ABB INDUSTRIAL DRIVES

ACS880-207 IGBT supply units

Hardware manual

ACS880-207 IGBT supply units

Hardware manual

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Original instructions
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Table of contents

Further information

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 of the drive.

- Read the **complete safety instructions** before you install, commission, use or service the drive. The complete safety instructions are given in ACS880 multidrives cabinets and modules safety instructions (3AUA0000102301 [English]).
- Read the warnings of the software function before you take the function in use or change its default parameter settings. Read the warnings of the parameter before you change its default setting. Refer to the firmware manual.

Target audience

This manual is intended for people who plan the installation, install, commission 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 you work 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 44) 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 component designation in brackets (for example, [Q20]). This will help you to identify the components in the circuit diagrams of the drive.

Terms and abbreviations

Term	Description
ACS-AP-I	Industrial assistant non-Bluetooth control panel
ACS-AP-W	Industrial assistant control panel with Bluetooth interface
ACU	Auxiliary control unit. Contains control electronics, auxiliary voltage circuitry, etc.
BCON	Type of control board
BCU	Type of control unit
Control unit	The part in which the control program runs.
Cubicle	One section of a cabinet-installed drive. A cubicle is typically behind a door of its own.
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

Term	Description
IGBT supply module	IGBT bridge and related components enclosed inside a metal frame or enclosure. Intended for cabinet installation.
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. For example, 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
UCU	Type of control unit.
USCA-02	Adapter for installing F-series option modules onto the UCU control unit.

Related documents

You can find manuals on the Internet. See below for the relevant code/link. For more documentation, go to www.abb.com/drives/documents.

	Manuals for ACS880 multidrives cabinets

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.

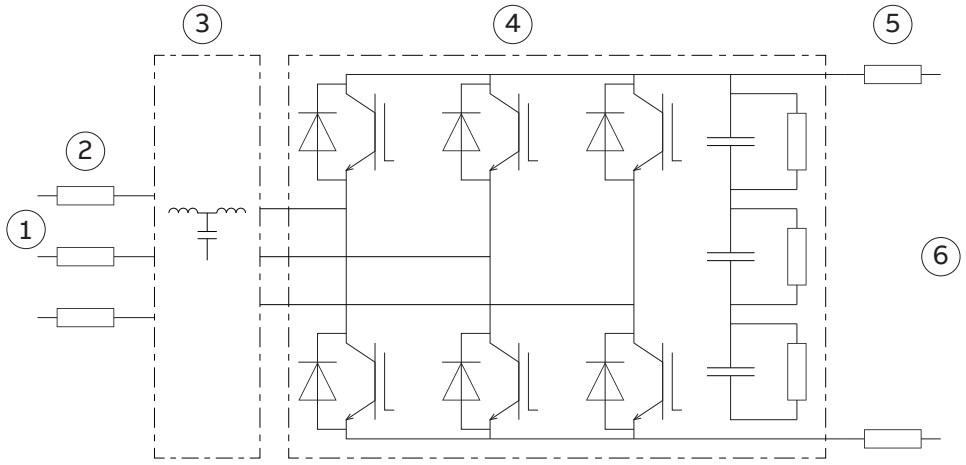
The LCL filter is an essential part of the IGBT supply unit. The supply module does not work without the filter. It suppresses the AC voltage distortion and current harmonics. The high AC inductance smooths the line voltage waveform distorted by the high-frequency switching of the converter. Capacitive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

The IGBT supply unit can be equipped with optimal grid control functionality and work as a grid converter. The grid converter can be used to produce an island AC grid. It is also possible to use grid converters in parallel with generators to support the operation of a distributed power system. The grid converter produces sinusoidal three-phase AC voltages from the DC link voltage of the system. AC voltage magnitude and frequency can be defined by the user. A grid converter can be used in eg. marine applications where ordinary power grid connection is not available. For further details, refer to Optimal grid control of ACS880 IGBT supply control program supplement (3AXD50000164745 [English]) or Optimal grid control of ACS880 IGBT supply control program (YISLX) supplement (3AXD50001096762 [English]).

Optimal grid control functionality is in use only when the license key N8053 has been activated on the memory unit. This has been done at the factory for a unit with the option +N8053. You can see the license information with the Drive Composer PC tool or ACS-AP-x control panel in **System info** - **Licenses**. If the license key for the optimal grid control is missing, the converter indicates fault 6E1F Licensing fault. Auxiliary code in the event logger indicates the plus code of missing license, in this case N8053. For further assistance, contact your local ABB representative.

Simplified main circuit diagram

This 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

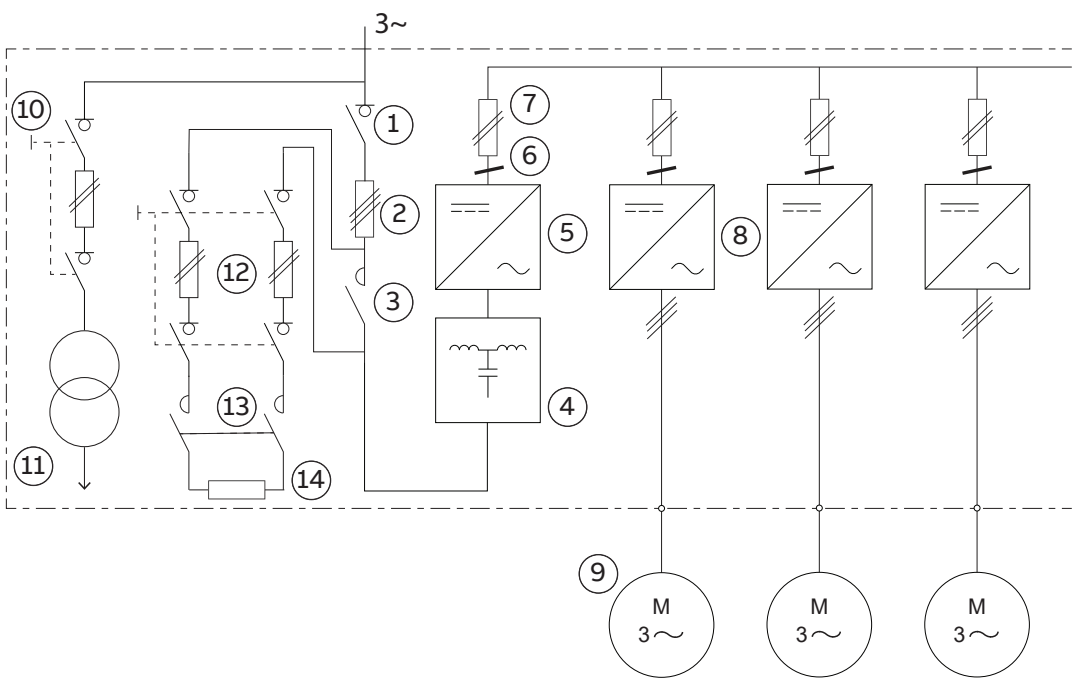
A charging circuit powers up the DC link capacitors of the drive system smoothly. Discharged capacitors cannot be directly connected to the full supply voltage. The charging current must be limited until the capacitors are charged and ready for normal use.

Cabinet-installed units have a resisting charging circuit. It consists of fuses, a contactor and charging resistors. The resistive charging circuit is in use after power-up for 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, refer to the firmware manual.

Overview diagram of the drive

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



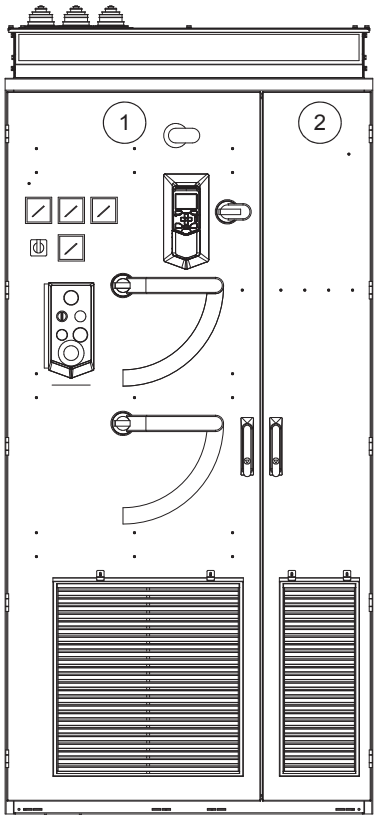
1	Main switch-disconnector ([Q1], option +F253) (standard, always with +F250)
2	AC fuses [F1]
3	Main contactor ([Q2], option +F250) (standard, always with +F253)
4	LCL filter [R03]
5	IGBT supply module [T01]
6	Common mode filter [R1]
7	DC fuses [F2]
8	Inverter modules [T11]
9	Motor(s)
10	Auxiliary voltage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

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

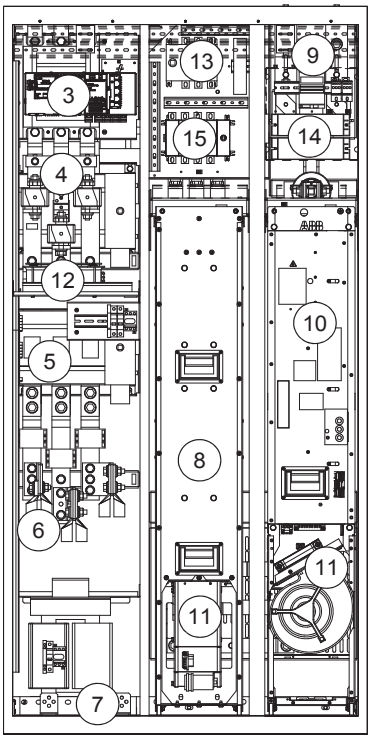
Limited scope means simplified version of a low power multidrive (400V and 500V) with less options and configurations. Includes only max 980A DSU, max 810A IGBT supply units and R1i-R7i inverter units.

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.

Door closed



Door open

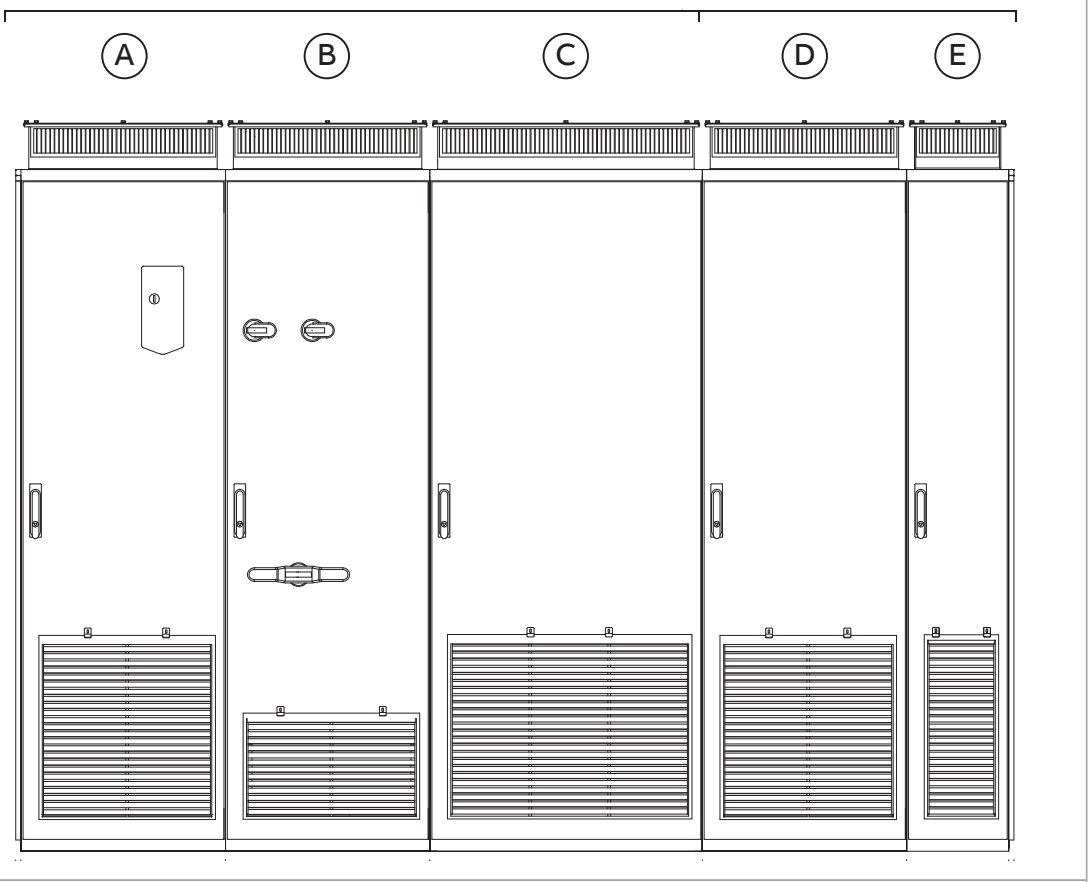


1	Incoming cubicle
2	IGBT supply module cubicle
3	BCU control unit [A51] with optional modules
4	AC fuses [F1]
5	Main switch-disconnector ([Q1], option +F253)
6	Input power cable connections [L1, L2, L3]
7	Location of PE busbar and input power cable lead-throughs
8	LCL filter module [R03]
9	DC fuses [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 a supply unit and an inverter unit. Cables enter the cabinet through the bottom.



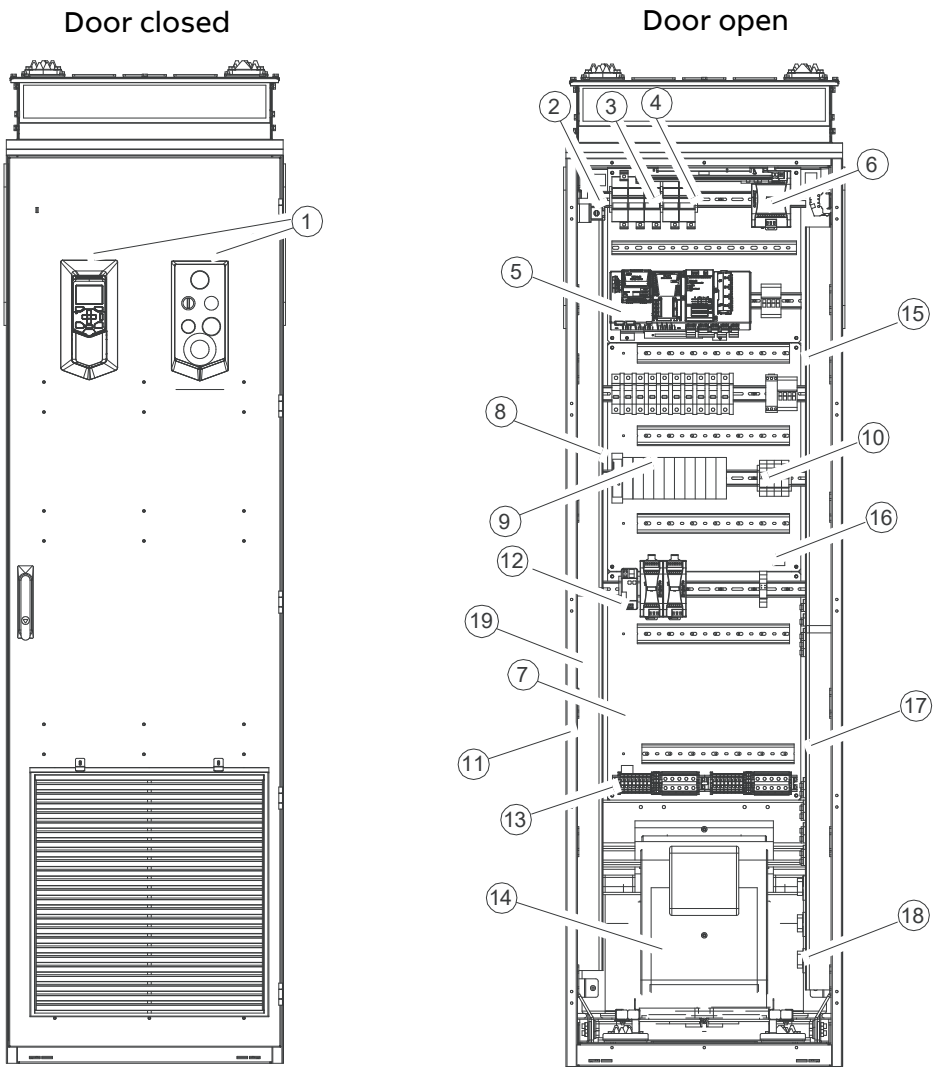
A	Auxiliary control cubicle (ACU). Contains control electronics and customer I/O connections.
B	Incoming cubicle (ICU). Contains the power input cable terminals and switchgear.
C	Supply module cubicle. Contains the supply modules.
D	Inverter module cubicle. Contains inverter modules.
E	Inverter control 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
6	T130	24 V DC power supply for cabinet lighting (option +G301)

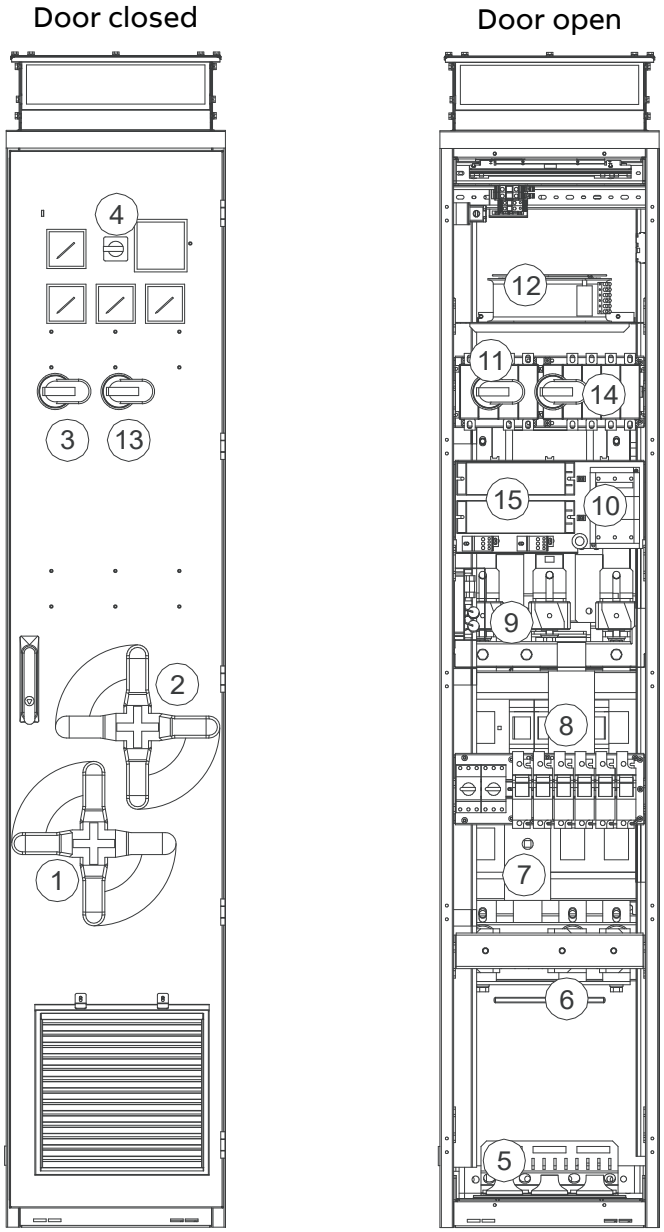
7		Reserved space for customer-defined equipment
	T21	At the backside of the assembly plate: Auxiliary voltage transformer (option +G344). **Note:** Connections are accessible from front. (Terminal block is at the lower part of cubicle.)
	T101	At the backside of the assembly plate: Auxiliary voltage 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).

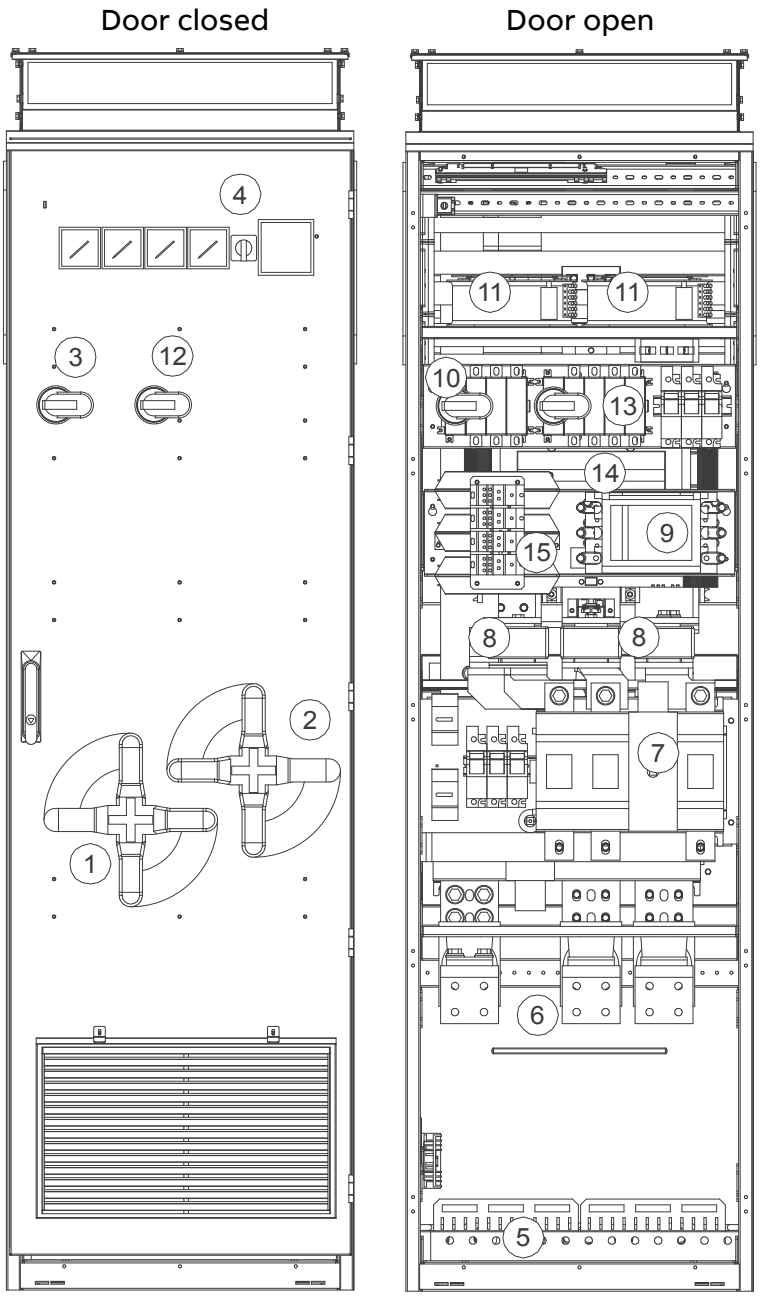


1	Main switch-disconnector [Q1]
2	Grounding switch [Q9] (option +F259)

3	Auxiliary voltage switch [Q21]
4	Phase selector switch for voltage meter [S5.x] (option +G334)
5	Grounding busbar [PE]
6	Input power cable terminals [L1…L3]
7	Main switch-disconnector [Q1]
8	Grounding 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).

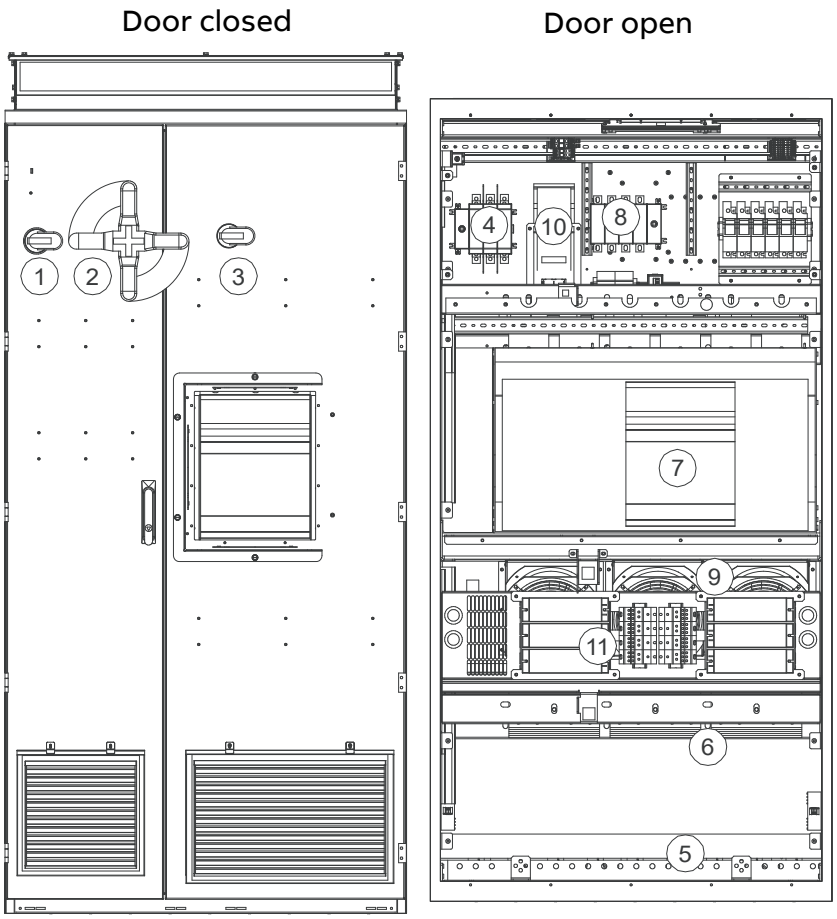


1	Main switch-disconnector handle
2	Grounding switch [Q9] (option +F259)
3	Auxiliary voltage switch handle
4	Phase selector switch for voltage meter [S5.x] (option +G334)
5	Grounding busbar [PE]

6	Input power cable terminals [L1…L3]
7	Main switch-disconnectors [Q1.1, Q1.2] (option +Q253)
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] (option +F250)
15	Charging resistors

Layout drawing of a 1000 mm incoming cubicle

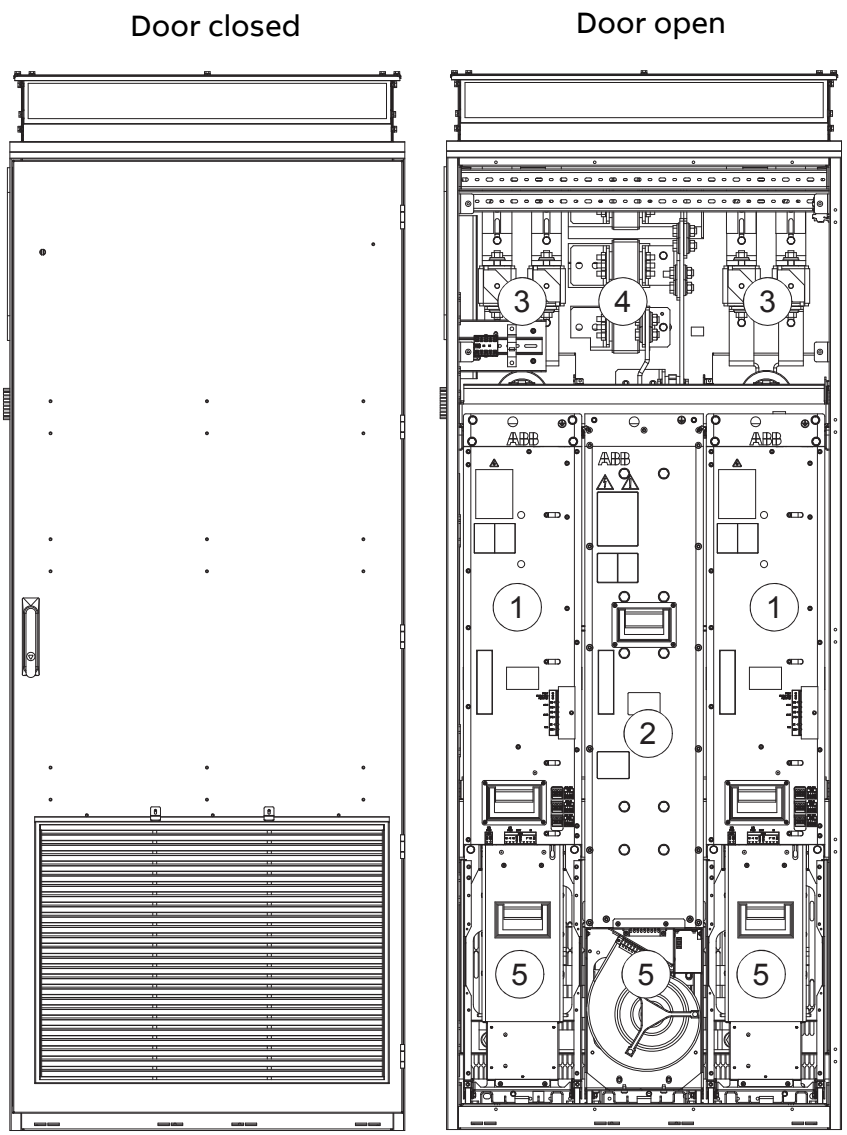
These layout drawings show a 1000 mm wide incoming cubicle with cabling through the bottom (option +H350).



1	Auxiliary voltage switch [Q21]
2	Grounding switch [Q9] (option +F259)
3	Charging switch [Q3]
4	Auxiliary voltage switch [Q21]
5	Grounding busbar [PE]
6	Input power cable terminals [L1…L3]
7	Main circuit breaker [Q1] (option +F255)
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).

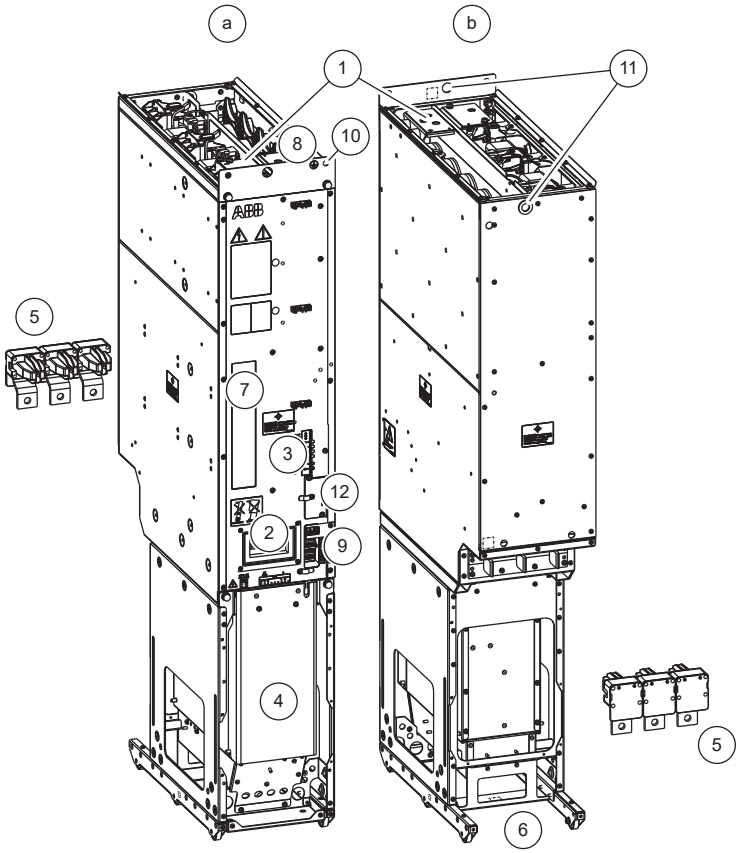


1	Supply module
2	LCL filter module
3	DC fuses
4	AC fuses
5	Module cooling fan

Layout drawings of supply and LCL filter modules

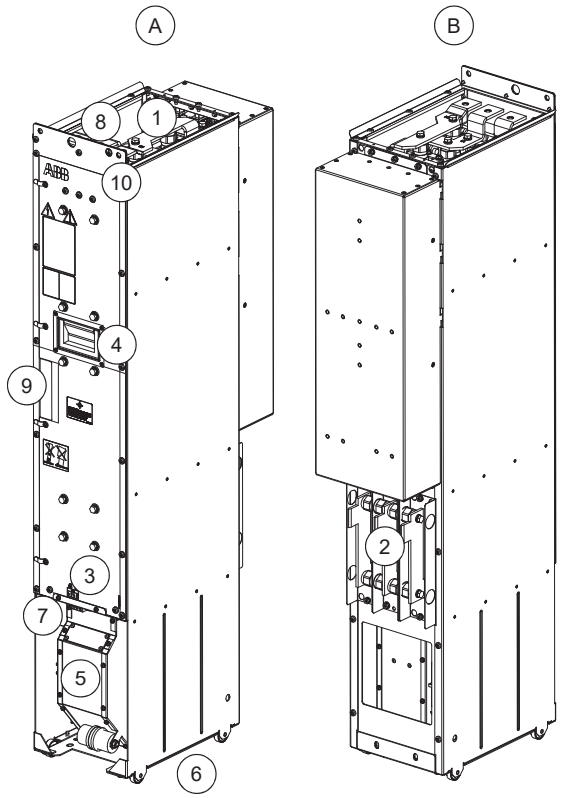
IGBT supply module (frame R8i)

This figure shows the layout of the R8i module.



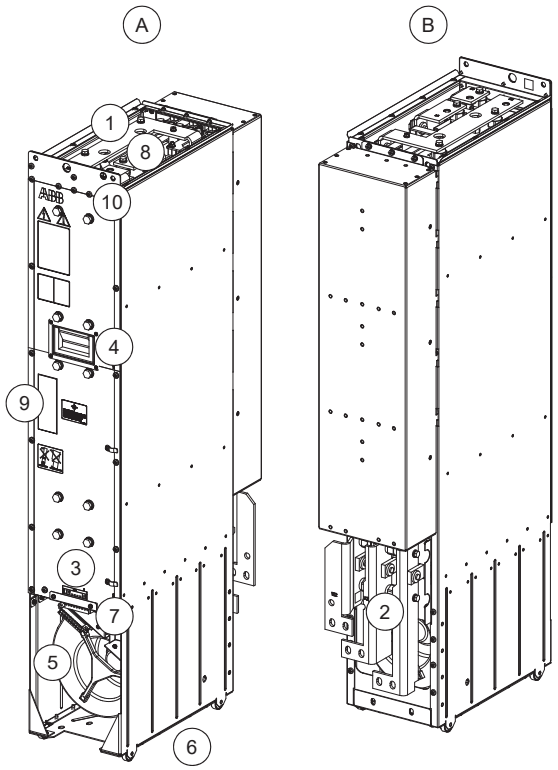
A	R8i module, front
B	R8i module, back
1	DC busbars
2	Handle
3	LEDs and fiber optic connectors
4	Fan (standard speed-controlled fan shown; a direct-on-line fan is available as option +C188)
5	Quick connector (three phases). The counterpart is fastened to the cabinet behind the module.
6	Wheels
7	Type 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

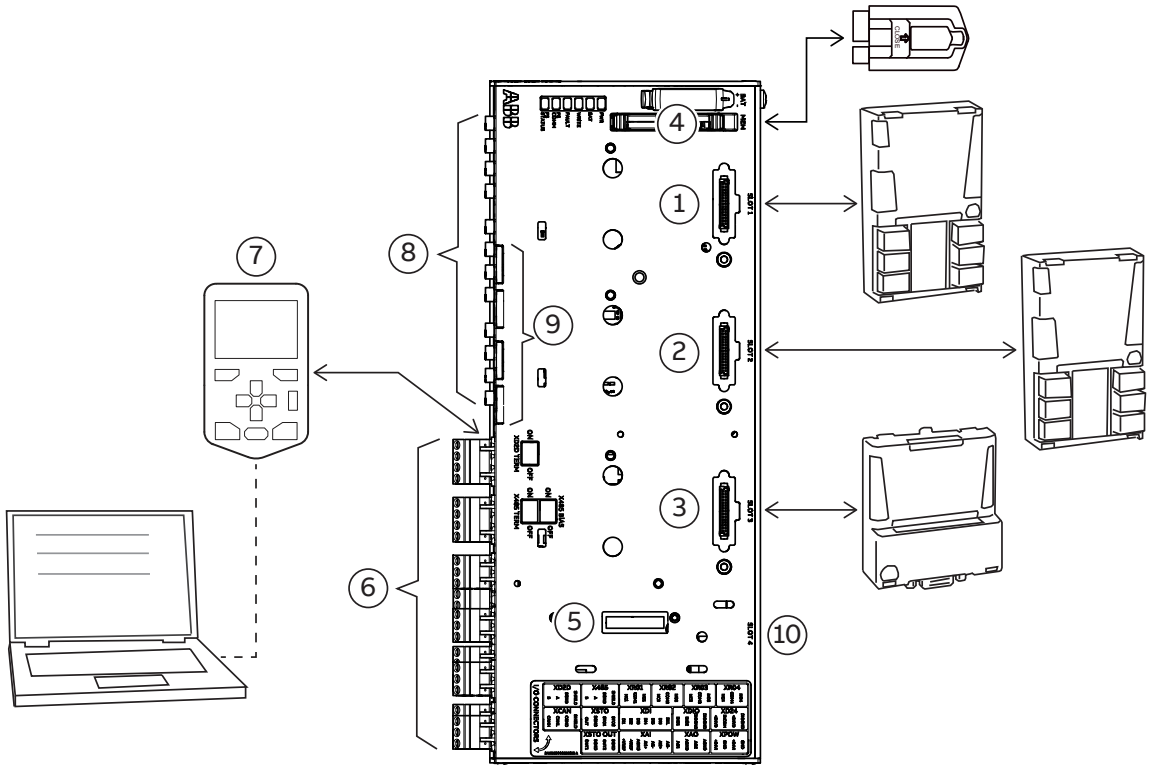
Input power connections of the IGBT supply unit are terminals L1, L2 and L3 located in the lower part of the incoming cubicle. Power cables enter the cabinet via lead-throughs on the floor of the cubicle as standard. For further details, see section Terminal and cable entry data for the input power cable (page 173).

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).

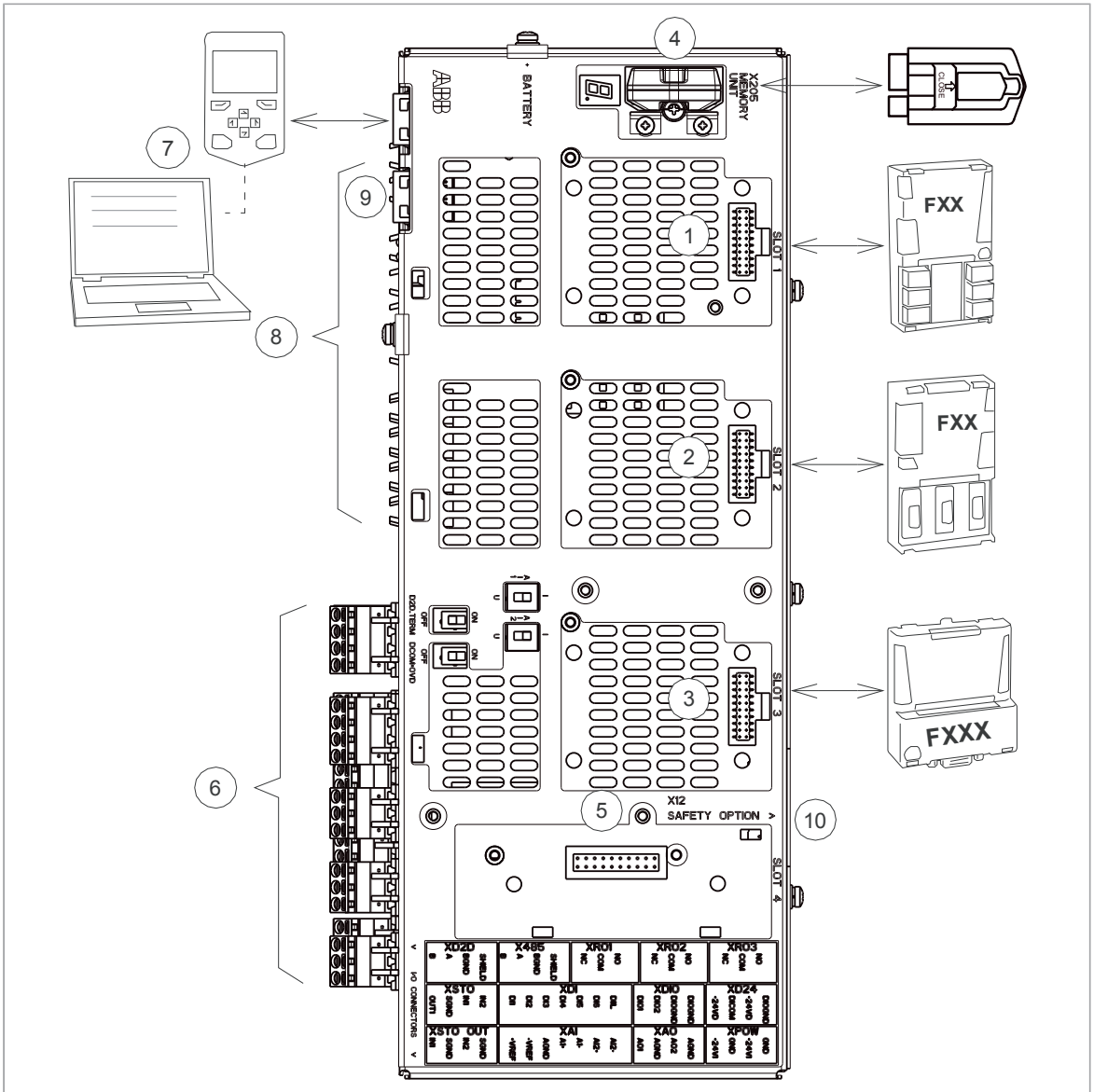
The supply unit I/O control interface is mostly in internal use.

Overview of the control connections of the UCU 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. For F-type modules with USCA-02 adapter.	7	Control panel
4	Memory unit	8	Fiber optic links to power modules (inverter, supply, brake or converter)
5	Slot 4 for RDCO module	9	Ethernet ports
6	Terminal blocks	10	Safety option interface. Reserved for future use.

Overview of the control connections of the BCU control unit

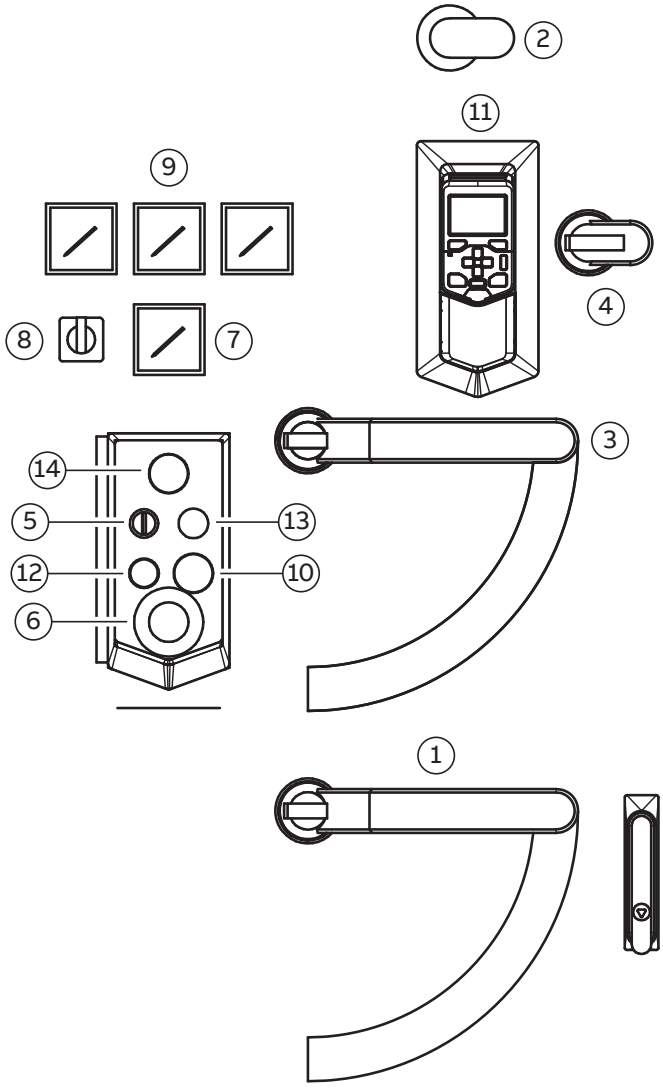


1 2 3	Analog and digital I/O extension modules and fieldbus communication modules can be inserted into slots 1, 2 and 3.	7	Control panel
4	Memory unit	8	Fiber optic links to power modules (inverter, supply, brake or converter)
5	Slot 4 for RDCO module	9	Ethernet port. Not in use.
6	Terminal blocks.	10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

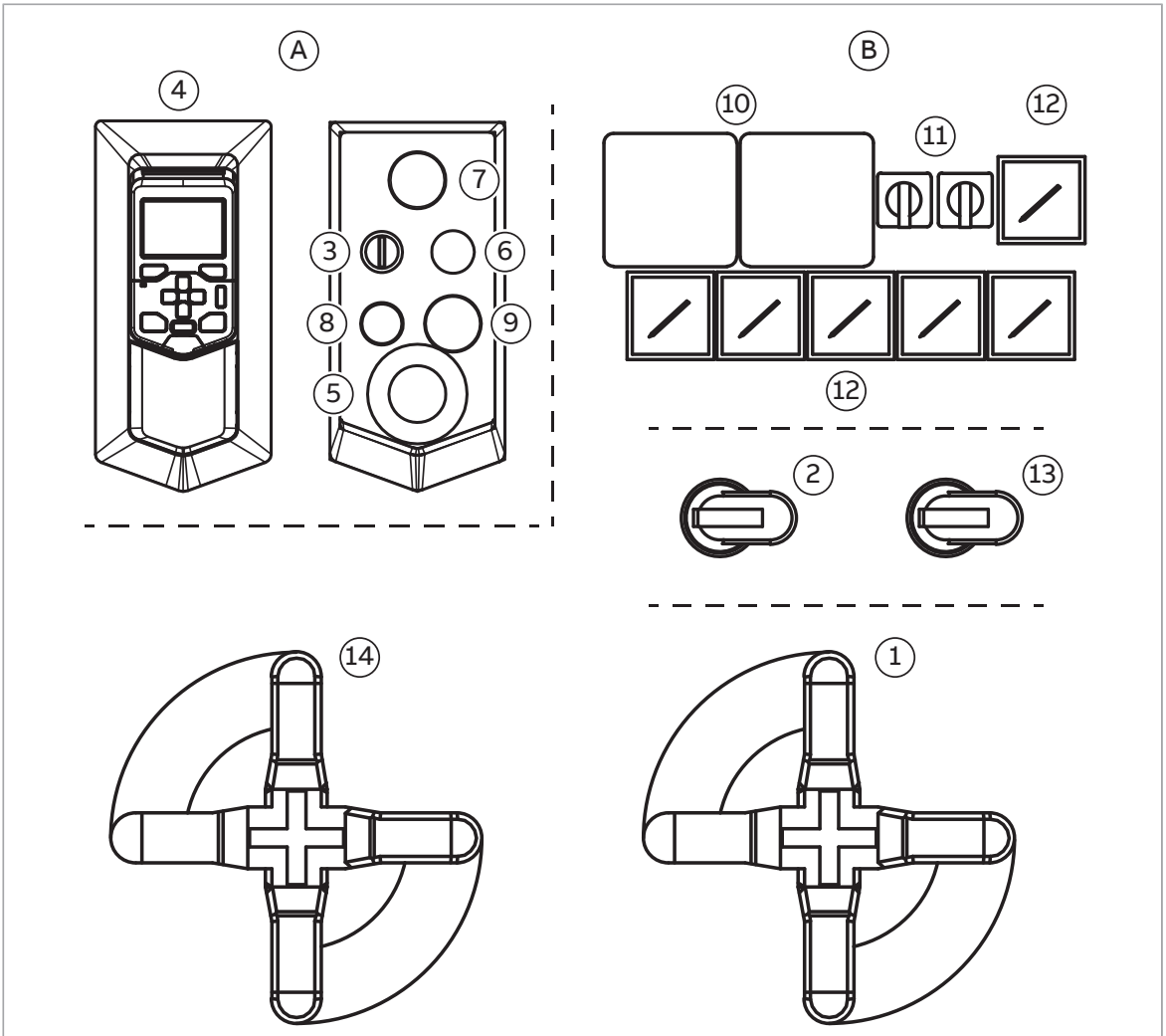
Door switches and devices for frame R8i cabinet (limited scope version)



1	Main switch-disconnector [Q1]
2	Auxiliary voltage switch [Q21]
3	Grounding switch [Q9] (option +F259)
4	Charging switch [Q3]
5	Operating switch [S21]. Supply unit start/stop control and main contactor/breaker on/off control.
6	Emergency stop button [S61] (option +G331)
7	Voltage meter [P5.x] (option +G334)
8	Phase selector switch for voltage meter [S5.x] (option +G334)
9	AC phase current meters [P2.x] (option +G335)
10	Supply transformer breaker disconnect push button [S22] (option +Q959)

11	Control panel [A59] (option +J400, +J412, or +J425)
12	Ground fault indicator light and reset button [S90] (option +Q954)
13	Emergency stop reset button and indication lamp [S62] [P62] (option +G331)
14	Electrical disconnect push button. Additional supply unit stop control and main contactor/breaker off control [S23] (option +G332).

Door switches and devices for frame R8i cabinet



A		Auxiliary control cubicle
B		Incoming cubicle
1	Q1	Main switch-disconnector [Q1]
2	Q21	Auxiliary voltage switch [Q21]
3	S21	Operating switch [S21]. Supply unit start/stop control and main contactor/breaker on/off control.
4	A59	Control panel [A59] (option +J400, +J412, or +J425)
5	S61	Emergency stop button [S61] (option +G331)
6	S62	Emergency stop reset button and indication lamp [S62] , [P62], (option +G331)
7	S23	Electrical disconnect push button. Additional supply unit stop control and main contactor/breaker off control [S23] (option +G332).
8	S90	Ground fault indicator light and reset button [S90] (option +Q954)
9	S22	Supply transformer breaker disconnect push button [S22] (option +Q959)
10	P5.x	Voltage meter [P5.x] (option +G334)
11	S5.x	Phase selector switch for voltage meter [S5.x] (option +G334)
12	P2.x	AC phase current meters [P2.x] (option +G335)
13	Q3	Charging switch [Q3]
14	Q9	Grounding switch [Q9] (option +F259)

Main disconnecting device [Q1]

Depending on the configuration of the drive, the main disconnecting device [Q1] is either a switch-disconnector or a main circuit breaker. Units with a switch-disconnector also have a main contactor.

The main disconnecting device isolates the drive main circuit from the main AC power supply. To isolate, user turns the switch-disconnector to the 0 (OFF) position, or racks out the main breaker.

WARNING!
The main disconnecting device does not isolate the input power terminals or AC voltage meters [P5.x] (option +G334) from the main AC power supply. Depending on the drive configuration, also the auxiliary circuit and charging circuit (if any) can remain non-isolated. To isolate the drive completely from the main AC power supply, open the main breaker of the supply transformer.

WARNING!
The grounding switch [Q9] (option +F259) and the main switch-disconnecting device [Q1] are electrically interlocked: Only one of them can be closed at a time. The drive auxiliary control voltage must be on to close the switches.

Auxiliary voltage switch [Q21]

The auxiliary voltage switch [Q21] controls the supply to the internal auxiliary circuits. User operates the switch with a handle on the cabinet door.

Grounding switch [Q9]

The grounding switch [Q9] (option +F259) connects the main AC power busbars to the PE busbar.

To close the grounding switch, auxiliary voltage must be switched on, and the main disconnecting device [Q1] must be open. User operates the switch with a handle on the cabinet door.

WARNING!
The grounding switch does not ground the input power terminals of the drive or the auxiliary (control) voltage circuits.

Charging switch [Q3]

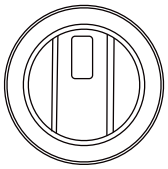
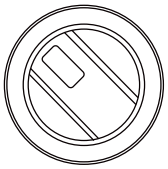
The charging switch [Q3] feeds power to the charging circuit. The supply unit control program controls the charging circuit on and off with the charging contactor [Q4]. At the drive power up, the control program closes the contactor. After the DC link capacitors are charged, the control program opens the contactor and starts the supply unit.

User operates the charging switch with a handle on the cabinet door. The switch must be closed during the drive power up to enable charging. ABB recommends to keep the switch open otherwise.

Operating switch [S21]

As standard, the operating switch [S21] controls the drive as follows:

- ENABLE/RUN (1) position: Run enable and Start signals of the supply unit are active. If the drive is de-energized, the control program runs the power up sequence: supply unit charges the drive DC link, closes the main contactor [Q2] or the main breaker [Q1] and starts the normal operation.
- 0 position: Supply unit stops and opens the main contactor [Q2] or the main breaker [Q1].

Position ENABLE/RUN (1)	Position OFF (0)
	

Emergency stop button [S61] and reset button [S62]

The emergency stop button [S61] (option +G331) activates an emergency stop function. When the user presses the button, the function stops the drive and motor according to the stop category (optional selection). The button has a self-hold mechanism. Before the drive restart is possible, the user must release the button and press the reset button [S62]. The reset button light goes on after the emergency stop function is ready for reset.

Control panel [A59]

The control panel is the user interface of the unit. An example control panel is shown below.

With the control panel, the user can:

- start and stop the unit
- view and reset the fault and warning messages, and view the fault history
- view actual signals
- change parameter settings
- change between local (control panel) and remote (external device) control.

To be able to start and stop the unit with the control panel, the Run enable signal and Start enable signal must be on (1) on the supply control unit. Normally, this is the case when the operating switch [S21] on the cabinet door is in ENABLE/RUN (1) position. The control mode selection on the control panel must also be Local. The Loc/Rem key of the panel selects between the local and remote control modes.

PC connection

User can connect a PC to the drive through the USB connector on the front of the control panel. When PC is connected to the control panel, the control panel keypad is disabled. To communicate with the drive, the PC must have a suitable drive PC tool installed (for example, Drive Composer).

Fieldbus control

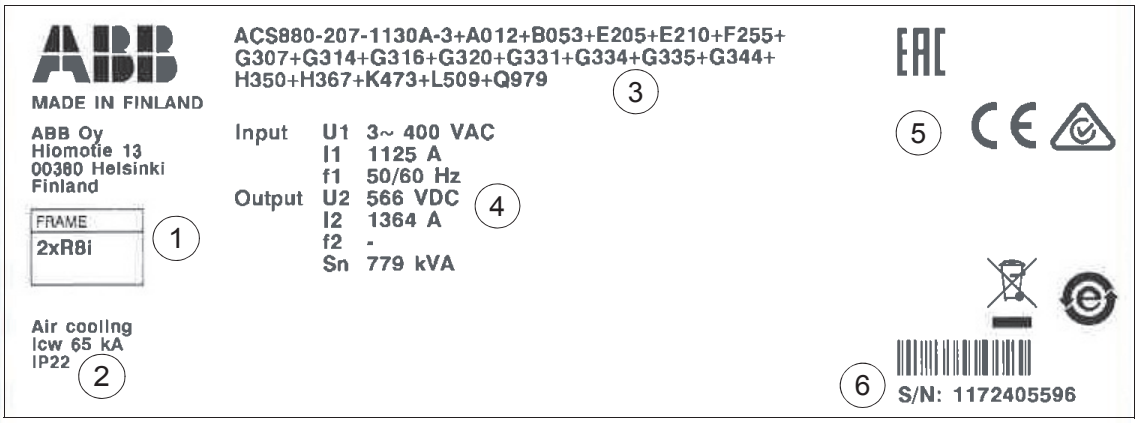
If the drive, or a unit of a drive (supply, inverter, etc.) has an optional fieldbus adapter, it is possible to control the drive or unit through a fieldbus. There are many fieldbus adapter types available.

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 44).
4	Ratings (listed in the technical data)
5	Valid markings. See ACS880 multidrives cabinets and modules electrical planning instructions (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.

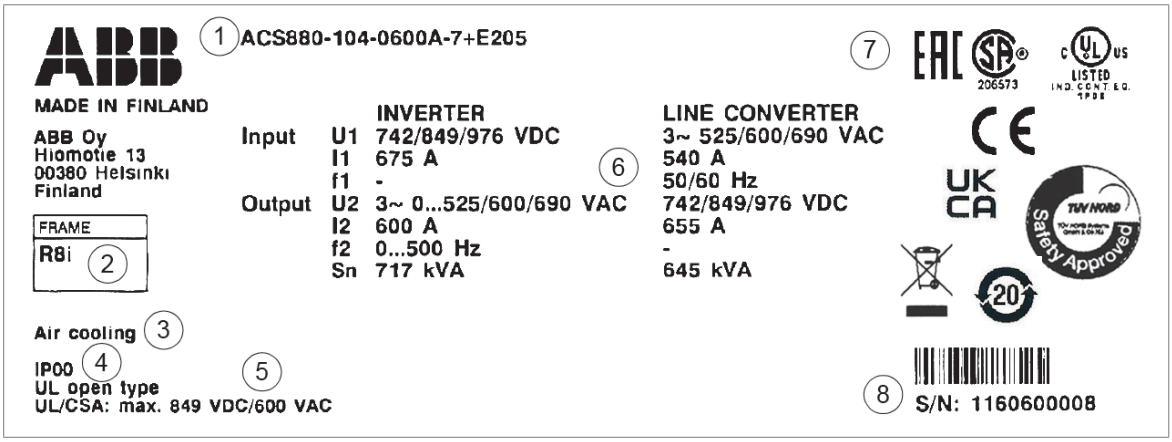
Type designation labels of the supply module and LCL filter module

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.

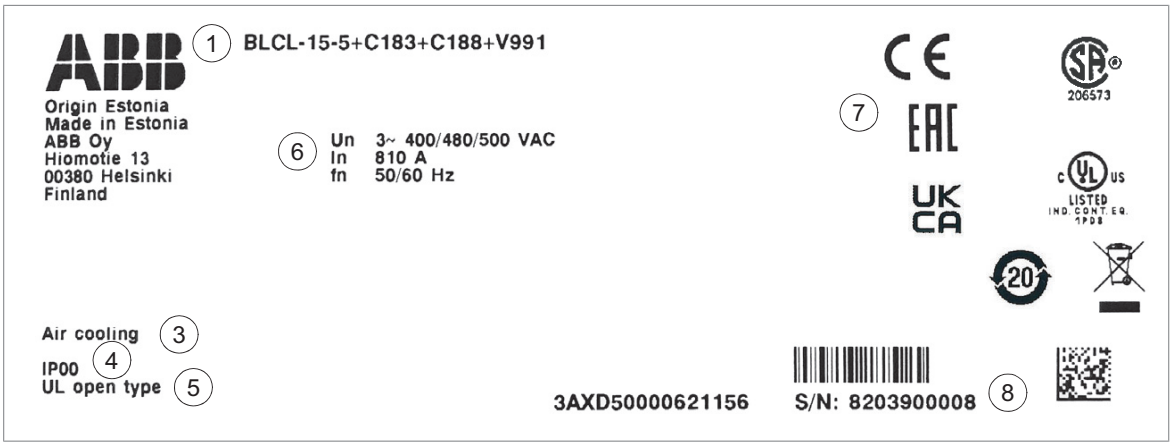
Quote the complete type designation and serial number when contacting technical support on the subject of individual IGBT supply modules or LCL filter modules.

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 ACS880 multidrives cabinets and modules electrical planning instructions (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
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)
J410	Drive control panel connection kit
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
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

CODE	DESCRIPTION
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
Monitoring	
K500	Wired remote monitoring
K501	Wireless remote monitoring with 4G
K502	Wireless remote monitoring with Bluetooth
K503	Wireless remote monitoring with 4G and Bluetooth
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
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
Other	
V112	Module auxiliary and fan power supply connector version. Type of the X50 connector is not mechanically backwards compatible with a module without option +V112.
Control unit	
V998	UCU-22…24 control unit

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
Other	
V112	Module auxiliary and fan power supply connector version. Type of the X50 connector is not mechanically backwards compatible with a module without option +V112.

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)
V112	Module auxiliary and fan power supply connector version. Type of the connector is not mechanically backwards compatible with a module without option +V112.
V991	Hardware version. LCL filter modules with or without this code are interchangeable.

Weak supply networks

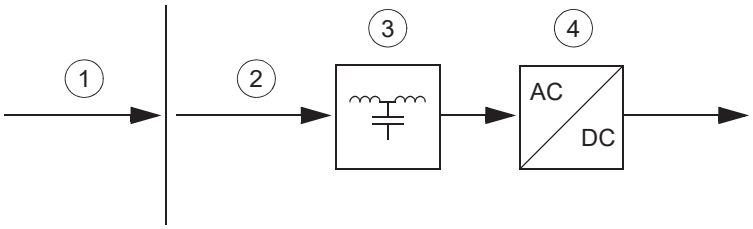
In weak supply networks with a short-circuit ratio less than 8, ABB recommends to equip the supply unit with a BAMU auxiliary measurement unit. Without the BAMU, there is a risk of nuisance DC overvoltage trippings due to disturbances caused by high-voltage THD in the supply voltage. Short-circuit ratio is defined as the supply network's apparent short-circuit power $S_{k,net}$ divided by the drive's nominal apparent power S_n:

$SCR_{net} = S_{k,net} / S_n$, where

- SCR_{net} = short-circuit ratio of the supply network
- $S_{k,net}$ = supply network's apparent short-circuit power
- S_n = nominal apparent power of the drive.

If a generator is used as a supply: The recommendation for ACS880 IGBT supply unit with generator supply is:

- always use a BAMU auxiliary measurement unit
- short-circuit ratio of the supply network $SCR_{net} > 3$
- short-circuit ratio of the generator $SCR_{gen} = 1/xk > 2$, where
  - xk = relative short-circuit reactance
- generator nominal power $P_{gen} > 0.3 \times P_{N,ISU}$, where
  - P_{gen} = generator nominal power (output)
  - $P_{N,ISU}$ = typical power of the IGBT supply unit in no-overload use.



1	Generator. $SCR_{gen} > 2$
2	Supply network. $SCR_{net} > 3$
3	LCL filter
4	IGBT supply module

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 ACS880 multidrives cabinets and modules electrical planning instructions (3AUA0000102324 [English]).

WARNING!
Only qualified electricians are allowed to do the work described in this chapter. Read the safety instructions given in ACS880 multidrives cabinets and modules safety instructions (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 persons who do work on the drive, motor cable or motor.

This procedure gives information on how to de-energize the drive and make it safe to do work on it. The procedure does not include all possible drive configurations. Each drive is made to order. Always refer to the circuit diagrams of the drive delivery.

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.

Do these steps before you begin any installation or maintenance work.

1. Prepare for the work.
   - Make sure that you have a work order.
   - Do an on-site risk assessment or job hazard analysis.
   - Make sure that you have the correct tools available.
   - Make sure that the workers are qualified.
   - Select the correct personal protective equipment (PPE).
   - Stop the drive and motor(s).
2. Clearly identify the work location and equipment.
3. Disconnect all possible voltage sources. Make sure that connection is not possible. Lock out and tag out.
   - If the drive is equipped with a DC/DC converter unit or a DC feeder unit: Open the disconnecting device of the energy storage connected to the unit. The disconnecting device is outside the drive cabinet. Then open the DC switch-disconnector ([Q11], option +F286 or +F290) of the unit.
   - Open the main disconnecting device of the drive.
   - Open the charging switch if it is 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.
   - Open the auxiliary voltage switch-disconnector (if it is present), and all other possible disconnecting devices that isolate the drive from dangerous voltage sources.
   - If a permanent magnet motor connects to the drive, disconnect the motor from the drive with a safety switch or by other means.
   - Open the main isolating device of the drive.
   - Disconnect all dangerous external voltages from the control circuits.
   - After you disconnect power from the drive, wait 5 minutes to let the intermediate circuit capacitors discharge before you continue.
4. Protect other energized parts in the work location against contact and take special precautions when close to bare conductors.
5. Measure that the installation is de-energized. Use a quality voltage tester. If the measurement requires removal or disassembly of shrouding or other cabinet

structures, obey the local laws and regulations applicable to live electrical work. This includes, but is not limited to, electric shock and arc protection.

- Before and after you measure 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 (U, V, W) and the grounding (PE) busbar is zero.

  Important! Repeat the measurement with the DC voltage setting of the voltage tester. Measure between each phase and ground. There is a risk of dangerous DC voltage charging due to leakage capacitances of the motor circuit. This voltage can remain charged for a long time after the drive power-off. The measurement discharges the voltage.
- Make sure that the voltage between the drive DC busbars and the grounding (PE) busbar is zero.
- If the drive is equipped with a DC/DC converter unit or a DC feeder unit: Make sure that the voltage between the energy storage terminals of the unit (ES+ and ES-) and the grounding (PE) busbar is zero.

6. Install temporary grounding as required by the local regulations.
7. Ask for a permit to work from the person that is responsible for the electrical installation work.

General notes

Printed circuit boards

WARNING!
Use ESD wristband when you handle printed circuit boards. Do not touch the boards unnecessarily. The boards are sensitive to electrostatic discharge.

Handling fiber optic cables

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

- Handle the fiber optic cables with care.
- When you disconnect the fiber optic cables, always hold the connector, not the cable.
- Do not touch the ends of the fibers. They are 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 resistance of the drive

WARNING!
Do not do voltage withstand or insulation resistance tests on the drive. The tests can cause damage to the drive. Every drive is 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 resistance of the input power cable

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

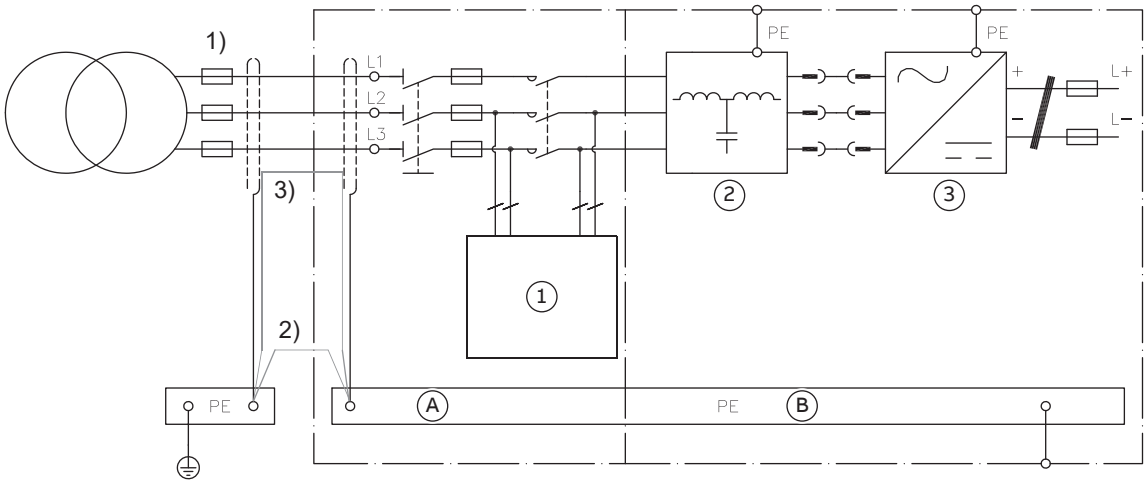
Compatibility check - IT (ungrounded) earthing system

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)



A	Incoming cubicle
B	IGBT supply module cubicle
1	Components for charging circuit
2	LCL filter
3	IGBT supply module

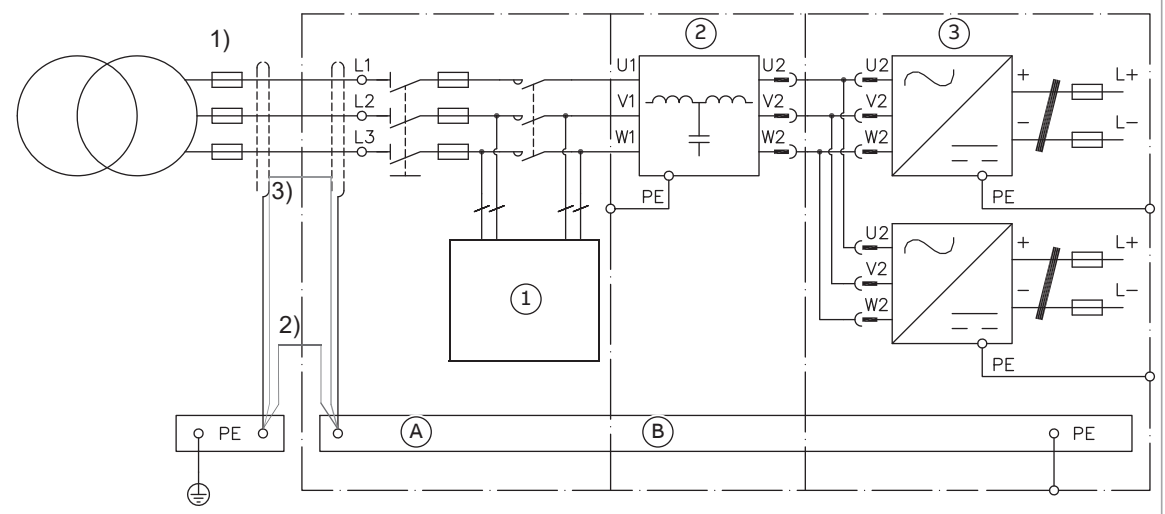
Note: 1) Fuses or other protection means.

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 ACS880 multidrives cabinets and modules electrical planning instructions (3AUA0000102324 [English]).

For the cable selection instructions, see ACS880 multidrives cabinets and modules electrical planning instructions (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)



A	Incoming cubicle
B	IGBT supply module cubicle
1	Components for charging circuit
2	LCL filter
3	IGBT supply module(s)

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 ACS880 multidrives cabinets and modules electrical planning instructions (3AUA0000102324 [English]).

For the cable selection instructions, see ACS880 multidrives cabinets and modules electrical planning instructions (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)

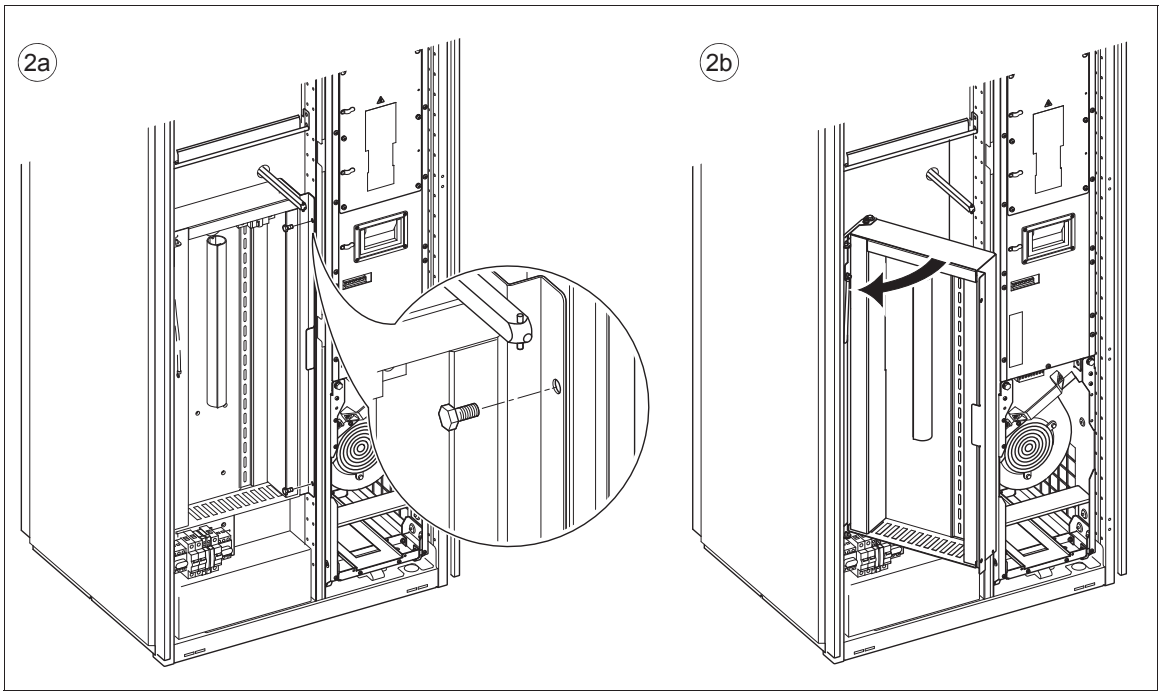
The cable lead-through details, and cable connection details are shown in section Terminal and cable entry data for the input power cable (page 173).

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 54).
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. See Use of fasteners in cable lug connections (page 64). 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 67).
6. Fasten the shroud and swing-out frame.
7. Close the door.



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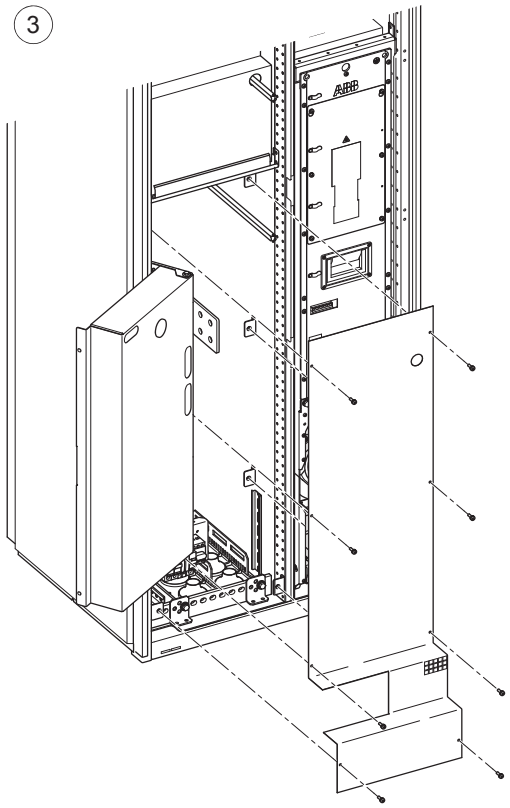

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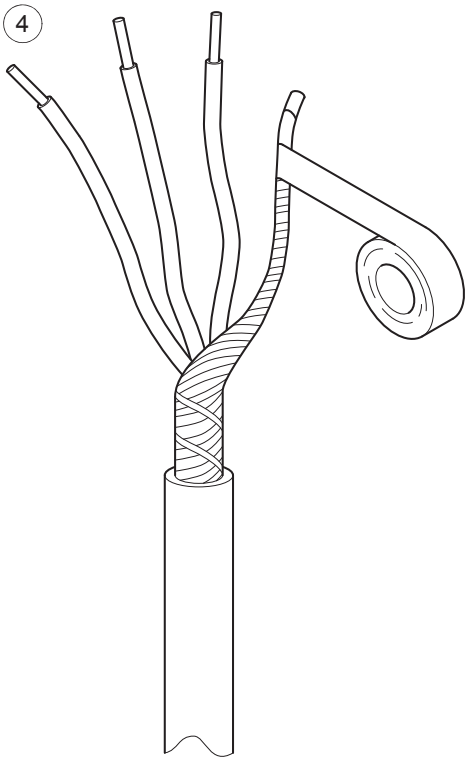
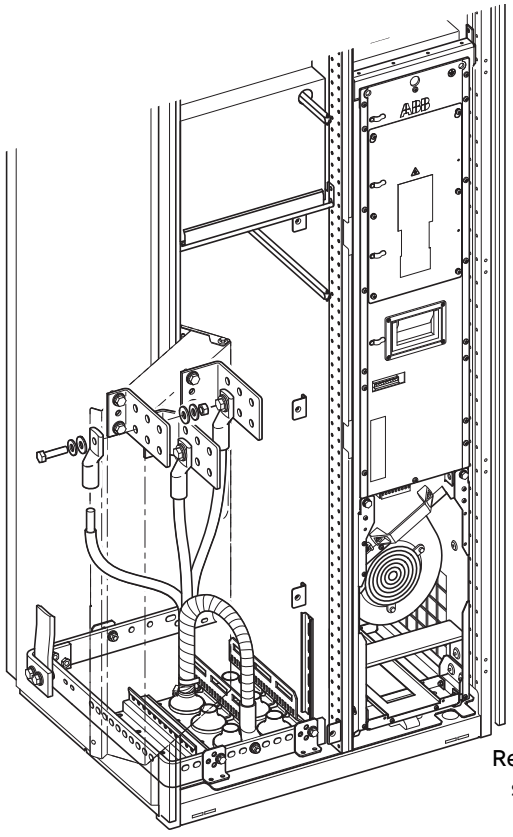
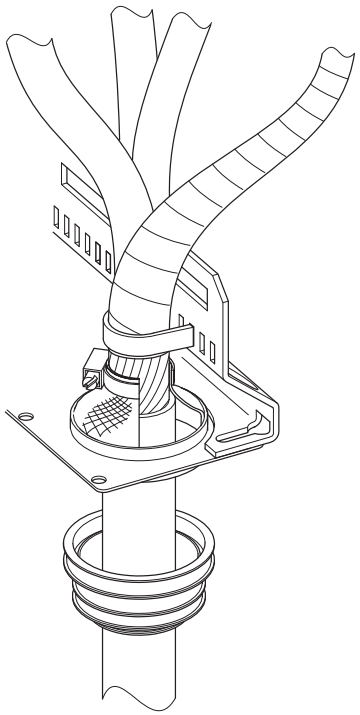






Recommendation: 360 degrees grounding of the cable shield at the lead-through suppresses interference.

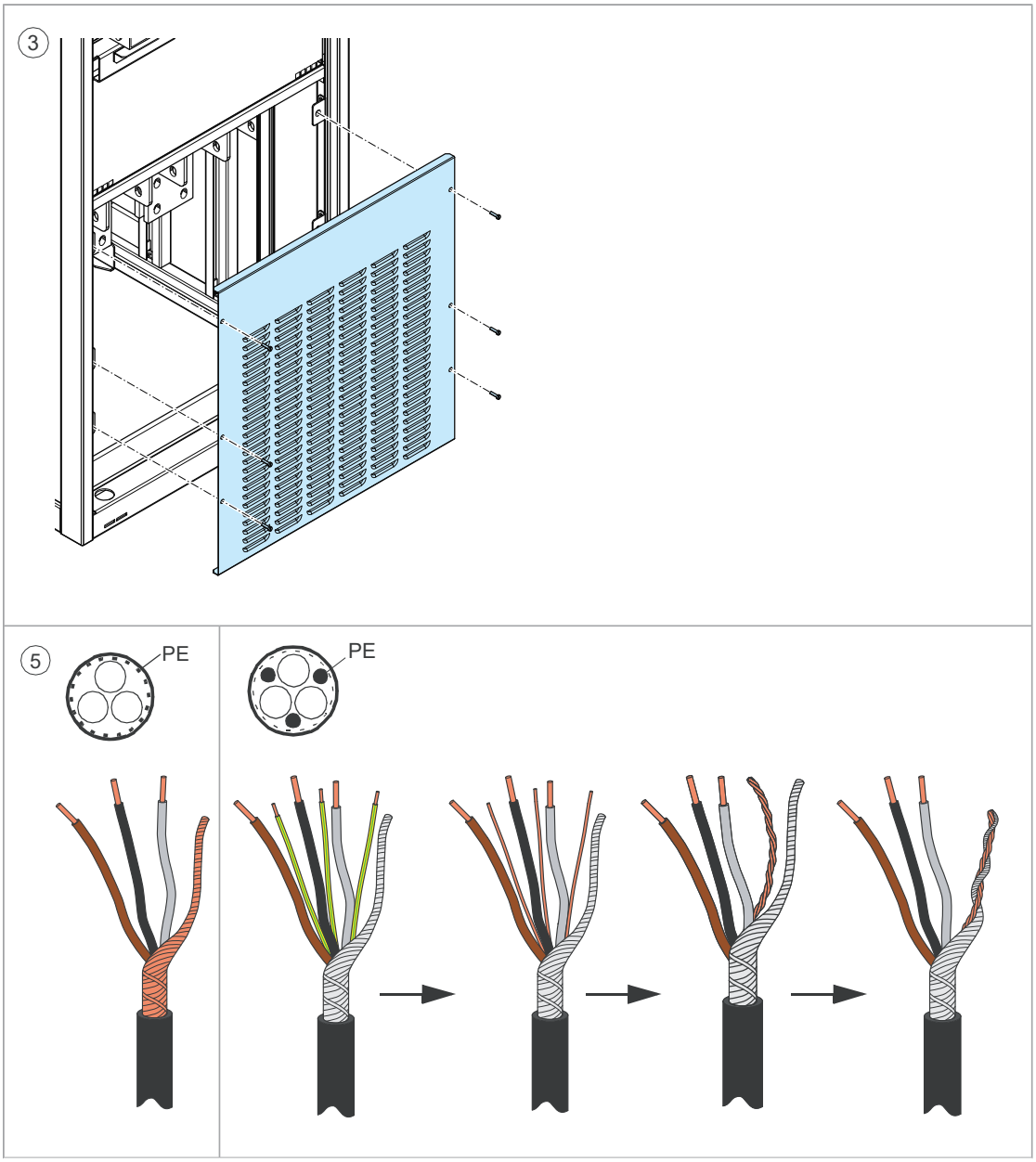
Connection procedure (frame R8i and multiples)

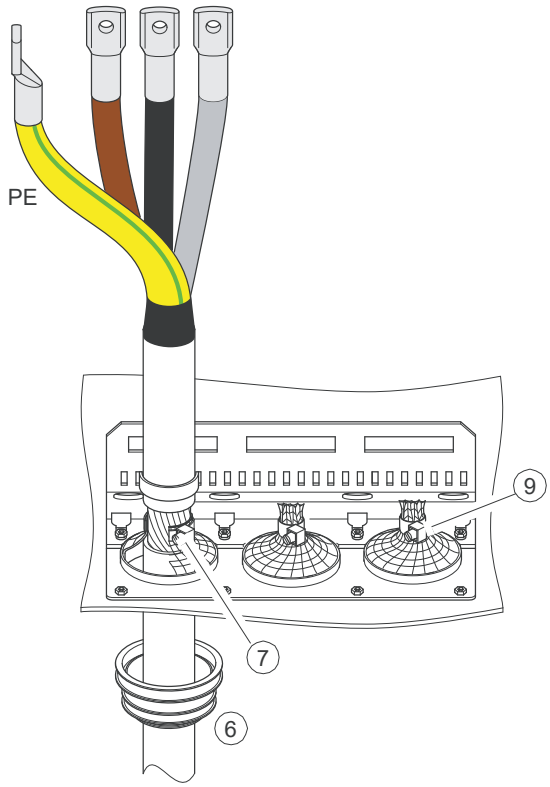
The cable entry details, and cable connection details are shown in section Terminal and lead-through data for the input power cable in the technical data.

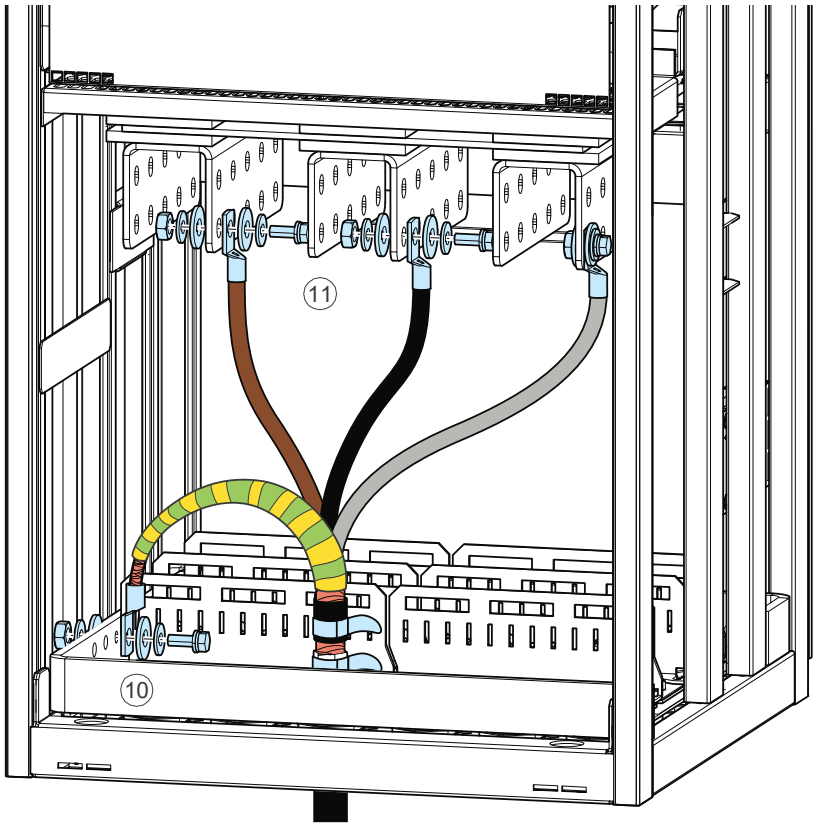
WARNING!
Obey the safety instructions of the drive. If you ignore them, injury or death, or damage to the equipment can occur. If you are not a qualified electrical professional, do not do installation, commissioning or maintenance work.

WARNING!
Apply grease to stripped aluminum conductors before you attach 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 54).
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. See Use of fasteners in cable lug connections (page 64). Tighten the screws to the torque given in the technical data.
12. Reinstall the shrouding removed earlier.
13. Close the door.


3
5
PE
PE

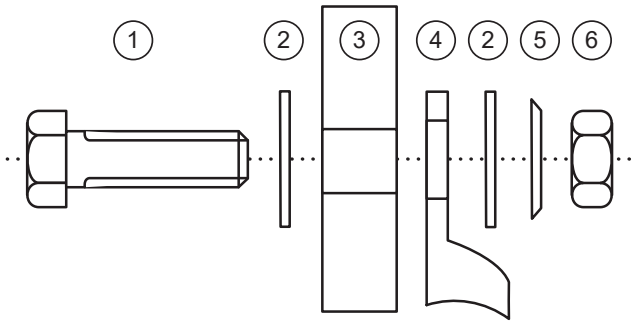

PE
9
7
6


11
10

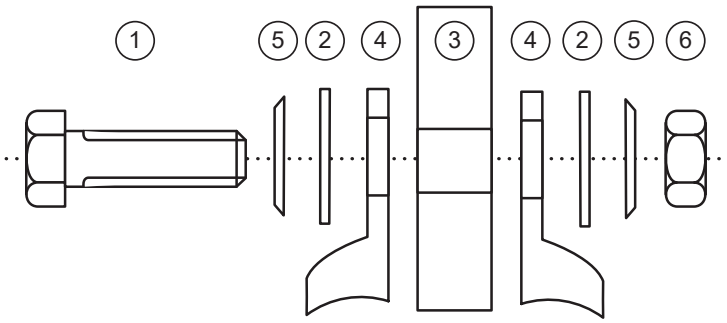
Use of fasteners in cable lug connections

Use the bolts, nuts and washers delivered with the drive. Install all the fasteners in the correct order. See the figure below. Tighten the cable lug to the torque specified for the connection.

Cable lug on one side of the busbar



Cable lugs on both sides of the busbar



1	Bolt	4	Cable lug
2	Plain washer	5	Spring washer
3	Busbar	6	Nut

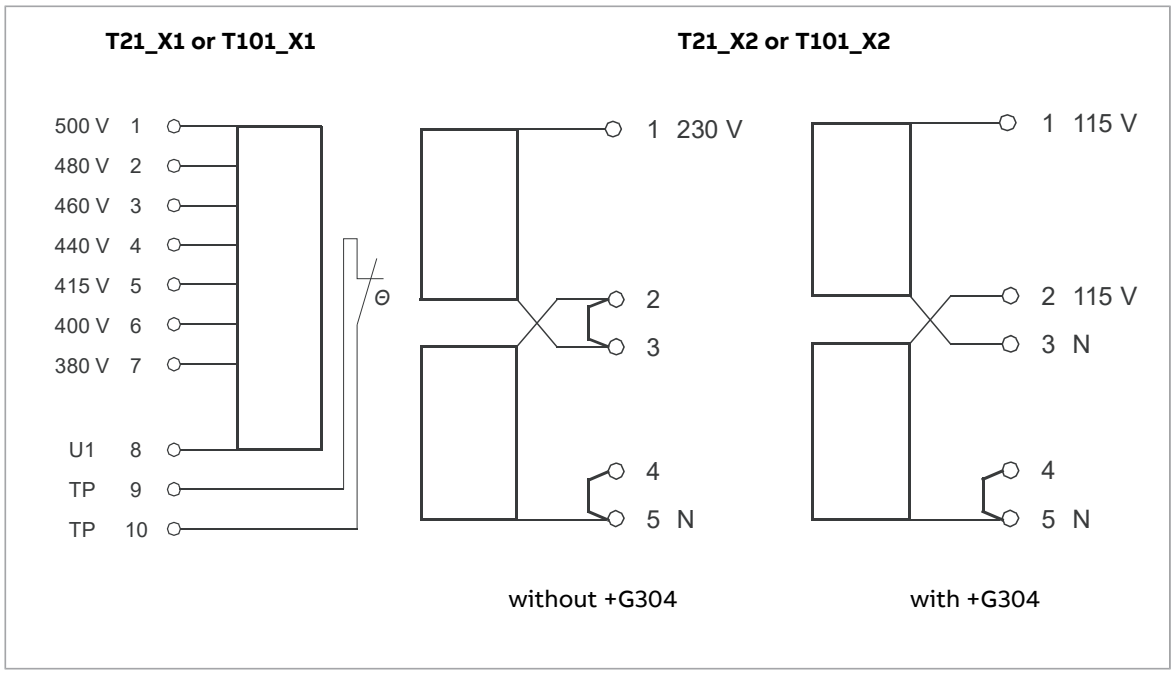
Checking the settings of transformers T21, T101 and T111

The factory makes auxiliary voltage transformer [T21, T101, T111] connections according to the supply voltage and desired output voltage. 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.

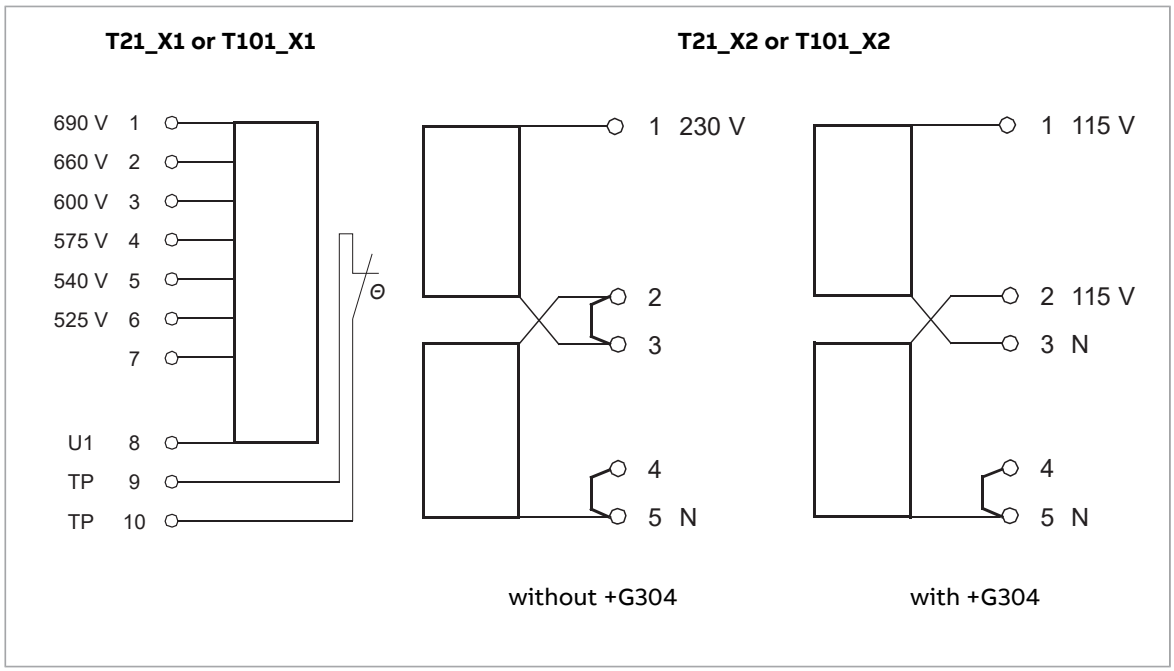
Transformer [T21] is a standard equipment. Transformers [T101] and [T111] are present if required by the options specified by the customer.

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. For the locations of the transformers and the terminal blocks, refer to the layout drawing of an auxiliary control cubicle and the circuit diagrams delivered with the drive.

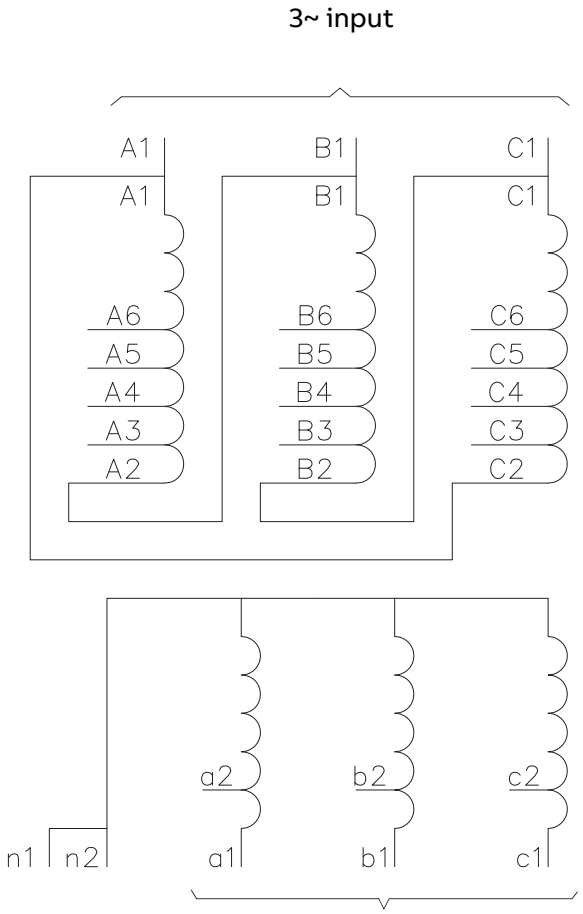
T21 and T101 tap settings (400...500 V units)



T21 and T101 tap settings (690 V units)



T111 tap settings



	3~ input				3~ output	
Supply voltage	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 chapters Control unit (UCU) and Control unit (BCU).

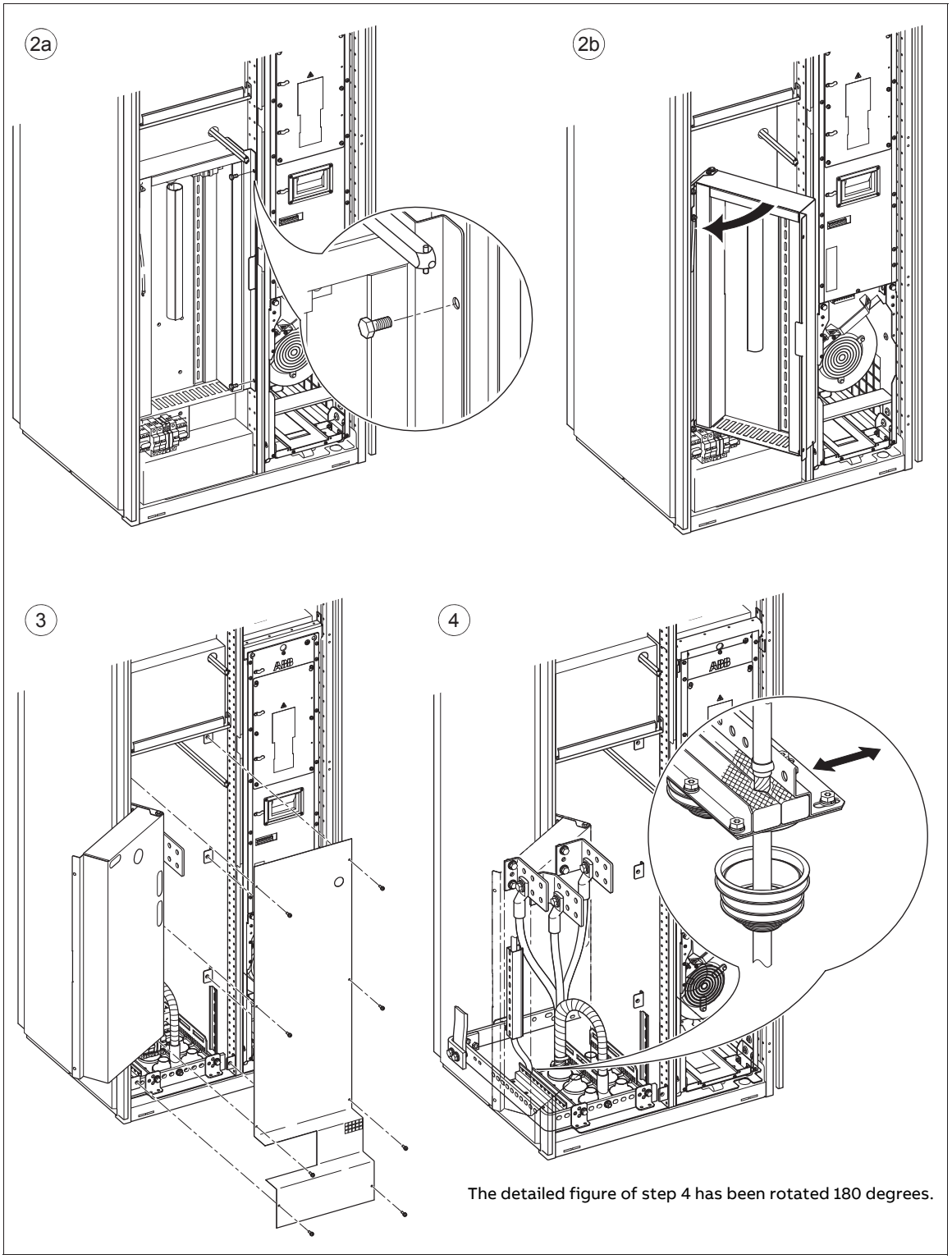
Connection procedure (frame R8i, limited scope version)

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 control unit chapter 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

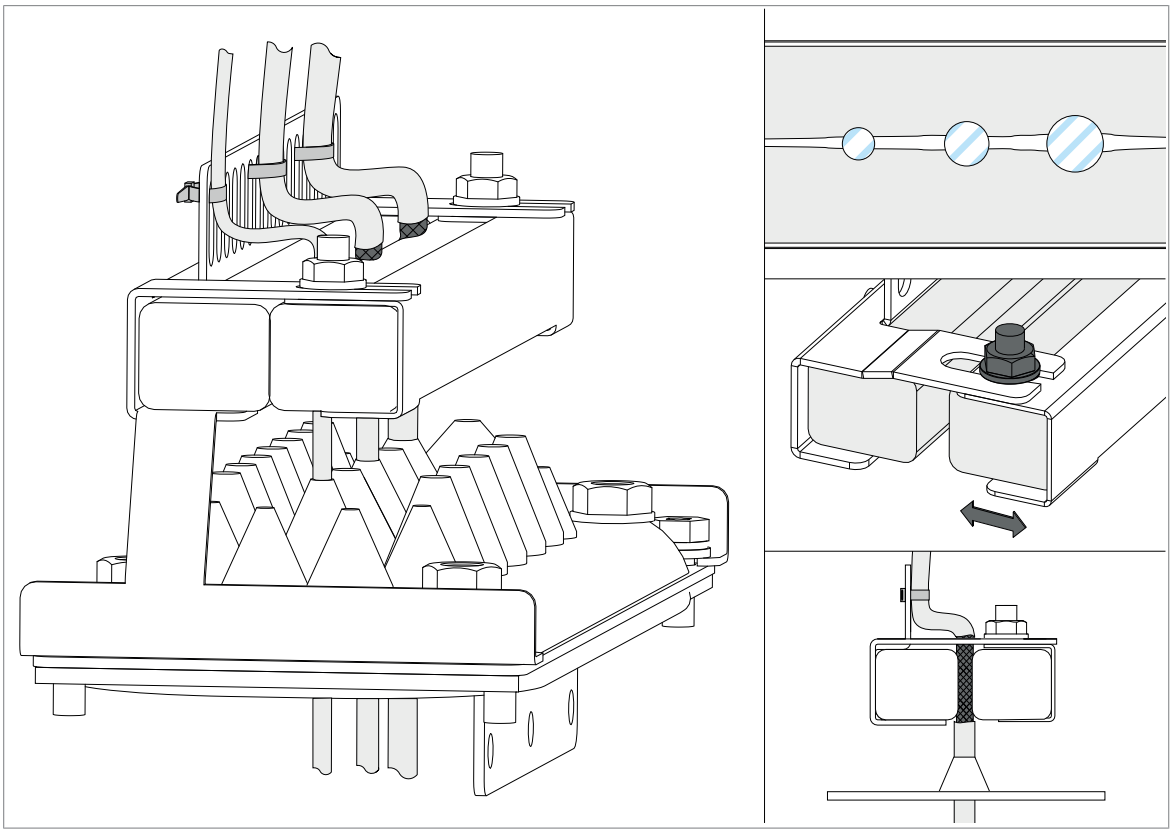
WARNING!
Obey the safety instructions of the drive. If you ignore them, injury or death, or damage to the equipment can occur. If you are not a qualified electrical professional, do not do installation, commissioning or maintenance work.

1. Stop the drive (if running) and do the steps in section Electrical safety precautions (page 54) before you start the work.
2. Put the control cables into the cabinet as described in section Grounding the outer shields of the control cables 360° at the cabinet entry (page 69).
3. Route the control cables as described in section Routing the control cables inside the cabinet (page 71).
4. Connect the control cables as described in section Connecting control cabling (page 71).

Grounding the outer shields of the control cables 360° at the cabinet entry

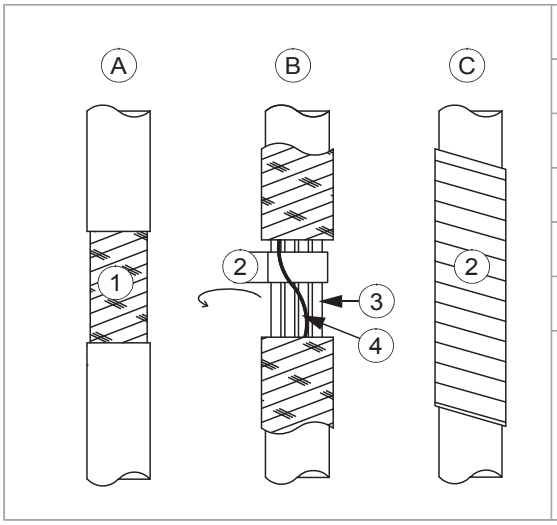
Ground the outer shields of all control cables 360° with the EMI conductive cushions at the cabinet entry. The grounding principle is the same for top and bottom entry cables. The figures show the bottom entry. The actual design details can vary.

1. If necessary, temporarily remove the shrouding in front of the cable entry.
2. Put the cables in sequence from the smallest to the largest. This will help to achieve a good contact with the cushions.
3. Loosen the tightening bolts of the EMI conductive cushions and pull them apart.
4. Cut holes in the grommets and put the cables through the grommets.
5. Peel the insulation from the part of the cable that will be in contact with the EMI conductive cushion.
6. Put the cables between the cushions and attach them with cable ties for strain relief.
7. Move the cushions back together.
8. Tighten the bolts to make sure that the EMI conductive cushions press tightly around the peeled part of the cables.



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

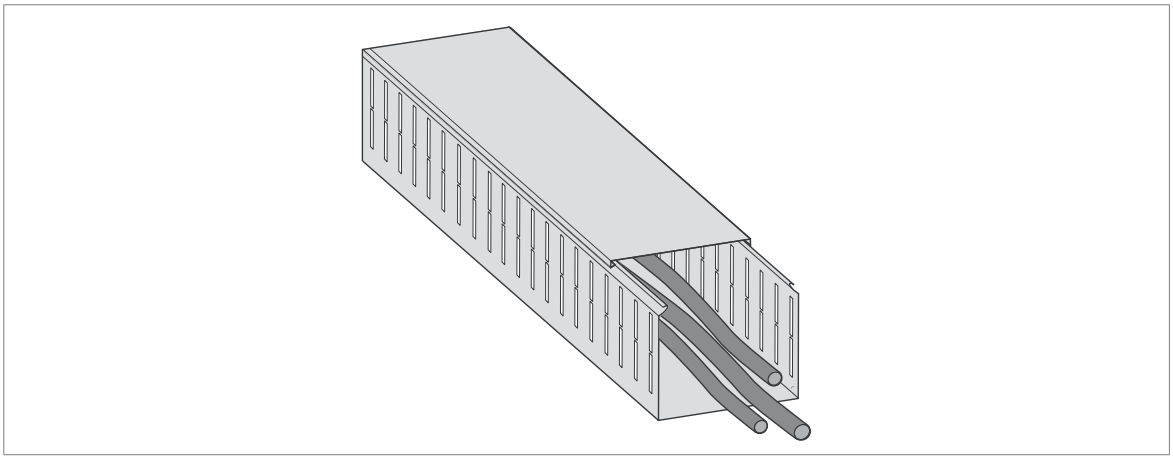
- Cut the shield at the midpoint of the peeled part. Be careful not to cut the conductors or the grounding wire.
- Turn the conductive side of the shield inside out over the insulation.
- Cover the exposed shield and the peeled cable with copper foil to keep the shielding continuous.



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

Routing the control cables inside the cabinet

Use the existing trunking in the cabinet where 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.



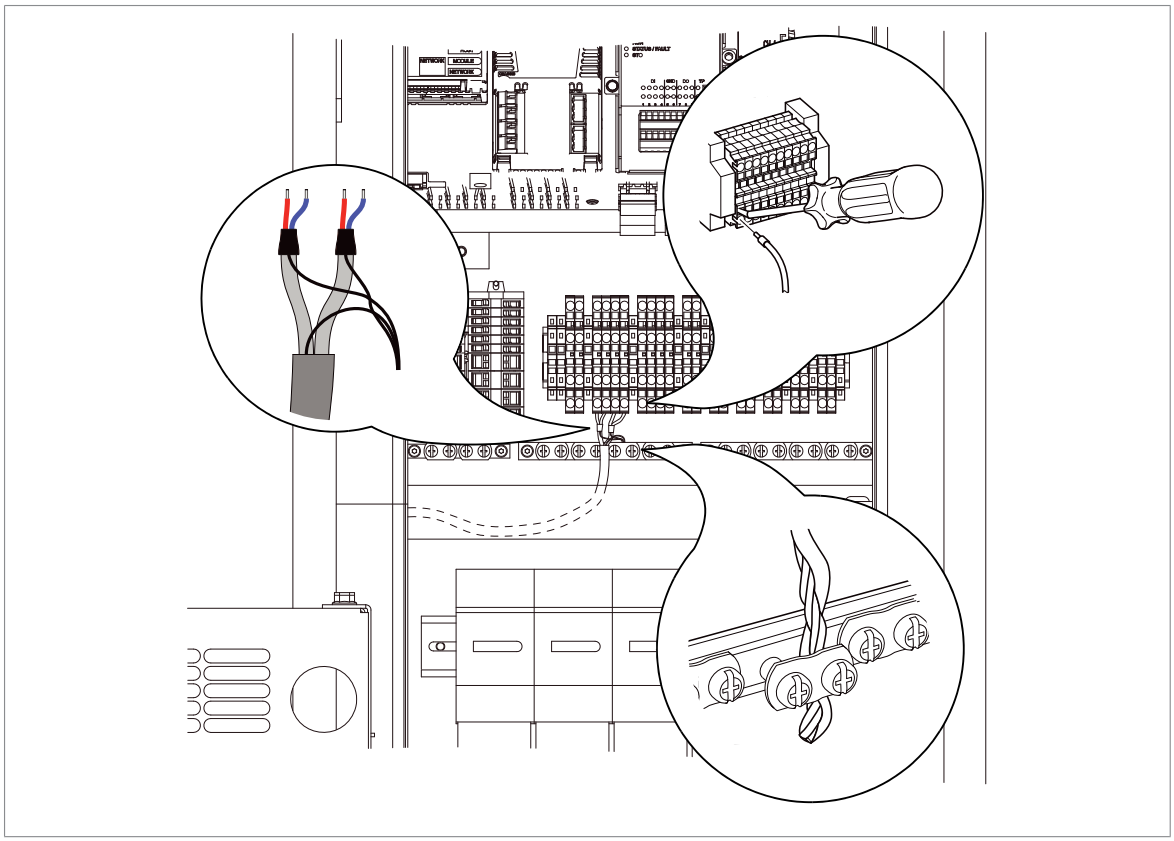
Connecting control cabling

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

Obey these instructions:

- Connect the inner twisted pair shields and all separate grounding wires to the grounding clamps near the terminals.
- Ground the outer shield of the cable at the cable entry, not at the grounding clamps near the terminals.
- 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.

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.



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.

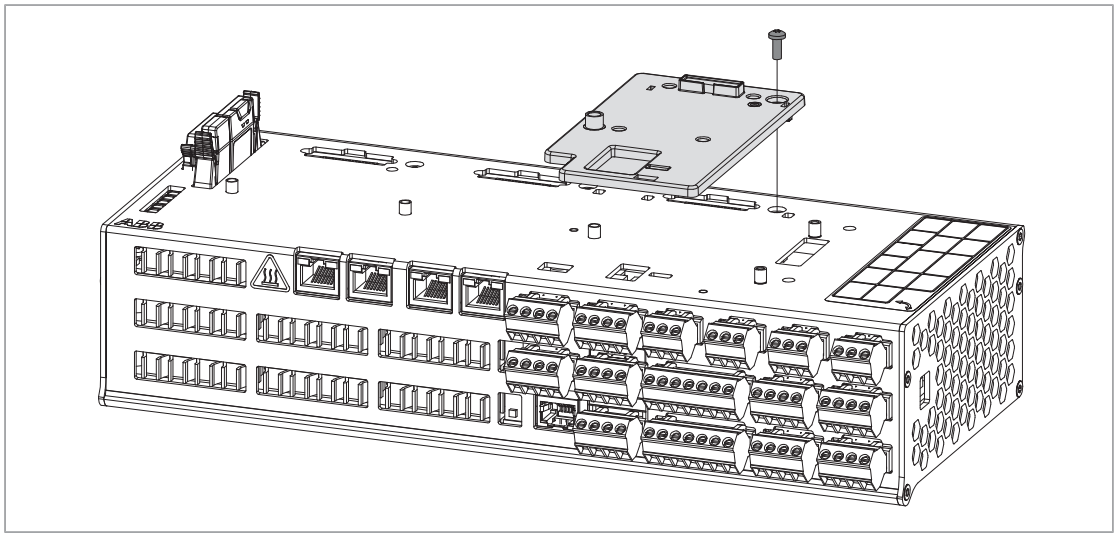
Installing optional modules

Installing option modules (UCU)

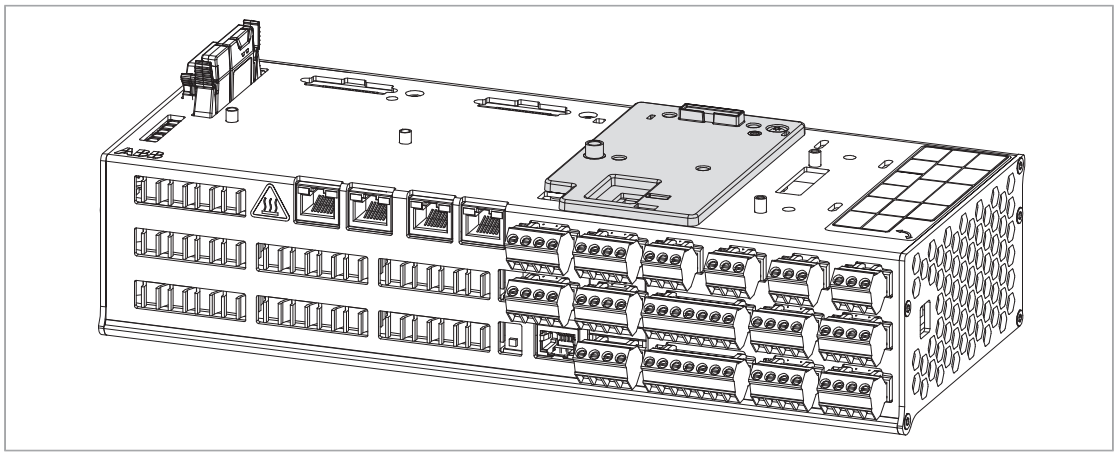
A slot adapter is necessary if you install F-series option modules onto the control unit. You can install a maximum of 3 slot adapters per control unit.

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, commissioning or maintenance work.

1. Stop the drive and do the steps in section Electrical safety precautions (page 54) before you start the work.
2. Attach the slot adapter onto slot 1, slot 2 or slot 3 with a screw.



3. Torque the screw to 0.8 N·m (7.1 lbf·in).



Installation of I/O extension and fieldbus adapter modules on BCU

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, commissioning or maintenance work.

WARNING!
Use ESD wristband when you handle printed circuit boards. Do not touch the boards unnecessarily. The boards are sensitive to electrostatic discharge.

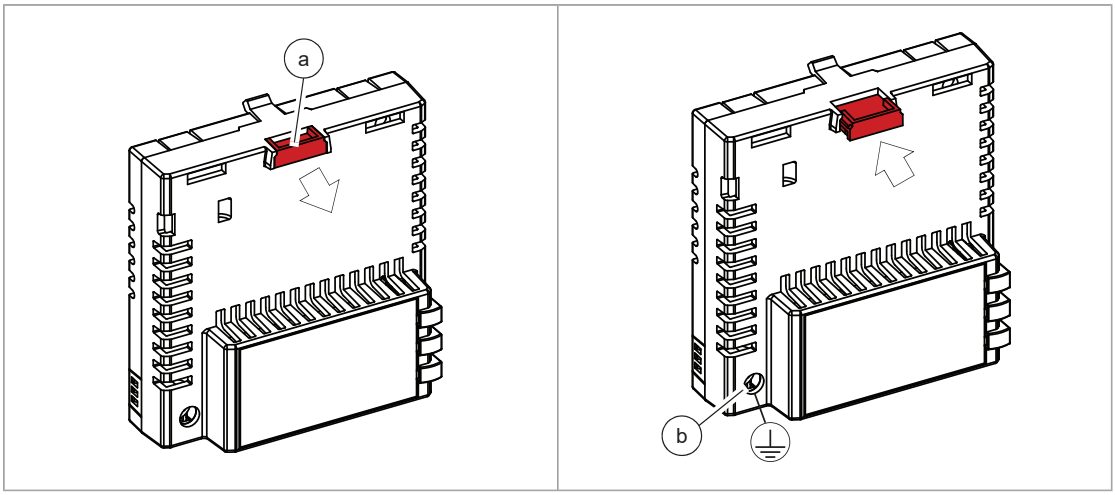
Pay attention to the free space required by the cabling or terminals coming to the option modules.

1. Stop the drive and do the steps in section Electrical safety precautions (page 54) before you start the work.
2. Pull out the lock (a) with a screw driver.

   Note: The location of the lock depends on the module type.
3. Install the module to a free option module slot on the control unit.
4. Push in the lock (a).
5. Tighten the grounding screw (b) to a torque of 0.8 N·m (7 lbf·in).

   Note: The screw tightens the connections and grounds the module. It is essential for fulfilling the EMC requirements and for proper operation of the module.

   WARNING!
   Do not use excessive force, or leave the screw too loose. Over-tightening can cause damage to the screw or module. A loose screw can cause an operation failure.



6. Connect the wiring to the module. Obey the instructions given in the documentation of the module.

If you must remove the option module after it is installed into the drive, use a suitable tool (for example, small pliers) to carefully pull out the lock.

Installation of an FSO safety functions module to BCU

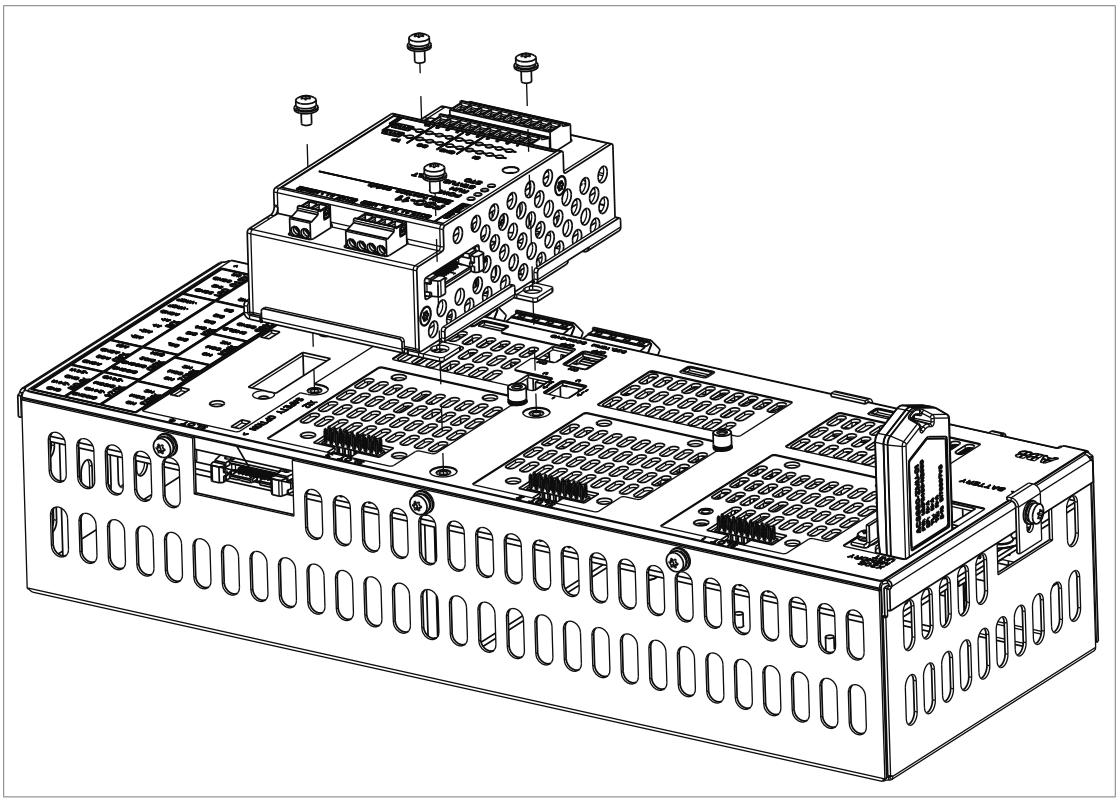
Installation of an FSO safety functions module onto BCU control unit

WARNING!
Obey the safety instructions given in ACS880 multidrives 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.

This procedure describes the installation of an FSO safety functions module onto the BCU control unit. As an alternative, the FSO module can be installed adjacent to the control unit, which is the standard method for factory-installed FSO modules. For instructions, refer to the applicable FSO module user's manual.

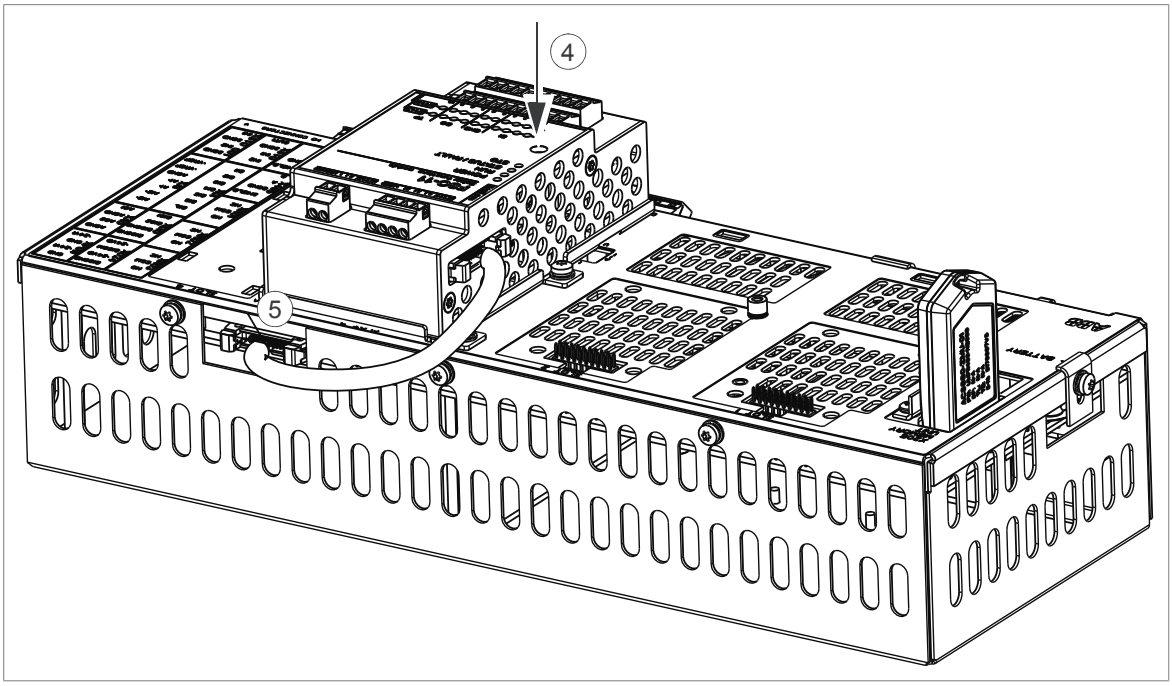
1. Stop the drive and do the steps in section Electrical safety precautions (page 54) before you start the work.
2. The FSO module comes with alternative bottom plates for installation onto different control units. For installation onto a BCU control unit, the mounting points should be located at the long edges of the module as shown in the illustration below. If necessary, replace the bottom plate of the FSO module.
3. Attach the FSO module onto slot 3 of the BCU control unit [A41] with four screws.



4. Torque the FSO module electronics grounding screw to 0.8 N·m (7.1 lbf·in).

   Note: The screw tightens the connections and grounds the module. It is essential for fulfilling the EMC requirements and for proper operation of the module.

5. Connect the FSO module data cable between FSO connector X110 and BCU connector X12.
6. To complete the installation, refer to the instructions in the applicable FSO module user's manual.

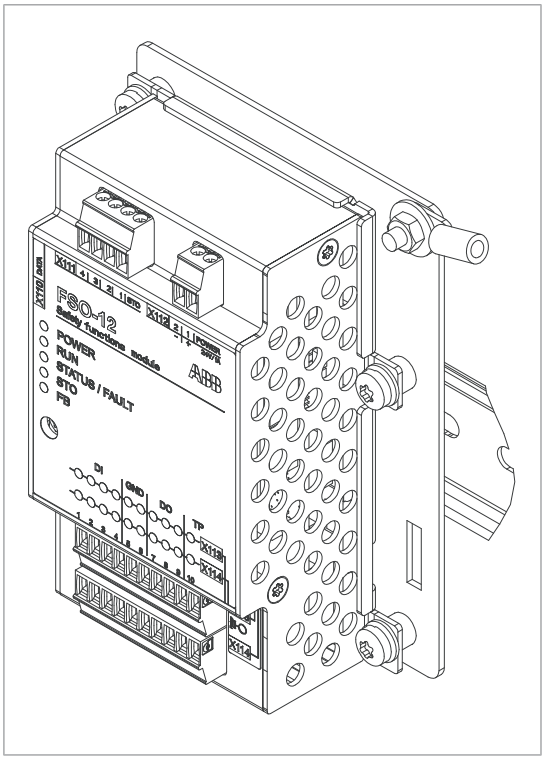


Installation of an FSO safety functions module adjacent to the control unit

To reserve the slots of the control unit for other modules, you can install the FSO module separately from the control unit using mounting kit 3AXD50000025495. The kit contains:

- parts for mounting the FSO module onto a DIN rail nearby the control unit
- longer cables for connecting the FSO module to the control unit
- installation instructions (assembly drawing).

The illustration below shows the FSO module installed onto a DIN rail.

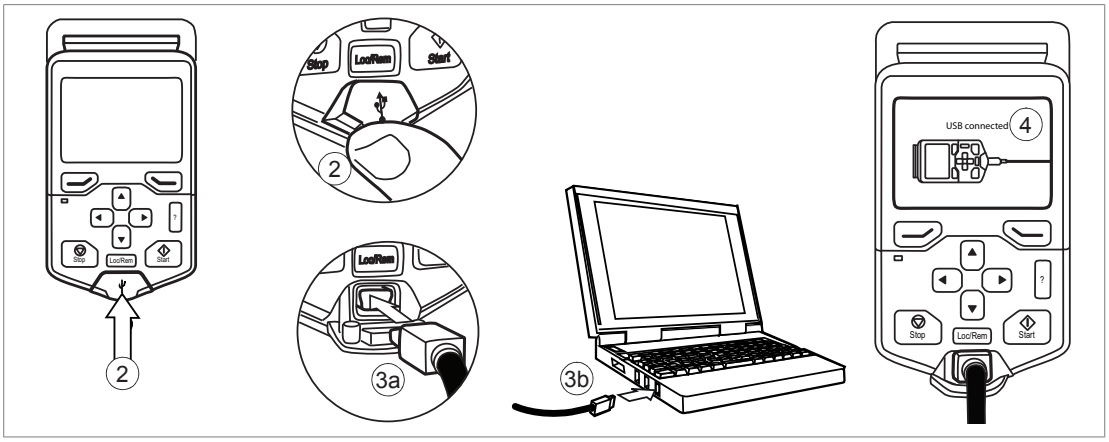


Connecting a PC

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

A PC (with, for example, the Drive Composer PC tool) can be connected as follows:

1. To connect a control panel to the unit, either
   - insert the control panel into the panel holder or platform, or
   - use 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.


Stop
Loc/Rem
Start
2
2
3a
3b
USB connected
4
Stop
Loc/Rem
Start

4

Control unit (UCU)

Contents of this chapter

This chapter

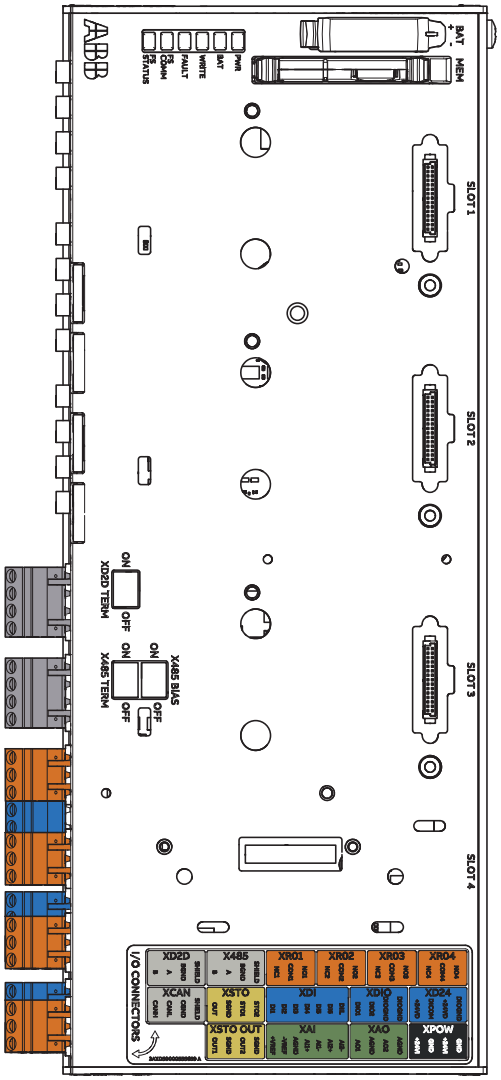
- gives information on the connections of the control unit, and
- has the specifications of the inputs and outputs of the control unit.

General

The UCU control units are used for controlling power modules (drive, inverter, supply, converter, etc) via fiber optic links. UCU-22 has two, UCU-23 has eight and UCU-24 has 14 power module connections. The UCU control units have integrated branching unit functionality for collecting and storing real-time data from the power modules to help fault tracing and analysis. The data is stored on a memory card which can be analyzed by ABB service personnel.

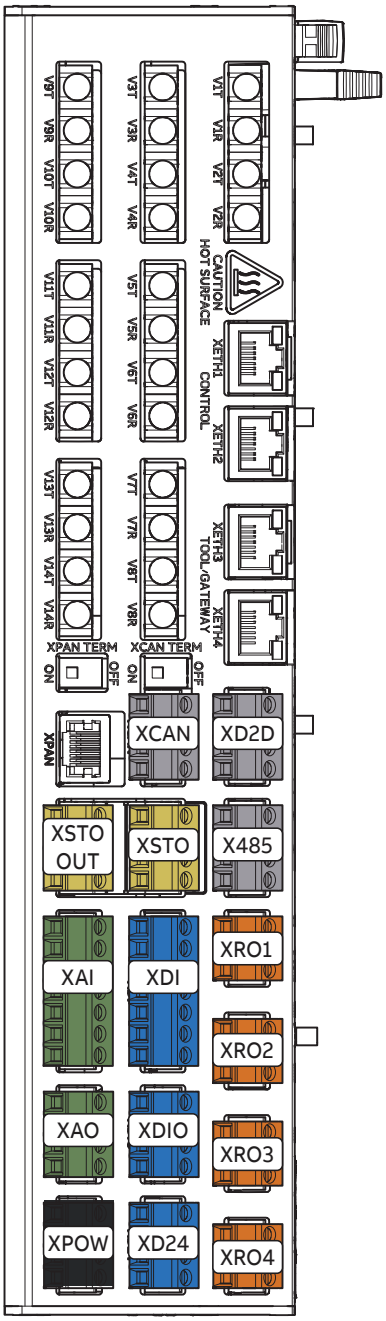
Layout

The figures below show an example UCU-24 control unit.

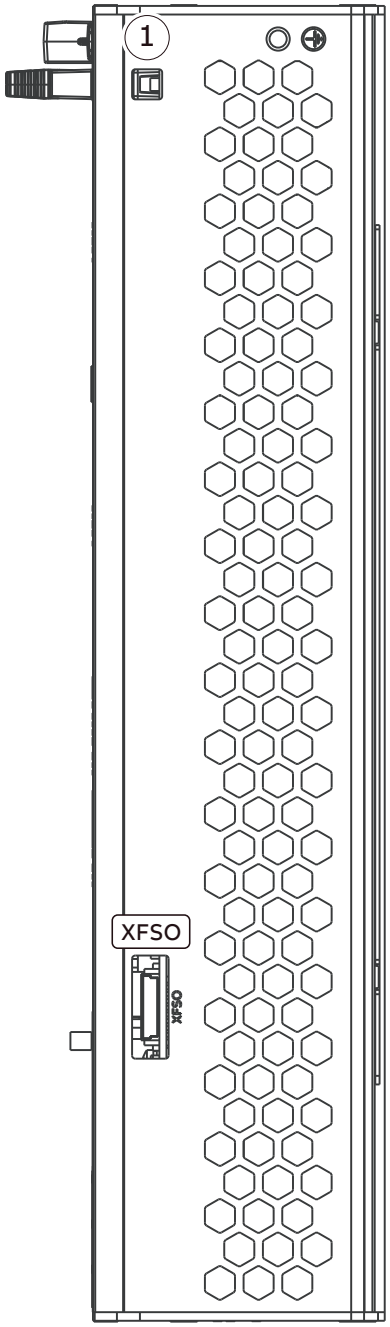


	Description
I/O	I/O terminals
SLOT 1	I/O extension, encoder interface or fieldbus adapter module connection. For F-type modules with USCA-02 adapter.
SLOT 2	
SLOT 3	
SLOT 4	RDCO-0x DDCS communication option module connection
MEM	UMU-01 memory unit connection. Data logger microSDHC memory card for inverter module communication is inside the memory unit.
BAT	Holder for real-time clock battery (BR2032)
XD2D TERM	Termination switches for drive-to-drive link (XD2D)
X485 TERM	RS-485 link termination switch
X485 BIAS	RS-485 link bias switch.
DICOM= DIOGND	Ground selection. Determines whether DICOM is separated from DIOGND (ie. the common reference for the digital inputs floats). Refer to the ground isolation diagram.

LED	Description
PWR	When the PWR LED is on, the voltage supply is sufficient.
BAT	When the BAT LED is on, the real-time clock battery voltage is higher than 2.5 V. If the LED is off, replace the battery.
WRITE	When the WRITE LED is on, writing to microSDHC memory card is in progress. Do not remove the microSDHC memory card.
FAULT	The control program has generated a fault. Refer to the firmware manual.
FS COMM	Reserved.
FS STATUS	Reserved.



	Description
XAI	Analog input
XAO	Analog output
XCAN	Not in use
XCAN TERM	CAN bus termination switch
XDI	Digital input
XDIO	Digital input/output
XD2D	Drive-to-drive link
XD24	+24 V output (for digital input)
XETH1	Ethernet ports for fieldbus, internal switch
XETH2	
XETH3	Ethernet ports for tool communication, internal switch
XETH4	
XPAN	Control panel connection
XPAN TERM	Panel bus termination switch
XPOW	External power input
XRO1	Relay output RO1
XRO2	Relay output RO2
XRO3	Relay output RO3
XRO4	Relay output RO4, reserved.
XSTO	Safe torque off connection (input signals)
XSTO OUT	Safe torque off connection (to inverter modules)
X485	RS-485 link
V1T/V1R … V14T/V14R	Fiber optic connections to converter modules (VxT = transmitter, VxR = receiver)



	Description
XFSO	Not in use
1	Humidity and temperature measurements

Default I/O diagram of the supply control unit

This table describes the use of the default connections in the IGBT supply unit.

Terminal			Description	
XD2D			Drive-to-drive link	
1 2 3 4	1 2 3 4	B A BGND SHIELD	Not supported	
	XD2D.TERM		Drive-to-drive link termination switch	
X485			RS485 connection	
5 6 7 8	5 6 7 8	B A BGND SHIELD	Not in use by default	
	X485 BIAS		X485 bias selection switch	
	X485 TERM		X485 termination switch	
XCAN			CAN bus	
9 10 11 12	9 10 11 12	CANH CANL CGND SHIELD	Not supported Not supported Not supported Control cable shield	
	XCAN TERM		CANopen termination switch	
XRO1			Relay output 1	
11 12 13	11 12 13	NC1 COM1 NO1	Norm. closed Common Norm. open	XRO1: Charging [1] (Energized = Closes charging contactor.) 250 V AC / 30 V DC, 2 A
XRO2			Relay output 2	
21 22 23	21 22 23	NC2 COM2 NO2	Norm. closed Common Norm. open	XRO2: Fault (-1) [2] 250 V AC / 30 V DC, 2 A
XRO3			Relay output 3	
31 32 33	31 32 33	NC3 COM3 NO3	Norm. closed Common Norm. open	XRO3: MCB ctrl [1] (Energized = Closes main contactor/breaker.) 250 V AC / 30 V DC, 2 A
XRO4			Relay output 4	

Terminal			Description	
41 42 43	41	NC4	Norm. closed	XRO4: Not supported 250 V AC / 30 V DC, 2 A
	42	COM4	Common	
	43	NO4	Norm. open	
XSTO			Safe torque off input connection	
1 2 3 4	1	OUT	XSTO: STO1 and STO2 are connected to OUT at the factory. To enable start and operation, STO1 and STO2 must be connected to OUT.	
	2	SGND		
	3	STO1		
	4	STO2		
XSTO OUT			Safe torque off output connection (to inverter modules)	
5 6 7 8	5	OUT1	XSTO OUT: Not in use	
	6	SGND		
	7	OUT2		
	8	SGND		
XDI			Digital inputs	
1 2 3 4 5 6 7	1	DI1	Temp fault[3] (0 = overtemperature)	
	2	DI2	Run / enable[3] (1 = run / enable)	
	3	DI3	MCB feedback[1] (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 -> = fault reset)	
	7	DIIL	Not in use by default. DIIL is connected to XD24:5 at the factory.	
XDIO			Digital input/outputs	
1 2 3 4	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 6 7 8	5	+24VD	+24 V DC 200 mA[4]	
	6	DICOM	Digital input ground	
	7	+24VD	+24 V DC 200 mA[4]	
	8	DIOGND	Digital input/output ground	
	DICOM=DIOGND		Ground selection switch. Determines whether DICOM is separated from DIOGND (ie, common reference for digital inputs floats). ON: DICOM connected to DIOGND. OFF: DICOM and DIOGND separate.	
XAI			Analog inputs, reference voltage output	
1 2 3 4 5 6 7	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. 0(2)…10 V, R_{in} > 200 kohm[5]	
	5	AI1-		
	6	AI2+	Not in use by default. 0(4)…20 mA, R_{in} = 100 ohm[6]	
	7	AI2-		

Terminal			Description
XAO			Analog outputs
	1	AO1	Zero (no signal indicated)[3] 0…20 mA, R_L < 500 ohm
	2	AGND	
	3	AO2	Zero (not signal indicated)[3] 0…20 mA, R_L < 500 ohm
	4	AGND	
XPOW			External power input
	1	+24VI	19…32 V DC, 1.5…2.9 A (depends on the load and supply voltage) External power input Two supplies can be connected to the control unit for redundancy.
	2	GND	
	3	+24VI	
	4	GND	
XFSO			Safety functions module connection. Not supported in supply unit.
XETH1			Ethernet ports for fieldbus. Support depends on the firmware. Refer to the firmware manual.
XETH2			
XETH3			Ethernet ports for tool communication. Support depends on the firmware. Refer to the firmware manual.
XETH4			
XPAN			Control panel connection
	XPAN TERM		Control panel connection termination switch. Used for panel bus configuration.
MEM			Memory unit connection

1) 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.
2) Use of the signal in the control program (fixed). See also the delivery-specific circuit diagrams.
3) Use of the signal in the control program (fixed). See also the delivery-specific circuit diagrams.
4) Total load capacity of these outputs is 4.8 W (200 mA at 24 V) minus the power taken by DIO1 and DIO2.
5) Current [0(4)…20 mA, R_{in} = 100 ohm] or voltage [0(2)…10 V, R_{in} > 200 kohm]. Change of setting requires reboot of control unit.
6) Current [0(4)…20 mA, R_{in} = 100 ohm] or voltage [0(2)…10 V, R_{in} > 200 kohm]. Change of setting requires reboot of control unit.

Additional information on the connections

Power supply for the control unit (XPOW)

Power to the control unit is supplied internally through terminal block XPOW.

Refer to the control unit connector data for the current and voltage ratings of the power supply.

Connect an additional external power supply to the free +24 V and GND terminals of the XPOW terminal block if:

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

Digital interlock (DIIL)

Digital interlock input (DIIL) terminal is originally intended for interlock signals that stop the drive/unit when necessary. In the ACS880 primary control program, DIIL terminal is the source for the run enable signal by default. The inverter unit or drive cannot start, or it stops when there is no DIIL signal. In other control programs (and units), the default use of the DIIL terminal varies. Refer to firmware manual for more information.

Note: This input is **not** SIL or PL classified.

Control panel connection (XPAN)

The XPAN connector can be used to connect an assistant control panel or FDPI-02 diagnostics and panel interface unit to the control unit. With FDPI-02, it is possible to connect one control panel to two or more control units in a chain topology, also known as a panel bus. For more information, refer to FDPI-02 diagnostics and panel interface user's manual (3AUA0000113618 [English]).

The XPAN TERM switch sets the termination for the panel bus. Must be set to ON if there is no panel bus, or if the control unit is the last one in a panel bus. On intermediate units in a panel bus, set termination to OFF (1).

Safe torque off (XSTO, XSTO OUT)

The XSTO input only acts as a true Safe torque off input on the inverter control unit. De-energizing the STO input terminals of other control units (supply, DC/DC converter, or brake unit) stops the unit but does not constitute a SIL/PL classified safety function.

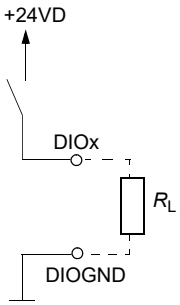
MicroSDHC memory card slot

The control unit 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 microSDHC memory card inserted into the UMU-01 memory unit and can be analyzed by ABB service personnel.

Connector data

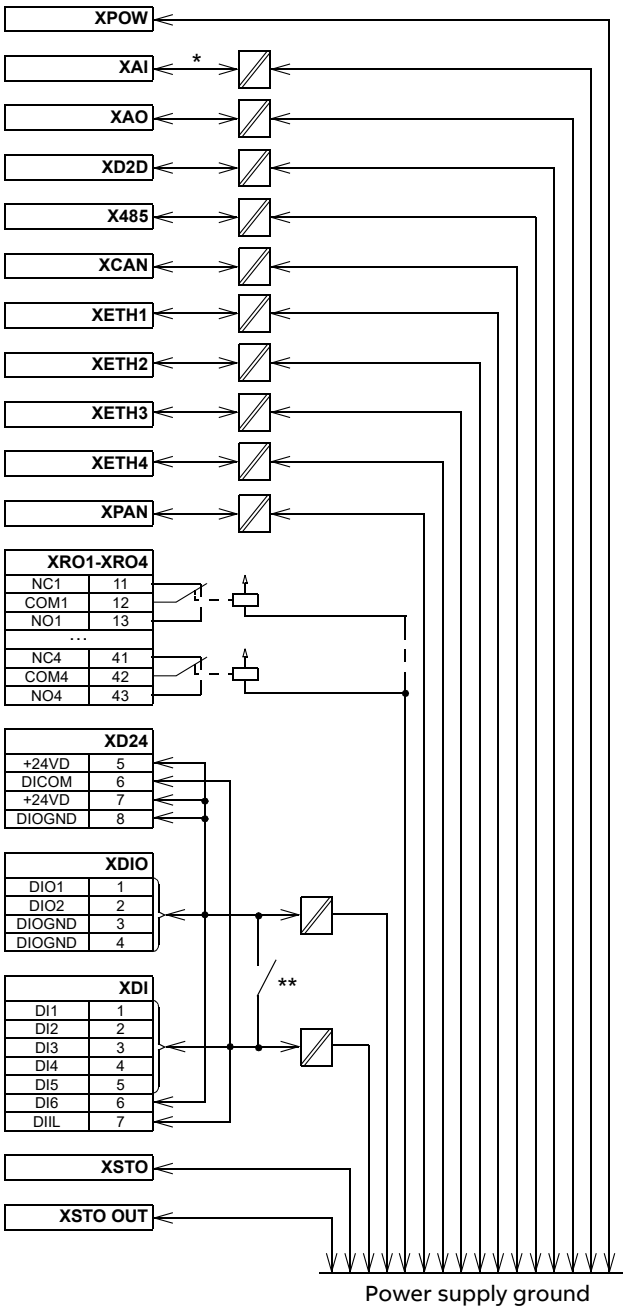
The wire size accepted by all screw terminals (for both stranded and solid wire) is 0.5 … 2.5 mm^2 (22…12 AWG). Connector pitch is 5 mm.

Maximum tightening torque of the screw terminals is 0.45 N·m (4 lbf·in).

Power supply (XPOW)	19…32 V DC, 2.9 A External power input. Two supplies can be connected to the control unit for redundancy.
Relay outputs XRO1…XRO4	250 V AC / 30 V DC, 2 A Protected by varistors
+24 V output (XD24:2 and XD24:4)	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)	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 I_{max}: 15 mA (DI1…DI5), 5 mA (DI6)
Start interlock input DIIL (XDI:7)	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…100 kHz with hardware filtering of 4 microseconds) for 24 V level square wave signal (sinusoidal or other wave form cannot be used). In some control programs, DIO2 can be configured as a 24 V level square wave frequency output. Refer to the firmware manual, parameter group 11.	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)	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 parameters 12.15 AI1 unit selection and 12.25 AI2 unit selection	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 Resolution: 11 bit + sign bit Inaccuracy: 1% of full scale range
Analog outputs AO1 and AO2 (XAO)	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	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)	Physical layer: RS-485 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 and bias by switch (X485 TERM and X485 BIAS)
CAN connection (XCAN)	Termination by switch (XCAN TERM) This connection is not supported by the firmware.
Safe torque off connection (XSTO)	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 SIL/PL classified 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 and IEC 61800-5-2
Safe torque off output (XSTO OUT)	To STO connector of inverter module.
Control panel connection (XPAN)	Connector: RJ-45 Cable length < 50 m (164 ft) Termination by switch (XPAN TERM)
Fieldbus Ethernet connection with internal switch (XETH1 and XETH2)	Connector: RJ-45 Cable type: minimum requirement CAT5e
microSDHC memory card slot (microSDHC CAR)	Memory card type: microSDHC (minimum of class 4 speed grade) Supported memory size: 4 GB…32 GB
Battery	Real-time clock battery type: BR2032
The terminals of the control unit fulfill the Protective Extra Low Voltage (PELV) requirements. The PELV requirements of a relay output are not fulfilled if a voltage higher than 48 V is connected to the relay output.	

Ground isolation diagram



*The maximum common mode voltage between each AI input and AGND is ±30 V.

****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.

5

Control unit (BCU)

Contents of this chapter

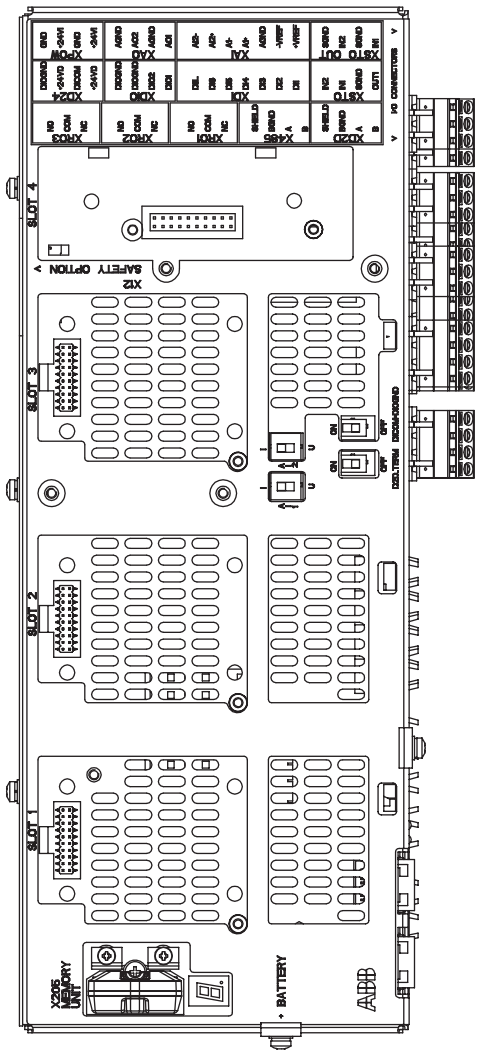
This chapter

- gives information on the connections of the control unit, and
- has the specifications of the inputs and outputs of the control unit.

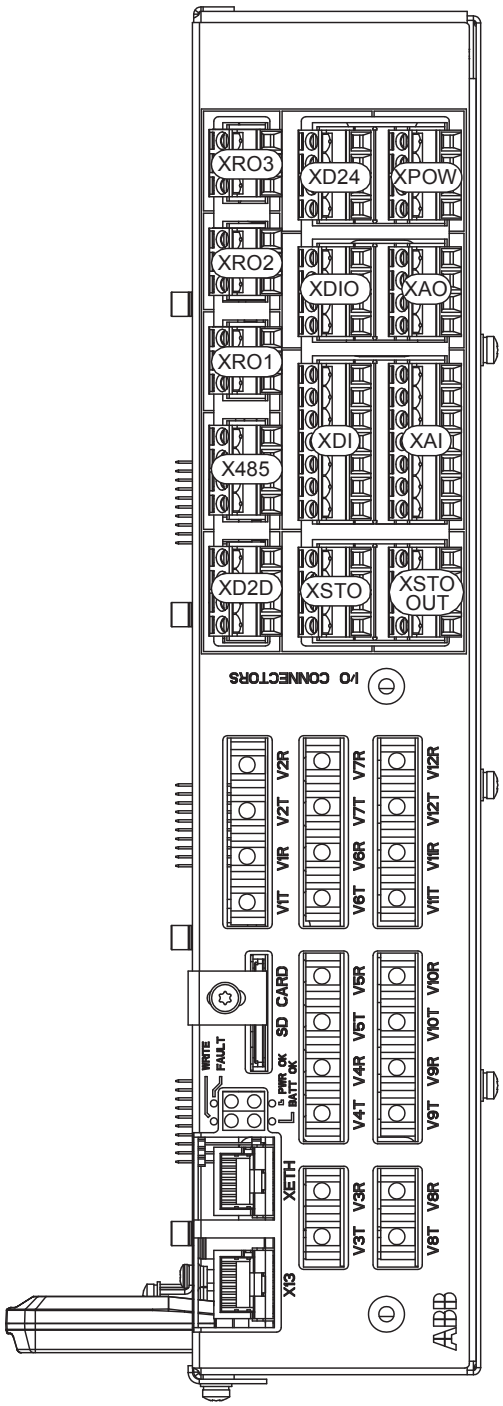
General

The BCU control units are used for controlling power modules (drive, inverter, supply, converter, etc) via fiber optic links. BCU-02 has two, BCU-12 has seven, and BCU-22 has 12 power module connections. The BCU control units have integrated branching unit functionality for collecting and storing real-time data from the power modules to help fault tracing and analysis. The data is stored on a memory card which can be analyzed by ABB service personnel.

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, field-bus adapter or FSO safety functions module connection
SLOT 4	RDCO 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 safety functions module (optional)
X13	Control panel, PC connection through the control panel
X485	Not in use by default
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 and BCU-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 is sufficient
WRITE	Writing to memory card in progress. Do not remove the memory card.

Default I/O diagram of the supply control unit

This table describes the use of default connections in the IGBT supply unit.

Terminal			Description	
XD2D			Drive-to-drive link	
1 2 3 4	1 2 3 4	B A BGND Shield	Not supported	
ON OFF	D2D.TERM		Drive-to-drive link termination switch	
X485			RS485 connection	
5 6 7 8	5 6 7 8	B A BGND Shield	Not in use by default	
XRO1, XRO2, XRO3			Relay outputs	
11 12 13 21 22 23 31 32 33	11 12 13 21 22 23 31 32 33	NC COM NO NC COM NO NC COM NO	Norm. closed Common Norm. open Norm. closed Common Norm. open Norm. closed Common Norm. open	XRO1: Charging[1] (Energized = Closes charging contactor.) 250 V AC / 30 V DC, 2 A XRO2: Fault (-1)[2] (Energized = Indicates no fault.) 250 V AC / 30 V DC, 2 A XRO3: MCB ctrl[1] (Energized = Closes main contactor/breaker.) 250 V AC / 30 V DC, 2 A
XSTO			Safe torque off input connection	
1 2 3 4	1 2 3 4	OUT SGND IN1 IN2	XSTO: IN1 and IN2 are connected to OUT at the factory. To enable start and operation, IN1 and IN2 must be connected to OUT.	
XSTO OUT			Safe torque off output connection (to inverter modules)	
5 6 7 8	5 6 7 8	IN1 SGND IN2 SGND	XSTO OUT: Not in use	
XDI			Digital inputs	
1 2 3 4 5 6 7	1 2 3 4 5 6 7	DI1 DI2 DI3 DI4 DI5 DI6 DIIL	Temp fault[2] (0 = overtemperature) Run / enable[2] (1 = run / enable) MCB feedback[1] (0 = main contactor/breaker open) Not in use by default. Can be used for eg, auxiliary circuit breaker fault. Not in use by default. Can be used for eg, earth fault monitoring. Reset[2] (0 -> 1 = fault reset) Not in use by default. DIIL is connected to XD24:5 at the factory.	

Terminal			Description
XDIO			Digital input/outputs
1 2 3 4	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 6 7 8	1	+24VD	+24 V DC 200 mA [3]
	2	DICOM	Digital input ground
	3	+24VD	+24 V DC 200 mA [3]
	4	DIOGND	Digital input/output ground
ON OFF	DICOM=DIOGND		Ground selection switch. Determines whether DICOM is separated from DIOGND (ie, common reference for digital inputs floats). ON: DICOM connected to DIOGND. OFF: DICOM and DIOGND separate.
XAI			Analog inputs, reference voltage output
1 2 3 4 5 6 7	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. 0(2)…10 V, R_{in} > 200 kohm [4]
	5	AI1-	
	6	AI2+	Not in use by default. 0(4)…20 mA, R_{in} = 100 ohm [5]
	7	AI2-	
– U	AI1		AI1 current/voltage selection switch
– U	AI2		AI2 current/voltage selection switch
XAO			Analog outputs
1 2 3 4	1	AO1	Zero (no signal indicated)[2] 0…20 mA, R_L < 500 ohm
	2	AGND	
	3	AO2	Zero (not signal indicated)[2] 0…20 mA, R_L < 500 ohm
	4	AGND	
XPOW			External power input
1 2 3 4	1	+24VI	24 V DC (±10%), 2 A External power input Two supplies can be connected to the control unit for redundancy.
	2	GND	
	3	+24VI	
	4	GND	
X12			Safety functions module connection. Not in use by default in IGBT supply unit.
X13			Control panel connection
X205			Memory unit connection

1) 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.

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

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

4) 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.

[5] 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.

Additional information on the connections

Power supply for the control unit (XPOW)

Power to the control unit is supplied internally through terminal block XPOW.

Refer to the control unit connector data for the current and voltage ratings of the power supply.

Connect an additional external power supply to the free +24 V and GND terminals of the XPOW terminal block if:

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

Digital interlock (DIIL)

Digital interlock input (DIIL) terminal is originally intended for interlock signals that stop the drive/unit when necessary. In the ACS880 primary control program, DIIL terminal is the source for the run enable signal by default. The inverter unit or drive cannot start, or it stops when there is no DIIL signal. In other control programs (and units), the default use of the DIIL terminal varies. Refer to firmware manual for more information.

Note: This input is **not** SIL or PL classified.

Safe torque off (XSTO, XSTO OUT)

The XSTO input only acts as a true Safe torque off input on the inverter control unit. De-energizing the STO input terminals of other control units (supply, DC/DC converter, or brake unit) stops the unit but does not constitute a SIL/PL classified safety function.

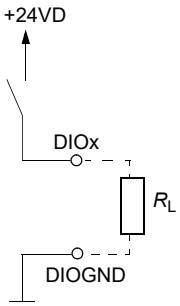
SDHC memory card slot

The control unit 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

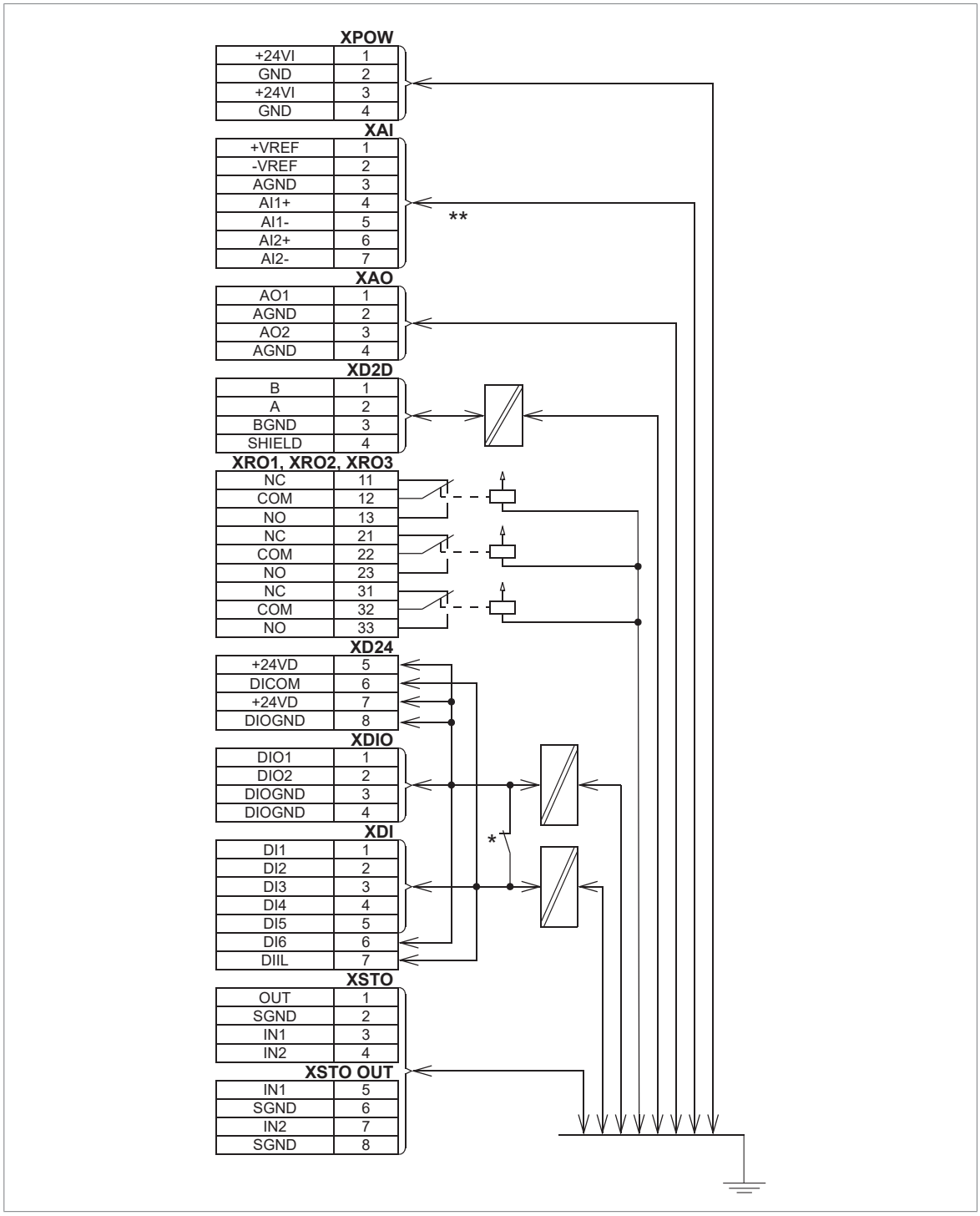
The wire size accepted by all screw terminals (for both stranded and solid wire) is 0.5 … 2.5 mm^2 (22…12 AWG). Connector pitch is 5 mm.

The maximum tightening torque for screw terminals is 0.45 N·m (4 lbf·in).

Power supply (XPOW)	24 V DC (±10%), 2 A External power input. Two supplies can be connected to the BCU control unit for redundancy.
Relay outputs RO1…RO3 (XRO1…XRO3)	250 V AC / 30 V DC, 2 A Protected by varistors
+24 V output (XD24:5 and XD24:7)	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)	24 V logic levels: “0” < 5 V, “1” > 15 V R_{in}: 2.0 kohm (DI1…DI5) Input type: NPN/PNP (DI1…DI5), PNP (DI6) Hardware filtering: 0.04 ms, digital filtering up to 8 ms I_{max}: 15 mA (DI1…DI5), 5 mA (DI6)
Start interlock input DIIL (XDI:7)	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). In some control programs, DIO2 can be configured as a 24 V level square wave frequency output. Refer to the firmware manual, parameter group 11.	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)	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	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 Resolution: 11 bit + sign bit Inaccuracy: 1% of full scale range
Analog outputs AO1 and AO2 (XAO)	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	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)	Physical layer: RS-485 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)
Safe torque off connection (XSTO)	Input voltage range: -3…30 V DC Logic levels: "0" < 5 V, "1" > 17 V. **Note:** Both circuits must be closed to enable start and operation (IN1 and IN2 must be connected to OUT). This applies to all control units (including drive, inverter, supply, brake, DC/DC converter etc. control units), but SIL/PL classified Safe torque off functionality is only achieved through the XSTO connector of the drive/inverter control unit. Current consumption: 66 mA (continuous) per STO channel per drive/inverter module EMC (immunity) according to IEC 61326-3-1 and IEC 61800-5-2
Safe torque off output (XSTO OUT)	To STO connector of inverter module.
Control panel connection (X13)	Connector: RJ-45 Cable length < 100 m (328 ft)
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
Battery	Real-time clock battery type: BR2032
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 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.

**The maximum common mode voltage between each AI input and AGND is +30 V

6

Installation checklist

Installation checklist

Contents of this chapter

This chapter contains a checklist for 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, commissioning or maintenance work.

WARNING!
Do the steps in section Electrical safety precautions (page 54) before you start the work.

Make sure that ...	☑
The ambient operating conditions meet the drive ambient conditions specification and enclosure rating (IP code).	☐
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 cooling air can flow freely in and out of the drive.	☐

Make sure that ...	☑
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. 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 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.	☐
If the drive is equipped with a DC/DC-converter unit: The energy storage cable is connected to the correct terminals of the DC/DC-converter and energy storage, and the terminals are tightened to the correct torque.	☐
If the drive is equipped with a DC/DC-converter unit: The energy storage is equipped with fuses for protecting the energy storage cable in a cable short-circuit situation.	☐
If the drive is equipped with a DC/DC-converter unit: The energy storage is 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. The conductor is connected to the correct terminal, and the terminal is tightened to the correct torque. 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. Grounding has also been measured according to the regulations.	☐
If an external brake resistor is connected to the drive: The brake resistor cable 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.	☐
The terminal box cover of the motor is in place. Cabinet shrouds are in place and doors are closed.	☐
The motor and the driven equipment are ready for power-up.	☐

7

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 ACS880 multidrives cabinets and modules safety instructions (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 ACS880 multidrives cabinets and modules safety instructions (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.	☐
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 106).	☐
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 control unit [A41] are closed for the supply unit to start. (IN1 and IN2 must be connected to OUT.) See chapters Control unit (UCU) and Control unit (BCU).	☐
Drives with ground fault monitoring device for IT ungrounded systems (option +Q954): If necessary, adjust the settings of the device. See the circuit diagrams of the delivery and the manual of the device.	☐

Tasks	☑
Powering up the auxiliary circuit of the drive	
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 the firmware manual of the supply unit. If you need more information on the use of the control panel, see ACS-AP-I, -S, -W and ACH-AP-H, -W 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 the firmware manual of the supply unit.	☐
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 106).	☐
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.	☐
Validating the safety functions	
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. See the function-specific manual for the validation tasks. Safety functions are optional. See the function-specific manual for the validation tasks.	☐
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 106) 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 106).

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 107).
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 104) 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 104) instead.

1. Perform the tasks listed in section Connecting the drive / supply unit to the power line (page 108).
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.

8

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 ACS880 multidrives cabinets and modules safety instructions (3AUA0000102301 [English]). Ignoring the instructions can cause physical injury or death, or damage to the equipment.

Maintenance intervals

The tables show the maintenance tasks that can be done by the end user. For the ABB Service offering, contact your local ABB Service representative (new.abb.com/contact-centers).

Description of symbols

Action	Description
I	Inspection (visual inspection and maintenance action if needed)
P	Performance of on/off-site work (commissioning, tests, measurements or other work)
R	Replacement

Recommended maintenance intervals after start-up

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				
Aging														
Control panel battery										R				
Control unit battery							R						R	
Cabinet auxiliary 24 V DC power supplies and buffers													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

Maintenance task/object		Years from start-up												
		1	2	3	4	5	6	7	8	9	10	11	12	...
Other														
ABB-SACE main circuit breaker maintenance		I	I	I	I	I	I	I	I	I	I	I	I	I
ABB contactors maintenance		I	I	I	I	I	I	I	I	I	I	I	I	I
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.

Note:

- The maintenance and component replacement intervals are based on the assumption that the equipment operates 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. Contact 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 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, commissioning 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 54) 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 exterior of the drive

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, commissioning or maintenance work.

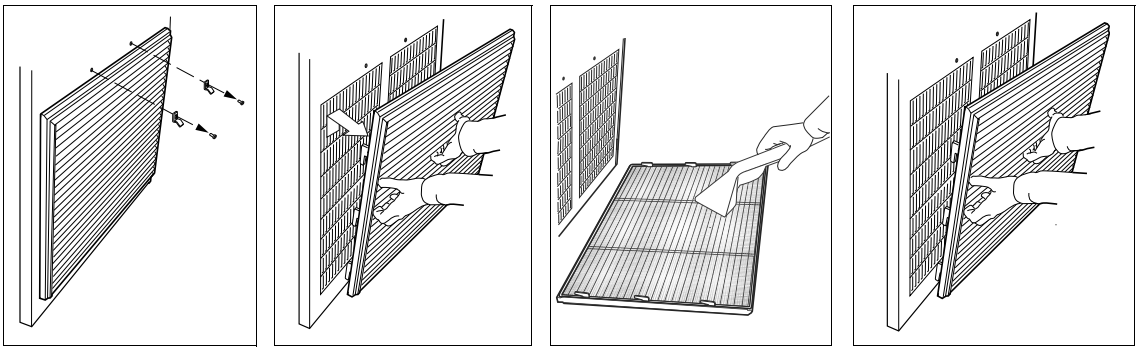
1. Stop the drive and do the steps in section Electrical safety precautions (page 54) before you start the work.
2. Clean the exterior of the drive. Use:
   - vacuum cleaner with an antistatic hose and nozzle
   - soft brush
   - dry or damp (not wet) cleaning cloth. Moisten with clean water, or mild detergent (pH 5…9 for metal, pH 5…7 for plastic).

WARNING!
Prevent water from entering the drive. Never use excessive amount of water, a hose, steam, etc.

Cleaning the door air inlets (IP22 and IP42)

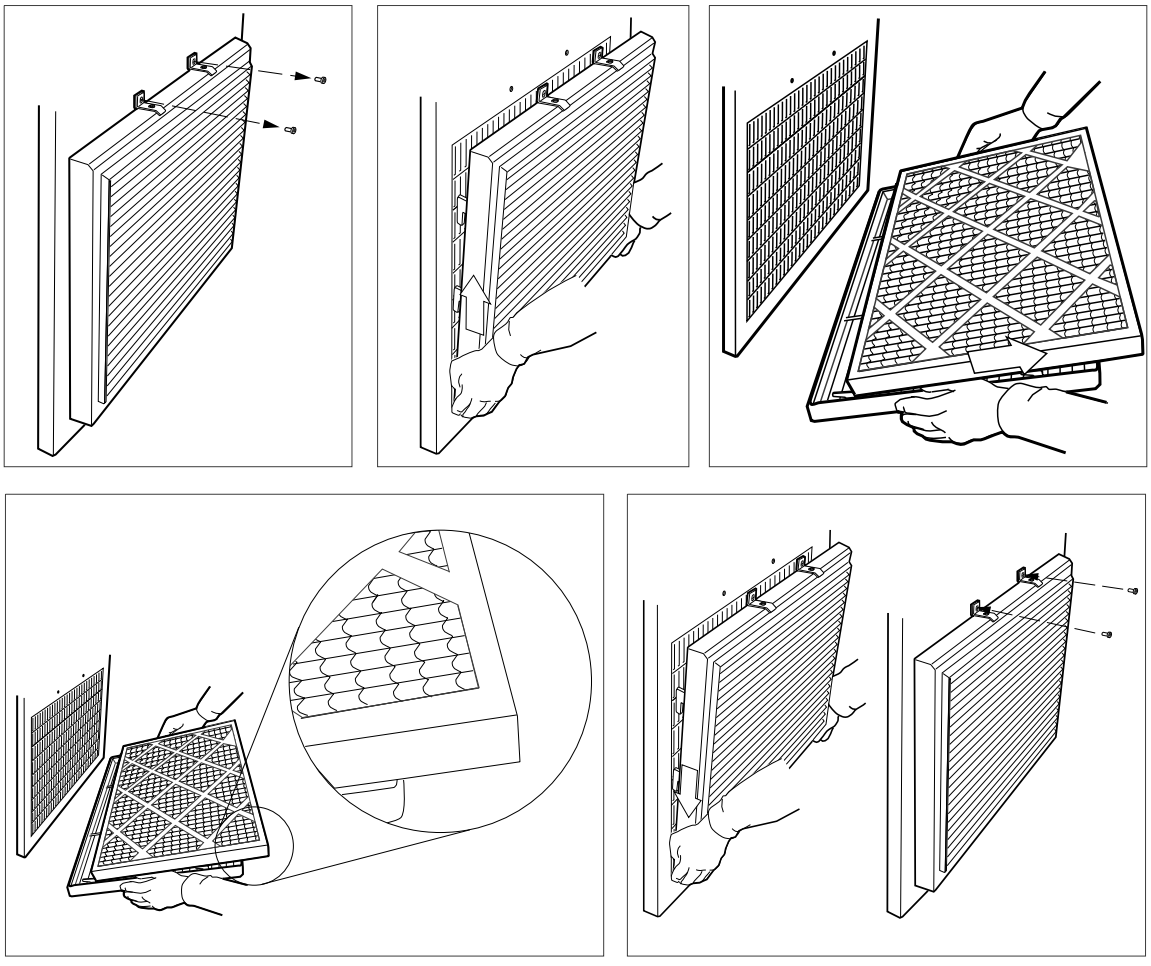
Check the dustiness of the air inlet meshes. If the dust cannot be removed by vacuum cleaning from outside through the grating holes with a small nozzle, proceed as follows:

1. Stop the drive and do the steps in section Electrical safety precautions (page 54) 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 54) 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 roof outlet 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 54) 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. Protect the adjacent equipment from dust.
5. 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.
6. Reinstall the cooling fan.

Fans

The lifespan of the cooling fans of the drive depends on 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)

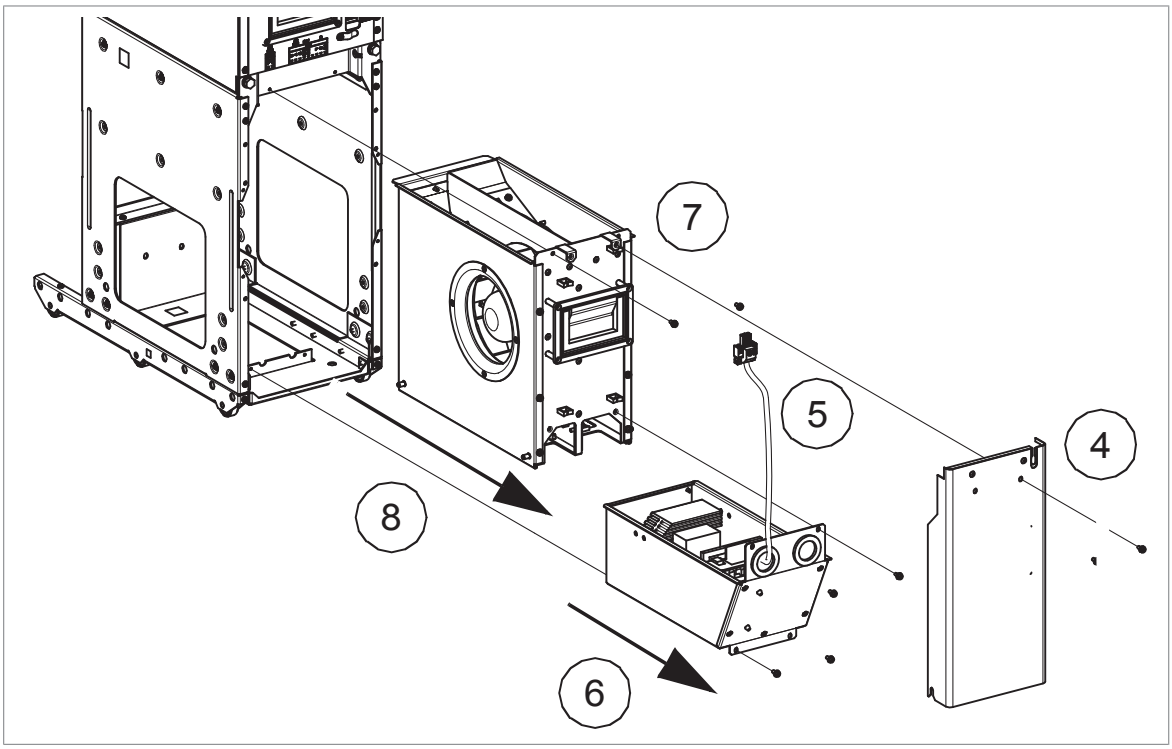
The module is equipped with a fan unit that contains two cooling fans.

WARNING!
Obey the safety instructions 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, commissioning or maintenance work.

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

Before you start replacing the fan kit of the converter module, make sure that the connector at the end of the fan kit cable is compatible with the counterpart in the module. Black connector is compatible only with the black counterpart, and gray connector only with the gray counterpart. If the connectors are not compatible, replace the connector at the end of the fan kit cable. Use the connector in the old fan kit, or order a suitable connector from ABB.

1. Stop the drive and do the steps in section Electrical safety precautions (page 54) 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)

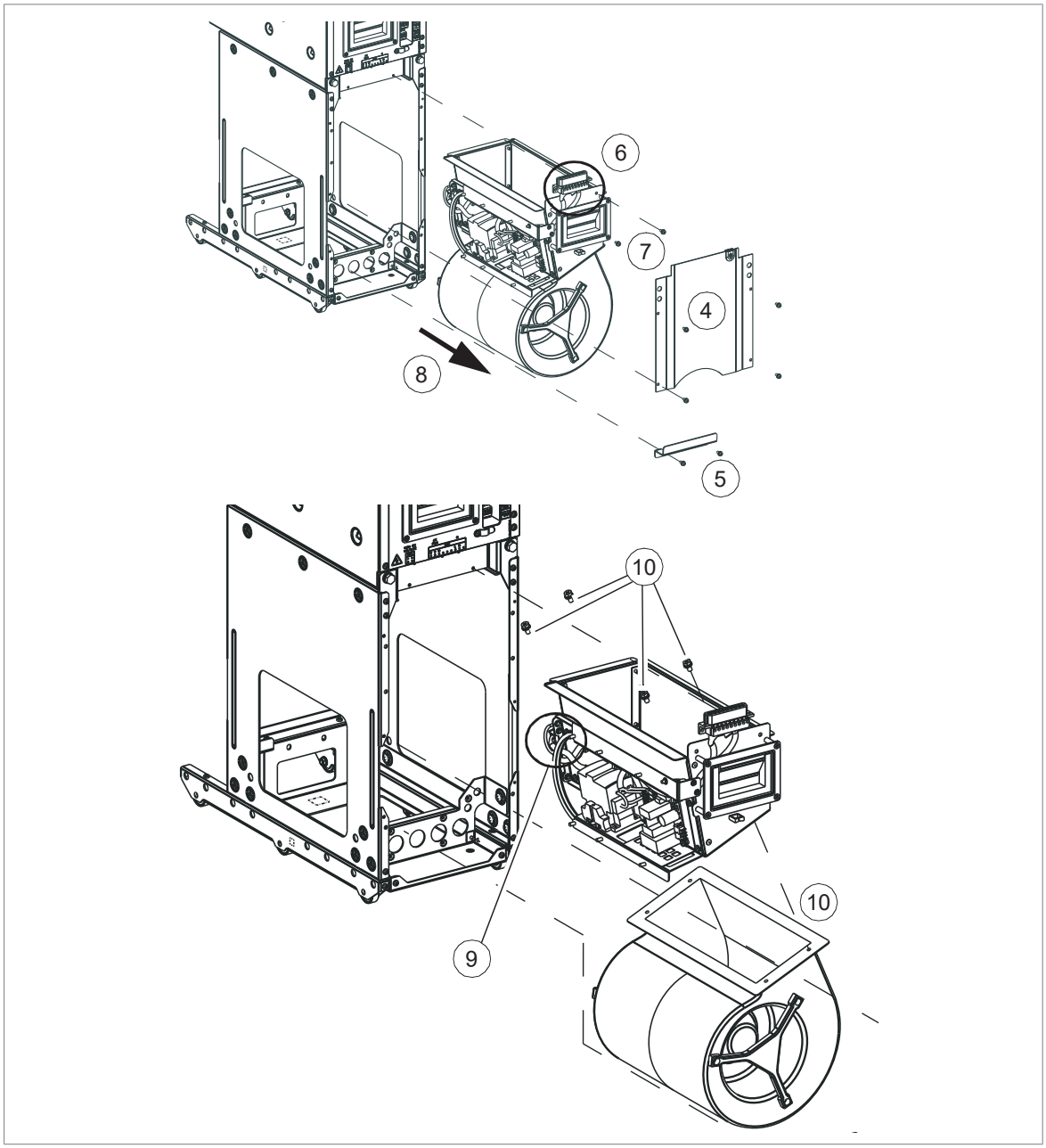
WARNING!
Obey the safety instructions of the drive. If you ignore them, injury or death, or damage to the equipment can occur. If you are not a qualified electrical professional, do not do installation, commissioning or maintenance work.

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

Before you start replacing the fan kit of the converter module, make sure that the connector at the end of the fan kit cable is compatible with the counterpart in the module. Black connector is compatible only with the black counterpart, and gray connector only with the gray counterpart. If the connectors are not compatible, replace

the connector at the end of the fan kit cable. Use the connector in the old fan kit, or order a suitable connector from ABB. Refer to Connector replacement guide for ACS880-x04 R8i/D8T, BLCL-2X, BL-2X and BLHF DOL fan (3AXD50001059903 [English]).

1. Stop the drive and do the steps in section Electrical safety precautions (page 54) 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.



Replacing the circuit board compartment fan

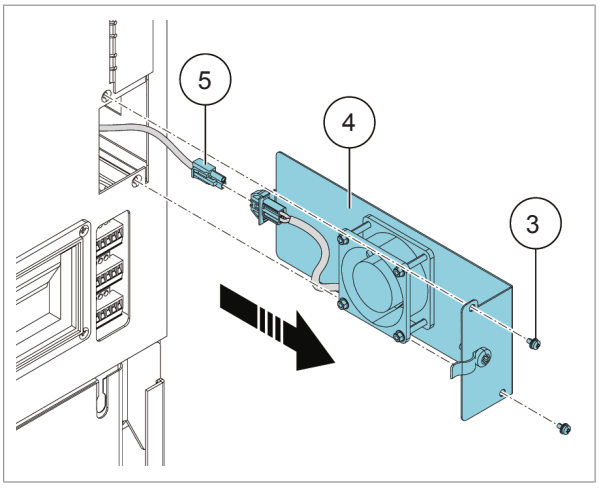
Frame R8i modules are equipped with a fan blowing air through the circuit board compartment.

The fan is accessible from the front of the module.

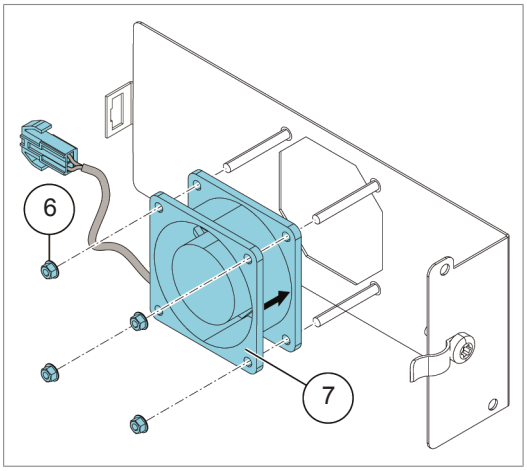
WARNING!
Obey the safety instructions of the drive. If you ignore them, injury or death, or damage to the equipment can occur. If you are not a qualified electrical professional, do not do installation, commissioning or maintenance work.

1. Stop the drive and do the steps in section Electrical safety precautions (page 54) 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.

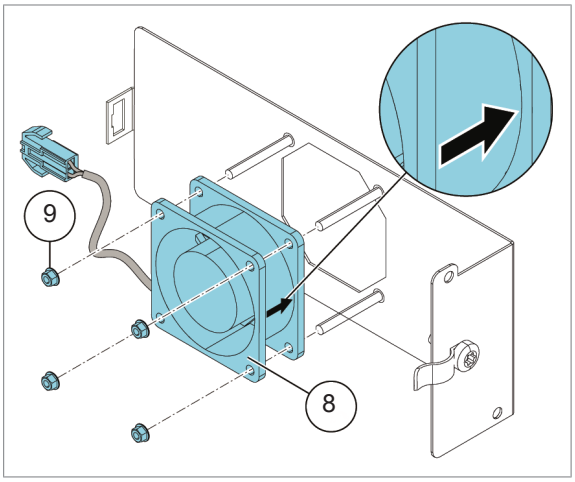
4. Pull the fan holder out of the module.
5. Disconnect the fan cable.



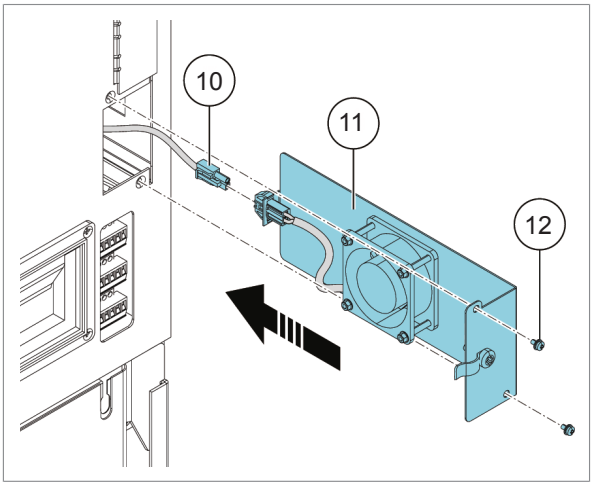
6. Remove the four M3 (5.5 mm) nuts which hold the fan.
7. Remove the fan from the fan holder.



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.

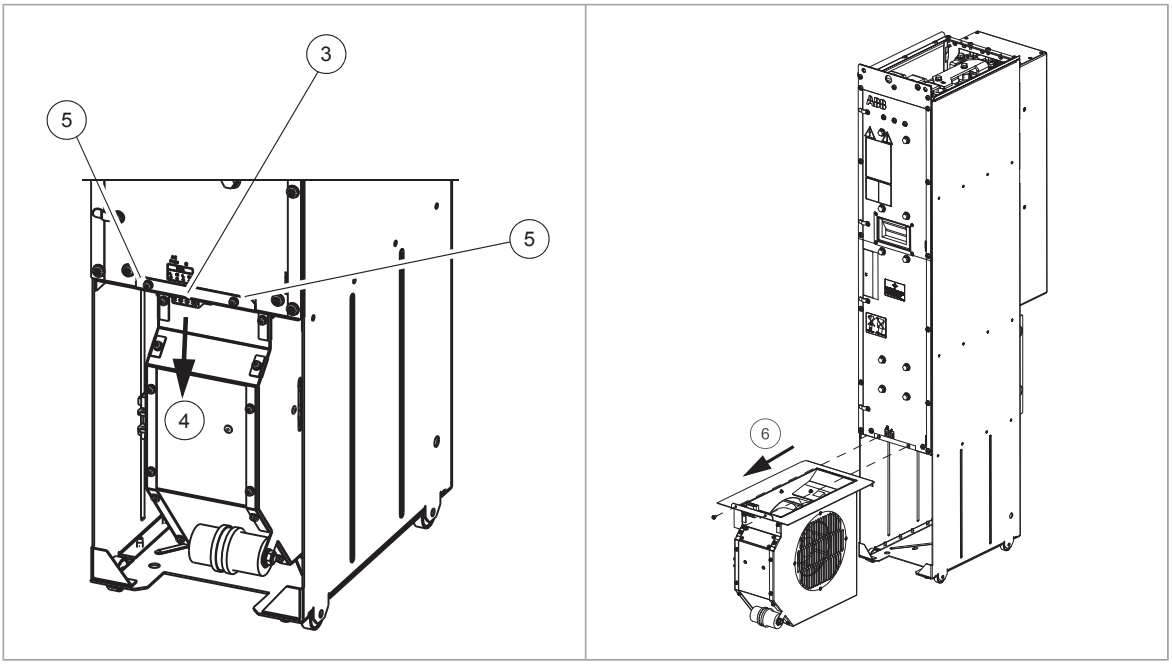


Replacing the fan of the LCL filter (BLCL-1x-x)

WARNING!
Obey the safety instructions 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, commissioning or maintenance work.

Note: Before you start replacing the fan kit of the converter module, make sure that the connector at the end of the fan kit cable is compatible with the counterpart in the module. Black connector is compatible only with the black counterpart, and gray connector only with the gray counterpart. If the connectors are not compatible, replace the connector at the end of the fan kit cable. Use the connector in the old fan kit, or order suitable connector from ABB. Refer to +V112 connector replacement guide for ACS880 BLCL-1X and BL-1X fan kit change, connector X55 (3AXD50001065140 [English]).

1. Stop the drive and do the steps in section Electrical safety precautions (page 54) 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.

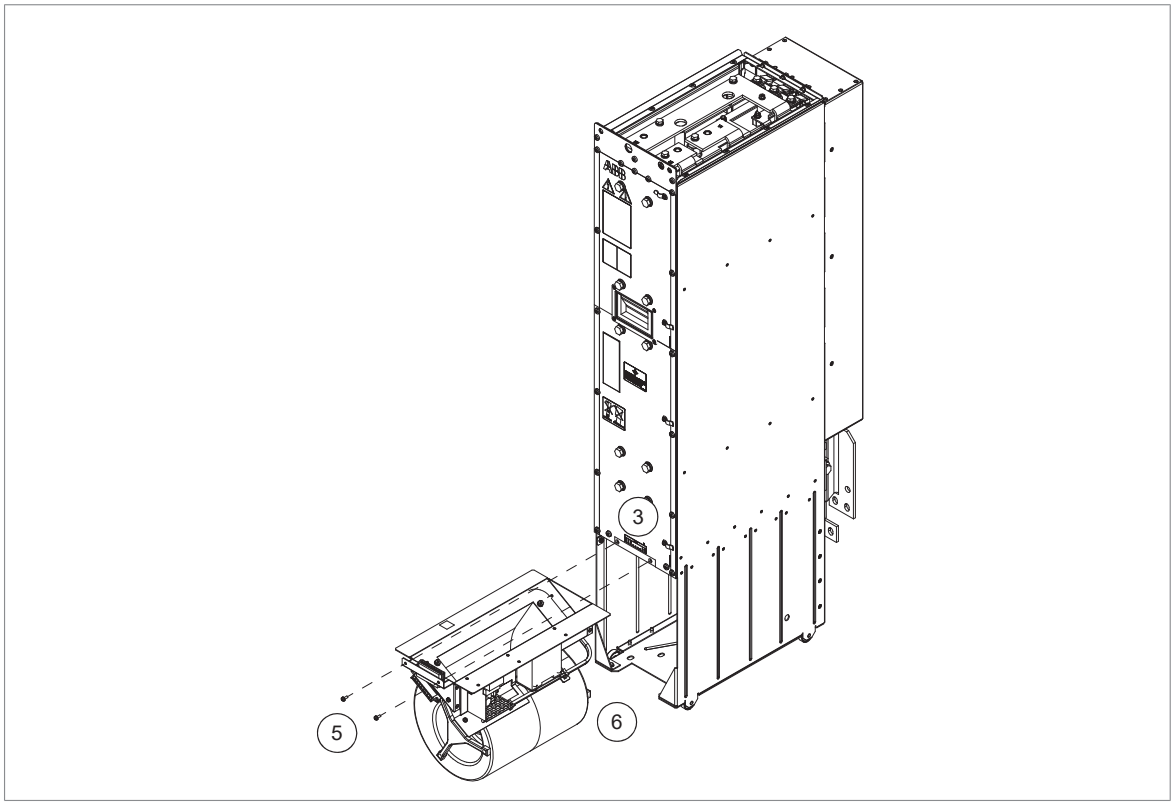


Replacing the fan of the LCL filter (BLCL-2x-x)

WARNING!
Obey the safety instructions 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, commissioning or maintenance work.

Note: Before you start replacing the fan kit of the filter module, make sure that the connector at the end of the fan kit cable is compatible with the counterpart in the module. Black connector is compatible only with the black counterpart, and gray connector only with the gray counterpart. If the connectors are not compatible, replace the connector at the end of the fan kit cable. Use the connector in the old fan kit, or order suitable connector from ABB. Refer to +V112 connector replacement guide for ACS880-x04 R8i/D8T, BLCL-2X, BL-2X and BLHF DOL fan (3AXD50001059903 [English]).

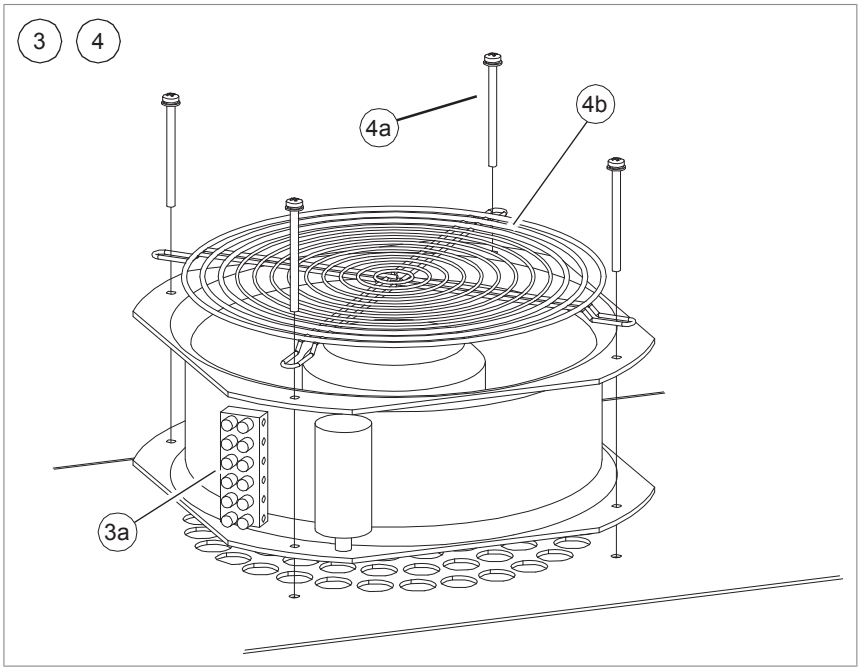
1. Stop the drive and do the steps in section Electrical safety precautions (page 54) before you start the work.
2. Open the door.
3. Remove the two locking screws of fan supply plug connector.
4. Pull the plug connector downwards to unplug the fan wiring.
5. Remove the screws in front of the fan unit.
6. Pull the fan unit out.
7. Replace the fan of the fan unit. Install the fan unit 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. If you are not a qualified electrical professional, do not do installation, commissioning or maintenance work.

1. Stop the drive and do the steps in section Electrical safety precautions (page 54) 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.

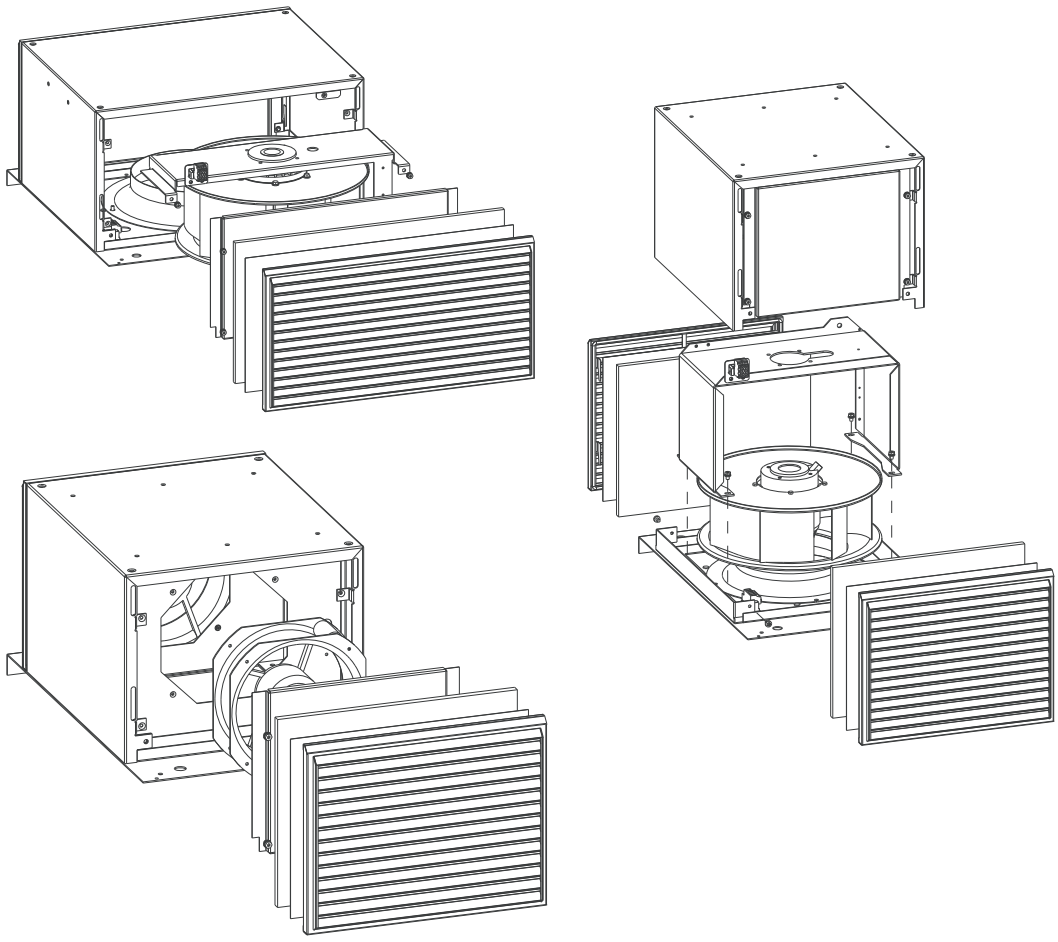
1. Disconnect the drive from the AC power line and make sure it is safe to start the work. See section Electrical safety precautions (page 54).
2. Remove the shrouding from in front of the fan.
3. Unplug the power supply cable of the fan.
4. Remove the fastening screws of the fan.
5. Install the new fan in reverse order.

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

WARNING!
Obey the safety instructions 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, commissioning 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 54).
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. For allowed configurations when using reduced run function, refer to the firmware manual of the supply unit.

Starting reduced run operation

WARNING!
Obey the safety instructions given in ACS880 multidrives 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 54) 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 multidrives 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.

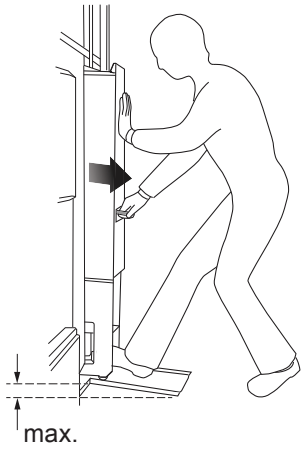
1. Stop the drive and do the steps in section Electrical safety precautions (page 54) before you start the work.
2. Remove the air baffle from the module bay.
3. Reinstall the module into its bay.
4. Switch on the power to the supply/rectifier unit.
5. Enter "0" into parameter 195.13 Reduced run mode.

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.

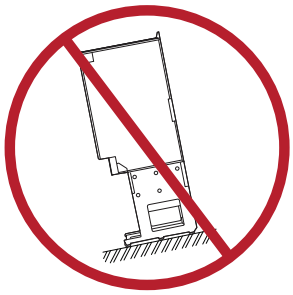
WARNING!
Ignoring the following instructions can cause physical injury, or damage to the equipment:

- 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).

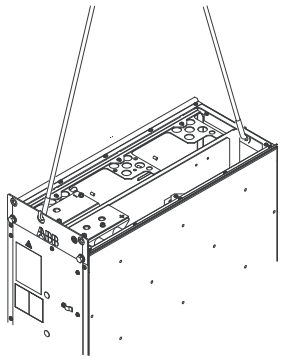


Support the top and bottom of the module while removing!

Do not tilt!

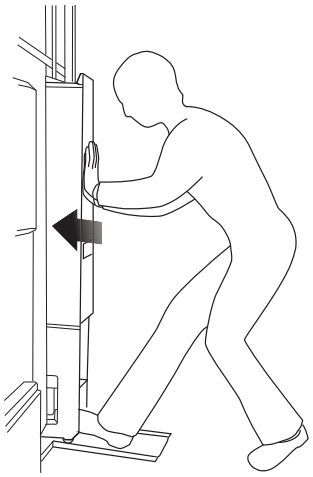


Do not leave the module unattended on a sloping floor!



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!



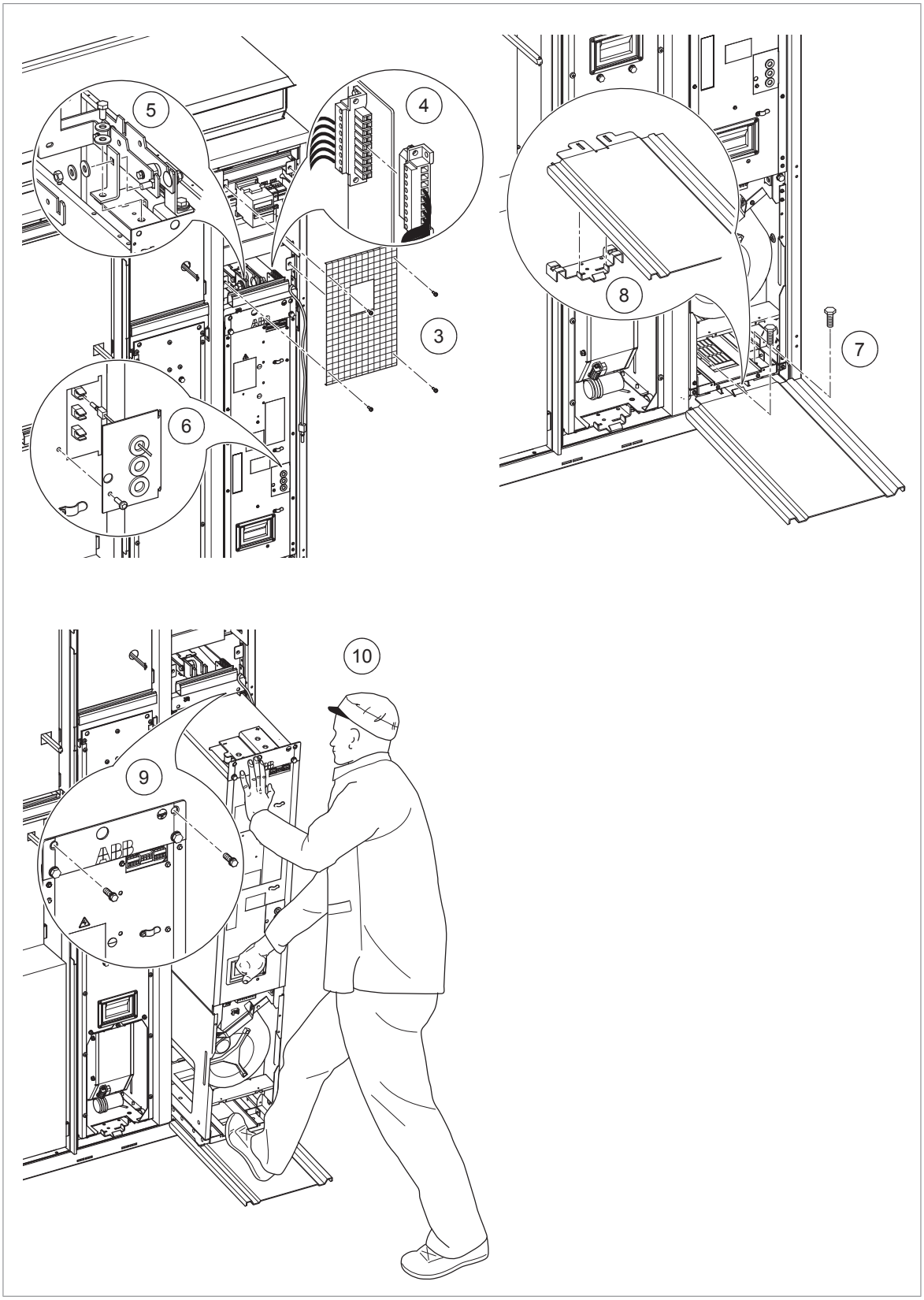
Support the top and bottom of the module while replacing!

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]).

Note: Before you start replacing the supply module, make sure that the connector at the end of the auxiliary power supply cable in the cabinet is compatible with the counterpart in the module. Black connector is compatible only with the black counterpart, and gray connector only with the gray counterpart. If the connectors are not compatible, replace the connector in the new module. Use the connector in the old module, or order suitable connector from ABB. Refer to +V112 connector replacement guide for ACS880-x04 R8i/D8T/D7T module change (3AXD50001060015 [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 54).
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 auxiliary power supply 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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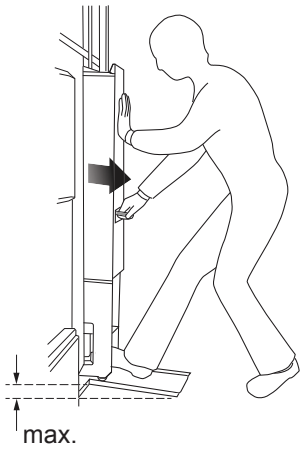
Replacing the IGBT supply module (frame R8i and multiples)

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

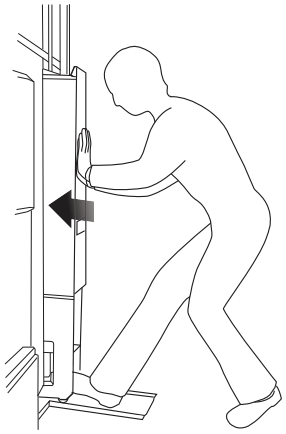
If you are not a qualified electrical professional, do not do installation or maintenance work.

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!



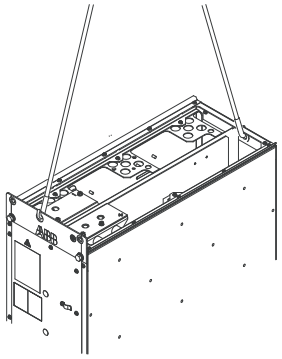
Support the top and bottom of the module while replacing!

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]).

Note: Before you start replacing the supply module, make sure that the connector at the end of the auxiliary power supply cable in the cabinet is compatible with the counterpart in the module. Black connector is compatible only with the black counterpart, and gray connector only with the gray counterpart. If the connectors are not compatible, replace the connector in the new module. Use the connector in the old module, or order suitable connector from ABB. Refer to +V112 connector replacement guide for ACS880-x04 R8i/D8T/D7T module change (3AXD50001060015 [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 54).
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 auxiliary power supply 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.

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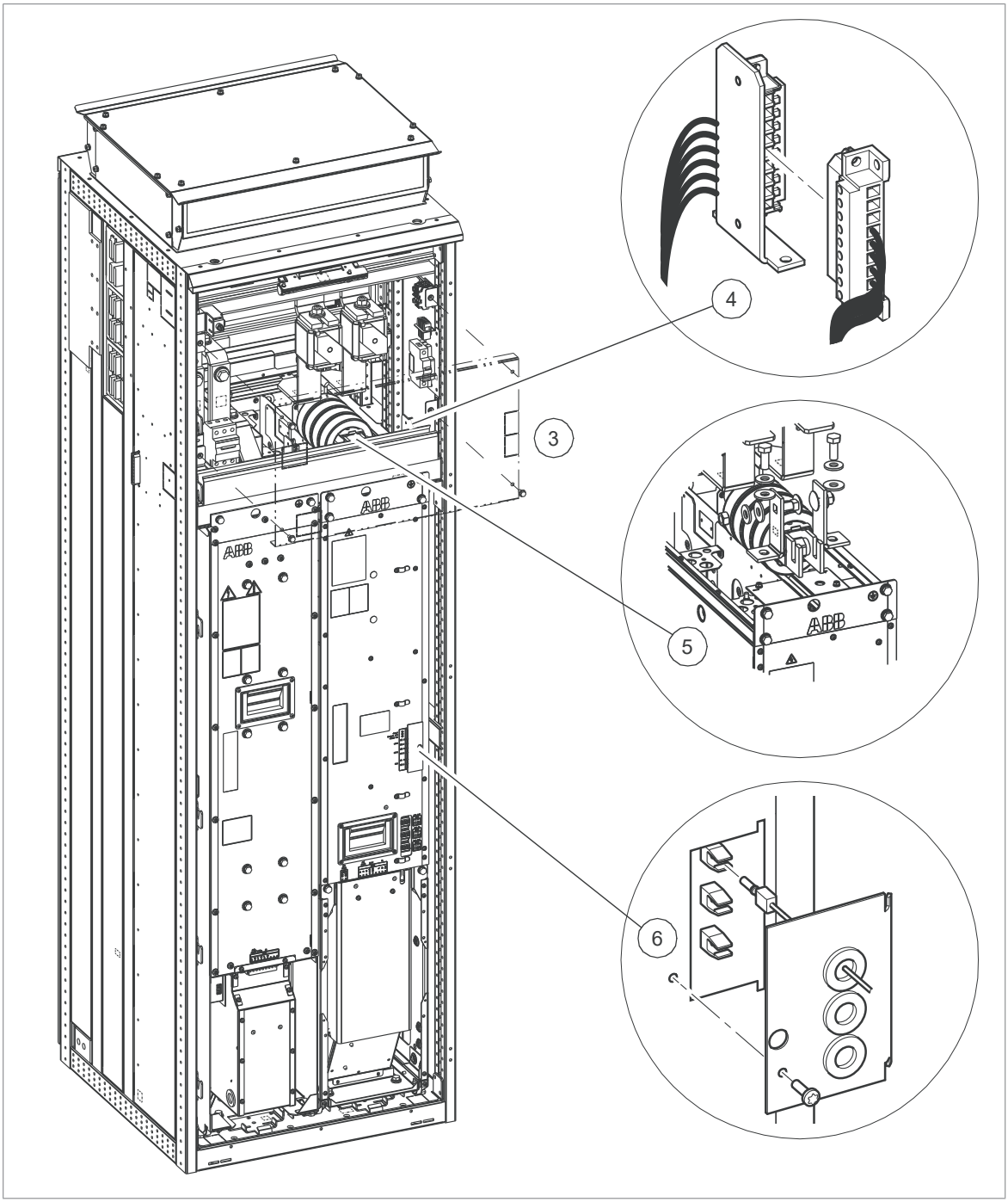
9. Remove the two fastening screws that fasten the top of the module to the cabinet frame.
10. Pull the module carefully out of the cabinet along the ramp. While pulling on the handle, keep a constant pressure with one foot on the base of the module to prevent the module from falling on its back.
11. 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 auxiliary power supply 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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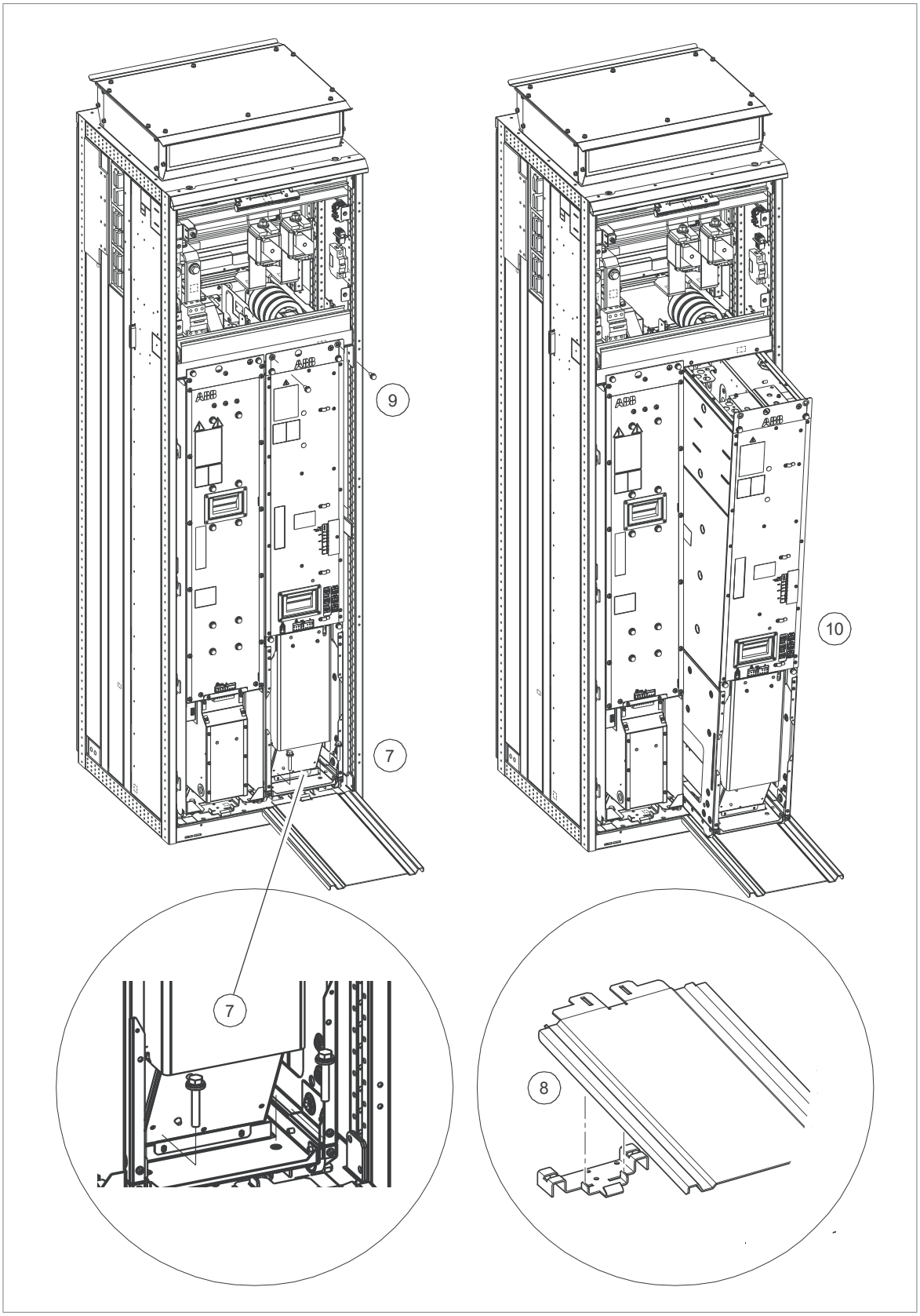
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LCL filter

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:

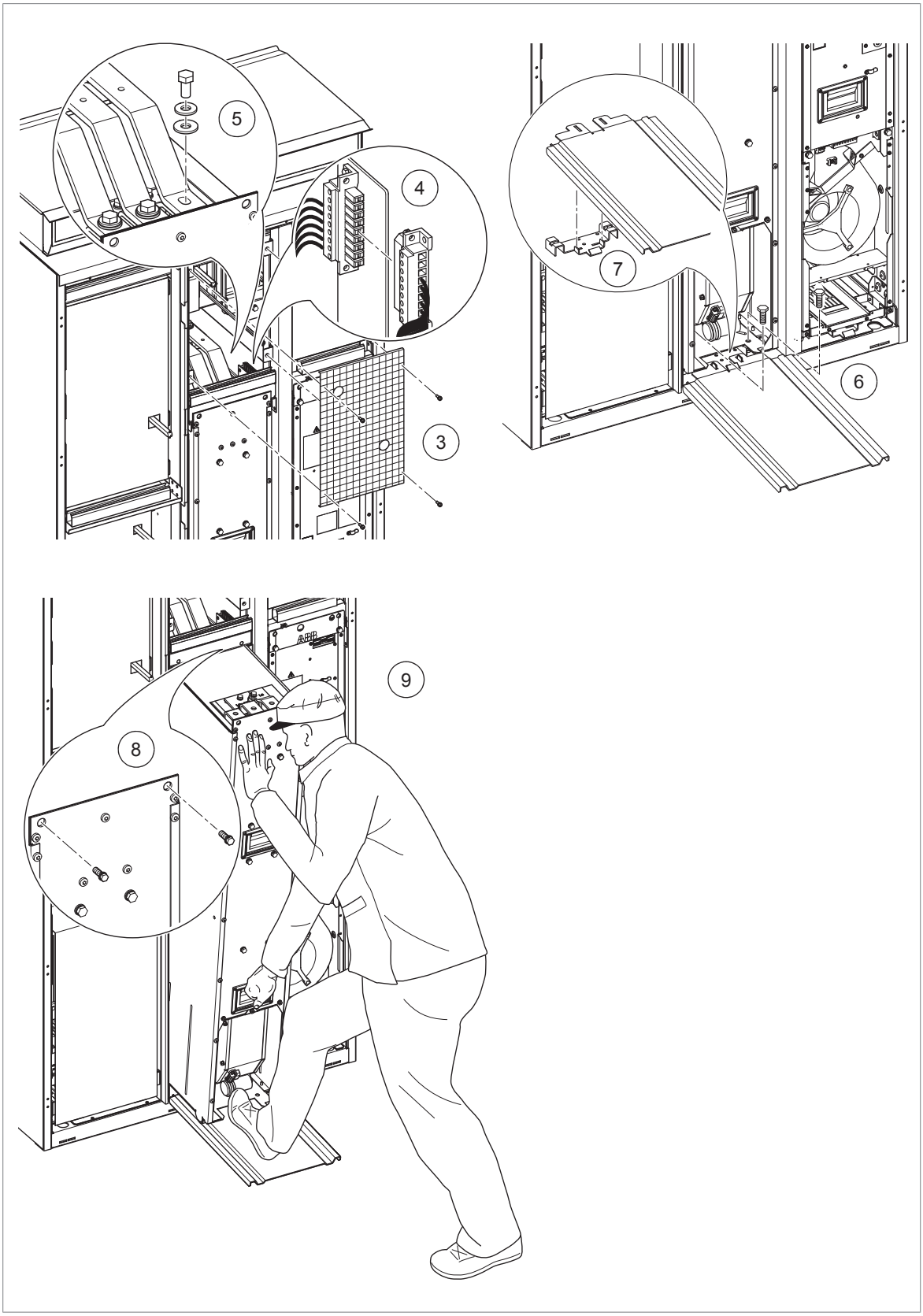
- Use extreme caution when maneuvering a supply module that runs on wheels. The modules are heavy and have a high center of gravity. They topple over easily if handled carelessly.
- When removing a module which is equipped with wheels, pull the module carefully out of the cubicle along the ramp. While 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]).

Note: Before you start replacing the filter module, make sure that the connector at the end of the auxiliary power supply cable in the cabinet is compatible with the counterpart in the module. Black connector is compatible only with the black counterpart, and gray connector only with the gray counterpart. If the connectors are not compatible, replace the connector in the new module. Use the connector in the old module, or order suitable connector from ABB. Refer to +V112 connector replacement guide for ACS880 BLCL-2X, BL-2X and BLHF module change, connector X30 (3AXD50001065157 [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 54).
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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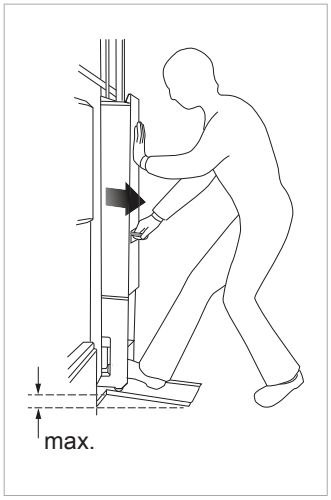
Replacing the LCL filter (frame R8i and multiples)

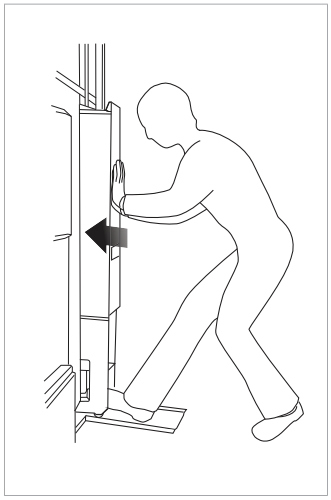
Refer to the drawings below.

WARNING!
Obey the safety instructions 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, commissioning or maintenance work.

WARNING!

- Do not use the module extraction/installation ramp when the height of the drive cabinet plinth is more than the maximum permitted 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 move the module on its wheels for long distances. It can cause damage to the wheels. Also, there is a risk of the module falling over.
- 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.

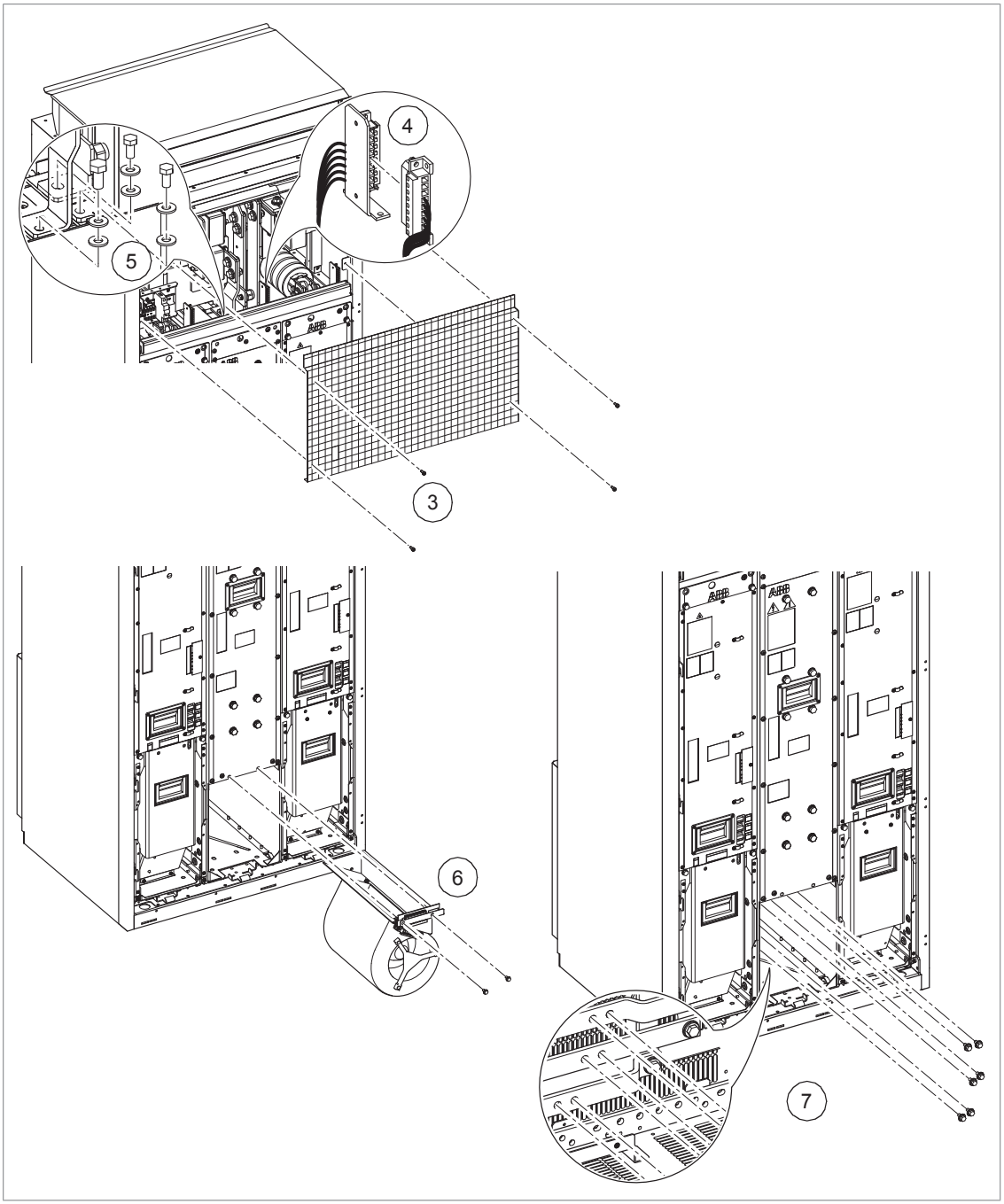

- Wear protective gloves and long sleeves! Some parts have sharp edges.

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]).

Note: Before you start replacing the filter module, make sure that the connector at the end of the auxiliary power supply cable in the cabinet is compatible with the counterpart in the module. Black connector is compatible only with the black counterpart, and gray connector only with the gray counterpart. If the connectors are not compatible, replace the connector in the new module. Use the connector in the old module, or order suitable connector from ABB. Refer to +V112 connector replacement guide for ACS880 BLCL-2X, BL-2X and BLHF module change, connector X30 (3AXD50001065157 [English]).

1. Stop the drive (if running) and do the steps in section Electrical safety precautions (page 54) 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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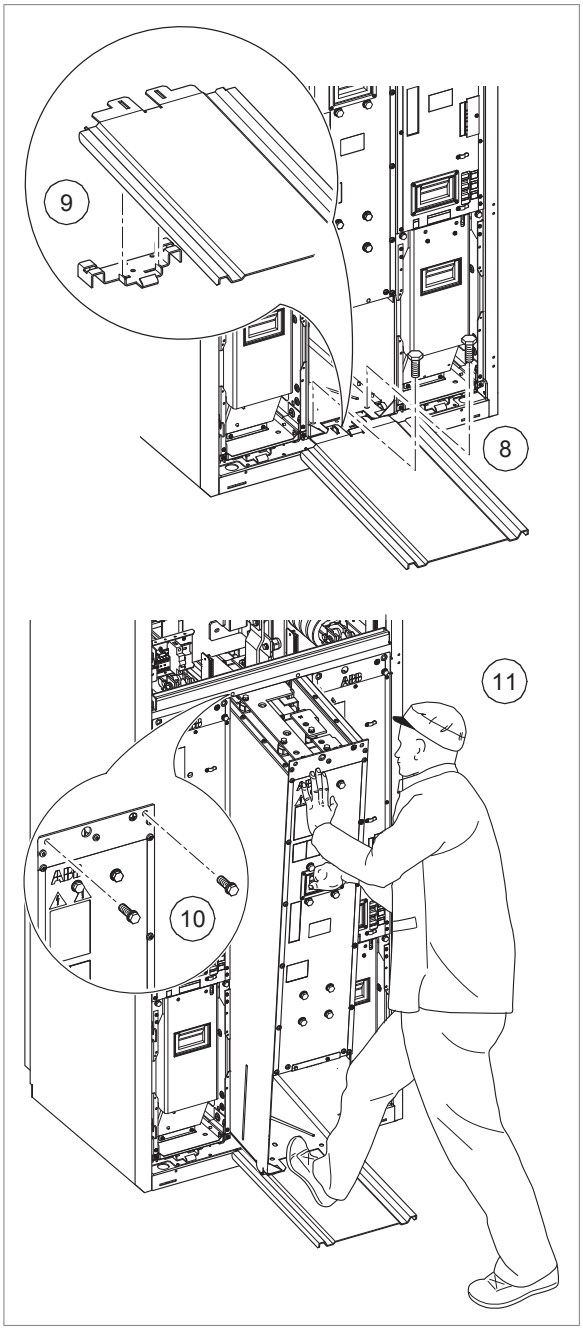
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Capacitors

The intermediate DC circuit 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, refer to Capacitor reforming instructions (3BFE64059629 [English]).

Fuses

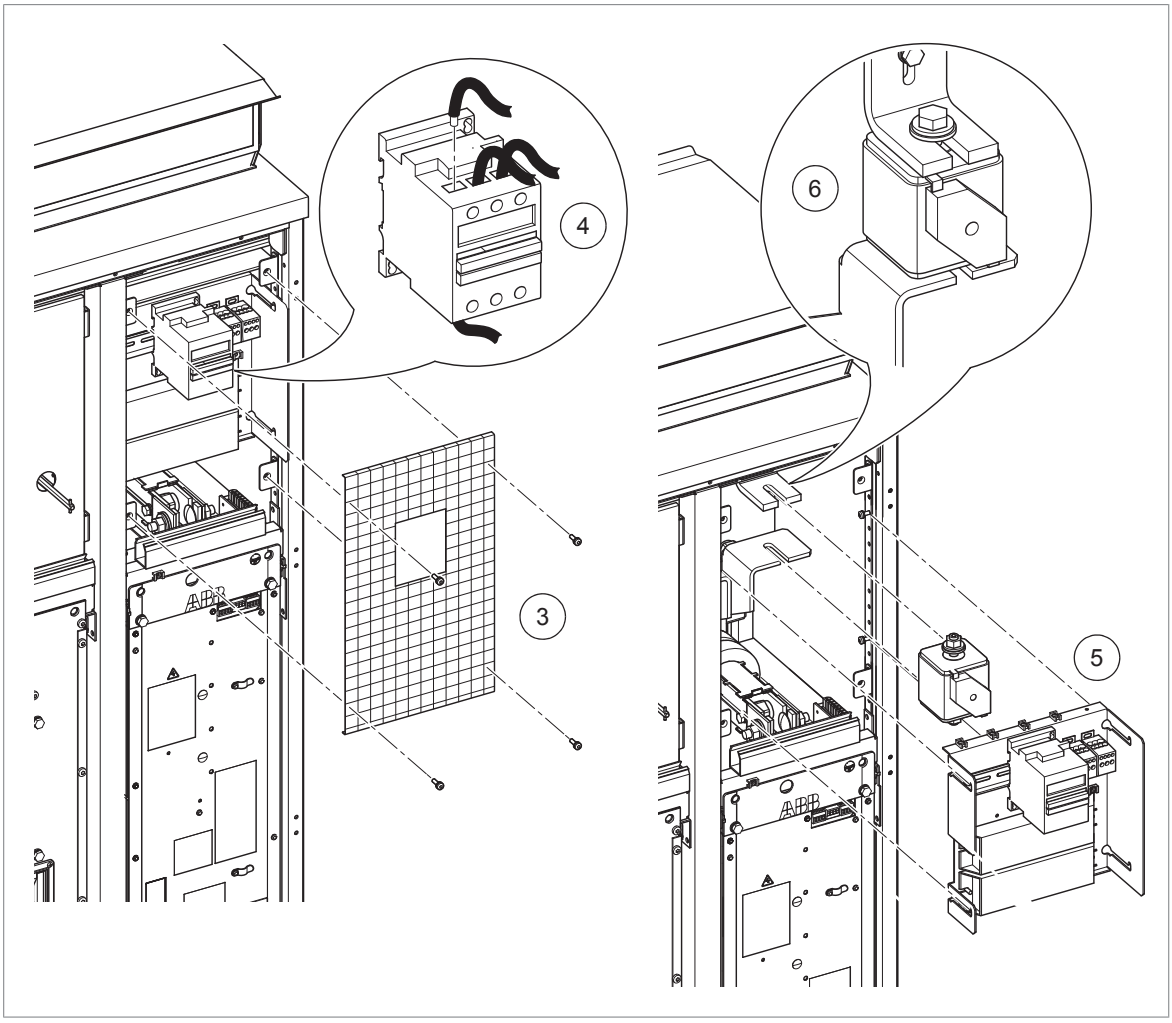
Checking and replacing the DC fuses (limited scope version)

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 54). 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.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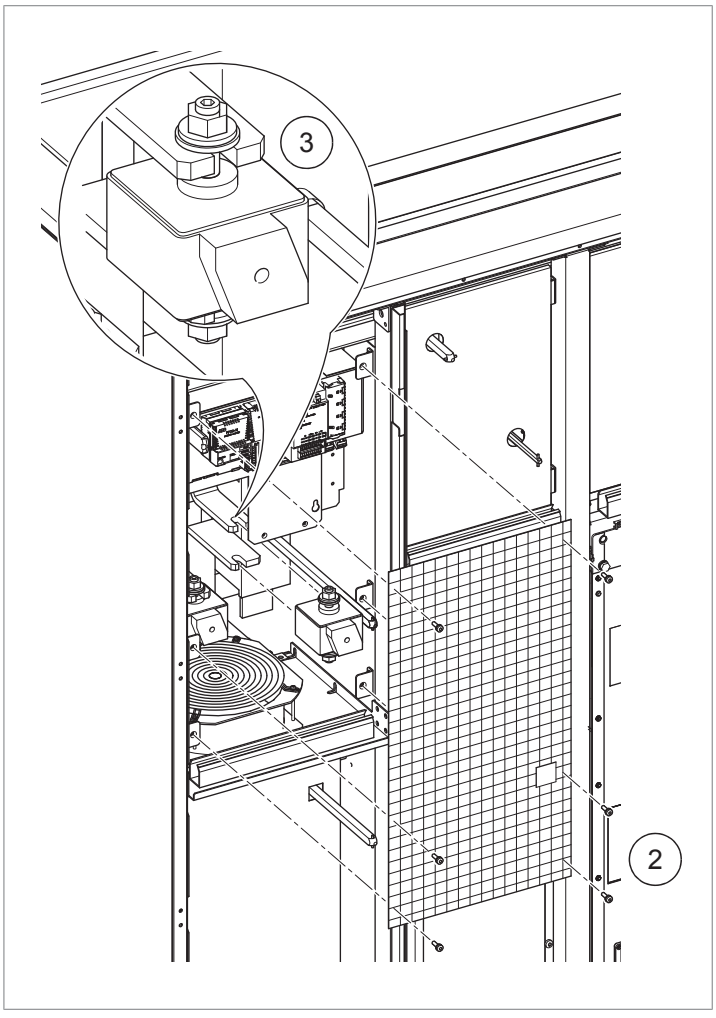
Checking and replacing the AC fuses (limited scope version)

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 54).
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 54). 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.

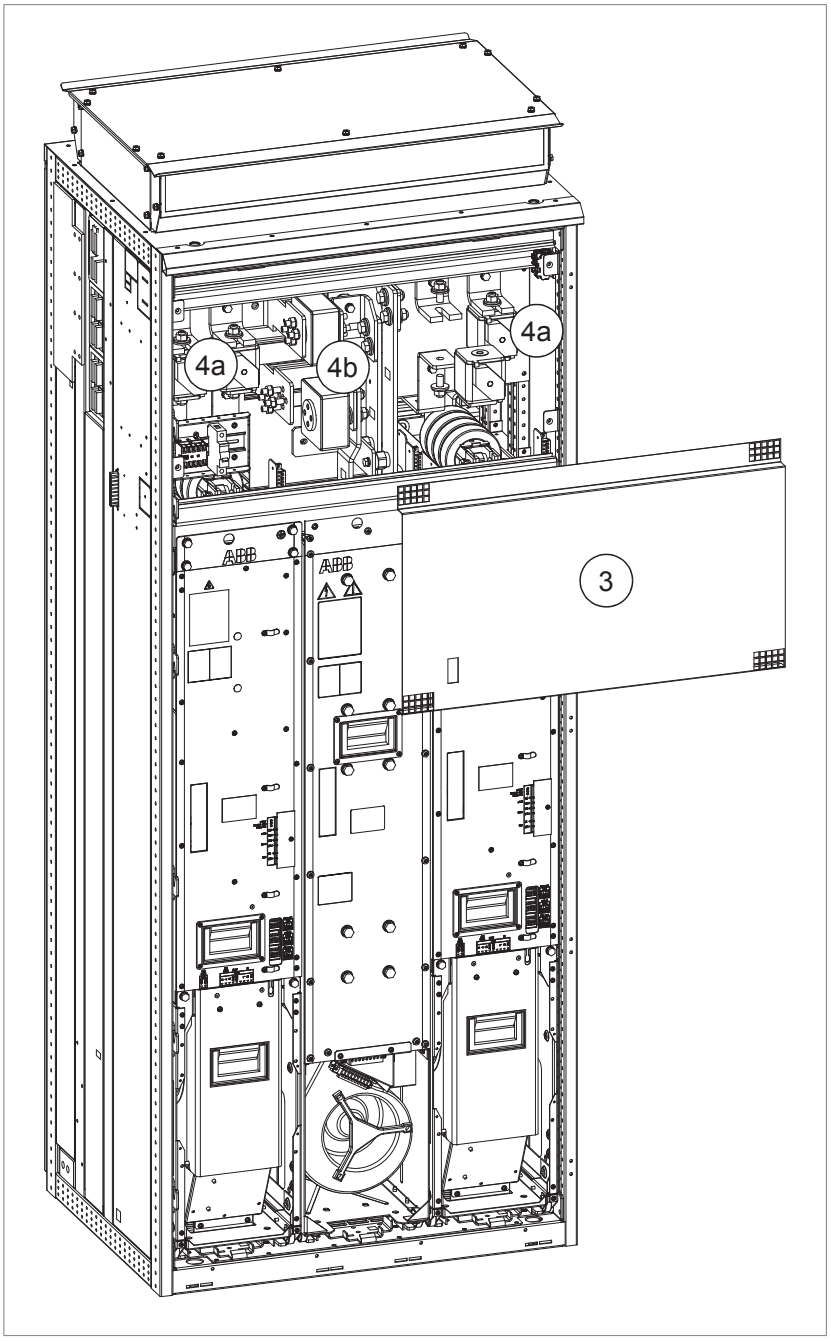
Checking and replacing the AC fuses (frame R8i and multiples)

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 54).
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.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4a
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Control unit (UCU)

UCU control unit types

There are three variants of the UCU control unit used in ACS880: UCU-22, UCU-23 and UCU-24. These have a different number of converter module connections but are otherwise identical. The UCU types are interchangeable if the number of connections is sufficient and the control program is the same. For example, UCU-24 can be used as a direct replacement for both UCU-22 and UCU-23.

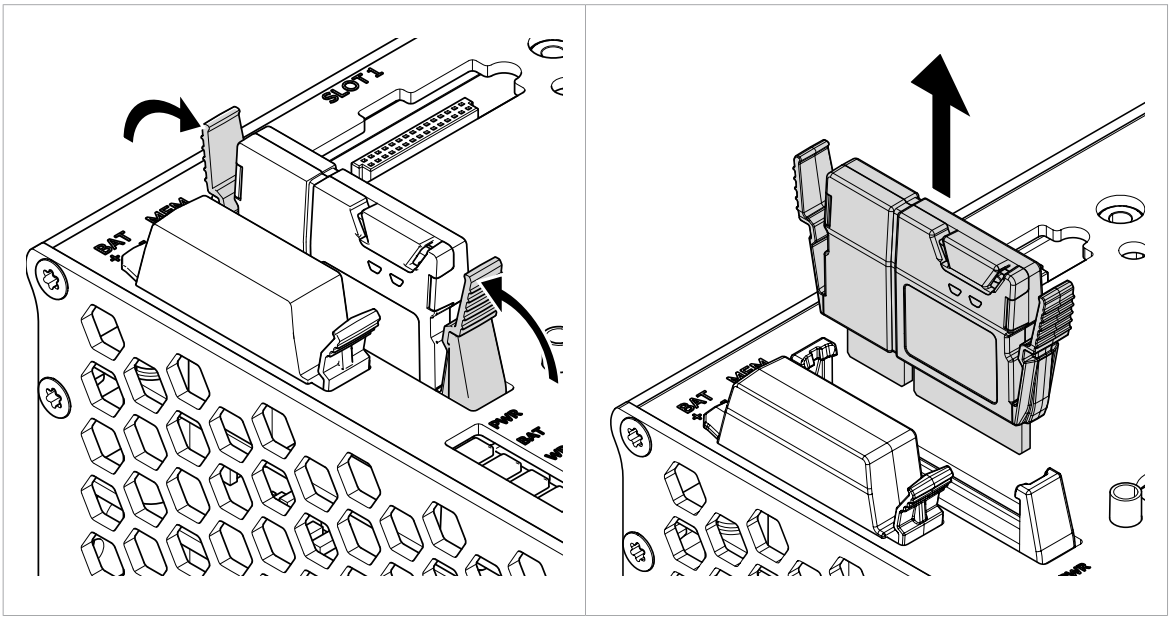
Replacing the memory unit (UCU)

If you replace the control unit, move the memory unit from the old control unit to the new control unit to keep the existing parameter settings.

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, commissioning or maintenance work.

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

1. Stop the drive and do the steps in section Electrical safety precautions (page 54) before you start the work.
2. Make sure that the control unit is not powered.
3. Push and hold in the clips on the memory unit. Pull the memory unit out.
4. Push the new memory unit in.



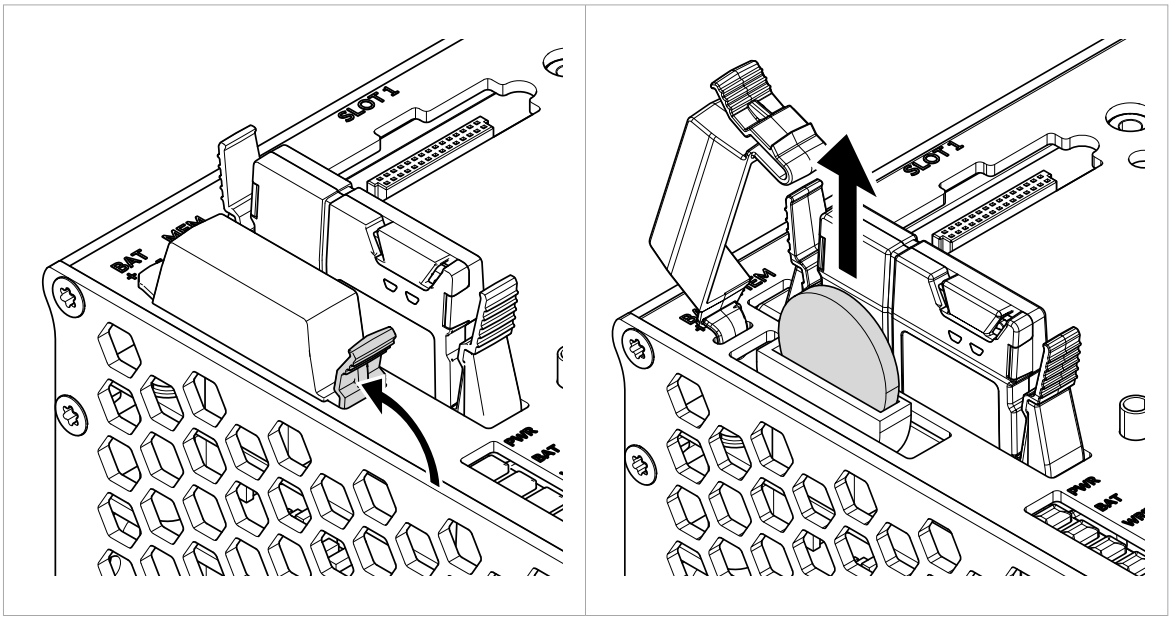
Replacing the real-time clock battery (UCU)

When the BAT LED is on, the real-time clock battery voltage is high enough. If the LED is off, replace the battery.

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, commissioning or maintenance work.

1. Stop the drive and do the steps in section Electrical safety precautions (page 54) before you start the work.
2. Open the battery cover.
3. Replace the battery with a new BR2032 battery.

   Note: The real-time clock stays set for 2 minutes without battery.
4. Close the battery cover.
5. If necessary, set the real-time clock.
6. Dispose of the old battery according to local disposal rules or applicable laws.



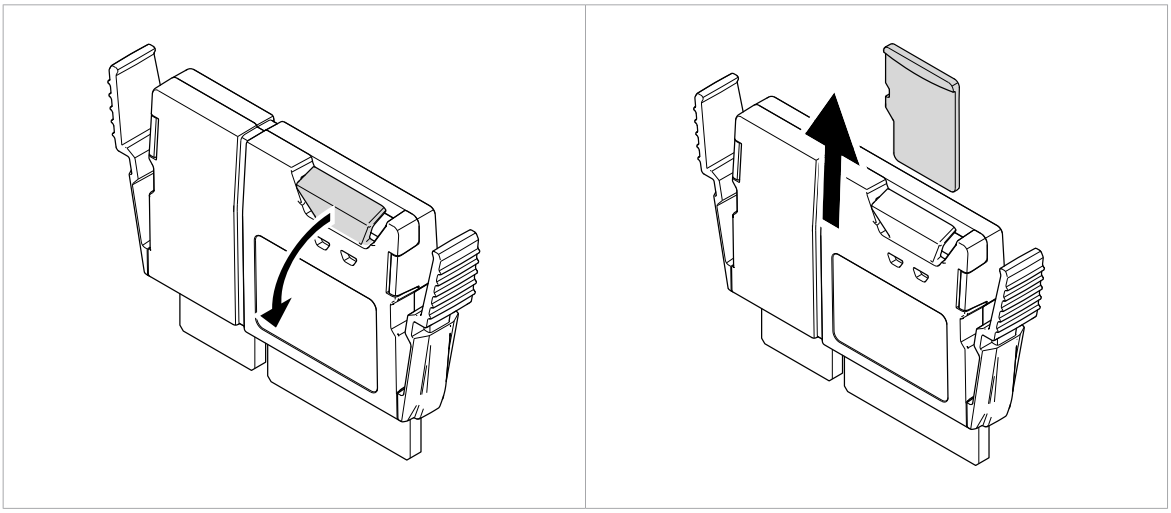
Replacing the microSDHC memory card (UCU)

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, commissioning or maintenance work.

For the replacement card type, refer to the technical data.

1. Stop the drive and do the steps in section Electrical safety precautions (page 54) before you start the work.
2. Remove the UMU-01 memory unit from the control unit.
3. Take the memory unit out from the cabinet before you remove the microSDHC card from it. The card is small and can fall into the cabinet.
4. Open the memory card cover in the memory unit.

5. Push the card to remove it.
6. Install a new card in reverse order.



Control unit (BCU)

BCU control unit types

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

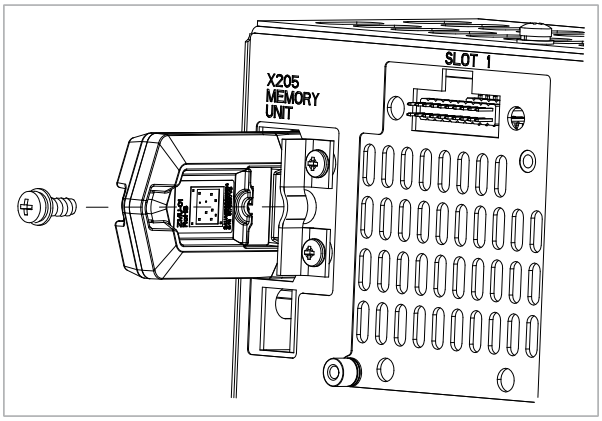
Replacing the memory unit (BCU)

If you replace the control unit, move the memory unit from the old control unit to the new control unit to keep the existing parameter settings.

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, commissioning or maintenance work.

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 54) 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.

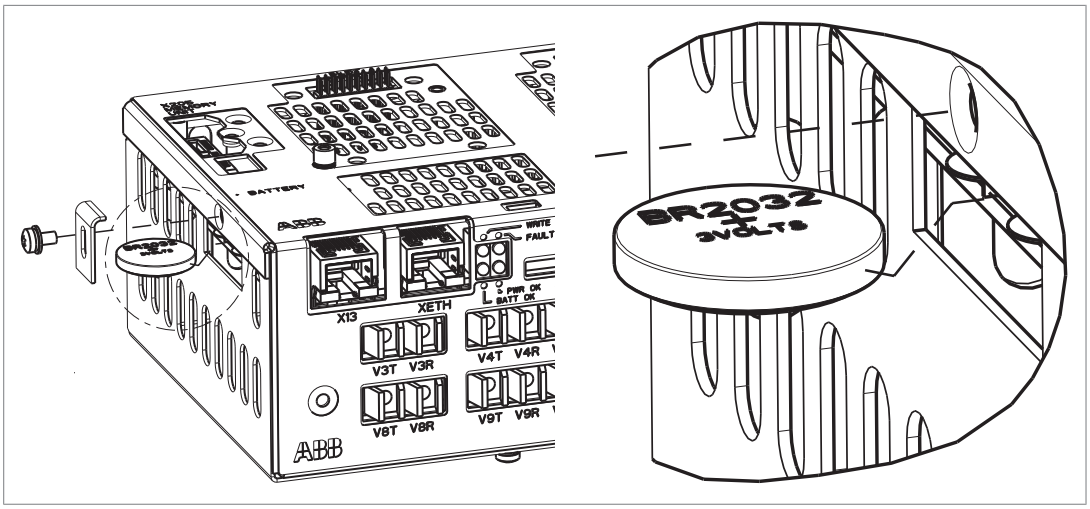


Replacing the battery (BCU)

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, commissioning or maintenance work.

Replace the real-time clock battery if the BATT OK LED is off when the control unit is powered.

1. Stop the drive and do the steps in section Electrical safety precautions (page 54) before you start the work.
2. Remove the fastening screw.
3. Replace the battery with a new BR2032 battery.
4. If necessary, set the real-time clock.
5. Discard the old battery according to local disposal rules or applicable laws.



Control panel

Refer to ACS-AP-I, -S, -W Assistant control panels user’s manual (3AUA0000085685 [English]).

Refer to ACS-BP-S basic control panels user’s manual (3AXD50000032527 [English]).

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.
	Flashing green	There is an active warning in the unit.
	Continuous red	There is an active fault in the unit.
	Flashing red	There is a fault that requires the stopping and restarting of the drive/converter/inverter.
	Flashing 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.

9

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.

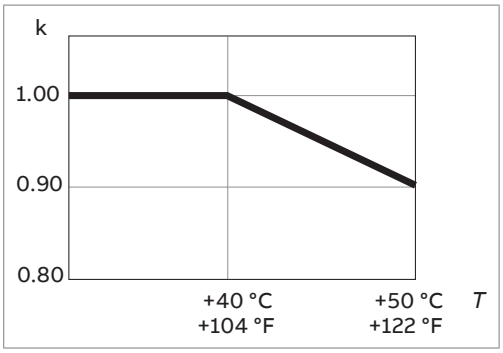
P_{Hd} Output power in heavy-duty use

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

Derating

Surrounding air temperature derating

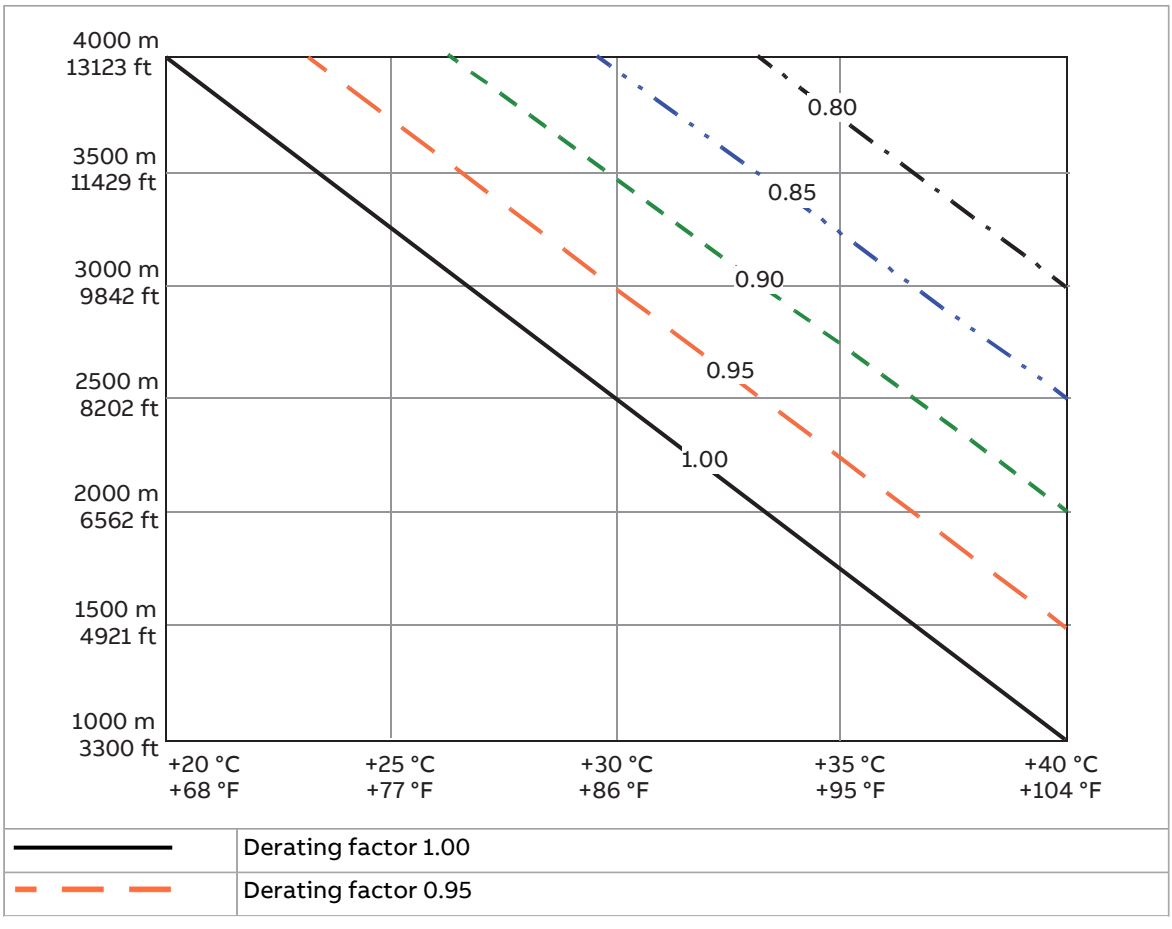
In the temperature range +40…50 °C (+104…122 °F), the rated output current is derated by 1 percentage point for every added 1 °C (1.8 °F). The output current can be calculated by multiplying the current given in the rating table by the derating factor *(k)*:



Altitude derating

At altitudes more than 1000 m (3281 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. The maximum permitted installation altitude is given in the technical data.

If the surrounding air temperature is less than +40 °C (104 °F), the derating can be reduced by 1.5 percentage points for every 1 °C (1.8 °F) reduction in temperature. A few altitude derating curves are shown below.



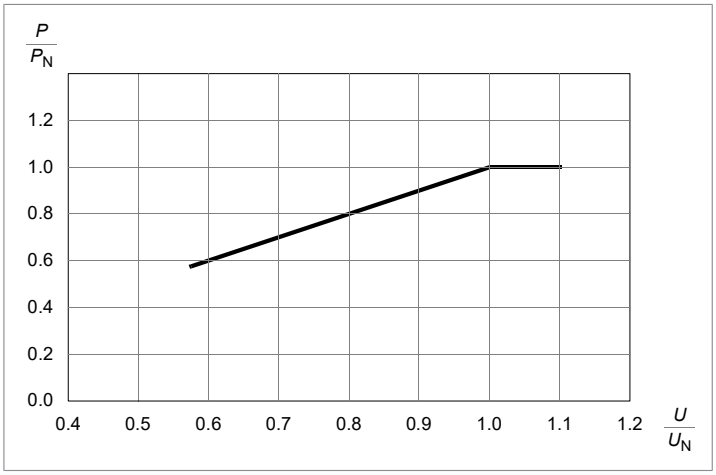
	Derating factor 0.90
	Derating factor 0.85
	Derating factor 0.80

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

Derating for output voltage boosting

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 an unsuitable tap setting of the 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	700 A, 690 V	Flush end type	170M6411	3
0580A-3	900 A, 690 V	Flush end type	170M6413	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	700 A, 690 V	Flush end type	170M6411	3
0530A-5	900 A, 690 V	Flush end type	170M6413	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, size 3	Flush end type	170M6416	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

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	Height 1		Height 2		Width 1		Width 2		Depth 1		Depth 2	
ACS880-207-...	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

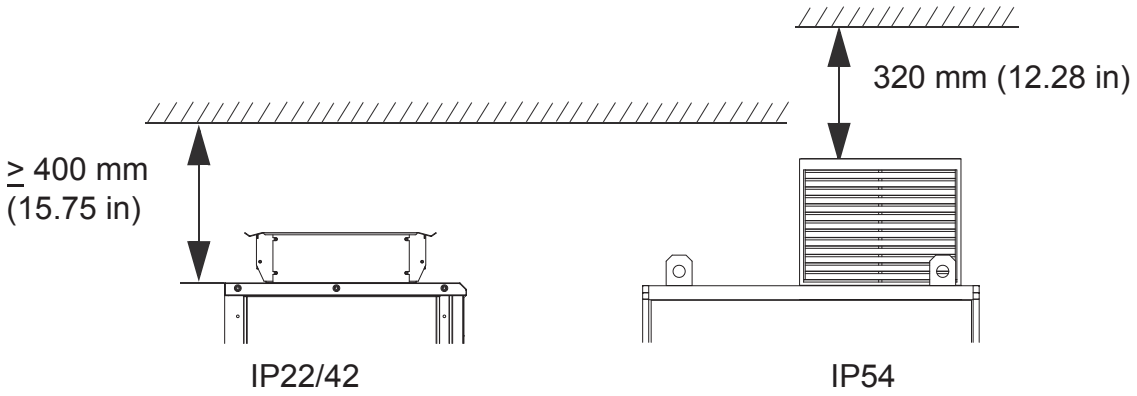
Free space requirements

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	m³/h	ft³/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

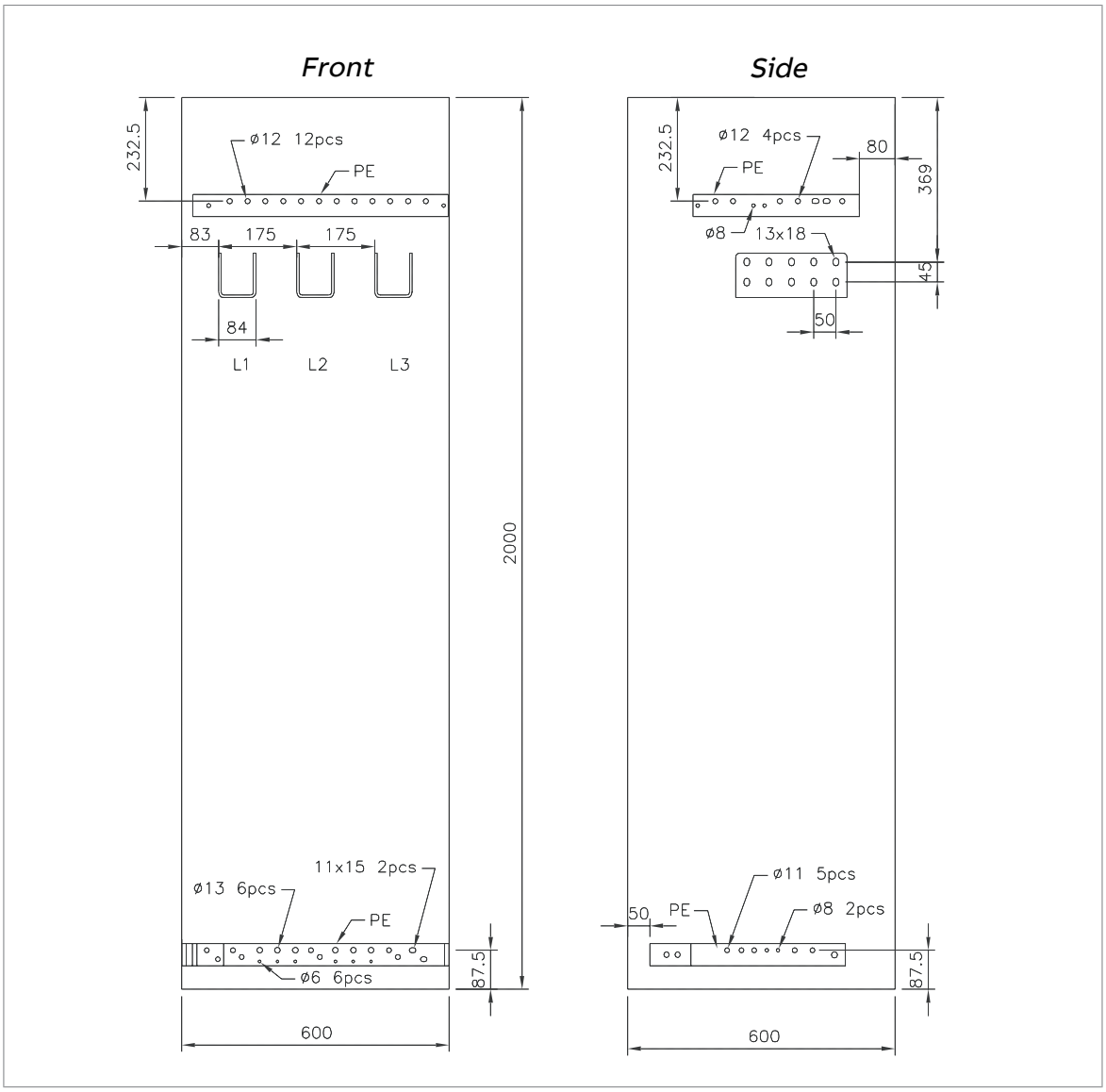
These losses are not calculated according to the ecodesign standard IEC 61800-9-2.

The efficiency is not calculated according to the ecodesign standard IEC 61800-9-2.

Terminal and cable entry data for the input power cable

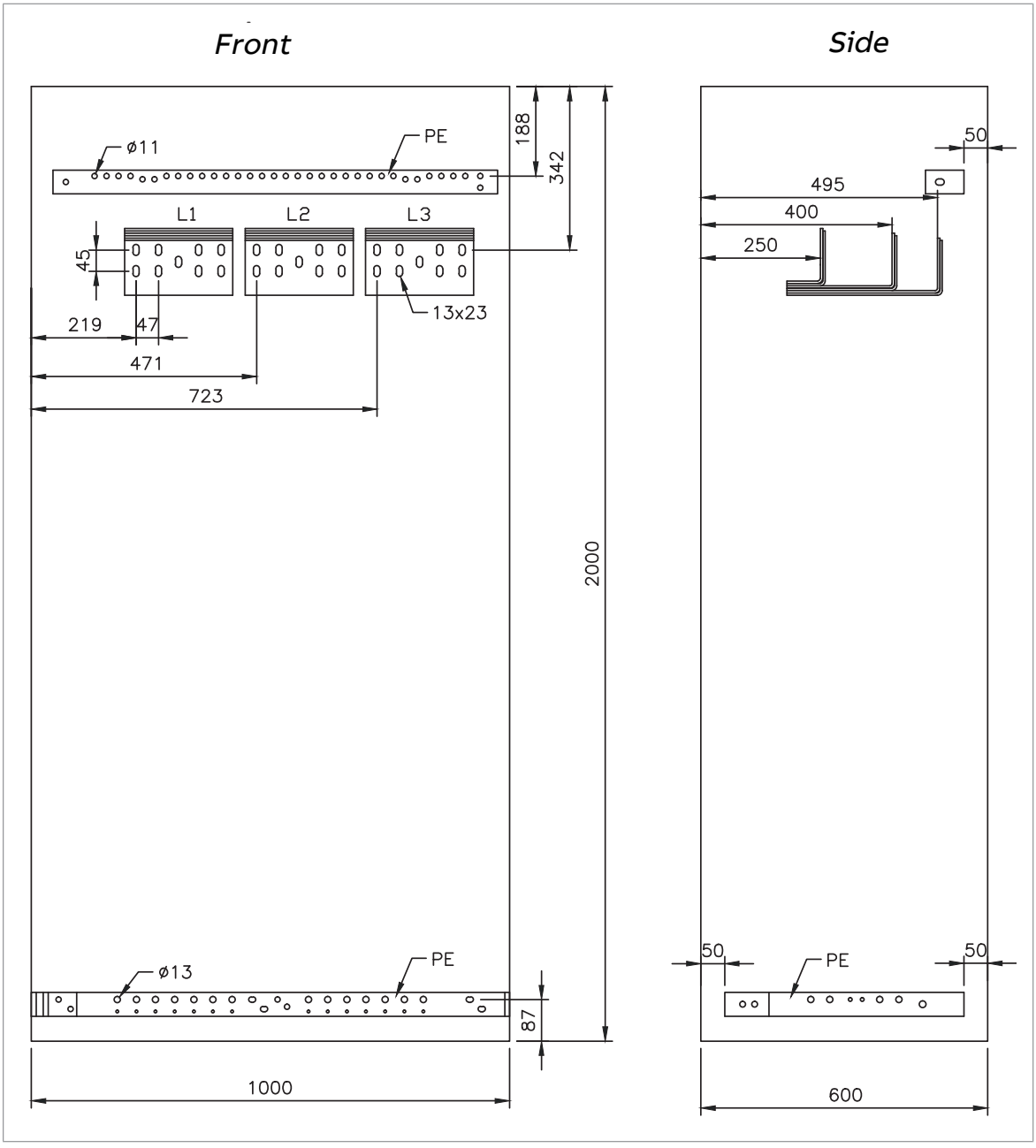
600 mm incoming cubicle – main circuit breaker (+F255), top cable entry

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 (A2-70 or A4-70)
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:
IEC:
525…690 V AC 3-phase ± 10%
In corner-grounded TN systems: 525…600 V AC
UL/CSA:
525…600 V AC
The voltage range 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><u>Supply units with the ABB-defined main switch-disconnector and fuses:</u>
• Rated peak withstand current I_{pk} = 105 kA
• Rated short-time withstand current I_{cw} = 50 kA/1 s
<u>Supply units with ABB-defined main circuit breaker and fuses:</u>
• Rated peak withstand current I_{pk} = 143 kA
• Rated short-time withstand current I_{cw} = 65 kA/1 s (50 kA/1 s for units with earthing/grounding switch)</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>
</table>
$$THD = \sqrt{\sum_{2}^{50}\left(\frac{I_n}{I_N}\right)^2}$$
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 = supply unit nominal current
I_n = nth harmonic current component</td></tr>
</table>

Control unit connection data

See chapters Control unit (UCU) and Control unit (BCU).

Energy efficiency data (ecodesign)

Energy efficiency data is not provided for the drive/unit. Multidrives and multidrive modules are not in the scope of the EU ecodesign requirements (Regulation EU/2019/1781) or the UK ecodesign requirements (Regulation SI 2021 No. 745).

Typical power cable sizes

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

The cable sizing is based on a maximum of 9 cables installed side by side on a ladder type cable tray, with three trays on top of each other (with 30 cm of space between the trays), and an ambient temperature of 30 °C (IEC 60364-5-52).

Conductor cross-section (copper)		PVC insulation Conductor temperature 70°		XLPE insulation Conductor temperature 90°		Typical dimensions of copper cable	
mm²	AWG / kcmil	I_{Lmax} (A)	Time const. (s)	I_{Lmax} (A)	Time const. (s)	Size	ø [mm]
1.5	16	13	85	16	67	3 × 1.5 + 1.5	13
2.5	12	18	121	23	88	3 × 2.5 + 2.5	14
4	12	24	175	30	133	3 × 4 + 4	16
6	10	30	251	38	186	3 × 6 + 6	18
10	8	42	359	53	268	3 × 10 + 10	21
16	6	56	514	70	391	3 × 16 + 16	23
25	4	71	791	89	598	3 × 25 + 16	24
35	1	88	1000	110	760	3 × 35 + 16	26
50	1/0	107	1308	134	990	3 × 50 + 25	29
70	2/0	137	1613	171	1230	3 × 70 + 35	32
95	4/0	167	2046	209	1551	3 × 95 + 50	38
120	250	193	2441	241	1859	3 × 120 + 70	41
150	300	223	2820	279	2139	3 × 150 + 70	44
185	400	255	3329	319	2525	3 × 185 + 95	50
240	500	301	4073	376	3099	3 × 240 + 120	55
300	600	348	4779	435	3636	3 × 300 + 150	58

Conductor cross-section (aluminum)		PVC insulation Conductor temperature 70°		XLPE insulation Conductor temperature 90°		Typical dimensions of aluminum cable	
mm²	AWG / kcmil	I_{Lmax} (A)	Time const. (s)	I_{Lmax} (A)	Time const. (s)	Size	ø [mm]
35	1	67	736	84	669	3 × 35 + 10 Cu	26
50	1/0	82	959	102	874	3 × 50 + 15 Cu	29
70	2/0	105	1182	131	1079	3 × 70 + 21 Cu	32
95	4/0	128	1492	159	1376	3 × 95 + 29 Cu	38
120	250	148	1776	184	1637	3 × 120 + 41 Cu	41

Conductor cross-section (aluminum)		PVC insulation Conductor temperature 70°		XLPE insulation Conductor temperature 90°		Typical dimensions of aluminum cable	
mm²	AWG / kcmil	I_{Lmax} (A)	Time const. (s)	I_{Lmax} (A)	Time const. (s)	Size	ø [mm]
150	300	171	2042	213	1881	3 × 150 + 41 Cu	44
185	400	196	2422	243	2237	3 × 185 + 57 Cu	49
240	500	231	2967	286	2740	3 × 240 + 72 Cu	54
300	600	267	3478	330	3229	3 × 300 + 88 Cu	58

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 (Standard). For indoor use only.
Arcing class (IEC TR 61641)	B – ASSEMBLY providing personnel and ASSEMBLY protection under arcing conditions. Tested at the following voltage with an arcing current of 65 kA for 300 milliseconds: • 400 V units (indicated by "-4" in drive type): 420 V • 500 V units (indicated by "-5" in drive type): 550 V • 690 V units (indicated by "-7" in drive type): 760 V
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

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). For UL and CSA compliant installations, the maximum surrounding air temperature is 40 °C (104 °F).	-40 … +70 °C (-40 … +158 °F)	-40 … +70 °C (-40 … +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 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 IEC/EN 60664-1	2		
Vibration IEC/EN 61800-5-1 IEC 60068-2-6:2007, EN 60068-2-6:2008	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	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

Colors

RAL Classic 7035, RAL Classic 9017.

Materials

Drive

Refer to Recycling instructions and environmental information for ACS880 cabinet-installed drives and multidrive modules (3AXD50000153909 [English]).

Packaging of drive

- Plywood[1)]
- Wood
- PET (strapping)
- PE (VCI film)
- Metal (fixing clamps, screws)
- VCI emitter capsules
- Clay desiccant.

1) Seaworthy package only

Packaging of options

- Cardboard
- Kraft paper
- PP (straps)
- PE (film, bubble wrap)
- Plywood, wood (only for heavy components).

Materials vary according to the item type, size and shape. Typical package consists of a cardboard box with paper filling or bubble wrap. ESD-safe packing materials are used for printed circuit boards and similar items.

Manuals

Printed product manuals are made of recyclable paper. Product manuals are available on the Internet.

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 DC capacitors need selective treatment according to IEC 62635 guidelines.

To aid recycling, most plastic parts are marked with an appropriate identification code. In addition, components containing substances of very high concern (SVHCs)

are listed in European Chemicals Agency's SCIP database. SCIP is the database for information on Substances of Concern In articles as such or in complex objects (Products) established under the Waste Framework Directive (2008/98/EC). For further information, contact your local ABB distributor or consult European Chemicals Agency's SCIP database to find out which SVHCs are used in the drive, and to find out where those components are located.

Contact your local ABB distributor for further information on environmental aspects. End of life treatment must follow international and national regulations.

For more information on ABB end of life services, refer to new.abb.com/service/end-of-life-services.

Applicable standards

See ACS880 multidrives cabinets and modules electrical planning instructions (3AUA0000102324 [English]).

Markings

See ACS880 multidrives cabinets and modules electrical planning instructions (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.

Cyber security 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.

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/contact-centers.

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 forms.abb.com/form-26567.

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