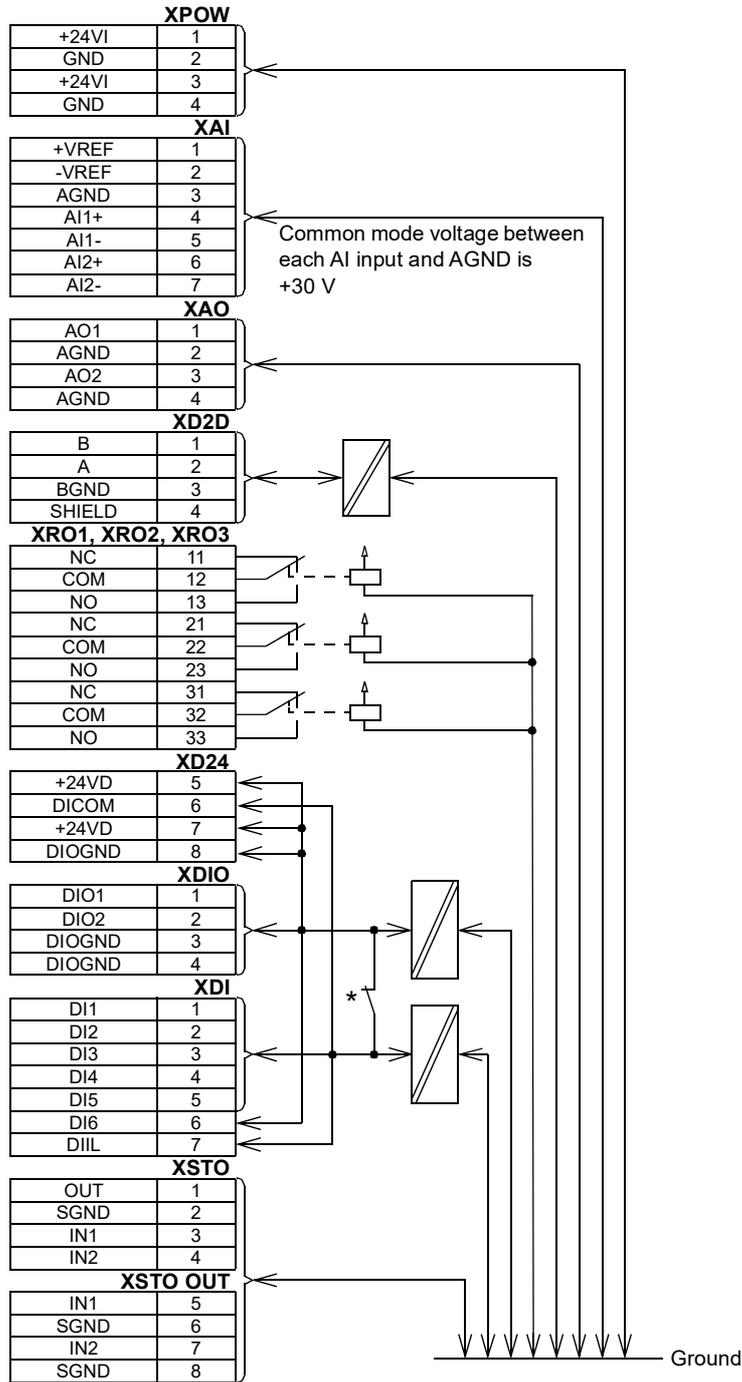
Connector: RJ-45  
 This connection is not supported by the firmware.

**SDHC memory card slot (SD CARD)**

Memory card type: SDHC  
 Maximum memory size: 4 GB

The terminals of the control unit fulfill the Protective Extra Low Voltage (PELV) requirements. The PELV requirements of a relay output are not fulfilled if a voltage higher than 48 V is connected to the relay output.

**Ground isolation diagram**



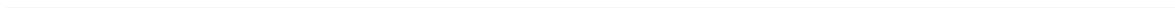
**\*Ground selector (DICOM=DIOGND) settings**

DICOM=DIOGND: ON

All digital inputs share a common ground (DICOM connected to DIOGND). This is the default setting.

DICOM=DIOGND: OFF

Ground of digital inputs DI1...DI5 and DIIL (DICOM) is isolated from DIO signal ground (DIOGND). Isolation voltage 50 V.



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# Further information

## **Product and service inquiries**

Address any inquiries about the product to your local ABB representative, quoting the type designation and serial number of the unit in question. A listing of ABB sales, support and service contacts can be found by navigating to [abb.com/searchchannels](http://abb.com/searchchannels).

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