ABB INDUSTRIAL DRIVES

ACS880-207 IGBT supply units

Hardware manual

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Hardware manual

3AUA0000130644 Rev D
EN
Original instructions
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1

Introduction to the manual

Contents of this chapter

This chapter gives basic information on the manual.

Applicability

The manual is applicable to the cabinet-installed ACS880-207 IGBT supply units that form a part of an ACS880 multidrive system.

Safety instructions

Obey 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 cabinets and modules safety instructions* (3AUA0000102301 [English]).
- Read the **software-function-specific warnings and notes** before changing the default settings of a 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 installation, install, start up and do maintenance work on the drive, or create instructions for the end user of the drive concerning the installation and maintenance of the drive.

Read the manual before working on the drive. You are expected to know the fundamentals of electricity, wiring, electrical components and electrical schematic symbols.

Categorization by 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, ACS880-207-0420A-3 where 0420A is the unit size. The option codes of the unit are listed after the plus sign. Section *Type designation keys (page 39)* explains the type designation code in detail.

The frame size of the IGBT supply module is, for example, R8i. The ratings table lists the frame sizes.

Use of component designations

Some device names in the manual include the item designation in brackets, for example [Q20], to make it possible to identify the components in the circuit diagrams of the drive.

Terms and abbreviations

Term	Description
ACU	Auxiliary control unit. Contains control electronics, auxiliary voltage circuitry, etc.
BCON	Type of control board
BCU	Type of control unit
Control board	Circuit board in which the control program runs
Control unit	Control board built in a housing (often rail-mountable)
Cubicle	One section of a cabinet-installed drive. A cubicle is typically behind a door of its own.
CVAR	Varistor board
DC link	DC circuit between rectifier and inverter
DI	Digital input
Drive	Frequency converter for controlling AC motors
FCAN	Optional CANopen® adapter module
FCNA-01	Optional ControlNet™ adapter module
FDCO-01	DDCS communication module with two pairs of 10 Mbit/s DDCS channels
FDNA-01	Optional DeviceNet™ adapter module
FDPI	Diagnostics and panel interface board
FEA-03	Optional I/O extension adapter
FECA-01	Optional EtherCAT® adapter module
FENA-11	Optional Ethernet adapter module for EtherNet/IP™, Modbus TCP® and PROFINET IO® protocols
FENA-21	Optional Ethernet adapter module for EtherNet/IP™, Modbus TCP® and PROFINET IO® protocols, 2-port
FEPL-01	Optional 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
Frame, frame size	Physical size of the drive or power module
FSCA-01	Optional RS-485 (Modbus/RTU) adapter
FSO-12, FSO-21	Optional functional safety modules
ICU	Incoming unit
IGBT	Insulated gate bipolar transistor
IGBT supply module	IGBT bridge and related components enclosed inside a metal frame or enclosure. Intended for cabinet installation.

Term	Description
IGBT supply unit	IGBT supply module(s) under control of one control unit, and related components.
Intermediate circuit	DC circuit between rectifier and inverter
INU	Inverter unit
Inverter	Converts direct current and voltage to alternating current and voltage.
Inverter module	Inverter bridge, related components and drive DC link capacitors enclosed in a metal frame or enclosure. Intended for cabinet installation.
Inverter unit	Inverter module(s) under control of one control unit, and related components. One inverter unit typically controls one motor.
ISU	IGBT supply unit
LCL filter	Inductor-capacitor-inductor filter
Multidrive	Drive for controlling several motors which are typically coupled to the same machinery. Includes one supply unit, and one or several inverter units.
Parameter	In the drive control program, user-adjustable operation instruction to the drive, or signal measured or calculated by the drive. In some (for example fieldbus) contexts, a value that can be accessed as an object, eg, variable, constant, or signal.
RDCO	Optical DDCS communication module
Rectifier	Converts alternating current and voltage to direct current and voltage
Single drive	Drive for controlling one motor

Related documents

Manual	Code
General manuals	
ACS880 multidrive cabinets and modules safety instructions	3AUA0000102301
ACS880 multidrive cabinets and modules electrical planning instructions	3AUA0000102324
ACS880 multidrive cabinets mechanical installation instructions	3AUA0000101764
Supply unit manuals	
ACS880-207 IGBT supply units hardware manual	3AUA0000130644
ACS880 IGBT supply control program firmware manual	3AUA0000131562
ACS880 multidrives, Optimal grid control (option +N8053) supplement	3AXD50000220717
Optimal grid control of ACS880 IGBT supply control program supplement	3AXD50000164745
ACS880-307 +A003 diode supply units hardware manual	3AUA0000102453
ACS880-307…+A018 diode supply units hardware manual	3AXD50000011408
ACS880 diode supply control program firmware manual	3AUA0000103295
ACS880-907 regenerative rectifier units hardware manual	3AXD50000020546
ACS880 regenerative rectifier control program firmware manual	3AXD50000020827
Inverter unit manuals	
ACS880-107 inverter units hardware manual	3AUA0000102519
ACS880 primary control program firmware manual	3AUA0000085967
ACS880 primary control program quick start-up guide	3AUA0000098062
Manuals for application programs (Crane, Winder, etc.)	
Brake unit and DC/DC converter unit manuals	
ACS880-607 1-phase brake units hardware manual	3AUA0000102559
ACS880-607 3-phase dynamic brake units hardware manual	3AXD50000022034
ACS880 (3-phase) brake control program firmware manual	3AXD50000020967

Manual	Code
ACS880-1607 DC/DC converter units hardware manual	3AXD50000023644
ACS880 DC/DC converter control program firmware manual	3AXD50000024671
Option manuals	
ACS880 +C132 marine type-approved cabinet-built drives supplement	3AXD50000039629
ACS-AP-x assistant control panels user's manual	3AUA0000085685
Drive composer start-up and maintenance PC tool user's manual	3AUA0000094606
Lifter for air-cooled drive modules user's guide	3AXD50000332588
Manuals for I/O extension modules, fieldbus adapters, safety options etc.	

You can find manuals on the Internet. See www.abb.com/drives/documents. For manuals not available in the document library, contact your local ABB representative.

2

Operation principle and hardware description

Contents of this chapter

This chapter describes the operation basics and the hardware of the IGBT supply unit (ACS880-207).

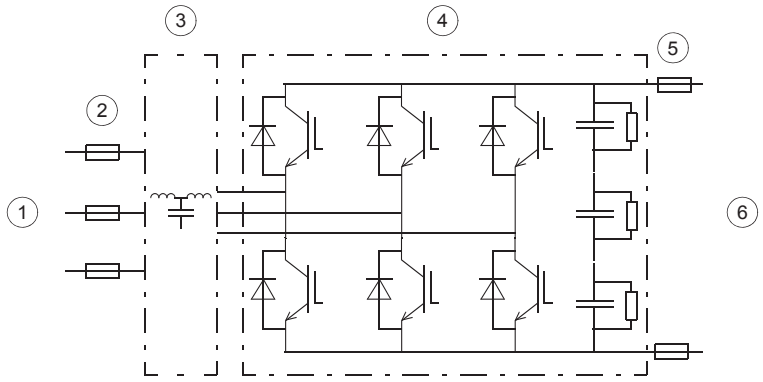
Operation principle

IGBT supply unit rectifies three-phase AC current to direct current for the intermediate DC link of the drive. The intermediate DC link supplies the inverters that run the motors. There can be one inverter unit only (single drives) or several inverter units (multidrives) connected to the intermediate circuit.

The LCL filter is an essential part of the IGBT supply unit. The supply module does not work without the filter. It suppresses the AC voltage distortion and current harmonics. The high AC inductance smooths the line voltage waveform distorted by the high-frequency switching of the converter. Capacitive component of the filter effectively filters the high-frequency (over 1 kHz) harmonics.

Simplified main circuit diagram

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



1.	AC voltage
2.	AC fuses
3.	LCL filter
4.	IGBT supply module
5.	DC fuses
6.	DC voltage

Charging

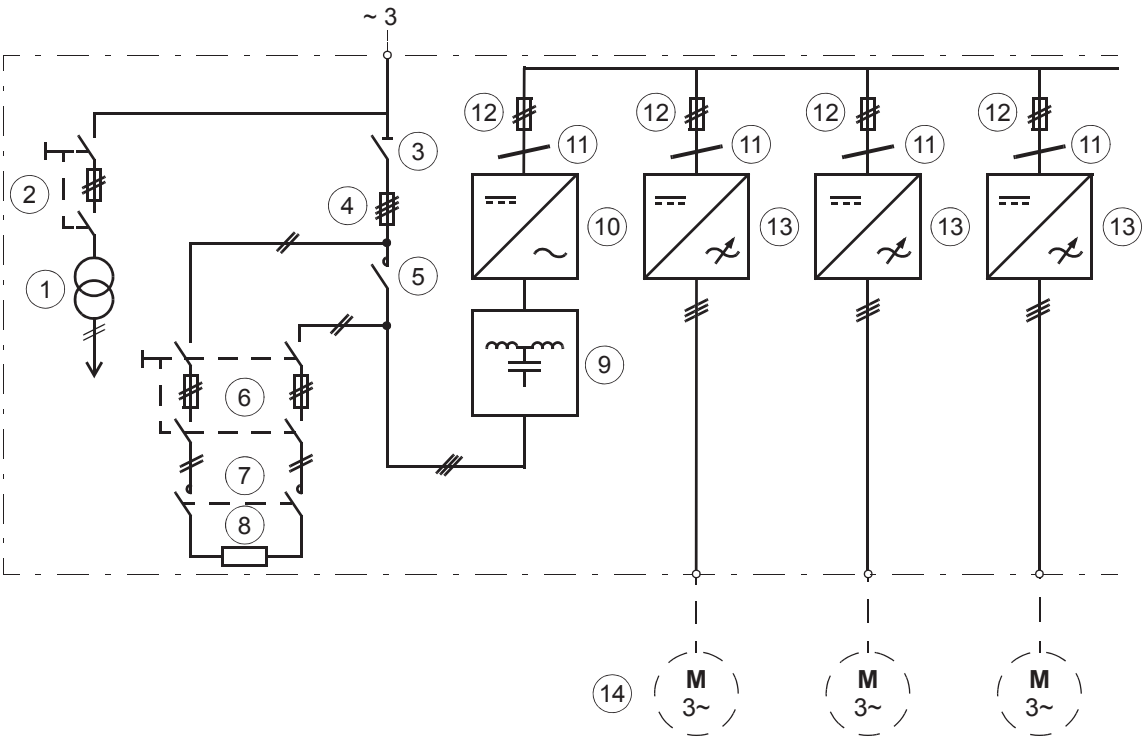
A charging circuit powers up the DC link capacitors of the drive system smoothly. Discharged capacitors cannot be directly connected to the full supply voltage. The charging current must be limited until the capacitors are charged and ready for normal use.

In cabinet-installed 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. For further information, see the firmware manual.

Overview diagram of the drive

The following figure shows a single-line diagram of a drive with an IGBT supply unit.

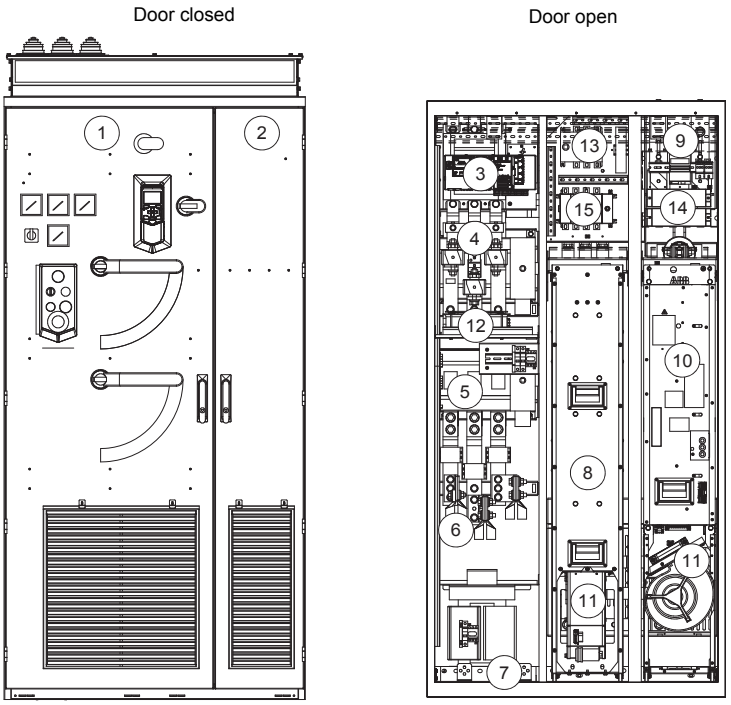


1	Auxiliary voltage transformer ([T21], option +G344)
2	Auxiliary voltage switch [Q21]
3	Main switch-disconnector ([Q1], option +F253) (standard, always with +F250)
4	AC fuses [F1]
5	Main contactor ([Q2], option +F250) (standard, always with +F253)
6	Charging switch fuse [Q3]
7	Charging contactor [Q4]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

Layout drawing of an IGBT supply unit 1×R8i (limited scope version)

Limited scope means simplified version of a low power multidrive (400V and 500V) with less options and configurations. Includes only max 980A DSU, max 810A IGBT supply units and R1i-R7i inverter units.

Note that there is also another version of 1×R8i supply unit available, see the drawings below. The multidrive version contains separate auxiliary control and incoming cubicles.

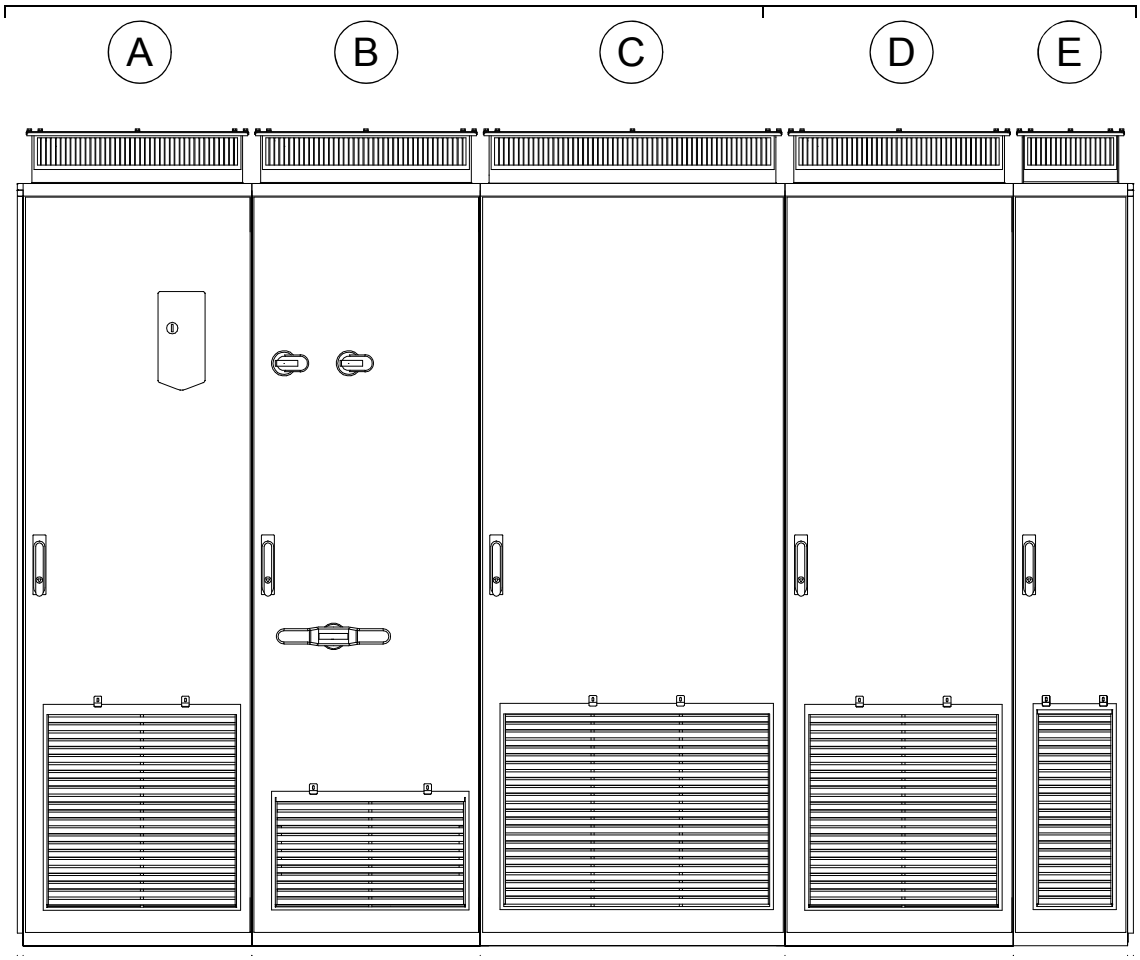


1	Incoming cubicle
2	IGBT supply module cubicle
3	BCU control unit [A51] with optional modules
4	AC fuses [F1]
5	Main switch-disconnector ([Q1], option +F253)
6	Input power cable connections [L1, L2, L3]
7	Location of PE busbar and input power cable lead-throughs
8	LCL filter module [R03]
9	DC fuses [F2]
10	IGBT supply module [T01]
11	Module cooling fan
12	Cabinet cooling fan
13	Auxiliary voltage switch [Q21]
14	Charging assembly plate containing charging contactor [Q4] and resistors

15	Charging switch [Q3]

Overview drawing of a drive

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



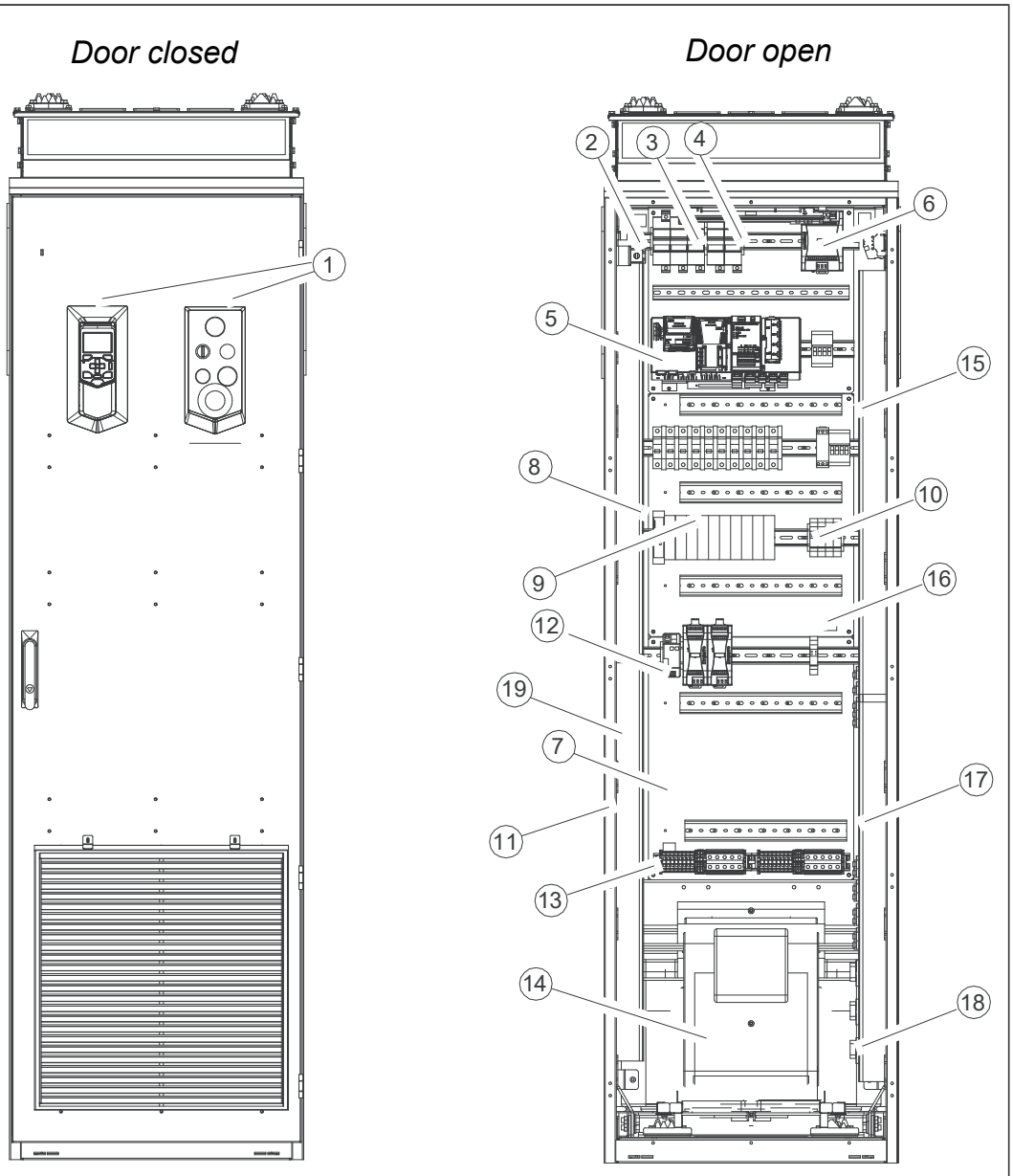
A	Auxiliary control cubicle (ACU). Contains control electronics and customer I/O connections.
B	Incoming cubicle (ICU). Contains the power input cable terminals and switchgear.
C	Supply module cubicle. Contains IGBT supply modules.
D	Inverter module cubicle. Contains inverter modules.
E	Inverter control cubicle. Contains inverter control unit.

Layout drawings of the cubicles in the supply unit

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



1	S21, etc.	Control panel and operating switches.
2	F111.1	Fuses, direct-on-line cooling fans of the module (option +C188)
3	F101	Fuses, IP54 roof fans (option +B055)
4	F21	Fuses, auxiliary voltage transformer

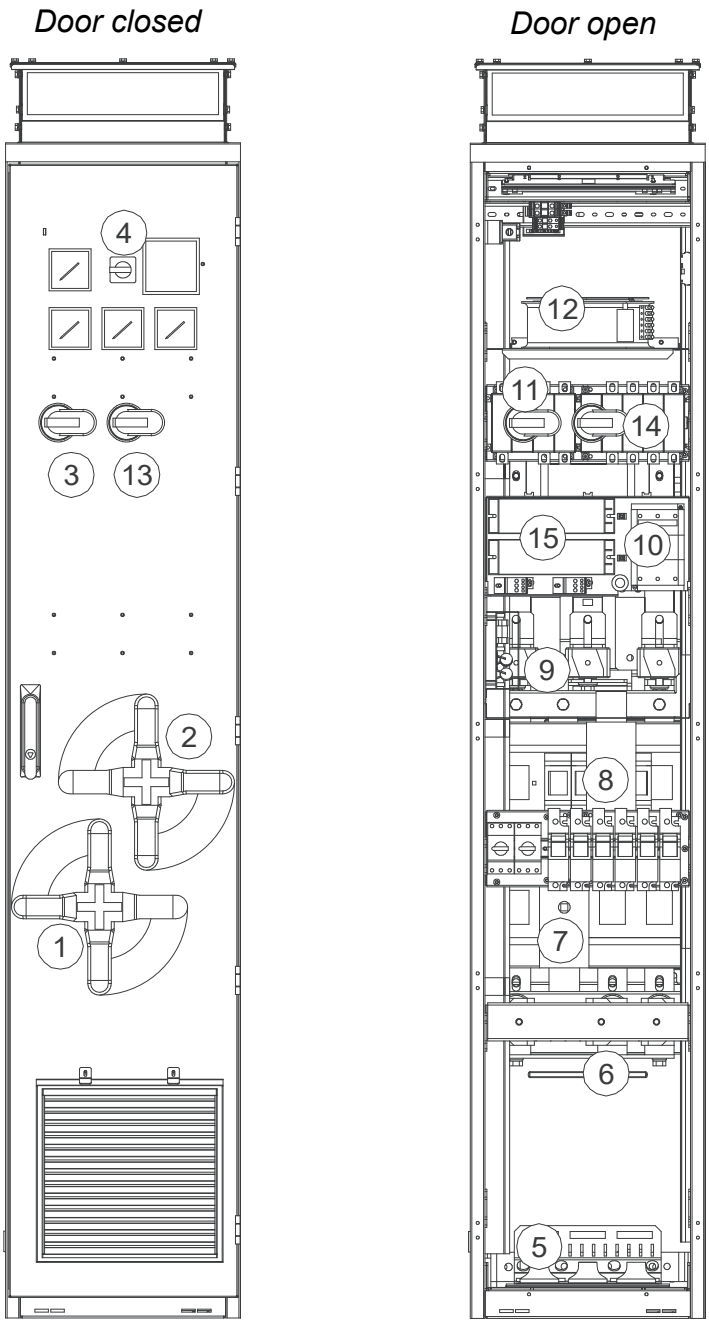
5	A51	Control unit (BCU)
6	T130	24 V DC power supply for cabinet lighting (option +G301)
7		Reserved space for customer-defined equipment
	T21	At the backside of the assembly plate: Auxiliary voltage transformer (option +G344). **Note:** Connections are accessible from front. (Terminal block is at the lower part of cubicle.)
	T101	At the backside of the assembly plate: Auxiliary voltage transformer, IP54 roof fans (option +B055). **Note:** Connections are accessible from front. (Terminal block is at the lower part of cubicle.)
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 cooling fans (option +C188).
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, size and appearance vary depending on the supply unit size and selected 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).

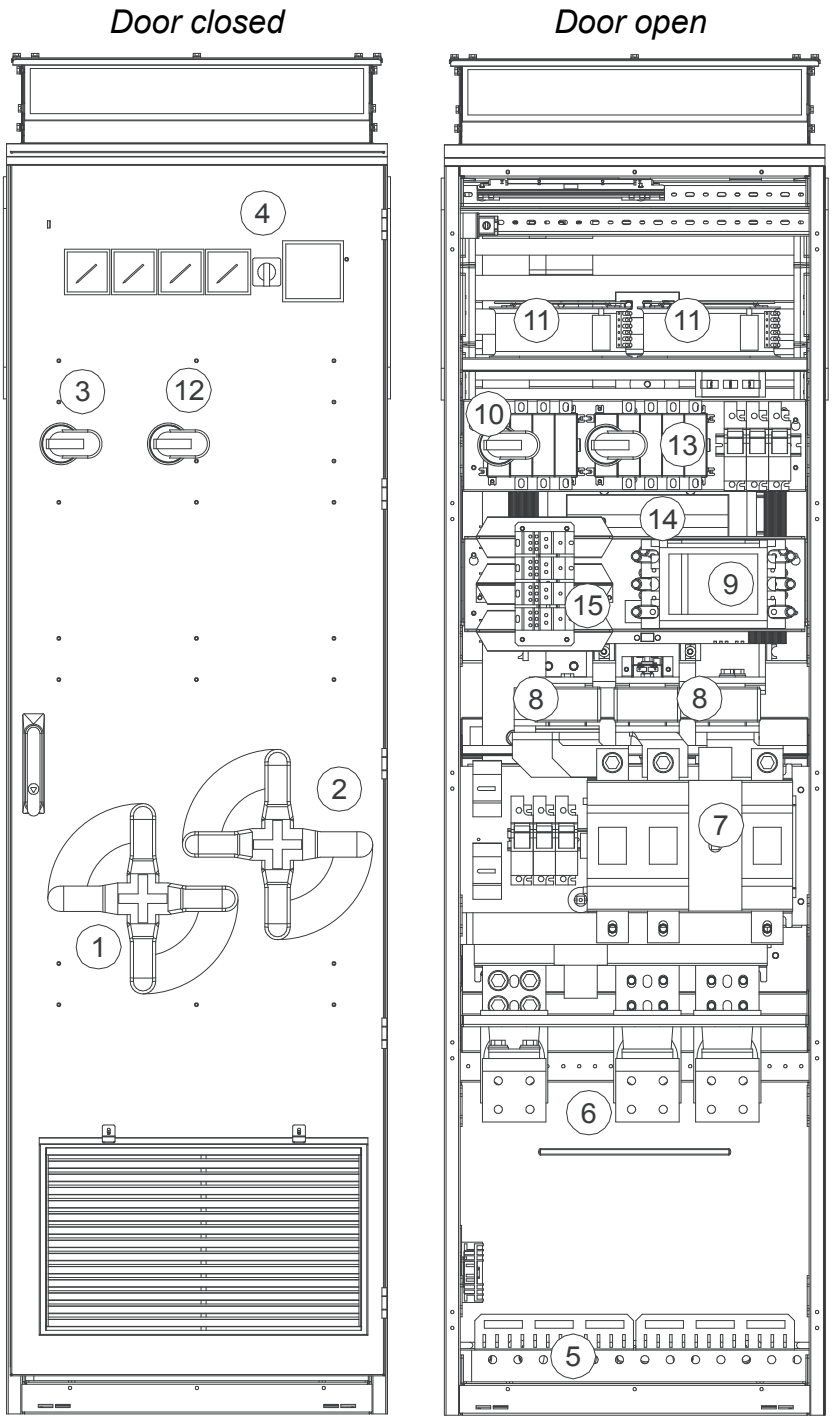


1	Main switch-disconnector handle

2	Earthing/grounding switch handle ([Q9], option +F259)
3	Auxiliary voltage switch handle
4	Selector switch for V meter (option +G334)
5	Grounding busbar [PE]
6	Input power cable terminals [L1…L3]
7	Main switch-disconnector [Q1]
8	Grounding/earthing switch ([Q9], option +F259)
9	Main AC fuses [F1…3]
10	Main contactor ([Q2], option +F250)
11	Auxiliary voltage switch [Q21]
12	Cubicle cooling fan
13	Charging switch handle
14	Charging switch [Q3]
15	Charging resistors

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).

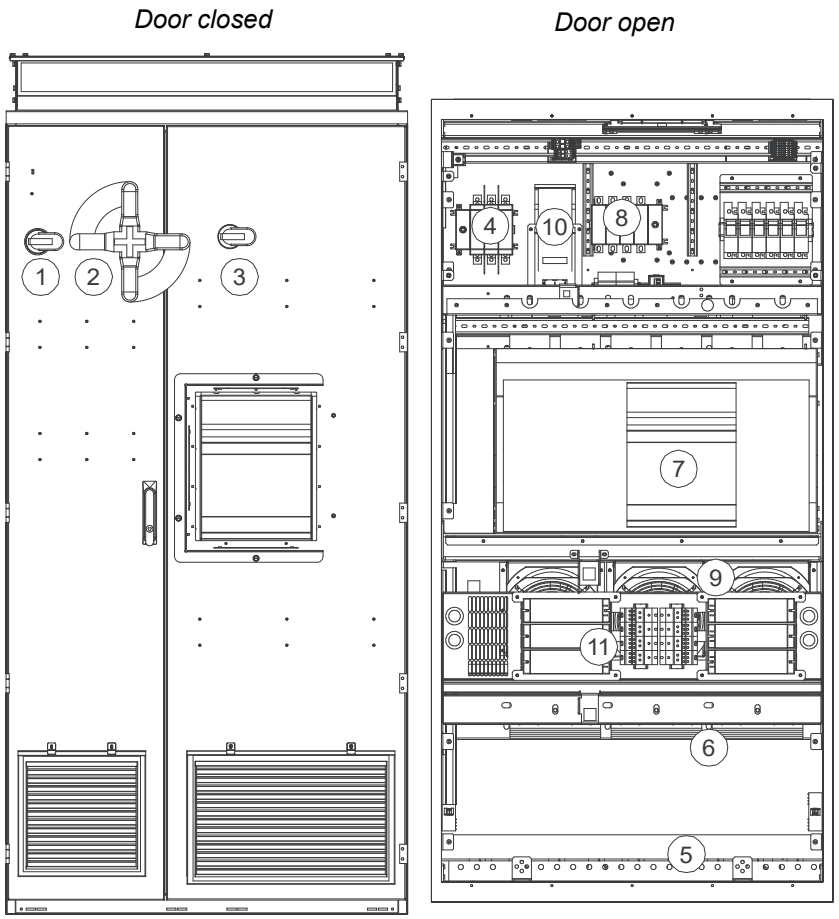


1	Main switch-disconnector handle
2	Earthing/grounding switch handle ([Q9], option +F259)
3	Auxiliary voltage switch handle

4	Selector switch for V meter (option +G334)
5	Grounding [PE] busbar
6	Input power cable terminals [L1…L3]
7	Main switch-disconnectors [Q1.1, Q1.2]
8	Main AC fuses [F1.1…F2.3]
9	Charging contactor [Q4]
10	Auxiliary voltage switch [Q21]
11	Cubicle cooling fans
12	Charging switch handle
13	Charging switch [Q3]
14	Main contactor [Q2]
15	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).

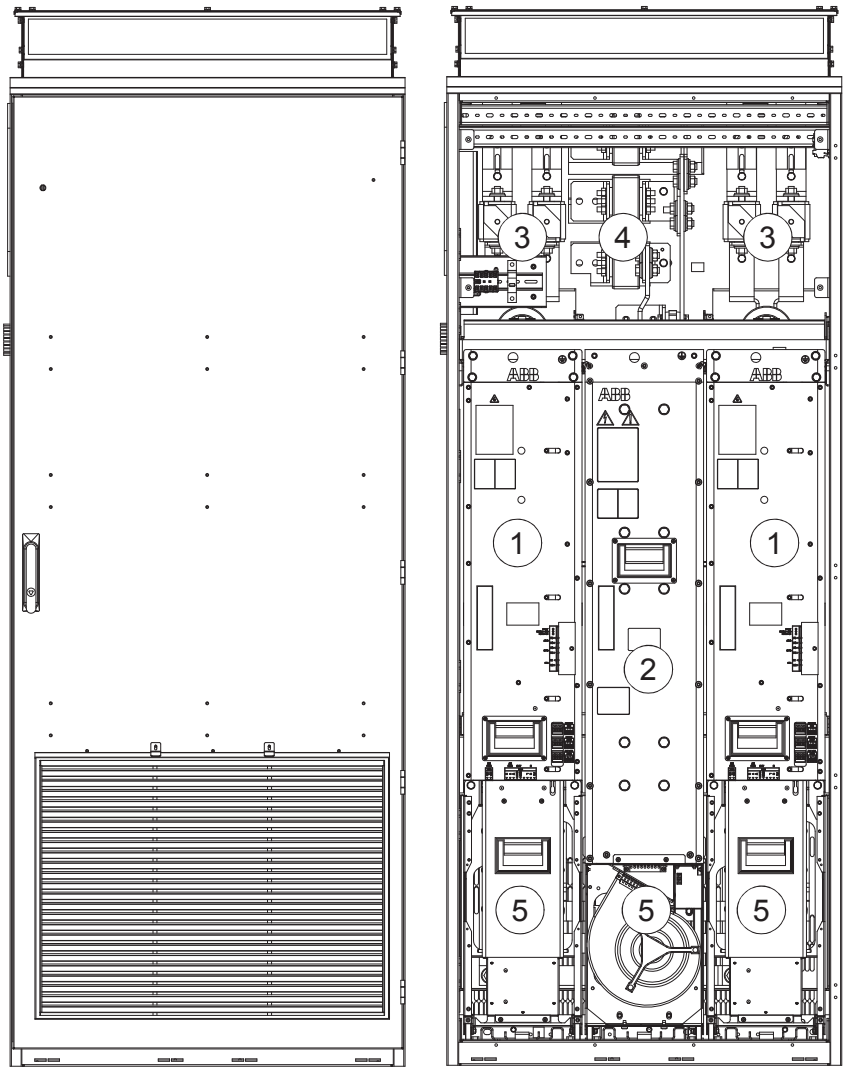


1	Auxiliary voltage switch handle
2	Earthing/grounding switch handle ([Q9], option +F259)
3	Charging switch handle
4	Auxiliary voltage switch [Q21]
5	Grounding [PE] busbar
6	Input power cable terminals [L1…L3]
7	Main circuit breaker [Q1]
8	Charging switch [Q3]
9	Cubicle cooling fans
10	Earthing/grounding switch ([Q9], option +F259)
11	Charging resistors

Layout drawing of a supply module cubicle 2×R8i

These layout drawings show the supply module cubicle. The cubicle contains IGBT supply module(s) and LCL filter module(s).

Door closed *Door open*

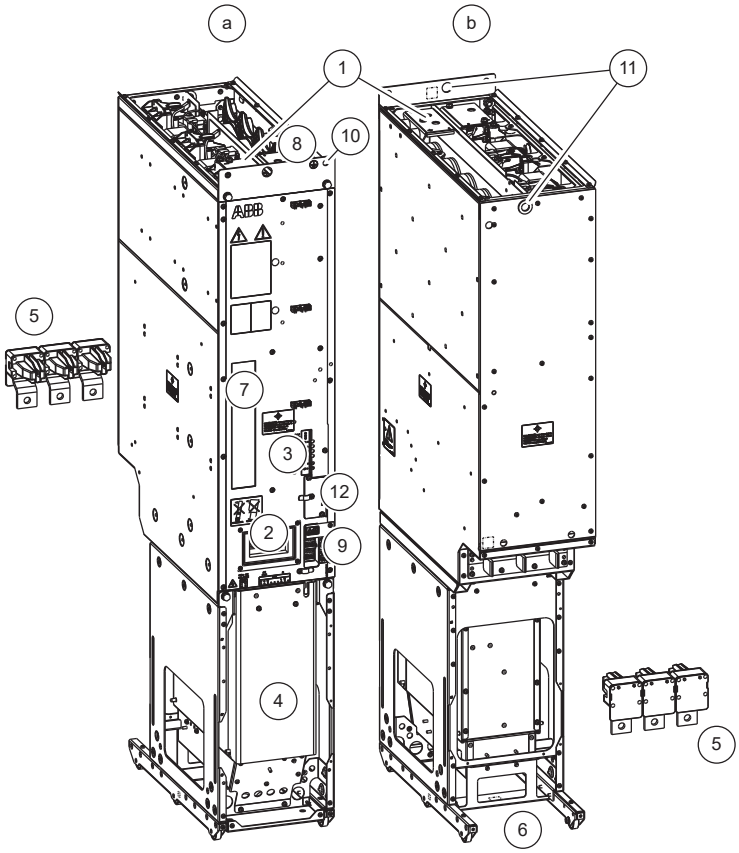


1	Supply module
2	LCL filter module
3	DC fuses
4	AC fuses
5	Module cooling fan

Layout drawings of supply and LCL filter modules

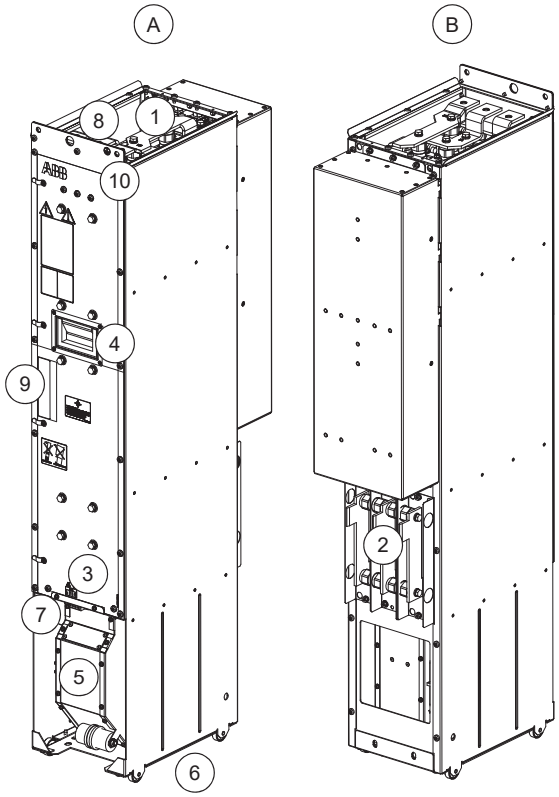
IGBT supply module (frame R8i)

This figure shows the layout of the R8i module.



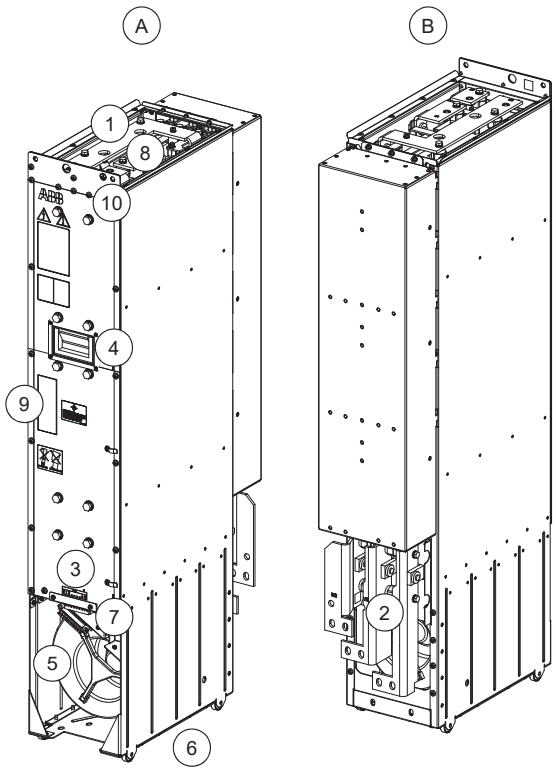
A	R8i module, front
B	R8i module, back
1	DC busbars
2	Handle
3	LEDs and fiber optic connectors
4	Fan (standard speed-controlled fan shown; a direct-on-line fan is available as option +C188)
5	Quick connector (three phases). The counterpart is fastened to the cabinet behind the module.
6	Wheels
7	Type designation label
8	Terminal block [X50] (power supply for internal boards and module heating element, option +C183; DOL fan supply, option +C188)
9	Connectors [X51], [X52], [X53]
10	The unpainted grounding point (PE) between module frame and cabinet frame.
11	Lifting eyes
12	Circuit board compartment fan

LCL filter module (type BLCL-1x-x for frame 1×R8i)



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

LCL filter module (type BLCL-2x-x for frame R8i multiples)



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

Overview of power and control connections

Input power connections of the IGBT supply 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 cable entry data for the input power cable (page 129)*.

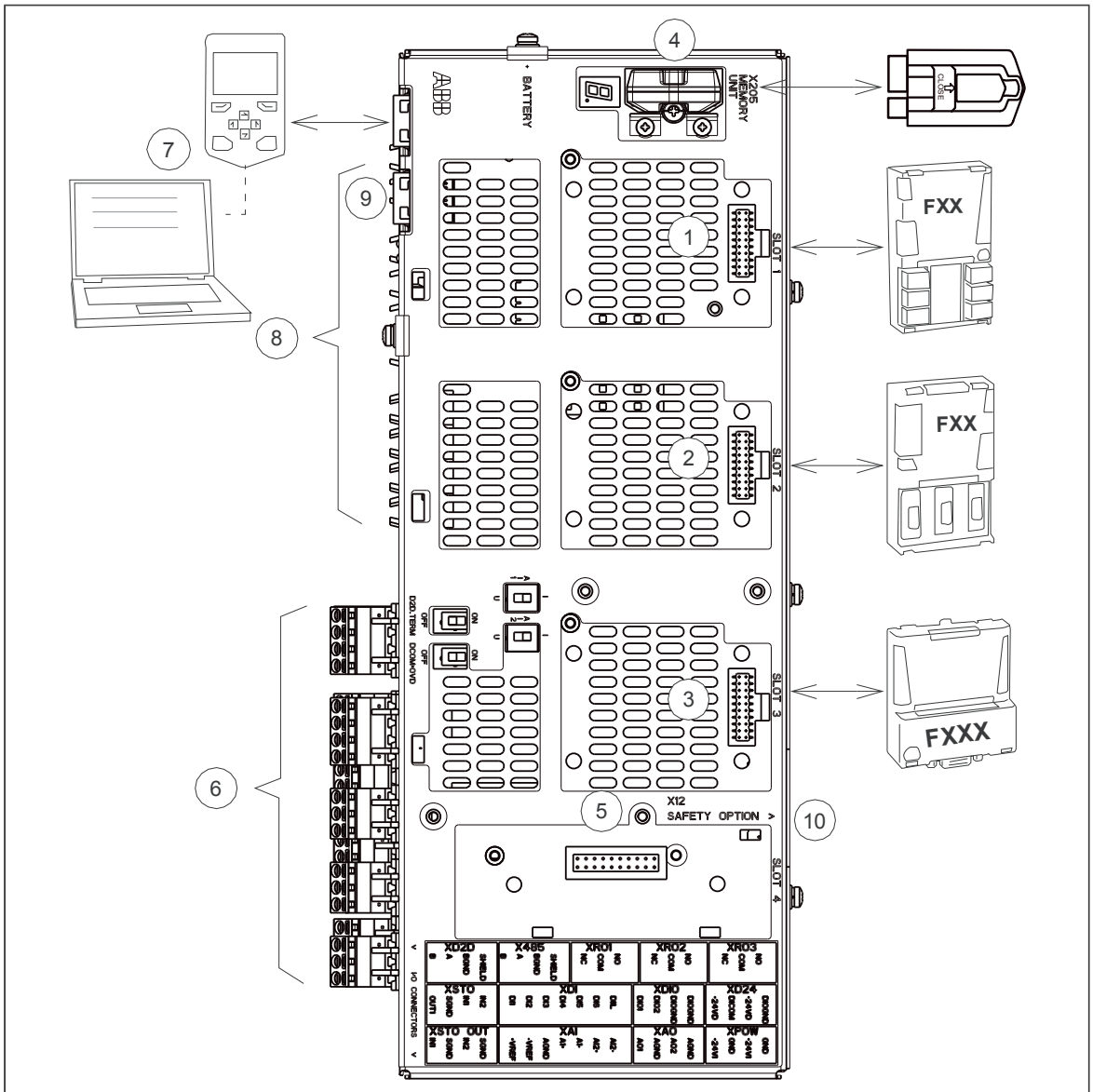
A cabinet-installed supply unit is typically controlled using the local control devices installed on the cabinet door. No additional control connections are needed. However, it is possible to:

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

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

Overview of the control connections of the BCU control unit

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

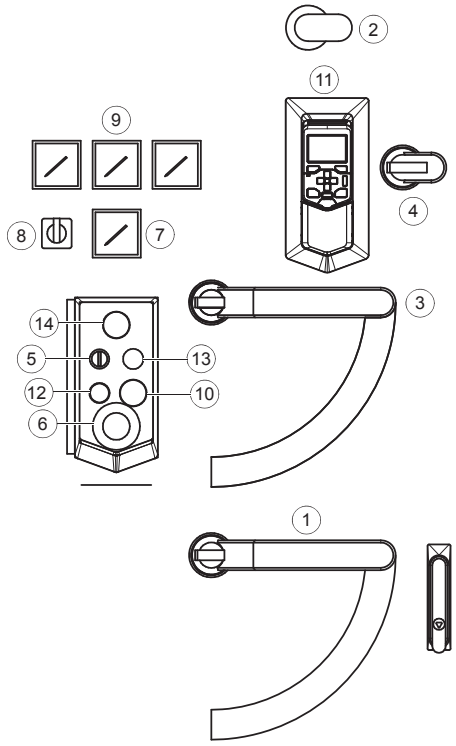


1 2 3	Analog and digital I/O extension modules and fieldbus communication modules can be inserted into slots 1, 2 and 3.	7	Control panel.
4	Memory unit	8	Fiber optic links to power modules (inverter, supply, brake or converter)
5	Slot 4 for RDCO-0x	9	Ethernet port. Not in use.
6	Terminal blocks.	10	Safety option interface. Only in use for the inverter units.

Supply unit control devices

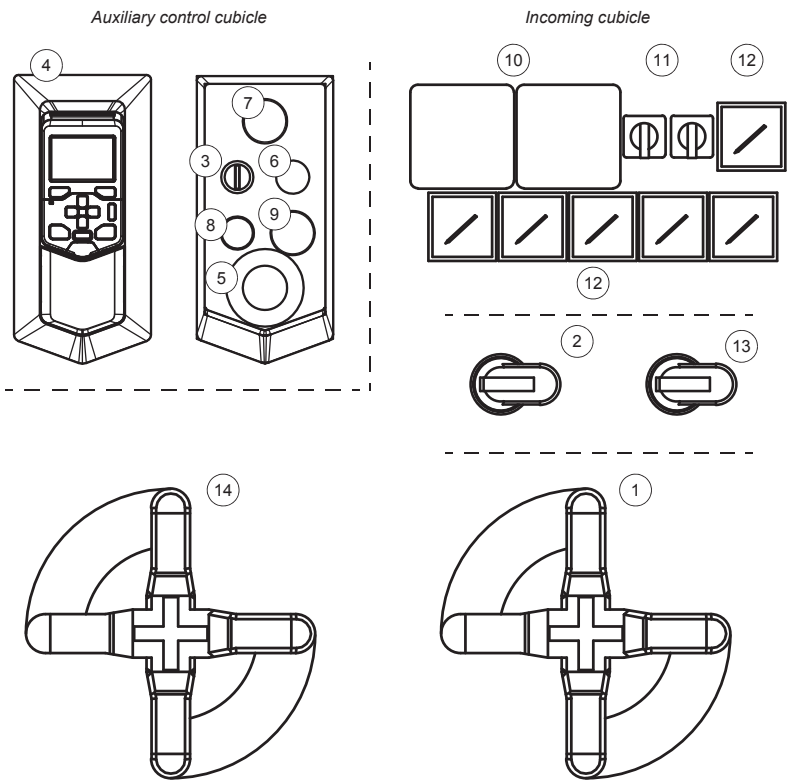
The following figure shows examples of the door control devices of the IGBT supply unit. The selection and exact location of control devices varies in different deliveries. The purpose of the devices is explained in the following sections.

Door switches and devices for frame R8i cabinet (limited scope version)



1	Main switch-disconnector / breaker
2	Auxiliary voltage switch
3	Grounding switch
4	Charging switch
5	Operating switch
6	Emergency stop button
7	Voltage meter
8	Selector switch for voltage meter
9	Current meters
10	Tripping button for the supply breaker
11	The ACS-AP-W control panel
12	Ground fault indication
13	E-stop reset button
14	Electrical on/off push button

Door switches and devices for frame R8i cabinet



1	Q1	Main switch-disconnector / breaker
2	Q21	Auxiliary voltage switch
3	S21	Operating switch
4	A59	The ACS-AP-W control panel
5	S61	Emergency stop button
6	S62	E-stop reset button
7	S23	Electrical disconnect push button
8	S90	Ground/Earth fault indicator light (option +Q954).
9	S22	Tripping button for the breaker of the supply transformer.
10	P5.x	Voltage meter (optional). Size of the meter can vary.
11	S5.x	Selector switch for voltage meters (optional).
12	P2.x	AC phase current meters (optional). Number of meters depends on option selection.
13	Q3	Charging switch
14	Q9	Grounding switch

Main switch-disconnector / main circuit breaker

The supply unit is equipped with a main switch-disconnector ([Q1], option +F253) or a main circuit 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 circuit breaker is withdrawable: to disconnect the drive, crank 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 circuit breaker the main circuit breaker does not isolate the charging circuit. To isolate the charging circuit, use the charging switch [Q3].

Note: The earthing/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 supply 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 supply 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 supply 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 circuit breaker and the LCL 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. After the DC link is charged, the main contactor [Q2] is closed and the charging contactor [Q4] opened. The supply module starts operating.
- The OFF position: The control program opens the main contactor [Q2] and the supply module stops rectifying.

Emergency stop button

The emergency stop button is an optional device ([S61], option +G331). Pressing the button activates an emergency stop function of the supply 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 section *E-stop reset button (page 34)* (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 supply 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 functional safety options +Q951, +Q952, +Q963, +Q964 and +Q979 are described in separate option manuals. For the manuals, see section *Related documents*.

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 supply 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-W control panel

With the control panel, you can:

- start and stop the supply 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 at digital input DI2 must be on (1) so that the supply 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 IGBT supply control program firmware manual* (3AUA0000131562 [English]).

PC connection

There is a USB connector on the front of the 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 (page 64)*.

Fieldbus control

You can control the supply 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 IGBT supply control program firmware manual* (3AUA0000131562 [English]).

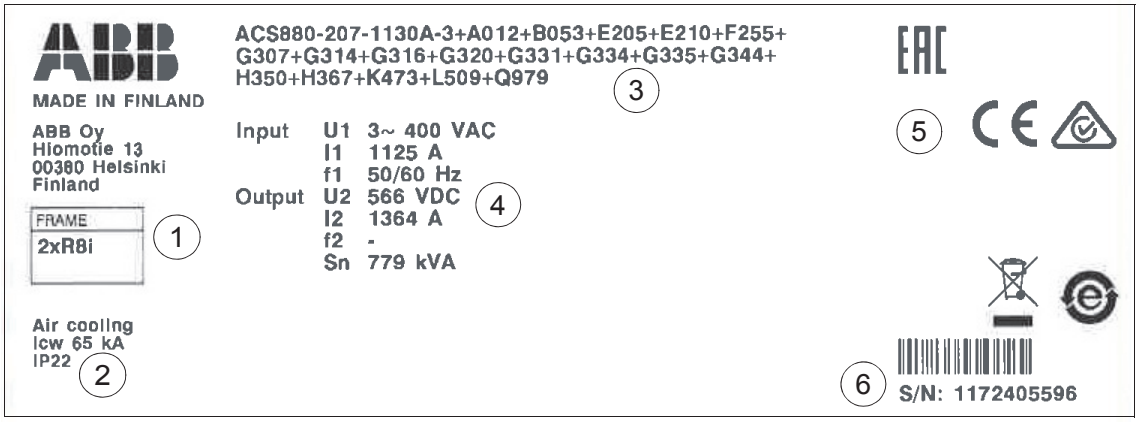
Note: To be able to switch the main contactor [Q2] and the supply unit on and off (Run enable signal) through the fieldbus, the Run enable command at digital input DI2 must be on (1). That is the case when the operating switch [S21] is switched to the on (1) position.

Type designation labels

Type designation label of the supply unit

Each IGBT supply 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.

Example labels are shown below.



1	Frame size
2	Degree of protection
3	Type designation. See section *Type designation keys (page 39)*.
4	Ratings (listed in the technical data)
5	Valid markings. See *Electrical planning instructions for ACS880 multidrive cabinets and modules* (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.

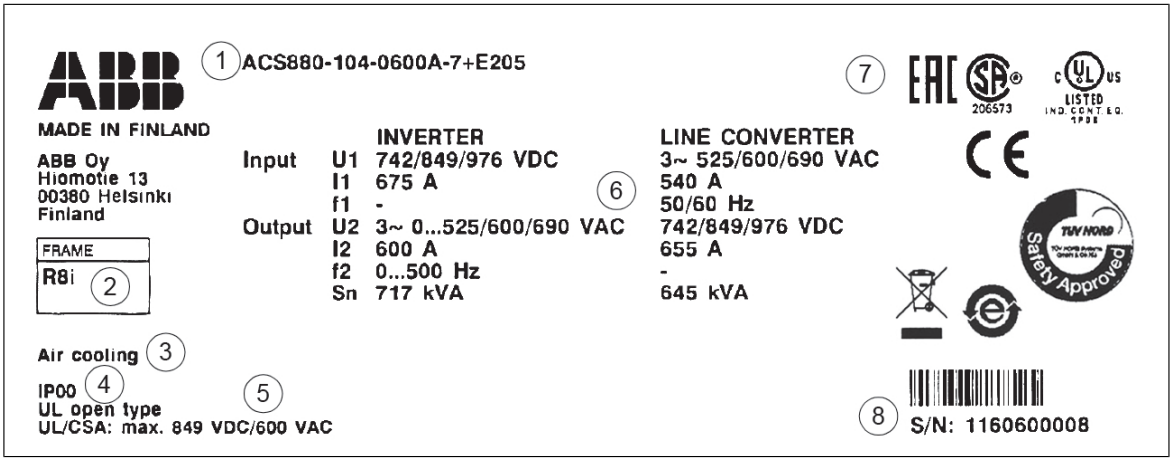
Type designation labels of the supply module and LCL filter module

Each IGBT supply module and LCL filter module has a type designation label attached to it. The type designation stated on the label contains information on the specifications and configuration of the unit.

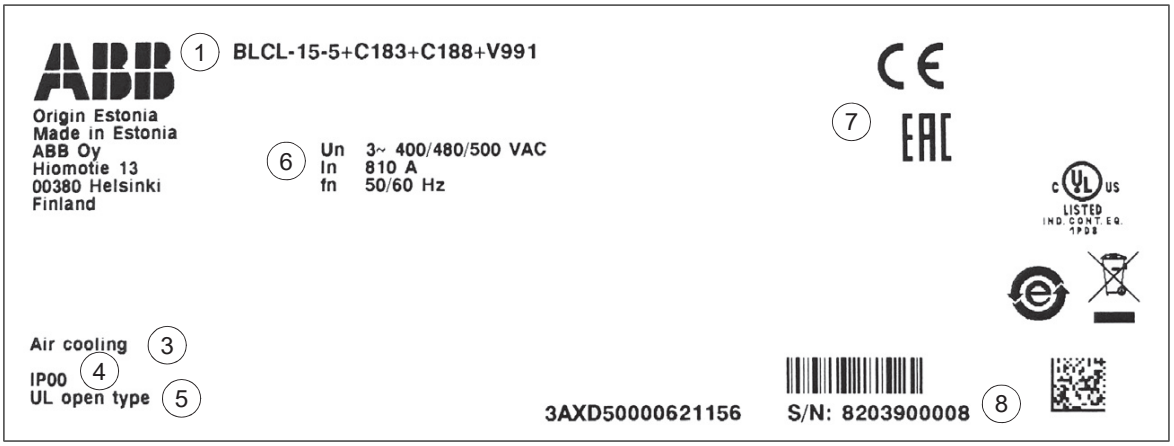
Quote the complete type designation and serial number when contacting technical support on the subject of individual IGBT supply modules or LCL filter modules.

Example labels are shown below.

Supply module



LCL filter module



No.	Description
1	Type designation
2	Frame size
3	Cooling method and additional information
4	Degree of protection
5	UL/CSA data
6	Ratings
7	Valid markings. See *Electrical planning instructions for ACS880 multidrive cabinets and modules* (3AUA0000102324 [English]).

No.	Description
8	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 cabinet-installed IGBT supply 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 IGBT supply unit.

CODE	DESCRIPTION
Basic codes	
ACS880	Product series
207	Cabinet-installed IGBT supply unit: supply frequency 50 Hz, control (auxiliary) voltage 230 V AC, IEC industrial cabinet construction, degree of protection IP22 (UL type 1), speed-controlled module cooling fans, power and control cabling through the bottom of the cabinet, European motor cabling, DC busbar material aluminum and copper, cable supply conductors, AC busbars of copper, complete documentation in English in a USB memory stick.
Size	
xxxxx	See the ratings table.
Voltage range	
3	Voltage rating: 380…415 V. This is indicated in type designation label as typical input voltage levels (3~ 400 V AC).
5	Voltage rating: 380…500 V. This is indicated in type designation label as typical input voltage levels (3~ 400/480/500 V AC).
7	Voltage rating: 525…690 V. This is indicated in type designation label as typical input voltage levels (3~ 525/600/690 V AC).
Plus codes	
Supply frequency	
A013	60 Hz
Degree of protection	
B054	IP42 (UL type 1)
B055	IP54 (UL type 12)
Construction	
C121	Marine construction
C128	Cooling air intake through floor of cabinet
C129	UL-approved
C130	Channeled air outlet

CODE	DESCRIPTION
C132	Marine type approval. Refer to *ACS880 +C132 marine type-approved cabinet-built drives supplement* (3AXD50000039629 [English]).
C134	CSA-approved
C164	100 mm plinth height
C176	Door hinges on left-hand side
C179	200 mm plinth height
C180	Seismic design
C186	Current and voltage measurements with BAMU auxiliary measurement unit
C188	Direct-on-line cooling fan
C202	Copper filters
C243	Additional voltage measurement for optimal grid control functionality
Filters	
E202	EMC 1st environment, restricted (max 1070A, only 400 V and 500 V)
E210	EMC 2nd Environment
Switchgear	
F250	Line contactor, standard in small power, (always with disconnector, option +F253)
F253	Disconnector switch (door interlocked), standard in small power, (always with line contactor, option +F250)
F255	Circuit breaker, standard in high power
F259	Earthing/grounding switch
Electrical	
G300	Cabinet heater
G301	Cabinet lighting
G304	Control (auxiliary) voltage 115 V AC
G307	Terminals for external control voltage for (UPS)
G314	Main DC busbar material aluminium (standard up to 3200A)
G315	DC busbar material tin plated copper (optional up to 3200 A, standard from 3200 A up)
G317	Busbar supply conductors
G330	Halogen free wiring materials. Not available with +C129 and +C134.
G331	Emergency stop push button on the door (red)
G332	Electrical disconnect push button on the door (black, opens main contactor / main circuit breaker)
G333	Multimeter for A-, V-, kW-, kWh-meter, not available in limited scope
G334	V-meter with selector switch
G335	A-meter in one phase

CODE	DESCRIPTION
3G335	A-meter in three phases
G336	Arc monitoring unit, 1 loop, Rea 101, including cable
G337	Arc monitoring with current monitoring unit
G343	Corrosion classification coupon in ACU (Purafil 3AUA64044052)
G344	Auxiliary voltage transformer
G426	Arc monitoring unit, extension for 2 loops, Rea 105, including cable
G442	Voltage measurement with BAMU auxiliary measurement unit. **Weak supply networks:** In weaker supply networks with a short-circuit ratio less than 8, it is highly recommended to install a BAMU auxiliary measurement unit to the drive. In such networks, there is a risk of nuisance DC overvoltage tripping due to disturbances caused by probable high-voltage THD in the supply voltage. Short-circuit ratio is defined as the supply network's apparent short-circuit power $S_{k,net}$ divided by the drive's nominal apparent power S_n ($S_{k,net}$ / S_n < 8).
G453	Common mode filter temperature monitoring
Cabling	
H351	Power cabling through roof of cabinet
H358	Blind 3 mm steel cable gland plates
H364	Blind 3 mm aluminium cable gland plates
H365	Blind 6 mm brass cable gland plates
H368	Control cabling through roof of cabinet
Control panel and PC options	
J400	Control panel ACS-AP-W (max. 4 panels on the door)
J401	LED monitoring display
J410	Drive control panel connection kit
J411	Remote supply ON/OFF control (from upper controller)
J412	Common control panel for a line up
J425	ACS-AP-I control panel
Fieldbus adapter modules	
K450	Panel Bus, built with Ethernet cable, needs FDPI option board in each unit, max. 32
K451	FDNA-01 DeviceNet adapter module
K454	FPBA-01 PROFIBUS DP adapter module
K457	FCAN-01 CANopen adapter module
K458	FSCA-01 Modbus RTU adapter module
K462	FCNA-01 ControlNet adapter module
K469	FECA-01 EtherCAT adapter module
K470	FEPL-02 Ethernet POWERLINK adapter module
K473	FENA-11 EtherNet/IP, Modbus TCP and PROFINET adapter module

CODE	DESCRIPTION
K475	FENA-21 high performance EtherNet/IP, Modbus TCP and PROFINET adapter module
K480	Ethernet switch for PC tool or control network (for max. 6 supply units)
K483	Ethernet switch with optical link for PC tool or control network (for max. 6 supply units)
K490	FEIP-21 Ethernet adapter module for EtherNet/IP
K491	FMBT-21 Ethernet adapter module for Modbus TCP
K492	FPNO-21 Ethernet adapter module for PROFINET IO
K493	Ethernet switch for PROFINET
K494	Ethernet switch with optical link for PROFINET
I/O extensions, feedback interfaces and fiber optic options	
L500	FIO-11, analog I/O extension module
L501	FIO-01 digital I/O extension module
L509	RDCO-04 optical DDCS communication adapter module
L515	FEA-03 option module extension module
L525	FAIO-01 analog I/O extension module
L526	FDIO-01 digital I/O extension module
Software and licensing	
N8010	IEC 61131-3 application programmability
N8053	License for optimal grid control mode in ACS880 IGBT supply control program. See *Optimal grid control of ACS880 IGBT supply control program supplement* (3AXD50000164745 [English]).
Cabinet options	
P913	Special color
Safety	
Q951	Emergency stop (category 0) with safety relays by opening the main circuit breaker/contactor
Q952	Emergency stop (category 1) with safety relays by opening the main circuit breaker/contactor
Q954	Earth fault monitoring, unearthed mains IT
Q959	Supply transformer breaker disconnect push button (wired to terminals) on the door
Q963	Emergency stop (category 0) with STO with safety relay
Q964	Emergency stop (category 1) with STO with safety relay
Q979	Emergency stop (configurable for category 0 or 1) with FSO with STO
Documentation **Note:** English-language manuals may be included if a translation in the specified language is not available.	
R701	German
R702	Italian
R705	Swedish

CODE	DESCRIPTION
R706	Finnish
R707	French
R708	Spanish
R711	Russian
R716	Hard copies of documentation
R717	Second set of hard copies of documentation

Type designation key of the IGBT supply 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 with 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 IGBT supply module.

CODE	DESCRIPTION
Basic codes	
ACS880	Product series
204	Construction: IGBT supply module. The module delivery includes internal du/dt filters and a speed-controlled cooling fan supplied from the DC bus as standard.
Size	
xxxxx	See the ratings table.
Voltage range	
3	Voltage rating: 380…415 V. This is indicated in type designation label as typical input voltage levels (3~ 400 V AC).
5	Voltage rating: 380…500 V. This is indicated in type designation label as typical input voltage levels (3~ 400/480/500 V AC).
7	Voltage rating: 525…690 V. This is indicated in type designation label as typical input voltage levels (3~ 525/600/690 V AC).
Plus codes	
Filter	
E205	Frame R8i only: Internal du/dt filters (included in the module delivery as standard)
Auxiliary power supply	
G304	115 V supply

Type designation key of the filter module

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

- The first 1…16 digits form the basic code. It describes the basic construction of the filter. The fields in the basic code are separated with 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 filter.

CODE	DESCRIPTION
Basic codes	
ACS880	Product series
BLCL	LCL filter for frame R8i supply module. The delivery includes on/off-controlled cooling fan as standard
Size	
13, 15, 24, 25	See the technical data.
Voltage range	
5	Voltage rating: 380…500 V. This is indicated in type designation label as typical input voltage levels (3~ 400/480/500 V AC).
7	Voltage rating: 525…690 V. This is indicated in type designation label as typical input voltage levels (3~ 525/600/690 V AC).
Plus codes	
C183	Internal heating element (included in the delivery as standard)
C188	Direct-on-line cooling fan (included in the delivery as standard with 230 V supply for BLCL-1x-x / 400 V AC supply for BLCL-2x-x)
G304	BLCL-1x-x only: 115 V AC 1-phase fan supply
G427	BLCL-2x-x only: 208 V AC 3-phase fan supply
P922	Module to be installed in the ABB cabinet (included in the delivery as standard)
V991	Hardware version. LCL filter modules with or without this code are interchangeable.

3

Electrical installation

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 ACS880-207 supply 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]). Ignoring the instructions can cause physical injury or death, or damage to the equipment.

The tightening torques for the electrical connections are listed in chapter *Technical data*.

Electrical safety precautions

These electrical safety precautions are 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 electrical professional, do not do installation or maintenance work.

Go through these steps before you begin any installation or maintenance work.

1. Clearly identify the work location and equipment.
2. Disconnect all possible voltage sources. Make sure that re-connection is not possible. Lock out and tag out.
   - Open the main disconnecting device of the drive.
   - Open the charging switch if present.
   - Open the disconnector of the supply transformer. (The main disconnecting device in the drive cabinet does not disconnect the voltage from the AC input power busbars of the drive cabinet.)
   - Close the grounding switch or switches ([Q9], option +F259) if present. Do not use excessive force as the switch has electromagnetic interlocking.
   - If the drive is equipped with a DC/DC converter unit (optional): Open the DC switch-disconnector ([Q11], option +F286) of the DC/DC converter. Open the disconnecting device of the energy storage connected to the DC/DC converter unit (outside the drive cabinet).
   - Open the auxiliary voltage switch-disconnector (if present), and all 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.
   - Disconnect all dangerous external voltages from the control circuits.
   - After you disconnect power from the drive, always wait 5 minutes to let the intermediate circuit capacitors discharge before you continue.
3. Protect any other energized parts in the work location against contact.
4. Take special precautions when close to bare conductors.

5. 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).
   - Before and after measuring the installation, verify the operation of the voltage tester on a known voltage source.
   - Make sure that the voltage between the drive input power terminals (L1, L2, L3) and the grounding (PE) busbar is zero.
   - Make sure that the voltage between the drive output terminals (T1/U, T2/V, T3/W) and the grounding (PE) busbar is zero.
   - Make sure that the voltage between the drive DC terminals (UDC+ and UDC-) and the grounding (PE) terminal is zero. In cabinet-built drives, measure between the drive DC busbars (+ and -) and the grounding (PE) busbar.
6. If the drive is not equipped with a grounding switch, install temporary grounding as required by the local regulations.
7. Ask the person in control of the electrical installation work for a permit to work.

General notes

Printed circuit boards

WARNING!
Use a grounding wrist band when you handle printed circuit boards. Do not touch the boards unnecessarily. The boards contain components sensitive to electrostatic discharge.

Optical components

WARNING!
Obey these instructions. If you ignore them, damage to the equipment can occur.

- Handle the fiber optic cables with care.
- When you unplug the fiber optic cables, always hold the connector, not the cable itself.
- Do not touch the ends of the fibers with bare hands as the ends are extremely sensitive to dirt.
- Do not bend the fiber optic cables too tightly. The minimum allowed bend radius is 35 mm (1.4 in).

Checking the insulation of the assembly

Measuring the insulation of the drive

WARNING!
Do not do any voltage withstand or insulation resistance tests on any part of the drive as testing can damage the drive. Every drive has been tested for insulation between the main circuit and the chassis at the factory. Also, there are voltage-limiting circuits inside the drive which cut down the testing voltage automatically.

Measuring the insulation of the input power cable

Before you connect the input power cable to the drive, measure its insulation according to local regulations.

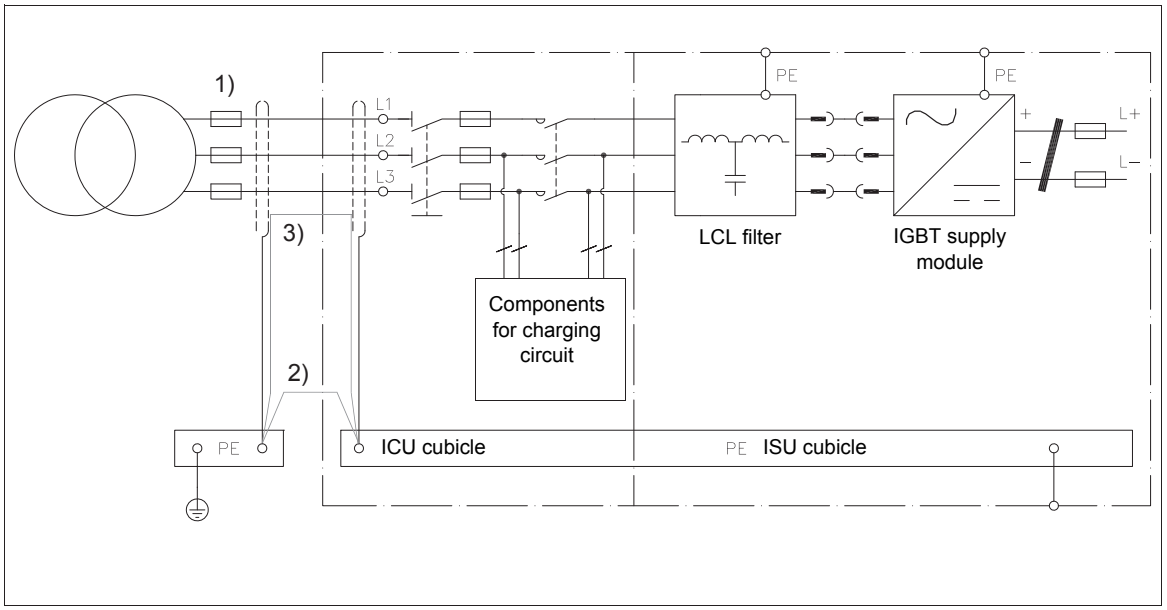
Compatibility check - IT (ungrounded) earthing system

Drives with a category 2, 1st environment EMC filter (option +E202) are not suitable for use in an IT (ungrounded) supply network system. If the drive is equipped with option +E202, disconnect the filter before connecting the drive to the IT supply network. Contact ABB for instructions.

WARNING!
Do not install a drive equipped with EMC filter +E202 on an IT system (an ungrounded power system or a high-resistance-grounded [over 30 ohms] power system). The system will be connected to ground potential through the EMC filter capacitors of the drive. This can cause danger, or damage the drive.

Connecting the input power cables

Connection diagram (frame 1×R8i, limited scope version)



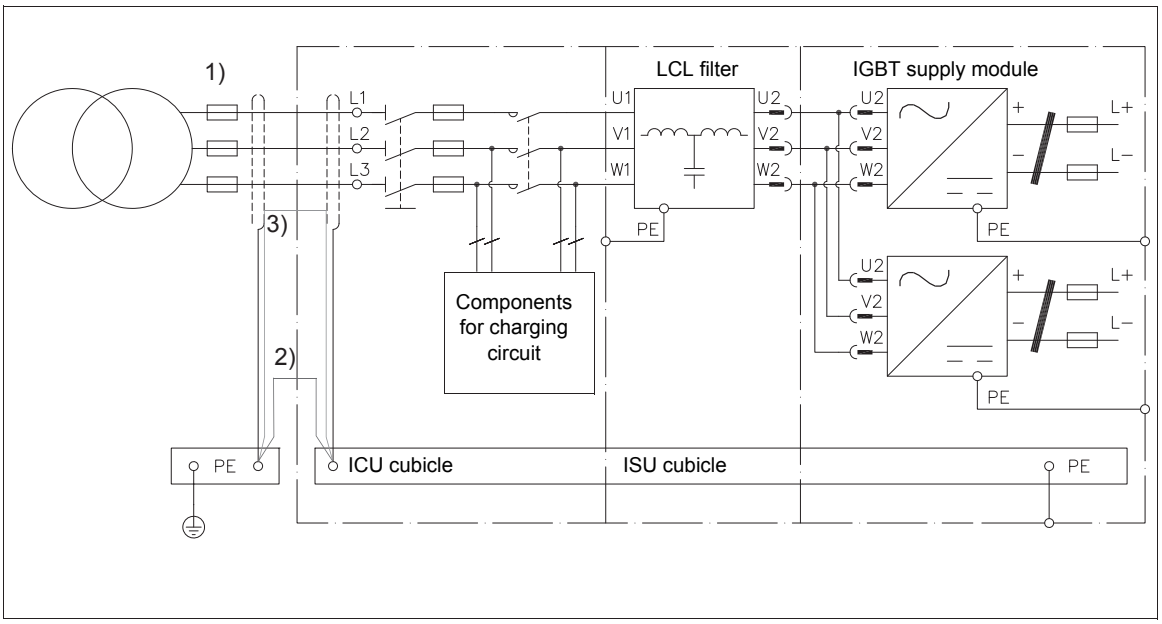
Note: 1) Fuses or other protection means.

Use a separate grounding PE cable 2) or a cable with a separate PE conductor 3) if the conductivity of the shield does not meet the requirements 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]).

The cable lead-through details (number and size of holes), and cable connection details (number and dimensions of busbars, tightening torque) are given in chapter *Technical data*.

Connection diagram (frame R8i and multiples)



Note: 1) Fuses or other protection means.

Use a separate grounding PE cable 2) or a cable with separate PE conductor 3) if the conductivity of the shield does not meet the requirements 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]).

The cable lead-through details (number and size of holes), and cable connection details (number and dimensions of busbars, tightening torque) are given in chapter *Technical data*.

Connection procedure (frame R8i, limited scope version)

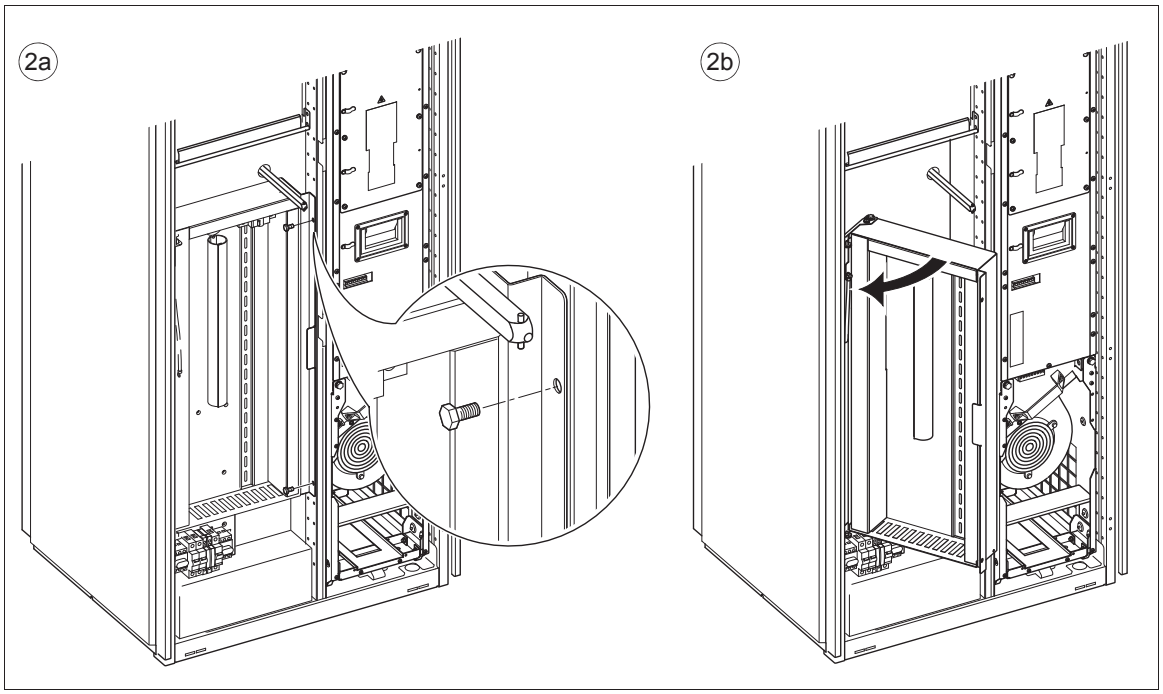
The cable lead-through details, and cable connection details are shown in section *Terminal and cable entry data for the input power cable (page 129)*.

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

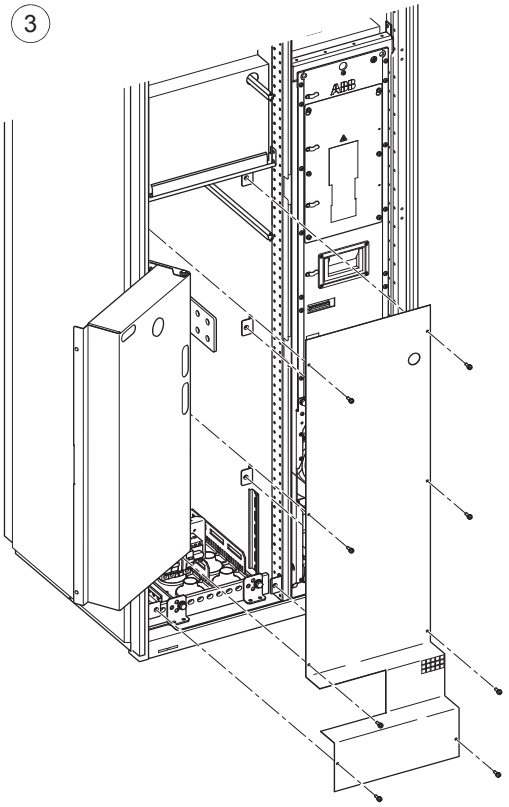
WARNING!
With aluminum cables, apply grease to stripped conductors before attaching them to non-coated aluminum cable lugs. Obey the grease manufacturer's instructions. Aluminum-aluminum contact can cause oxidation of the contact surfaces.

1. Disconnect the drive from the AC power line and make sure it is safe to start the work. See section *Electrical safety precautions (page 46)*
2. Open the cubicle door.
3. Undo the locking screws at the edge of the swing-out frame (2a) and open the frame (2b).
4. Undo the screws of the shroud in the lower part of the cubicle. Lift and remove the shroud.
5. Lead the cable in, strip and connect:
   - Twist the cable shield to bundle and connect to cabinet PE (ground) busbar with a cable lug. Tightening torque is 70 N·m (52 lbf·ft).
   - Connect any separate ground conductors/cables to the cabinet PE (ground) busbar.
   - Connect the phase conductors to the input power terminals with cable lugs. Tightening torque is 70 N·m (52 lbf·ft).

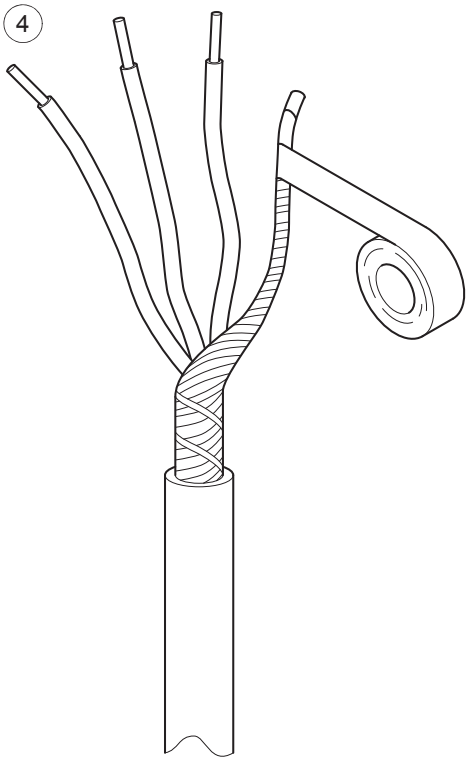
     Note: Before fastening the shroud and swing-out frame, connect the control cables if any. See section *Connecting the control cables for the supply unit (page 57)*.
6. Fasten the shroud and swing-out frame.
7. Close the door.

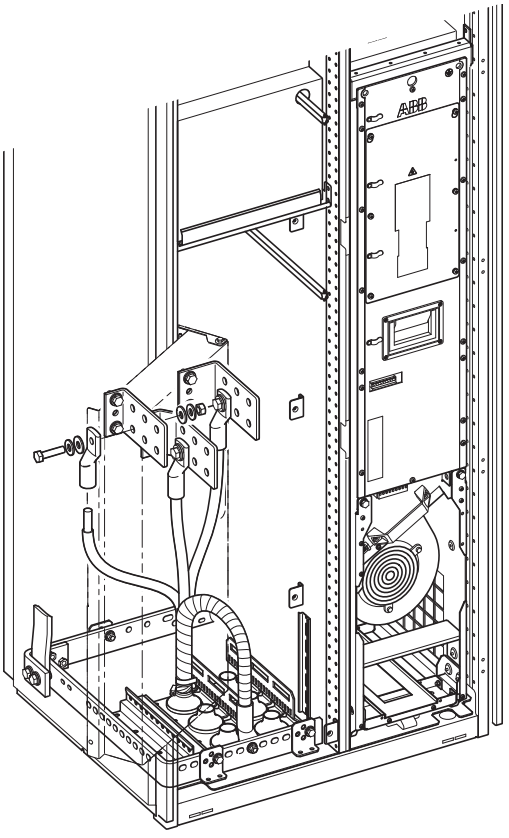


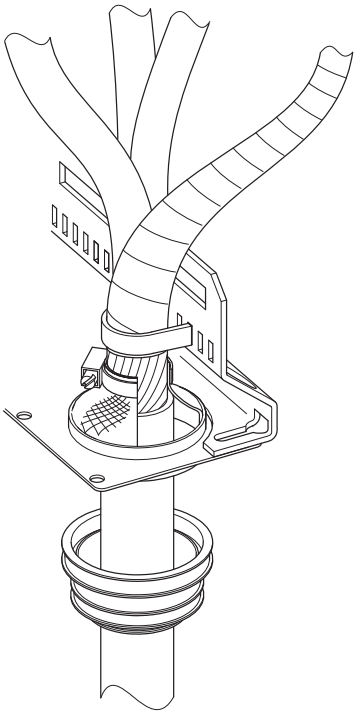
3



4







Recommendation: 360 degrees grounding of the cable shield at the lead-through suppresses interference.

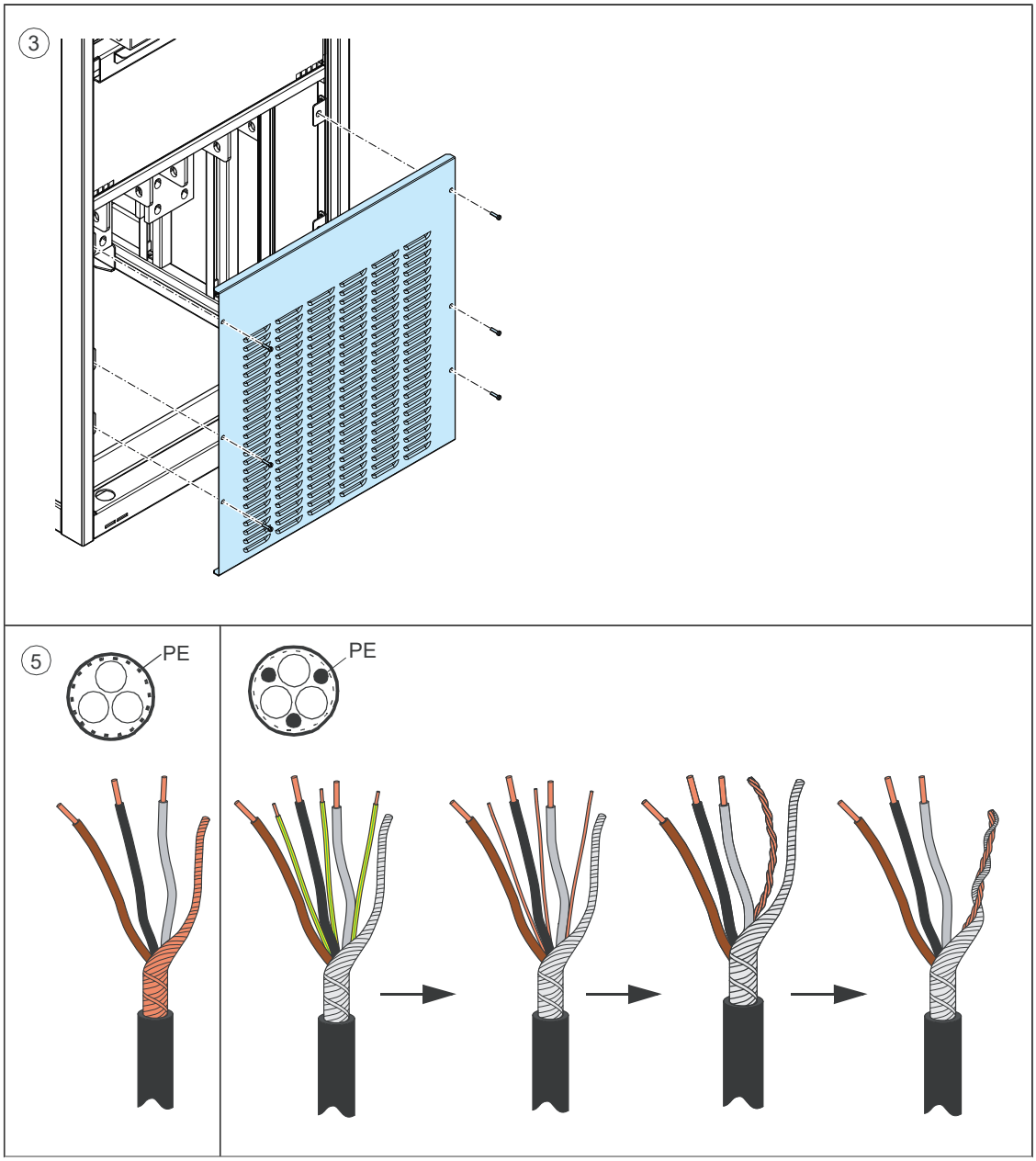
Connection procedure (frame R8i and multiples)

The cable entry details, and cable connection details are shown in section Terminal and lead-through data for the input power cable in the technical data.

WARNING!
Obey the safety instructions of the drive. If you ignore them, injury or death, or damage to the equipment can occur. If you are not a qualified electrical professional, do not do installation or maintenance work.

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 (page 46)*
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 in the technical data.
11. Connect the phase conductors of the input cable to the L1, L2 and L3 terminals. Tighten the screws to the torque given in the technical data.
12. Reinstall the shrouding removed earlier.
13. Close the door.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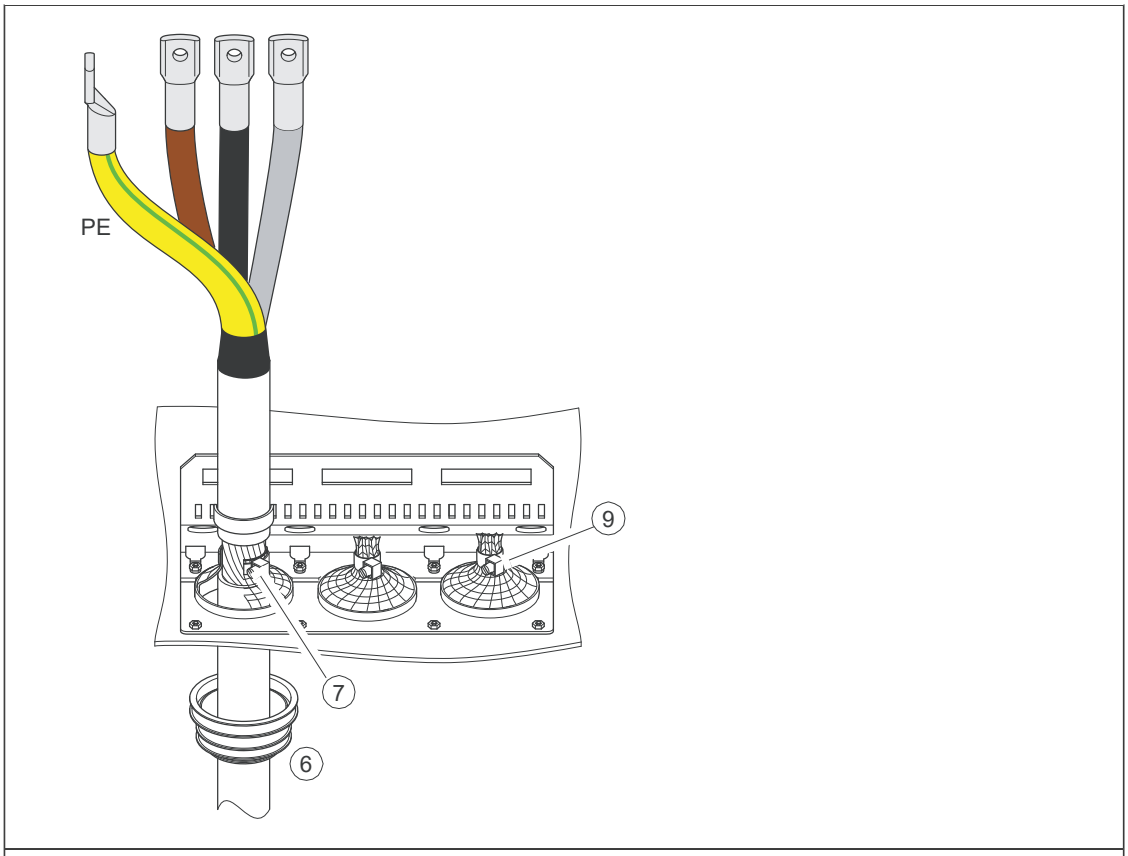
PE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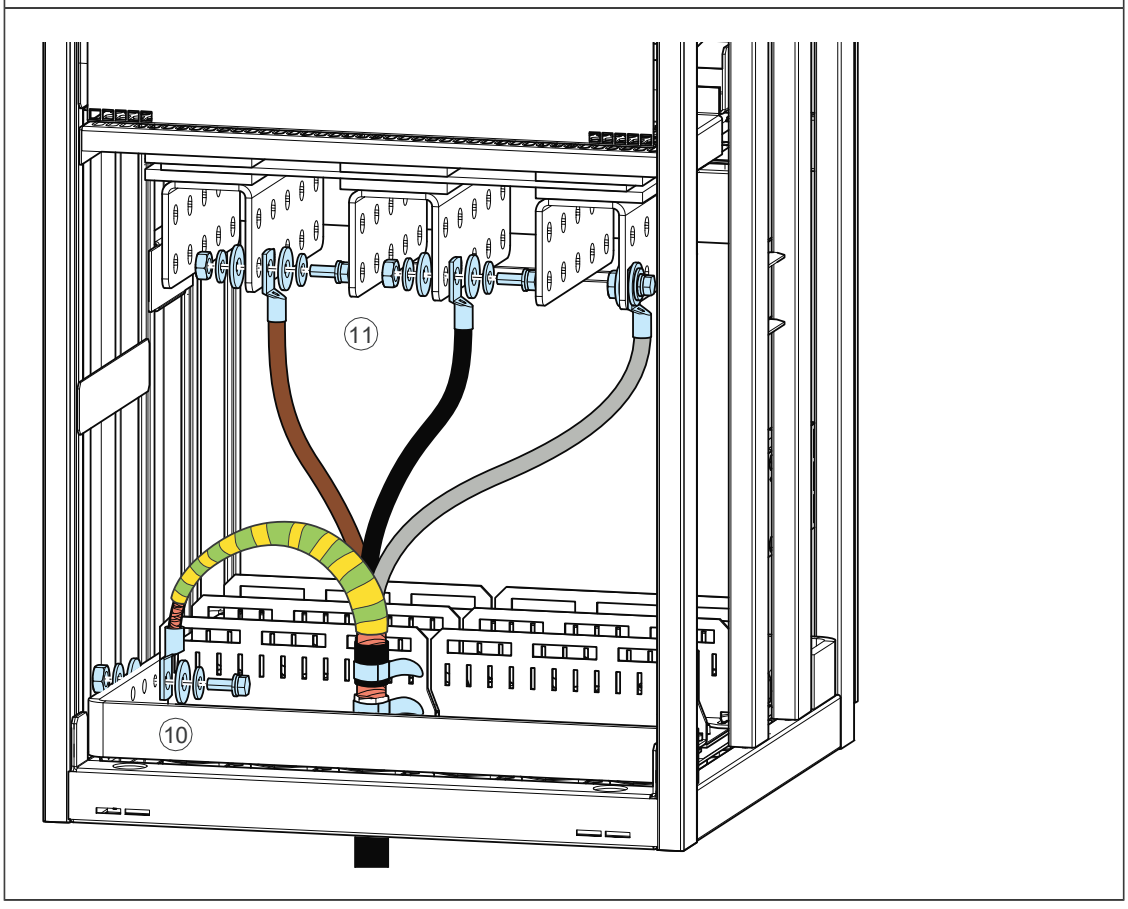

11
10

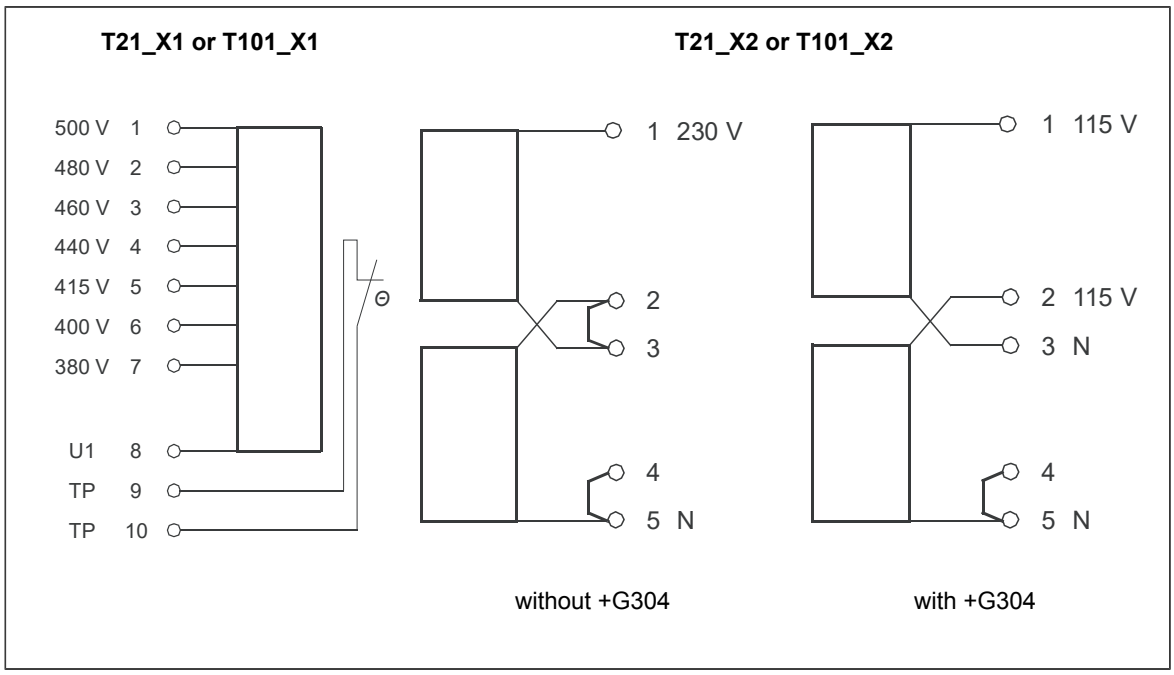
Checking the settings of transformers T21, T101 and T111

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.

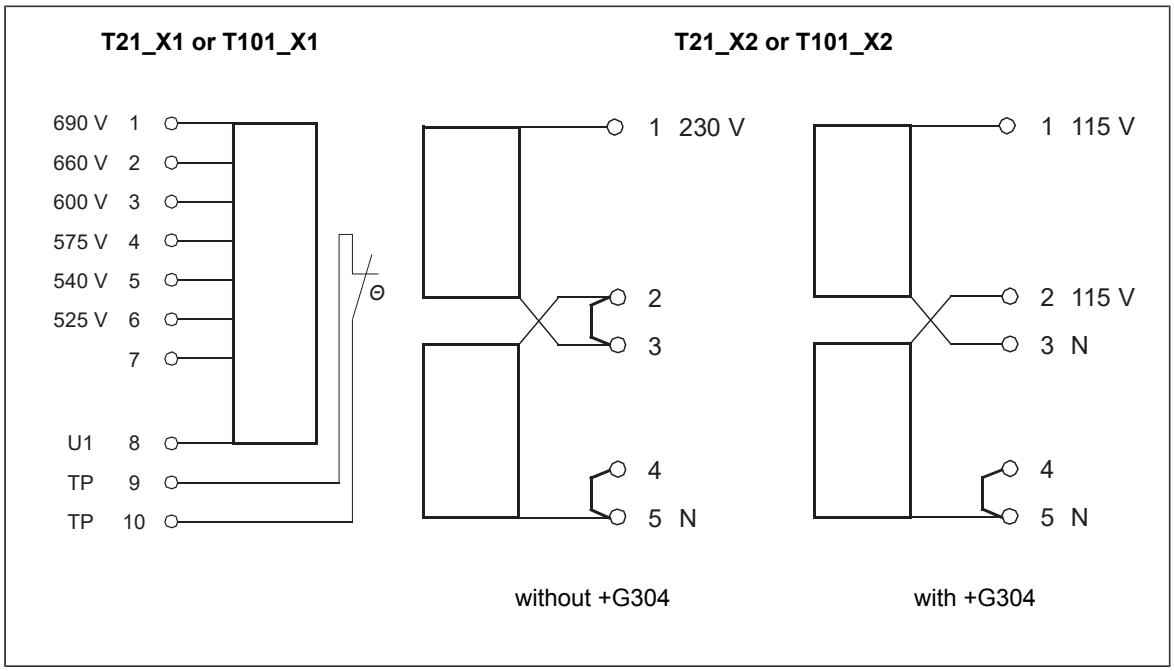
Transformer [T21] is a standard equipment. Transformers [T101] and [T111] are present if required by the options specified by the customer.

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 the layout drawing of an auxiliary control cubicle and in the circuit diagrams delivered with the drive.

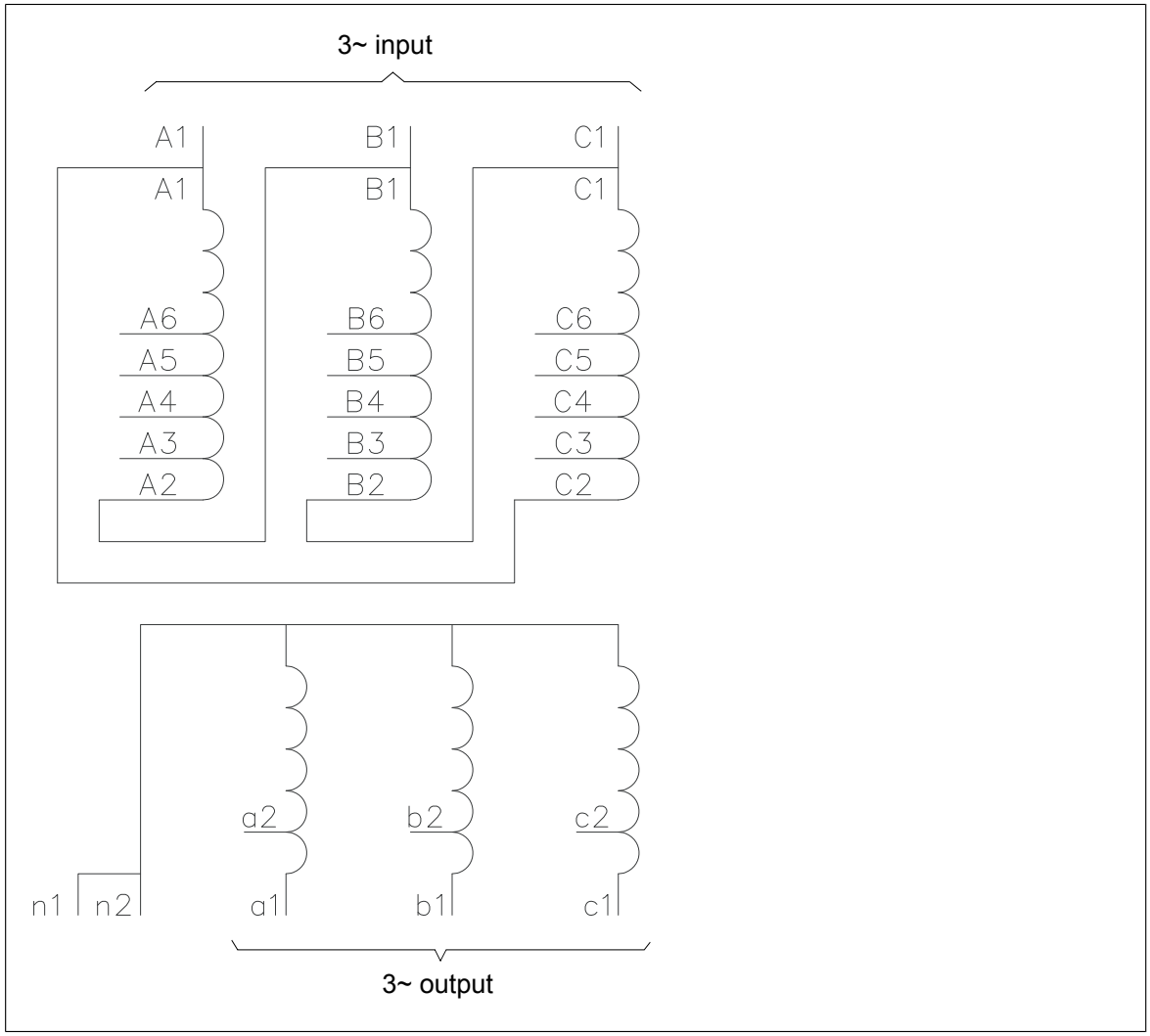
T21 and T101 tap settings (400…500 V units)



T21 and T101 tap settings (690 V units)



T111 tap settings



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

Checking the settings of the cooling fan transformer

The cooling fan transformer connections are made at the factory.

Connecting the control cables for the supply unit

Default I/O connection diagram

See chapter *The control unit*.

Connection procedure (frame R8i, limited scope version)

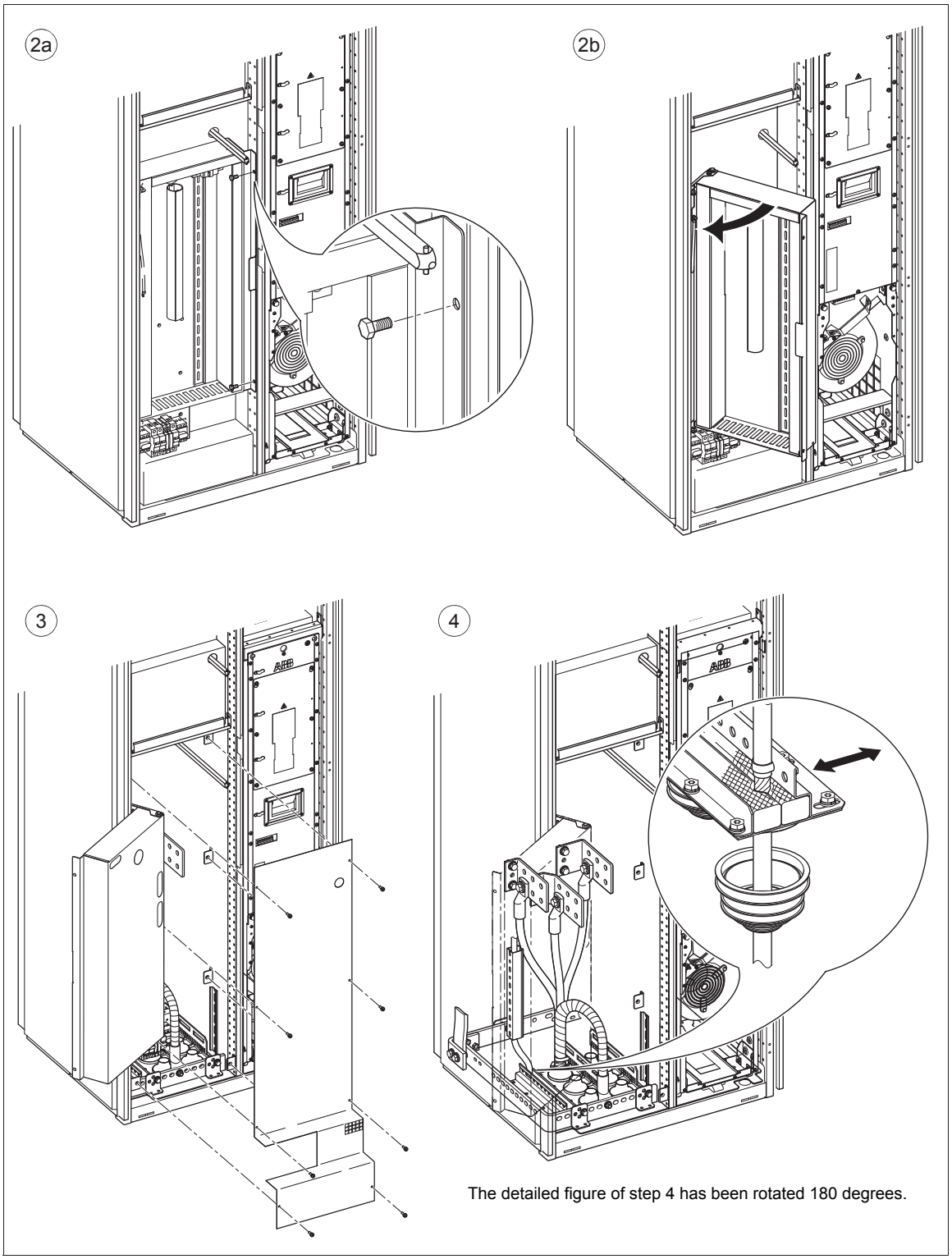
The following procedure instructs how to connect the control cables of a supply unit. See the circuit diagrams delivered with the supply unit.

Note: The I/O of the supply unit is mostly reserved for the internal use.

The power cables are routed to the cabinet through the bottom and there is no auxiliary control cubicle as standard. The extra cubicle is only added if there is a lot of options.

1. Open the cubicle door.
2. Undo the locking screws at the edge of the swing-out frame (2a) and open the frame (2b).
3. Undo the screws of the shroud in the lower part of the cubicle. Lift and remove the shroud.
4. Run the cables into the inside of the cabinet through grounding cushions.
   - Seal the cable with a rubber grommet (cut suitable hole to it).
   - Run the cables between the cushions. Strip the cable at this location to enable proper connection of the bare shield and the cushions. Tighten the cushions firmly onto the cable shields.
   - Fasten the cable to the support above the cushions with a cable tie.

5. Run the cables to the appropriate terminals. Wherever possible:
   - Use the existing cable trunking in the cabinet.
   - Use sleeving wherever the cables are laid against sharp edges.
   - Tie the cables to provide strain relief.
   - To allow the swing-out frame to open properly, leave some slack in the cable (if the cable needs to be run to a device in the frame).
6. Cut the cables to suitable length. Strip the cables and conductors.
7. Twist the cable shields into bundles and connect them to the ground terminal nearest to the terminal block. Keep the unshielded portion of the cables as short as possible.
8. Connect the conductors to appropriate terminals (see the circuit diagrams delivered with the unit).
9. Fasten the shroud and the swing-out frame.
10. Close the door.



The detailed figure of step 4 has been rotated 180 degrees.

Connection procedure (frame R8i and multiples)

See the chapter on control units for the default I/O connections. Note that the default I/O connections can be affected by some options. See the circuit diagrams delivered with the drive for the actual wiring.

Control cable connection procedure

WARNING!
Obey the safety instructions given in *ACS880 multidrive cabinets and modules safety instructions* (3AUA0000102301 [English]). If you ignore the safety instructions, injury or death, or damage to the equipment can occur.

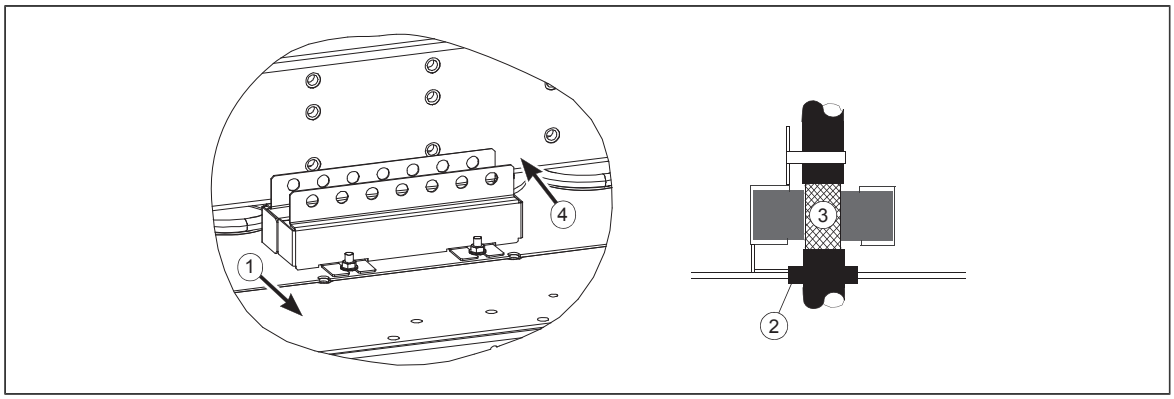
If you are not a qualified electrical professional, do not do installation or maintenance work.

1. Stop the drive (if running) and do the steps in section *Electrical safety precautions (page 46)* before you start the work.
2. Run the control cables into the cabinet as described in section *Grounding the outer shields of the control cables at the cabinet entry* below.
3. Route the control cables as described in section *Routing the control cables inside the cabinet*.
4. Connect the control cables as described in section *Connecting control cabling*.

Grounding the outer shields of the control cables at the cabinet entry

Ground the outer shields of all control cables 360 degrees at the EMI conductive cushions as follows (example constructions are shown below, the actual hardware may vary):

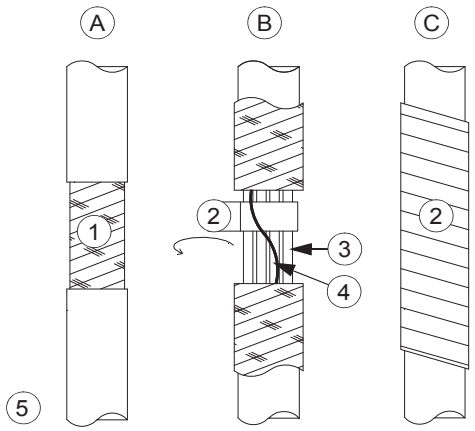
1. Loosen the tightening screws of the EMI conductive cushions and pull the cushions apart.
2. Cut adequate holes to the rubber grommets in the entry plate and put the cables through the grommets and the cushions.
3. Strip off the cable plastic sheath above the entry plate just enough to ensure proper 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.



Note 1: Keep the shields continuous as close to the connection terminals as possible. Secure the cables mechanically at the entry strain relief.

Note 2: 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.



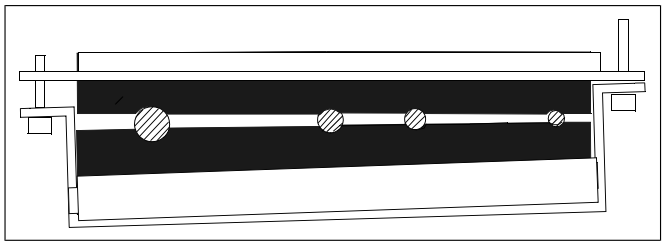
A	Stripped cable
B	Conductive surface of the shield exposed
C	Stripped part covered with copper foil
1	Cable shield
2	Copper foil
3	Shielded twisted pair
4	Grounding wire

Note for top entry of cables: When each cable has its own rubber grommet, sufficient IP and EMC protection can be achieved. However, if there is more than one cable per grommet, 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.
4. 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
≤ 13	4
≤ 17	3
< 25	2
≥ 25	1

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



6. If more than one cable go through a grommet, seal the grommet by applying Loctite 5221 (or equivalent adhesive sealant) inside the grommet.

Routing the control cables inside the cabinet

Use the existing trunking in the cabinet wherever possible. Use sleeving if cables are laid against sharp edges. When running cables to or from a swing-out frame, leave enough slack at the hinge to allow the frame to open fully.

Connecting control cabling

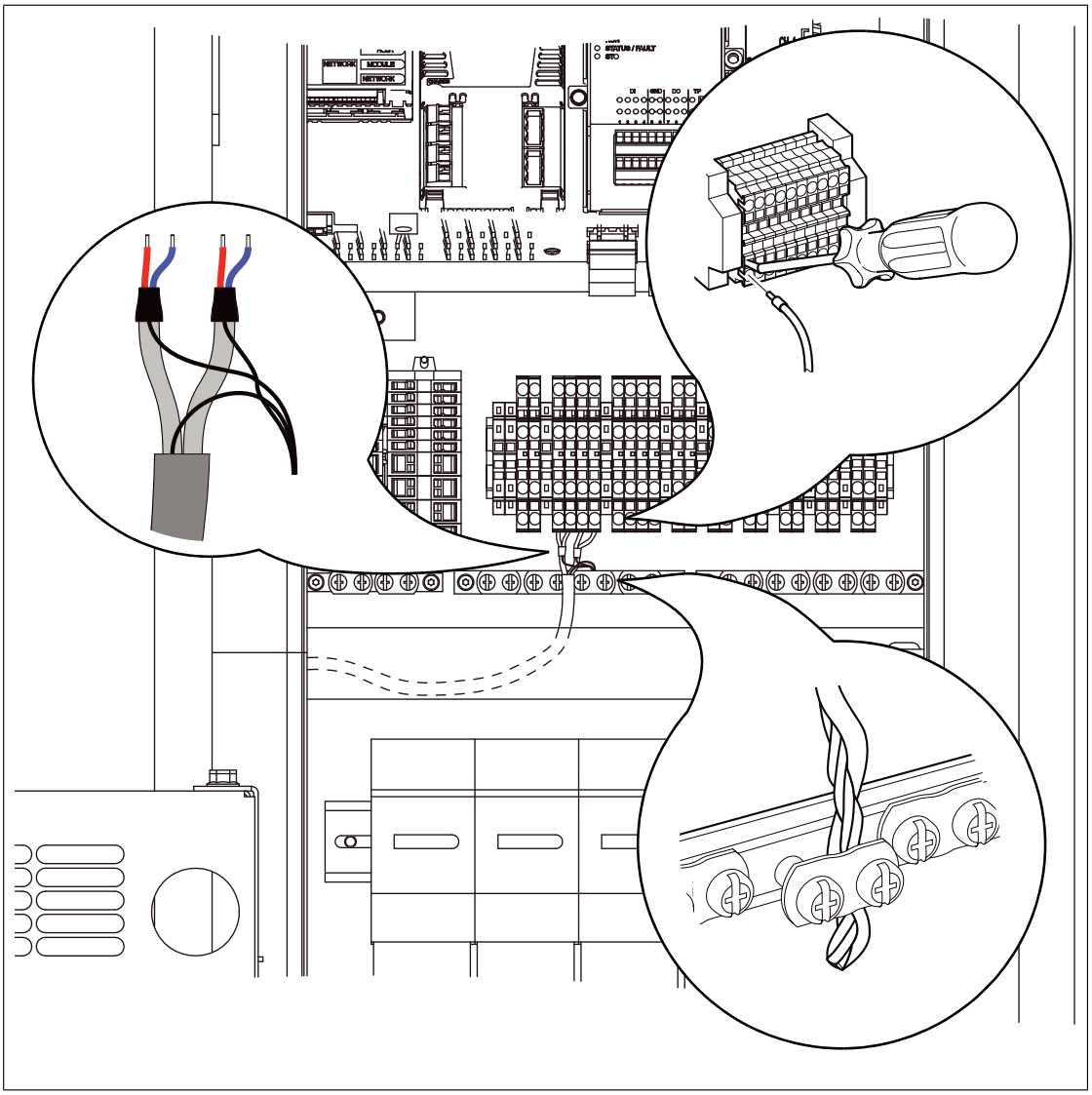
Connect the conductors to the appropriate terminals. Refer to the wiring diagrams delivered with the drive.

Connect the inner twisted pair shields and all separate grounding wires to the grounding clamps closest to the terminals.

The drawing below represents the grounding of the control cabling when connecting to a terminal block inside the cabinet. The grounding is done in the same way when connecting directly to a component such as the control unit.

Notes:

- Do not ground the outer shield of the cable here since it is grounded at the cable entry.
- Keep any signal wire pairs twisted as close to the terminals as possible. Twisting the wire with its return wire reduces disturbances caused by inductive coupling.



At the other end of the cable, leave the shields unconnected or ground them indirectly via a high-frequency capacitor with a few nanofarads, eg. 3.3 nF / 630 V. The shield can also be grounded directly at both ends if they are in the same ground line with no significant voltage drop between the end points.

Wiring the functional safety options +Q951, +Q952, +Q963, +Q964 or +Q979

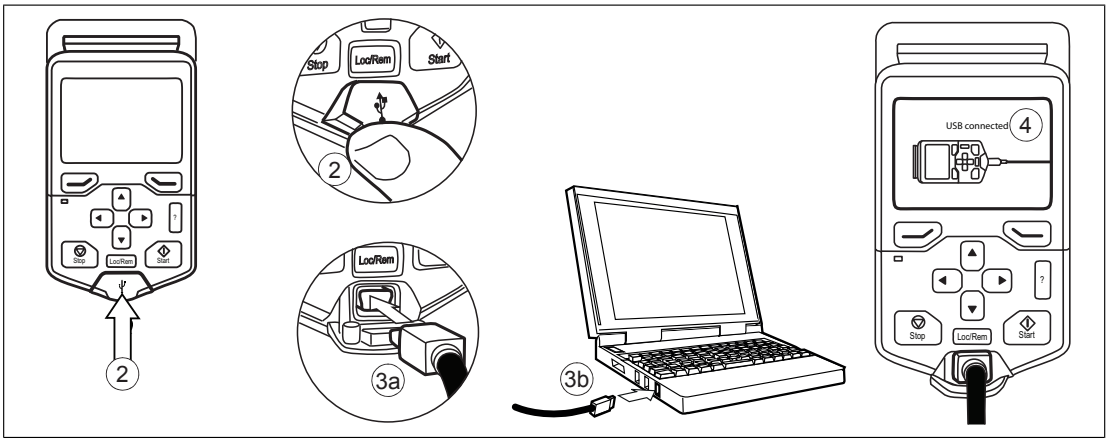
The wiring instructions for the functional safety options +Q951, +Q952, +Q963, +Q964 and +Q979 are given in separate option manuals. For the manuals, see section *Related documents*.

Connecting a PC

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

A PC (with eg, the Drive composer PC tool) can be connected as follows:

1. Connect an ACx-AP-x control panel to the unit either
   - by inserting the control panel into the panel holder or platform, or
   - by using an Ethernet (eg, Cat 5e) networking cable.
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 will display an indication whenever the connection is active.
5. See the documentation of the PC tool for setup instructions.



4

Installation checklist

Installation checklist

Contents of this chapter

This chapter contains a checklist of the mechanical and electrical installation of the drive.

Checklist

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

WARNING!
Obey the safety instructions of the drive. If you ignore them, injury or death, or damage to the equipment can occur. If you are not a qualified electrical professional, do not do installation or maintenance work.

WARNING!
Stop the drive and do the steps in section *Electrical safety precautions (page 46)* before you start the work.

Make sure that …	☑
The ambient operating conditions meet the drive ambient conditions specification, and enclosure rating (IP code or UL enclosure type).	☐
The supply voltage matches the nominal input voltage of the drive. See the type designation label.	☐
The insulation resistance of the input power cable, motor cable and motor is measured according to local regulations and the manuals of the drive.	☐
The drive cabinet is attached to the floor, and if necessary due to vibration etc, also by its top to the wall or roof.	☐
The drive module is fastened properly to the enclosure.	☐

Make sure that …	☑
The cooling air flows freely in and out of the drive.	☐
If the drive is connected to a network other than a symmetrically grounded TN-S system: You have done all the required modifications (for example, you may need to disconnect the EMC filter or ground-to-phase varistor). See the electrical installation instructions in the supply unit manual.	☐
There is an adequately sized protective earth (ground) conductor(s) between the drive and the switchboard, the conductor is connected to correct terminal, and the terminal is tightened to the correct torque. Proper grounding has also been measured according to the regulations.	☐
If the drive is equipped with a DC/DC converter unit: There is an adequately sized protective earth (ground) conductor between the energy storage and the DC/DC converter, the conductor has been connected to appropriate terminal, and the terminal has been tightened to the proper torque. Proper grounding has also been measured according to the regulations.	☐
If the drive is equipped with a DC/DC converter unit: The energy storage cable has been connected to the correct terminals of the DC/DC converter and energy storage, and the terminals have been tightened to the proper torque.	☐
If the drive is equipped with a DC/DC converter unit: The energy storage has been equipped with fuses for protecting energy storage cable in a cable short-circuit situation.	☐
If the drive is equipped with a DC/DC converter unit: The energy storage has been equipped with a disconnecting device.	☐
The input power cable is connected to the correct terminals, the phase order is correct, and the terminals are tightened to the correct torque.	☐
There is an adequately sized protective earth (ground) conductor between the motor and the drive, and the conductor is connected to the correct terminal, and the terminal is tightened to the correct torque. Proper grounding has also been measured according to the regulations.	☐
The motor cable is connected to the correct terminals, the phase order is correct, and the terminals are tightened to the correct torque.	☐
The motor cable is routed away from other cables.	☐
No power factor compensation capacitors are connected to the motor cable.	☐
If an external brake resistor is connected to the drive: There is an adequately sized protective earth (ground) conductor between the brake resistor and the drive, and the conductor is connected to the correct terminal, and the terminals are tightened to the correct torque. Proper grounding has also been measured according to the regulations.	☐
If an external brake resistor is connected to the drive: The brake resistor is connected to the correct terminals, and the terminals are tightened to the correct torque.	☐
If an external brake resistor is connected to the drive: The brake resistor cable is routed away from other cables.	☐
The control cables are connected to the correct terminals, and the terminals are tightened to the correct torque.	☐
The voltage setting of the auxiliary voltage transformers (if any) is correct. See the electrical installation instructions.	☐
If a drive bypass connection will be used: The direct-on-line contactor of the motor and the drive output contactor are either mechanically and/or electrically interlocked, that is, they cannot be closed at the same time. A thermal overload device must be used for protection when bypassing the drive. Refer to local codes and regulations.	☐
There are no tools, foreign objects or dust from drilling inside the drive.	☐
The area in front of the drive is clean: the drive cooling fan cannot draw any dust or dirt inside.	☐
Cover(s) of the motor connection box are in place. Cabinet shrouds are in place and doors are closed.	☐
The motor and the driven equipment are ready for power-up.	☐

5

Start-up

Contents of this chapter

This chapter describes the start-up procedure of the ACS880-207 IGBT supply 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: Supply unit with the grounding switch ([Q9], option +F259). The same device designations are also used in the circuit diagrams, typically.

These instructions cannot 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 safety instructions 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 +Q951, +Q952, +Q963, +Q964 and +Q979), the start-up instructions are given in separate option manuals, not in this chapter. Reserve the necessary option manuals at hand before performing the supply unit start-up and follow also their instructions. See section *Related documents*..

Note: Before you activate the automatic fault reset or automatic restart functions of the drive control program, make sure that no dangerous situations can occur. These functions reset the drive automatically and continue operation after a fault or supply break. If these functions are activated, the installation must be clearly marked as defined in IEC/EN 61800-5-1, subclause 6.5.3, for example, “THIS MACHINE STARTS AUTOMATICALLY”.

Start-up procedure

Tasks	☑
Safety	
WARNING! Follow the safety instructions during the start-up procedure. See *Safety instructions* for *ACS880 multidrive cabinets and modules* (3AUA0000102301 [English]). Only qualified electricians are allowed to start-up the drive.	☐
Checks/Settings with no voltage connected	
Make sure that the disconnector of the supply transformer is locked to the off (0) position, that means no voltage is, or cannot be connected to drive inadvertently.	☐
If a generator is used as a supply: The recommendation for ACS880 IGBT supply unit with generator supply is: •always use BAMU auxiliary measurement unit •short-circuit ratio of the grid > 3 •short-circuit ratio of the generator 1/Xk > 2 •generator nominal power P_{gen} > 0.3 × P_{ISU}	☐
Open the main disconnecting device of the drive: Supply unit with main switch-disconnector ([Q1], option +F253): Open the switch-disconnector [Q1]. Supply unit with main breaker ([Q1], option +F255): Rack out the main breaker [Q1].	☐
Supply unit with a main circuit 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. For the limit rules, see below. **General rules** 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. **Long term current limit** Rule of thumb: Set to the rated AC current of the module. **Peak current limit** Rule of thumb: Set to a value 3…4 times the rated AC current of the module.	☐
Supply unit with the grounding switch ([Q9], option +F259): Close the grounding switch [Q9]. **WARNING!** Do not use excessive force. There is electromagnetic interlocking in use. See section *Electromagnetic interlocking (page 70)*.	☐
Open the charging circuit switch fuse [Q3].	☐
Check the mechanical and electrical installation. See the installation checklist.	☐
Check the settings of breakers/switches in the auxiliary circuits. See the delivery-specific circuit diagrams.	☐
Disconnect the unfinished or unchecked 230 V AC cables that lead from the terminal blocks to the outside of the equipment.	☐
Check that both circuits of Safe torque off on the BCU control unit [A41] are closed for the supply unit to start. (IN1 and IN2 must be connected to OUT.) See chapter *The control unit*.	☐

Tasks	☑
Powering up the auxiliary circuit of the supply unit	
Make sure that it is safe to connect voltage. Make sure that: •nobody is working on the unit or circuits that are wired from outside into the cabinets •covers of the motor terminal boxes are on.	☐
Supply unit with the voltage meters on door ([F5], option +G334): Close the circuit breaker for the meters.	☐
Close the circuit breakers supplying the auxiliary circuits [F22,..., F26].	☐
Close the cabinet doors.	☐
Close the disconnector and breaker of the supply transformer. The drive input power terminals are energized.	☐
Switch the auxiliary voltage switch [Q21] on. The drive auxiliary circuit is energized.	☐
Supply unit with the grounding switch ([Q9], option +F259): Open the grounding switch. **WARNING!** Do not use excessive force. If the unit is equipped with a grounding switch [Q9], electromagnetic interlocking is also used. You cannot switch the main switch-disconnector [Q1] on before its lock release relay [K1] is energized, that is: •the main input terminals [L1, L2 and L3] are powered, and •auxiliary voltage switch [Q21] is switched on, and •circuit breakers [F22 and F23] in between the relay [K1] and auxiliary voltage switch [Q21] are switched on.	☐
Setting up the supply unit parameters	
Check the correct voltage range, parameter *195.01 Supply voltage*. If your supply unit consists of more than one module, parameters *195.30 Parallel type filter* and *195.31 Parallel connection rating id* need to be set. First, select the correct voltage range with parameter *195.30 Parallel type filter*. Then, select the correct supply unit type with parameter *195.31 Parallel connection rating id*. See also *ACS880 IGBT supply control program firmware manual* (3AUA0000131562 [English]). If you need more information on the use of the control panel, see *ACS-AP-x assistant control panels user's manual* (3AUA0000085685 [English]).	☐
Switch the control panel to the remote mode (Loc/Rem key) to enable control of the supply unit with the operating switch [S21].	☐
Drives with a fieldbus adapter (optional): Set the fieldbus parameters. Activate the fieldbus adapter module in the control program. See the user's manual of the fieldbus adapter module, and *ACS880 IGBT supply control program firmware manual* (3AUA0000131562 [English]).	☐
Powering up the main circuit of the drive	
Close the main disconnecting device: Supply unit with main switch-disconnector ([Q1], option +F253): Close the main switch-disconnector [Q1]. Supply unit with main breaker ([Q1], option +F255): Rack in the main breaker [Q1]. **Note:** The grounding switch ([Q9], option +F259) must be switched off. **WARNING!** Do not use excessive force. There is electromagnetic interlocking in use. See section *Electromagnetic interlocking (page 70)*.	☐
Switch the charging circuit switch fuse [Q3] on.	☐

Tasks	☑
Turn the operating switch [S21] to on (1) position to activate the Run enable signal of the supply unit. **WARNING!** Never use the green (I) push button of the main breaker ([Q1], option +F255) for closing. If the button is not disabled, it closes the main breaker immediately without the drive DC link charging sequence. This causes overcurrent which blows the main circuit fuses. Now, the supply unit starts and the control program controls it through the drive power-up sequence: 1. charging contactor [Q4] switch on, 2. charging (until the DC link voltage rises high enough), 3. main contactor [Q2] / breaker [Q1] switch on, 4. start of the supply module rectifying, 5. charging contactor [Q4] switch off.	☐
On-load checks	
Check that the supply module cooling fan and LCL filter module fans rotate freely in the right direction. A paper sheet set on the intake (door) gratings stays. The fans run noiselessly.	☐
Validate the operation of safety functions (for example, emergency stop). **WARNING!** The safety functions are not safe before they are validated according to the instructions. Safety functions are optional. See the function-specific manual for the validation tasks.	☐

Electromagnetic interlocking

Note: If the unit is equipped with a grounding switch ([Q9], option +F259), electromagnetic interlocking is also used. Therefore:

- You cannot close the grounding switch [Q9] if the main disconnecting device is closed*, or the drive auxiliary power is switched off.
- You cannot close the main disconnecting device* if the grounding switch [Q9] is closed, or the drive auxiliary power is switched off.

See the circuit diagrams delivered with the drive.

* Depending on the main disconnecting device type, this means either of these: The main switch-disconnector ([Q1], option +F253) is closed, or the main breaker ([Q1], option +F255) is racked out.

Switching off the supply unit and the drive

1. Stop the motors connected to the drive (that is: give stop command to all inverter units).
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] / breaker [Q1] off.

Disconnecting the drive from AC power line (excluding the input power terminals), and temporary grounding

1. Switch off the drive. See section *Switching off the supply unit and the drive (page 70)* above.
2. Depending on the main disconnecting device type: Open the main switch-disconnector ([Q1], option +F253), or rack out the main breaker ([Q1], option +F255).
3. Switch the charging circuit switch fuse [Q3] off.

4. Supply unit with the grounding switch ([Q9], option +F259): Switch the grounding switch on.

WARNING!
Do not use excessive force. There is electromagnetic interlocking in use. See section *Electromagnetic interlocking (page 70)*.

5. Switch off the auxiliary voltage by turning the auxiliary voltage switch [Q21] to the off position.
6. Switch off the external auxiliary supply voltage (supply unit option +G307), and any other dangerous voltage connected to the drive from outside.
7. Secure against reconnection: Lock the disconnectors and attach warning signs.
8. Wait for 5 minutes to let the drive DC link capacitors to discharge.
9. Open the door and ensure by measuring that the main circuit after the main switch-disconnector/main circuit breaker [Q1] is not under voltage.

Supply unit without the grounding switch (no option +F259):

If temporary grounding is needed, connect a temporary grounding system to the main AC busbars after the main switch-disconnector/main circuit breaker [Q1] and to the grounding (PE) busbar of the drive. See the local regulations and EN 50110-1:2004.

WARNING! The input power busbars are under voltage. Keep the cabinet door closed. Do not remove the shroud in front of input power busbars.

Disconnecting and temporary grounding the drive (including the input power terminals)

1. Perform the tasks listed in section *Disconnecting the drive from AC power line (excluding the input power terminals), and temporary grounding (page 70)*.
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 supply unit and ensure 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 system to the input power terminals and to the grounding (PE) busbar of the drive. See the local regulations and EN 50110-1:2004.

Connecting the drive / supply unit to the power line

This section describes how to re-connect the supply unit to the power line after a service, etc. break. If you do the very first power line connection of the supply unit, obey the instructions in section *Start-up procedure (page 68)* instead.

WARNING!
The input power busbars are under voltage even when the drive main disconnecting device [Q1] is open. Keep the cabinet door closed. Do not remove the shroud in front of the busbars.

1. Close the cabinet doors, if not yet closed.
2. Make sure that it is safe to connect voltage. Ensure that:
   - nobody is working on the unit or circuits that are wired from outside into the cabinets,
   - covers of the motor terminal boxes are on.
3. Close the disconnector of the supply transformer (if open) to connect the voltage to the drive input power terminals.
4. Switch on the external auxiliary supply voltage (supply unit option +G307), and any other voltages connected to the drive from outside.
5. Switch on the auxiliary voltage by turning the auxiliary voltage switch [Q21] to the on position.
6. Supply unit with the grounding switch ([Q9], option +F259): Switch the grounding switch off.
7. Switch the charging circuit switch fuse [Q3] on.
8. Depending on the main disconnecting device type: Close the main switch-disconnector ([Q1], option +F253), or rack in the main breaker ([Q1], option +F255).

Powering-up the supply unit / drive

This section describes how to re-power-up the supply unit after a service, etc. break. If you do the very first power-up of the supply unit, obey the instructions in section *Start-up procedure (page 68)* instead.

1. Perform the tasks listed in section *Connecting the drive / supply unit to the power line (page 71)*.
2. Turn the operating switch [S21] to the on (1) position to activate the Run enable signal of the supply unit. The supply unit starts and the control program steps through the power-up sequence: 1. charging contactor [Q4] switch on, 2. charging (until the DC link voltage rises high enough), 3. main contactor [Q2] / breaker [Q1] switch on, 4. start of the supply module rectifying, 5. charging contactor [Q4] switch off.

WARNING!
Never use the green (I) push button of the main breaker ([Q1], option +F255) for closing. If the button is not disabled, it closes the main breaker immediately without the drive DC link charging sequence. This causes overcurrent which blows the main circuit fuses.

3. Start the motors connected to the drive.

6

Maintenance

Contents of this chapter

This chapter instructs how to maintain the IGBT supply unit and how to interpret its fault indications. The information is valid for cabinet-installed ACS880-207 IGBT supply units.

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]). Ignoring the instructions can cause physical injury or death, or damage to the equipment.

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). For more information, consult your local ABB Service representative (www.abb.com/searchchannels).

Maintenance task/object		Years from start-up												
		1	2	3	4	5	6	7	8	9	10	11	12	…
Cooling fans														
Cooling fan of supply module (frame R8i, speed-controlled)										R				
Cooling fan of supply module (frame R8i, 50 Hz, direct-on-line (option +C188))										R				
Cooling fan of supply module (frame R8i, 60 Hz, direct-on-line (option +C188))										R				
Cooling fan of LCL filter (50 Hz, direct-on-line)										R				
Cooling fan of LCL filter (60 Hz, direct-on-line)							R[1)]			R			R[1)]	
Internal circuit board compartment fan										R				
Cabinet cooling fans (internal, door, IP54) 50 Hz										R				
Cabinet cooling fans (internal, IP54) 60 Hz							R						R	
Cabinet cooling fan (door) 60 Hz										R				
Batteries														
Control panel battery										R				
Control unit battery							R						R	
Connections and environment														
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
Spare parts														
Spare parts		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
Inspections by user														
Cleaning IP22 and IP42 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, corrosion, temperature)		I	I	I	I	I	I	I	I	I	I	I	I	I
Cleaning the heatsink of the supply module		I	I	I	I	I	I	I	I	I	I	I	I	I
Other														
ABB-SACE main circuit breaker maintenance		I	I	I	I	I	I	I	I	I	I	I	I	I

Maintenance task/object		Years from start-up												
		1	2	3	4	5	6	7	8	9	10	11	12	…
Functional safety														
Safety function test	I See the maintenance information of the safety function.													
Safety component expiry (Mission time, T_M)	20 years													
														4FPS10000292961

1) 6 years interval if fan supply voltage is 400 V instead of 320 V.

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**

Note:

- Maintenance and component replacement intervals are based on the assumption that the equipment is operated within the specified ratings and ambient conditions. ABB recommends annual drive inspections to ensure the highest reliability and optimum performance.
- Long term operation near the specified maximum ratings or ambient conditions may require shorter maintenance intervals for certain components. Consult your local ABB Service representative for additional maintenance recommendations.

Maintenance timers and counters

The control program has maintenance timers and 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.

Cabinet

Cleaning the interior of the cabinet

WARNING!
Obey the safety instructions given in *ACS880 multidrive cabinets and modules safety instructions* (3AUA0000102301 [English]). If you ignore the safety instructions, injury or death, or damage to the equipment can occur.

If you are not a qualified electrical professional, do not do installation or maintenance work.

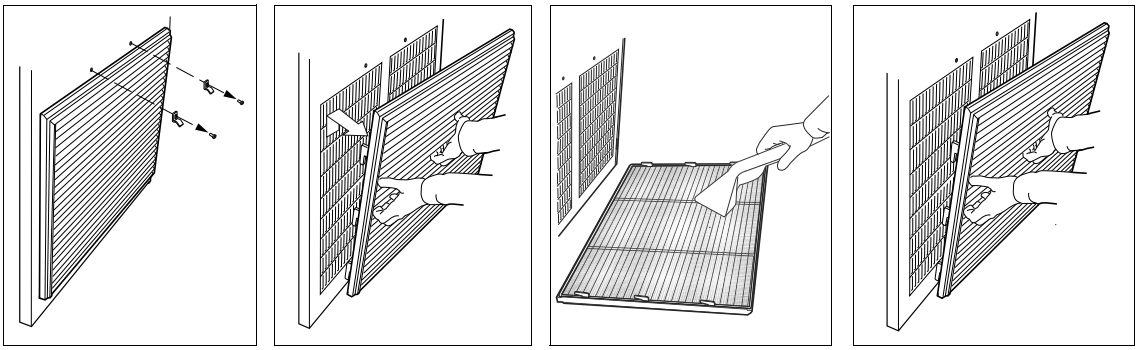
WARNING!
Use a vacuum cleaner with antistatic hose and nozzle, and wear a grounding wristband. Using a normal vacuum cleaner creates static discharges which can damage circuit boards.

1. Stop the drive and do the steps in section *Electrical safety precautions (page 46)* before you start the work.
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 modules (top).
5. Clean the air inlet gratings (if any) on the door.
6. Close the door.

Cleaning the door air inlets (IP22 and IP42)

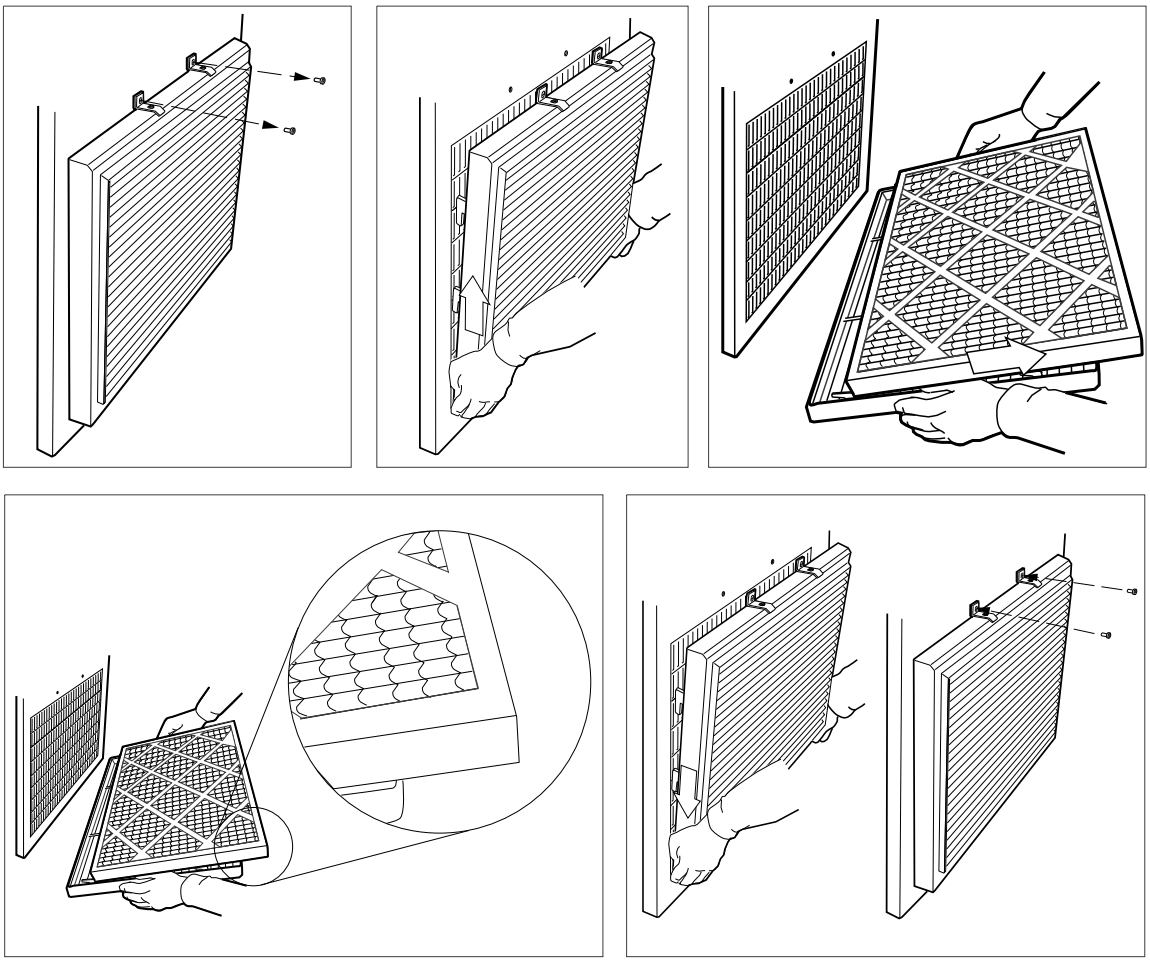
Check the dustiness of the air inlet meshes. If the dust cannot be removed by vacuum cleaning from outside through the grating holes with a small nozzle, proceed as follows:

1. Stop the drive and do the steps in section *Electrical safety precautions (page 46)* before you start the work.
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)

1. Stop the drive and do the steps in section *Electrical safety precautions (page 46)* before you start the work.
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.



Replacing the outlet (roof) filters (IP54)

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 gratings in reverse order.

Cleaning the heatsink

The drive module heatsink fins pick up dust from the cooling air. The drive runs into overtemperature warnings and faults if the heatsink is not clean. When necessary, clean the heatsink as follows.

WARNING!
Use the required personal protective equipment. Wear protective gloves and long sleeves. Some parts have sharp edges.

WARNING!
Use a vacuum cleaner with antistatic hose and nozzle, and wear a grounding wristband. Using a normal vacuum cleaner creates static discharges which can damage circuit boards.

1. Stop the drive and do the steps in section *Electrical safety precautions (page 46)* before you start the work.
2. Remove the drive module from the cabinet.
3. Remove the module cooling fan(s). See the separate instructions.
4. Blow dry, clean and oil-free compressed air from bottom to top and simultaneously use a vacuum cleaner at the air outlet to trap the dust. If there is a risk of dust entering adjoining equipment, do the cleaning in another room.
5. Reinstall the cooling fan.

Power connections and quick connectors

Retightening the power connections

WARNING!
Obey the safety instructions given in *ACS880 multidrive cabinets and modules safety instructions* (3AUA0000102301 [English]). If you ignore the safety instructions, injury or death, or damage to the equipment can occur.

If you are not a qualified electrical professional, do not do installation or maintenance work.

1. Stop the drive and do the steps in section *Electrical safety precautions (page 46)* before you start the work.
2. Examine the tightness of the cable connections. Use the tightening torques given in the technical data.

Fans

The lifespan of the cooling fans of the drive depends on the running time, ambient temperature and dust concentration. See the firmware manual for the actual signal which indicates the running time of the cooling fan. Reset the running time signal after fan replacement.

Replacement fans are available from ABB. Do not use other than ABB specified spare parts.

Replacing R8i module cooling fan (speed-controlled version)

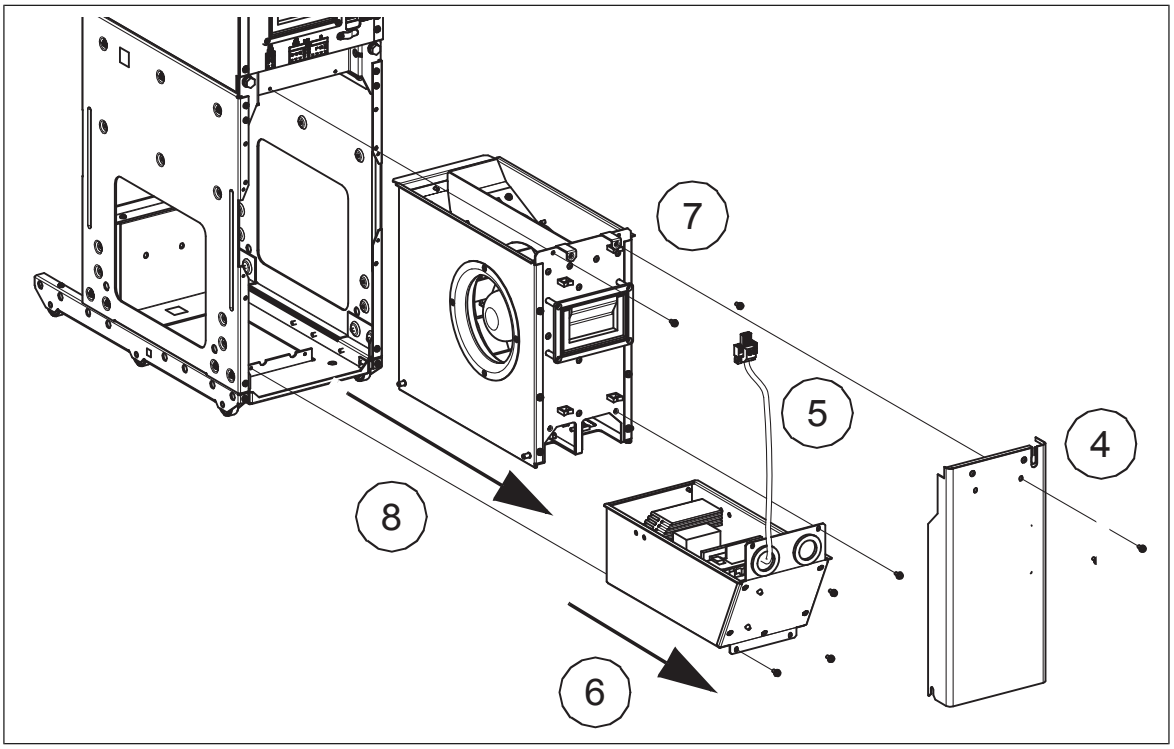
The module is equipped with a fan unit that contains two cooling fans.

WARNING!
Obey the safety instructions given in *ACS880 multidrive cabinets and modules safety instructions* (3AUA0000102301 [English]). If you ignore the safety instructions, injury or death, or damage to the equipment can occur.

If you are not a qualified electrical professional, do not do installation or maintenance work.

WARNING!
Use the required personal protective equipment. Wear protective gloves and long sleeves. Some parts have sharp edges.

1. Stop the drive and do the steps in section *Electrical safety precautions (page 46)* before you start the work.
2. Open the cubicle door.
3. Remove the shroud in front of the fan (if any).
4. Remove the screws holding the front cover plate. Lift the cover plate somewhat to release it.
5. Disconnect the fan wiring.
6. Remove the unit below the fan.
7. Remove the screws of the fan unit.
8. Pull out the fan unit.
9. Install a new fan in reverse order.



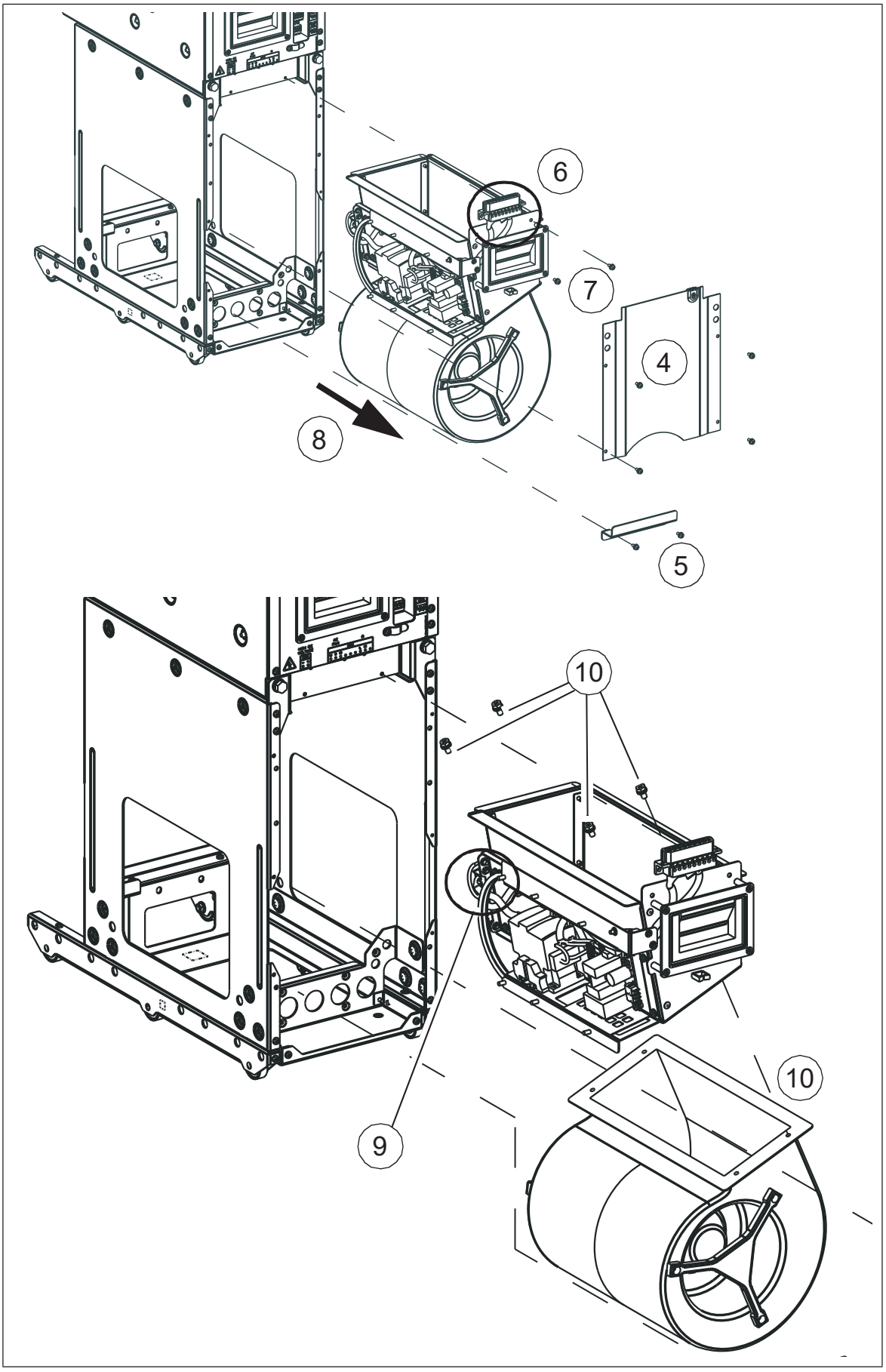
Replacing R8i module cooling fan (direct-on-line version)

WARNING!
Obey the safety instructions given in *ACS880 multidrive cabinets and modules safety instructions* (3AUA0000102301 [English]). If you ignore the safety instructions, injury or death, or damage to the equipment can occur.

If you are not a qualified electrical professional, do not do installation or maintenance work.

WARNING!
Use the required personal protective equipment. Wear protective gloves and long sleeves. Some parts have sharp edges.

1. Stop the drive and do the steps in section *Electrical safety precautions (page 46)* before you start the work.
2. Open the door.
3. Remove the shroud in front of the fan (if any).
4. Remove the screws holding the front cover plate. Lift the cover plate somewhat to release it.
5. Remove the bracket.
6. Disconnect the wiring of the fan unit.
7. Remove the screws of the fan unit.
8. Pull out the fan unit.
9. Disconnect the fan wire from the fan unit.
10. Remove the screws of the fan.
11. Install a new fan in reverse order.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Replacing the circuit board compartment fan

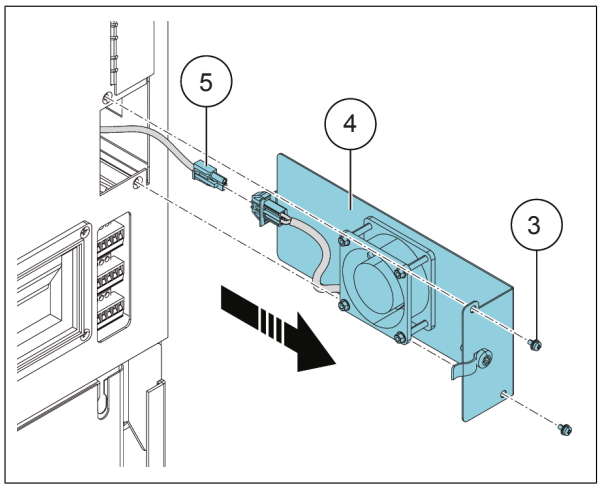
Frame R8i modules are equipped with a fan blowing air through the circuit board compartment.

The fan is accessible from the front of the module.

WARNING!
Obey the safety instructions given in *ACS880 multidrive cabinets and modules safety instructions* (3AUA0000102301 [English]). If you ignore the safety instructions, injury or death, or damage to the equipment can occur.

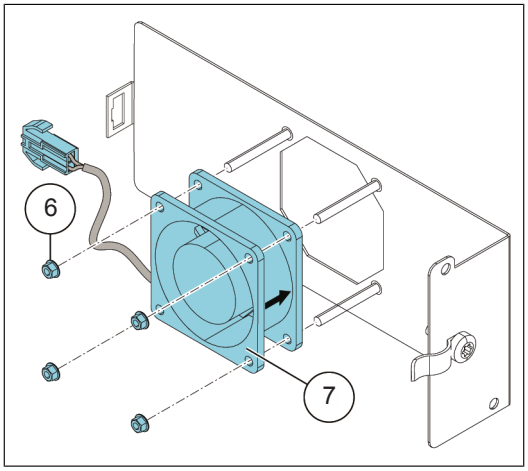
If you are not a qualified electrical professional, do not do installation or maintenance work.

1. Stop the drive and do the steps in section *Electrical safety precautions (page 46)* before you start the work.
2. Open the door of the module cubicle.
3. Remove the two M4×12 (T20) screws which lock the fan holder.
4. Pull the fan holder out of the module.
5. Disconnect the fan cable.

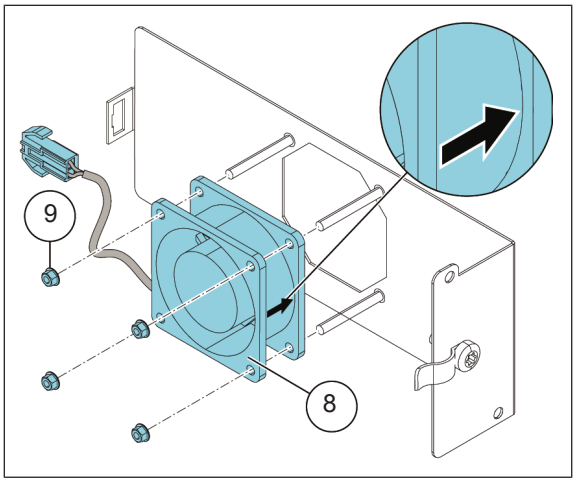


6. Remove the four M3 (5.5 mm) nuts which hold the fan.

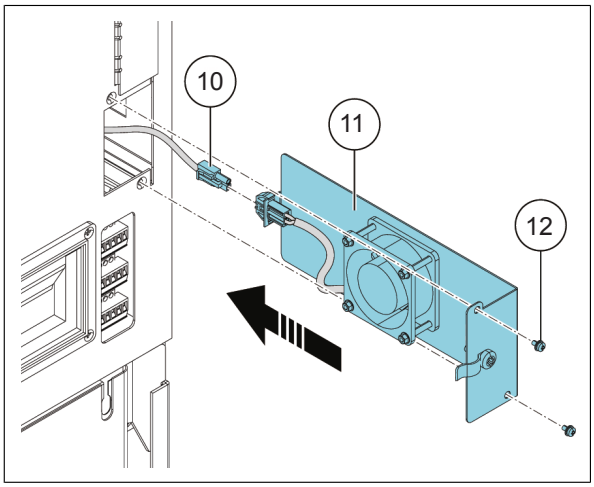
7. Remove the fan from the fan holder.



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 M4×12 (T20) screws.

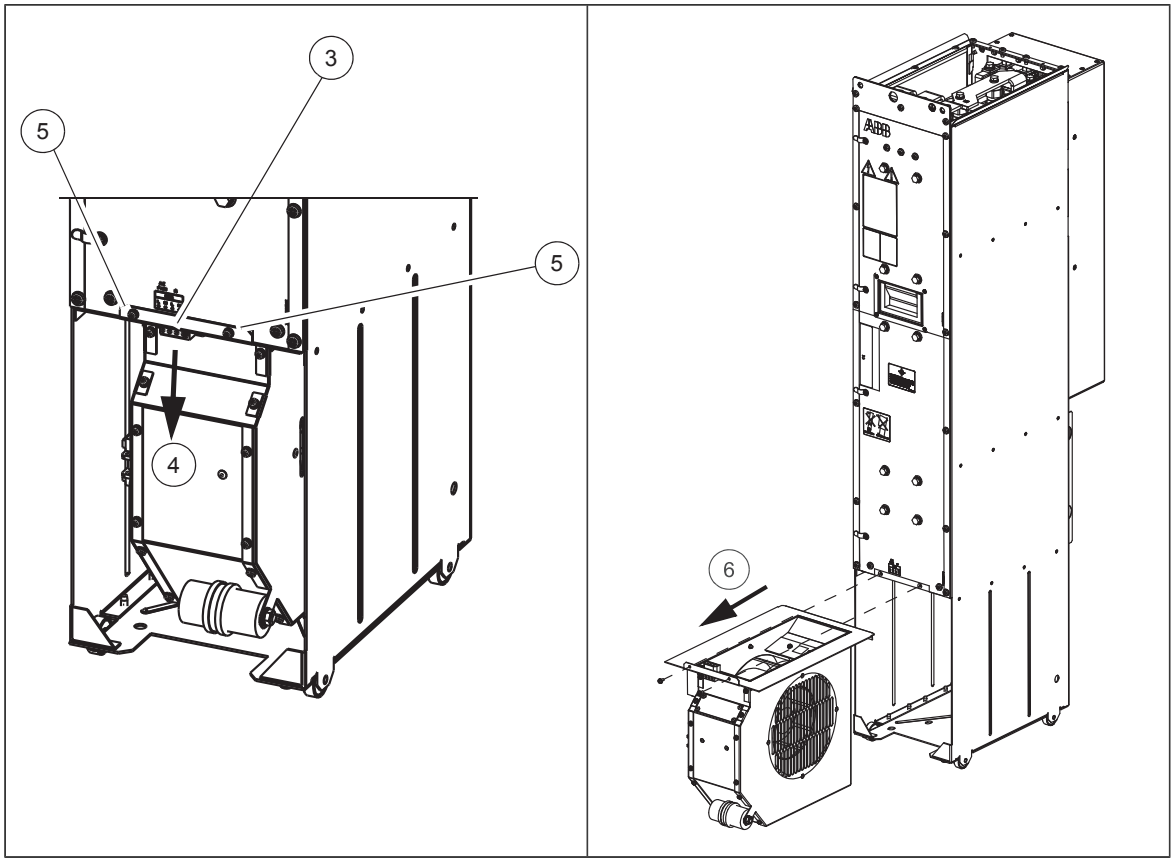


Replacing the fan of the LCL filter (BLCL-1x-x)

WARNING!
Obey the safety instructions given in *ACS880 multidrive cabinets and modules safety instructions* (3AUA0000102301 [English]). If you ignore the safety instructions, injury or death, or damage to the equipment can occur.

If you are not a qualified electrical professional, do not do installation or maintenance work.

1. Stop the drive and do the steps in section *Electrical safety precautions (page 46)* before you start the work.
2. Open the door.
3. Remove the two locking screws of fan supply plug connector.
4. Pull the plug connector downwards to unplug the fan wiring.
5. Remove two screws in front of the fan unit.
6. Pull the fan unit out.
7. Install a new fan in reverse order.

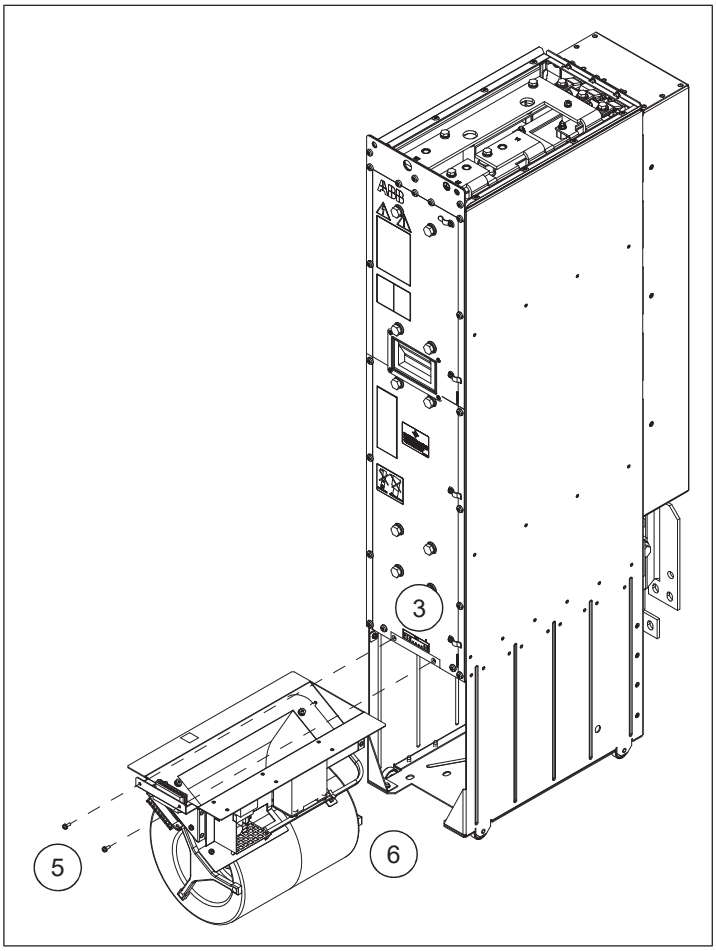


Replacing the fan of the LCL filter (BLCL-2x-x)

WARNING!
Obey the safety instructions given in *ACS880 multidrive cabinets and modules safety instructions* (3AUA0000102301 [English]). If you ignore the safety instructions, injury or death, or damage to the equipment can occur.

If you are not a qualified electrical professional, do not do installation or maintenance work.

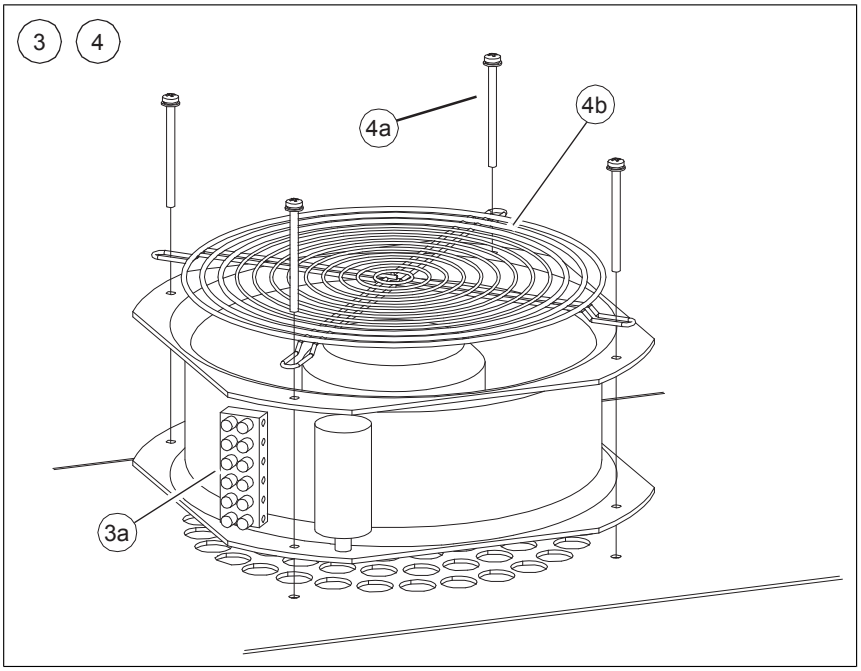
1. Stop the drive and do the steps in section *Electrical safety precautions (page 46)* before you start the work.
2. Open the door.
3. Remove the two locking screws of fan supply plug connector.
4. Pull the plug connector downwards to unplug the fan wiring.
5. Remove the screws in front of the fan unit.
6. Pull the fan unit out.
7. Install a new fan in reverse order.



Replacing the cooling fan in the incoming cubicle

WARNING!
Obey the safety instructions of the drive. If you ignore them, injury or death, or damage to the equipment can occur.

1. Stop the drive and do the steps in section *Electrical safety precautions (page 46)* before you start the work.
2. Remove the shrouding (if any) in front of the fan.
3. Disconnect the fan wiring (a).
4. Remove the fastening screws (a) and finger guard (b) of the fan.
5. Install the new fan in reverse order. Make sure that the arrow indicating the air flow direction points up.



Replacing the fan in the auxiliary control cubicle

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.

1. Disconnect the drive from the AC power line and make sure it is safe to start the work. See section *Electrical safety precautions (page 46)*.
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.

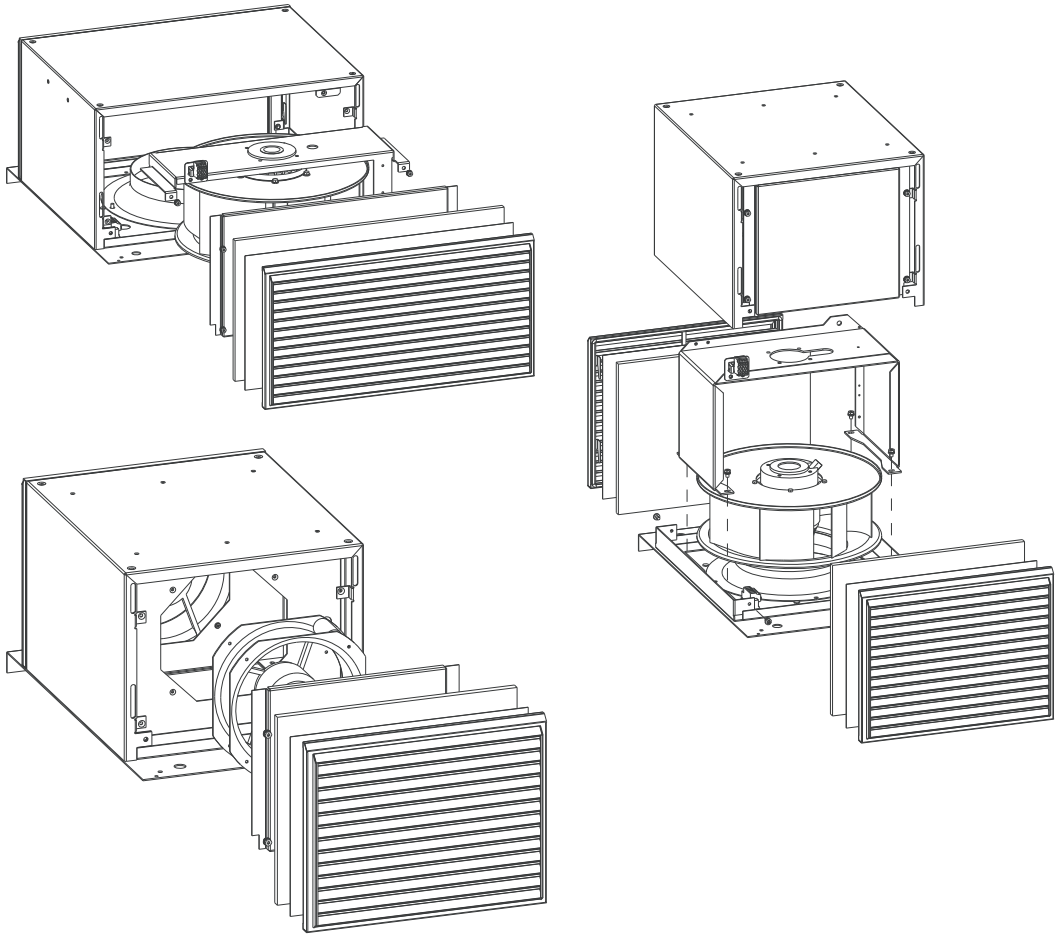
Replacing the roof fan for IP54 cabinet (option +B055)

WARNING!
Obey the safety instructions given in *ACS880 multidrive cabinets and modules safety instructions* (3AUA0000102301 [English]). If you ignore the safety instructions, injury or death, or damage to the equipment can occur.

If you are not a qualified electrical professional, do not do installation or maintenance work.

WARNING!
Use the required personal protective equipment. 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 (page 46)*.
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 fan models

IGBT supply module

Reduced run

A “reduced run” function is available for supply/rectifier units consisting of parallel-connected 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 motor still apply; for example, the modules remaining in use must be able to provide enough current.

Starting reduced run operation

WARNING!
Obey the safety instructions given in *ACS880 multidrive cabinets and modules safety instructions* (3AUA0000102301 [English]). If you ignore the safety instructions, injury or death, or damage to the equipment can occur.

If you are not a qualified electrical professional, do not do installation or maintenance work.

WARNING!
Use the required personal protective equipment. Wear protective gloves and long sleeves. Some parts have sharp edges.

1. Stop the drive and do the steps in section *Electrical safety precautions (page 46)* before you start the work.
2. If the control unit is powered from the faulty module, connect the control unit to another 24 V DC power supply. ABB strongly recommends using an external power supply with supply/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 supply/rectifier unit.
6. Enter the number of supply/rectifier modules present into parameter *195.13 Reduced run mode*.
7. Reset all faults and start the supply/rectifier unit. The maximum current limit is now automatically set according to the new 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

WARNING!
Obey the safety instructions given in *ACS880 multidrive cabinets and modules safety instructions* (3AUA0000102301 [English]). If you ignore the safety instructions, injury or death, or damage to the equipment can occur.

If you are not a qualified electrical professional, do not do installation or maintenance work.

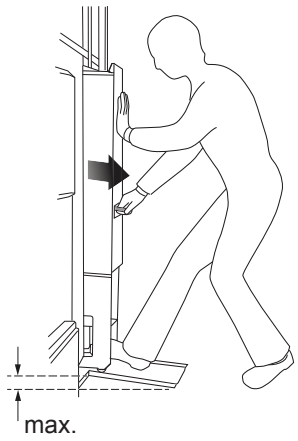
1. Stop the drive and do the steps in section *Electrical safety precautions (page 46)* before you start the work.
2. Remove the air baffle from the module bay.
3. Reinstall the module into its bay.
4. Switch on the power to the supply/rectifier unit.
5. Enter "0" into parameter *195.13 Reduced run mode*.

Replacing the IGBT supply module (limited scope version)

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

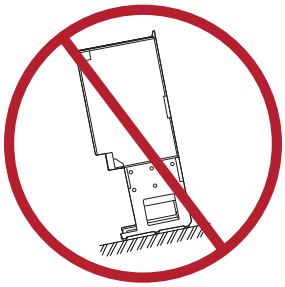
WARNING!
Ignoring the following instructions can cause physical injury, or damage to the equipment:

- Use extreme caution when maneuvering a supply 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.
- Do not use the module pull-out ramp with plinth heights of 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).

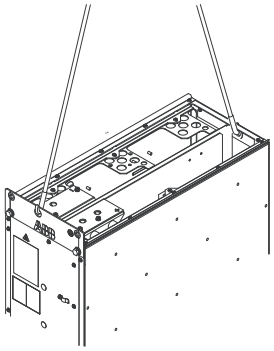


Support the top and bottom of the module while removing!

Do not tilt!

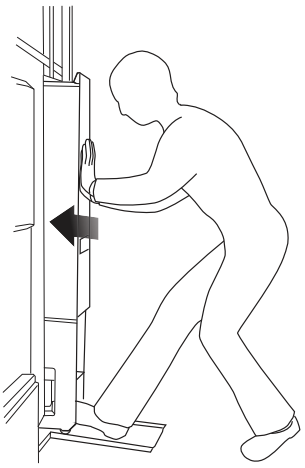


Do not leave the module unattended on a sloping floor!



Lift the module by the upper part only using the lifting holes at the top!

Mind your fingers! Keep fingers away from the edges of the front flange of the module!

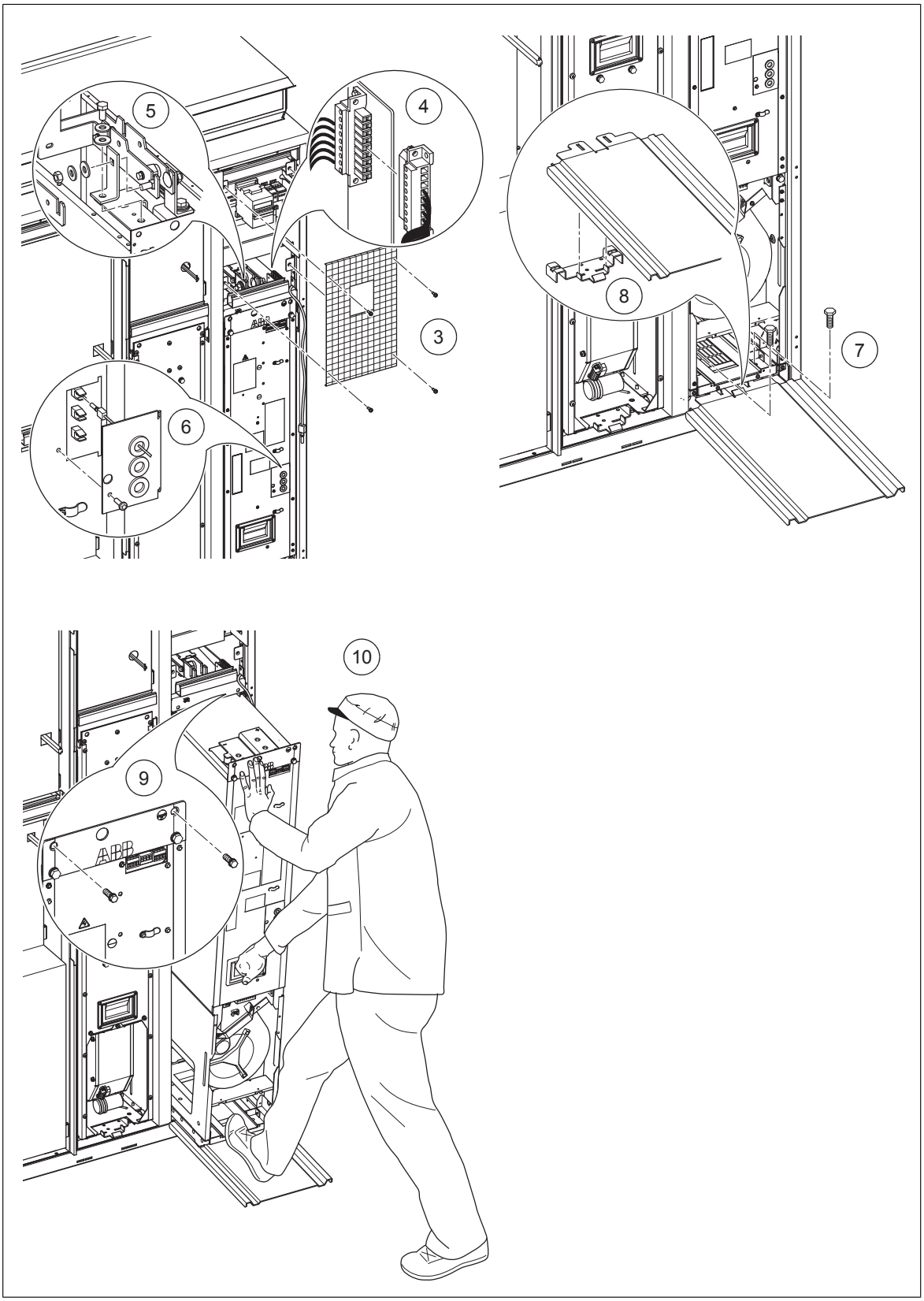


Support the top and bottom of the module while replacing!

Note: As an alternative to using the extraction/installation ramp, a lifter is available from ABB Service. For more information, contact ABB Service, or see *Lifter for air-cooled drive modules user's guide* (3AXD50000332588 [English]).

1. Disconnect the drive from the AC power line and make sure it is safe to start the work. See section *Electrical safety precautions (page 46)*.
2. Open the cubicle door.
3. Undo the screws of the shroud in the upper part of the cubicle. Remove the shroud.
4. Unplug the signal connector [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 [X53].
7. Remove the two screws that fasten the bottom of the module to the base of the cabinet.
8. Install the module pull-put ramp: lift the module pull-out ramp against the cabinet base so that the hooks of the base go into the ramp’s holes.
9. Remove the two fastening screws that fasten the top of the module to the cabinet frame.
10. 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.

11. 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 signal connector.
    - Reconnect the fiber optic cables.
    - Fasten the shrouds.
12. Remove the module pull-out ramp and close the cabinet doors.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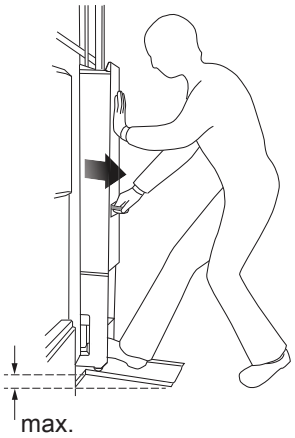
Replacing the IGBT supply module (frame R8i and multiples)

WARNING!
Obey the safety instructions given in *ACS880 multidrive cabinets and modules safety instructions* (3AUA0000102301 [English]). If you ignore the safety instructions, injury or death, or damage to the equipment can occur.

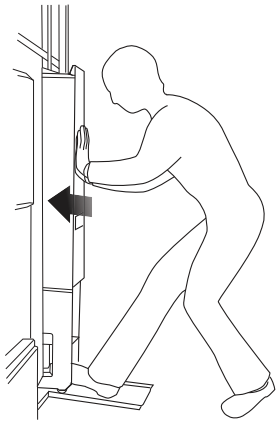
If you are not a qualified electrical professional, do not do installation or maintenance work.

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

- Do not use the module extraction/installation ramp with plinth heights which exceeds the maximum allowed height.
- Secure the module extraction/installation ramp carefully.
- Push the module into the cabinet and pull it from the cabinet carefully preferably with help from another person. Keep a constant pressure with one foot on the base of the module to prevent the module from falling on its back. Keep your fingers away from the edges of the front flange of the module.



Support the top and bottom of the module while removing!

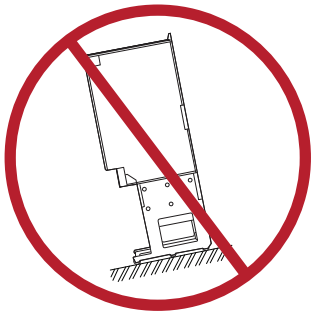


Support the top and bottom of the module while replacing!

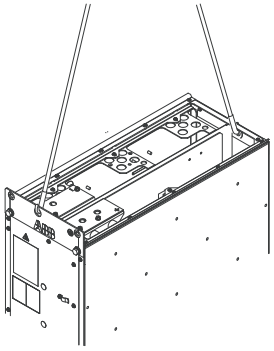
Mind your fingers! Keep fingers away from the edges of the front flange of the module!

- Be careful when handling a tall module. The module overturns easily because it is heavy and has a high center of gravity. Whenever possible, secure the module with chains. Do not leave an unsupported module unattended especially on a sloping floor.

Do not tilt!



Do not leave the module unattended on a sloping floor!



Lift the module by the upper part only using the lifting holes at the top!

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

Note: As an alternative to using the extraction/installation ramp, a lifter is available from ABB Service. For more information, contact ABB Service, or see *Lifter for air-cooled drive modules user's guide* (3AXD50000332588 [English]).

1. Disconnect the drive from the AC power line and make sure it is safe to start the work. See section *Electrical safety precautions (page 46)*.
2. Open the cubicle door.
3. Undo the screws of the shroud in the upper part of the cubicle. Remove the shroud.
4. Unplug the signal connector [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. Remove the two screws that fasten the bottom of the module to the base of the cabinet.
8. Install the module pull-put ramp: lift the module pull-out ramp against the cabinet base so that the hooks of the base go into the ramp’s holes.
9. Remove the two fastening screws that fasten the top of the module to the cabinet frame.
10. 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.

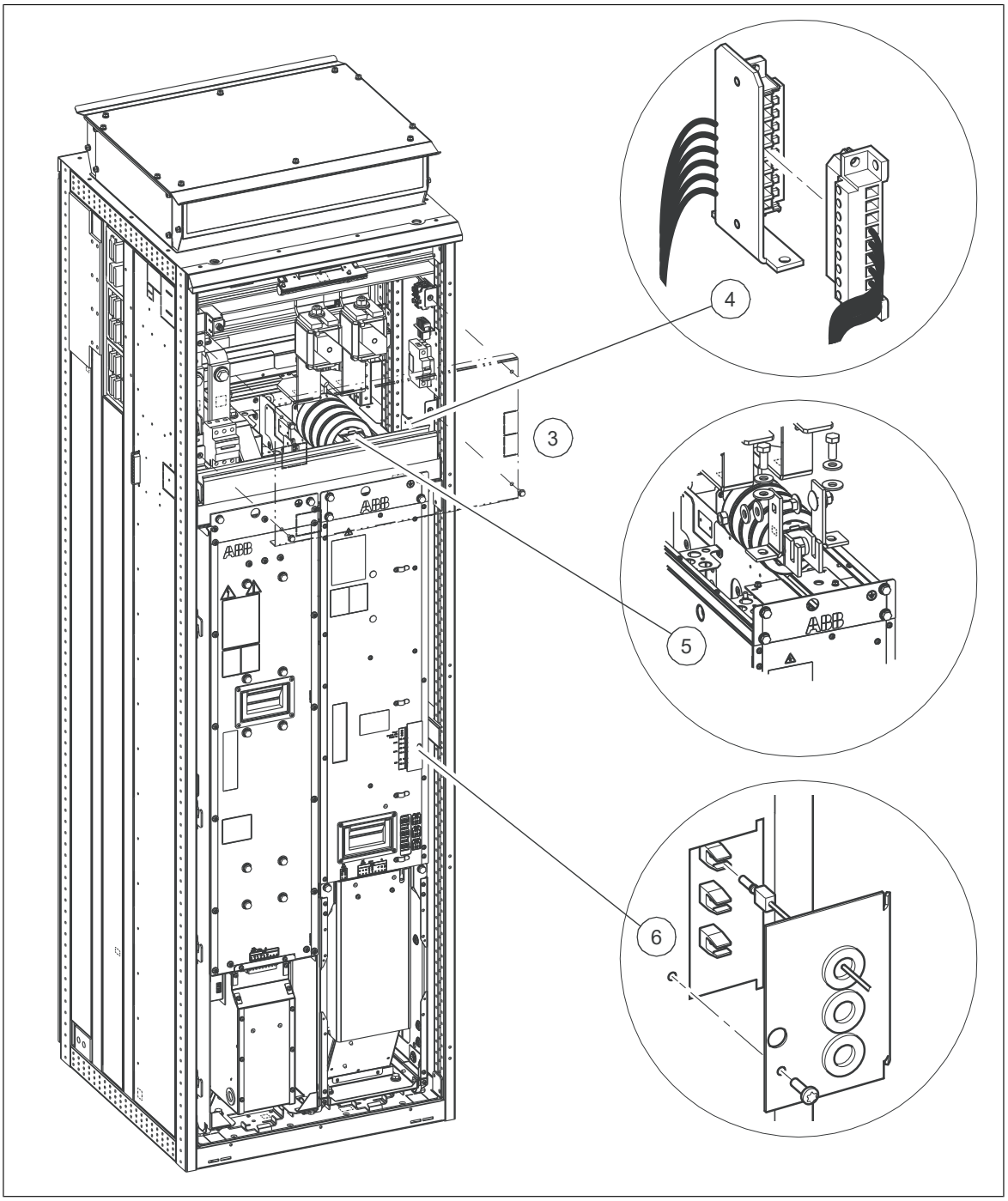
11. Replace the module: install the module in reverse order. Mind you fingers. Keep a constant pressure with one foot on the base of the module to prevent the module from falling on its back.

    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 signal connector [X50].
    - Reconnect the fiber optic cables.
    - Fasten the shrouds.

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

The figures show replacement of a 1×R8i module.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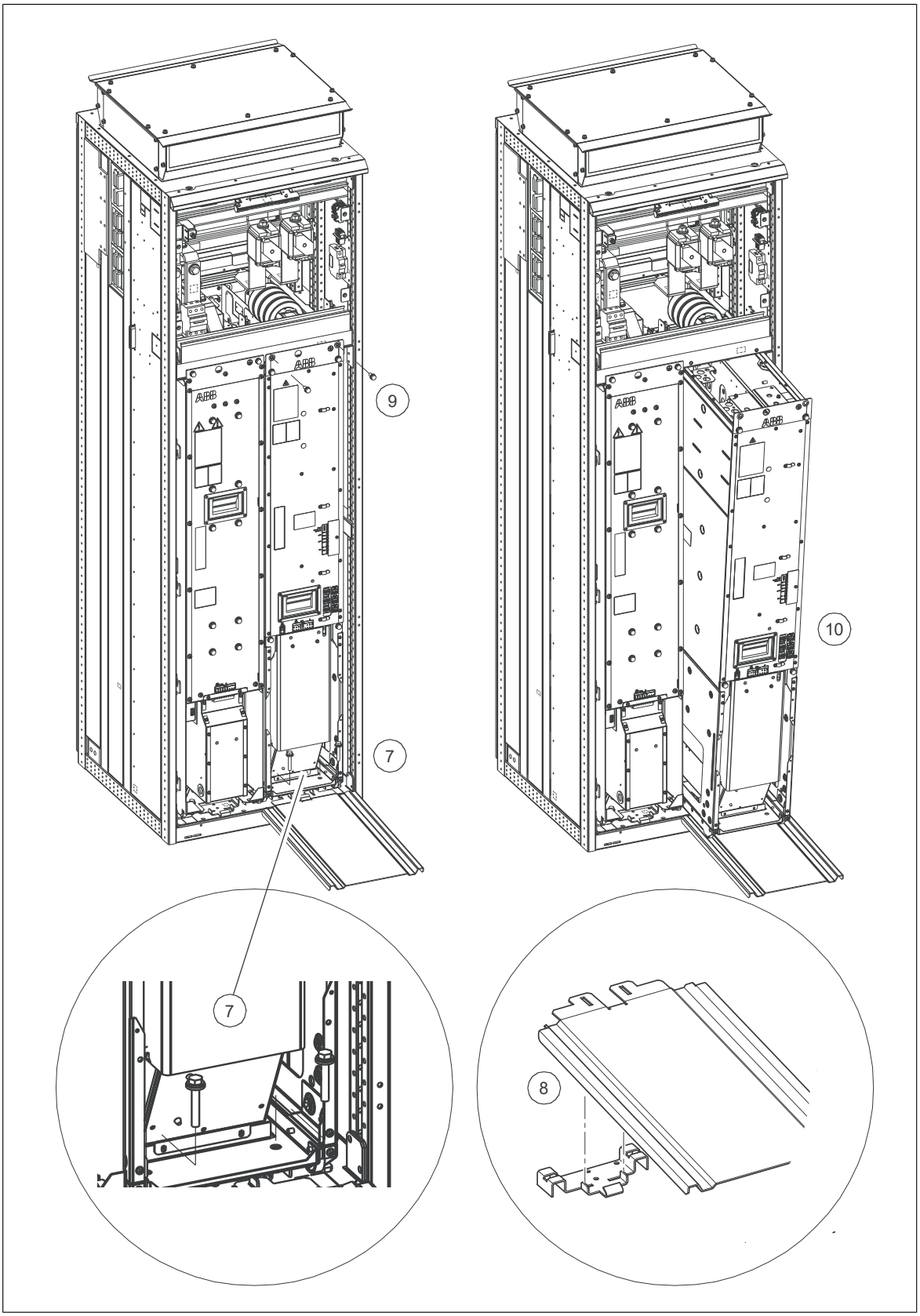
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LCL filter

Replacing the LCL filter (limited scope version)

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

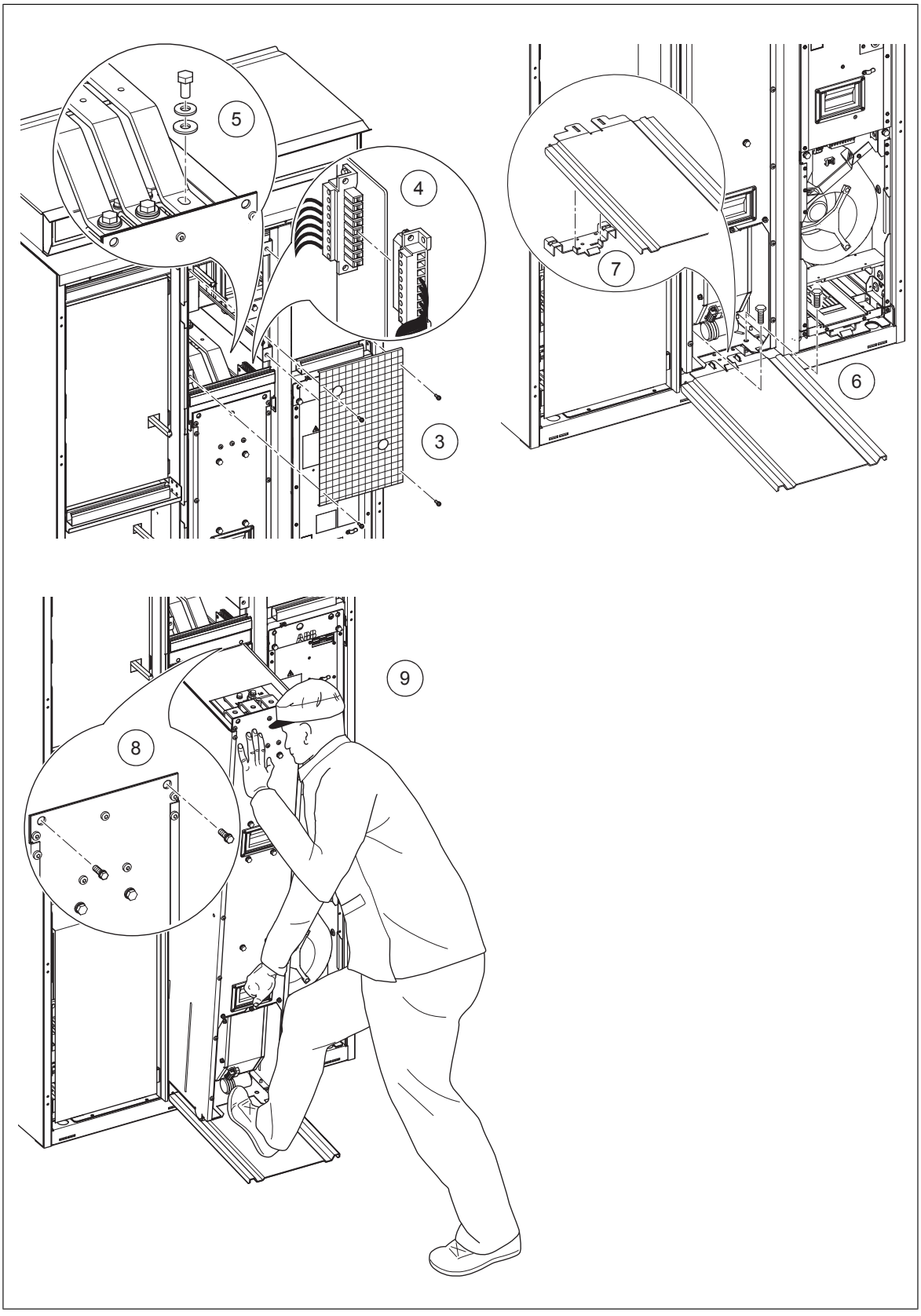
WARNING!
Ignoring the following instructions can cause physical injury, or damage to the equipment:

- Use extreme caution when maneuvering a supply 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.
- Do not tilt the module. Do not leave the module unattended on a sloping floor.
- Do not use the ramp with plinth heights of 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).

Note: As an alternative to using the extraction/installation ramp, a lifter is available from ABB Service. For more information, contact ABB Service, or see *Lifter for air-cooled drive modules user's guide* (3AXD50000332588 [English]).

1. Disconnect the drive from the AC power line and make sure it is safe to start the work. See section *Electrical safety precautions (page 46).*
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 signal connector cable on top of the module.
5. Remove the screws in the busbars on top of the LCL filter module. Be careful not to drop the screws inside the module!
6. Remove the two screws that fasten the bottom of the module to the base of the cabinet.
7. Install the module pull-put 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 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 signal connector.
    - Fasten the shrouds.
11. Remove the module pull-out ramp and close the cabinet doors.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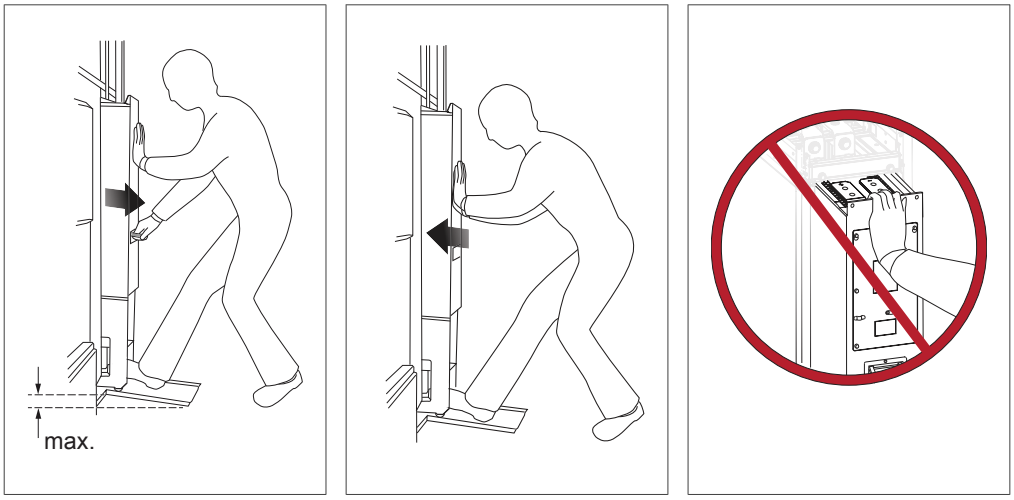
Replacing the LCL filter (frame R8i and multiples)

Refer to the drawings below.

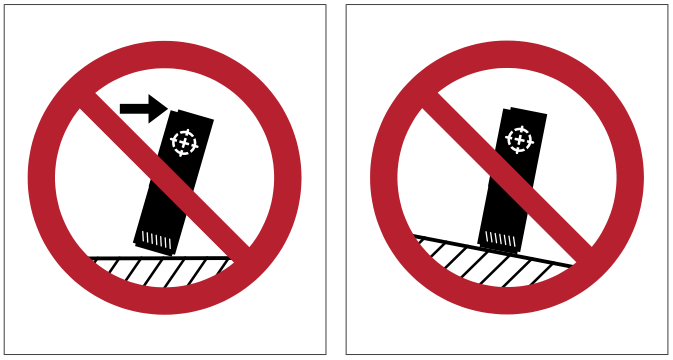
WARNING!
Obey the safety instructions. If you ignore them, injury or death, or damage to the equipment can occur.

WARNING!

- Do not use the module extraction/installation ramp with plinth heights which exceeds the maximum allowed height.
- Secure the module extraction/installation ramp carefully.
- Push the module into the cabinet and pull it from the cabinet carefully preferably with help from another person. Keep a constant pressure with one foot on the base of the module to prevent the module from falling on its back. Keep your fingers away from the edges of the front flange of the module.



- Do not roll the module on its wheels for a longer distance than what is required for inserting or extracting the module. To move the module to or from the vicinity of the cabinet, lay the module on its side on a pallet or equivalent, and use a forklift or pallet truck.
- Be careful when handling a tall module. The module overturns easily because it is heavy and has a high center of gravity. Whenever possible, secure the module with chains. Do not leave an unsupported module unattended especially on a sloping floor.



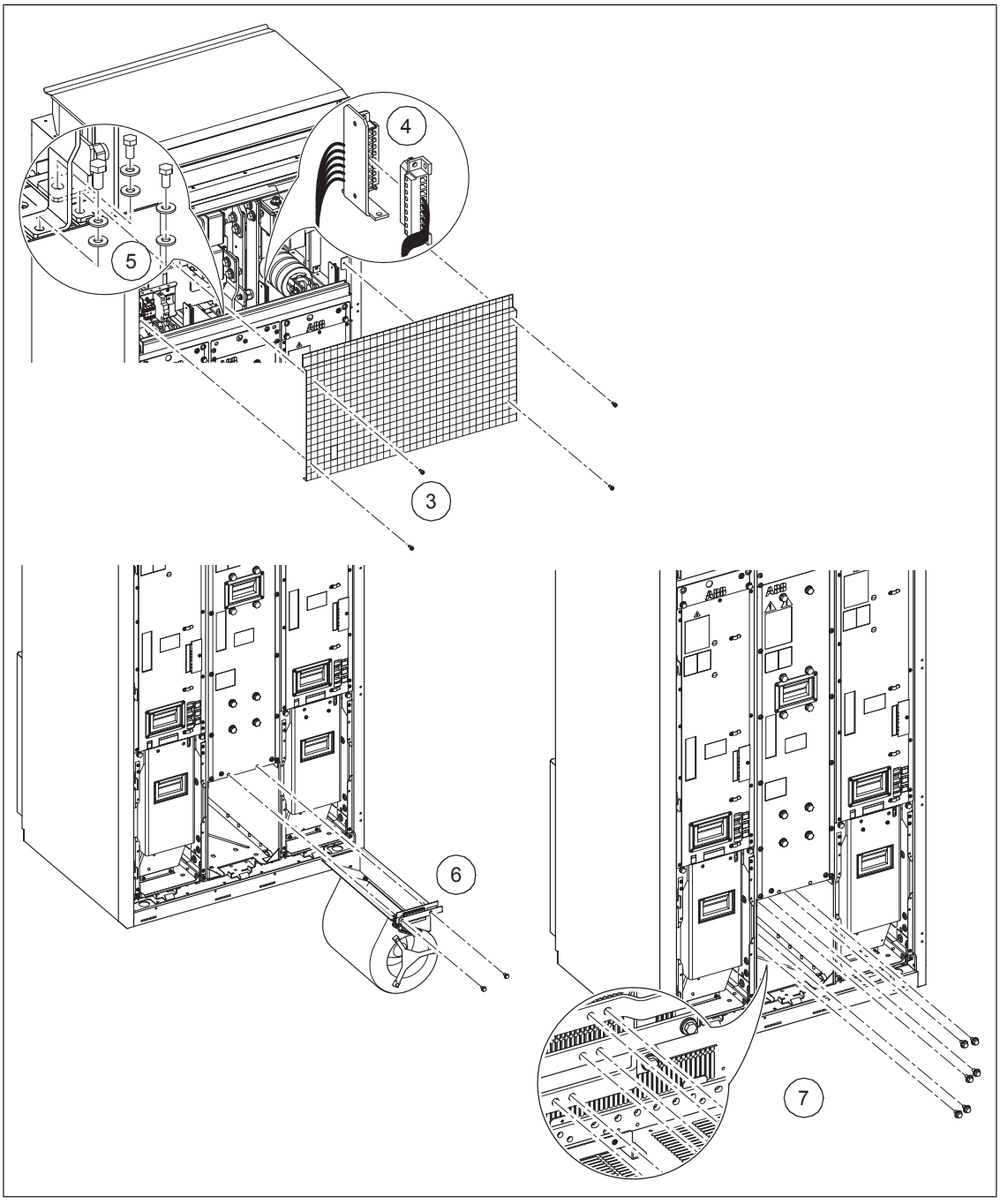
- Wear protective gloves and long sleeves! Some parts have sharp edges.

Note: As an alternative to using the extraction/installation ramp, a lifter is available from ABB Service. For more information, contact ABB Service, or see *Lifter for air-cooled drive modules user's guide* (3AXD50000332588 [English]).

1. Stop the drive (if running) and do the steps in section *Electrical safety precautions (page 46)* before you start the work.
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 signal connector cable on top of the module.
5. Remove the screws that connect the busbars to the top of the filter module. Be careful not to drop the screws into the module.
6. Remove the fan of the filter module. Unplug the signal connector cable and remove the screws in front of the fan.
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 extraction/installation ramp: lift the 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 signal connector.
    - Fasten the shrouds.
13. Remove the module extraction/installation ramp and close the cabinet doors.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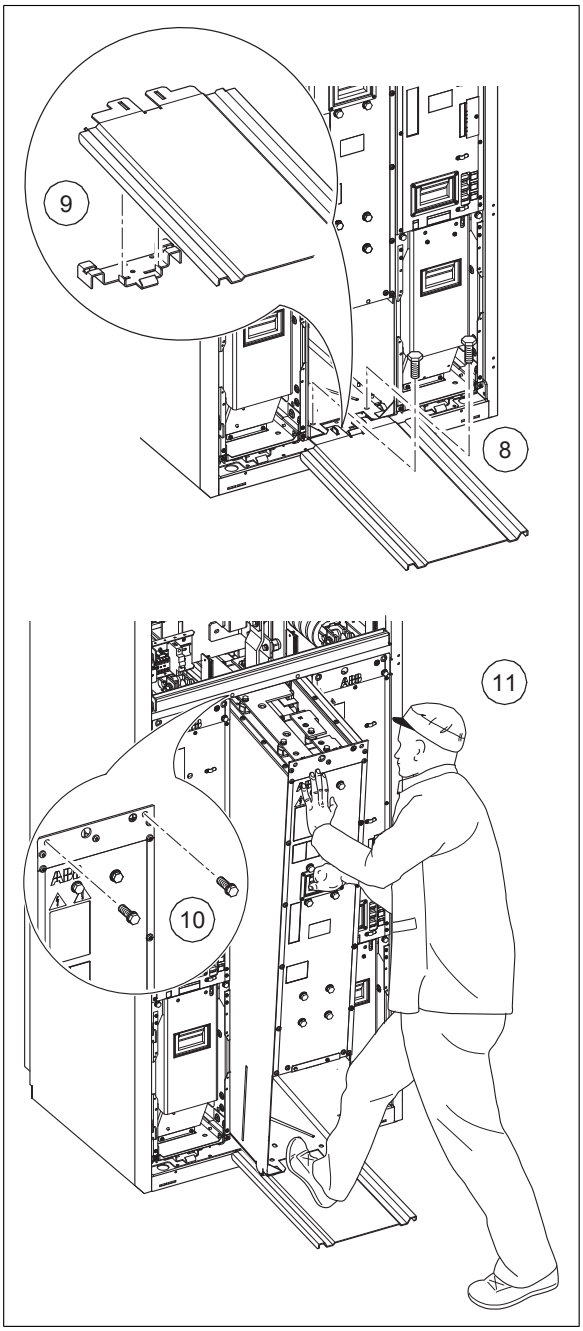


Capacitors

The DC link of the drive contains several electrolytic capacitors. Operating time, load, and surrounding air temperature have an effect on the life of the capacitors. Capacitor life can be extended by decreasing the surrounding air temperature.

Capacitor failure is usually followed by damage to the unit and an input cable fuse failure, or a fault trip. If you think that any capacitors in the drive have failed, contact ABB.

Reforming the capacitors

The capacitors must be reformed if the drive has not been powered (either in storage or unused) for a year or more. The manufacturing date is on the type designation label. For information on reforming the capacitors, see *Capacitor reforming instructions* (3BFE64059629 [English]) in the ABB Library (https://library.abb.com/en).

Fuses

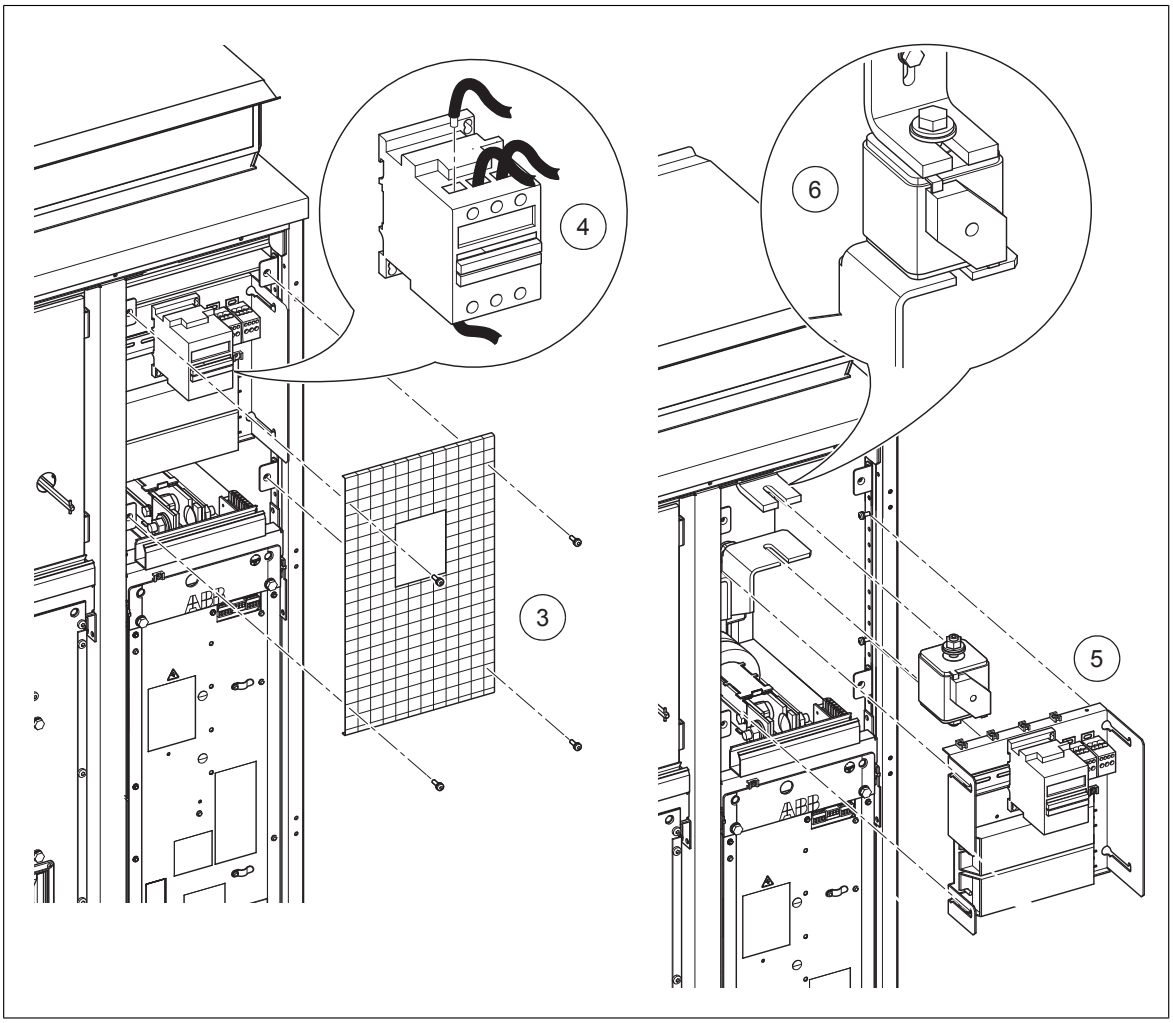
Checking and replacing the DC fuses (limited scope version)

WARNING!
Only qualified electricians are allowed to this work. Read the complete safety instructions of 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 (page 46)*. Switch off the disconnector of the charging circuit [Q3].
2. Open the IGBT supply module cubicle door.
3. Undo the screws of the shroud in the upper part of the cubicle. Remove the shroud.
4. Disconnect all conductors wired to the components which are attached to the assembly plate in front of the fuses (such as wiring to the charging contactor [Q4]). Write down the correct connections before disconnecting.
5. Undo the fastening screws of the assembly plate and pull it out.
6. 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	Cooper Bussmann fuses	Mersen (Ferraz-Shawmut) fuses
M12	50 N·m	46 N·m

7. Install the assembly plate back on place. Connect all conductors wired to the components which are attached to the assembly plate. Attach the shrouds in reverse order and close the door.



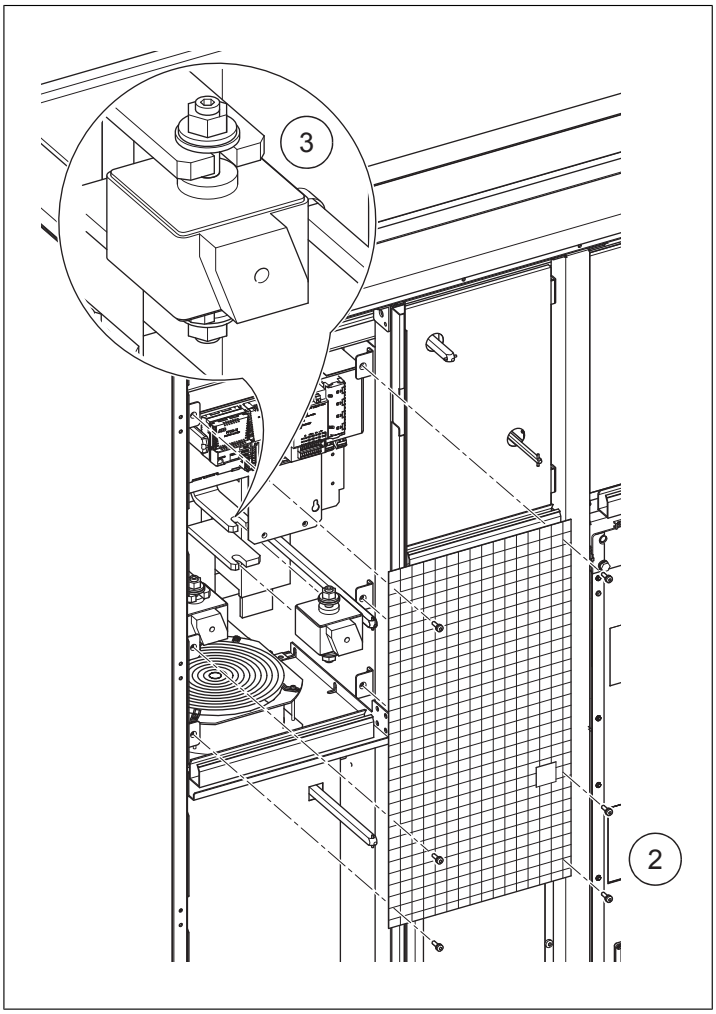
Checking and replacing the AC fuses (limited scope version)

WARNING!
Only qualified electricians are allowed to this work. Read the complete safety instructions of 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 (page 46)*.
2. Undo the screws of the shroud in the upper part of the cubicle. Lift and remove the shroud.
3. 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	Cooper Bussmann fuses	Mersen (Ferraz-Shawmut) fuses
M12	50 N·m	46 N·m

4. Attach the shroud and close the door.



Checking and replacing the DC fuses (frame R8i and multiples)

WARNING!
Only qualified electricians are allowed to this work. Read the complete safety instructions of 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 (page 46)*. Switch off the disconnector of the charging circuit [Q3].
2. Open the IGBT supply 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 IGBT supply 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	Cooper Bussmann fuses	Mersen (Ferraz-Shawmut) fuses
M12	50 N·m	46 N·m

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

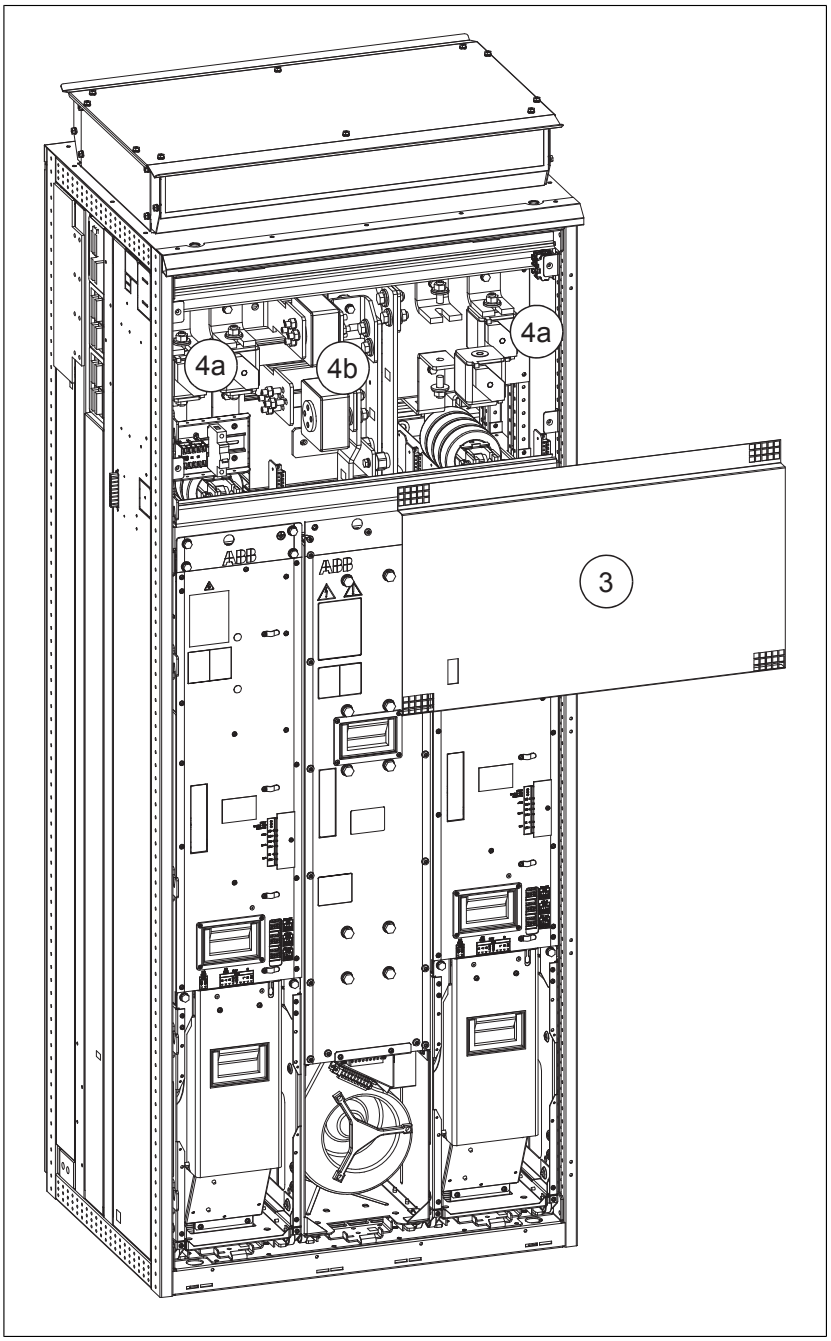
Checking and replacing the AC fuses (frame R8i and multiples)

WARNING!
Only qualified electricians are allowed to this work. Read the complete safety instructions of 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 (page 46)*.
2. Open the IGBT supply 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 LCL 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	Cooper Bussmann fuses	Mersen (Ferraz-Shawmut) fuses
M12	50 N·m	46 N·m

5. Attach the shroud and close the door.



Control panel

For detailed information on the control panel, see *ACx-AP-x assistant control panels user's manual* (3AUA0000085685 [English]).

Cleaning the control panel

Use a soft damp cloth to clean the control panel. Avoid harsh cleaners which could scratch the display window.

Replacing the battery

The instructions below describe how to replace the battery that powers the real-time clock of the control panel.

1. Turn the lid on the back of the control panel counter-clockwise until the lid opens.
2. Remove the battery gently.
3. Replace the battery with a new CR2032 battery. The battery holder has grip nails. First slide the battery and then press on the other side. The battery will snap in.
4. Make sure that the battery polarity shows positive on the upside.
5. Put the lid back and tighten it by turning it clockwise.
6. Dispose of the old battery according to local disposal rules or applicable laws.

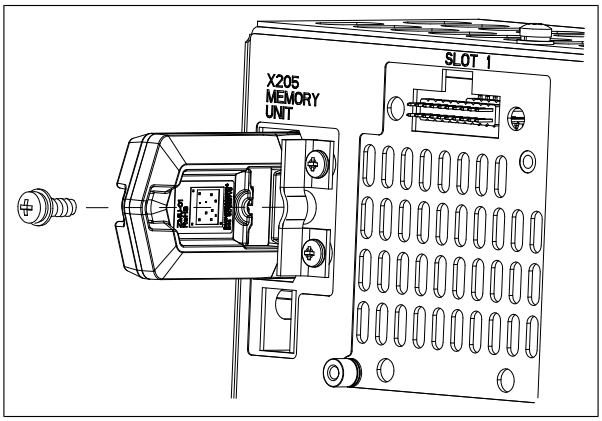
Memory unit

Replacing the memory unit

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

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

1. Stop the drive and do the steps in section *Electrical safety precautions (page 46)* before you start the work.
2. Make sure that the control unit is not powered.
3. Remove the fastening screw and pull the memory unit out.
4. Install a memory unit in reverse order.



LEDs and other status indicators

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.

Control panel and panel platform/holder LEDs

The ACS-AP-… control panel has a status LED. The control panel mounting platform or holder has two status LEDs. For their indications, see the following table.

Location	LED	Indication
Control panel	Continuous green	The unit is functioning normally.
	Flickering green	Data is transferred between the PC and the unit through the USB connection of the control panel.
	Blinking green	There is an active warning in the unit.
	Continuous red	There is an active fault in the unit.
	Blinking red	There is a fault that requires the stopping and restarting of the drive/converter/inverter.
	Blinking blue (ACS-AP-W only)	The Bluetooth interface is enabled, in discoverable mode, and ready for pairing.
	Flickering blue (ACS-AP-W only)	Data is being transferred through the Bluetooth interface of the control panel.
Control panel mounting platform or holder (with the control panel removed)	Red	There is an active fault in the unit.
	Green	Power supply for the control unit is OK.

Functional safety components

The mission time of functional safety components is 20 years which equals the time during which failure rates of electronic components remain constant. This applies to the components of the standard Safe torque off circuit as well as any modules, relays and, typically, any other components that are part of functional safety circuits.

The expiry of mission time terminates the certification and SIL/PL classification of the safety function. The following options exist:

- Renewal of the whole drive and all optional functional safety module(s) and components.
- Renewal of the components in the safety function circuit. In practice, this is economical only with larger drives that have replaceable circuit boards and other components such as relays.

Note that some of the components may already have been renewed earlier, restarting their mission time. The remaining mission time of the whole circuit is however determined by its oldest component.

Contact your local ABB service representative for more information.

7

Technical data

Contents of this chapter

This chapter contains the technical data valid for the cabinet-installed ACS880-207 IGBT supply units.

Ratings

ACS880-207-…	Consists of module type ACS880-104-…	Frame	No-overload use					Light-overload use		Heavy-duty use	
			I_N	I_N	I_{max}	P_N	S_N	I_{Ld}	P_{Ld}	I_{Hd}	P_{Hd}
			A (DC)	A (AC)	A (DC)	kW	kVA	A (DC)	kW (DC)	A (DC)	kW (DC)
U_N = 400 V (with U1 = 3~400 V AC and U2 = 566 V DC)											
0420A-3	0470A-3	R8i	513	423	667	290	293	492	279	384	217
0580A-3	0640A-3	R8i	698	576	908	395	399	670	379	522	296
0810A-3	0900A-3	R8i	982	810	1277	556	561	943	553	735	416
1130A-3	0640A-3	2×R8i	1364	1125	1773	772	779	1309	741	1020	577
1330A-3	0760A-3	2×R8i	1615	1332	2100	914	923	1550	877	1208	683
1580A-3	0900A-3	2×R8i	1921	1584	2497	1086	1097	1844	1043	1437	813
2350A-3	0900A-3	3×R8i	2848	2349	3703	1611	1627	2734	1547	2130	1205
3110A-3	0900A-3	4×R8i	3765	3105	4894	2130	2151	3614	2045	2816	1593
4620A-3	0900A-3	6×R8i	5598	4617	7278	3167	3199	5374	3040	4187	2369
U_N = 500 V (with U1 = 3~400/480/500 V AC and U2 = 566/679/707 V DC)											
0400A-5	0440A-5	R8i	480	396	624	340	343	461	326	359	254
0530A-5	0590A-5	R8i	644	531	837	455	460	618	437	482	341
0730A-5	0810A-5	R8i	884	729	1149	625	631	849	600	661	468
1040A-5	0590A-5	2×R8i	1255	1035	1631	887	896	1205	852	939	664
1420A-5	0810A-5	2×R8i	1724	1422	2241	1219	1231	1655	1170	1290	912
2120A-5	0810A-5	3×R8i	2564	2115	3334	1813	1832	2462	1741	1918	1356
2800A-5	0810A-5	4×R8i	3394	2799	4412	2400	2424	3258	2304	2539	1795
4150A-5	0810A-5	6×R8i	5031	4149	6540	3557	3593	4829	3415	3763	2661
U_N = 690 V (with U1 = 3~525/600/690 V AC and U2 = 742/849/976 V DC)											
0310A-7	0340A-7	1×R8i	371	306	557	362	366	356	348	278	271
0370A-7	0410A-7	1×R8i	447	369	671	437	441	430	419	335	327
0540A-7	0600A-7	1×R8i	655	540	982	639	645	629	613	490	478
0720A-7	0410A-7	2×R8i	873	720	1309	852	860	838	818	653	637
1050A-7	0600A-7	2×R8i	1277	1053	1915	1246	1258	1226	1196	955	932
1570A-7	0600A-7	3×R8i	1899	1566	2848	1853	1872	1823	1779	1420	1386
2070A-7	0600A-7	4×R8i	2510	2070	3765	2449	2474	2409	2351	1877	1832
3080A-7	0600A-7	6×R8i	3732	3078	5598	3642	3679	3583	3496	2792	2724
4100A-7	0600A-7	8×R8i	4976	4104	7464	4856	4905	4777	4661	3722	3632
5130A-7	0600A-7	10×R8i	6220	5130	9330	6070	6131	5971	5827	4653	4540

Definitions

Nominal ratings

U_N Nominal AC supply voltage of drive system. See also the electrical power network specification.

I_N Nominal output current (available continuously with no over-loading)

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.

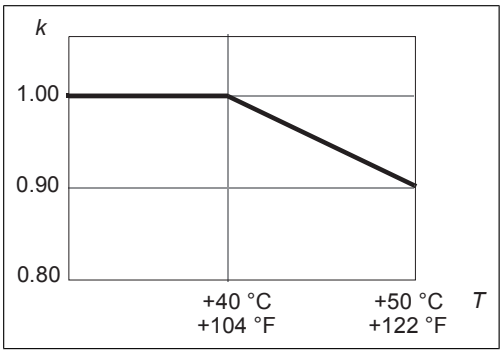
P_{Hd} Output power in heavy-duty use

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

Derating

Surrounding air temperature derating

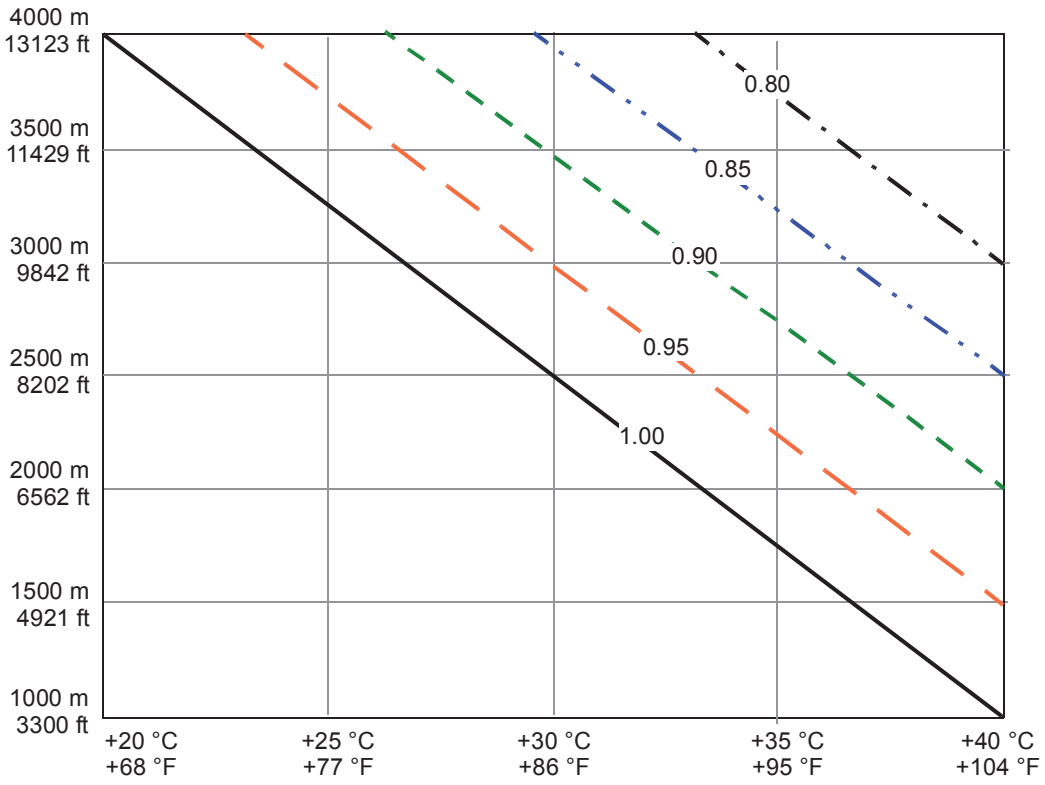
In the temperature range +40…50 °C (+104…122 °F), the rated output current is derated by 1 percentage point for every added 1 °C (1.8 °F). The output current can be calculated by multiplying the current given in the rating table by the derating factor *(k)*:



Altitude derating

At altitudes 1000 … 2000 m (3281 … 6562 ft) above sea level, the output current derating is 1 percentage point for every added 100 m (328 ft). For example, the derating factor for 1500 m (4921 ft) is 0.95. For altitudes above 2000 m (6562 ft), contact ABB.

If surrounding air temperature is below +40 °C, the derating can be reduced by 1.5 percentage points for every 1 °C reduction in temperature. A few altitude derating curves are shown below.



———	Derating factor 1.00
– – –	Derating factor 0.95
– – –	Derating factor 0.90

	Derating factor 0.85
	Derating factor 0.80

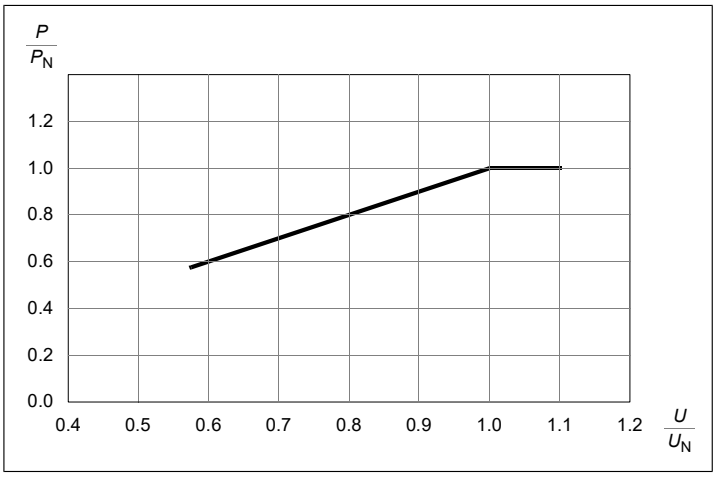
For a more accurate derating, use the DriveSize PC tool.

Derating for output voltage boosting

Note: This information is only valid for drives whose BLCL filters have the type code marking +V991.

The drive can output a higher motor voltage than the supply voltage. This can require derating of the drive output power depending on the difference between the supply voltage and the output voltage to the motor for continuous operation.

This drawing shows the required derating. It is valid for all supply voltage ranges.



Note: The drive voltage rating must always be selected according to the boosted voltage value.

Note: Auxiliary voltage transformer must be set according to supply voltage levels. If drive selection based on boosted voltage level causes unsuitable tap setting to auxiliary voltage transformer, consult your local ABB representative.

Fuses

Main circuit AC fuses

Unit type ACS880-207-…	Rating	Type	Example	Qty
U_N = 400 V (Range 380 … 415 V)				
0420A-3	630 A, 690 V, size 3	Flush end type	170M6410	3
0580A-3	1000 A, 690 V, size 3	Flush end type	170M6414	3
0810A-3	1250 A, 690 V, size 3	Flush end type	170M6416	3
1130A-3	2000 A, 690 V	Flush end type	170M7062	3
1330A-3	2500 A, 690 V	Flush end type	170M7063	3
1580A-3	2500 A, 690 V	Flush end type	170M7063	3
2350A-3	2000 A, 690 V	Flush end type	170M7062	6
3110A-3	2500 A, 690 V	Flush end type	170M7063	6
4620A-3	2500 A, 690 V	Flush end type	170M7063	9
U_N = 500 V (Range 380 … 500 V)				
0400A-5	630 A, 690 V, size 3	Flush end type	170M6410	3
0530A-5	1000 A, 690 V, size 3	Flush end type	170M6414	3
0730A-5	1250 A, 690 V, size 3	Flush end type	170M6416	3
1040A-5	1600 A, 690 V, size 3	Flush end type	170M6419	3
1420A-5	2500 A, 690 V	Flush end type	170M7063	3
2120A-5	2000 A, 690 V	Flush end type	170M7062	6
2800A-5	2500 A, 690 V	Flush end type	170M7063	6
4150A-5	2500 A, 690 V	Flush end type	170M7063	9
U_N = 690 V (Range 525 … 690 V)				
0310A-7	500 A, 690 V	Flush end type	170M6408	3
0370A-7	630 A, 690 V	Flush end type	170M6410	3
0540A-7	900 A, 690 V	Flush end type	170M6413	3
0720A-7	1250 A, 690 V	Flush end type	170M7059	3
1050A-7	1600 A, 690 V, size 3	Flush end type	170M6419	3
1570A-7	1250 A, 690 V	Flush end type	170M7059	6
2070A-7	2000 A, 690 V	Flush end type	170M7062	6
3080A-7	2000 A, 690 V	Flush end type	170M7062	9
4100A-7	2000 A, 690 V	Flush end type	170M7062	12
5130A-7	2000 A, 690 V	Flush end type	170M7062	15
				3AXD00000601909

Main circuit DC fuses

Unit type ACS880-207-…	Rating	Type	Example	Qty
U_N = 400 V (Range 380 … 415 V)				
0420A-3	900 A, 690 V, size 3	Flush end contact	170M6413	2
0580A-3	1100 A, 690 V, size 3	Flush end contact	170M6415	2
0810A-3	1600 A, 690 V, size 3	Flush end contact	170M6419	2
1130A-3	1100 A, 690 V, size 3	Flush end contact	170M6415	4
1330A-3	1400 A, 690 V, size 3	Flush end contact	170M6417	4
1580A-3	1600 A, 690 V, size 3	Flush end contact	170M6419	4
2350A-3	1600 A, 690 V, size 3	Flush end contact	170M6419	6
3110A-3	1600 A, 690 V, size 3	Flush end contact	170M6419	8
4620A-3	1600 A, 690 V, size 3	Flush end contact	170M6419	12
U_N = 500 V (Range 380 … 500 V)				
0400A-5	900 A, 690 V, size 3	Flush end contact	170M6413	2
0530A-5	1100 A, 690 V, size 3	Flush end contact	170M6415	2
0730A-5	1600 A, 690 V, size 3	Flush end contact	170M6419	2
1040A-5	1100 A, 690 V, size 3	Flush end contact	170M6415	4
1420A-5	1400 A, 690 V, size 3	Flush end contact	170M6417	4
2120A-5	1400 A, 690 V, size 3	Flush end contact	170M6417	6
2800A-5	1400 A, 690 V, size 3	Flush end contact	170M6417	8
4150A-5	1400 A, 690 V, size 3	Flush end contact	170M6417	12
U_N = 690 V (Range 525 … 690 V)				
0310A-7	630 A, 1250 V	Flush end contact	170M6544	2
0370A-7	800 A, 1250 V	Flush end contact	170M6546	2
0540A-7	1100 A, 1000 V	Flush end contact	170M6549	2
0720A-7	800 A, 1250 V	Flush end contact	170M6546	4
1050A-7	1100 A, 1000 V	Flush end contact	170M6549	4
1570A-7	1100 A, 1000 V	Flush end contact	170M6549	6
2070A-7	1100 A, 1000 V	Flush end contact	170M6549	8
3080A-7	1100 A, 1000 V	Flush end contact	170M6549	12
4100A-7	1100 A, 1000 V	Flush end contact	170M6549	16
5130A-7	1100 A, 1000 V	Flush end contact	170M6549	20
				3AXD00000601909

Fuses on CVAR board

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

LCL filters

Unit type ACS880-207-…	Frame	LCL filter type
U_N = 400 V (Range 380 … 415 V)		
0420A-3	R8i	ACS880-BLCL-13-5+C183+C188+P922+V991
0580A-3	R8i	ACS880-BLCL-13-5+C183+C188+P922+V991
0810A-3	R8i	ACS880-BLCL-15-5+C183+C188+P922+V991
1130A-3	2×R8i	ACS880-BLCL-24-5+C183+C188+P922+V991
1330A-3	2×R8i	ACS880-BLCL-24-5+C183+C188+P922+V991
1580A-3	2×R8i	ACS880-BLCL-25-5+C183+C188+P922+V991
2350A-3	3×R8i	2×ACS880-BLCL-24-5+C183+C188+P922+V991
3110A-3	4×R8i	2×ACS880-BLCL-25-5+C183+C188+P922+V991
4620A-3	6×R8i	3×ACS880-BLCL-25-5+C183+C188+P922+V991
U_N = 500 V (Range 380 … 500 V)		
0400A-5	R8i	ACS880-BLCL-13-5+C183+C188+P922+V991
0530A-5	R8i	ACS880-BLCL-13-5+C183+C188+P922+V991
0730A-5	R8i	ACS880-BLCL-15-5+C183+C188+P922+V991
1040A-5	2×R8i	ACS880-BLCL-24-5+C183+C188+P922+V991
1420A-5	2×R8i	ACS880-BLCL-25-5+C183+C188+P922+V991
2120A-5	3×R8i	2×ACS880-BLCL-24-5+C183+C188+P922+V991
2800A-5	4×R8i	2×ACS880-BLCL-25-5+C183+C188+P922+V991
4150A-5	6×R8i	3×ACS880-BLCL-25-5+C183+C188+P922+V991
U_N = 690 V (Range 525 … 690 V)		
0310A-7	1×R8i	ACS880-BLCL-13-7+C183+C188+P922+V991
0370A-7	1×R8i	ACS880-BLCL-13-7+C183+C188+P922+V991
0540A-7	1×R8i	ACS880-BLCL-15-7+C183+C188+P922+V991
0720A-7	2×R8i	ACS880-BLCL-24-7+C183+C188+P922+V991
1050A-7	2×R8i	ACS880-BLCL-25-7+C183+C188+P922+V991
1570A-7	3×R8i	2×ACS880-BLCL-24-7+C183+C188+P922+V991
2070A-7	4×R8i	2×ACS880-BLCL-25-7+C183+C188+P922+V991
3080A-7	6×R8i	3×ACS880-BLCL-25-7+C183+C188+P922+V991
4100A-7	8×R8i	4×ACS880-BLCL-25-7+C183+C188+P922+V991
5130A-7	10×R8i	5×ACS880-BLCL-25-7+C183+C188+P922+V991
		3AXD00000601909

Dimensions

Unit type ACS880-207-…	Height 1		Height 2		Width 1		Width 2		Depth 1		Depth 2	
	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in
U_N = 400 V (Range 380 … 415 V)												
0420A-3	2145	84.5	2315	91.1	1000	39.4	1600	63.0	636	25	756	29.8
0580A-3	2145	84.5	2315	91.1	1000	39.4	1600	63.0	636	25	756	29.8
0810A-3	2145	84.5	2315	91.1	1000	39.4	1600	63.0	636	25	756	29.8
1130A-3	2145	84.5	2315	91.1	-	-	2000	78.7	636	25	756	29.8
1330A-3	2145	84.5	2315	91.1	-	-	2000	78.7	636	25	756	29.8
1580A-3	2145	84.5	2315	91.1	-	-	2000	78.7	636	25	756	29.8
2350A-3	2145	84.5	2315	91.1	-	-	2600	102.4	744	29.3	864	34
3110A-3	2145	84.5	2315	91.1	-	-	2800	110.2	744	29.3	864	34
4620A-3	2145	84.5	2315	91.1	-	-	4000	157.5	744	29.3	864	34
U_N = 500 V (Range 380 … 500 V)												
0400A-5	2145	84.5	2315	91.1	1000	39.4	1600	63.0	636	25	756	29.8
0530A-5	2145	84.5	2315	91.1	1000	39.4	1600	63.0	636	25	756	29.8
0730A-5	2145	84.5	2315	91.1	1000	39.4	1600	63.0	636	25	756	29.8
1040A-5	2145	84.5	2315	91.1	-	-	1800	70.9	636	25	756	29.8
1420A-5	2145	84.5	2315	91.1	-	-	2000	78.7	636	25	756	29.8
2120A-5	2145	84.5	2315	91.1	-	-	2600	102.4	744	29.3	864	34
2800A-5	2145	84.5	2315	91.1	-	-	2800	110.2	744	29.3	864	34
4150A-5	2145	84.5	2315	91.1	-	-	4000	157.5	744	29.3	864	34
U_N = 690 V (Range 525 … 690 V)												
0310A-7	2145	84.5	2315	91.1	-	-	1600	63.0	636	25	756	29.8
0370A-7	2145	84.5	2315	91.1	-	-	1600	63.0	636	25	756	29.8
0540A-7	2145	84.5	2315	91.1	-	-	1600	63.0	636	25	756	29.8
0720A-7	2145	84.5	2315	91.1	-	-	1800	70.9	636	25	756	29.8
1050A-7	2145	84.5	2315	91.1	-	-	1800	70.9	636	25	756	29.8
1570A-7	2145	84.5	2315	91.1	-	-	2600	102.4	636	25	756	29.8
2070A-7	2145	84.5	2315	91.1	-	-	2800	110.2	744	29.3	864	34
3080A-7	2145	84.5	2315	91.1	-	-	3600	141.7	744	29.3	864	34
4100A-7	2145	84.5	2315	91.1	-	-	5100	200.1	744	29.3	864	34
5130A-7	2145	84.5	2315	91.1	-	-	5900	232.3	744	29.3	864	34

Definitions

Height 1	Normal height
Height 2	Height with IP54 roof
Width 1	Low power multidrive
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

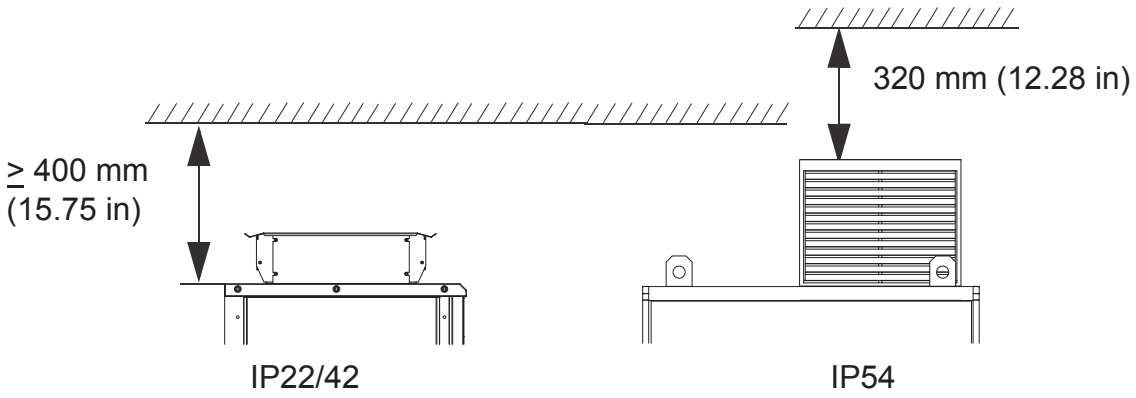
Free space requirements

Unit type ACS880-207-…	Above [2]		Front [1]		Left		Right	
	mm	in	mm	in	mm	in	mm	in
U_N = 400 V (Range 380 … 415 V)								
0420A-3	400	15.7	700	27.6	15	0.6	15	0.6
0580A-3	400	15.7	700	27.6	15	0.6	15	0.6
0810A-3	400	15.7	700	27.6	15	0.6	15	0.6
1130A-3	400	15.7	700	27.6	15	0.6	15	0.6
1330A-3	400	15.7	700	27.6	15	0.6	15	0.6
1580A-3	400	15.7	700	27.6	15	0.6	15	0.6
2350A-3	400	15.7	700	27.6	15	0.6	15	0.6
3110A-3	400	15.7	700	27.6	15	0.6	15	0.6
4620A-3	400	15.7	700	27.6	15	0.6	15	0.6
U_N = 500 V (Range 380 … 500 V)								
0400A-5	400	15.7	700	27.6	15	0.6	15	0.6
0530A-5	400	15.7	700	27.6	15	0.6	15	0.6
0730A-5	400	15.7	700	27.6	15	0.6	15	0.6
1040A-5	400	15.7	700	27.6	15	0.6	15	0.6
1420A-5	400	15.7	700	27.6	15	0.6	15	0.6
2120A-5	400	15.7	700	27.6	15	0.6	15	0.6
2800A-5	400	15.7	700	27.6	15	0.6	15	0.6
4150A-5	400	15.7	700	27.6	15	0.6	15	0.6
U_N = 690 V (Range 525 … 690 V)								
0310A-7	400	15.7	700	27.6	15	0.6	15	0.6
0370A-7	400	15.7	700	27.6	15	0.6	15	0.6
0540A-7	400	15.7	700	27.6	15	0.6	15	0.6
0720A-7	400	15.7	700	27.6	15	0.6	15	0.6
1050A-7	400	15.7	700	27.6	15	0.6	15	0.6
1570A-7	400	15.7	700	27.6	15	0.6	15	0.6
2070A-7	400	15.7	700	27.6	15	0.6	15	0.6
3080A-7	400	15.7	700	27.6	15	0.6	15	0.6
4100A-7	400	15.7	700	27.6	15	0.6	15	0.6
5130A-7	400	15.7	700	27.6	15	0.6	15	0.6

Unit type ACS880-207-…	Above [2]		Front [1]		Left		Right	
	mm	in	mm	in	mm	in	mm	in

[1] Includes the door switches. Does not include the space needed for the door opening.

[2] Measured from the base plate of the cabinet top. **Note:** 320 mm (12.28 in) is required for fan replacement of IP54 cabinets.



Definitions

Above Free space to enable cooling air flow

Front Door turn radius (more space preferred for safety exit)

Left Possible end plate

Right Possible end plate

Losses, cooling data and noise

Unit type ACS880-207-…	$P_{lossISU}$	$P_{lossLCL}$	$P_{lossTOTAL}$	Air flow		Noise	Efficiency
	kW	kW	kW	m^3/h	ft^3/min	dB	%
U_N = 400 V (Range 380 … 415 V)							
0420A-3	4.4	2.2	6.6	2200	1295	72	97.8
0580A-3	6.1	3.2	9.3	2200	1295	72	97.7
0810A-3	9.4	3.9	13.3	2200	1295	72	97.7
1130A-3	12.2	5.0	17.2	4100	2413	74	97.8
1330A-3	13.6	5.9	19.5	4100	2413	74	97.9
1580A-3	18.7	7.3	26.0	4100	2413	74	97.7
2350A-3	28.1	11.9	40.0	6900	4061	76	97.6
3110A-3	37.5	14.6	52.1	8200	4826	76	97.6
4620A-3	56.2	21.9	78.1	12300	7240	78	97.6
U_N = 500 V (Range 380 … 500 V)							
0400A-5	4.5	2.1	6.7	2200	1295	72	98.1
0530A-5	6.0	2.9	8.9	2200	1295	72	98.1
0730A-5	8.6	3.4	12.1	2200	1295	72	98.1
1040A-5	11.9	4.5	16.5	4100	2413	74	98.2
1420A-5	17.3	6.6	23.8	4100	2413	74	98.1
2120A-5	25.9	9.1	35.0	6900	4061	76	98.1
2800A-5	34.6	13.1	47.7	8200	4826	76	98.1
4150A-5	51.9	19.7	71.5	12300	7240	78	98.0
U_N = 690 V (Range 525 … 690 V)							
0310A-7	6.1	2.5	8.7	2200	1295	72	97.7
0370A-7	7.1	3.0	10.1	2200	1295	72	97.7
0540A-7	10.2	4.5	14.6	2200	1295	72	97.8
0720A-7	14.3	4.1	18.4	4100	2413	74	97.9
1050A-7	20.3	7.6	27.9	4100	2413	74	97.8
1570A-7	30.5	9.1	39.6	6900	4061	76	97.9
2070A-7	40.6	15.2	55.9	8200	4826	76	97.8
3080A-7	60.9	22.9	83.8	12300	7240	78	97.8
4100A-7	81.2	30.5	111.7	16400	9653	79	97.8
5130A-7	101.5	38.1	139.7	20500	12066	79	97.8

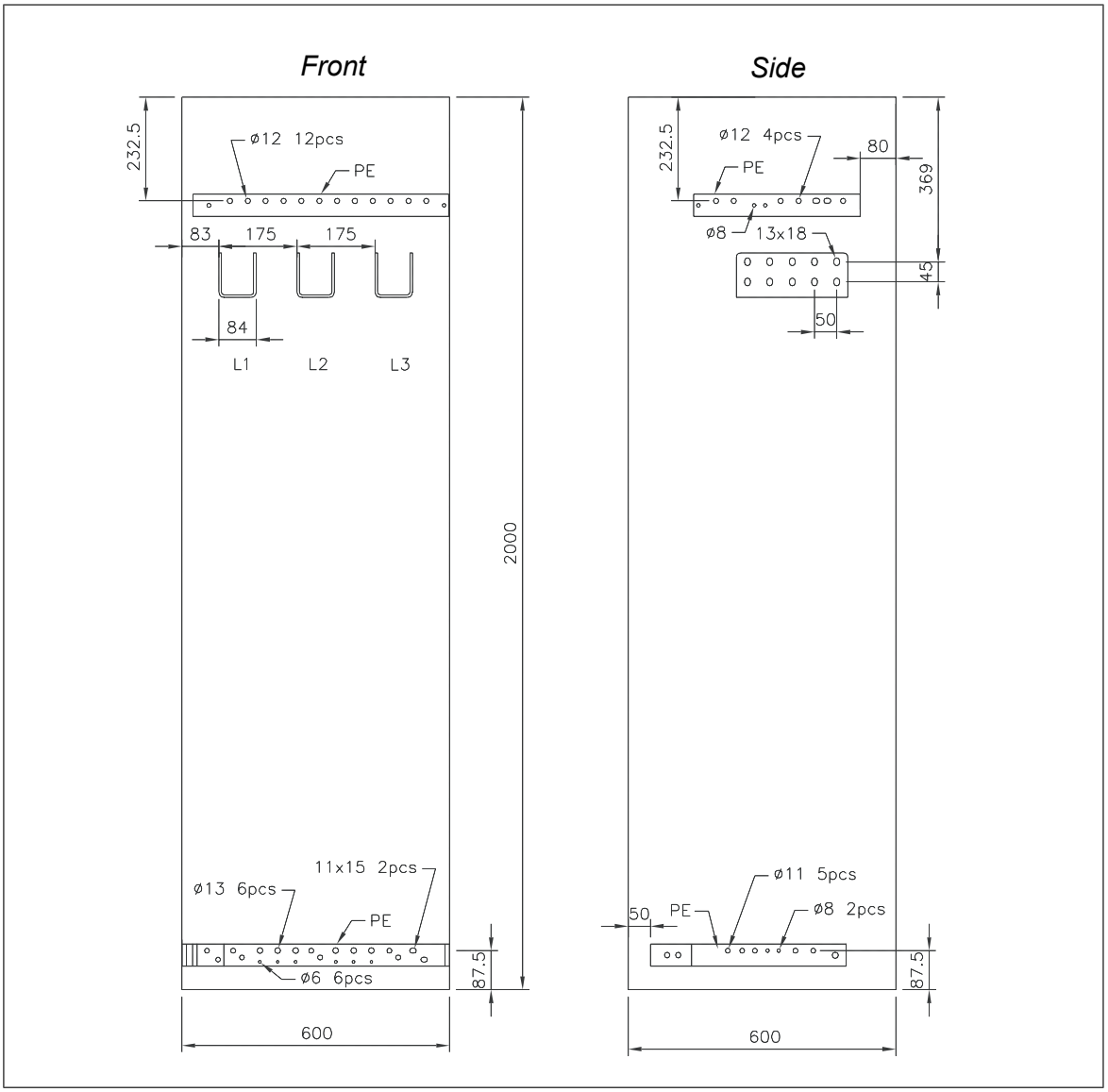
Definitions

$P_{lossICU}$	Heat dissipation. Total losses of the ISU module with nominal power
$P_{lossLCL}$	Heat dissipation. Total losses of the LCL filter module at nominal power
$P_{lossTOTAL}$	Heat dissipation. Total losses of the ISU and LCL filter modules at nominal power
Noise	Noise with direct-on-line fans running at nominal speed

Terminal and cable entry data for the input power cable

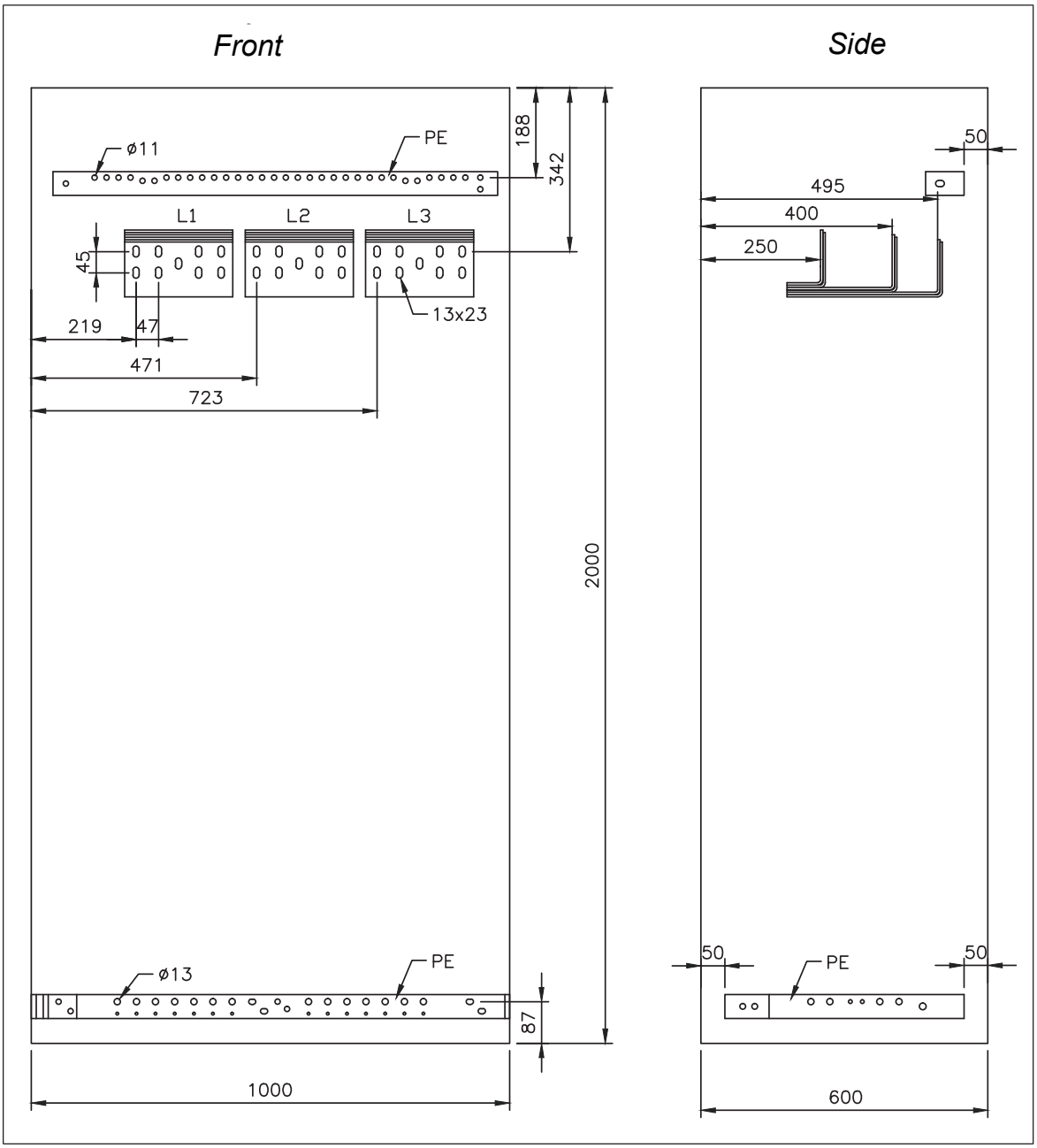
■ 600 mm incoming cubicle – main circuit breaker (+F255), top cable entry

The dimensions are given in millimeters. Tightening torque for the cable lug connection depends on the bolt size and type. See the technical data.



1000 mm incoming cubicle – main circuit breaker (+F255), top cable entry

The dimensions are given in millimeters. Tightening torque for the cable lug connection depends on the bolt size and type. See the technical data.



Tightening torques

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

Electrical connections

Size	Torque	Strength class
M3	0.5 N·m (4.4 lbf·in)	4.6...8.8
M4	1 N·m (9 lbf·in)	4.6...8.8
M5	4 N·m (35 lbf·in)	8.8
M6	9 N·m (6.6 lbf·ft)	8.8
M8	22 N·m (16 lbf·ft)	8.8
M10	42 N·m (31 lbf·ft)	8.8
M12	70 N·m (52 lbf·ft)	8.8
M16	120 N·m (90 lbf·ft)	8.8

Mechanical connections

Size	Max. torque	Strength class
M5	6 N·m (53 lbf·in)	8.8
M6	10 N·m (7.4 lbf·ft)	8.8
M8	24 N·m (17.7 lbf·ft)	8.8

Insulation supports

Size	Max. torque	Strength class
M6	5 N·m (44 lbf·in)	8.8
M8	9 N·m (6.6 lbf·ft)	8.8
M10	18 N·m (13.3 lbf·ft)	8.8
M12	31 N·m (23 lbf·ft)	8.8

Cable lugs

Size	Max. torque	Strength class
M8	15 N·m (11 lbf·ft)	8.8
M10	32 N·m (23.5 lbf·ft)	8.8
M12	50 N·m (37 lbf·ft)	8.8

Electrical power network specification

<table>
<tr><td>Voltage (U_1)</td><td>400 V units: 380…415 V AC 3-phase ± 10%. This is indicated in the type designation label as typical input voltage level (3~ 400 V AC).
500 V units: 380…500 V AC 3-phase ± 10%. This is indicated in the type designation label as typical input voltage levels (3~ 400/480/500 V AC).
690 V units: 525…690 V AC 3-phase ± 10% (525…600 V AC ± 10% in UL/CSA installations, or corner-grounded TN systems). This is indicated in the type designation label as typical input voltage levels (3~ 525/600/690 V AC).</td></tr>
<tr><td>Network type</td><td>TN (grounded) and IT (ungrounded) systems</td></tr>
<tr><td>Frequency</td><td>50/60 Hz, variation ± 5% of nominal frequency</td></tr>
<tr><td>Imbalance</td><td>Max. ± 3% of nominal phase-to-phase input voltage</td></tr>
<tr><td>Short-circuit withstand strength (IEC/EN 61439-1)</td><td>Supply units with the ABB-defined main switch-disconnector and fuses:
•Rated peak withstand current I_{pk} = 105 kA
•Rated short-time withstand current I_{cw} = 50 kA/1 s
Supply units with ABB-defined main circuit breaker and fuses:
•Rated peak withstand current I_{pk} = 143 kA
•Rated short-time withstand current I_{cw} = 65 kA/1 s</td></tr>
<tr><td>Short-circuit current protection (UL 508A, CSA C22.2 No. 14-13)</td><td>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 class T fuses.</td></tr>
<tr><td>Fundamental power factor (cos phi$_1$)</td><td>0.99</td></tr>
<tr><td>Harmonic distortion</td><td>Harmonics are below the limits defined in IEEE519.
<table>
<tr><th>R_{sc}</th><th>THD Voltage [%]</th><th>THD Current [%]</th></tr>
<tr><td>20</td><td>3</td><td>2.5 1)</td></tr>
<tr><td>100</td><td>0.8</td><td>2.5 1)</td></tr>
<tr><td>$THD = \sqrt{\sum_{2}^{50}\left(\frac{I_n}{I_N}\right)^2}$</td><td colspan="2">$I_n$ nth harmonic component
I_N nominal current</td></tr>
</table>
1) Other loads may influence the THD value.
THD = Total Harmonic Distortion (THD). The voltage THD depends on the short-circuit ratio (R_{sc}). The spectrum of the distortion also contains interharmonics.
$R_{sc} = I_{sc}/I_N$
I_{sc} = short-circuit current at point of common coupling (PCC)
I_N = IGBT supply unit nominal current</td></tr>
</table>

Control unit connection data (BCU)

See chapter *The control unit*.

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).

Aluminum cable		**PVC insulation Conductor temperature 70 °C**		**XLPE insulation Conductor temperature 90 °C**	
Size	⌀ **[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 °C		XLPE insulation Conductor temperature 90 °C	
Size	**⌀ [mm]**	**I_{Lmax} [A]**	**Time const. [s]**	**I_{Lmax} [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

Protection classes

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

Optical components

The specifications of the optic cable are as follows:

- Storage temperature: -55 … +85 °C (-67 … +185 °F)
- Installation temperature: -20 … +70 °C (-4 … +158 °F)
- Maximum short-term tensile force: 50 N (11.2 lbf)
- Minimum short-term bend radius: 25 mm (1.0 in)
- Minimum long-term bend radius: 35 mm (1.4 in)
- Maximum long-term tensile load: 1 N (3.6 ozf)
- 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.

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

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®) cables, which allow longer connection distances thanks to their lower attenuation. HCS® cables cannot be used with 5 MBd optical components.

The maximum lengths of fiber optic links for POF and HCS® cables are 20 and 200 meters (65.6 ft and 656 ft) respectively.

Ambient conditions

Environmental limits for the drive are given below. The drive is to be used in a heated, indoor, controlled environment.

	Operation installed for stationary use	Storage in the protective package	Transportation in the protective package
Installation site altitude	0…4000 m (0…13123 ft)* Output derated above 1000 m (3281 ft). *Neutral-grounded TN and TT network systems, non-corner-grounded IT network systems. Corner-grounded TN, TT and IT network systems up to 600 V.	-	-
Air temperature	0 … +40 °C (+32 … +104 °F). No condensation allowed. Output derated in the range +40 … +50 °C (+104 … +122 °F).	-40 to +70 °C (-40 to +158 °F)	-40 to +70 °C (-40 to +158 °F)
Relative humidity	Max. 95%	Max. 95%	Max. 95%
	No condensation allowed. Maximum allowed relative humidity is 60% in the presence of corrosive gases.		
Contamination	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 Chemical gases: Class 3C2 Solid particles: Class 3S2 (3S1 with IP20). No conductive dust allowed.	IEC 60721-3-1:1997 Chemical gases: Class 1C2 Solid particles: Class 1S3 (packing must support this, otherwise 1S2)	IEC 60721-3-2:1997 Chemical gases: Class 2C2 Solid particles: Class 2S2
Pollution degree	2		
Vibration IEC/EN 61800-5-1 IEC 60068-2-6:2007, EN 60068-2-6:2008 Environmental testing Part 2: Tests –Test Fc: Vibration (sinusoidal)	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^2 (32.8 ft/s^2)
Shock IEC 60068-2-27:2008, EN 60068-2-27:2009 Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock	Not allowed	With packing max. 100 m/s^2 (328 ft/s^2) 11 ms	With packing max. 100 m/s^2 (328 ft/s^2) 11 ms

Materials

Cabinet	•Zinc coated steel sheet •Polyester thermosetting powder coating on visible surfaces, color RAL Classic 7035 and RAL Classic 9017
Busbars for user power connections	Tin-plated copper
Fire safety of materials (IEC 60332-1)	Insulating materials and non-metallic items: mostly self-extinctive
Package	Standard package: •timber, polyethylene sheet (thickness 0.15 mm), stretch film (thickness 0.023 mm), PP tape, PET strap, sheet metal (steel) •for land and air transport when planned storage time is less than 2 months or when storage can be arranged in clean and dry conditions less than 6 months •can be used when products will not be exposed to corrosive atmosphere during transport or storage Container package: •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) •for sea transport in containers •recommended for land and air transport when storage time prior to installation exceeds 6 months or storage is arranged in partially weather-protected conditions Seaworthy package: •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) •for sea transport with or without containerization •for long storage periods in environments where roofed and humidity-controlled storage cannot be arranged Cabinets are attached to the pallet with screws and braced from the top end to the package walls to prevent swaying inside the package. Package elements are attached to each other with screws.
Disposal	The main parts of the drive can be recycled to preserve natural resources and energy. Product parts and materials should be dismantled and separated. 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. 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. See *ACS880 cabinet-installed drives recycling instructions and environmental information* (3AXD50000153909 [English]).

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]).

Disclaimers

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 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). 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 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.

8

The control unit

Contents of this chapter

This chapter

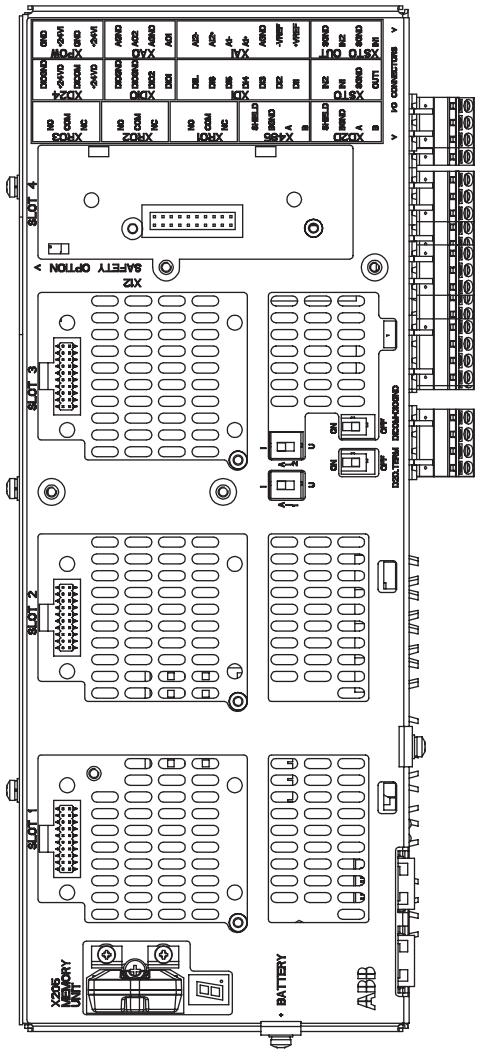
- describes the connections of the control unit
- contains the specifications of the inputs and outputs of the control unit.

General

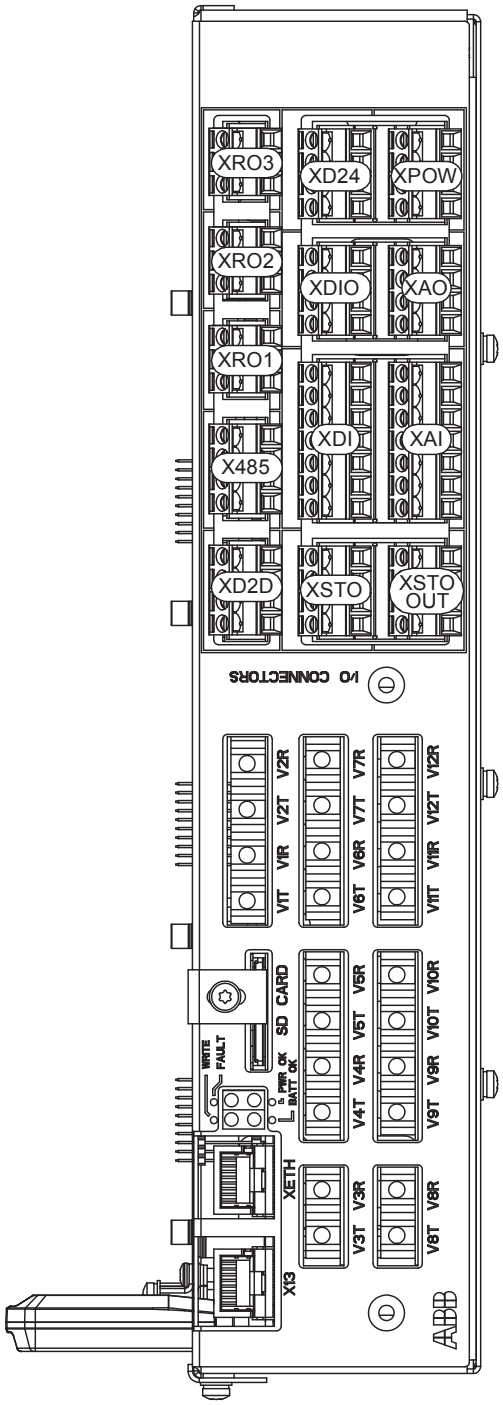
The BCU-x2 control unit is used with frame size R8i and multiples. The BCU-x2 consists of a BCON-12 control board (and a BIOC-01 I/O connector board and power supply board) built in a metal housing. The control unit is connected to the IGBT supply module(s) by fiber optic cables.

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 power module connections (2, 7 and 12 respectively) but are otherwise similar.

BCU-x2 layout



	Description
I/O	I/O terminals (see following diagram)
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
SLOT 4	RDCO-0x DDCS communication option module connection
X205	Memory unit connection
BATTERY	Holder for real-time clock battery (BR2032)
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). See the ground isolation diagram.
7-segment display Multicharacter indications are displayed as repeated sequences of characters	
	(“U” is indicated briefly before “o”.) Control program running
	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)
XSTO OUT	Safe torque off connection (to inverter modules)
X12	(On the opposite side) Connection for FSO-xx safety functions module (optional)
X13	Control panel / PC connection
X485	Not in use
V1T/V1R, V2T/V2R	Fiber optic connection to modules 1 and 2 (VxT = transmitter, VxR = receiver)
V3T/V3R … V7T/V7R	Fiber optic connection to modules 3…7 (BCU-12/22 only) (VxT = transmitter, VxR = receiver)
V8T/V8R … V12T/V12R	Fiber optic connection to modules 8…12 (BCU-22 only) (VxT = transmitter, VxR = receiver)
SD CARD	Data logger memory card for inverter module communication
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 supply/inverter unit.
PWR OK	Internal voltage supply is OK
WRITE	Writing to memory card in progress. Do not remove the memory card.

Default I/O diagram of the supply control unit

The diagram below shows the default I/O connections on the supply control unit (A51), and describes the use of the connections in the supply unit. Under normal circumstances, the factory-made wiring should not be changed.

The wire size accepted by all screw terminals (for both stranded and solid wire) is 0.5 … 2.5 mm^2 (24…12 AWG). The torque is 0.5 N·m (5 lbf·in).

XD2D		**Drive-to-drive link**
1	B	Drive-to-drive link (not in use by default)
2	A	
3	BGND	
4	Shield	
D2D.TERM		**Drive-to-drive link termination** [1]
X485		**RS485 connection**
5	B	Not in use (not in use by default)
6	A	
7	BGND	
8	Shield	
XRO1…XRO3		**Relay outputs**
11	NC	XRO1: **Charging** [2] (Energized = Closes charging contactor.) 250 V AC / 30 V DC / 2 A
12	COM	
13	NO	
21	NC	XRO2: **Fault(-1)** [3] (Energized = Indicates no fault.) 250 V AC / 30 V DC / 2 A
22	COM	
23	NO	
31	NC	XRO3: **MCB ctrl** [2] (Energized = Closes main contactor/breaker.) 250 V AC / 30 V DC / 2 A
32	COM	
33	NO	
XSTO		**XSTO connector**
1	OUT	XSTO connector. Both circuits (power module, control unit) must be closed for the supply unit to start. (IN1 and IN2 must be connected to OUT.) [4]
2	SGND	
3	IN1	
4	IN2	
5	IN1	Not in use
6	SGND	
7	IN2	
8	SGND	
XDI		**Digital inputs**
1	DI1	Temp fault [3] (0 = overtemperature)
2	DI2	Run / enable [3] (1 = run / enable)
3	DI3	MCB fb [2] (0 = main contactor/breaker open)
4	DI4	Not in use by default. Can be used for eg, auxiliary circuit breaker fault
5	DI5	Not in use by default. Can be used for eg, earth fault monitoring.
6	DI6	Reset [3] (0 -> 1 = fault reset)
7	DIIL	Not in use by default. Can be used for eg, emergency stop.
XDIO		**Digital input/outputs**
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
XD24		**Auxiliary voltage output**
5	+24VD	+24 V DC 200 mA [5]
6	DICOM	Digital input ground
7	+24VD	+24 V DC 200 mA [5]
8	DIOGND	Digital input/output ground
DICOM=DIOGND		**Ground selection switch** [6]
XAI		**Analog inputs, reference voltage output**
1	+VREF	10 V DC, R_L 1…10 kohm
2	-VREF	-10 V DC, R_L 1…10 kohm
3	AGND	Ground
4	AI1+	Not in use by default.
5	AI1-	0(2)…10 V, R_{in} > 200 kohm [7]
6	AI2+	Not in use by default.
7	AI2-	0(4)…20 mA, R_{in} = 100 ohm [8]
XAO		**Analog outputs**
1	AO1	**Zero** [3] 0…20 mA, R_L < 500 ohm
2	AGND	
3	AO2	**Zero** [3] 0…20 mA, R_L < 500 ohm
4	AGND	
XPOW		**External power input**
1	+24VI	24 V DC, 2.05 A
2	GND	
3	+24VI	
4	GND	
X12		**Safety functions module connection** (not in use in supply units)
X13		**Control panel connection**
X205		**Memory unit connection**

Notes:

[1] Must be set to ON when the supply unit is the first or last unit on the drive-to-drive (D2D) link. On intermediate units, set termination to OFF.

[2] Use of the signal in the control program. When parameter 120.30 External charge enable has value Yes (default setting), the control program reserves this I/O terminal for external charging circuit control and monitoring, and parameters 110.24 RO1 source and 110.30 RO3 source are write-protected. If the value is No, you can use the I/O terminal for other purposes.

[3] Use of the signal in the control program (fixed). See also the delivery-specific circuit diagrams.

[4] This input only acts as a true Safe torque off input in inverter control units. In other applications (such as a supply or brake unit), de-energizing the IN1 and/or IN2 terminal will stop the unit but not constitute a true safety function.

[5] Total load capacity of these outputs is 4.8 W (200 mA at 24 V) minus the power taken by DIO1 and DIO2.

[6] 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.

[7] Current [0(4)…20 mA, R_{in} = 100 ohm] or voltage [0(2)…10 V, R_{in} > 200 kohm] input selected by switch AI1. Change of setting requires reboot of control unit.

[8] Current [0(4)…20 mA, R_{in} = 100 ohm] or voltage [0(2)…10 V, R_{in} > 200 kohm] input selected by switch AI2. Change of setting requires reboot of control unit.

External power supply for the control unit (XPOW)

The control unit is powered from a 24 V DC, 2 A supply through terminal block XPOW. With a type BCU control unit, a second supply can be connected to the same terminal block for redundancy.

Using an external supply is recommended if

- the control unit needs to be kept operational during input power breaks, for example, because of continuous fieldbus communication
- immediate restart is needed after a power break (that is, no control unit power-up delay is allowed).

Safe torque off (XSTO, XSTO OUT)

Note: The XSTO input only acts as a true Safe torque off input on the inverter control unit. De-energizing the IN1 and/or IN2 terminals of other units (supply, DC/DC converter, or brake unit) will stop the unit but not constitute a true safety function.

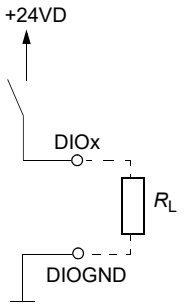
FSO-xx safety functions module connection (X12)

See the user manual of the FSO-xx module. Note that the FSO-xx safety functions module is not in use in supply, DC/DC converter or brake units.

SDHC memory card slot

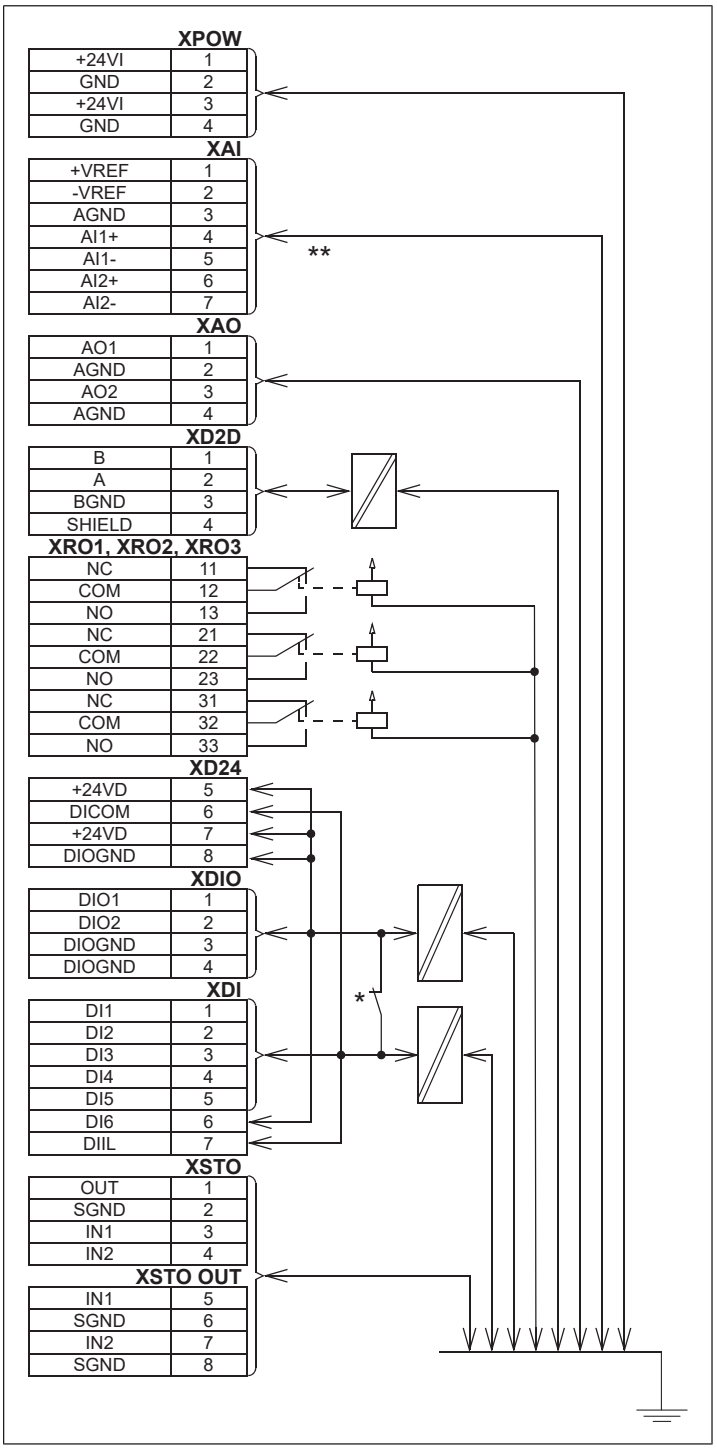
The BCU-x2 has an on-board data logger that collects real-time data from the power modules to help fault tracing and analysis. The data is stored onto the SDHC memory card inserted into the SD CARD slot and can be analyzed by ABB service personnel.

Connector data

Power supply (XPOW)	Connector pitch 5 mm, wire size 2.5 mm^2 24 V (±10%) DC, 2 A External power input. Two supplies can be connected for redundancy.
Relay outputs RO1…RO3 (XRO1…XRO3)	Connector pitch 5 mm, wire size 2.5 mm^2 250 V AC / 30 V DC, 2 A Protected by varistors
+24 V output (XD24:2 and XD24:4)	Connector pitch 5 mm, wire size 2.5 mm^2 Total load capacity of these outputs is 4.8 W (200 mA / 24 V) minus the power taken by DIO1 and DIO2.
Digital inputs DI1…DI6 (XDI:1…XDI:6)	Connector pitch 5 mm, wire size 2.5 mm^2 24 V logic levels: “0” < 5 V, “1” > 15 V R_{in}: 2.0 kohm Input type: NPN/PNP (DI1…DI5), PNP (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 sensor. "0" > 4 kohm, "1" < 1.5 kohm. I_{max}: 15 mA (DI1…DI5), 5 mA (DI6)
Start interlock input DIIL (XDI:7)	Connector pitch 5 mm, wire size 2.5 mm^2 24 V logic levels: "0" < 5 V, "1" > 15 V R_{in}: 2.0 kohm Input type: NPN/PNP Hardware filtering: 0.04 ms, digital filtering up to 8 ms
Digital inputs/outputs DIO1 and DIO2 (XDIO:1 and XDIO:2) 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, parameter group 111/11.	Connector pitch 5 mm, wire size 2.5 mm^2 As inputs: 24 V logic levels: "0" < 5 V, "1" > 15 V. R_{in}: 2.0 kohm. Filtering: 1 ms. As outputs: Total output current from +24VD is limited to 200 mA 
Reference voltage for analog inputs +VREF and -VREF (XAI:1 and XAI:2)	Connector pitch 5 mm, wire size 2.5 mm^2 10 V ±1% and –10 V ±1%, R_{load} 1…10 kohm Maximum output current: 10 mA
Analog inputs AI1 and AI2 (XAI:4 … XAI:7). Current/voltage input mode selection by switches	Connector pitch 5 mm, wire size 2.5 mm^2 Current input: –20…20 mA, R_{in} = 100 ohm Voltage input: –10…10 V, R_{in} > 200 kohm Differential inputs, common mode range ±30 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

Analog outputs AO1 and AO2 (XAO)	Connector pitch 5 mm, wire size 2.5 mm^2 0…20 mA, R_{load} < 500 ohm Frequency range: 0…500 Hz Resolution: 11 bit + sign bit Inaccuracy: 2% of full scale range
XD2D connector	Connector pitch 5 mm, wire size 2.5 mm^2 Physical layer: RS-485 Transmission rate: 8 Mbit/s Cable type: Shielded twisted-pair cable with a twisted pair for data and a wire or another pair for signal ground (nominal impedance 100 … 165 ohm, for example Belden 9842) Maximum length of link: 50 m (164 ft) Termination by switch
RS-485 connection (X485)	Connector pitch 5 mm, wire size 2.5 mm^2 Physical layer: RS-485
Safe torque off connection (XSTO)	Connector pitch 5 mm, wire size 2.5 mm^2 Input voltage range: -3…30 V DC Logic levels: "0" < 5 V, "1" > 17 V. **Note:** For the unit to start, both connections must be “1”. This applies to all control units (including drive, inverter, supply, brake, DC/DC converter etc. control units), but true Safe torque off functionality is only achieved through the XSTO connector of the drive/inverter control unit. EMC (immunity) according to IEC 61326-3-1
Safe torque off output (XSTO OUT)	Connector pitch 5 mm, wire size 2.5 mm^2 To STO connector of inverter module.
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.	

BCU-x2 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.

**Common mode voltage between each AI input and AGND is +30 V

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 www.abb.com/searchchannels.

Product training

For information on ABB product training, navigate to new.abb.com/service/training.

Providing feedback on ABB manuals

Your comments on our manuals are welcome. Navigate to new.abb.com/drives/manuals-feedback-form.

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