

ABB INDUSTRIAL DRIVES

ACS880-1604LC DC/DC converter modules

Hardware manual



ACS880-1604LC DC/DC converter modules

Hardware manual

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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 ACS880-1604LC DC/DC converter modules for user-defined cabinet installations.

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 liquid-cooled multidrives cabinets and modules safety instructions \(3AXD50000048633 \[English\]\)](#).
- 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 module

Some descriptions, instructions and technical data which concern only certain module or frame sizes are marked with the size identifier (such as "2×R8i", etc.). The marking derives from the quantity and basic construction of the converter modules that form the converter unit. For example, frame size "2×R8i" indicates that the converter unit consists of two frame size R8i converter modules connected in parallel.

The frame size is marked on the type designation labels. The frame size of each drive module is also shown in the rating tables.

The instructions and technical data which concern only certain optional selections are marked with option codes (such as +E205). The options included in the drive can be identified from the option codes visible on the type designation label.

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
BAMU	Auxiliary measurement unit
BCU	Type of control unit
BDCL	Series of L-filters, for example BDCL-14-5
BDPS	Module internal power supply board
BFPS	Control and power supply board for speed-controlled cooling fan
CIO	I/O module for controlling cooling fans
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/DC converter	Charges or discharges an external energy storage (such as a battery or capacitor bank) from or into the DC bus
DC/DC converter module	Converter power electronics, related components and DC capacitors enclosed in a metal frame or enclosure. Intended for cabinet installation.
DC/DC converter unit	DC/DC converter module(s) under control of one control unit, and related components
DDC	DC/DC converter unit
DI	Digital input
DOL	Direct-on-line
Drive	Frequency converter for controlling AC motors
EMC	Electromagnetic compatibility
Energy storage	Device that stores electrical energy, for example, a battery or a super capacitor.
Flat-PLS	Rittal Flat-PLS, a busbar system for standard, commercially available flat busbars
Frame, frame size	Physical size of the drive or power module
IGBT	Insulated gate bipolar transistor
INU	Inverter unit
Inverter	Converts direct current and voltage to alternating current and voltage.
Inverter unit	Inverter module(s) under control of one control unit, and related components. One inverter unit typically controls one motor.
LCU	Liquid cooling unit

Term	Description
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.
PLC	Programmable logic controller
Supply unit	Supply module(s) under control of one control unit, and related components.
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 modules](#)

2

Operation principle and hardware description

Contents of this chapter

This chapter describes the DC/DC converter operation basics and the hardware of the converter.

Operation principle

The DC/DC converter unit (DDC) transfers energy from a common DC bus of a drive into an external energy storage and discharges energy back to the DC bus. The energy storage can be, for example, a battery or super capacitor. The energy storage is not included in the DC/DC module product offering.

The DC/DC converter unit has a single converter module or parallel converter modules under the command of one control unit. Parallel DC/DC converter modules must have a common energy storage. Each parallel module must have the output cabling of its own. ABB also recommends that you use identical cablings (cable type, cross-sectional area, and length) and have identical load for each module. For other solutions, contact ABB.

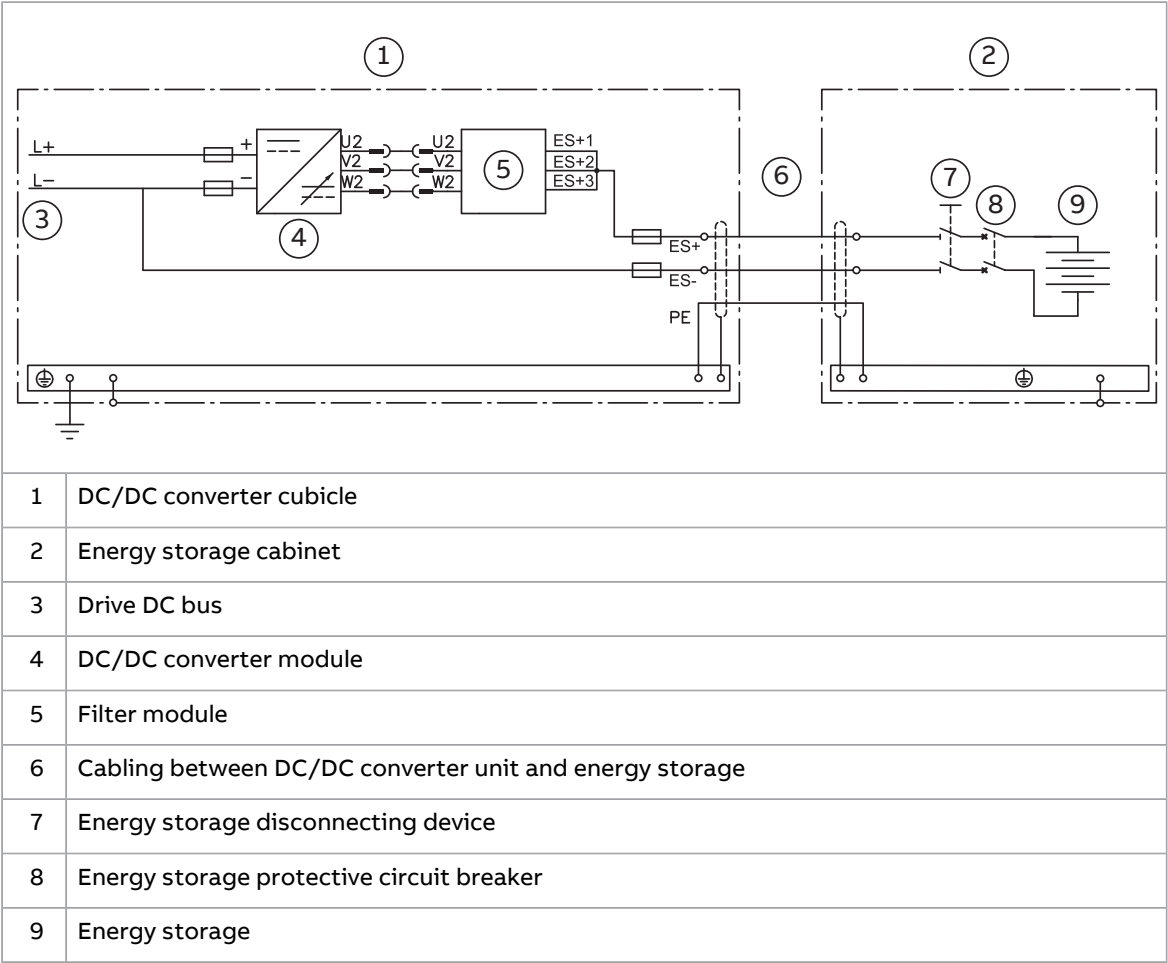
Typically, the DC/DC converter is used in marine applications for heave compensation, peak load compensation, propulsion supply in harbors, energy storing instead of an additional generator and so on. The DC/DC converter can also be used in automotive applications such as electric car charging systems and also in several other applications where energy storing and reuse is needed.

■ Main circuit diagram

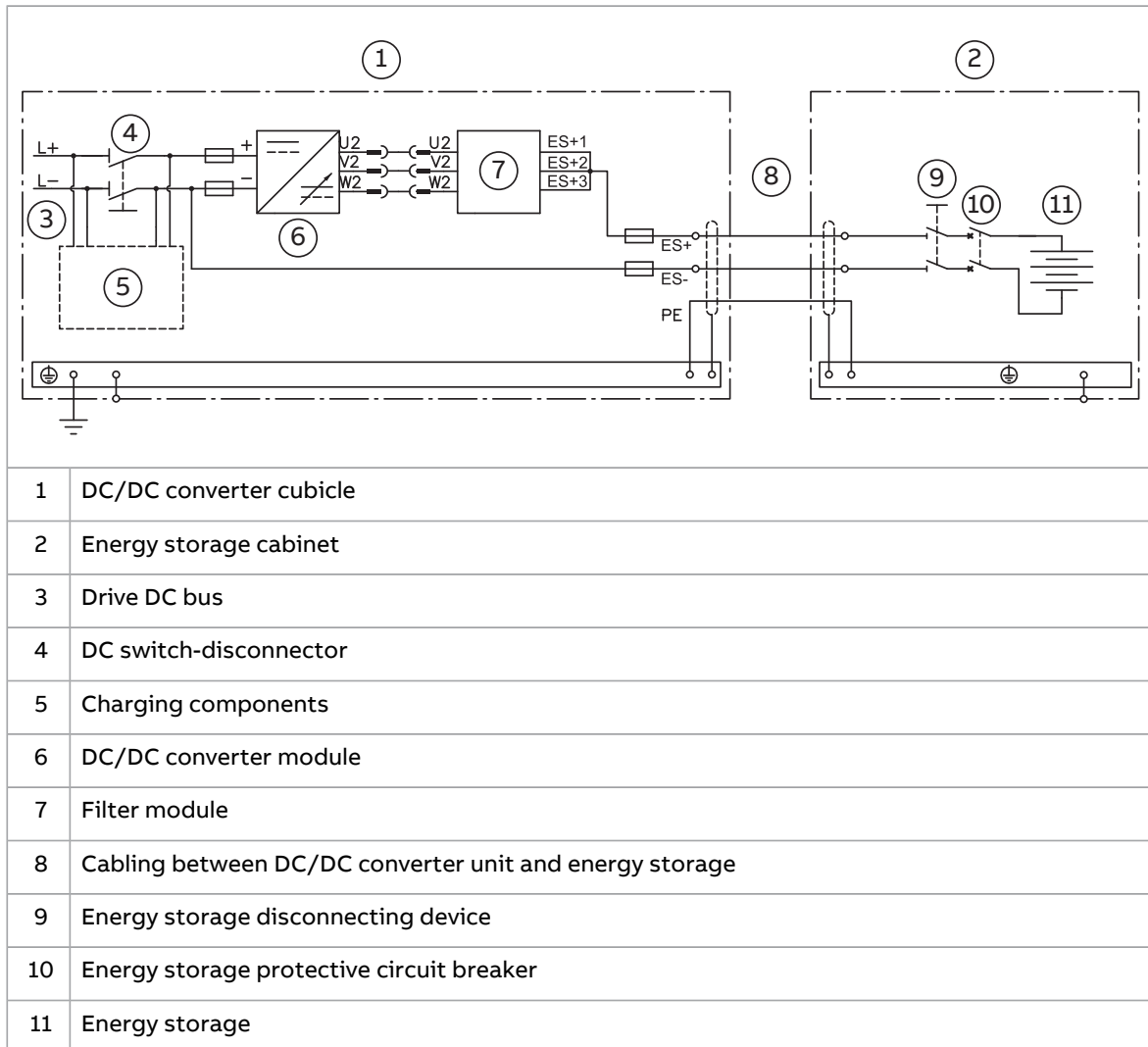
The DC/DC converter module must be equipped with external DC fuses. You can equip the converter with a DC switch-disconnector, if quick isolation of the module from the DC bus is required.

20 Operation principle and hardware description

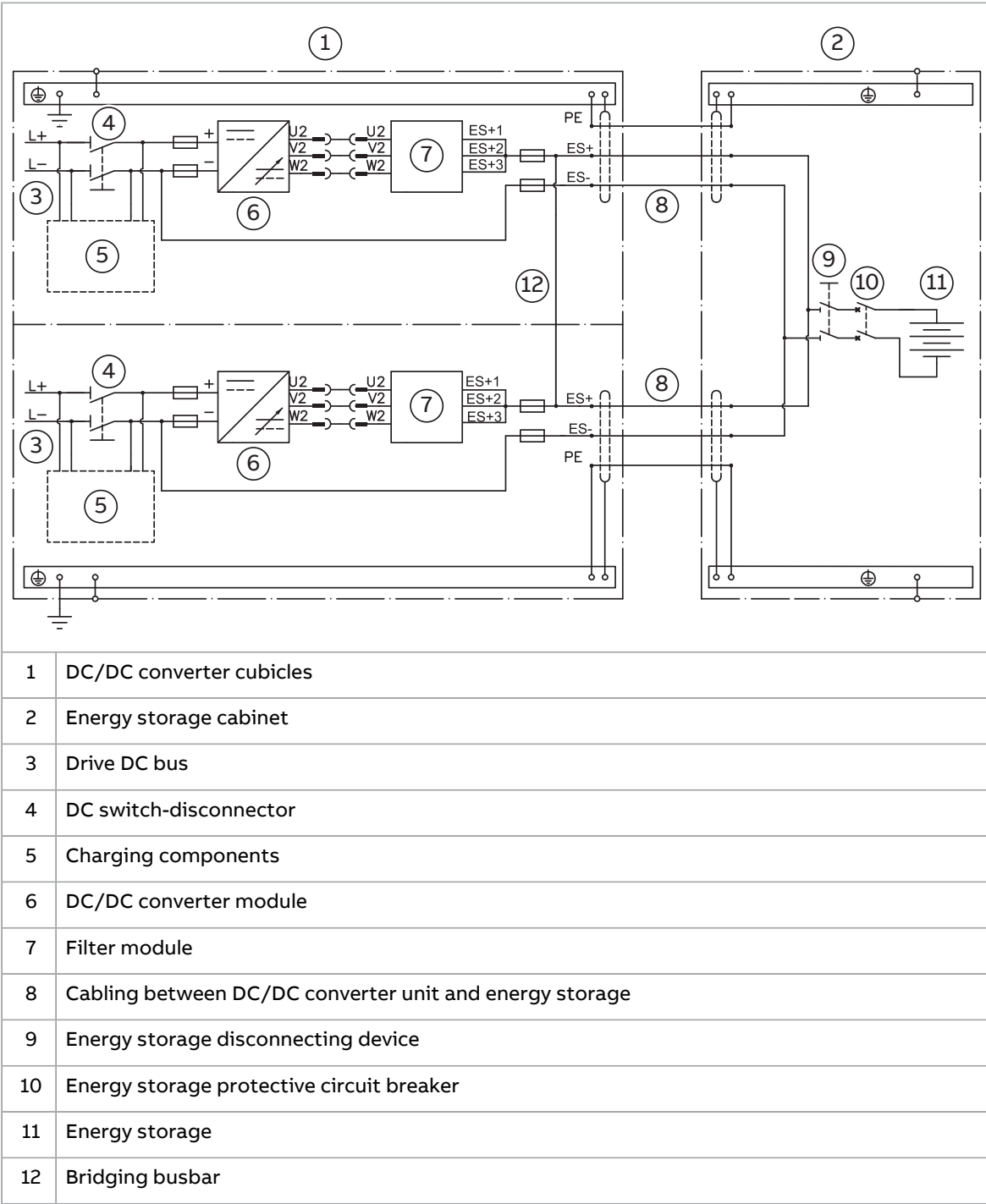
This figure shows a simplified main circuit diagram of a DC/DC converter without a DC switch-disconnector or charging circuit.



This figure shows a simplified main circuit diagram of a DC/DC converter with the DC switch-disconnector and charging circuit.

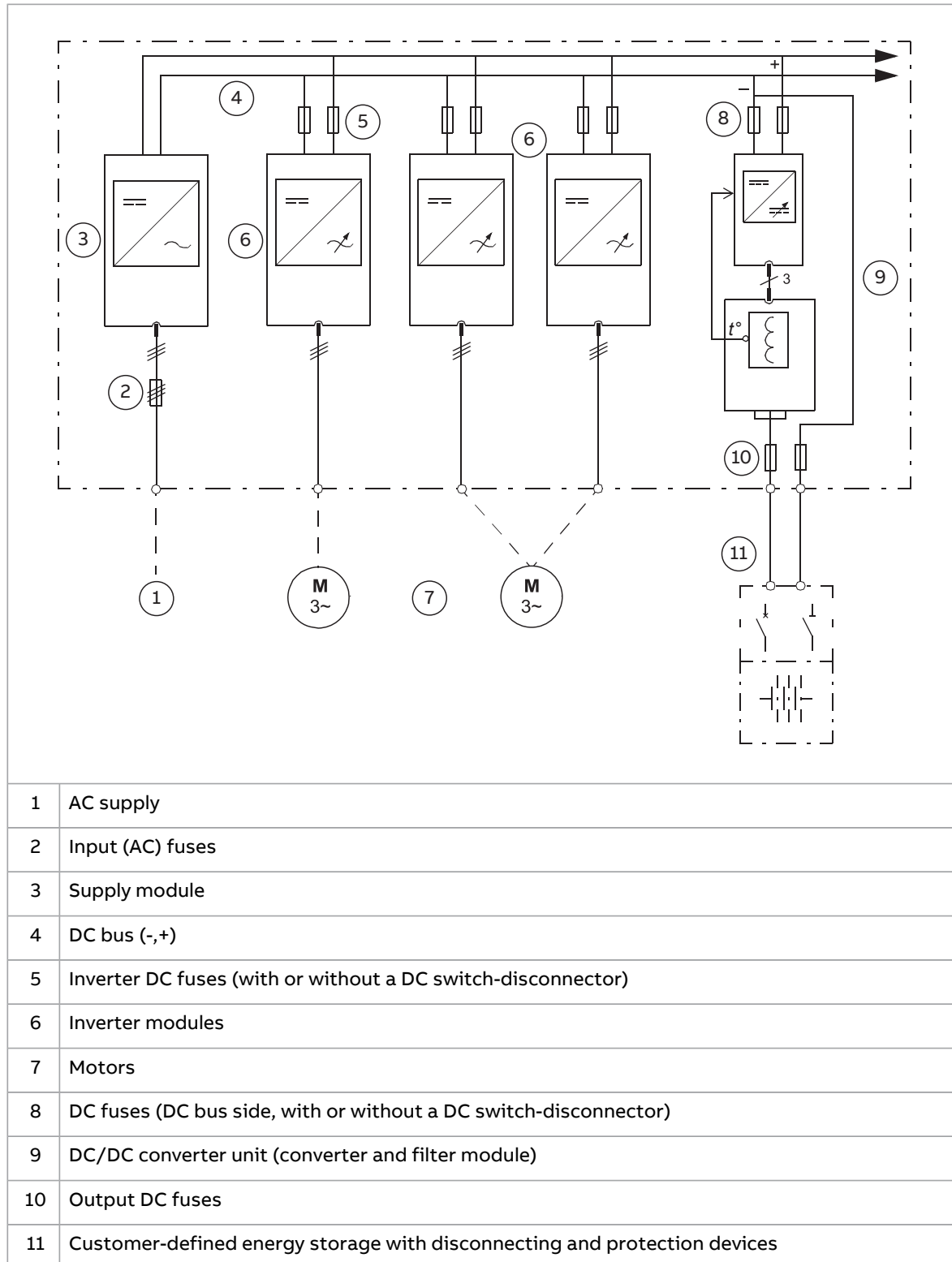


This figure shows a simplified main circuit diagram of parallel-connected DC/DC converter modules with the DC switch-disconnector and charging circuit. Also the energy storage and related cabling and equipment are visible.



Overview diagram of a drive with a DC/DC converter unit

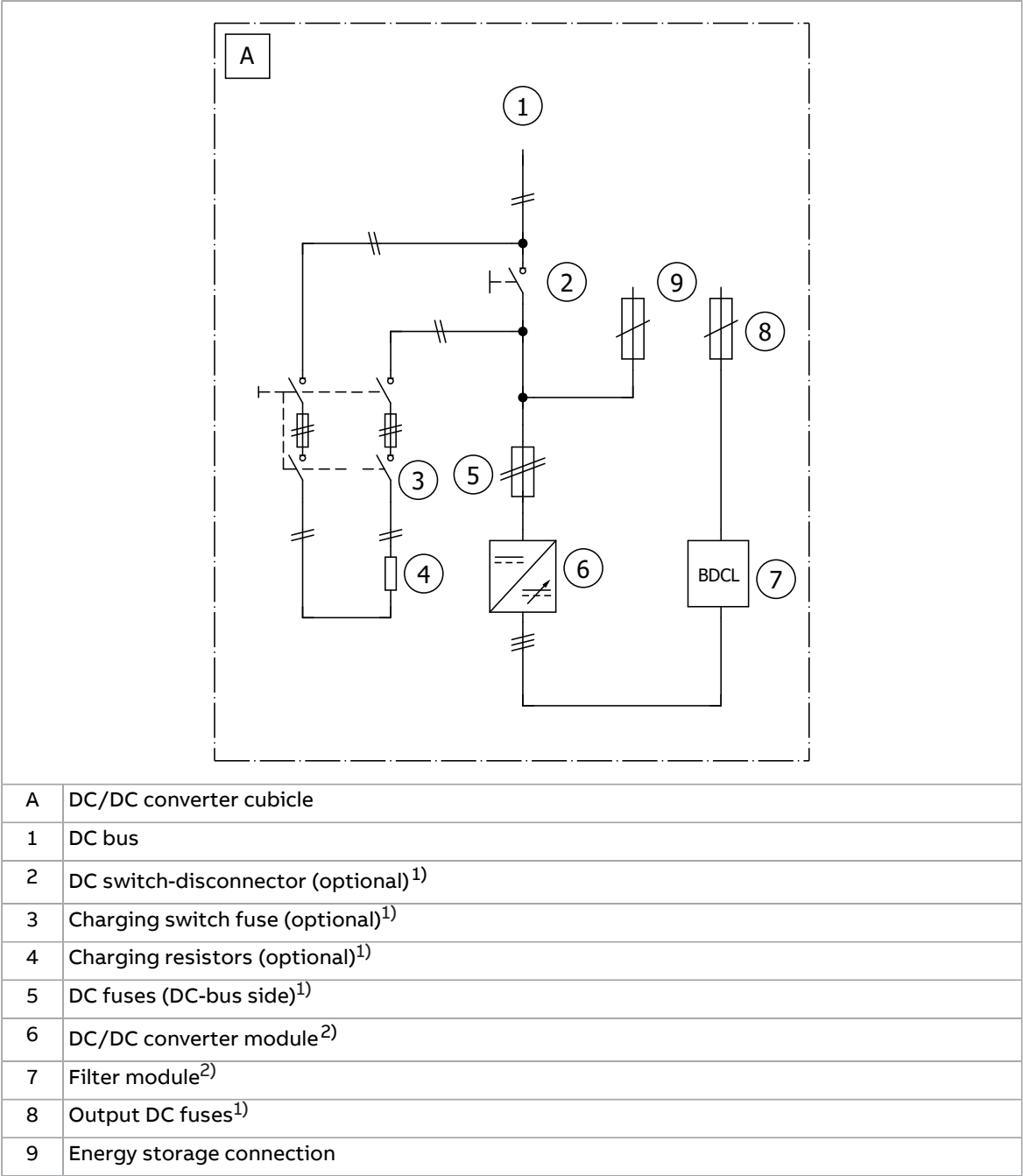
This diagram shows a possible application of a converter unit in an example system. The DC/DC converter unit includes a DC/DC converter module and a filter module.



Single-line circuit diagram of the DC/DC converter unit

This figure shows a connection example of a DC/DC converter unit with one frame R8i module. The connection is the same in both Rittal VX25 and generic enclosures.

The table gives explanations for the numbers and letters of the diagram. It also indicates if customer can order the components from ABB or if the customer needs to acquire them separately.



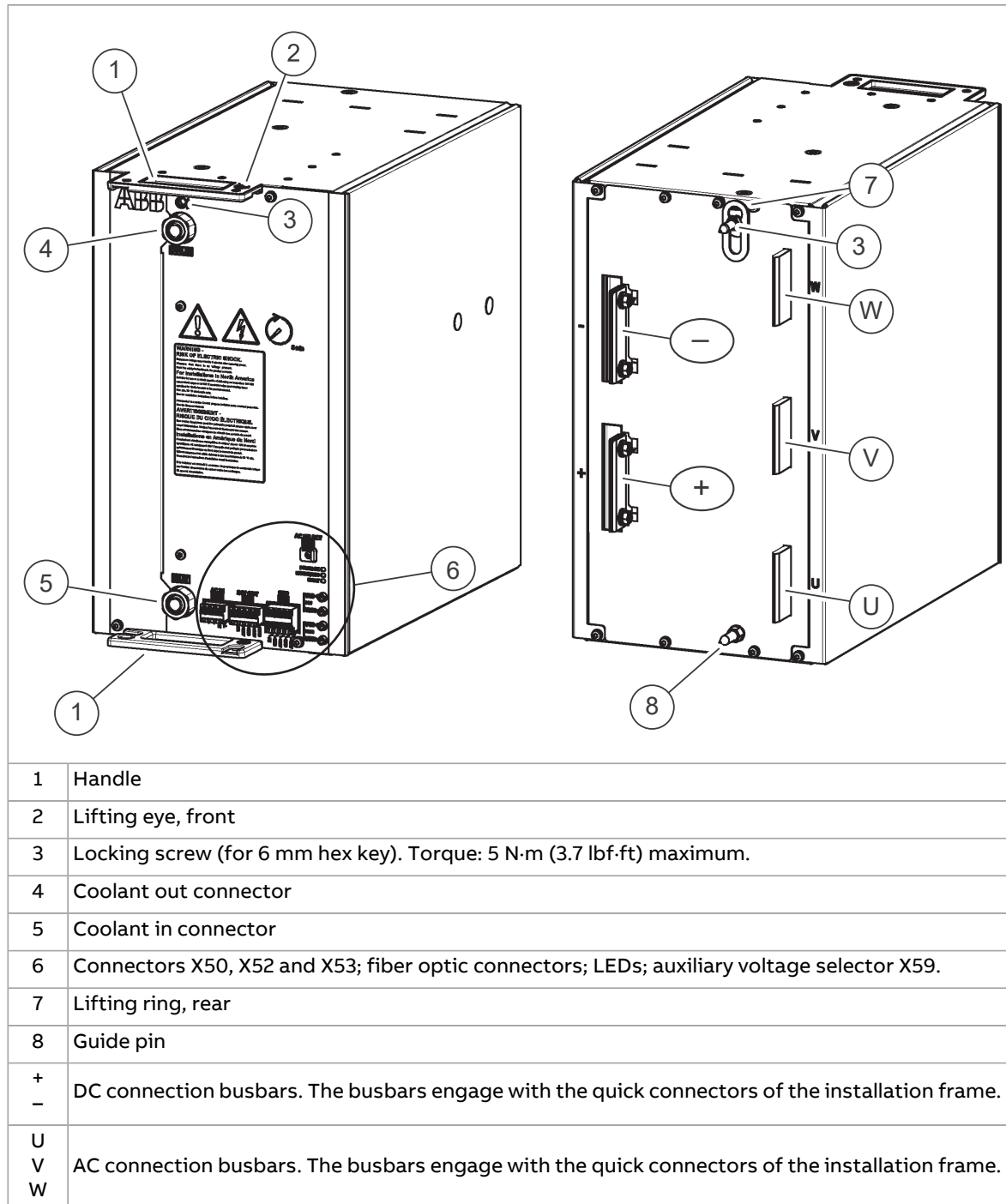
¹⁾ Available from ABB or third party.

²⁾ Available from ABB.

Converter module hardware

■ Frame R7i

Module layout



Coolant connectors

The coolant pipe inlet and outlet connectors are located at the bottom front and top front of the module respectively. The connectors are for 16/13 millimeter PA (polyamide) pipe.

Installation frame

See the dimension drawings.

Connectors X50, X52 and X53; Auxiliary voltage selector X59

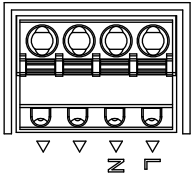
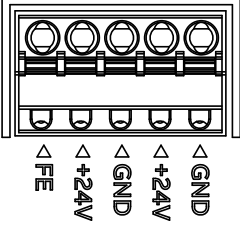
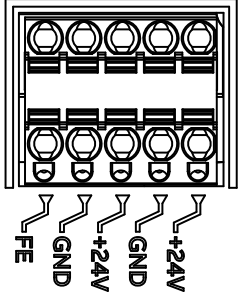
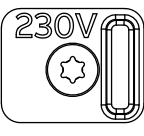
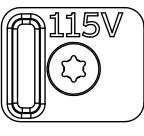
R7i modules contain a power supply board that provides 24 V DC for the circuit boards of the module. The 24 V DC voltage provided by the power supply board is also available on X53, and can be used to power the control unit of a single R7i module.

Note: With parallel-connected modules, it is strongly recommended to use an external 24 V DC supply to power the control unit.

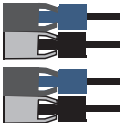
The power supply board of the module is powered internally from the DC link. An auxiliary voltage of 230 V AC or 115 V AC (selectable) can optionally be connected to terminal block X50 to feed the power supply board even when the DC link is not live. The selection between 115 V and 230 V is made with selector plug X59. The setting can be changed by removing the screw, moving the plug into the 115 V position, and reinstalling the screw.

Note: The Safe torque off (STO) safety function is only implemented in inverter units. Therefore, the STO function cannot be used in supply, brake and converter units. In supply, brake and converter units, de-energizing any connection of STO IN (X52) connector stops the unit. Note that this stop in supply or brake module is not safety related and must not be used for safety function purposes.

The “24V” inputs on X52 must be connected to +24 V (on connector X53, for example) on each module. On a new module, a jumper wire set installed at the factory makes this connection.

AC IN X50 	Auxiliary voltage input for internal power supply of module. Voltage selected by X59.
24V OUT X53 	24 V DC output (for eg. control unit)
STO X52 	STO connectors of the module. Must be connected to 24 V DC for the module to start.
AC SELECT X59 	Auxiliary voltage: 230 V AC
AC SELECT X59 	Auxiliary voltage: 115 V AC

Fiber optic connectors

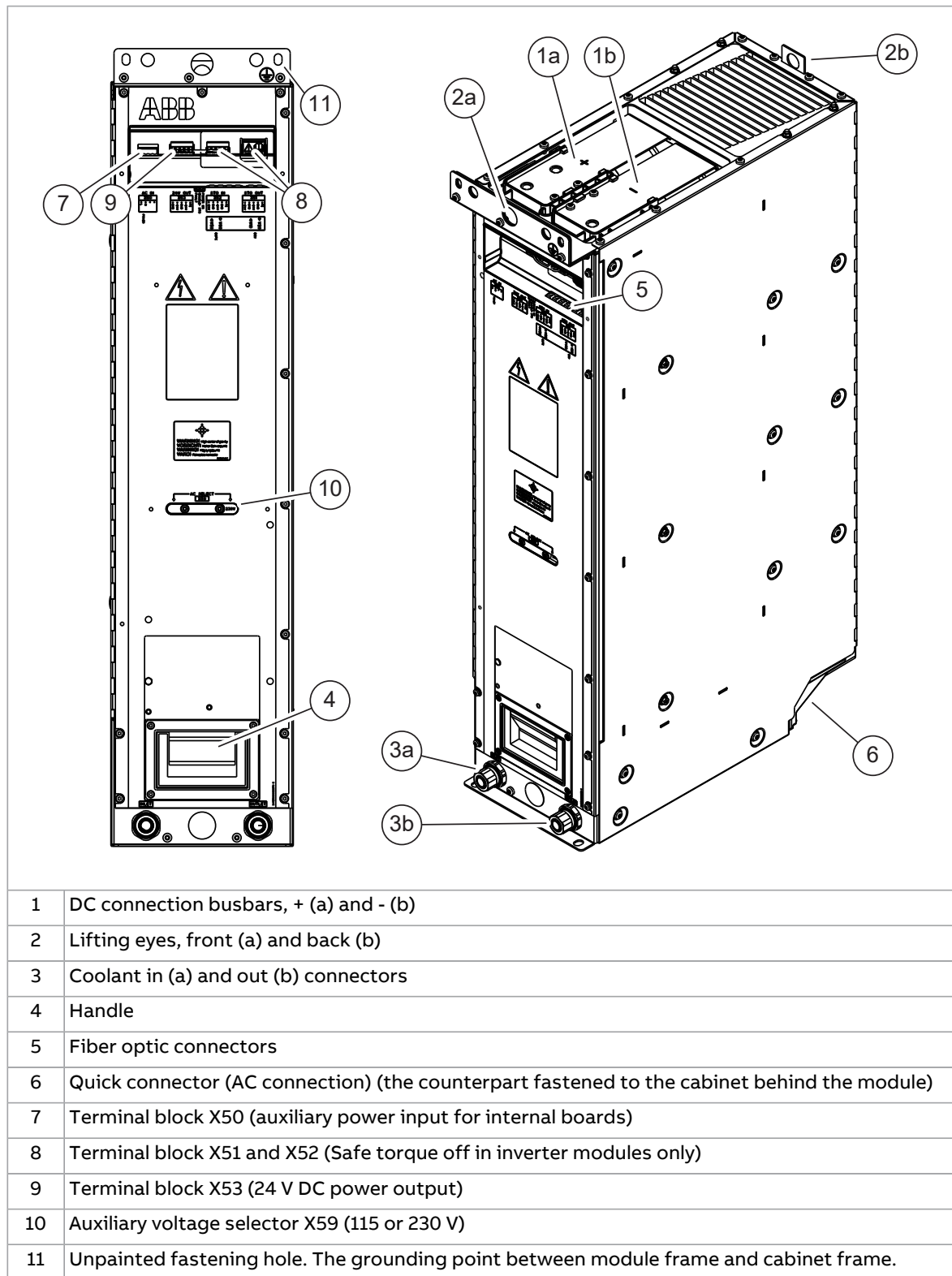
BCU	V20		Name	Description
	V10		BCU or UCU	Control unit connection. Must be connected by the installer.
BSFC	V60		BSFC	Charging controller connection. Must be connected by the installer.
	V50			

LEDs

LED	Color	Indication
FAULT	Continuous red	There is an active fault in the module.
ENABLE / STO	Continuous green	The module is ready for use.
ENABLE / STO	Continuous yellow	XSTO connectors are de-energized.
POWER OK	Continuous green	Supply voltage of the internal circuit boards is OK (> 21 V).

■ Frame R8i

Module layout



Coolant connectors

The coolant pipe inlet and outlet connectors are located at the bottom front of the module. The connectors are for 16/13 millimeter PA (polyamide) pipe.

Connectors X50...X59

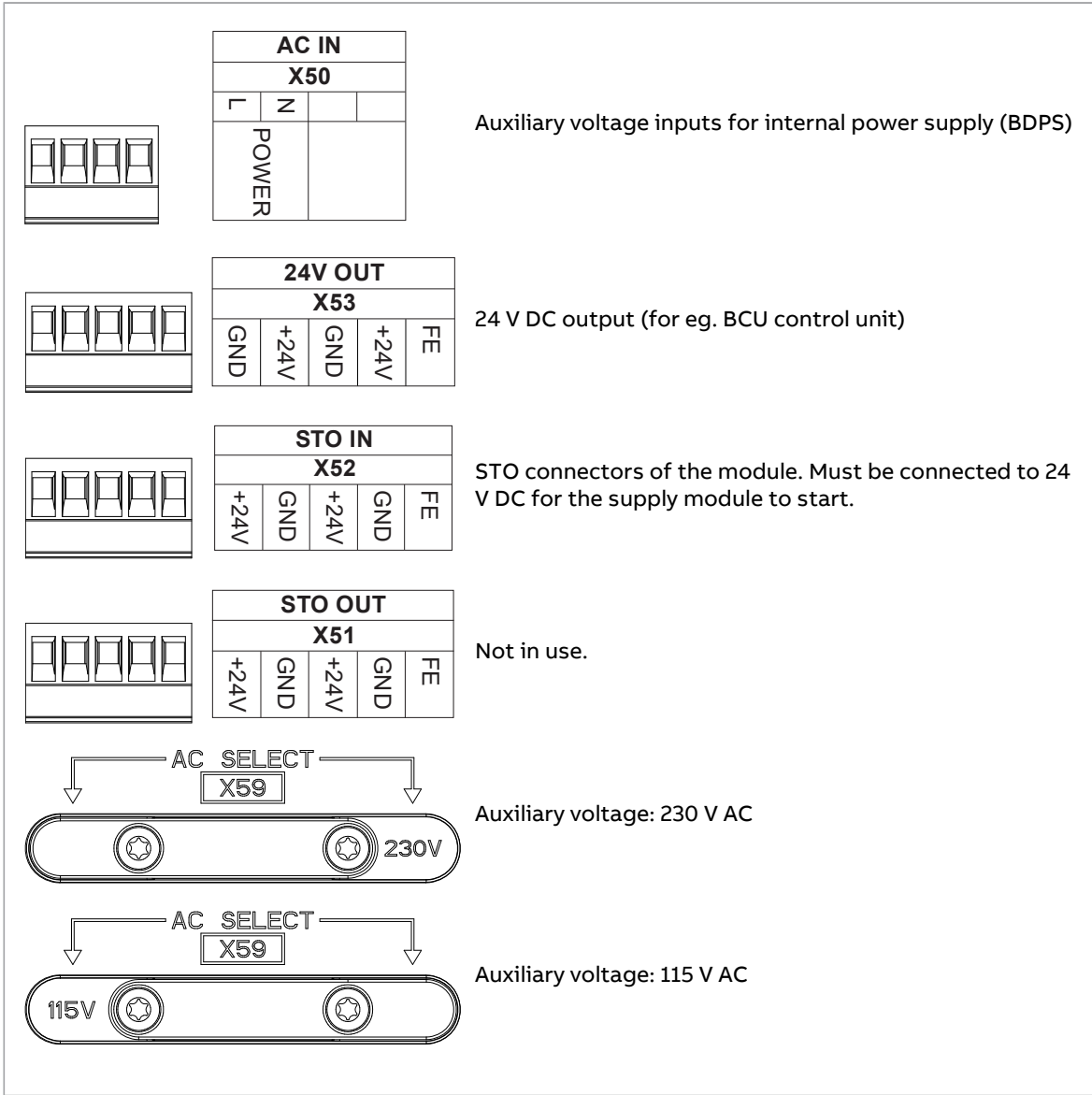
R8i modules contain a power supply (BDPS) that provides 24 V DC for the circuit boards of the module. The 24 V DC voltage provided by the BDPS is also available on X53, and can be used to power the BCU control unit of a single R8i module.

Note: With parallel-connected modules, it is strongly recommended to use an external 24 V DC supply to power the control unit.

The BDPS is powered internally from the DC link. An auxiliary voltage of 230 V AC or 115 V AC (selectable) can optionally be fed to terminal block X50 to power the BDPS even when the DC link is not live. The selection between 115 V and 230 V is made with selector plug X59. The setting can be changed by removing the two screws, turning the plug 180 degrees, and reinstalling the screws.

Note: The Safe torque off (STO) safety function is only implemented in inverter units. Therefore, the STO function can not be used in supply, brake and converter units. In supply, brake and converter units, de-energizing any connection of STO IN (X52) connector stops the unit. Note that this stop in supply or brake module is not safety related and must not be used for safety function purposes.

The “24V” inputs on X52 must be connected to +24 V (on connector X53, for example) on each module. On a new module, a jumper wire set installed at the factory makes this connection.



Fiber optic connectors

BSFC	V50		Name	Description
	V60		BSFC	Charging controller connection. Must be connected by the installer.
BCU	V10		BCU	Control unit connection. Must be connected by the installer.
	V20			

LEDs

LED	Color	Indication
FAULT	Continuous red	There is an active fault in the module.
ENABLE / STO	Continuous green	The module is ready for use.

LED	Color	Indication
ENABLE / STO	Continuous yellow	XSTO connectors are de-energized.
POWER OK	Continuous green	Supply voltage of the internal circuit boards is OK (> 21 V).

■ DC bus connection and capacitor charging

The customer (or the system integrator) must equip the converter unit with input DC fuses and output DC fuses. The customer (or the system integrator) must also equip the energy storage with a protective device (for example, fuses) that protects the energy storage cable in a cable short-circuit or overload situation.

The user can install a DC switch-disconnector if quick isolation of the module from the DC bus is required.

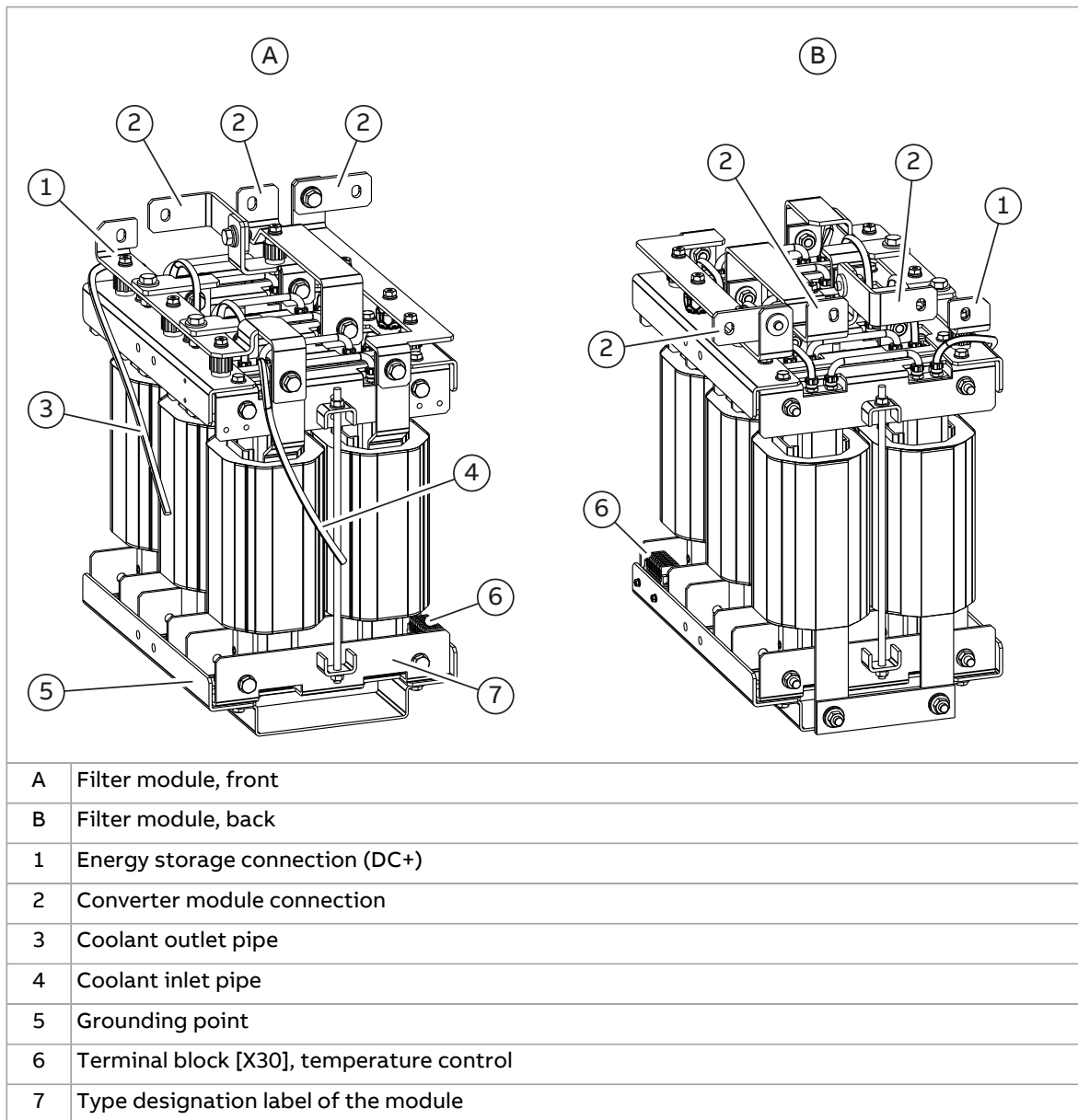
The user must install a capacitor charging circuit, if:

- the converter module is connected to the DC bus through a DC switch-disconnector, or
- the converter unit is directly connected to the DC bus and the supply unit of the system does not have charging circuit capability.

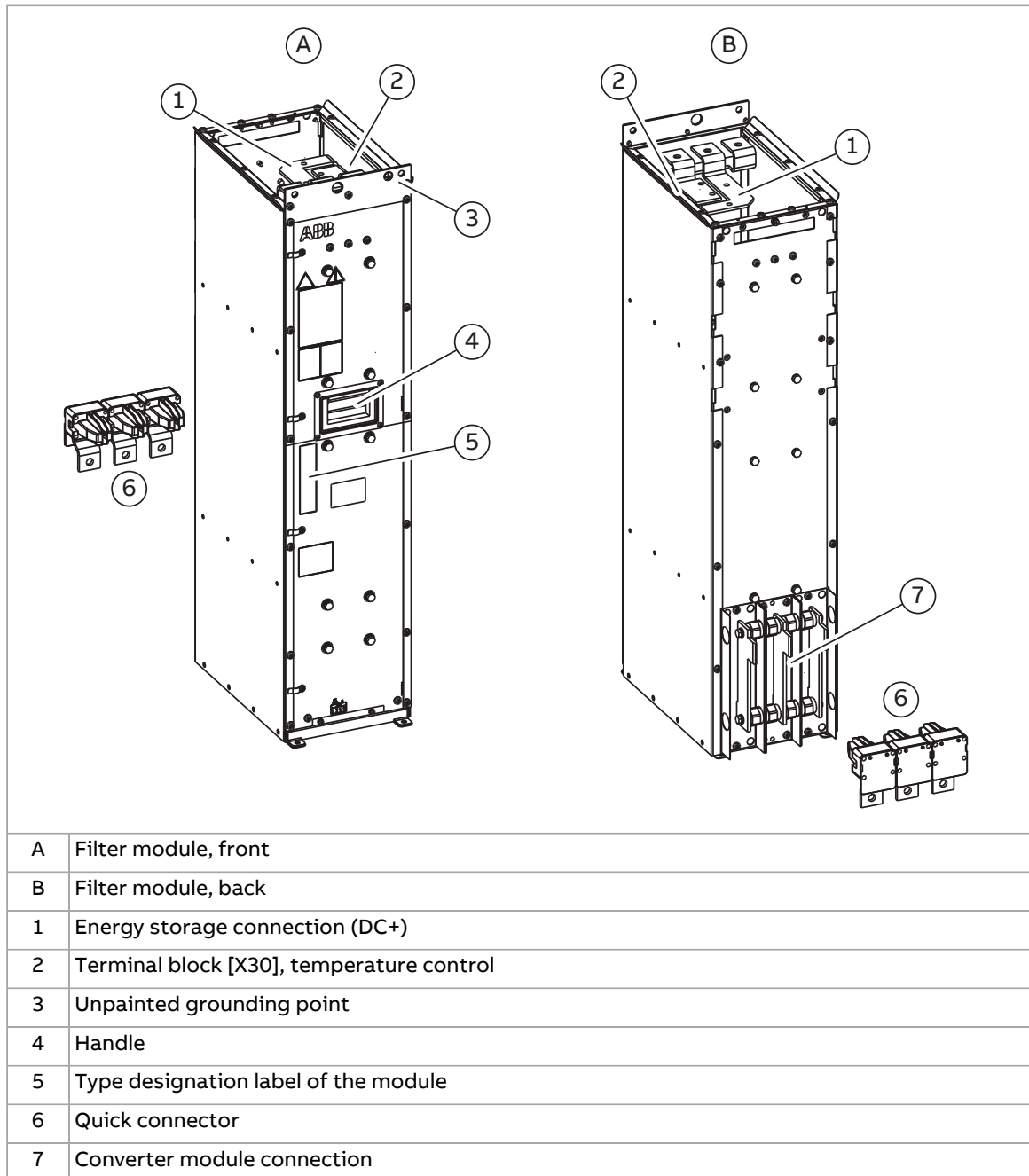
The charging circuit design presented in this manual consists of a charging switch [Q10], resistors [R10] and a charging controller [A11].

BDCL filter module

■ BDCL filter module for frame R7i converter module



■ BDCL filter module for frame R8i converter module



■ Overheating protection of the filter

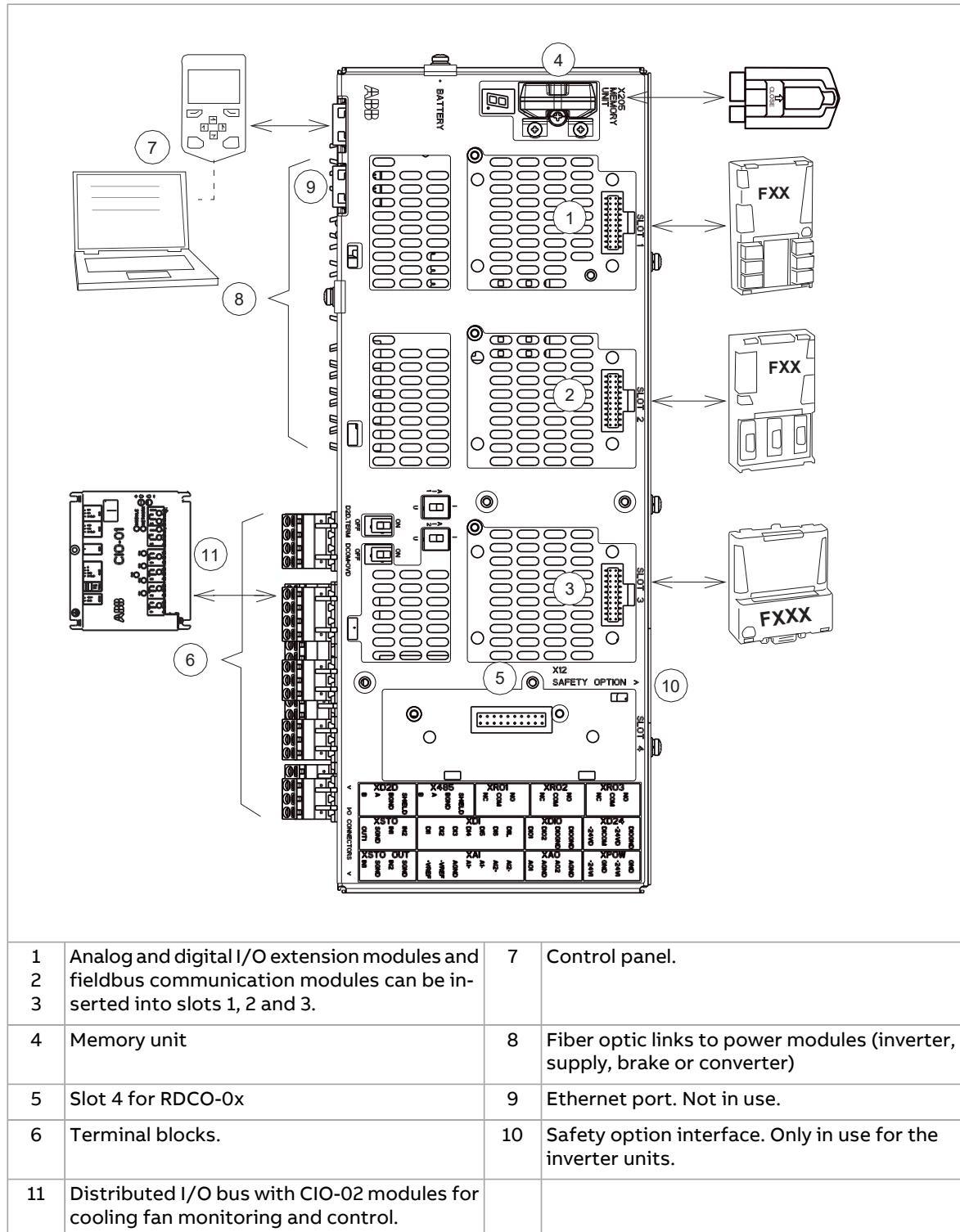
By default, the BDCL filter is protected against overheating (caused by, for example, a fan malfunction or loss of coolant flow) with a thermistor and the temperature monitoring function of the control program. If the filter temperature becomes too high, the temperature monitoring function stops the DC/DC converter automatically.

Control unit

DC/DC converter units use a BCU or UCU control unit. The control unit has inputs, outputs, and slots for option modules. A fiber optic link connects the control unit to each converter module.

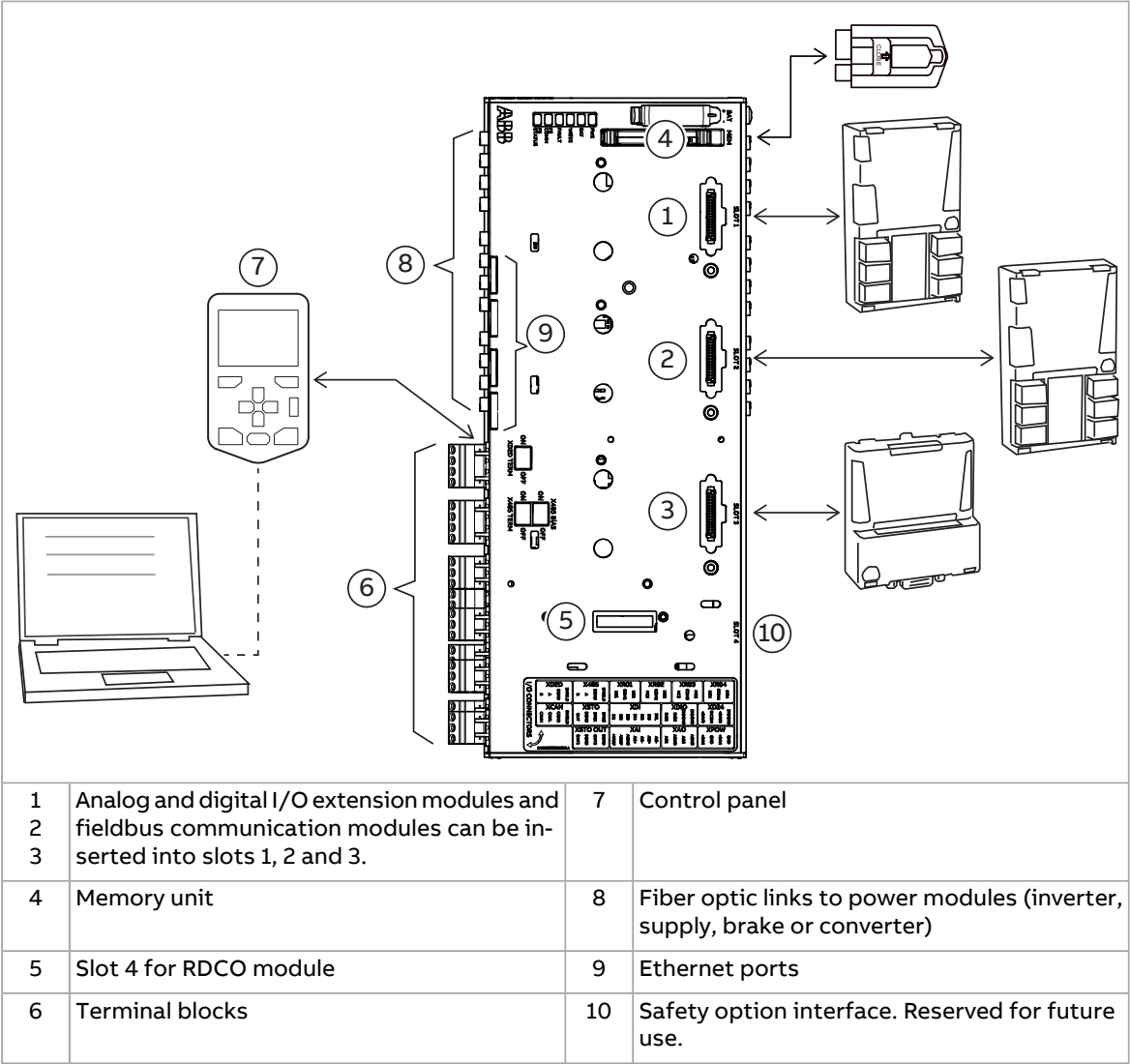
Power to the control unit can be supplied from the module (terminal block X53), from an external 24 V DC power supply, or both for redundancy.

Overview of the control connections of the BCU control unit



Overview of the control connections of the UCU control unit

This diagram shows the control connections and interfaces of the UCU control unit.



Converter unit control devices

■ DC switch-disconnector

You can equip the DC/DC converter cabinet with DC switch-disconnector [Q11]. A converter unit with a DC switch-disconnector must also have a precharge circuit including a charging switch.

The DC switch-disconnector allows the isolation of the unit from the DC bus. Before the unit is reconnected to the DC bus, you must charge the capacitors of the converter modules through a charging circuit.



WARNING!

You must also switch off the charging switch to disconnect the DC/DC converter from the DC supply. Do not operate the DC switch-disconnector under load.

■ Charging switch

If the converter is equipped with a DC switch-disconnector, you must equip the converter unit with a charging circuit including a charging switch [Q10]. If you have connected the switches as shown in the example circuit diagrams, close the charging switch first when the converter unit is connected to an energized DC bus. When the charging is completed, close the main DC switch-disconnector and open the charging switch. The converter unit will not start if the charging switch is closed.



WARNING!

You must also switch off the charging switch to disconnect the DC/DC converter from the DC supply.

■ Door lights

You can install the load disconnected indicator on the cabinet door. This indicator shows the state of the energy storage disconnecting device.

You can install also the charging OK indicator and DC/DC converter disconnected indicator, if the DC switch-disconnector is equipped.

■ Control unit

The DC/DC converter module is controlled by a BCU or UCU control unit. For more information, see [The control unit](#).

■ 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.

The Loc/Rem key of the panel selects between the local and remote control modes.

■ **PC connection**

There is an USB connector on the front of the panel that can be used to connect a PC to the converter. When a PC is connected to the control panel, the control panel keypad is disabled.

■ **Fieldbus control**

You can control the converter unit through a fieldbus interface if the unit is equipped with an optional fieldbus adapter, and when you have configured the control program for the fieldbus control with parameters. For more information on parameters, see [ACS880 DC/DC converter control program firmware manual \(3AXD50000024671 \[English\]\)](#).

■ **BAMU voltage/current measurement unit**

You can equip the converter with a BAMU voltage/current measurement unit. For more information, see [BAMU-12C auxiliary measurement unit hardware manual \(3AXD50000117840 \[English\]\)](#).

■ **CIO-01 I/O module**

You can equip the converter with a CIO-01 I/O module. For more information, see [CIO-01 I/O module for distributed I/O bus control user's manual \(3AXD50000126880 \[English\]\)](#).

Code	Description
Voltage range	
3	DC voltage corresponding AC input voltages 3 ~ 380...415 V. This is indicated in the type designation label as typical input voltage level 566 V DC.
5	DC voltage corresponding AC input voltages 3 ~ 380...500 V. This is indicated in the type designation label as typical input voltage level 566 / 679 / 707 V DC.
7	DC voltage corresponding AC input voltages 3 ~ 525...690 V. This is indicated in the type designation label as typical input voltage level 742 / 849 / 976 V DC.
Option codes	
C132	Marine type approval
C209	Marine product certification issued by Bureau Veritas
E205	Internal du/dt filtering
P904	Extended warranty (30 months from delivery or 24 months from commissioning)
P909	Extended warranty (42 months from delivery or 36 months from commissioning)
P911	Extended warranty (66 months from delivery or 60 months from commissioning)
P948	Customized extended warranty

■ Type designation key of the filter module

The type designation contains information on the specifications and configuration of the filter module. The digits express the module type.

Code	Description
Basic code	
BDCL-13LC	Liquid-cooled BDCL-13 filter
BDCL-14LC	Liquid-cooled BDCL-14 filter
BDCL-15LC	Liquid-cooled BDCL-15 filter
Voltage range	
7	BDCL-13LC: DC voltage corresponding AC input voltages 3 ~ 380...690 V. This is indicated in the type designation label as typical input voltage level 566 / 707 / 976 V DC. BDCL-14LC and BDCL-15LC: DC voltage corresponding AC input voltages 3 ~ 525...690 V. This is indicated in the type designation label as typical input voltage level 742 / 849 / 976 V DC.
Option codes	
V112	Module auxiliary and fan power supply connector version. Type of the connector is not mechanically backwards compatible with a module without option +V112.

3

Moving and unpacking the module

Contents of this chapter

This chapter gives basic information on unpacking and moving the module.



WARNING!

Obey the safety instructions given in [ACS880 liquid-cooled multidrive cabinets and modules safety instructions \(3AXD50000048633 \[English\]\)](#).

Moving and unpacking the module

The modules are delivered on a wooden base, boxed in corrugated cardboard. The cardboard box is tied to the base with PET bands.

1. Cut off the bands.
2. Lift off the cardboard box.
3. Remove any filling material.
4. Cut open the plastic wrapping of the module.
5. Lift off the module.
6. Check that there are no signs of damage.

Dispose of or recycle the packaging according to the local regulations.

If you need to pack the modules, see the package information in the technical data.

4

Cabinet construction



Contents of this chapter

This chapter gives instructions on how to install the modules and additional equipment into a cabinet.

For general instructions, see [Drive modules cabinet design and construction instructions \(3AUA0000107668 \[English\]\)](#).

Limitation of liability

The installation must always be designed and made according to applicable local laws and regulations. ABB does not assume any liability whatsoever for any installation which breaches the local laws and/or other regulations. Furthermore, if the recommendations given by ABB are not followed, the drive may experience problems that the warranty does not cover.

■ North America

Installations must be compliant with NFPA 70 (NEC)¹⁾ and/or Canadian Electrical Code (CE) along with state and local codes for your location and application.

¹⁾ National Fire Protection Association 70 (National Electric Code).

Energy storage

Obey the instructions of the energy storage manufacturer.

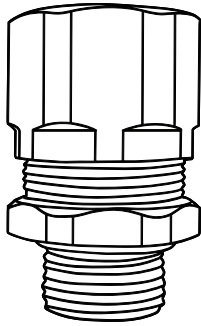
Liquid pipe connector installation instructions

These instructions are applicable to the liquid pipe connectors that are used in ABB drives. There are two types of connectors: type A and type B. Refer to the illustrations

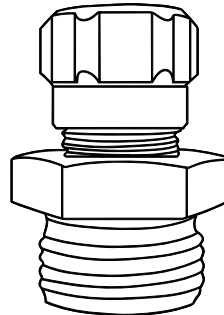
below. When you install a connector, identify the connector type first. Obey the type-specific instructions carefully.

Reserve these materials and tools at hand:

- LOCTITE 2700 threadlocker
- Torque wrench (size depends on the connector size)
- For the type B connector: adjustable pliers



Type A



Type B



WARNING!

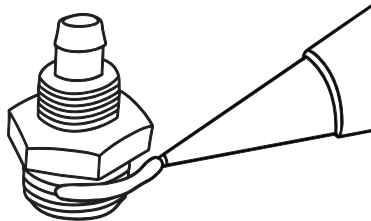
Do the electrical safety precautions steps before you do work on the drive. Refer to the drive safety instructions. If you are not a qualified electrical professional, do not do work on the drive. If you ignore safety instructions, injury or death, or damage to the equipment can occur.

Installation procedure:

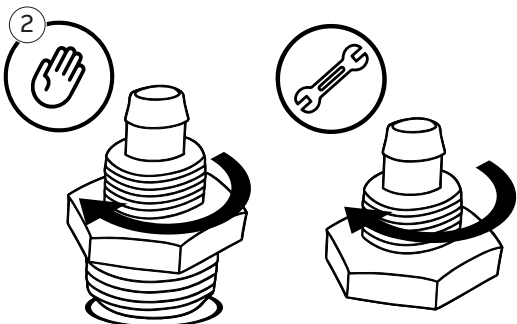
1. If the union nut has no sealing ring (o-ring), apply the threadlocker to the threads of the union nut. Always add the threadlocker onto the outer thread. This prevents the threadlocker from entering the circuit.
2. Put the union nut carefully onto the threads and start to screw it in by hand. Tighten it to the torque specified in the table below with a torque wrench. Wipe out extra threadlocker.

Torque for type A connector	Torque for type B connector
30 N·m	20 N·m

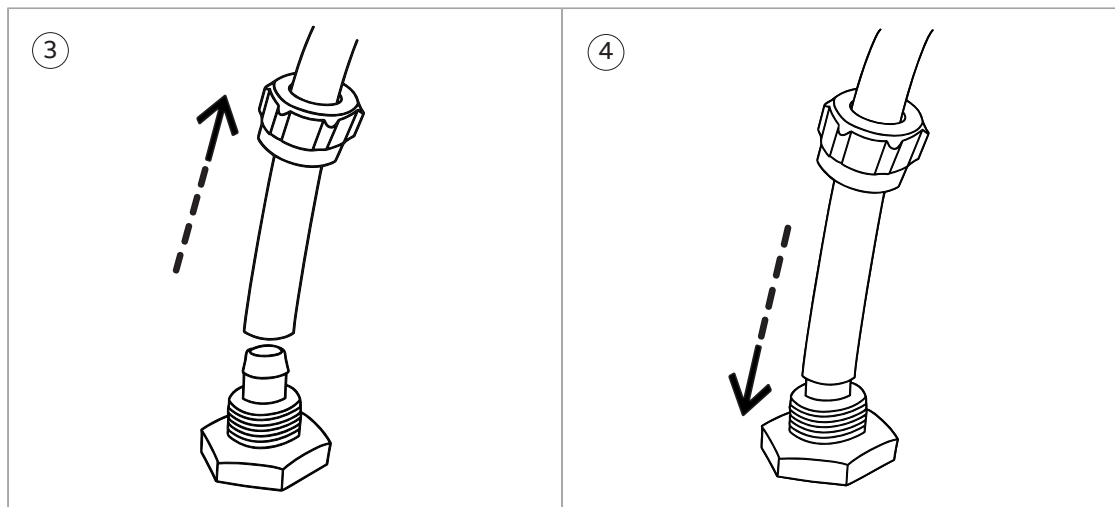
①



②



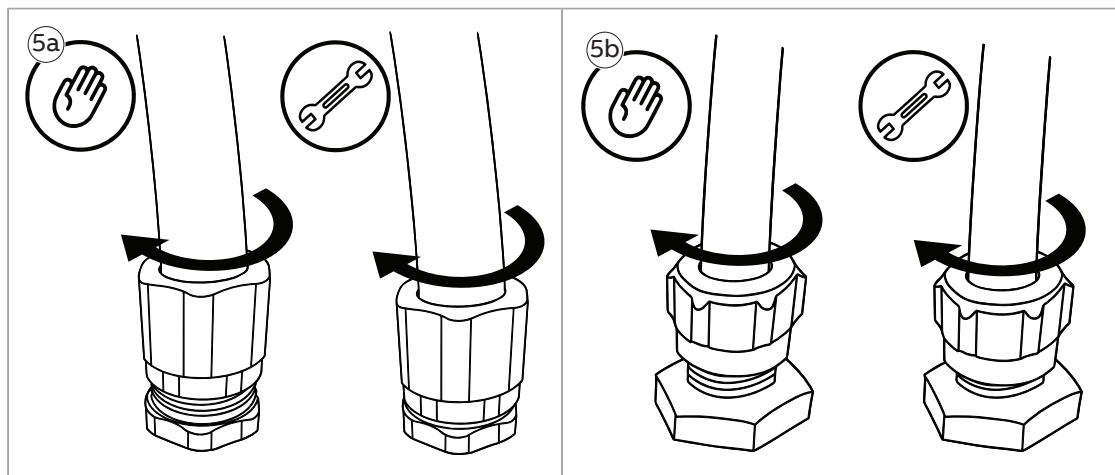
3. Push the screwing plug over the pipe, and place the pipe on the union nut.
4. Pull down the screwing plug.



5. a) Type A connector: Start to screw the plug in by hand. Tighten the plug with a torque wrench to 20 N·m.
 b) Type B connector: Start to screw the plug in by hand. Tighten the plug with adjustable pliers. Leave 2...3 mm thread visible.

**WARNING!**

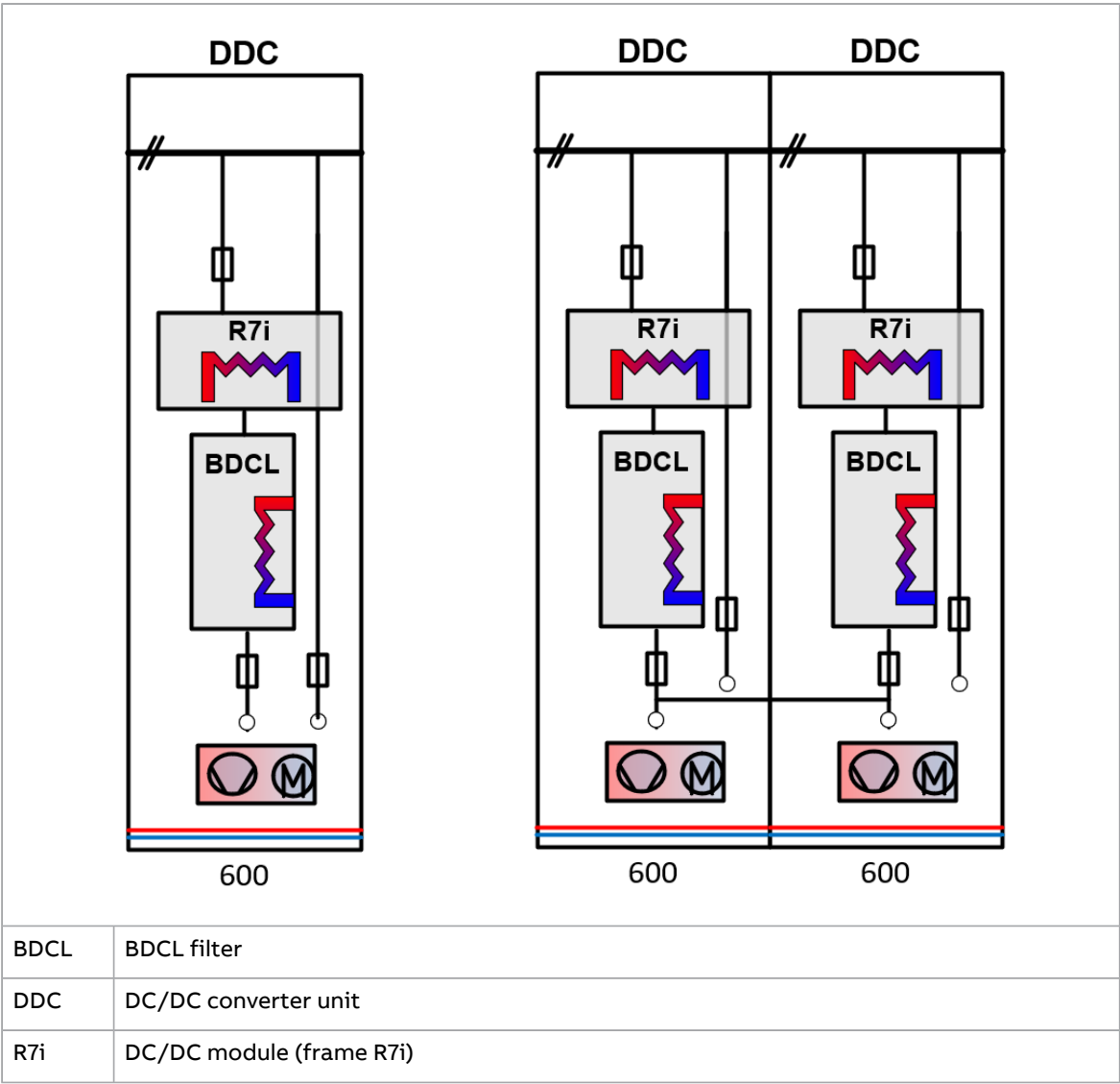
Do not tighten the plug of the type B connector too much. It can break the connector or pipe.



Cabinet configuration overview

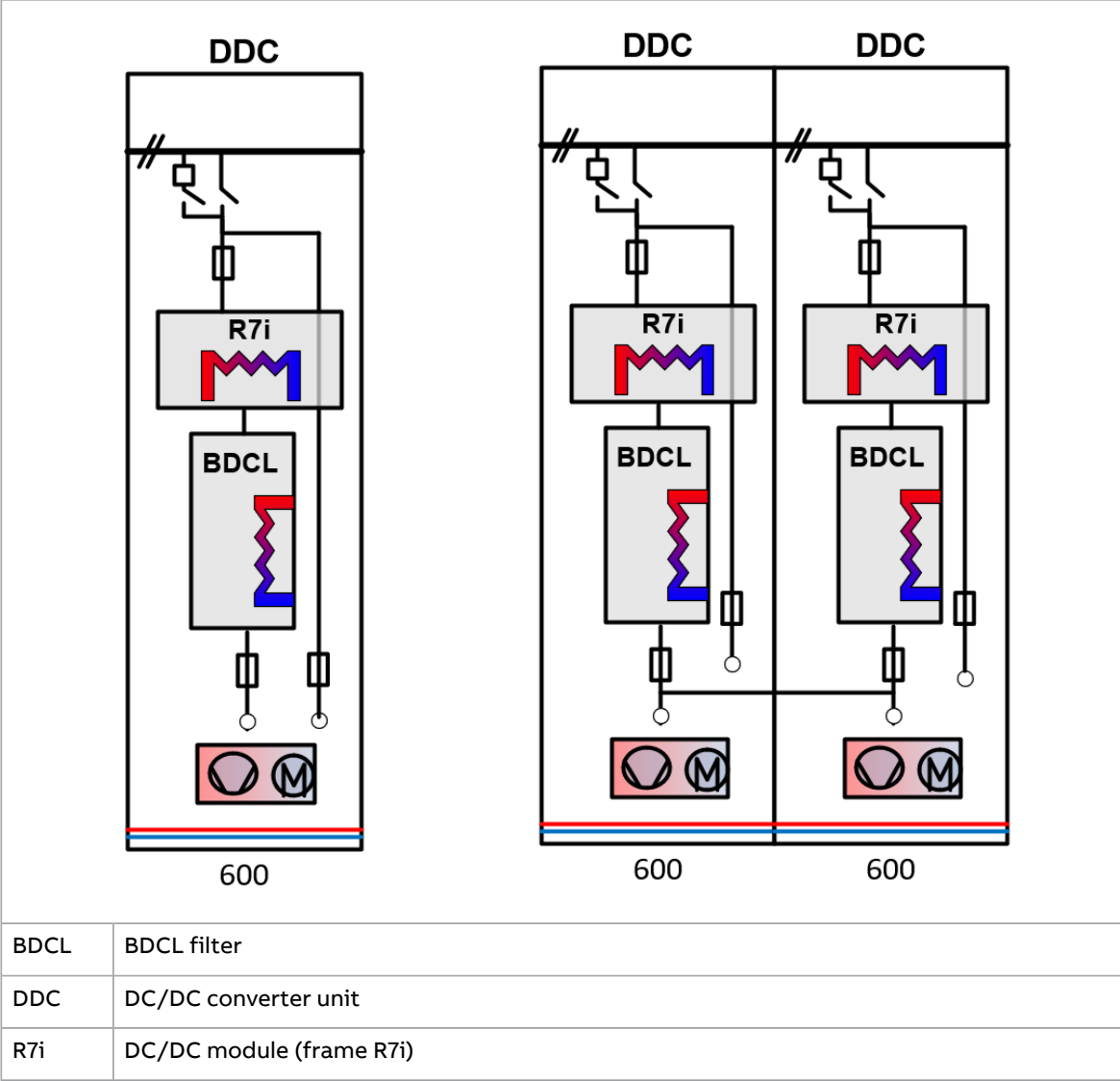
■ Frame R7i without DC switch-disconnector

This illustration shows the DC/DC converter configuration of 1×R7i and 2×R7i units, without DC switch-disconnector, installed in the Rittal VX25 or generic enclosures.



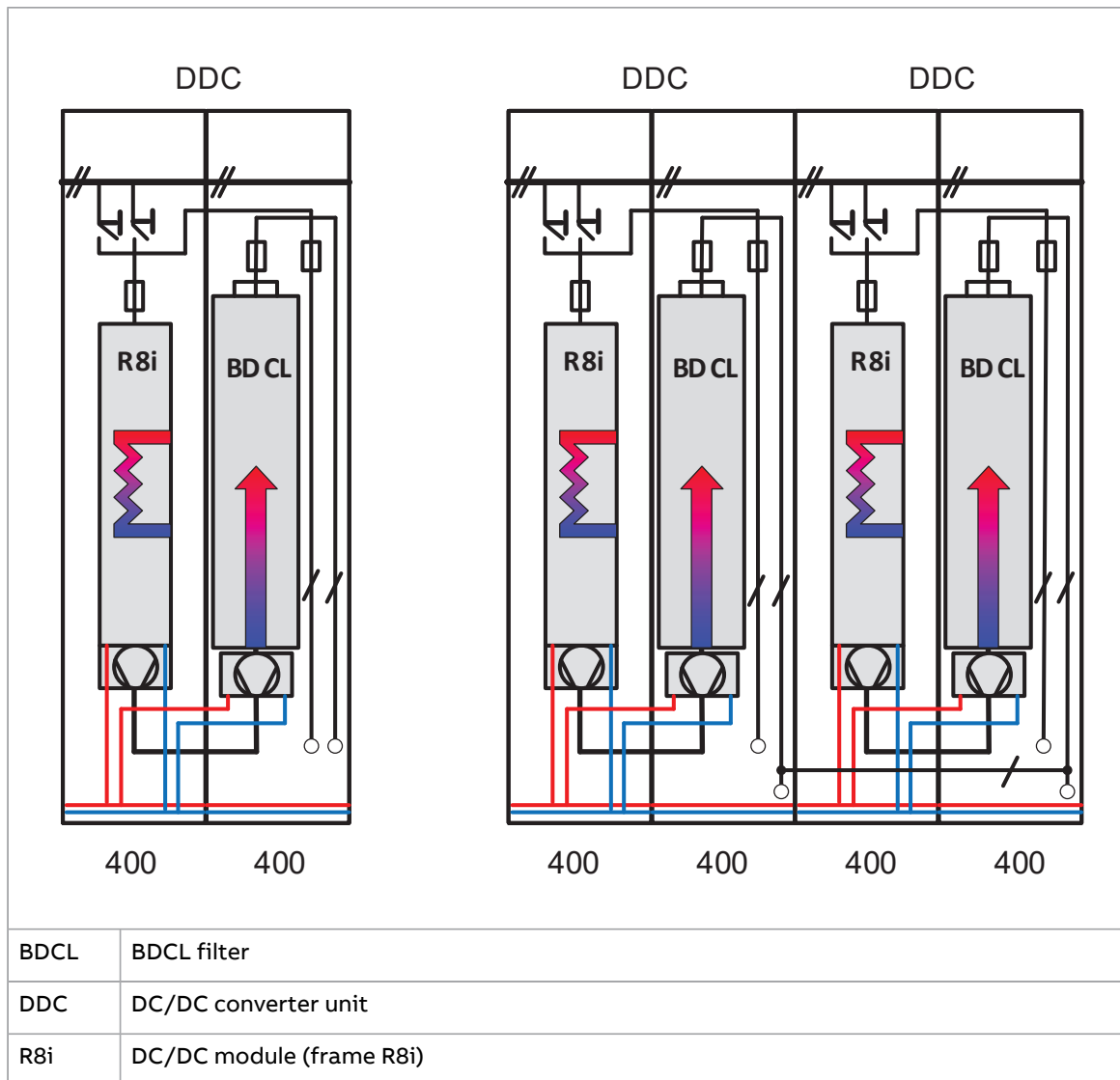
■ **Frame R7i with DC switch-disconnector**

This illustration shows the DC/DC converter configuration of 1×R7i and 2×R7i units, with DC switch-disconnector, installed in the Rittal VX25 or generic enclosures.



- **Frame R8i**

This figure shows the DC/DC converter configuration of 1×R8i and 2×R8i units installed in the Rittal VX25 or generic enclosures.



BDCL	BDCL filter
DDC	DC/DC converter unit
R8i	DC/DC module (frame R8i)

Installation examples

This section gives examples of how to place the drive and additional equipment into a Rittal VX25 enclosure.

Each example includes a table that lists:

- installation stages of different equipment in the order in which the installation into the enclosure should be done
- instruction code of the step-by-step instructions
- equipment kit code
- kit ordering code.

You can find the kit-specific assembly drawings, step-by-step instructions and kit information on the Internet. Go to <https://sites-apps.abb.com/sites/lvacdrivesengineeringsupport/content>. If needed, contact your local ABB representative.

The example includes also cabinet assembly drawings that show each stage listed in the table. More detailed steps of each stage are described in the kit-specific assembly drawings. The tightening torques are listed in the kit-specific assembly drawings. See the hardware manual for the tightening torques of drive module input and output terminals.

For general instructions, see [Drive modules cabinet design and construction instructions \(3AUA0000107668 \[English\]\)](#).



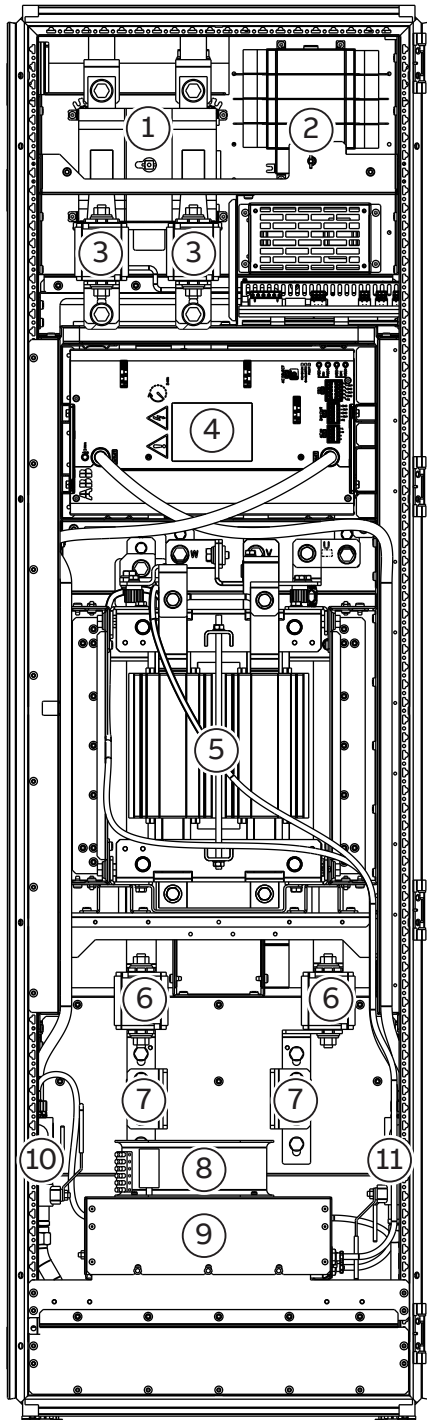
WARNING!

Remove the code labels attached to mechanical parts such as busbars, shrouds and sheet metal parts before installation. They may cause bad electrical connections, or, after peeling off and collecting dust in time, cause arcing or block the cooling air flow.



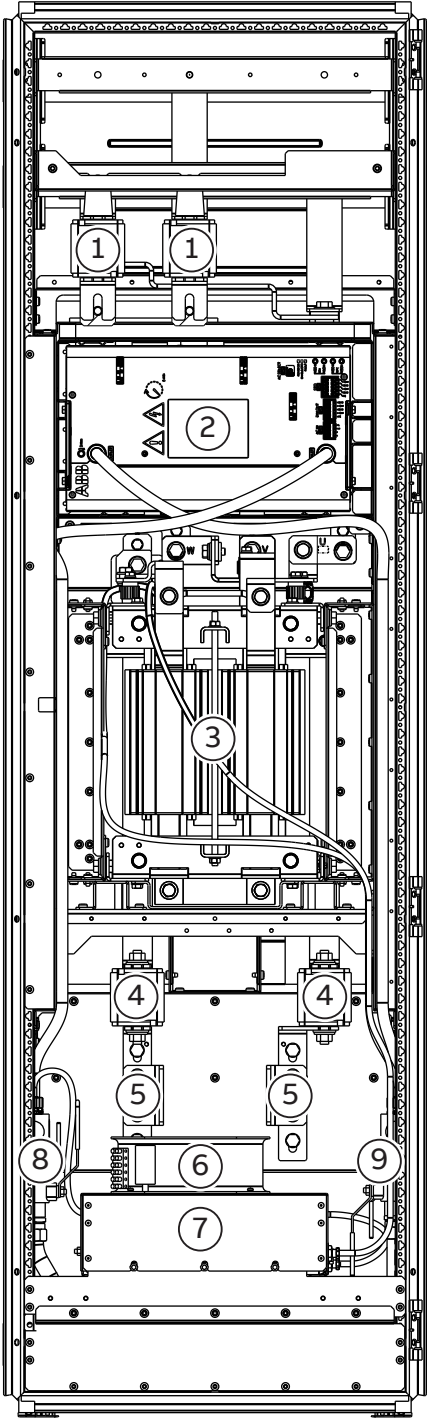
■ R7i DC/DC converter module in Rittal VX25 enclosure

Layout with DC switch-disconnector and charging



Item	Description
1	DC switch-disconnector
2	Charging switch
3	Input DC fuse
4	R7i DC/DC converter module
5	BDCL filter module
6	Output DC fuse
7	Terminal for energy storage connection
8	Cooling fan
9	Heat exchanger
10	Inlet manifold
11	Outlet manifold

Layout without DC switch-disconnector and charging

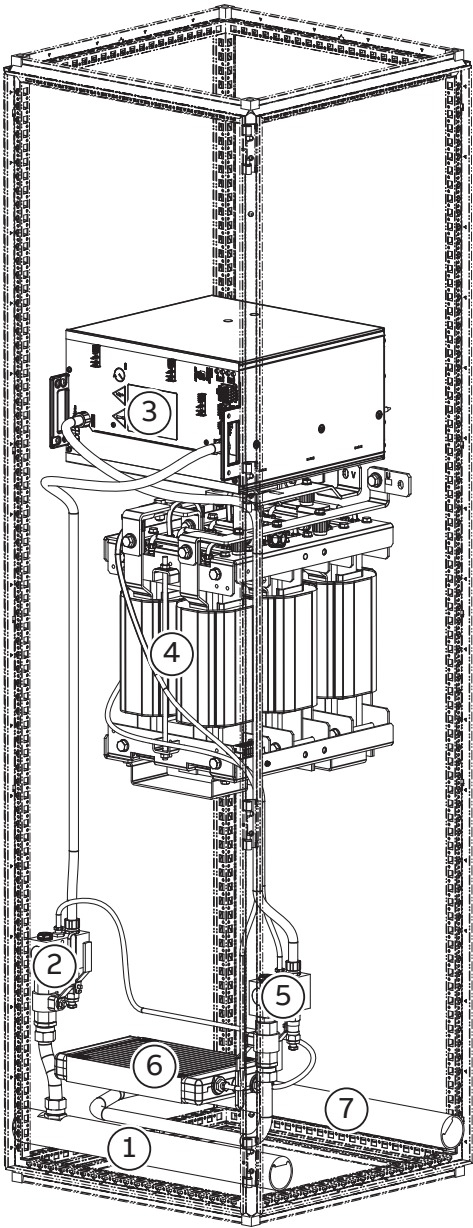


The diagram illustrates the internal layout of a cabinet. At the top, two input DC fuses (1) are shown. Below them is an R7i DC/DC converter module (2). A BDCL filter module (3) is positioned in the center. Below the filter are two output DC fuses (4). At the bottom, there are two terminal blocks for energy storage connection (5), a cooling fan (6), a heat exchanger (7), an inlet manifold (8), and an outlet manifold (9). The components are arranged in a vertical stack within the cabinet frame.

Item	Description
1	Input DC fuse
2	R7i DC/DC converter module
3	BDCL filter module
4	Output DC fuse
5	Terminal for energy storage connection
6	Cooling fan
7	Heat exchanger
8	Inlet manifold
9	Outlet manifold



Pipe routing example



1	Coolant IN
2	Inlet manifold with stop and drain valves
3	DC/DC converter module
4	BDCL filter module
5	Outlet manifold with stop and drain valves
6	Heat exchanger
7	Coolant OUT

Installation stages

#	Installation stage	Instruction code	Kit code	Kit ordering code
1	Installation of common parts			
	Common DC bracket kit (for Rittal Flat-PLS)	3AXD50000333639	A-468-X-001-VX	3AXD50000333387
2	Side plates kit installation			
	Side plate kit	3AXD50000327591	A-468-8-020-VX	3AXD50000360543
3	BDCL filter mounting mechanics kit and output busbar kit installation			
	R7i DDC module output DC busbar kit, for fuse size 1	3AXD50001114268	L-6-7-259-VX	3AXD50001114107
	R7i DDC module output DC busbar kit, for fuse size 3	3AXD50001107055	L-6-7-250-VX	3AXD50001102425
	BDCL mounting mechanics kit	3AXD50001107161	L-6-7-319-VX	3AXD50001101305
4	Cooling components kit and filter to module busbars installation			
	Cooling components kit 4	3AXD50000898978	L-468-8-444-VX	3AXD50000899111
	R7i DDC filter to module busbars	3AXD50001106959	L-6-7-240-VX	3AXD50001102432
5	Heat exchanger and fan mechanics installation			
	LCL heat exchanger kit	-	L-468-8-446	3AXD50000479795
	R7i DDC heat exchanger mechanics kit	3AXD50001107178	L-6-7-449-VX	3AXD50001102418
6	BDCL filter installation			
7	Installation frame kit and DC busbar kit installation			
	R7i installation frame kit HZ	3AXD50001034382	L-6-7-038-VX	3AXD50001013547
	R7i DDC DC busbar kit	3AXD50001106966	L-6-7-239-VX	3AXD50001102449
8A	Busbar kits for fuse only solution			
	For fuse size 1 (kit 1)	3AXD50001106973	L-6-7-225-VX	3AXD50001102494
	For fuse size 3 (kit 2)	3AXD50001107185	L-6-7-226-VX	3AXD50001102500
8B	Busbar kits for DC switch solution			
	R7i DDC switch mechanics kit for OT400 (kit 1)	3AXD50001107192	L-6-7-223-VX	3AXD50001102470
	R7i DDC switch mechanics kit for OT600 (kit 2)	3AXD50001107086	L-6-7-224-VX	3AXD50001102487
	R7i DDC connection busbars for OT400 (kit 1)	3AXD50001106980	L-6-7-221-VX	3AXD50001102456
	R7i DDC connection busbars for OT600 (kit 2)	3AXD50001107208	L-6-7-222-VX	3AXD50001102463
9	Module installation			



56 Cabinet construction

#	Installation stage	Instruction code	Kit code	Kit ordering code
10	Swing out frame and shroud kit installation			
	R7i DDC swing frame kit	3AXD50001107093	L-6-7-054-VX	3AXD50001102524
	R7i DDC shroud kit	3AXD50001107222	L-6-7-354-VX	3AXD50001102517
11	Marine kit installation			
	R7i DDC marine support kit	3AXD50001106997	L-6-7-505-VX	3AXD50001102531
12	Pressure relief vent kit and cabinet cover installation			
	Pressure relief vent kit 2	3AXD50000666430	L-68-X-461-VX	3AXD50000667277



Exploded view diagram of the Rittal VX25 2000x600x600 cabinet.

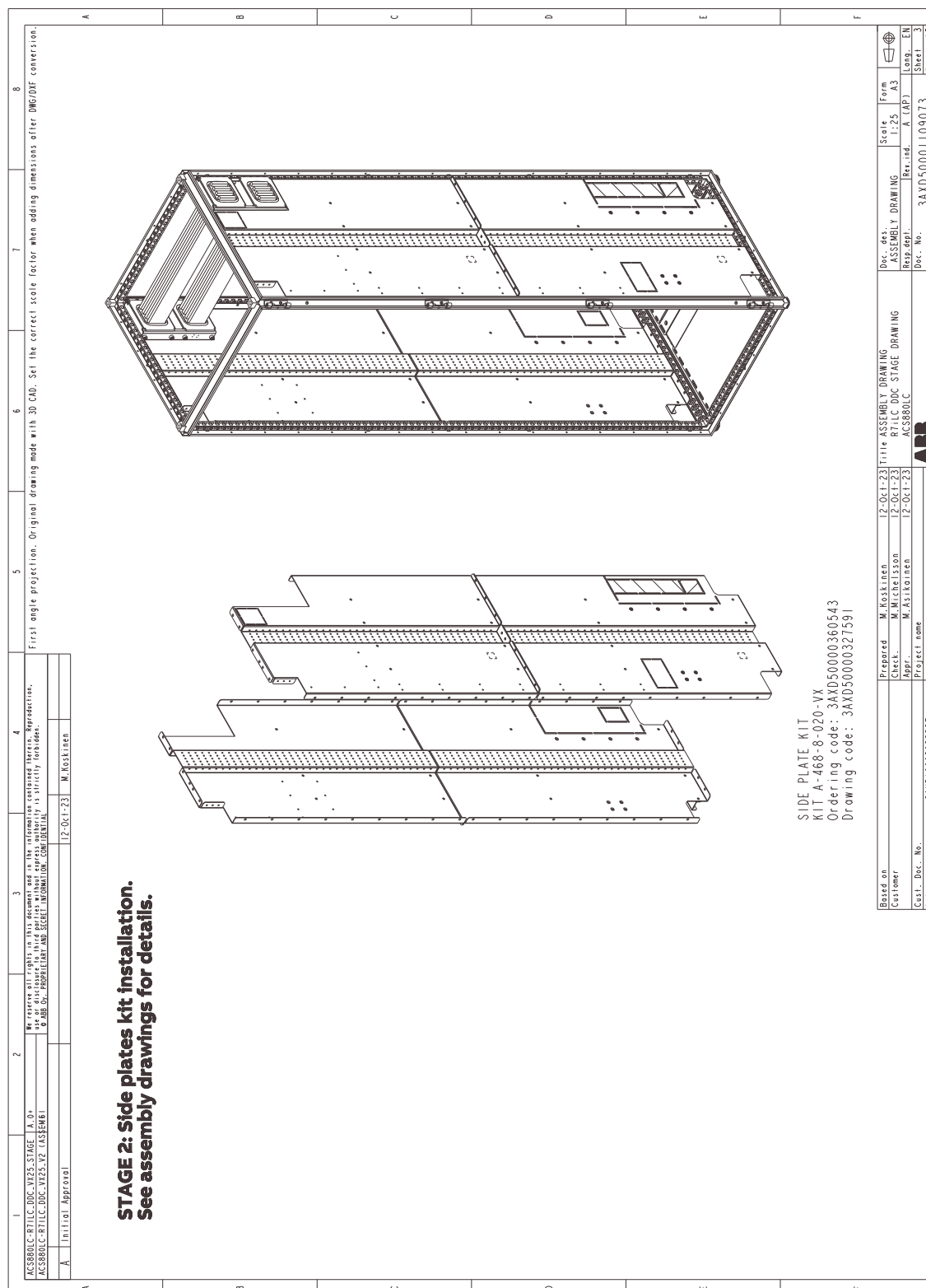
Sub-assembly details:

- A: KITS FOR ACS880-1604LC 1xR7i IN RITTAL VX25 2000x600x600 CABINET**
 Note! Only parts included in ABB kits are shown here.
 See kit assembly drawings for required Rittal and/or other standard parts.
- B: DC FUSE ONLY MECHANICS KIT 1 & 2**
 KIT L-6-7-225-VX
 Ordering code: 3AXD50001102494
 FOR FUSE SIZE 3 (KIT 2)
 KIT L-6-7-226-VX
 Ordering code: 3AXD50001102500
- C: RTi DDC FILTER TO MODULE BUSBARS**
 KIT L-6-7-220-VX
 Ordering code: 3AXD50001102432
- D: RTi DDC OUTPUT DC BUSBAR KIT 1**
 KIT L-6-7-255-VX
 Ordering code: 3AXD50001104107
RTi DDC OUTPUT DC BUSBAR KIT 2
 KIT L-6-7-250-VX
 Ordering code: 3AXD50001102425
- E: RTi DDC OUTPUT DC BUSBAR KIT 1**
 KIT L-6-7-255-VX
 Ordering code: 3AXD50001104107
RTi DDC OUTPUT DC BUSBAR KIT 2
 KIT L-6-7-250-VX
 Ordering code: 3AXD50001102425
- F: RTi DDC MARINE SUPPORT KIT**
 KIT L-6-7-505-VX
 Ordering code: 3AXD50001102531
- Other components shown:**
 - FLAT-PLS SUPPORT KIT FOR DC**
 KIT A-468-X-001-VX
 Ordering code: 3AXD50000333387
 - PRESSURE RELIEF VENT KIT 2**
 KIT L-68-X-461-VX
 Ordering code: 3AXD50000667277
 - BDCL MOUNTING MECH KIT**
 KIT L-6-7-319-VX
 Ordering code: 3AXD50001101305
 - LCL HEAT EXCHANGER KIT**
 KIT L-468-X-446-VX
 Ordering code: 3AXD50000479195
 - RTi DDC HEAT EXCHANGER MECH KIT**
 KIT L-6-7-445-VX
 Ordering code: 3AXD50001102418
 - RTi DDC SWITCH MECH KIT 1 & 2**
 FOR 01400 (KIT 1)
 KIT L-6-7-225-VX
 Ordering code: 3AXD50001102470
 FOR 01600 (KIT 2)
 KIT L-6-7-224-VX
 Ordering code: 3AXD50001102487
 - RTi DDC DC BUSBAR KIT**
 KIT L-6-7-239-VX
 Ordering code: 3AXD50001102449
 - RTi INSTALLATION FRAME KIT HZ**
 KIT L-6-7-038-VX
 Ordering code: 3AXD50001013547
 - RTi DDC SHROUD KIT**
 KIT L-6-7-354-VX
 Ordering code: 3AXD50001102517
 - RTi DDC SWING FRAME KIT**
 KIT L-6-7-054-VX
 Ordering code: 3AXD50001102524
 - RTi DDC MARINE SUPPORT KIT**
 KIT L-6-7-505-VX
 Ordering code: 3AXD50001102531

**STAGE 1: Common assembly installations (Common DC bus, cabinet floor).
See assembly drawings for details.**

[illegible]

Stage 2: Side plates kit installation

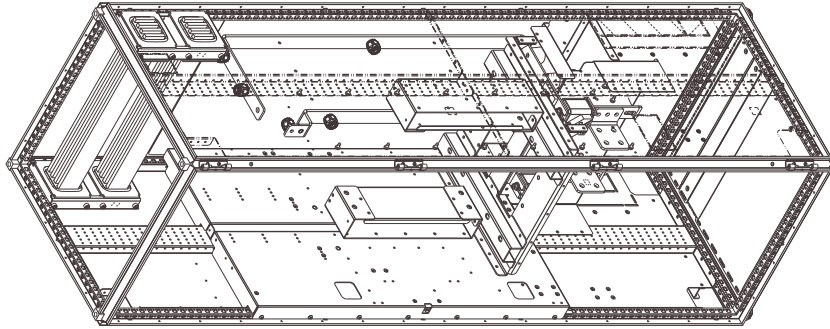


STAGE 3: BDCL filter mounting mechanics kit and output busbar kit installation. See assembly drawings for details.

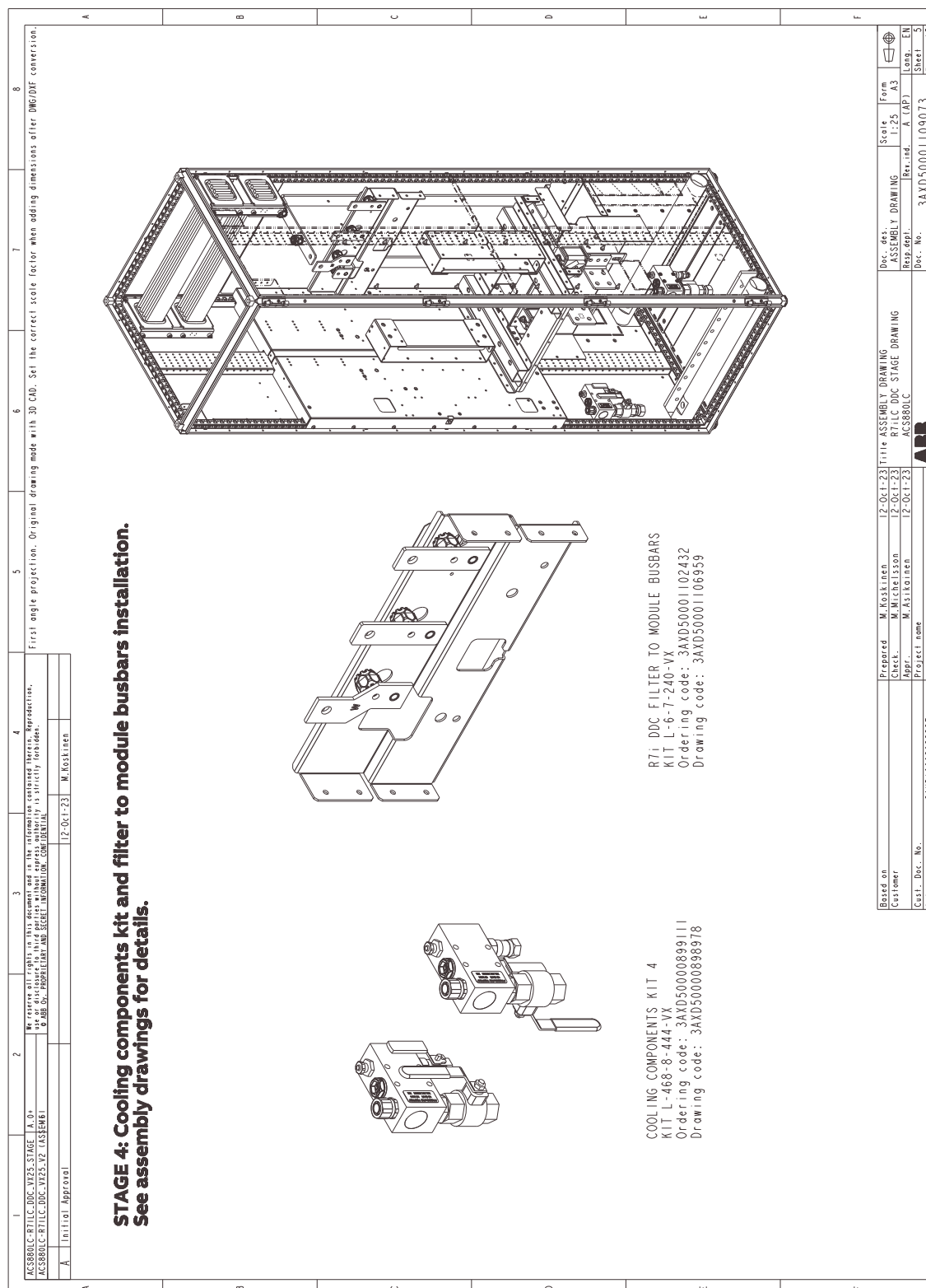


FOR FUSE SIZE 1 (KIT 1)
KIT L-6-7-259-VX
Ordering code: 3AXD5000114107
Drawing code: 3AXD5000114268

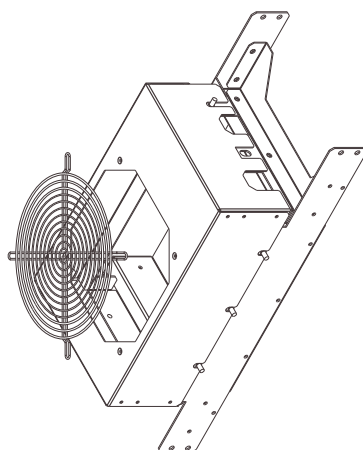
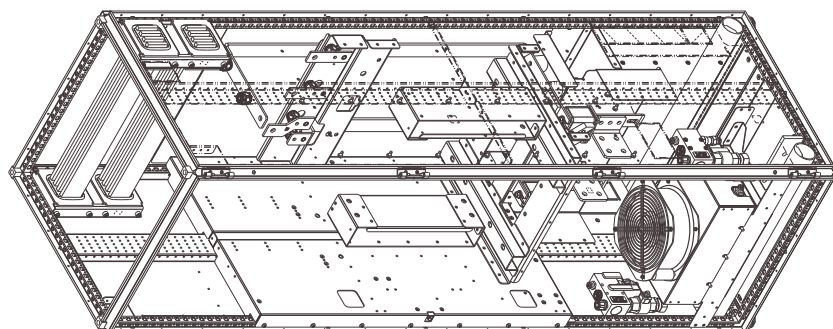
FOR FUSE SIZE 3 (KIT 2)
KIT L-6-7-250-VX
Ordering code: 3AXD50001102425
Drawing code: 3AXD50001107055

[illegible]

Stage 4: Cooling components kit and filter to module busbars installation

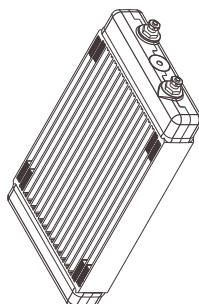


STAGE 5: Heat exchanger and fan mechanics installation.
See assembly drawings for details.



R7i DDC HEAT EXCHANGER MECH KIT
KIT L-6-7-449-VX
Ordering code: 3AXD50001102418
Drawing code: 3AXD50001107178

Note: Fan and heat exchanger are not included in kit.



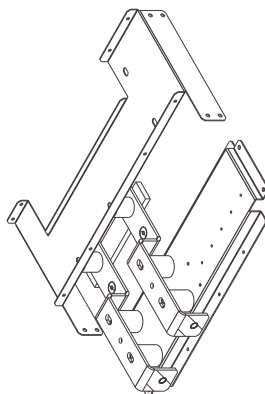
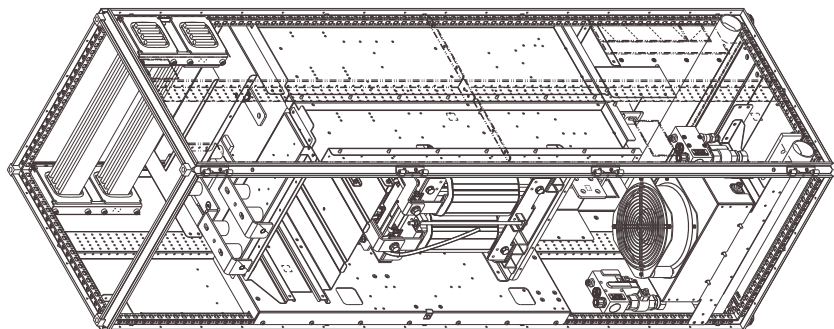
LCL HEAT EXCHANGER KIT
KIT L-468-8-446
Ordering code: 3AXD50000479795

Prepared	M. Koskinen	12-Oct-23	Title		ASSEMBLY DRAWING	Doc. des.	Scale	Form
Check.	M. Michésson	12-Oct-23	R71LC DDC STAGE		DRAWING		1:25	A3
Appr.	M. Asikainen	12-Oct-23	ACS800LC					
Project name			ABB					
Proj. No.	3AXD0002038237		Dec. No.		3AXD5000109073			
MS. No.			Weight		kg			
Long.			EN		6			
Total			15					

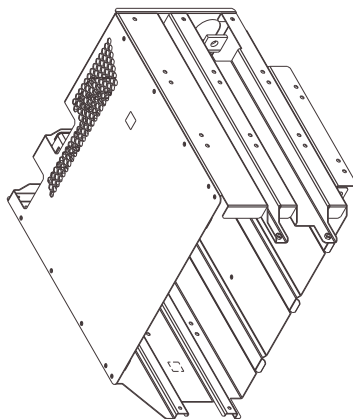
Stage 6: BDCL filter installation

[illegible]

STAGE 7: Installation frame kit and DC busbar kit installation.
See assembly drawings for details.



R7i DDC DC BUSBAR KIT
KIT L-6-7-239-VX
Ordering code: 3AXD50001102449
Drawing code: 3AXD50001106966



R7i INSTALLATION FRAME KIT HZ
 KIT L-6-7-038-VX
 Ordering code: 3AXD50001013547
 Drawing code: 3AXD50001034382

3AID0002038237	Project name	Dec. No.	Dec. det.	Scale	Form
Weight kg			ASSEMBLY DRAWING	1:25	A3
DMS Number			Rev. 1	Rev. 1	
			Rev. 2	Rev. 2	
			Rev. 3	Rev. 3	
			Rev. 4	Rev. 4	
			Rev. 5	Rev. 5	
			Rev. 6	Rev. 6	
			Rev. 7	Rev. 7	
			Rev. 8	Rev. 8	
			Rev. 9	Rev. 9	
			Rev. 10	Rev. 10	
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			Rev. 12	Rev. 12	
			Rev. 13	Rev. 13	
			Rev. 14	Rev. 14	
			Rev. 15	Rev. 15	
			Rev. 16	Rev. 16	
			Rev. 17	Rev. 17	
			Rev. 18	Rev. 18	
			Rev. 19	Rev. 19	
			Rev. 20	Rev. 20	
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			Rev. 22	Rev. 22	
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Stage 8A: Busbar kits for fuse only solution (unit without DC switch)

[illegible]

STAGE 8B: Busbar kits for DC switch solution. See assembly drawings for details.

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AC880LC-RT1LC DDC-V125, STAGE 1, A, 01
AC880LC-RT1LC DDC-V125, V2 (ASSEMBLY)
A Initial Approval

2
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Stage 9: Module installation

[illegible]

STAGE 10: Swing out frame and shroud kit installation. See assembly drawings for details.

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AC880LC-R7iLC-DDC-W25-STAGE 1 A.0-
AC880LC-R7iLC-DDC-W25-1Z (ASSEMBLY)
A Initial Approval 12-Oct-23 M. Koskinen

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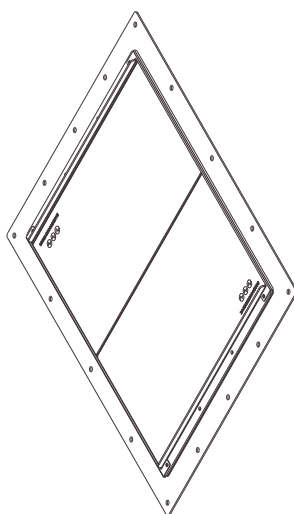
First angle projection. Original drawing made with 3D CAD. Set the correct scale factor when adding dimensions after DWG/DXF conversion.

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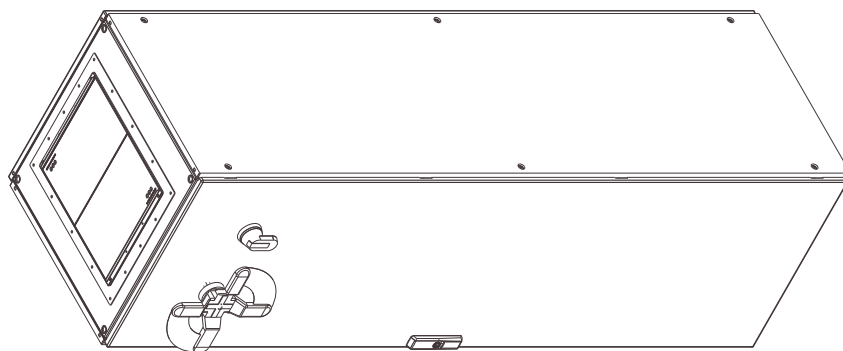
Stage 11: Marine kit installation

[illegible]

STAGE 12: Pressure relief vent kit and cabinet cover installation.
See assembly drawings for details.



PRESSURE RELIEF VENT KIT 2
KIT L-68-X-461-VX
Ordering code: 3AXD50000667277
Drawing code: 3AXD50000666430



1	2	3	4	5	6	7	8
First angle projection. Original drawing made with 3D CAD. Set the correct scale factor when adding dimensions after DWG/DXF conversion.							
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A	Initial Approval						
		12-Oct-23 M. Koskinen					

STAGE 12: Pressure relief vent kit and cabinet cover installation.

See assembly drawings for details.

PRESSURE RELIEF VENT KIT 2
KIT L-68-Y-461-VX
Ordering code: 3AXD5000667277
Drawing code: 3AXD5000666430

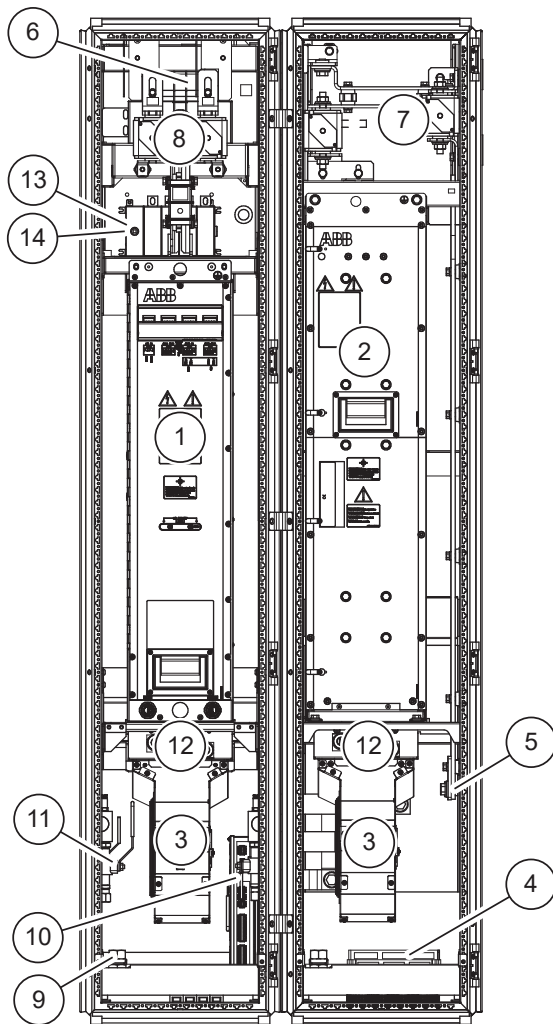
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Customer	M. Koskinen	ASSEMBLY DRAWING	1:25	A3
	M. Michelsson	R7 LC DDC STAGE DRAWING		
	M. Asikainen	AC880LC		

Cust. Doc. No.	Project name	Doc. No.	Rev. no.	Lang.	EN
3AXD5000666430	3AXD5000666430	3AXD5000666430	1	EN	Sheet 14

■ R8i DC/DC converter module in Rittal VX25 enclosure

Layout with DC switch/disconnector and charging

This figure shows an example of the DC/DC converter unit in the Rittal VX25 enclosure. The unit includes an R8i DC/DC converter module, a BDCL filter module, bottom cable entries for the energy storage connection, DC switch-disconnector and charging components.



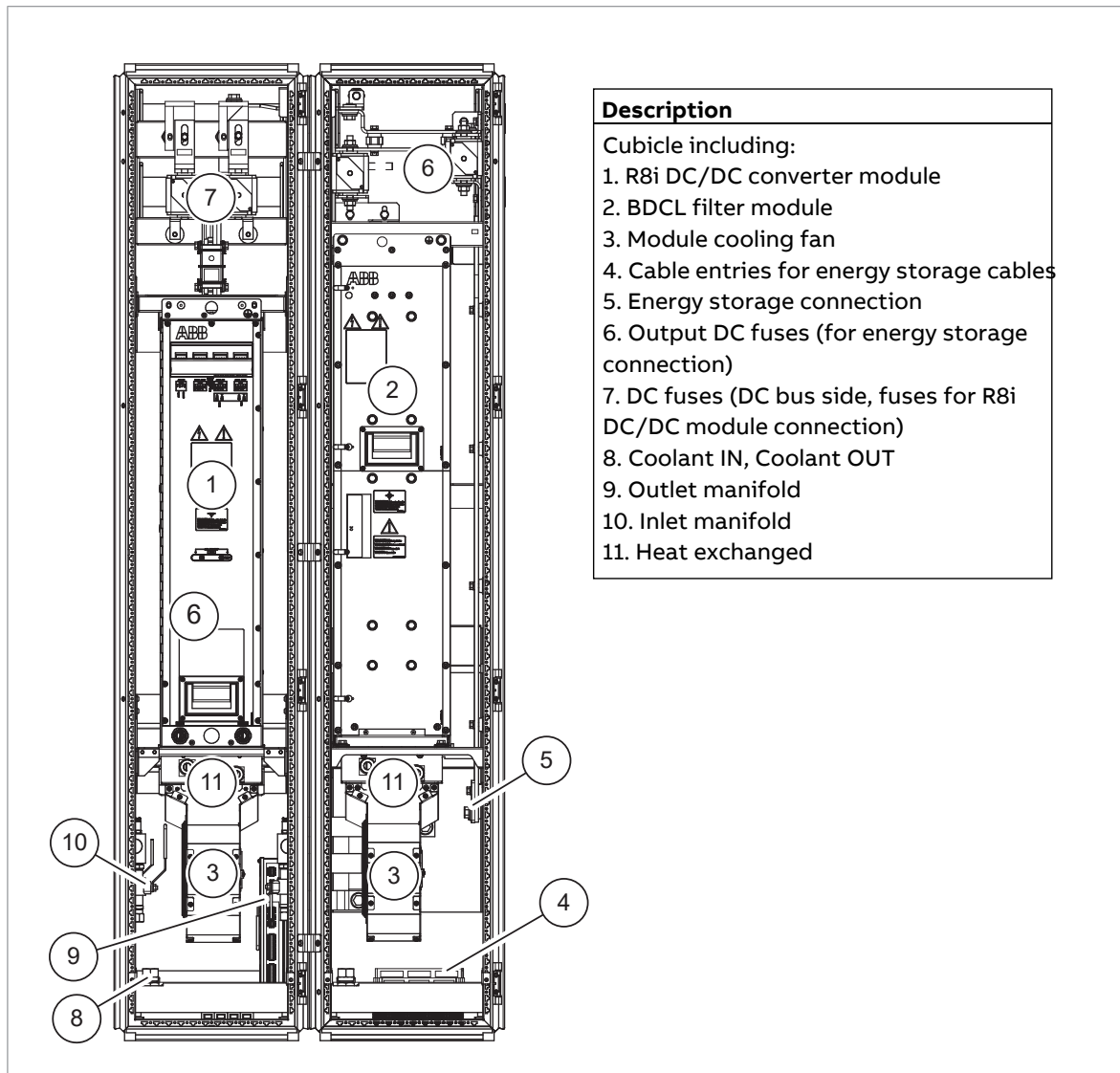
Description

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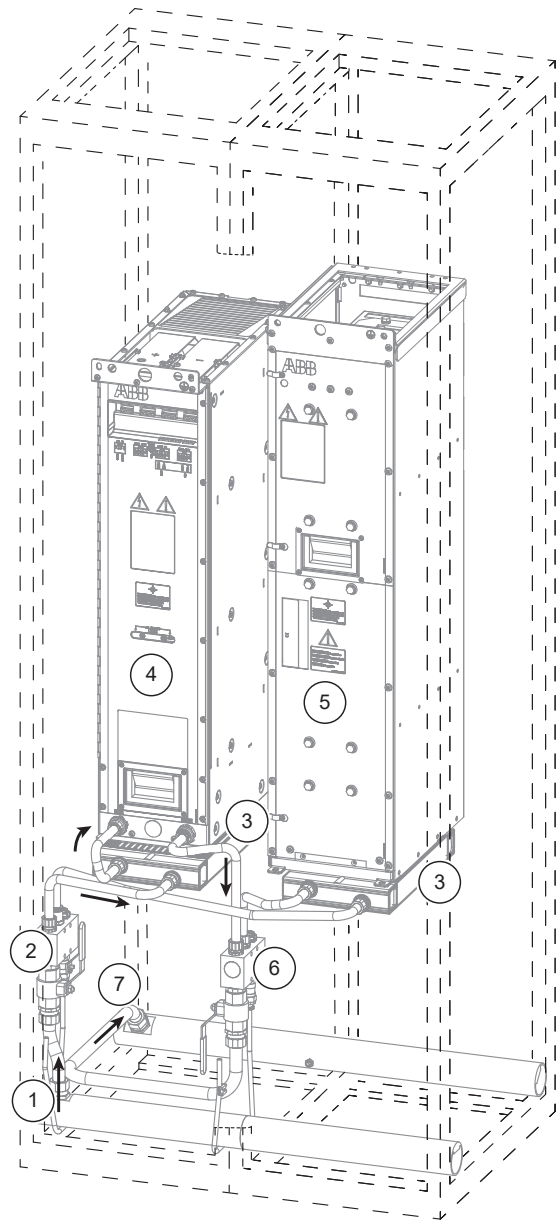
1. R8i DC/DC converter module
2. BDCL filter module
3. Module cooling fan
4. Cable entries for energy storage cables
5. Energy storage connection
6. DC switch/disconnector
7. Output DC fuses
8. DC fuses (DC bus side)
9. Coolant IN, Coolant OUT
10. Outlet manifold
11. Inlet manifold
12. Heat exchanger
13. Charging switch
14. Charging resistors (behind the charging switch)

Layout without DC switch/disconnector and charging

This figure shows an example of the DC/DC converter unit in the Rittal VX25 enclosure without DC switch/disconnector and charging. The unit includes an R8i DC/DC converter module, a BDCL filter module and bottom cable entries for the energy storage connection.



Pipe routing example



1	Coolant IN
2	Inlet manifold with stop and drain valves
3	Heat exchanger
4	DC/DC converter module
5	BDCL filter module
6	Outlet manifold with stop and drain valves
7	Coolant OUT

Installation stages

#	Installation stage	Instruction code	Kit code	Kit ordering code
1	Installation of common parts:			
	Baying parts	3AXD50000336340	-	-
	Flat-PLS support kit	3AXD50000333639	-	3AXD50000333387
2	Sideplates, busbars and quick connectors for connecting DDC module and filter			
	Side plate kit	3AXD50000327591	L-468-8-020-VX	3AXD50000360543
	Busbars for connecting DDC module and filter	3AXD50000437146	L-4-8-258-VX	3AXD50000437191
	Quick connector	3AUA0000118667	A-468-8-100	3AUA0000119227
3	Module installation parts			
	DDC module mounting kit	3AXD50000330461	L-4-8-301-VX	3AXD50000360598
	BDCL module mounting kit	3AXD50000437993	L-4-8-312-VX	3AXD50000437207
	R8i fan	-	-	3AXD50000043886 (230 V) 3AXD50000045414 (115 V)
	Heat exchanger	-	L-468-8-440	3AXD50000041265
4	DDC and energy storage connection	3AXD50000438006	L-4-8-257-VX	3AXD50000437313
5A	DC connection with charging			
	DC switch kit W400	3AXD50000342600	L-4-8-254-VX	3AXD50000361038
	R8i CMMF busbar kits	3AXD50000205042	L-46-8-233	3AXD50000200368
	DC connection W400/W600	3AXD50000343614	L-46-8-207-VX	3AXD50000360567
5B	DC connection without charging			
	R8i DC connection busbar kit W400	3AXD50000332861	L-4-8-201-VX	3AXD50000360604
	DC fuse busbar kit W400	3AXD50000332885	L-4-8-251-VX	3AXD50000361021
	R8i CMMF busbar kit	3AXD50000041311	L-468-8-230	3AXD50000041264
6	Cooling components			
	Lead-through kit for bottom plate	3AXD50000004817	A-468-8-441	3AXD50000004385
	Cooling components kit 2	3AXD50000048258	L-468-8-442	3AXD50000044182
7	DDC module and filter installation	-	-	-



76 Cabinet construction

#	Installation stage	Instruction code	Kit code	Kit ordering code
8	Swing frame kit W400 and shoud installation			
	Swing frame kit W400	3AXD50000345106	L-4-X-051-VX	3AXD50000361045
	Shroud kit W400	3AXD50000353354	L-4-8-022-VX	3AXD50000361083
	BDCL shroud kit	3AXD50000444106	L-4-8-030-VX	3AXD50000441822

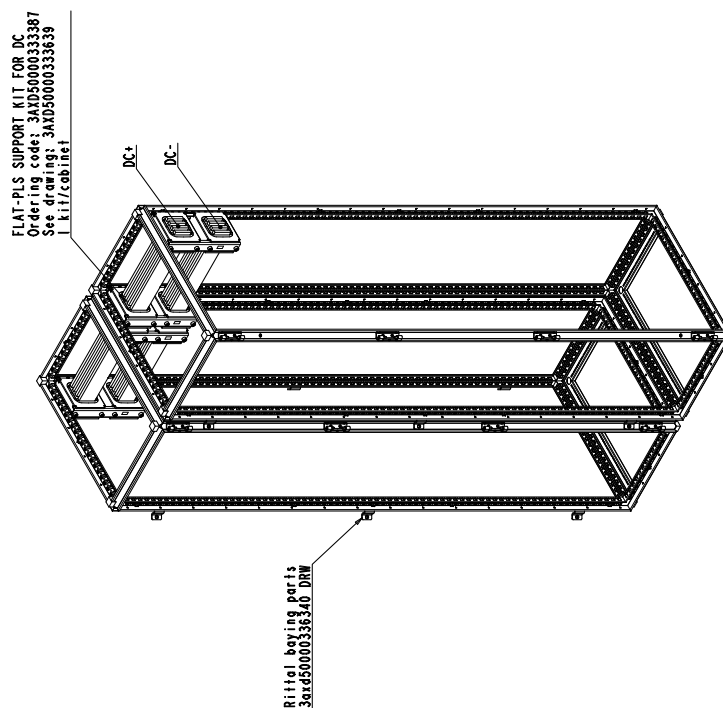


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5000004174	A.0*		
ACS880-1604LC-VX25 4AS25	-1,4		
Initial Approval			
		07-Mar-19	M. McClellan
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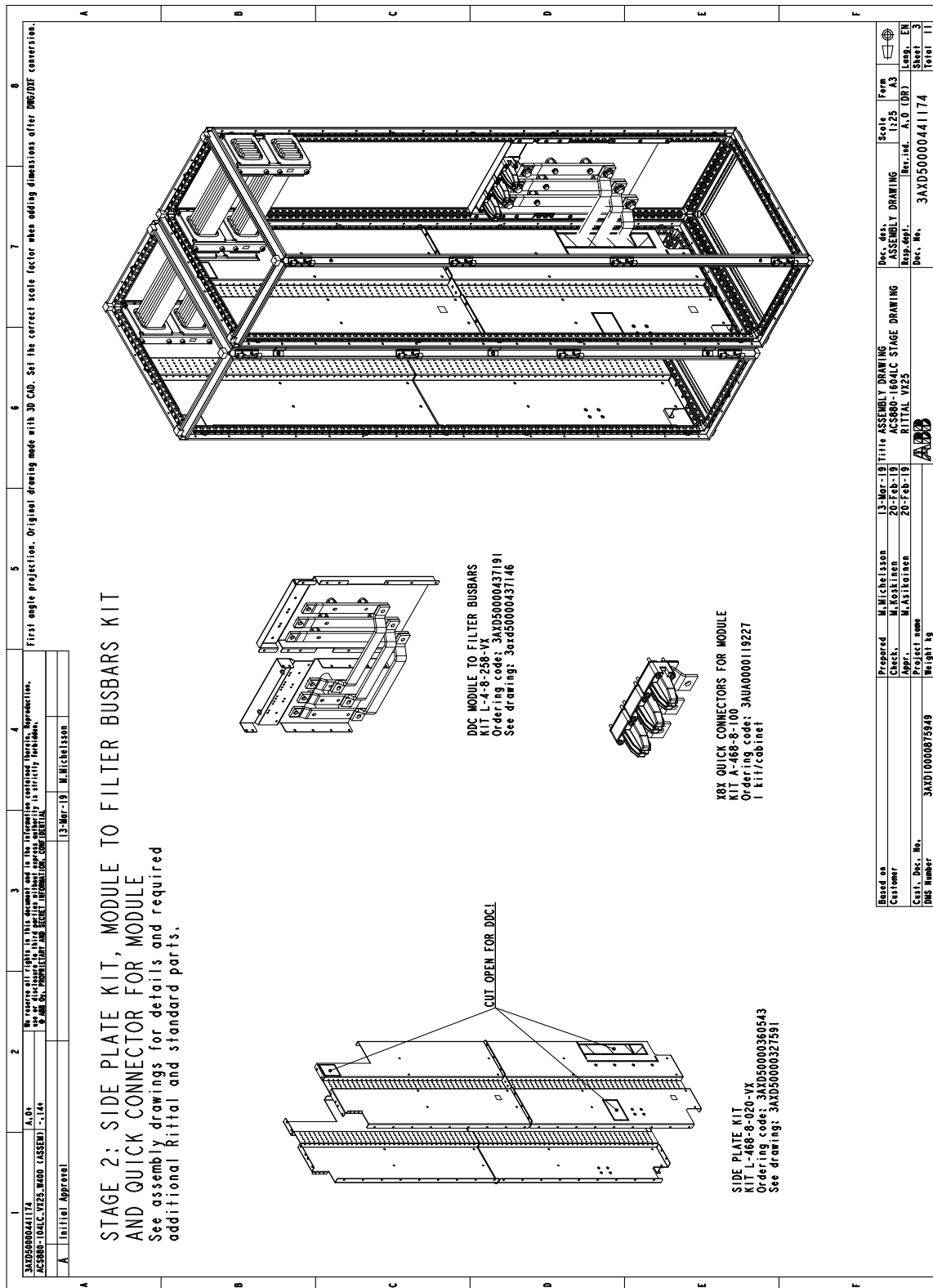
Note! See Cabinet design and construction instructions for ACS880 multidrive modules (3AUA0000107668 [English])

STAGE 1: Common assembly installations (Baying parts, Comm See assembly drawings for details

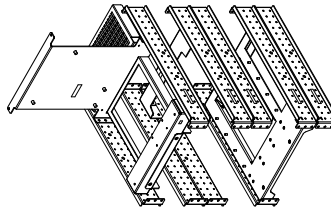
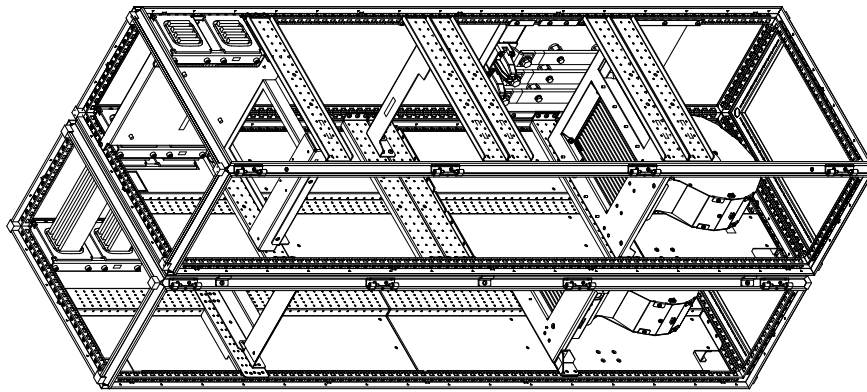


Prepared by	M. Michelson	13-Mar-19	Title	ASSEMBLY DRAWING	Doc. des.	Scale	Form
Checked by	M. Kostinen	20-Feb-19	ACSR80 - 160ALC STAGE	DRAWING	ASSEMBLY DRAWING	1:2.5	A3
Approved by	M. Aikioinen	20-Feb-19	RITTAL VK25		Rev. desc.	A. O. (001)	
Project name					Rev. desc.		
Weight in					Doc. No.	3AXD50000441174	
Doc. No.	3AXD5000075540				Sheet 1		
MS Number					Table 1		

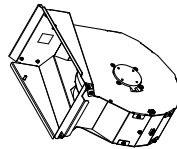
Stage 2: Side plates, busbars and quick connectors for connecting DDC module and filter



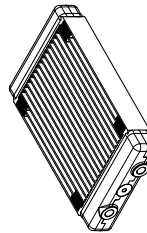
**STAGE3: R81- AND BDCL MODULE MOUNTING MECH W400 KITS
WITH HEAT EXCHANGERS AND FANS**
*See assembly drawings for details and required
additional Rittal and standard parts.*



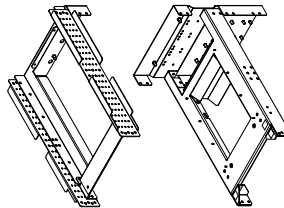
**BDCL MODULE MOUNTING MECH W400
KIT L-4-8-312-VX**
Ordering code: 3AXD50000437207
See drawing: 3AXD50000437993



R8i FAN KIT
Ordering codes:
3AXD50000043886 (230V)
3AXD5000004514 (115V)
1 kit/cabinet



ACS880LC HEAT
EXCHANGER KIT
KIT L-468-8-440
Ordering code: 3AXD50000041265
1 kit/cabinet



MODULE MOUNTING
MECH KIT W400
KIT L-4-8-301-VX
Ordering code: 3AXD50000360598
See drawing: 3AXD50000330461

	Prepared	M. Michelsson	13-Mar-19	Title	ASSEMBLY DRAWING	Doc. des.	Scale	Form
	Checkd.	M. Moskinen	20-Feb-19	RCS880-1604/C	STAGE DRAWING	ASSEMBLY DRAWING	1:25	A3
	Appr.	M. Asikainen	20-Feb-19	ITC500-1604/C	STAGE DRAWING	Reg. Appl.	Long. Ind. A, O (DR)	
	Project name					Doc. No.	3XD50000441174	
	Weight kg					Sheet 4	Total 11	
	DMS Number					Sheet 4	Total 11	
	DMS Number					Sheet 4	Total 11	

Stage 4: DDC and energy storage connection

The drawing consists of two parts. The top part is a perspective view of a large, rectangular metal frame assembly, likely a storage container or connection box. It features a complex internal structure with various beams, supports, and mounting points. The bottom part is a detailed view of a specific component, a 'DDC ENERGY STORAGE CONNECTION KIT', showing its internal structure and mounting points. The drawing is labeled 'STAGE4: DDC ENERGY STORAGE CONNECTION KIT' and includes a note about assembly drawings and required parts.

1	2	3	4	5	6	7	8
3AXD50000441174	A.0.	W. MICHOLSON	W. MICHOLSON	W. MICHOLSON	W. MICHOLSON	W. MICHOLSON	W. MICHOLSON
AC3800-16ALC-VY25-W400 (ASSEMBLY)	-140	W. MICHOLSON	W. MICHOLSON	W. MICHOLSON	W. MICHOLSON	W. MICHOLSON	W. MICHOLSON
A	Initial Approval						

STAGE4: DDC ENERGY STORAGE CONNECTION KIT

See assembly drawings for details and required additional Rittal and standard parts.

DDC ENERGY STORAGE CONNECTION KIT L-4-8-231-11-3AXD50000437313
 Ordering code: 3AXD50000437313
 See drawing: 3AXD50000438006
 For DC switch and fuse only designs.

Based on	Prepared	W. Micholsson	13-Mar-19	Title	ASSEMBLY DRAWING	Dec. des.	Scale	Form
Customer	Check.	M. Koskinen	20-Feb-19		AC3800-160ALC STAGE DRAWING	ASSEMBLY DRAWING	1:25	A3
	Appr.	M. Asikainen	20-Feb-19		RITTAL VY25	Rev. ind.	A. 0 (DR)	
Proj. no.	Project name					Rev. No.	3AXD50000441174	
Customer	Customer					Dec. No.	5	
Order Number	Weight kg					Sheet	5	
						Total	11	



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AC5880-1604.C.VY25.W400 (ASSEMBLY) - L14

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Initial Approval

4
13-Mar-19 M. Michelsson

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First angle projection. Original drawing made with 3D CAD. Set the correct scale factor when adding dimensions after DWG/DXF conversion.

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FOR DC SWITCH DESIGN:

STAGE 5A: DC SWITCH KIT W400, DC CONNECTION W400/W600
AND CMMF BUSBAR KIT

See assembly drawings for details and required additional Rittal and standard parts.

DC SWITCH KIT W400
KIT L-4-8-254-VX
Ordering code: 3AXD50000361038
See drawing: 3AXD50000342600

R81 CMMF BUSBAR KITS

FOR DC SWITCH:
KIT L-46-8-233
Ordering code: 3AXD50000200368
See drawing: 3AXD50000205042
Note: Filters not used in DDC

DC CONNECTION W400/W600
KIT L-46-8-207-VX
Ordering code: 3AXD50000360567
See drawing: 3AXD50000343614

Based on:
Customer

Prepared: M. Michelsson
Checked: M. Roskinen
Appr.: M. Asikainen
Project name

13-Mar-19 13-Mar-19 20-Feb-19 20-Feb-19

Title: ASSEMBLY DRAWING
AC5880-1604.C STAGE DRAWING
RITTAL VY25

Dec. des.:
Rep. des.:
Dec. No.:
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Scale:
1:25
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Sheet:
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Stage 5B: DC connection without charging

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AC5880 - (DALC, YZ25, W400 (ASSEMBLY) - 124
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First angle projection. Original drawing made with 3D CAD. Set the correct scale factor when adding dimensions after DWG/DXF conversion.

A Initial Approval

FOR FUSE ONLY DESIGN:

STAGE 5B: R81 DC CONN BUSBAR KIT W400, DC FUSE BUSBAR KIT W400 AND R81 CMF BUSBARS KIT INSTALLATION
See assembly drawings for details and required additional Rittal and standard parts.

DC FUSE BUSBAR KIT W400
KIT L-4-8-251-VX
Ordering code: 3AXD50000361021
See drawing: 3AXD50000332885

R81 DC CONN BUSBAR KIT W400
KIT L-4-8-201-VX
Ordering code: 3AXD50000360604
See drawing: 3AXD50000332861

R81 CMF BUSBAR KIT
KIT L-488-8-230
Ordering code: 3AXD50000041264
See drawing: 3AXD50000041311
Notes: Filters not used in DDC!

DC FUSE BUSBAR KIT W400

R81 CMF BUSBAR KIT

13-Mar-19 Title ASSEMBLY DRAWING
20-Feb-19 AC5880-1604LC STAGE DRAWING
20-Feb-19 RITLAL YZ25

Prepared H. Mikkelsen
Checked M. Mikkelsen
Appr. M. Mikkelsen

Dec. No. 3AXD5000041174
Scale 1:25
Format A3

Dec. No. 3AXD5000041174
Sheet 7
Total 11

Project name
Weight kg
DMS number 3AXD10000875949

ABB



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3AXD5000044174 ACS880-10ALC.V125.W400 (ASSEMBLY) -14+							
Initial Approval							
13-Mar-19 M. Michelsson							

STAGE 6: COOLING COMPONENTS KIT, CABLE LEAD-THROUGH KIT

BAMU MECHANICS INSTRUCTION(DRW: 3AXD50000444465) AND

PIPING INSTRUCTION(DRW: 3AXD50000446742)

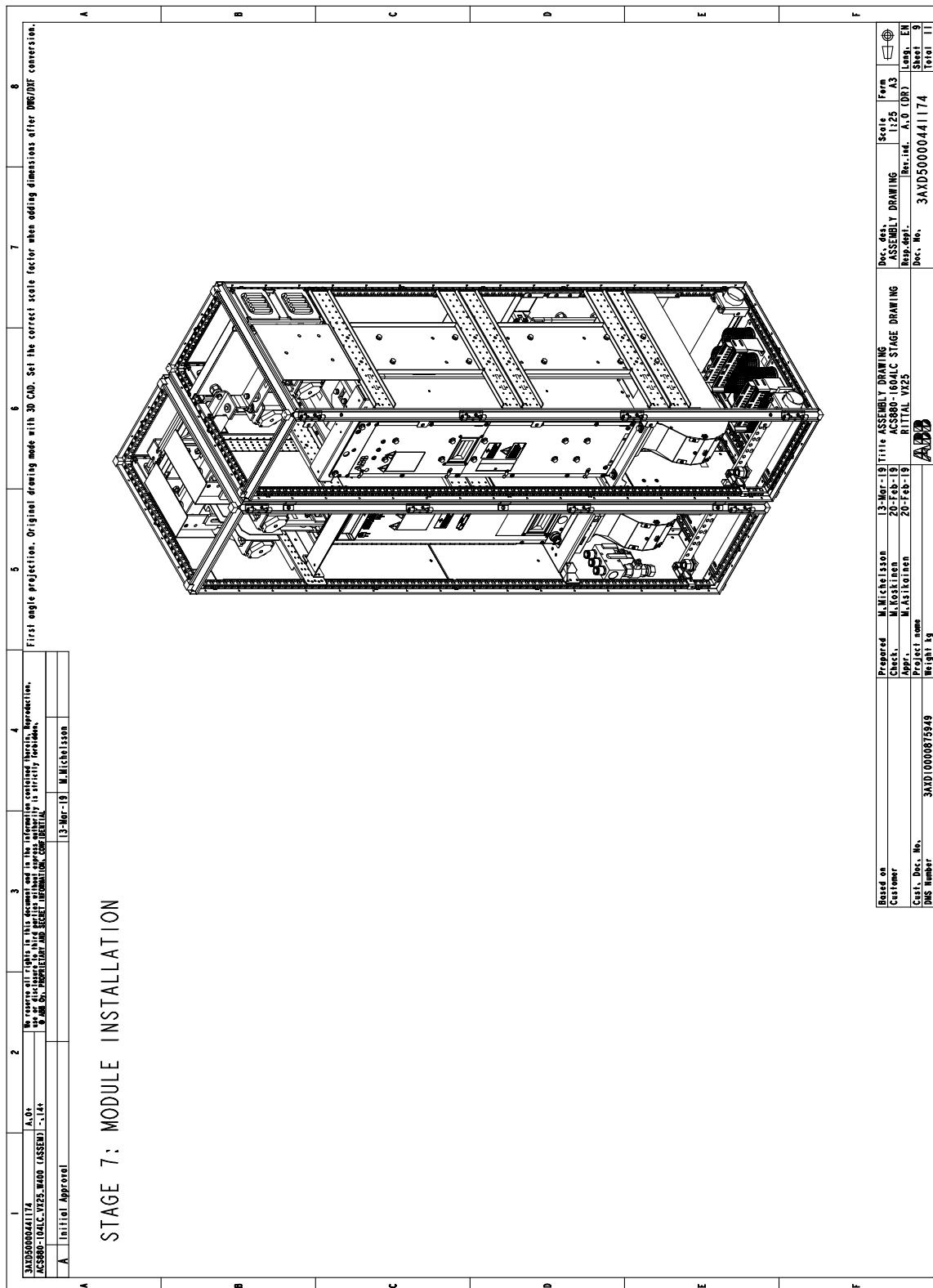
See assembly drawings for details and required additional Rittal and standard parts.

LEAD-THROUGH KIT FOR BOTTOM PLATE
KIT A-468-8-441
 Ordering code: 3AXD50000004385
 See drawing: 3AXD50000004817
 2 kits required

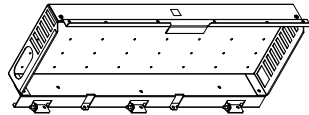
COOLING COMPONENTS KIT 2
KIT L-468-8-442
 Ordering code: 3AXD5000004182
 See drawing: 3AXD5000048258

Based on	Prepared	M. Michelsson	13-Mar-19	Title	ASSEMBLY DRAWING	Scale	Form
Customer	Checked	M. Michelsson	13-Mar-19	ASSEMBLY DRAWING	ASSEMBLY DRAWING	1:1	Form
Customer	Approved	M. Michelsson	20-Feb-19	RITTAL V125	Rev. ind. A.0. (DR)	1:1	Form
Customer	Project name	3AXD10000875949	20-Feb-19	RITTAL V125	Rev. ind. A.0. (DR)	1:1	Form
Customer	Weight kg	3AXD10000875949	20-Feb-19	RITTAL V125	Rev. ind. A.0. (DR)	1:1	Form
Customer	Weight kg	3AXD10000875949	20-Feb-19	RITTAL V125	Rev. ind. A.0. (DR)	1:1	Form

Stage 7: DDC module and filter installation



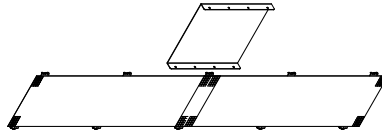
STAGE 8: SWING FRAME KIT W400 AND SHROUD KITS INSTALLATION
See assembly drawings for details and required additional Rittal and standard parts.



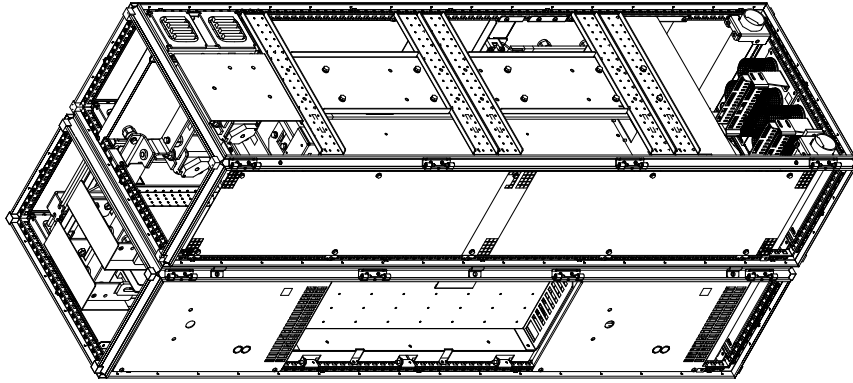
SWING FRAME KIT W400
KIT L-4-X-051-VX
Ordering code: 3AXD5000361045
See drawing: 3AXD5000345106



SHROUD KIT W400
KIT L-4-8-022-VX
Ordering code: 3AXD50000361083
See drawing: 3AXD50000353354



BDCL SHROUD KIT
KIT L-4-8-030-VX
Ordering code: 3AXD50000441822
See drawing: 3AXD50000444106



First angle projection. Original drawing made with 3D CAD. Set the correct scale factor when adding dimensions after DWG/DXF conversion.

STAGE 8: SWING FRAME KIT W400 AND SHROUD KITS INSTALLATION

See assembly drawings for details and required additional Rittal and standard parts.

SWING FRAME KIT W400
KIT L-4-X-051-VX
Ordering code: 3AXD5000361045
See drawing: 3AXD5000345106

SHROUD KIT W400
KIT L-4-8-022-VX
Ordering code: 3AXD5000361083
See drawing: 3AXD5000353354

BDCL SHROUD KIT
KIT L-4-8-030-VX
Ordering code: 3AXD5000441822
See drawing: 3AXD500044106

Based on	Prepared	M. Micheliussen	07-Mar-19	Title	ASSEMBLY DRAWING	Scale	Form
Customer	Checked	M. Roskneen	20-Feb-19	AC5880 - 604 STAGE DRAWING	1:25	A3	
Cust. Des. No.	Appr.	M. Asikainen	20-Feb-19	RITVAL V25	Rev. ind.	A.0 (ORT)	
3AXN0000876540	Project name	3AXN0000876540			Doc. No.	3AXD5000441174	
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					Doc. No.	3AXD5000441174	
					Rev. ind.	A.0 (ORT)	
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					Rev. ind.	A.0 (ORT)	
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					Rev. ind.	A.0 (ORT)	
					Doc. No.	3AXD5000441174	
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5

Guidelines for planning electrical installation

Contents of this chapter

This chapter contains electrical planning instructions.

Limitation of liability

The installation must always be designed and made according to applicable local laws and regulations. ABB does not assume any liability whatsoever for any installation which breaches the local laws and/or other regulations. Furthermore, if the recommendations given by ABB are not followed, the drive may experience problems that the warranty does not cover.

■ North America

Installations must be compliant with NFPA 70 (NEC)¹⁾ and/or Canadian Electrical Code (CE) along with state and local codes for your location and application.

¹⁾ National Fire Protection Association 70 (National Electric Code).

ABB is not responsible for the energy storage selection or protection of the energy storage.

Generic guidelines

Refer to [ACS880 liquid-cooled multidrives cabinets and modules electrical planning instructions \(3AXD50000048634 \[English\]\)](#) for the generic guidelines for planning the electrical installation (selecting cables, routing cables, etc.) of multidrives cabinets and modules.

Selecting the energy storage

The energy storage is not included in the drive delivery. The customer (or the system integrator) must acquire a suitable energy storage system. The customer (or the system integrator) is also responsible for the protection of the energy storage.

Additional guidelines:

- Connect parallel modules (if any) to the same energy storage.
 - If the DC feeder unit has parallel strings, connect each string to a separate energy storage.
 - Dimension the energy storage so that it withstands the required current cycles and the stored energy is sufficient. Take the depth of discharge into account in energy storage lifetime calculations.
 - Make sure that the energy storage withstands the current ripple of the converter. See the technical data.
 - The output voltage (energy storage voltage) is not allowed to exceed the drive DC bus voltage. Add sufficient voltage margin in the design to prevent this in case of voltage dips or grid faults.
 - The recommended energy storage operating voltage is:
 $U_{ES} = 150 \text{ V} \dots 80\% \text{ of } U_{DC}$
 - Typical DC voltage values:
 - with diode supply units:
 $U_{DC} = 1.35 \times U_{AC}$
 - with IGBT supply units:
 $U_{DC} = 1.41 \times U_{AC}$ (can be changed with supply unit parameter group 123 DC volt ref.
 - where
 U_{DC} = Drive DC voltage (in the DC bus)
 U_{AC} = Drive input voltage (AC)
 - ABB recommends to measure the energy storage voltage. If the energy storage is a super capacitor, voltage measurement is obligatory unless the capacitor withstands the maximum DC voltage of the drive or contains internal overvoltage protection.
 If the converter has the optional BAMU voltage/current measurement unit, the converter measures its output voltage (and thus also the energy storage voltage) automatically.
 If the converter does not have a BAMU, you must arrange the voltage measurement separately, and send the measured value to the converter control program, for example, through fieldbus communication or by some other means.
 For more information, see section Energy storage voltage measurement and estimation and parameter description in [ACS880 DC/DC converter control program firmware manual \(3AXD50000024671 \[English\]\)](#).
 - Equip the energy storage with a circuit breaker capable of opening the circuit if there is a failure in the energy storage or cable. See [Selecting a protective device for the energy storage](#) and [Energy storage disconnecting \(isolating\) device](#).
-

Implementing protections for the energy storage

■ General principles

The requirements for the customer-defined protections at the energy storage end:

- disconnecting device between the drive and energy storage system (for example, isolation disconnect switch, withdrawable circuit breaker)
- overload and short circuit protection for the cabling (for example, circuit breaker with thermal or electromagnetic trip unit)
- overload and short circuit protection for the energy storage elements itself (for example, integrated overload protection in batteries).

■ Selecting a protective device for the energy storage

The customer (or the system integrator) must equip the energy storage with a protective device. The protective device is not included in the drive delivery.

The protective device must provide an overload and short-circuit protection for the energy storage. If there is no other protection device for the cables at the energy storage end, the protective device of the energy storage must also provide the overload and short-circuit protection for the cable(s).

The customer (or the system integrator) must verify the operation of the protective device by short circuit calculations taking into account the impedances of the drive, filter (if any), cabling and energy storage, and minimum and maximum state of charge of the energy storage. The customer (or the system integrator) must take into account the impact of aging to storage impedances.

■ Energy storage disconnecting (isolating) device

The customer (or the system integrator) must equip the energy storage with an disconnecting (isolating) device. The disconnecting device is not included in the drive delivery.

■ Overload protection of the system by the DC/DC converter

There is a thermal protection function in the DC/DC converter control program. For more information on the thermal protection function, see the firmware manual.

■ Protecting the energy storage cable

There must be protective devices on the two ends of the energy storage cable:

- output DC fuses in the DC/DC converter unit (available from ABB, must be acquired and installed by the customer or system integrator)
- energy storage protective device (must be acquired and installed by the customer or system integrator).

On the converter side of the cable, the output DC fuses protect the DC/DC converter and the cable in a short-circuit situation.

On the energy storage side of the cable, the energy storage protective device protects the energy storage and the cable in a short-circuit or overload situation.

■ Energy storage discharging device

When necessary, the customer (or the system integrator) must equip the energy storage with a discharging device. If the energy storage is a super capacitor, ABB recommends to install a discharging device.

Implementing earth fault protection

The customer (or the system integrator) must install an earth fault protection device and connect it to the converter unit.

The DC/DC converter control program can be configured to trip on a fault or give a warning when external earth leakage is detected. For more information, refer to the firmware manual.

Implementing an interlocking between the disconnecting devices

The customer (or the system integrator) must implement an interlocking circuit between the DC switch-disconnector of the drive [Q11] and the energy storage disconnecter (isolator). The user must not be able to close the energy storage disconnecter (isolator) before closing the DC switch-disconnector of the drive [Q11].

Selecting and routing the energy storage cables

■ Cable selection procedure

Select each power cable as follows. Obey the local regulations.

1. Select the cable type. Obey the general guidelines and recommendations for the drive power cabling.
2. Select the cable size.
Multidrives module: Refer to the listing of typical power cable sizes given in the technical data of the multidrives module hardware manual.
3. Make sure that the short-circuit rating of the cable is sufficient. Take into account the disconnection time of the protective device. If the rating is not sufficient, select a larger cable, increase the number of parallel cables or change the cable to a type with higher conductor temperature rating.
4. Select the cable lugs.
5. Make sure that the cable can enter the cabinet through the cable entry plate.
Multidrives module: Refer to the dimension drawings of the customer-defined cabinet.
6. Make sure that there is sufficient space to install the cable(s) and cable lugs to the terminals.
Multidrives module: Refer to the terminal and cable entry data of the customer-defined cabinet.

■ Recommended cables

The customer (or the system integrator) must acquire and connect the energy storage cables. It is possible to use shielded cables with 2, 3 or 4 conductors. ABB recommends to use shielded cables with 4 conductors.

Refer to the table below for the cables and possible configurations.

Cable type	Positive	Negative	PE (ground)
2-conductor shielded cable	1 conductor	1 conductor	Shield ¹⁾
3-conductor shielded cable	1 conductor	1 conductor	1 conductor + shield
4-conductor shielded cable	2 conductors	2 conductors	Shield ¹⁾

¹⁾ The shield must meet the requirements of IEC 61439-1. If the shield does not meet the requirements, an additional PE conductor or cable is required.

ABB does not recommend to use single core cables. If it necessary to use single core cables, obey these guidelines:

- Use shielded cables. Ground the cable shields only at one end.
- Put the cables in groups of 2 or 4.
- Attach the cables according to the requirements to withstand the apparent short circuit forces.

■ Typical cable sizes

See the technical data.

■ Minimizing electromagnetic interference

The customer (or the system integrator) must obey these rules in order to minimize the electromagnetic interference caused by rapid current changes in the energy storage cables:

- Shield the energy storage cabling completely, either by using shielded cable or a metallic enclosure. Unshielded single-core cable can only be used if it is routed inside a cabinet that efficiently suppresses radiated emissions.
- Install the cables away from other cable routes.
- Avoid long parallel runs with other cables. The minimum recommended separation distance for parallel cabling is 0.3 m (1 ft).
- Cross other cables at right angles.

Keep the cable as short as possible in order to minimize the radiated emissions and stress on converter IGBT semiconductors. The longer the cable, the higher the radiated emissions, inductive load and voltage peaks over the IGBTs of the DC/DC converter.

■ Maximum cable length

Refer to the technical data.

■ EMC compliance of the complete installation

ABB has not verified that the EMC requirements are fulfilled with external energy storage and its cabling. The EMC compliance of the complete installation must be considered by the customer (or the system integrator).

Parallel connection

It is possible to connect multiple DC/DC converter units in parallel. In the parallel connection, both the inputs and the outputs of the units must be connected together. The inputs are connected through the common DC bus of the drive as standard. The outputs (ES+ to ES+, ES- to ES-) must be connected together at the energy storage end by the customer (or the system integrator).

The customer (or the system integrator) must make sure that the load sharing is even between the parallel units. Depending on the case, this may require additional parameter tuning in DC/DC converter control programs of both units:

- If the operating mode selection (parameter 197.13) is Power or Add: The load between the units is inherently shared according to the power or current references. No additional settings are required.
- If the operating mode selection (parameter 197.13) is DC voltage: Tune the load sharing using the droop control function.
- Master/follower operation of the parallel units: The control program does not support the master/follower link between several units. However, it is possible to implement the Master/follower operation with an external PLC. In that case, one DC/DC converter unit, the master unit, operates in the DC voltage control mode and the other unit(s) in power control mode. The external PLC reads the output current reference of the master unit, and uses it as the current reference of the follower units.

The load sharing during an overvoltage or undervoltage control of the DC/DC converter can require tuning of the DC voltage offset value between the parallel units. See the firmware manual for details.

The customer (or the system integrator) must pay special attention to the protection concept in case of parallel units. The protection must operate reliably in all possible fault cases.

6

Electrical installation

Contents of this chapter

This chapter describes the electrical installation of the modules.

The wiring diagrams in this chapter are simplified presentations. For details, see the example circuit diagrams included in the manual.

Note: The instructions do not cover all possible cabinet constructions.

For more information on electrical installation, see [ACS880 liquid-cooled multidrive cabinets and modules electrical planning \(3AXD50000048634 \[English\]\)](#).

Safety and liability



WARNING!

Only qualified electrical professionals are allowed to do the work described in this chapter. Read the **complete safety instructions** before you install, commission, use or service the drive. The complete safety instructions are given in [ACS880 liquid-cooled multidrive cabinets and modules safety instructions \(3AXD50000048633 \[English\]\)](#).

Note: The installation must always be designed and made according to applicable local laws and regulations. ABB does not assume any liability whatsoever for any installation which breaches the local laws and/or other regulations. Furthermore, if the recommendations given by ABB are not followed, the drive system may experience problems that the warranty does not cover.

Electrical safety precautions

These electrical safety precautions are for all personnel 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.

**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 motor(s).
2. Clearly identify the work location and equipment.
3. Disconnect all possible voltage sources. Make sure that re-connection is not possible. Lock out and tag out.
 - Open the disconnecting device of the energy storage connected to the DC/DC converter unit. The disconnecting device is outside the drive cabinet. Then open the DC switch-disconnector [Q11] of the unit.
 - Open the main disconnecting device of the drive.
 - Open the charging switch if present.
 - Open the disconnector of the supply transformer. (The main disconnecting device in the drive cabinet does not disconnect the voltage from the AC input power busbars of the drive cabinet.)
 - Open the auxiliary voltage switch-disconnector (if present), and all other possible disconnecting devices that isolate the drive from dangerous voltage sources.
 - In the liquid cooling unit (if present), open the switch-disconnector of the cooling pumps.
 - If you have a permanent magnet motor connected to the drive, disconnect the motor from the drive with a safety switch or by other means.
 - Open the main isolating device of the drive.
 - Disconnect all dangerous external voltages from the control circuits.
 - After you disconnect power from the drive, always wait 5 minutes to let the intermediate circuit capacitors discharge before you continue.
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 working (including – but 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 (T1/U, T2/V, T3/W) and the grounding (PE) busbar is zero.
Important! Repeat the measurement also with the DC voltage setting of the 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.
 - Make sure that the voltage between the energy storage terminals of the DC/DC converter 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 in control of the electrical installation work.

General notes

■ Printed circuit boards



WARNING!

Use a grounding wristband when you handle printed circuit boards. Do not touch the boards unnecessarily. The boards contain components 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).

Measuring the insulation resistance of the DC cabling



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.

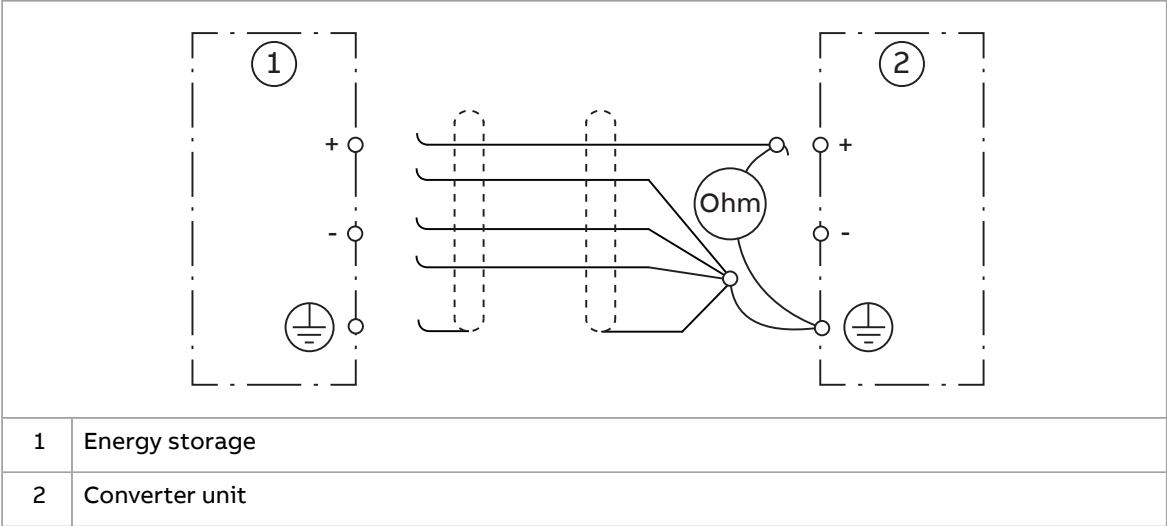




WARNING! Do not do voltage withstand or insulation resistance tests on the drive. The tests can cause damage to the drive. Every drive is tested for insulation between the main circuit and the chassis at the factory. Also, there are voltage-limiting circuits inside the drive which cut down the testing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

Measure the insulation resistance of the DC cabling as follows:

1. Make sure that the cable is disconnected at the drive end and at the other end. All conductors and the cable shield must be disconnected.
2. At the drive end, connect all conductors and shield of the cable together and to the grounding busbar (PE).
3. Disconnect one conductor and measure the insulation resistance between the conductor and the grounding busbar (PE). Use a measuring voltage of 1 kV DC. The insulation resistance must be higher than 1 Mohm.
4. Disconnect another conductor and measure its insulation resistance. Do this for all remaining conductors (including the cable shield).

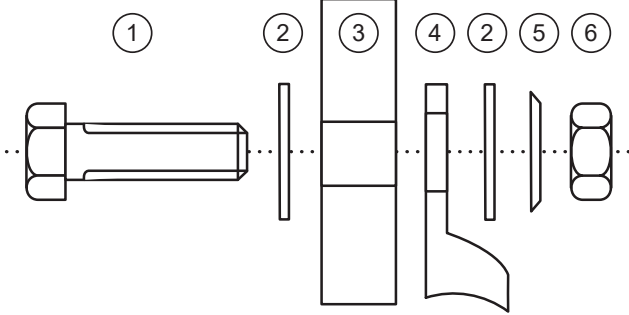


Connecting the energy storage cable and load disconnected indicator cable

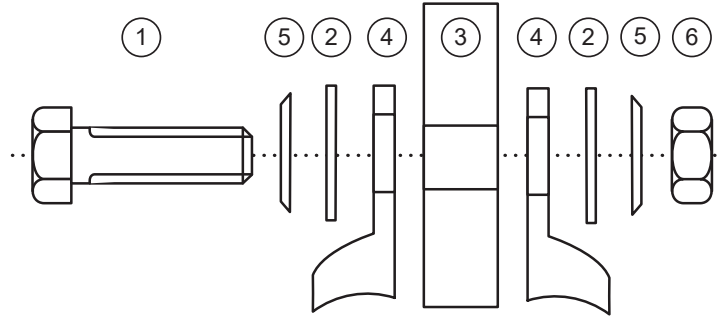
■ Use of fasteners in cable lug connections

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



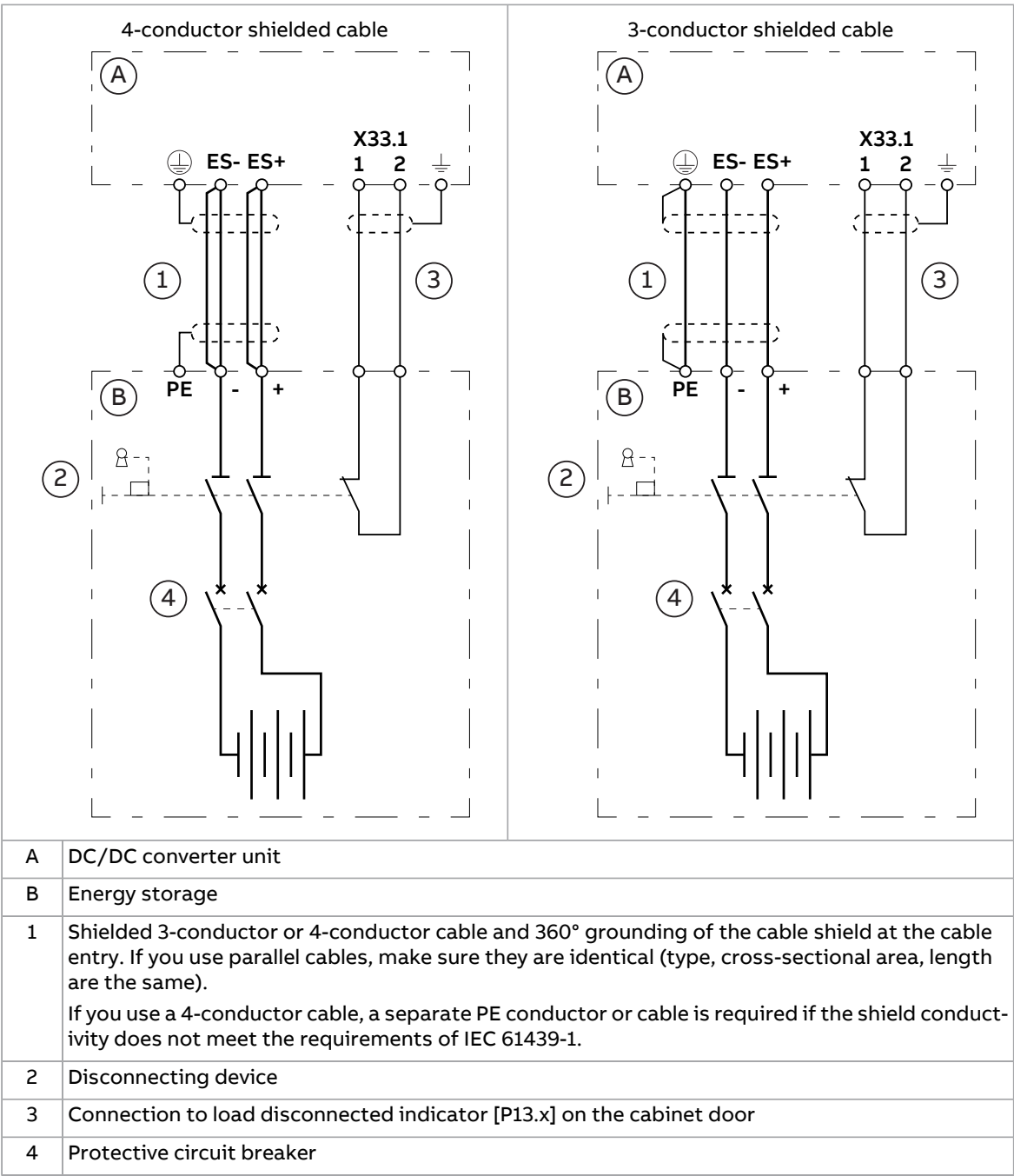
1	Bolt	4	Cable lug
2	Plain washer	5	Spring washer
3	Busbar	6	Nut



■ **Connection diagram**

If the converter unit has parallel modules, each module must have its own output cables. The cables must also be identical (cable type, cross-sectional area, and length must be the same).

This diagram shows the connections between the DC/DC converter unit and an energy storage.



■ Connection procedure for power connections inside the DC/DC converter cubicle



WARNING!

Obey the safety instructions given in [ACS880 liquid-cooled multidrives cabinets and modules safety instructions \(3AXD50000048633 \[English\]\)](#). 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!

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.

Make sure that the mechanical installation of the unit is completed (the converter and filter modules, and other components are installed into a cabinet).

Do the power connections inside the converter cubicle as follows:

1. Do the steps in section [Electrical safety precautions \(page 95\)](#) before you start the work.
2. Open the door of the DC/DC converter cubicle and remove the shrouding (if any).
3. Make the connections between the main circuit components inside the cabinet. Refer to the final circuit diagrams for the drive. When the connections are completed, examine them against the final circuit diagrams. Do not use the example circuit diagrams in this manual as the only source of information when you make or examine the connections. For the tightening torques, see the technical data.
4. Ground the converter module(s) through the module mounting screws. The grounding point is marked on the module.

Note: If the cabinet frame is painted (for example, Rittal VX25 enclosures), it is important to make sure that a good galvanic connection to ground (PE busbar) is achieved. You can, for example, remove the paint from the connection points and use star washers.

Note: The connection to ground only through the mounting screws and the cabinet chassis is not always sufficient. To ensure the continuity of the protective bonding circuit, you can connect the modules to the cabinet PE busbar with a copper busbar or cable. The inductance and impedance of the PE conductor must be rated according to permissible touch voltage appearing under fault conditions (so that the fault point voltage will not rise excessively when a ground fault occurs). Refer to [ACS880 liquid-cooled multidrives cabinets and modules electrical planning \(3AXD50000048634 \[English\]\)](#).

5. Install the shrouding removed earlier and close the cubicle doors.

■ Connection procedure of the energy storage cables

This procedure is applicable to an example cabinet design. The final custom designs of the cabinet can be different.



Before you start, make sure that:

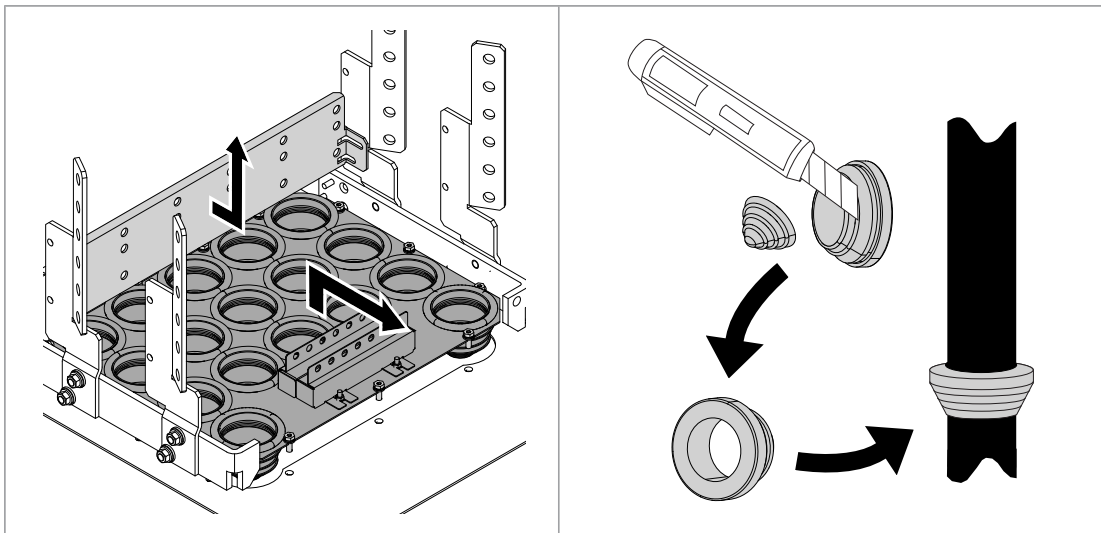
- the mechanical installation is completed (the converter and filter modules, and other components of the DC/DC converter unit are installed into a cabinet), and
- the electrical connections between the components of the DC/DC converter unit are completed.



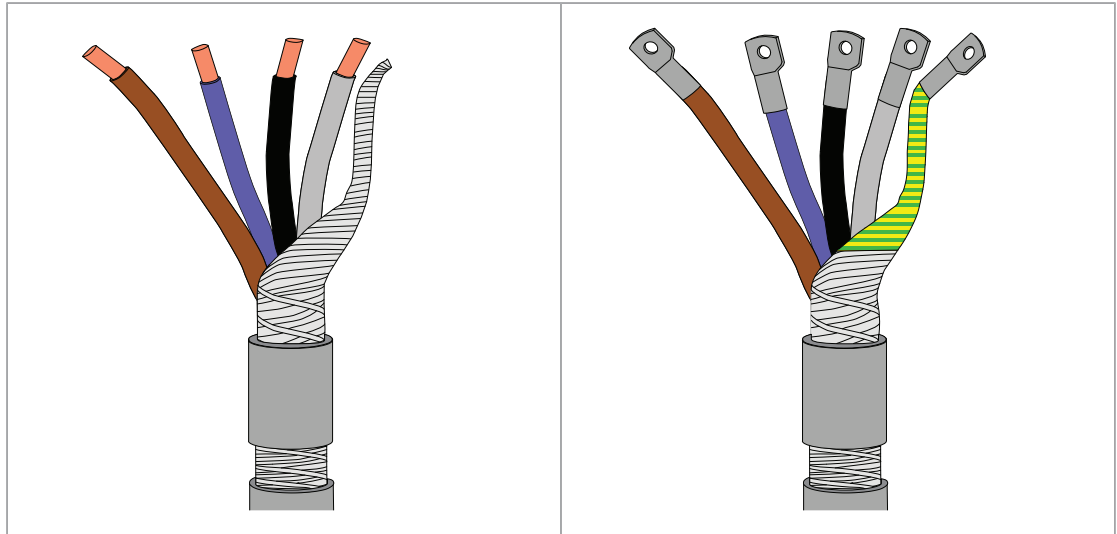
WARNING!

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 \(page 95\)](#) before you start the work.
2. Open the door of the DC/DC converter cubicle and remove the shrouding (if any).
3. IP54 cabinet: Remove the rear horizontal cable support and the cable entry plate. IP54 cabinet: Remove a sealing grommet from the cable entry plate for each cable. Cut hole into the rubber grommet and slide it onto the cable.

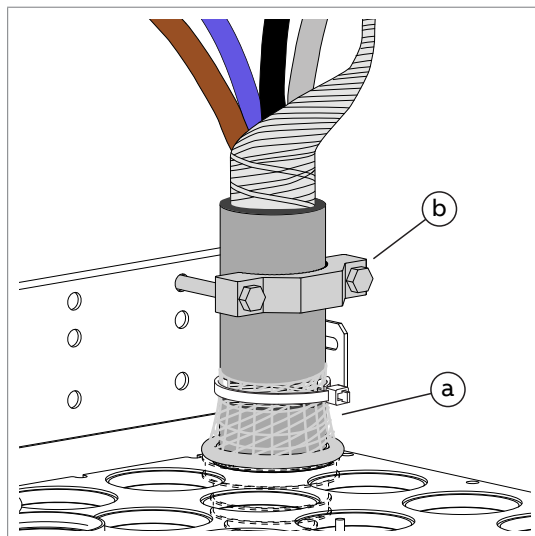


4. Lead the cables inside the cabinet through the cable entry plate. If there are several cables, use the rear 3 holes first.
IP54 cabinet: Attach the the sealing grommets to the cable entry plate. Attach also the cable entry plate, and the cable support.
5. For each cable, strip off 3...5 cm (1.2 ... 2 inches) of the outer insulation above the cable entry plate. Strip also the end of the cable, and the end of the conductors. Twist the shield to form a PE conductor, and mark it with yellow-green tape or heat-shrink tubing.
6. For each cable, attach cable lugs at the end of the PE conductor (twisted shield) and other conductors.

**WARNING!**

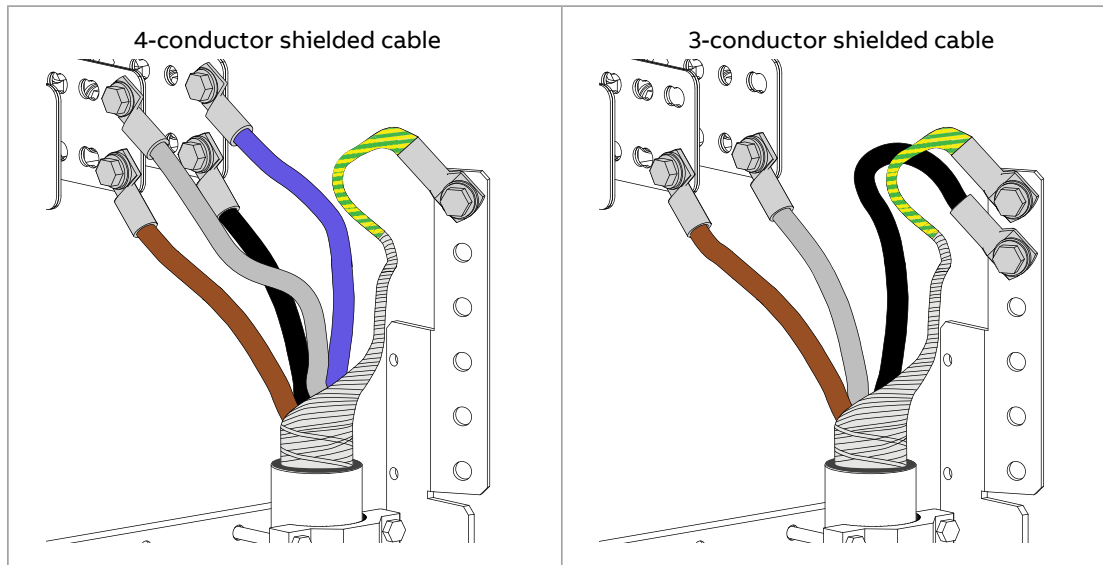
Apply grease to stripped aluminum conductors before you attach them to non-coated aluminum cable lugs. Obey the grease manufacturer's instructions. Aluminum-aluminum contact can cause oxidation in the contact surfaces.

7. For each cable, attach the conductive sleeve (a) to the bare cable shield with a cable tie. Attach the cable to the support bracket with a clamp (b).



8. For each cable, connect the positive conductor(s) to terminal ES+, and the negative conductor(s) to terminal ES-. Connect the cable shield to the PE busbar. If you use a 3-conductor cable, connect one conductor to the PE busbar. Use the bolts, nuts, and washers included in the delivery, and the connection method specified in [Use](#)

of fasteners in cable lug connections (page 99). Tighten the fasteners to the torque given in the technical data.



9. If there are more than 3 cables, attach additional cable support brackets for them.
10. Lead the load disconnected indicator cable inside the cubicle and connect it to the applicable terminals. For more information, refer to the control cable connection instructions.
11. Install the shrouding removed earlier and close the cubicle doors.
12. At the energy storage, connect the cables according to the instructions of the energy storage manufacturer.

Connecting the BDCL filter

Make sure that the mechanical installation of the unit is completed (the converter and filter modules, and other components are installed into a cabinet).

Make sure that the filter module is correctly grounded.



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. Do the steps in section [Electrical safety precautions \(page 95\)](#) before you start the work.
2. Make the filter module power connections. Connect the filter terminals ES+1, ES+2 and ES+3 together, for example, with a kit. Refer to sections [Main circuit diagram \(page 19\)](#) and [Connection diagram \(page 100\)](#). For available kits, refer to the ordering information.
3. Connect the thermistor input [XD1] of the converter control unit to the filter thermistor terminals:
 - Frame R7i: terminals [X6:1, X6:11]
 - Frame R8i: terminals [X30:5, X30:6].

**WARNING!**

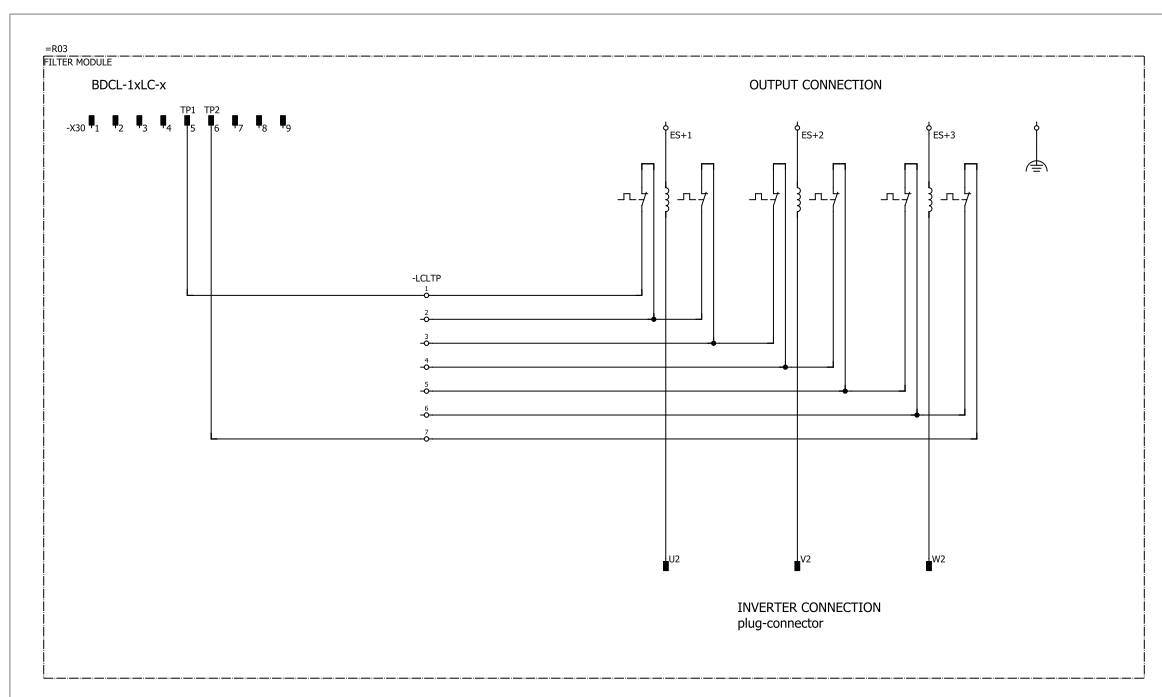
Do not disable the module temperature monitoring function.

**WARNING!**

Use the BDCL filter only with an ACS880-1604LC DC/DC converter module

■ Internal circuit diagram for the BDCL filter

The internal circuit diagram for the R8i BDCL filter is shown below. For the R7i BDCL filter, refer to chapter [Example circuit diagrams](#).



Installing the charging circuit

The cabinet builder must install and connect the charging circuit. For connections, see the example circuit diagrams. Consult ABB for more information on the necessary components and wiring.

Activate and tune the charging function in the control program. For information on tuning the parameters, see [ACS880 DC/DC converter control program firmware manual \(3AXD50000024671 \[English\]\)](#).

Connecting the external power supply cable for the auxiliary circuit

■ DC/DC converter module

The cabinet builder can arrange an auxiliary voltage of 230 V AC (or 115 V AC with option +G304) to connector X50 to supply power to the electronics of the DC/DC converter module. DC/DC converter modules have a power supply board that produces 24 V DC from the auxiliary voltage for the internal circuit boards. The 24 V DC voltage supplied by the power supply is available on connector X53, and can be used to power one control unit. It is not permitted to use the 24 V DC output on connector X53 for other purposes than for supplying power to the control unit.

■ BDCL filter module

For the filter connectors, see the hardware description. For the details about supply voltage levels and auxiliary circuit current consumption, see the technical data.

Connecting the control cables

■ Default I/O connection diagram

See [The control unit](#).

■ Connection procedure

Note: The instructions below are based on an example cabinet construction. They are not applicable to all possible solutions but only clarify the principles.

The procedure tells how to connect the control cables of a DC/DC converter unit. In this example, the power cables are routed to the cabinet through the bottom.

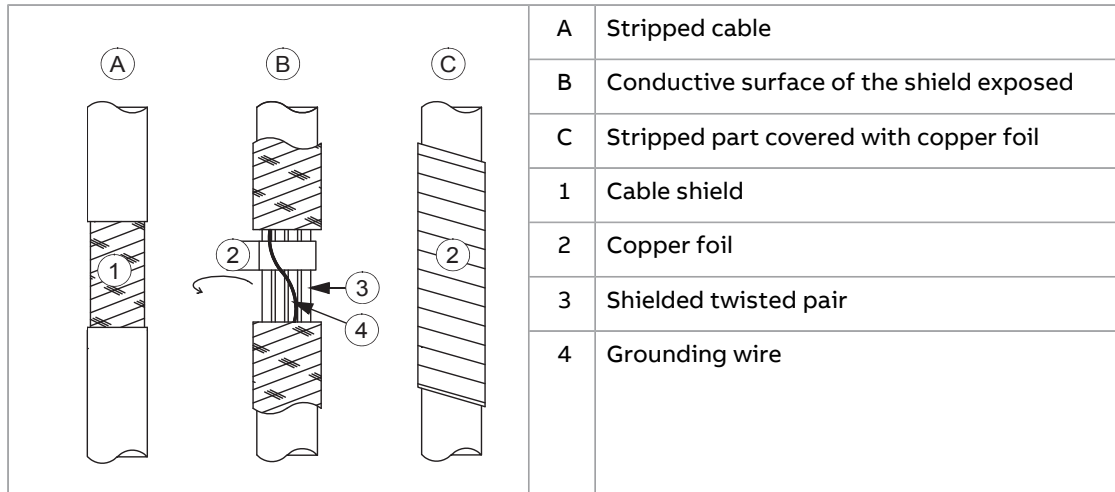


WARNING!

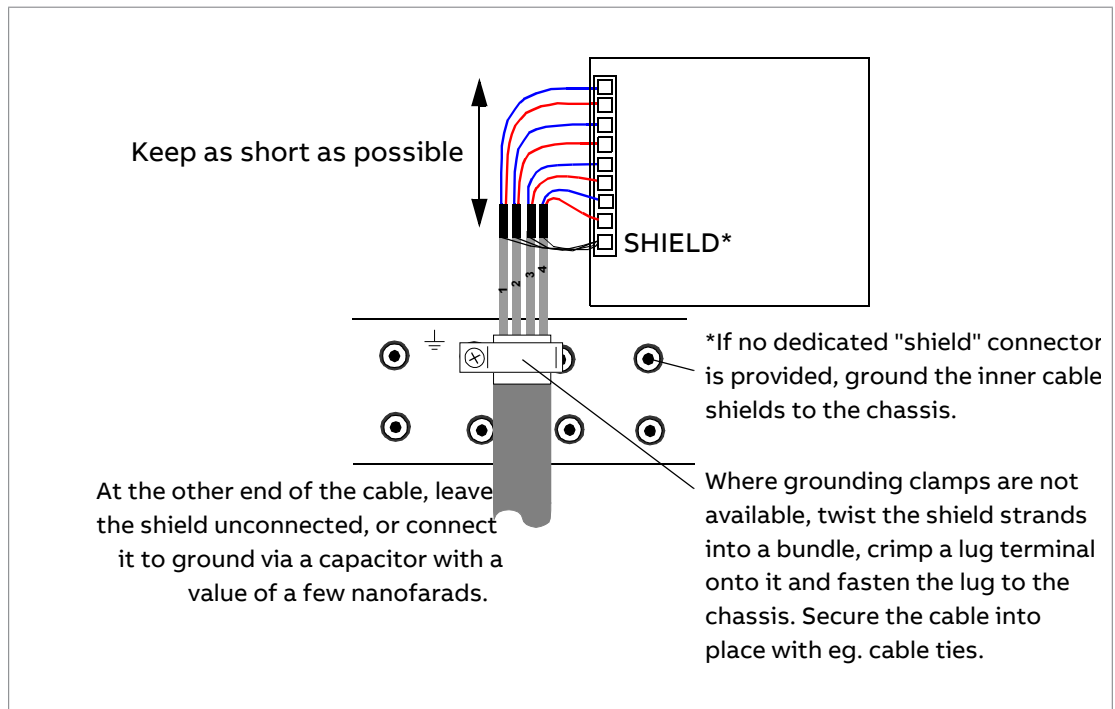
Obey the safety instructions given in [ACS880 liquid-cooled multidrives cabinets and modules safety instructions \(3AXD50000048633 \[English\]\)](#). If you ignore the safety instructions, injury or death, or damage to the equipment can occur.

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

1. Open the cubicle door.
2. Remove the shrouds (if any) from the cubicle.
3. Run the cables into the cabinet. If possible, arrange for a 360° grounding of the cable shield at the cable entry through.
If the outer surface of the shield is non-conductive, turn the shield inside out as shown below and wrap copper foil around the cable to keep the shielding continuous. Do not cut the grounding wire (if present).



4. Run the cables to the applicable terminals. When possible:
 - Use the existing cable trunking in the cabinet.
 - Use sleeving if the cables are laid against sharp edges.
 - Tie the cables to provide strain relief.
5. Cut the cables to the correct length.
6. Strip the cable ends and conductors. When connecting to the drive I/O, also remove the shield along with the outer sheathing, and use electrical tape or shrink tubing to contain the strands. Elsewhere, twist outer shield strands into a bundle, crimp a lug onto it and connect it to the nearest chassis grounding point.



7. Connect the conductors to applicable terminals.
8. Install the shrouds (if any).
9. Close the doors.

Installing option modules



WARNING!

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

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

1. Do the steps in section [Electrical safety precautions \(page 95\)](#) 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.

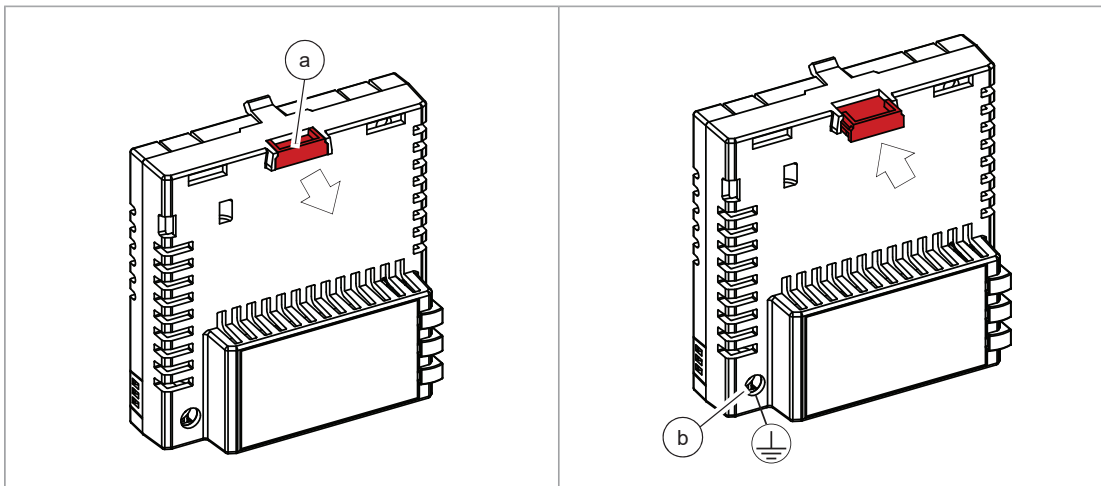
3. Install the module to a free option module slot on the control unit.
4. Push in the lock (a).
5. Tighten the grounding screw (b) to a torque of 0.8 N·m (7 lbf·in).

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 need to remove the option module after it has been installed into the drive, use a suitable tool (e.g. small pliers) to carefully pull out the lock.

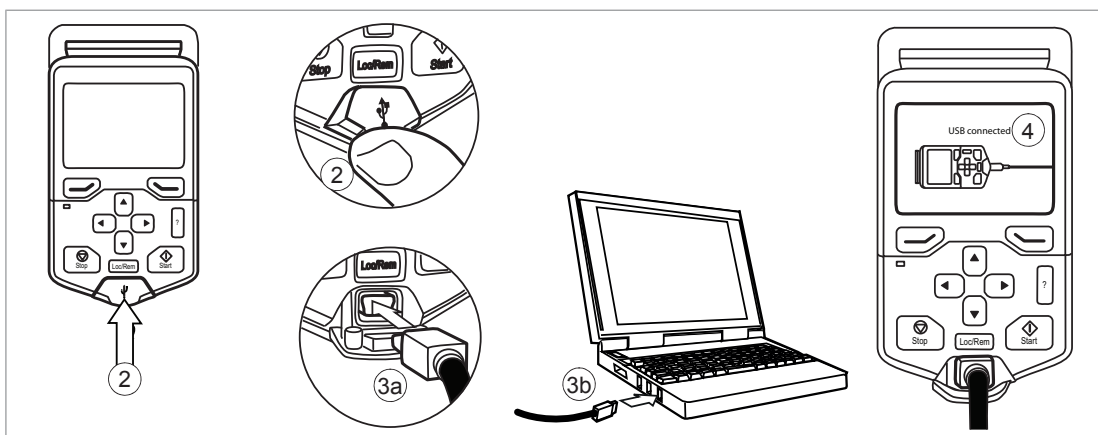
Connecting a PC

**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.



7

The control unit

Contents of this chapter

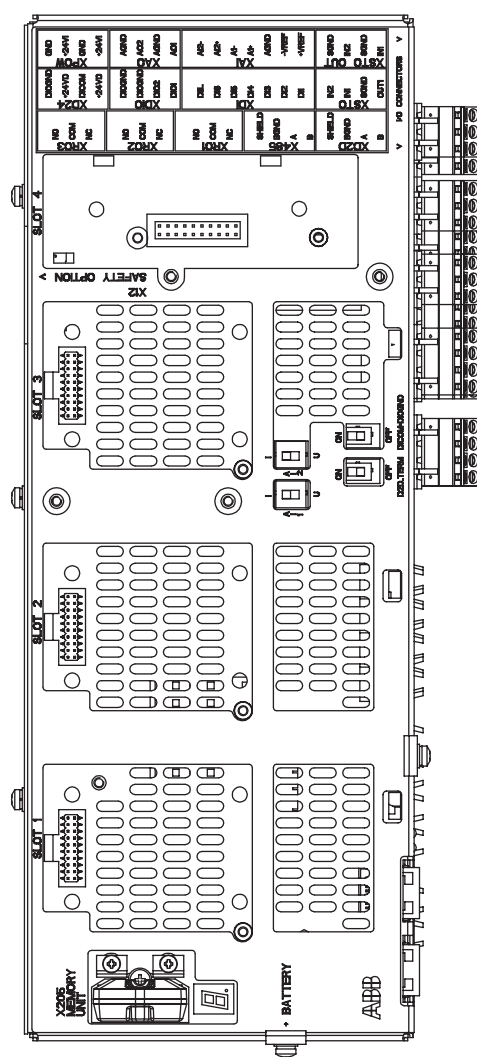
This chapter

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

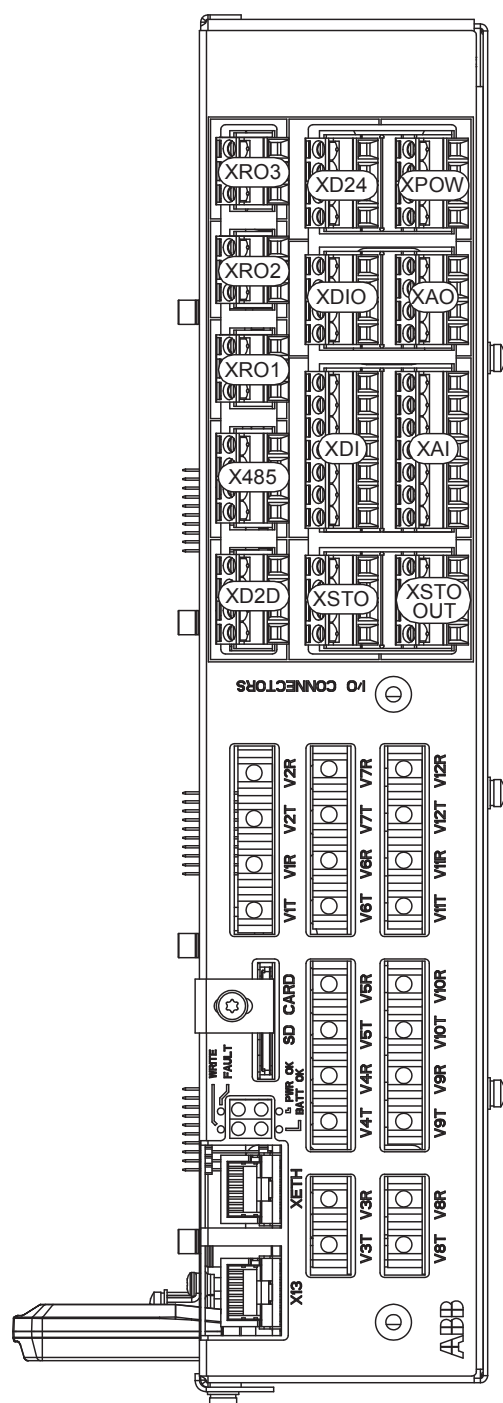
General

A BCU or UCU control unit controls the converter unit. The control unit is connected to the converter module(s) through fiber optic cables.

BCU layout

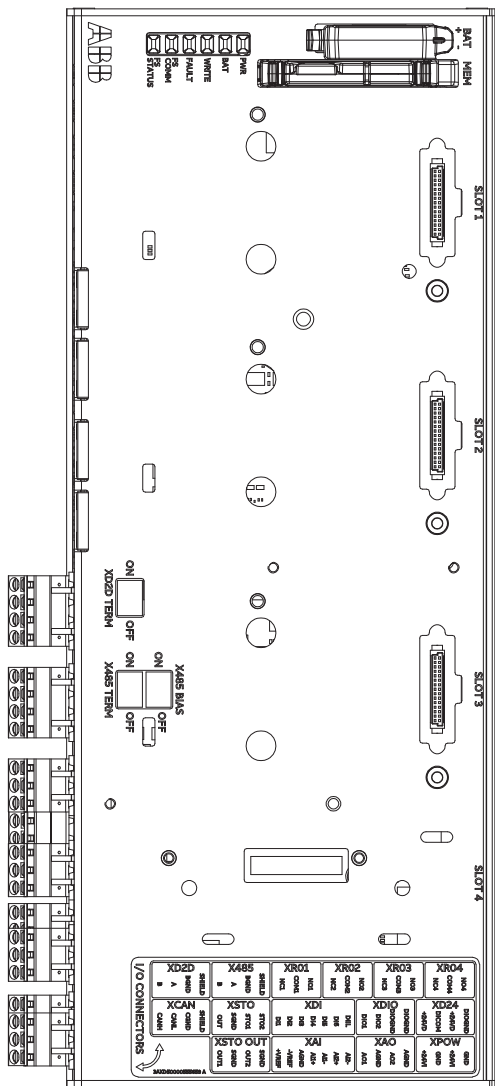


	Description
I/O	I/O terminals (see following diagram)
SLOT 1	I/O extension, encoder interface or fieldbus adapter module connection. (This is the sole location for an FDPI-02 diagnostics and panel interface.)
SLOT 2	I/O extension, encoder interface or fieldbus adapter module connection
SLOT 3	I/O extension, encoder interface, fieldbus adapter or FSO safety functions module connection
SLOT 4	RDCO-0x DDCS communication option module connection
X205	Memory unit connection
BATTERY	Holder for real-time clock battery (BR2032)
AI1	Mode selector for analog input AI1 (I = current, U = voltage)
AI2	Mode selector for analog input AI2 (I = current, U = voltage)
D2D TERM	Termination switch for drive-to-drive link (D2D)
DICOM=DIOGND	Ground selection. Determines whether DICOM is separated from DIOGND (ie. the common reference for the digital inputs floats). See the ground isolation diagram.
7-segment display Multicharacter indications are displayed as repeated sequences of characters	
	("U" is indicated briefly before "o".) Control program running
	Control program startup in progress
	(Flashing) Firmware cannot be started. Memory unit missing or corrupted
	Firmware download from PC to control unit in progress
	At power-up, the display may show short indications of eg. "1", "2", "b" or "U". These are normal indications immediately after power-up. If the display ends up showing any other value than those described, it indicates a hardware failure.



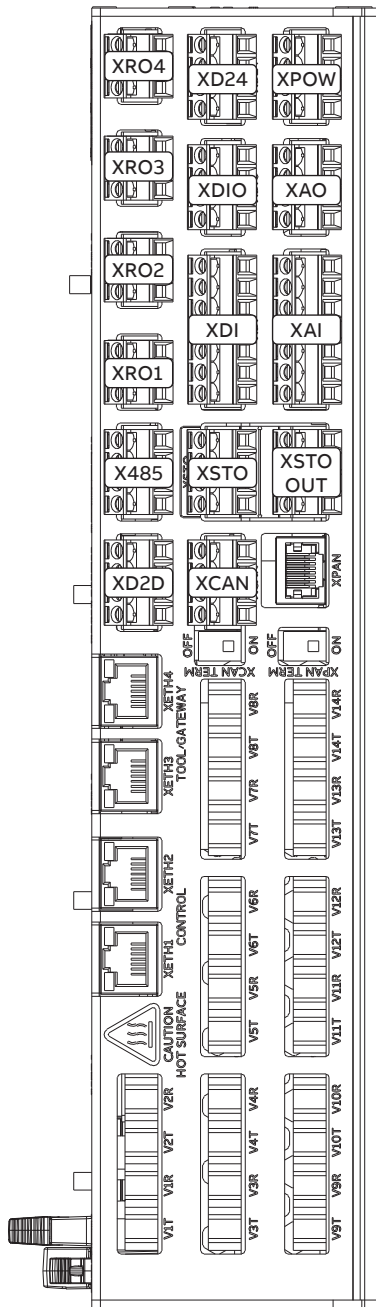
	Description
XAI	Analog inputs
XAO	Analog outputs
XDI	Digital inputs, Digital input interlock (DIIL)
XDIO	Digital input/outputs
XD2D	Drive-to-drive link
XD24	+24 V output (for digital inputs)
XETH	Ethernet port – Not in use
XPOW	External power input
XRO1	Relay output RO1
XRO2	Relay output RO2
XRO3	Relay output RO3
XSTO	Safe torque off connection (input signals)
XSTO OUT	Safe torque off connection (to inverter modules)
X12	(On the opposite side) Not in use
X13	Control panel / PC connection
X485	Connection to CIO-01
V1T/V1R, V2T/V2R	Fiber optic connection to modules 1 and 2 (VxT = transmitter, VxR = receiver)
V3T/V3R ... V7T/V7R	Fiber optic connection to modules 3...7 (BCU-12/22 only) (VxT = transmitter, VxR = receiver)
V8T/V8R ... V12T/V12R	Fiber optic connection to modules 8...12 (BCU-22 only) (VxT = transmitter, VxR = receiver)
SD CARD	Data logger memory card for inverter module communication
BATT OK	Real-time clock battery voltage is higher than 2.8 V. If the LED is off when the control unit is powered, replace the battery.
FAULT	The control program has generated a fault. See the firmware manual of the supply/inverter unit.
PWR OK	Internal voltage supply is OK
WRITE	Writing to memory card in progress. Do not remove the memory card.

UCU-22...24 layout



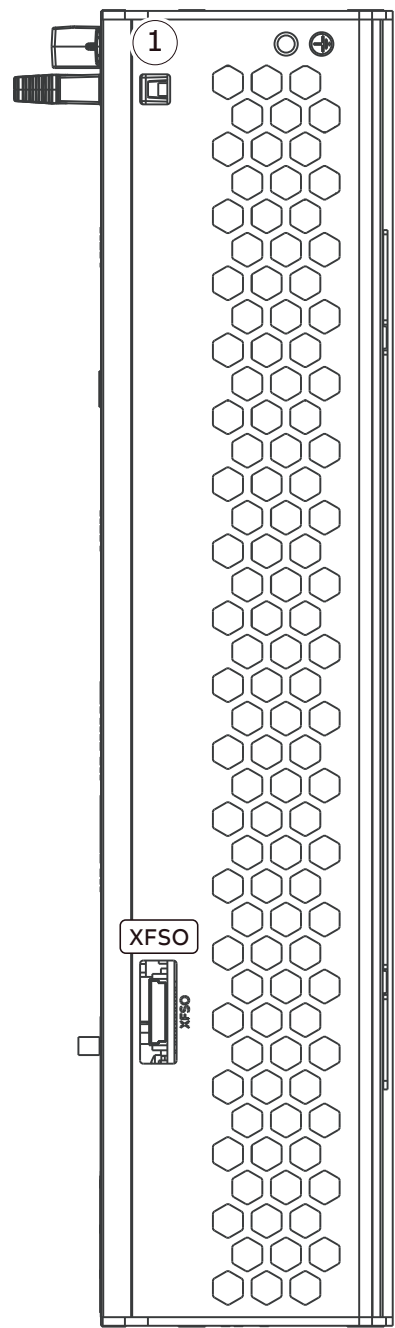
	Description
I/O	I/O terminals
SLOT 1	I/O extension, encoder interface or fieldbus adapter module connection. For F-type modules with USCA-02 adapter.
SLOT 2	I/O extension, encoder interface or fieldbus adapter module connection. For F-type modules with USCA-02 adapter.
SLOT 3	I/O extension, encoder interface or fieldbus adapter module connection. For F-type modules with USCA-02 adapter.
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	
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)

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	Description
XFSO	Not in use
Environmental sensors (1)	Humidity and temperature measurements

Default I/O diagram of the converter control unit (BCU)

The diagram below shows the default I/O connections of the BCU control unit of the converter, and describes the use of the signals/connections.

The wire size accepted by all screw terminals (for both stranded and solid wire) is 0.5 ... 2.5 mm² (22 ... 12 AWG). The tightening torque is 0.45 N·m (4 lbf·in).

Terminal			Description	
XD2D			Drive-to-drive link	
1	1	B	Not in use by default	
2	2	A		
3	3	BGND		
4	4	Shield		
	D2D.TERM		Drive-to-drive link termination switch ¹⁾	
X485			RS485 connection	
5	5	B	CIO-01 module connection (optional)	
6	6	A		
7	7	BGND		
8	8	Shield		
XRO1, XRO2, XRO3			Relay outputs	
11	11	NC	Norm. closed	XRO1: Not in use 250 V AC / 30 V DC, 2 A
	12	COM	Common	
	13	NO	Norm. open	
21	21	NC	Norm. closed	XRO2: Fault (-1) ²⁾ (Energized = no fault) 250 V AC / 30 V DC, 2 A
	22	COM	Common	
	23	NO	Norm. open	
31	31	NC	Norm. closed	XRO3: Fan control (DC/DC converter running, fan control on) 250 V AC / 30 V DC, 2 A
	32	COM	Common	
	33	NO	Norm. open	
XSTO, XSTO OUT			Safe torque off	
1	1	OUT	XSTO: Factory connection. Both circuits (power module, control unit) must be closed for the unit to start (IN1 and IN2 must be connected to OUT). ³⁾	
	2	SGND		
	3	IN1		
	4	IN2		
5	5	IN1	XSTO OUT: Not in use	
	6	SGND		
	7	IN2		
	8	SGND		

Terminal			Description
XDI			Digital inputs
1 2 3 4 5 6 7	1	DI1	Temp fault ²⁾ (0 = overtemperature)
	2	DI2	Not in use by default
	3	DI3	Not in use by default
	4	DI4	Not in use by default
	5	DI5	Not in use by default
	6	DI6	Not in use by default
	7	DIIL	Not in use by default
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 ⁴⁾
	2	DICOM	Digital input ground
	3	+24VD	+24 V DC 200 mA ⁴⁾
	4	DIOGND	Digital input/output ground
			DICOM=DIOGND
			Ground selection switch ⁵⁾
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 ⁶⁾
	5	AI1-	
	6	AI2+	Not in use by default. 0(4)...20 mA, $R_{in} = 100$ ohm ⁷⁾
	7	AI2-	
		AI1	AI1 current/voltage selection switch
		AI2	AI2 current/voltage selection switch
XAO			Analog outputs
1 2 3 4	1	AO1	Zero ²⁾ 0...20 mA, $R_L < 500$ ohm (not in use by default)
	2	AGND	
	3	AO2	Zero ²⁾ 0...20 mA, $R_L < 500$ ohm (not in use by default)
	4	AGND	
XPOW			External power input
1 2 3 4	1	+24VI	24 V DC, 2.05 A
	2	GND	
	3	+24VI	
	4	GND	
X12			Safety functions module connection (not in use in DC/DC converter units)
X13			Control panel connection

Terminal	Description
X205	Memory unit connection

- 1) Must be set to ON when the unit is the first or last unit on the drive-to-drive (D2D) link. On intermediate units, set termination to OFF.
- 2) Default use of the signal in the control program. The use can be changed by a parameter. See also the delivery-specific circuit diagrams.
- 3) This input only acts as a true Safe torque off input in inverter units. In other applications (eg, supply, DC/DC converter, or brake unit), de-energizing the IN1 and/or IN2 terminal will stop the unit but not constitute a true safety function.
- 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) Determines whether DICOM is separated from DIOGND (ie, common reference for digital inputs floats). ON: DICOM connected to DIOGND. OFF: DICOM and DIOGND separate.
- 6) Current [0(4)...20 mA, $R_{in} = 100 \text{ ohm}$] or voltage [0(2)...10 V, $R_{in} > 200 \text{ kohm}$] input selected by switch AI1. Change of setting requires reboot of control unit.
- 7) Current [0(4)...20 mA, $R_{in} = 100 \text{ ohm}$] or voltage [0(2)...10 V, $R_{in} > 200 \text{ kohm}$] input selected by switch AI2. Change of setting requires reboot of control unit.

Default I/O diagram of the converter control unit (UCU-22...24)

The diagram below shows the default I/O connections of the UCU control unit of the converter, and describes the use of the connections.

The wire size accepted by all screw terminals (for both stranded and solid wire) is 0.5 ... 2.5 mm² (22...12 AWG). The tightening torque is 0.45 N·m (4 lbf·in).

Terminal			Description
XD2D			Drive-to-drive link
1	1	D2D_B	Not in use by default
2	2	D2D_A	
3	3	BGND	
4	4	SHIELD	
ON 1	XD2D TERM		Drive-to-drive link termination switch. ¹⁾
X485			RS485 connection
5	5	B	CIO-01 module connection (optional)
6	6	A	
7	7	BGND	
8	8	SHIELD	
ON 1	X485 BIAS		X485 bias selection switch
ON 1	X485 TERM		X485 termination switch
XCAN			CAN bus
9	9	CAN_H	Not supported
10	10	CAN_L	
11	11	CAN_CGND	
12	12	CAN_SHLD	Control cable shield

Terminal			Description	
	XCAN TERM		CANopen termination switch	
XRO1			Relay output 1	
	11	NC1	Norm. closed	XRO1: Not in use 250 V AC / 30 V DC, 2 A
	12	COM1	Common	
	13	NO1	Norm. open	
XRO2			Relay output 2	
	21	NC2	Norm. closed	XRO2: Fault (-1)²⁾ (Energized = no fault) 250 V AC / 30 V DC, 2 A
	22	COM2	Common	
	23	NO2	Norm. open	
XRO3			Relay output 3	
	31	NC3	Norm. closed	XRO3: Fan control (DC/DC converter in operation, fan control on) 250 V AC / 30 V DC, 2 A
	32	COM3	Common	
	33	NO3	Norm. open	
XRO4			Relay output 4	
	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 ³⁾	
	1	OUT	XSTO: Factory connection. Both circuits must be closed for the supply to start (STO1 and STO2 must be connected to OUT).	
	2	SGND		
	3	STO1		
	4	STO2		
XSTO OUT			Safe torque off connection (to inverter modules)	
	5	OUT1	XSTO OUT: Not in use.	
	6	SGND		
	7	OUT2		
	8	SGND		
XDI			Digital inputs	
	1	DI1	Temp fault²⁾ (0 = overtemperature)	
	2	DI2	Not in use by default	
	3	DI3	Not in use by default	
	4	DI4	Not in use by default	
	5	DI5	Not in use by default	
	6	DI6	Not in use by default	
	7	DIIL	Not in use by default	
XDIO			Digital input/outputs	
	1	DIO1	Not in use by default	
	2	DIO2	Not in use by default	
	3	DIOGND	Digital input/output ground	
	4	DIOGND	Digital input/output ground	
XD24			Auxiliary voltage output	

Terminal			Description
	5	+24VD	+24 V DC 200 mA ⁴⁾
	6	DICOM	Digital input ground
	7	+24VD	+24 V DC 200 mA ⁴⁾
	8	DIGND	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	+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-	
XAO			Analog outputs
	1	AO1	Zero (no signal indicated) ²⁾ 0...20 mA, $R_L < 500$ ohm (not in use by default)
	2	AGND	
	3	AO2	Zero (not signal indicated) ²⁾ 0...20 mA, $R_L < 500$ ohm (not in use by default)
	4	AGND	
XPOW			External power input
	1	+24V	24 V DC, 2.05 A
	2	GND	
	3	+24V	
	4	GND	
XFSO			Safety functions module connection. Not used in DC/DC converter units.
XETH1			Ethernet ports for fieldbus. Not in use by default.
XETH2			
XETH3			
XETH4			Ethernet ports for tool communication. Not in use by default.
XPAN			Control panel connection
	XPAN TERM		Control panel connection termination switch
MEM			Memory unit connection

- 1) Must be set to ON when the unit is the first or last unit on a drive-to-drive (D2D) link. On intermediate units, set termination to OFF (1).
- 2) Default use of the signal in the control program. The use can be changed by a parameter. See also the delivery-specific circuit diagrams.
- 3) This input only acts as a true Safe torque off input in inverter units. In other applications (such as DC/DC converter unit), de-energizing the STO1 and/or STO2 terminal will stop the unit but not constitute a SIL/PL classified safety function.
- 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)

The control unit is powered from a 24 V DC, 2 A supply (ZCU, BCU) or a 24 V DC, 2.9 A supply (UCU) through terminal block XPOW. With a type BCU/UCU control unit, a second supply can be connected to the same terminal block for redundancy.

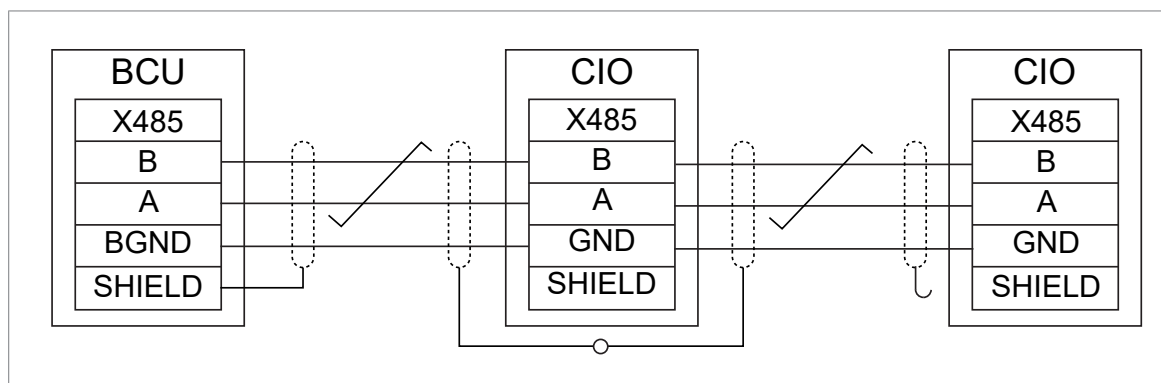
Using a second supply is recommended, if:

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

■ The X485 connector (BCU)

The X485 connector provides a connection for the optional CIO-01 I/O module. Refer to [CIO-01 I/O module for distributed I/O bus control user's manual \(3AXD50000126880 \[English\]\)](#) for more information.

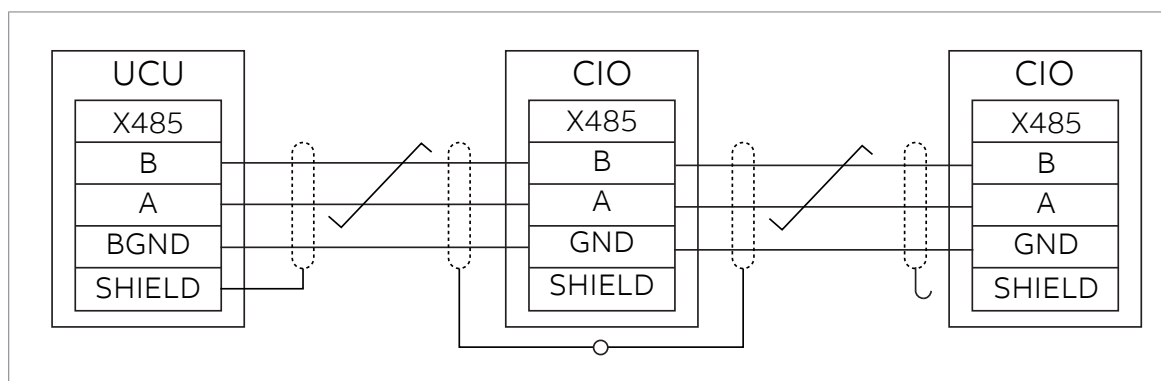
This diagram shows the wiring for the module.



■ The X485 connector (UCU)

The X485 connector provides a connection for the optional CIO-01 I/O module. Refer to [CIO-01 I/O module for distributed I/O bus control user's manual \(3AXD50000126880 \[English\]\)](#) for more information.

This diagram shows the wiring for the module.



Terminate the I/O bus at its physical ends:

1. Set the termination resistor switch of the CIO-01 module on the end of the I/O bus to ON position.
2. Set the X485 termination switch (X485 TERM) of the UCU control unit to ON position to terminate the other end of the I/O bus.
3. Set the termination resistors of all other CIO-01 modules to OFF position.

Make sure that two devices in the I/O bus have the biasing on:

1. Set the X485 bias switch (X485 BIAS) of the UCU control unit to ON position.
2. Make sure that the termination resistor switch in one of the CIO-01 modules is set to ON position. This automatically starts the biasing.

■ **Safe torque off (XSTO, XSTO OUT)**

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

■ **FSO safety functions module connection (X12, with BCU only)**

Refer to the applicable FSO module user's manual. Note that the FSO safety functions module is not used in supply, DC/DC converter or brake units.

Note: Control units that have a sticker with the text “No FSO support” are not compatible with the FSO safety functions module.

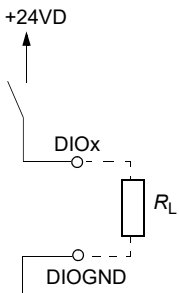
■ **SDHC memory card slot**

The BCU 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.

■ **MicroSDHC memory card slot**

The UCU-22...24 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 memory unit and can be analyzed by ABB service personnel.

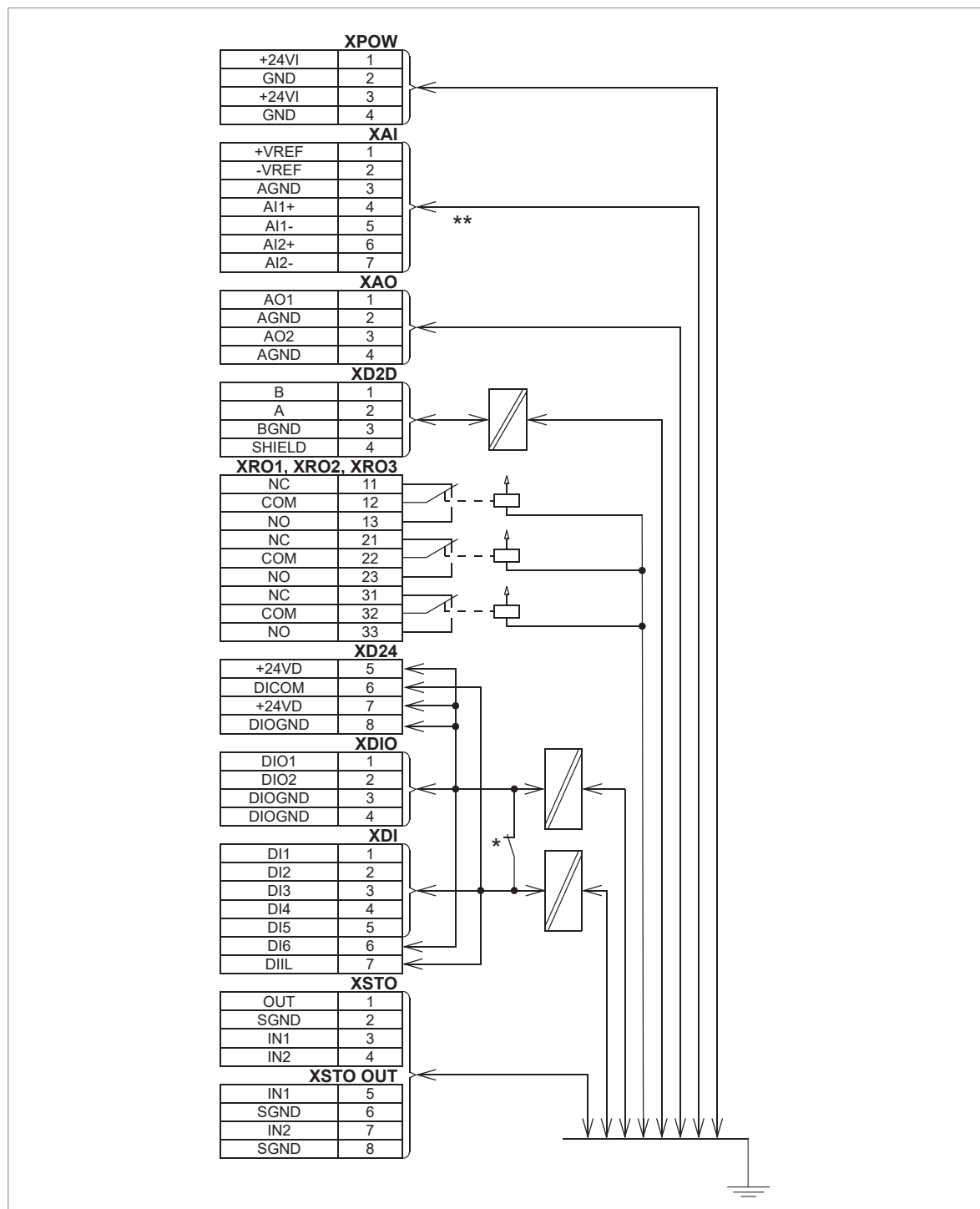
Connector data

Power supply (XPOW)	Connector pitch 5 mm, wire size 0.5 ... 2.5 mm² (22...12 AWG) Maximum tightening torque 0.45 N·m (4 lbf·in) 24 V (±10%) DC, 2 A (BCU) 19...32 V DC, 2.9 A (UCU-22...24) External power input. Two supplies can be connected to the BCU and UCU-22...24 control units for redundancy.
Relay outputs RO1...RO3 (XRO1...XRO3 [BCU]) Relay outputs RO1...RO4 (XRO1...XRO4 [UCU-22...24])	Connector pitch 5 mm, wire size 0.5 ... 2.5 mm² (22...12 AWG) Maximum tightening torque 0.45 N·m (4 lbf·in) 250 V AC / 30 V DC, 2 A Protected by varistors
+24 V output (XD24:2 and XD24:4)	Connector pitch 5 mm, wire size 0.5 ... 2.5 mm² (22...12 AWG) Maximum tightening torque 0.45 N·m (4 lbf·in) Total load capacity of these outputs is 4.8 W (200 mA / 24 V) minus the power taken by DIO1 and DIO2.
Digital inputs DI1...DI6 (XDI:1...XDI:6)	Connector pitch 5 mm, wire size 0.5 ... 2.5 mm² (22...12 AWG) Maximum tightening torque 0.45 N·m (4 lbf·in) 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 (BCU) I_{max}: 15 mA (DI1...DI5), 5 mA (DI6)
Start interlock input DIIL (XDI:7)	Connector pitch 5 mm, wire size 0.5 ... 2.5 mm² (22...12 AWG) Maximum tightening torque 0.45 N·m (4 lbf·in) 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). (BCU) 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). (UCU-22...24) 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.	Connector pitch 5 mm, wire size 0.5 ... 2.5 mm² (22...12 AWG) Maximum tightening torque 0.45 N·m (4 lbf·in) <u>As inputs:</u> 24 V logic levels: "0" < 5 V, "1" > 15 V. R_{in}: 2.0 kohm. Filtering: 1 ms. <u>As outputs:</u> Total output current from +24VD is limited to 200 mA 

Reference voltage for analog inputs +VREF and -VREF (XAI:1 and XAI:2)	Connector pitch 5 mm, wire size 0.5 ... 2.5 mm ² (22...12 AWG) Maximum tightening torque 0.45 N·m (4 lbf·in) 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 (BCU) Current/voltage input mode selection by parameters 12.15 AI1 unit selection and 12.25 AI2 unit selection (UCU)	Connector pitch 5 mm, wire size 0.5 ... 2.5 mm ² (22...12 AWG) Maximum tightening torque 0.45 N·m (4 lbf·in) 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)	Connector pitch 5 mm, wire size 0.5 ... 2.5 mm ² (22...12 AWG) Maximum tightening torque 0.45 N·m (4 lbf·in) 0...20 mA, R_{load} < 500 ohm Frequency range: 0...500 Hz Resolution: 11 bit + sign bit Inaccuracy: 2% of full scale range
XD2D connector	Connector pitch 5 mm, wire size 0.5 ... 2.5 mm ² (22...12 AWG) Maximum tightening torque 0.45 N·m (4 lbf·in) Physical layer: RS-485 Transmission rate: 8 Mbit/s Cable type: Shielded twisted-pair cable with a twisted pair for data and a wire or another pair for signal ground (nominal impedance 100 ... 165 ohm, for example Belden 9842) Maximum length of link: 50 m (164 ft) Termination by switch
RS-485 connection (X485)	Connector pitch 5 mm, wire size 0.5 ... 2.5 mm ² (22...12 AWG) Maximum tightening torque 0.45 N·m (4 lbf·in) 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) (UCU-22...24)
CAN connection (XCAN [UCU-22...24])	Connector pitch 5 mm, wire size 0.5 ... 2.5 mm ² (22...12 AWG) Maximum tightening torque 0.45 N·m (4 lbf·in) Termination by switch (XCAN TERM) This connection is not supported by the firmware.

Safe torque off connection (XSTO)	Connector pitch 5 mm, wire size 0.5 ... 2.5 mm² (22...12 AWG) Maximum tightening torque 0.45 N·m (4 lbf·in) 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. Current consumption: 10 mA (continuous) per STO channel (UCU-22...24). The number of parallel drive/inverter modules does not have an effect on the current consumption. Current consumption: 66 mA (continuous) per STO channel per drive/inverter module (BCU) EMC (immunity) according to IEC 61326-3-1 and IEC 61800-5-2
Safe torque off output (XSTO OUT)	Connector pitch 5 mm, wire size 0.5 ... 2.5 mm² (22...12 AWG) Maximum tightening torque 0.45 N·m (4 lbf·in) To STO connector of inverter module.
Control panel connection (X13 [BCU]) Control panel connection (XPAN [UCU-22...24])	Connector: RJ-45 Cable length < 100 m (328 ft) (BCU) Cable length < 50 m (164 ft) (UCU-22...24) Termination by switch (XPAN TERM) (UCU-22...24)
Ethernet connection (XETH [BCU]) Fieldbus Ethernet connection with internal switch (XETH1 and XETH2 [UCU-22...24]) Tool Ethernet connection with internal switch (XETH3 and XETH4 [UCU-22...24])	Connector: RJ-45 This connection is not supported by the firmware (BCU) Cable type: minimum requirement CAT5e (UCU-22...24)
SDHC memory card slot (SD CARD [BCU])	Memory card type: SDHC Maximum memory size: 4 GB
microSDHC memory card slot (microSDHC CARD [UCU-22...24])	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.	

■ BCU ground isolation diagram



*Ground selector (DICOM=DIOGND) settings

DICOM=DIOGND: ON

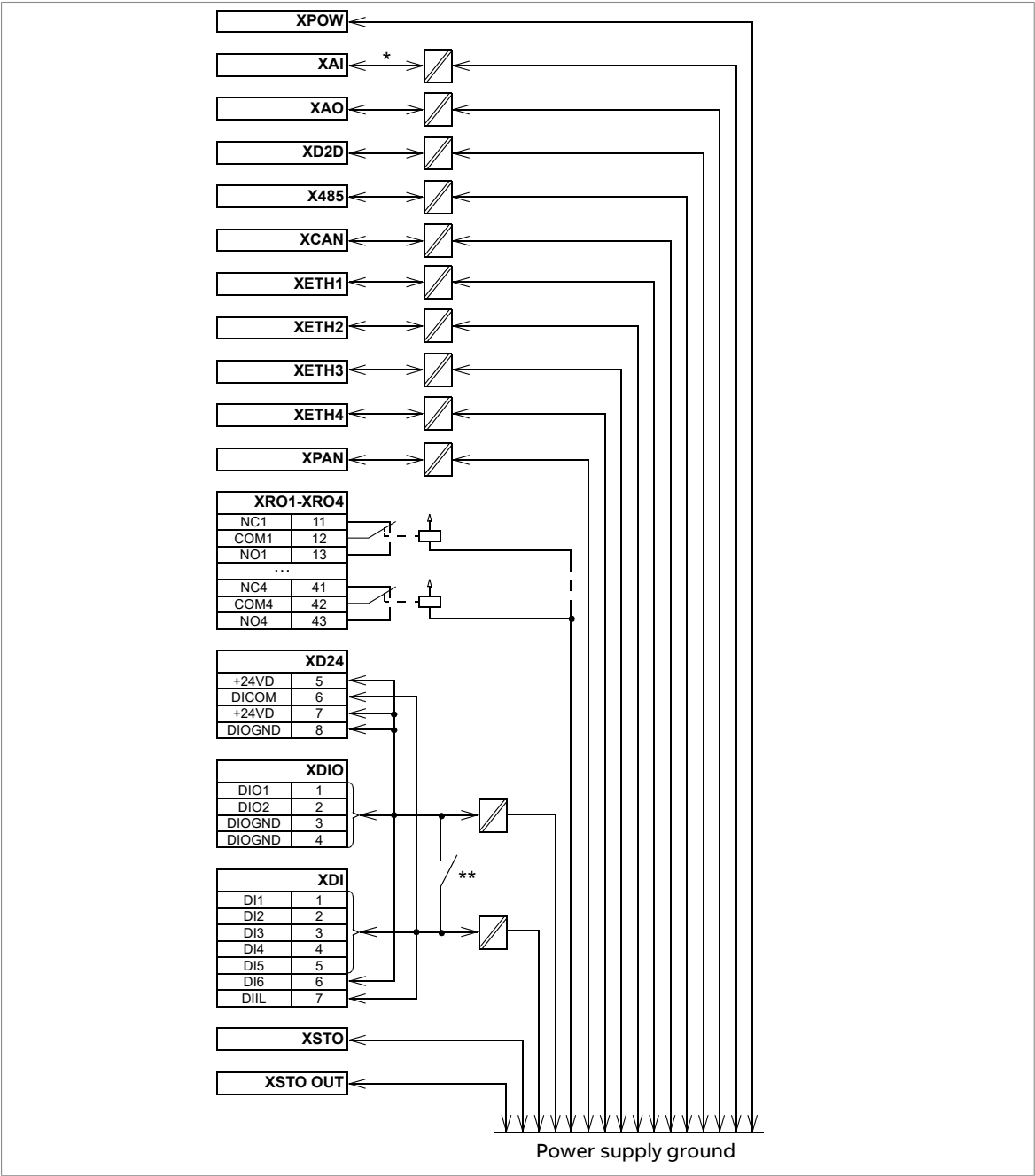
All digital inputs share a common ground (DICOM connected to DIOGND). This is the default setting.

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

■ UCU-22...24 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.

8

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!

Stop the drive and do the steps in section [Electrical safety precautions \(page 95\)](#) 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 drive module is fastened properly to the enclosure.	☐

130 Installation checklist

Make sure that ...	☒
<u>If the drive is connected to a network other than a symmetrically grounded TN-S system:</u> 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.	☐
The enclosures of the equipment in the cabinet have proper galvanic connection to the cabinet protective earth (ground) busbar; The connection surfaces at the fastening points are bare (unpainted) and the connections are tight, or separate grounding conductors have been installed.	☐
The main circuit connections inside the drive cabinet correspond to the circuit diagrams.	☐
The control unit has been connected. See the circuit diagrams.	☐
Appropriate AC fuses and main disconnecting device are installed.	☐
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.	☐
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.	☐
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.	☐
The energy storage is equipped with fuses for protecting the energy storage cable in a cable short-circuit situation.	☐
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.	☐
<u>If an external brake resistor is connected to the drive:</u> 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.	☐
<u>If an external brake resistor is connected to the drive:</u> The brake resistor cable is connected to the correct terminals, and the terminals are tightened to the correct torque.	☐
<u>If an external brake resistor is connected to the drive:</u> 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.	☐
<u>If a drive bypass connection will be used:</u> 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 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.	☐
The coolant connections between cubicles (if any) and to the cooling circuit are tight.	☐

Make sure that ...	☒
<u>If the drive is equipped with a cooling unit:</u> Make sure that the mechanical and electrical installation of the cooling unit is completed. Refer to the cooling unit documentation.	☐

9

Start-up

Contents of this chapter

This chapter describes the start-up procedure of the converter unit. The information is valid for the example DC/DC converter units presented in the example circuit diagrams.

The default device designations are given in square brackets, for example, [Q11]. The same device designations are also used in the example circuit diagrams. They refer to the circuit diagram of the example installation by ABB.



WARNING!

Only a qualified electrical professional can do the work described in this chapter. The persons who does the work must know the energy storage system, the DC/DC converter control program and the operation principle of the DC/DC converter.

Obey the safety instructions of the drive. If you ignore them, injury or death, or damage to the equipment can occur. The safety instructions are given in [ACS880 liquid-cooled multidrives cabinets and modules safety instructions \(3AXD50000048633 \[English\]\)](#).

Before you start, connect a control panel to the DC/DC converter unit. ABB recommends that you also have a PC with a drive commissioning tool (Drive Composer) connected. For information on the use of the control panel, refer to [ACS-AP-I, -S, -W and ACH-AP-H, -W Assistant control panels user's manual \(3AUA0000085685 \[English\]\)](#). For information on the use of the Drive Composer PC tool, refer to [Drive Composer start-up and maintenance PC tool user's manual \(3AUA0000094606 \[English\]\)](#).

Start-up procedure

Tasks	☒
Safety	
 WARNING! Obey the safety instructions during the start-up procedure. See ACS880 liquid-cooled multidrives cabinets and modules safety instructions (3AXD50000048633 [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.	☐
Checks/Settings with no voltage connected	
Make sure that it is safe to start the work. Do the steps in section Electrical safety precautions (page 95) .	☐
Make sure that the disconnect of the supply transformer is locked into the open position and that voltage cannot be connected to the drive accidentally.	☐
Make sure that all external auxiliary circuits are de-energized and disconnected. See the start-up instructions in the supply unit hardware manual.	☐
Make sure that the supply unit is de-energized, and the drive system is isolated from the supply network.	☐
<u>DC/DC converter with the DC switch-disconnector [Q11]:</u> Make sure that the DC switch-disconnector [Q11] and the DC/DC converter charging switch [Q10] are open and locked.	☐
Make sure that the energy storage disconnecting device (customer or system integrator-installed device) is locked into the open position.	☐
Make sure that the mechanical and electrical installation of the converter unit is completed and inspected. Refer to the installation checklist.	☐
Make sure that the drive is ready for the converter unit power up: - The supply and inverter units have been installed according to the instructions given in their hardware manuals. - The supply unit has been started up according to the instructions given in the applicable supply unit manual. - The inverter units have been started up according to the instructions given in the hardware manual and applicable firmware manual.	☐
<u>If the converter unit was stored for more than one year:</u> Reform the electrolytic DC capacitors in the DC bus of the drive. Refer to Capacitor reforming instructions (3BFE64059629 [English]) .	☐
Close the auxiliary voltage circuit breakers of the converter unit [F21, F22]. Close also other circuit breakers of the converter auxiliary circuits: cabinet fans [F115] and BAMU voltage/current measurement [F7] if present and the auxiliary voltage switch of the drive supply unit.	☐
Starting and checking the cooling system	
Fill up and bleed the internal cooling circuit. Start the cooling unit up. See Filling up and bleeding the internal cooling circuit (page 206) .	☐
Check the cooling system for leaks. Make sure that cooling circuit joints at the shipping split joining cubicles are tight and that all drain valves have been closed.	☐
Make sure that the coolant can flow freely in all cubicles.	☐
Close the cabinet doors.	☐
Connecting voltage to the drive and converter control unit	
Connect main AC voltage to the input terminals of the drive supply unit: Close the disconnect of the supply transformer.	☐



Tasks	☒
 WARNING! When you connect voltage to the supply unit, the DC busbars and the converters connected to the DC bus will become energized.  WARNING! <u>Converter units with a DC switch-disconnector:</u> Some types of converter modules can be energized through a charging circuit even if the DC switch-disconnector is open or the DC fuses are removed. <u>Converter units without a DC switch-disconnector:</u> If the converter unit only has DC fuses without a switch fuse, all the converter units with the DC fuses in position will be energized when the main breaker/contactors closes. To prevent this, remove the fuses from the converter units which are to remain de-energized before you connect the voltage. Do not install or remove DC fuses when the main breaker/contactors of the supply unit is closed (DC busbars are energized). <u>If the drive is equipped with a main switch-disconnector:</u> Close the main disconnecting device of the drive system.	☐
Close the auxiliary voltage switch [Q21] of the drive supply unit. The converter control unit will be powered. Do not close the main circuit breaker [Q1] or the main contactor [Q2] of the drive supply unit! You must not energize the drive DC bus at this time.	☐
Setting the parameters	
Set the DC/DC converter parameters. Refer to chapter Start-up in DC/DC converter control program firmware manual (3AXD50000024671 [English]) .	☐
Charging the DC/DC converter and connecting voltage to the converter	
Make sure that the energy storage disconnecting device is open.  WARNING! Always keep the energy storage disconnected from DC/DC converter until the DC/DC converter is charged.	☐
Start the supply unit and close the main contactor [Q2] or the main circuit breaker [Q1] of the drive supply unit.	☐
Power up and charge the DC/DC converter: <u>DC/DC converter with the DC switch-disconnector [Q11]:</u> 1. Close the DC/DC converter charging switch [Q10]. 2. Close the DC switch-disconnector [Q11]. 3. Open the DC/DC converter charging switch [Q10]. Note: The charging switch must be open before you can start the DC/DC converter. <u>DC/DC converter without DC switch-disconnector:</u> 1. Start the supply unit and close the main contactor [Q2] or the main breaker [Q1] of the drive supply unit. The DC/DC converter is energized and gets charged.	☐
Connecting the energy storage to the DC/DC converter	
Set parameter 120.12 Run enable 1 to Off. This makes sure that the DC/DC converter does not start automatically or unexpectedly after you connect the energy storage.	☐
Set the control panel to local control mode with the Loc/Rem key.	☐
Make sure that the energy storage voltage is less than the drive DC link voltage.	☐
 WARNING! Do not close the energy storage disconnecting device if the DC/DC converter is not connected or not ready to use. Close the energy storage disconnecting device.	☐
Close the energy storage protective circuit breaker (customer or system integrator-installed device).	☐



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Tasks	☒
Testing the DC/DC converter operation	
Set parameter 120.12 Run enable 1 to On.	☐
Set parameter 122.01 User Power ref to 0 A.	☐
Set current limits to low values, for example, 130.119 Minimum current to -50 A. 130.120 Maximum current to 50 A.	☐
Push the Start key on the control panel to start the converter. After start, increase slowly the value of parameter 122.01 User Power ref.	☐
Check the following signals: 102.01 DC voltage 102.02 ES voltage used 102.08 Total current 102.11 Modulation index % 130.101 DDC limit word 1.	☐
Press the Stop key on the control panel to stop the converter.	☐



10

Maintenance

Contents of this chapter

This chapter instructs how to maintain the DC/DC converter modules and how to interpret their fault indications. The information is valid for the example cabinet installations presented in this manual.

Maintenance intervals

The tables below show the maintenance tasks which can be done by the end user. For ABB Service offering, refer to www.abb.com/driveservices or consult your local ABB Service representative (www.abb.com/searchchannels).

■ 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

Recommended annual actions by the user	
Connections and environment	
Quality of supply voltage	P
Spare parts	
Spare parts	I
DC circuit capacitors reforming, spare modules and spare capacitors	P
Inspections by user	
Tightness of terminals	I
Dustiness, corrosion and temperature	I
Cooling liquid pipe connections	I
Coolant antifreeze concentration	P

Recommended every 2nd year actions by the user	
Inspection of coolant quality	P
Inspection of expansion tank air pressure	P
External circuit of main heat exchanger (temperature/flow/pressure)	I

Item	Years from start-up						
	3	6	9	12	15	18	21
Coolant							
Coolant draining and refill		R		R		R	
Cabinet fans							
Cooling fans, 230 VAC 50/60 Hz and 24 VDC			R			R	
CIO module for fan control (230 VAC and 24 VDC)			R			R	
Cooling fans, 115 VAC 50/60 Hz		R		R		R	
CIO module for fan control (115 VAC) ¹⁾		I/R		R		I/R	
Internal cooling fan for circuit boards							
R7i module internal cooling fan			R			R	
Aging							
BCU/UCU control unit battery (Real-time clock)		R		R		R	
Control panel battery (Real- time clock)			R			R	

¹⁾ Replace CIO module or reset fan counters. Refer to [CIO-01 I/O module for distributed I/O bus control user's manual \(3AXD50000126880 \[English\]\)](#).

Note:

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

Maintenance timers and counters

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

Disconnecting the DC/DC converter

■ Disconnecting the DC/DC converter from the energy storage

**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.

This procedure tells you how to disconnect the DC/DC converter from the energy storage.

1. Set the control panel to local mode with the **Loc/Rem** key.
2. Push the **Stop** key on the control panel.
3. Set parameter 120.19 Enable start signal to value Off. This prevents an accidental start of the unit.
4. Open the energy storage protective circuit breaker.
5. Open the energy storage disconnecting device. Lock out and tag out.
6. If it is necessary to disconnect the DC/DC converter from the drive system, and the converter has a DC switch-disconnector [Q11], continue with step 2 of the procedure in section [Disconnecting the DC/DC converter from the drive system with the DC switch-disconnector \(page 140\)](#).

■ Disconnecting the DC/DC converter from the drive system with the DC switch-disconnector



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.

This procedure tells you how to disconnect the DC/DC converter from the energy storage and the drive system with the optional DC switch-disconnector .

1. Do the steps in section [Disconnecting the DC/DC converter from the energy storage \(page 139\)](#).
2. Drives with DC switch-disconnector [Q11]: Open the DC switch-disconnector [Q11]. Lock out and tag out.
3. If it is necessary to do work inside the DC/DC converter unit, stop the drive system and isolate it from the main and auxiliary power supplies. Do the steps in section [Electrical safety precautions \(page 95\)](#).

Connecting the DC/DC converter



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.

This procedure tells you how to connect the DC/DC converter to the energy storage and the drive system.

1. Make sure that the work is completed and there are no tools inside the drive.
2. Close the cabinet doors.
3. Connect the DC/DC converter and energy storage. Refer to these instructions in chapter [Start-up](#):
 - [Connecting voltage to the drive and converter control unit \(page 134\)](#)
 - [Charging the DC/DC converter and connecting voltage to the converter \(page 135\)](#)
 - [Connecting the energy storage to the DC/DC converter \(page 135\)](#).
4. Set the control panel to local mode with the **Loc/Rem** key.
5. Set parameter 120.19 Enable start signal to value On.
6. Push the **Start** key on the control panel.

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. See also [CIO-01 I/O module for distributed I/O bus control user's manual \(3AXD50000126880 \[English\]\)](#).

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

■ Frame R7i – internal module fan replacement

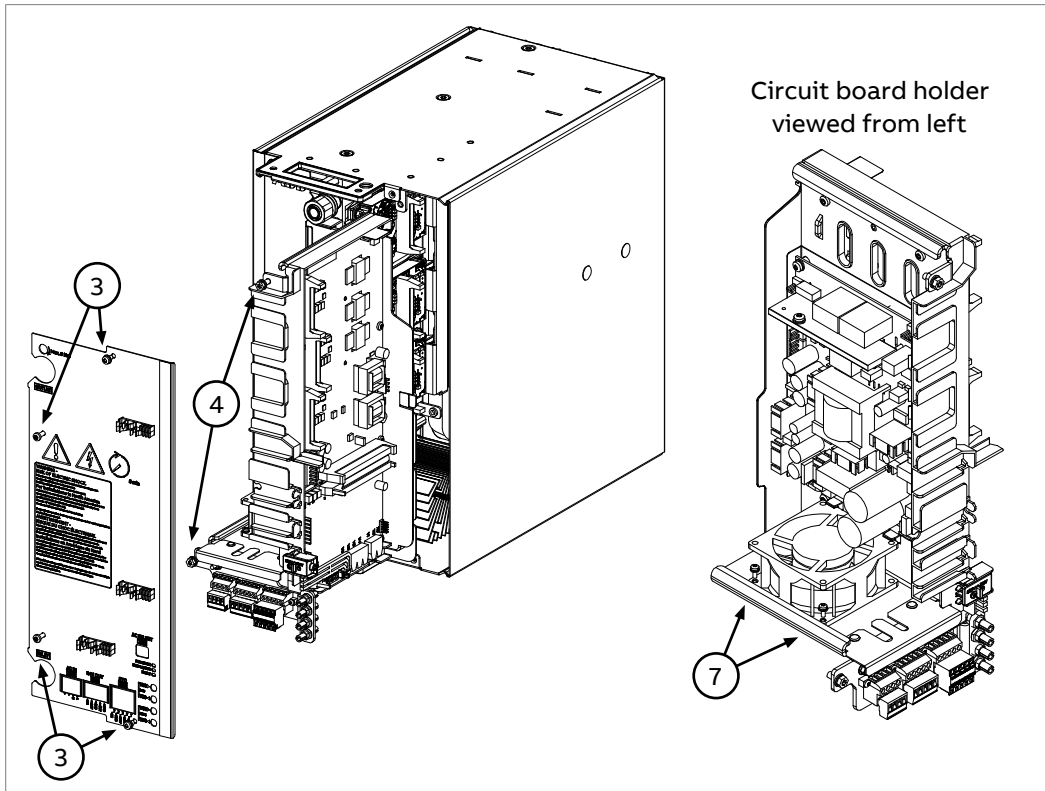
**WARNING!**

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. Stop the drive and do the steps in section [Electrical safety precautions \(page 95\)](#) before you start the work.
 2. Detach and move aside the wiring in front of the module.
 3. Remove the four screws that hold the faceplate of the module. Remove the faceplate.
 4. Remove the two screws that attach the circuit board holder to the module frame.
 5. Carefully pull the circuit board holder outward until you have access to the cooling fan at the bottom of the holder. Detach the wiring coming to the circuit boards if necessary.
 6. Disconnect the wiring of the fan.
 7. Remove the two screws that hold the fan. Remove the fan.
 8. Install a new fan in reverse order to the above. Note that the direction of airflow is up.
-



■ Frame R8i fan replacement



WARNING!

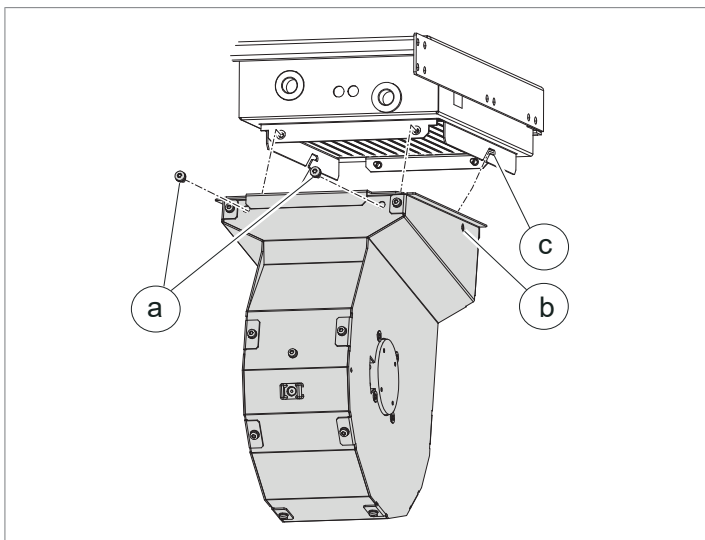
Obey the safety instructions of the drive. If you ignore them, injury or death, or damage to the equipment can occur. If you are not a qualified electrical professional, do not do installation, commissioning or maintenance work.



WARNING!

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

1. Stop the drive and do the steps in section [Electrical safety precautions \(page 95\)](#) before you start the work.
2. Remove any shrouding in front of the cooling fan in case of marine construction.
3. Disconnect the fan wiring. Remove the CIO module.
4. Remove the two retaining screws (a).
5. Pull the fan outwards to separate it from the heat exchanger housing.
6. Install new fan in reverse order. Align the guide pins (b) at the rear of the fan cowling with the slots (c) in the module bottom guide, then install the retaining screws (a).



R7i converter module



WARNING!

Obey the safety instructions given in [ACS880 liquid-cooled multidrives cabinets and modules safety instructions \(3AXD50000048633 \[English\]\)](#). 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!

Make sure that the replacement module has exactly the same type code as the old module.



WARNING!

Stop the pumps and drain the coolant before you do work on the liquid cooling system. There is high-pressure hot coolant (6 bar, max. 50 °C) in the cooling circuit when it is in operation.



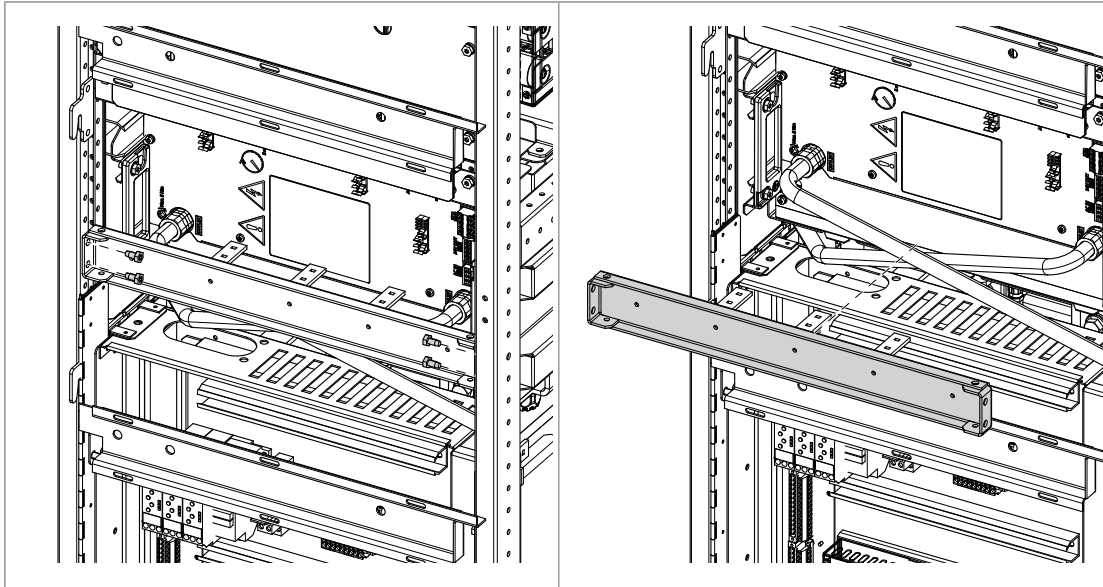
WARNING!

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

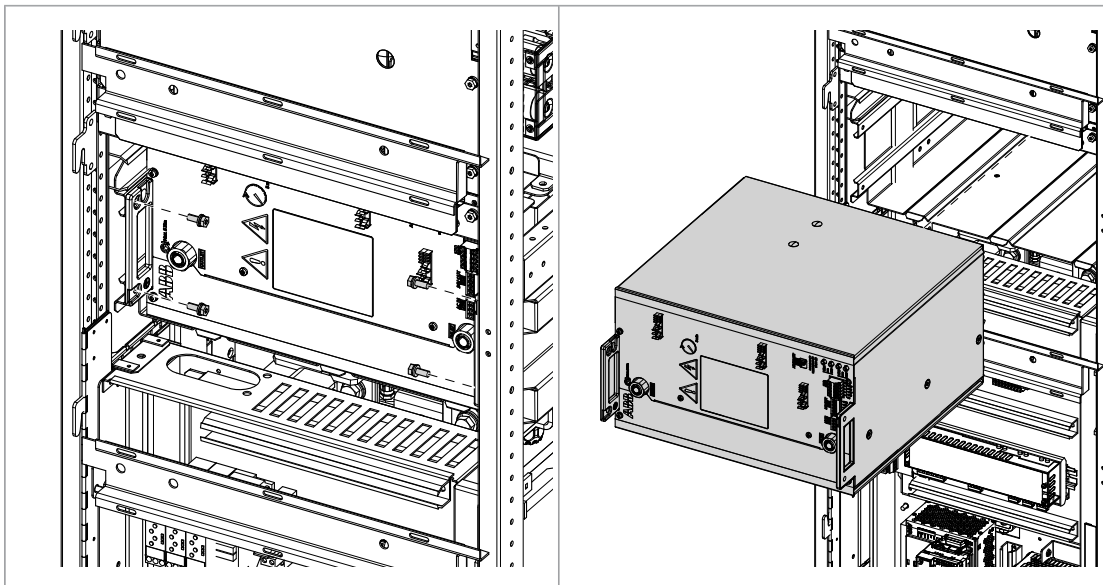
■ Removing the module

1. Stop the drive and do the steps in section [Electrical safety precautions \(page 95\)](#) before you start the work.
2. Open the cubicle door.

3. Remove the support beam in front of the module.



4. Disconnect the power and control cables from the module.
5. Close the inlet and outlet valves of the cubicle.
6. Put the drain hoses into a container. Open the drain valves. This will drain all the equipment in the cubicle.
7. After the coolant is drained, disconnect the coolant pipes from the module.
8. Assemble and install the service platform included in the delivery. Instructions are included in the platform kit.
9. Remove the screws that attach the module to the cabinet frame. Pull out the module onto the service platform.



■ Installing the module

Install the module as follows:

1. Push the module carefully into its bay.
 2. Install the module retaining screws and torque them to 5 N·m (3.6 lbf·ft).
 3. Connect the coolant pipes to the module. Tighten to 20 N·m (14.75 lbf·ft).
 4. Connect the power and control cables to the module.
 5. Fill up the cooling system. For instructions, see section [Filling up and bleeding the internal cooling circuit \(page 206\)](#).
 6. Install the support beam in front of the module.
-

R8i converter module

■ Replacing an R8i converter module

**WARNING!**

Obey the safety instructions given in [ACS880 liquid-cooled multidrives cabinets and modules safety instructions \(3AXD50000048633 \[English\]\)](#). 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!**

Make sure that the replacement module has exactly the same type code as the old module.

**WARNING!**

Stop the pumps and drain the coolant before you do work on the liquid cooling system. There is high-pressure hot coolant (6 bar, max. 50 °C) in the cooling circuit when it is in operation.

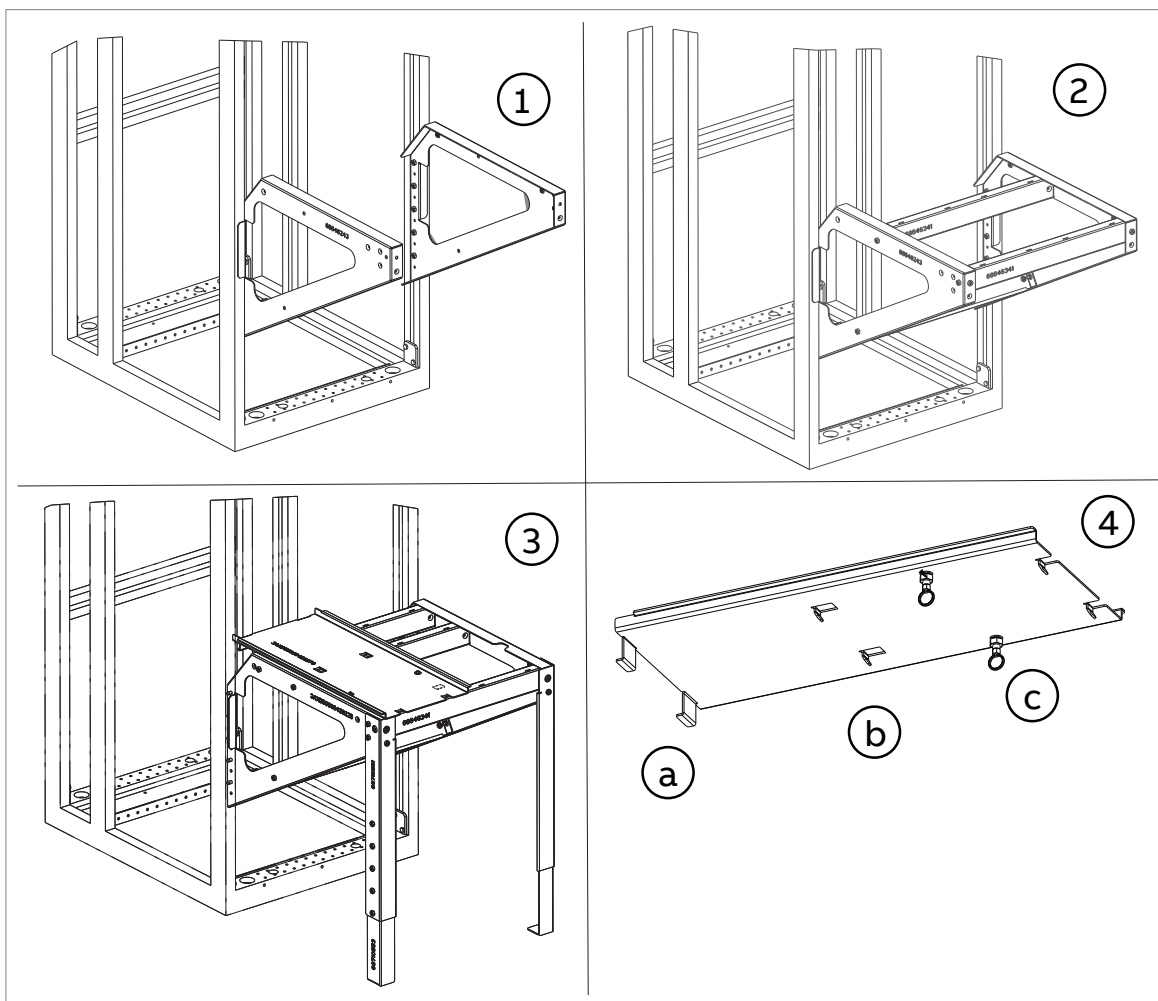
**WARNING!**

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

Assembling the service platform

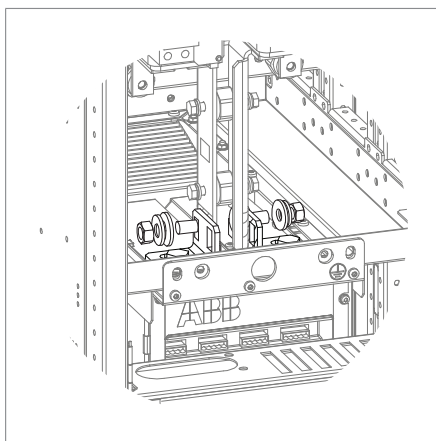
The service platform is included in the cabinet delivery. It can be used when installing or servicing liquid-cooled R8i modules.

1. Fasten the triangular supports to the cabinet frame (5 × M6 screws for each support). Make sure that the guide pins are properly inserted in the holes of the frame. Tighten the screws to torque (max 5.5 N·m / 4 lb·ft).
 2. Select the braces (4 pcs) according to the width of the cubicle and attach them to the supports.
 3. Attach the support feet to the platform and adjust them to the correct height.
 4. Attach the slide plate. Put the hooks (a) at the back of the slide plate through the holes in the cabinet frame. Align the slots (b) in the slide plate with the braces.
 5. Fix the slide plate into place with the index screws (c) at the bottom of the slide plate.
-

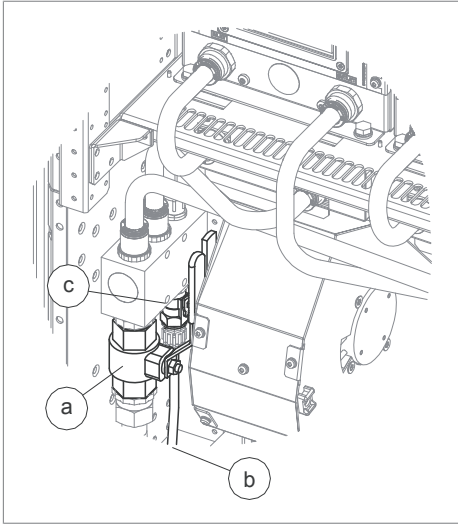


Removing the module

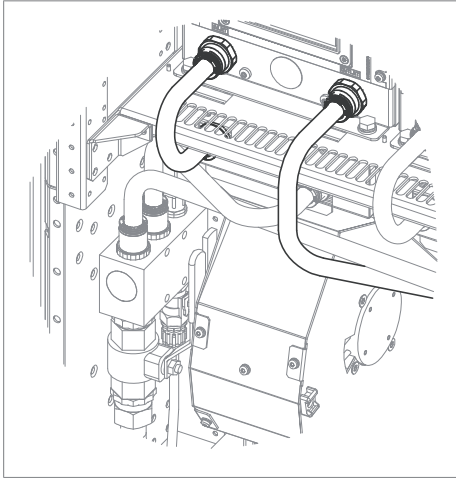
1. Do the steps in section [Electrical safety precautions \(page 95\)](#).
2. Remove the shrouding in front of the module.
3. Remove the locking screws of the swing-out frame (if present) and open it.
4. Disconnect the wiring from the module and move it aside. Use cable ties to keep the wiring out of the way.
5. Remove the L-shaped DC busbars at the top of the module. Make note of the orientation of the screws as well as the order of the washers.



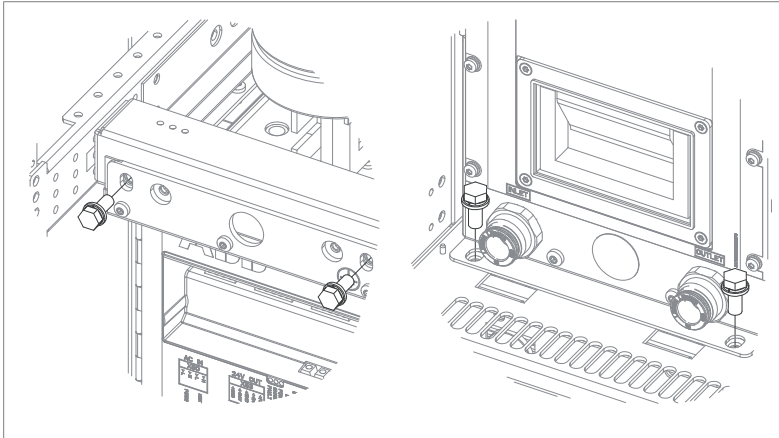
6. Close the inlet valve (a) and outlet valve. Lead the drain hoses (b, on both sides of the cubicle) into a suitable container. Open the drain valves (c, on both sides of the cubicle). This will drain all modules in the cubicle.



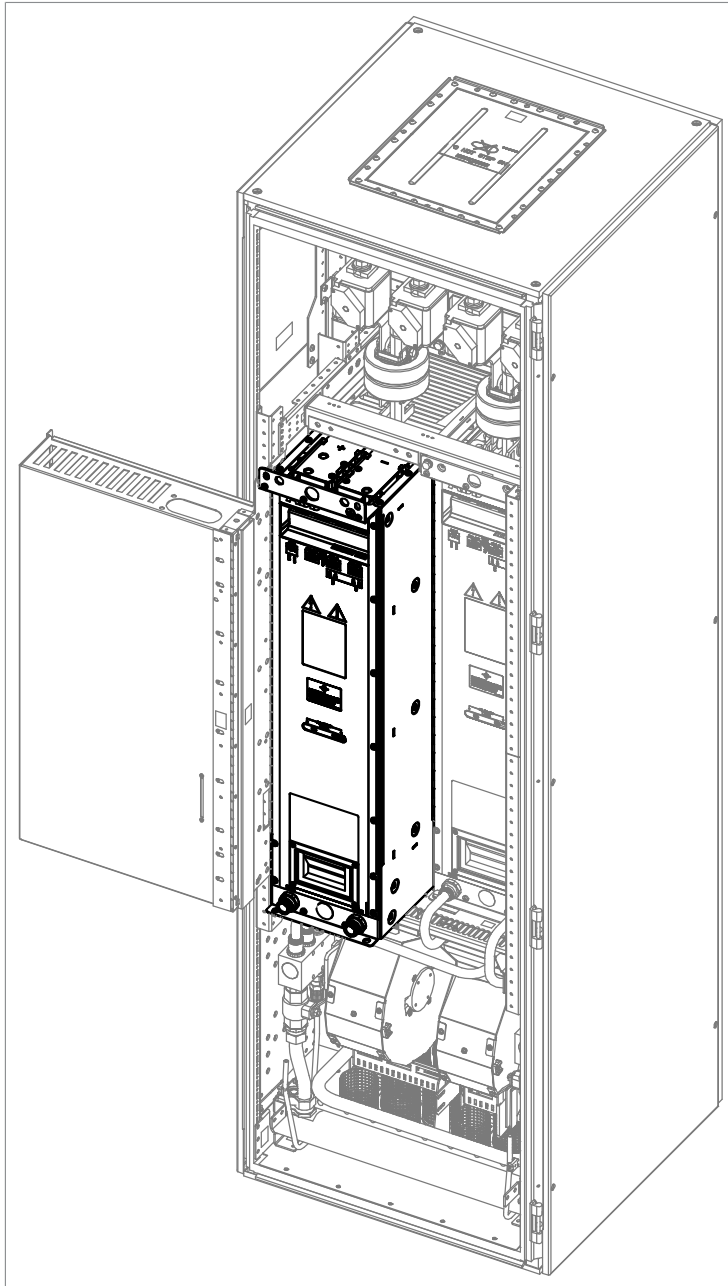
7. After the module has drained, disconnect the piping from the module.



8. Remove the module retaining screws at the top and the bottom of the module.



9. Pull the module carefully out onto a suitable platform. Keep the module secured to a hoist or equivalent to prevent the module from falling. For information on using the lifting device, see [Converter module lifting device for drive cabinets hardware manual \(3AXD50000210268 \[English\]\)](#).



Reinstalling the module

1. Push the module carefully into its bay.
 2. Fasten the retaining screws at the top and the bottom of the module.
 3. Reinstall the DC busbars at the top of the module.
 4. Reconnect the coolant pipes to the module. Tighten to specified torque. R8i module coolant connections: 15 N·m (11.1 lbf·ft). Other connections: 20 N·m (14.75 lbf·ft).
 5. Reconnect the control wiring to the module.
-

6. Fill up the cooling system. For instructions, see section [Filling up and bleeding the internal cooling circuit](#).
7. Close the swing-out frame (if present). Reinstall all shrouds removed earlier.

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 \[English\]\)](#).

Control panel

Refer to [ACS-AP-I, -S, -W and ACH-AP-H, -W Assistant control panels user's manual \(3AUA0000085685 \[English\]\)](#).

Control unit

■ BCU control unit types

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

■ UCU control unit types

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

■ Replacing the memory unit (BCU)

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

**WARNING!**

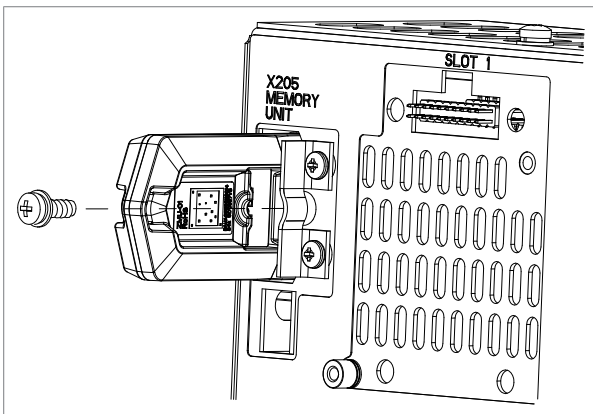
Obey the safety instructions given in [ACS880 liquid-cooled multidrives cabinets and modules safety instructions \(3AXD50000048633 \[English\]\)](#). If you ignore the safety instructions, injury or death, or damage to the equipment can occur.

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

**WARNING!**

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 \(page 95\)](#) 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 memory unit (UCU-22...24)

**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.

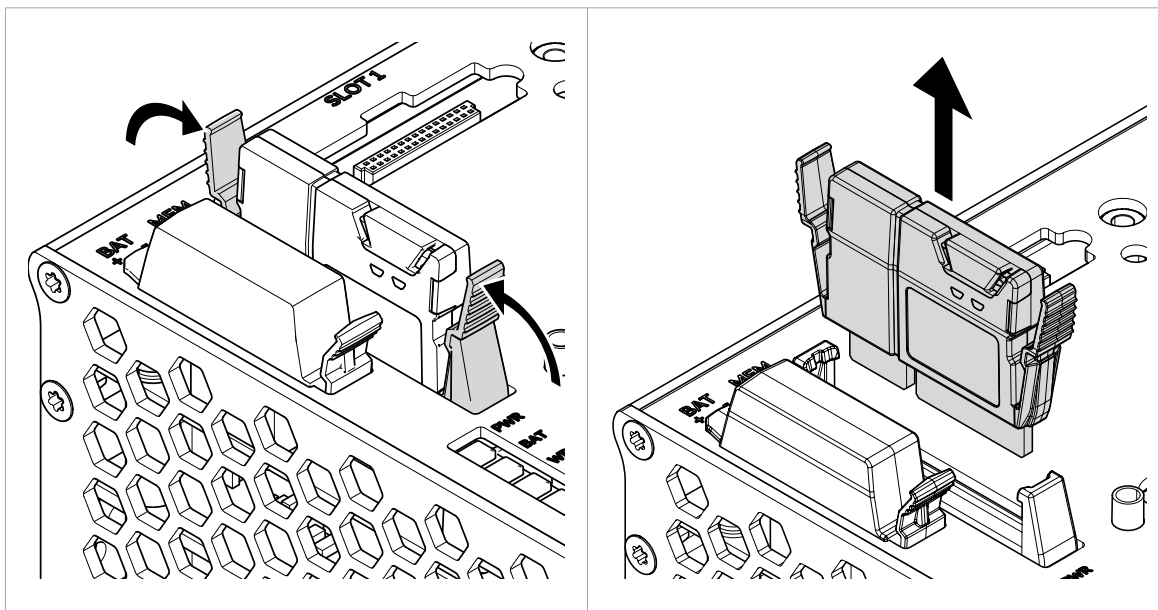
After replacing a control unit, you can keep the existing parameter settings by transferring the memory unit from the defective control unit to the new control unit.

**WARNING!**

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

1. Stop the drive and do the steps in section [Electrical safety precautions \(page 95\)](#) 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 BCU control unit battery



WARNING!

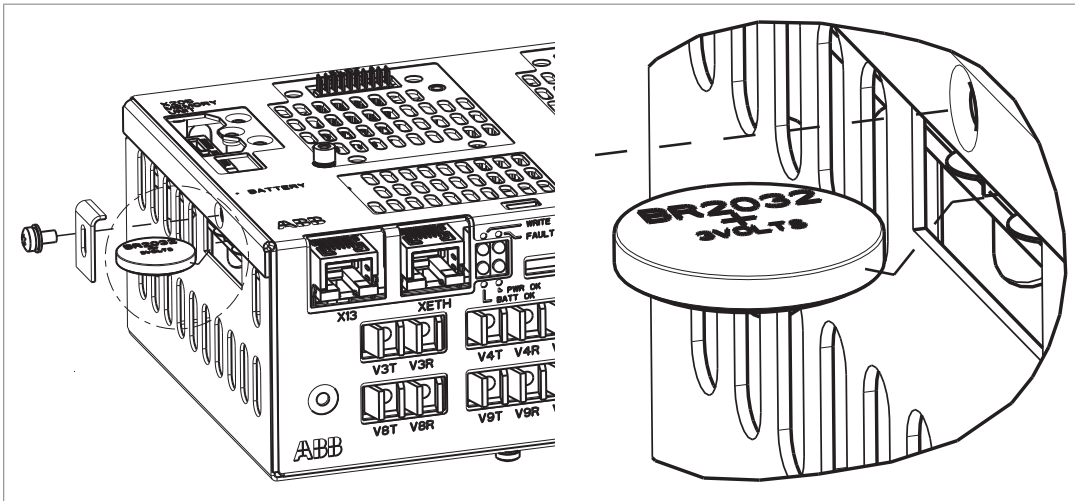
ObeY the safety instructions given in [ACS880 liquid-cooled multidrives cabinets and modules safety instructions \(3AXD50000048633 \[English\]\)](#). If you ignore the safety instructions, injury or death, or damage to the equipment can occur.

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

Replace the real-time clock battery if the BATT OK LED is not illuminated when the control unit is powered.

1. Stop the drive and do the steps in section [Electrical safety precautions \(page 95\)](#) before you start the work.
2. Undo the fastening screw and remove the battery.
3. Replace the battery with a new BR2032 battery.

4. Dispose of the old battery according to local disposal rules or applicable laws.
5. Set the real-time clock.



■ Replacing the real-time clock battery (UCU-22...24)



WARNING!

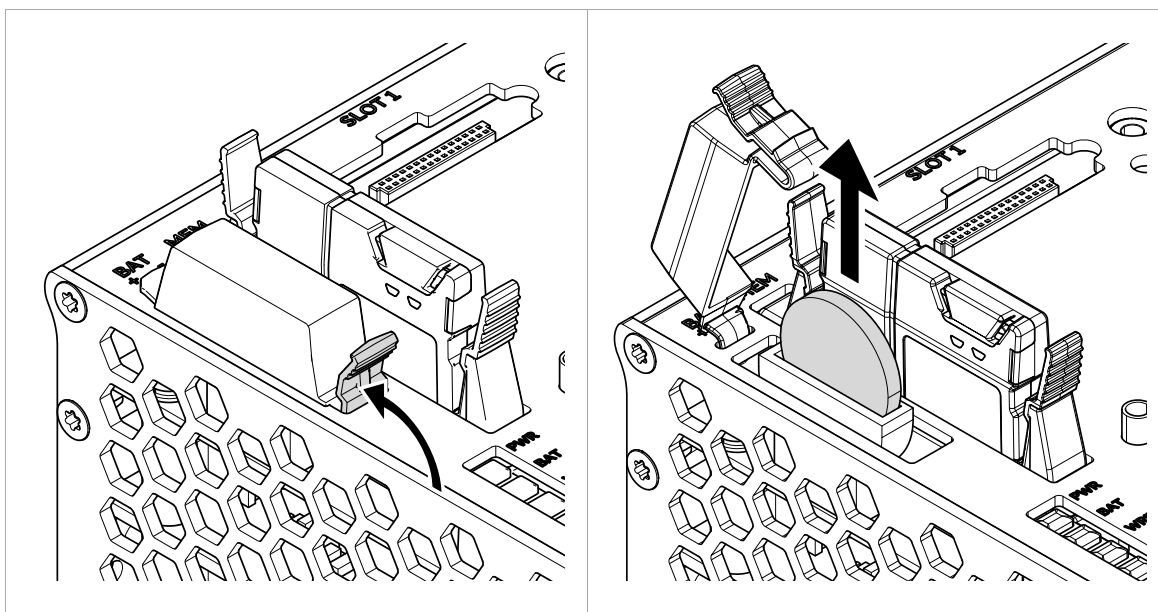
Obey the safety instructions of the drive. If you ignore them, injury or death, or damage to the equipment can occur. If you are not a qualified electrical professional, do not do installation, commissioning or maintenance work.

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

1. Stop the drive and do the steps in section [Electrical safety precautions \(page 95\)](#) 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. Set the real-time clock if necessary.
6. Dispose of the old battery according to local disposal rules or applicable laws.



■ Replacing the microSDHC memory card (UCU-22...24)

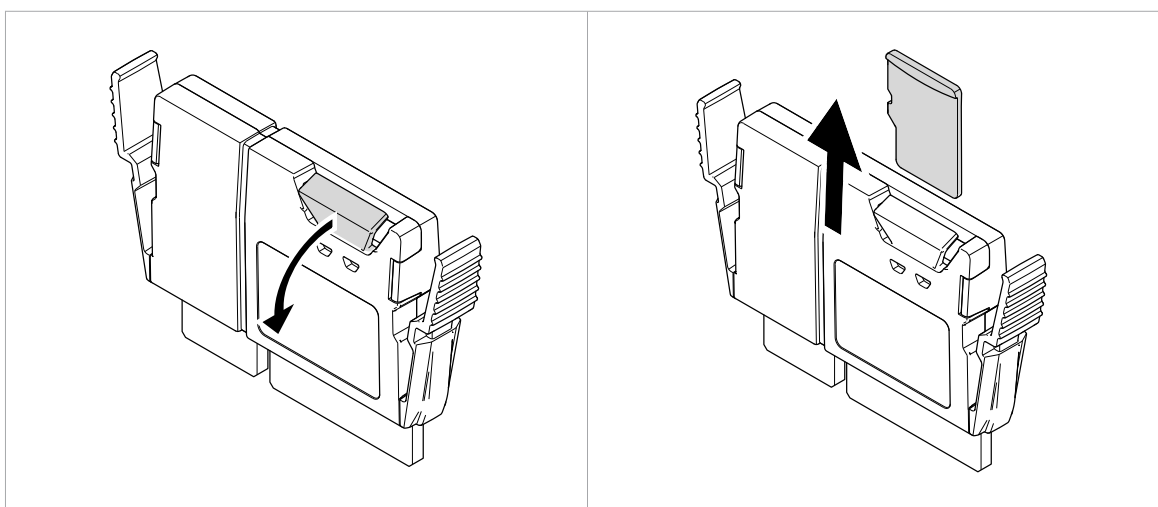


WARNING!

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. Remove the UMU-01 memory unit from the control unit.
2. Open the memory card cover in the memory unit.
3. Push the card to remove it.
4. Install a new card in reverse order.



LEDs and other status indicators

This section gives information on how to read the status indications of the DC/DC converter.

The control panel on the cabinet door shows the warnings and faults given by the control program. You can also use the Drive Composer PC tool to view the warnings and faults. For more information, refer to the firmware manual and the Drive Composer PC tool 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.

■ Converter module LEDs

The converter module LEDs are given in section [Converter module hardware \(page 25\)](#)

11

Ordering information

Contents of this chapter

This chapter lists the types and ordering codes of the unit components.

You can find the kit-specific assembly drawings, step-by-step instructions and detailed kit information on the Internet. Go to

<https://sites-apps.abb.com/sites/lvacdrivesengineeringsupport/content>. If necessary, contact your local ABB representative.

Note:

- This chapter only lists the installation accessories available from ABB. All other parts must be sourced from a third party (such as Rittal) by the system integrator. For a listing, refer to the kit-specific installation instructions available at <https://sites-apps.abb.com/sites/lvacdrivesengineeringsupport/content>. For access, contact your local ABB representative.
- Parts that are labeled suitable for generic enclosures are not designed for any specific enclosure system. These parts are intended as a basis for further engineering, and may require additional parts to be fully usable.
Installation accessories designed for generic enclosures are in fact designed for an inside width of 50 mm less than the nominal width of the enclosure. For example, a mechanical kit intended for 800 mm wide generic enclosure is designed for an inside width of 750 mm, and will not fit a 800 mm wide Rittal VX25 enclosure.

Kit code key

The kit codes shown in this chapter break down as follows.

The format of the kit code is x-w-s-yyy(-VX), for example, L-6-8-401 where:

- x = cooling method
-

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- A = air-cooled (some of these kits are also used with liquid-cooled drives)
 - L = liquid-cooled
 - w = cabinet width
 - 4 = 400 mm
 - 6 = 600 mm
 - 8 = 800 mm
 - s = module frame size / sizes
 - 1 = R1i
 - 2 = R2i
 - 3 = R3i
 - 4 = R4i
 - 5 = R5i
 - 6 = R6i/D6D
 - 7 = R7i/D7D/D7T
 - 8 = R8i/D8D/D8T
 - X = any, or not defined.
 - yyy = consecutive numbering
 - 001...099 = Kits related to cabinets, for example, adapter plates
 - 001...019 Common AC- and DC-related kits
 - 020...049 Cabinet mechanics kits
 - 050...059 Swing frame kits
 - 100...199 = Kits related to AC connection, for example, busbars
 - 100...129 Kits with connection to AC
 - 130...149 Kits with connection to module
 - 150...199 Other kits related to AC connection
 - 200...299 = Kits related to DC connection, for example, busbars
 - 200...229 Kits with connection to common DC
 - 230...249 Kits with connection to module
 - 250...299 Other kits related to DC connection
-

- 300...399 = Kits related to module installation, for example, mechanical supports
 - 300...330 Module supporting kits, basic mechanical support
 - 350...379 Shroud kits
- 400...499 = Other kits
 - 400...419 Fan kits
 - 420...439 Air guides
 - 440...459 Cooling circuit kits
- VX = Kit specifically designed for the Rittal VX25 enclosure system. Many kits without this designation are also used with the VX25 system.

Frame R7i and multiples

■ DC/DC converter modules

Converter units consisting of frame R7i converter modules are to be ordered as separate modules. For converter unit ratings, see the technical data.

DC/DC converter unit		Modules used	
Type	Frame size	Qty	Ordering code
$U_n = 400\text{ V}$			
ACS880-1604LC-0150A-3	R7i	1	ACS880-104LC-0120A-3
ACS880-1604LC-0250A-3	R7i	1	ACS880-104LC-0140A-3
ACS880-1604LC-0350A-3	R7i	1	ACS880-104LC-0210A-3
ACS880-1604LC-0450A-3	R7i	1	ACS880-104LC-0250A-3
ACS880-1604LC-0550A-3	R7i	1	ACS880-104LC-0470A-3
ACS880-1604LC-0700A-3	2×R7i	2	ACS880-104LC-0210A-3
ACS880-1604LC-0900A-3	2×R7i	2	ACS880-104LC-0250A-3
ACS880-1604LC-1100A-3	2×R7i	2	ACS880-104LC-0470A-3
$U_n = 500\text{ V}$			
ACS880-1604LC-0150A-5	R7i	1	ACS880-104LC-0120A-5
ACS880-1604LC-0250A-5	R7i	1	ACS880-104LC-0140A-5
ACS880-1604LC-0350A-5	R7i	1	ACS880-104LC-0200A-5
ACS880-1604LC-0450A-5	R7i	1	ACS880-104LC-0240A-5
ACS880-1604LC-0550A-5	R7i	1	ACS880-104LC-0460A-5
ACS880-1604LC-0700A-5	2×R7i	2	ACS880-104LC-0200A-5
ACS880-1604LC-0900A-5	2×R7i	2	ACS880-104LC-0240A-5
ACS880-1604LC-1100A-5	2×R7i	2	ACS880-104LC-0460A-5
$U_n = 690\text{ V}$			
ACS880-1604LC-0150A-7	R7i	1	ACS880-104LC-0100A-7
ACS880-1604LC-0200A-7	R7i	1	ACS880-104LC-0140A-7
ACS880-1604LC-0300A-7	R7i	1	ACS880-104LC-0220A-7
ACS880-1604LC-0399A-7	R7i	1	ACS880-104LC-0389A-7

DC/DC converter unit		Modules used	
Type	Frame size	Qty	Ordering code
ACS880-1604LC-0599A-7	2×R7i	2	ACS880-104LC-0220A-7
ACS880-1604LC-0799A-7	2×R7i	2	ACS880-104LC-0389A-7

Note: The energy storage is not included in the ACS880 module product offering. The customer must equip the DC/DC converter with an applicable energy storage system. For more information, see [Selecting the energy storage \(page 90\)](#).

Note: These components are always required to construct a working unit and must be ordered separately:

- DC/DC converter module(s)
- BDCL filter module(s). One filter module is necessary for each DC/DC converter module.
- Control unit kit
- Fiber optic cables
- R7i installation frame (3AXD50001013547). One installation frame is necessary for each DC/DC converter module.

Other parts given in this chapter can be required by the application or make the installation of the module easier.

■ BDCL filters

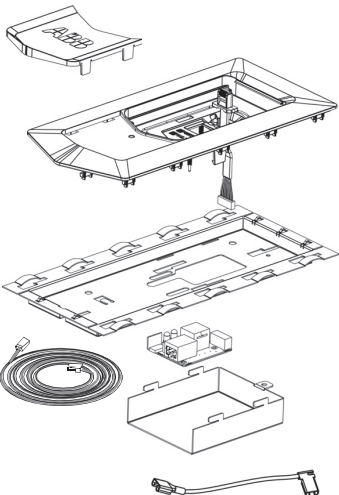
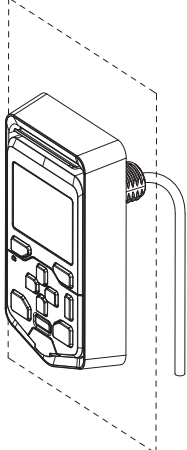
DC/DC converter unit type ACS880-1604LC-...	Frame size	L-filter		
		Type	Qty	Ordering code
U _n = 400 V				
0150A-3	R7i	BDCL-13LC-7	1	3AXD50000889990
0250A-3	R7i	BDCL-13LC-7	1	3AXD50000889990
0350A-3	R7i	BDCL-13LC-7	1	3AXD50000889990
0450A-3	R7i	BDCL-13LC-7	1	3AXD50000889990
0550A-3	R7i	BDCL-13LC-7	1	3AXD50000889990
0700A-3	2×R7i	BDCL-13LC-7	2	3AXD50000889990
0900A-3	2×R7i	BDCL-13LC-7	2	3AXD50000889990
1100A-3	2×R7i	BDCL-13LC-7	2	3AXD50000889990
U _n = 500 V				
0150A-5	R7i	BDCL-13LC-7	1	3AXD50000889990
0250A-5	R7i	BDCL-13LC-7	1	3AXD50000889990
0350A-5	R7i	BDCL-13LC-7	1	3AXD50000889990
0450A-5	R7i	BDCL-13LC-7	1	3AXD50000889990
0550A-5	R7i	BDCL-13LC-7	1	3AXD50000889990
0700A-5	2×R7i	BDCL-13LC-7	2	3AXD50000889990
0900A-5	2×R7i	BDCL-13LC-7	2	3AXD50000889990
1100A-5	2×R7i	BDCL-13LC-7	2	3AXD50000889990

DC/DC converter unit type ACS880-1604LC-...	Frame size	L-filter		
		Type	Qty	Ordering code
U _n = 690 V				
0150A-7	R7i	BDCL-13LC-7	1	3AXD50000889990
0200A-7	R7i	BDCL-13LC-7	1	3AXD50000889990
0300A-7	R7i	BDCL-13LC-7	1	3AXD50000889990
0399A-7	R7i	BDCL-13LC-7	1	3AXD50000889990
0599A-7	2×R7i	BDCL-13LC-7	2	3AXD50000889990
0799A-7	2×R7i	BDCL-13LC-7	2	3AXD50000889990

■ Control panel

The control panel is not included with the module but must be ordered separately. One control panel is required for the commissioning of an ACS880 drive system, even if the Drive Composer PC tool is used.

The control panel can be flush mounted on the cabinet door with the help of a door mounting kit. For more information on the control panel, see [ACS-AP-I, -S, -W and ACH-AP-H, -W Assistant control panels user's manual \(3AUA0000085685 \[English\]\)](#).

Type	Description	Ordering code	Illustration
ACS-AP-W	Control panel with Bluetooth	3AXD50000025965	
DPMP-01	Door mounting kit (IP55)	3AUA0000108878	
DPMP-02	Door mounting kit (IP65)	3AXD50000009374	

For more information on the door mounting kits, such as the contents of the kit, see the installation manuals:

- [DPMP-01 mounting platform for control panels installation guide \(3AUA0000100140 \[English\]\)](#)
- [DPMP-02/03 mounting platform for control panels installations guide \(3AUA0000136205 \[English\]\)](#).

■ Control electronics

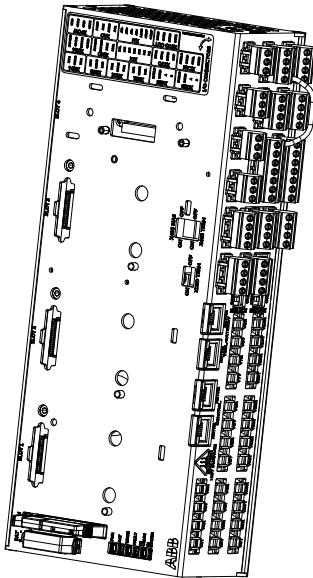
The customer must do the installation and wiring of the electronics outside the module. The current consumption of the main components in the auxiliary circuit is given in the technical data.

A control unit controls the DC/DC converter module(s). You must acquire the control unit and connect it to each DC/DC converter module with a pair of fiber optic cables. You can supply power (24 V DC) to the control unit from the DC/DC converter module, or from a power supply.

You must also acquire the cables. Use a suitable standard installation cable. Use the applicable plug connector [X53] for the connection to the DC/DC converter module. Refer to section [Control circuit plug connectors \(page 164\)](#).

Control unit (UCU)

The control unit delivery contains a memory unit with the ACS880 DC/DC converter control program.

Converter module frame size	Control unit type	Qty	Ordering code	Illustration
R7i	UCU-22	1	ACS880UCU-1604LC-22-0	
2×R7i	UCU-23*	1	ACS880UCU-1604LC-23-0	

*UCU-22 can be used as an alternative to UCU-23, if the BAMU voltage/current measurement unit is not used.

Fiber optic cables

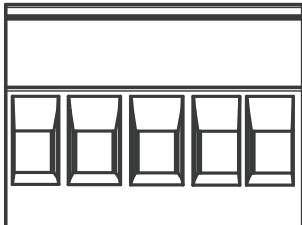
The fiber optic cables are needed between the control unit and the DC/DC converter module. You need one kit per each module. Select a kit with suitable length.

The following kits, each consisting of a pair of plastic fiber optic cables, are available from ABB:

Length	Kit type designation	Ordering code
2 m (6.6 ft)	NLWC-02	58988821
3 m (9.8 ft)	NLWC-03	58948233
5 m (16.4 ft)	NLWC-05	58948250
7 m (23 ft)	NLWC-07	58948268
10 m (32.8 ft)	NLWC-10	58948276

Control circuit plug connectors

Plug connectors for X51, X52 and X53 are included in the module kit. You can order these plug connectors as spare parts.

Connector	Data	Qty	Ordering code	Illustration
X51...X53	1 × MSTB 2,5/5-ST-5,08 BK 2 × MSTB 2,5/5-ST-5,08 YE 2.50 mm ² , 12 A, 320 V	1 per module	3AXD50000003541	

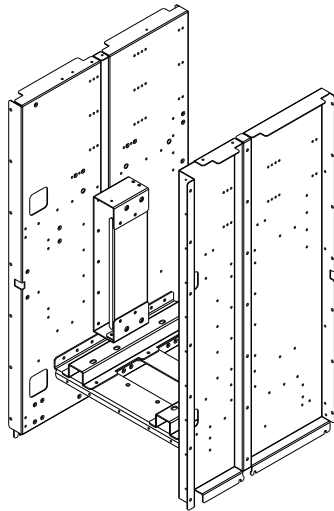
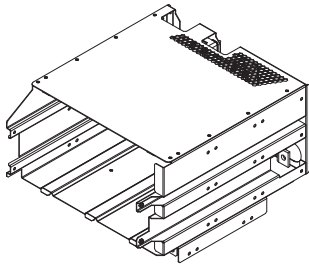
Options

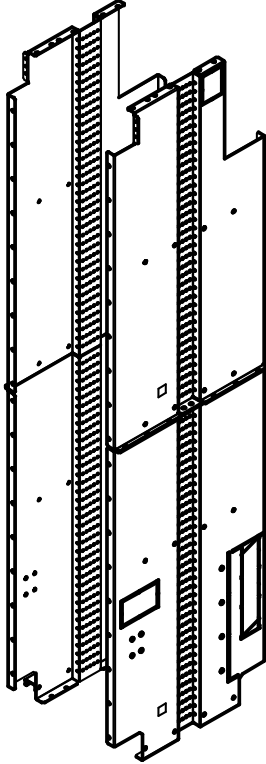
For more information related to available control panel, fieldbus, I/O module and DDCS communication options, contact ABB.

■ Mechanical installation accessories

Module installation parts

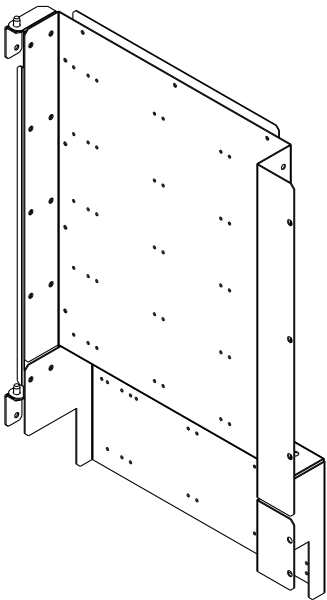
Module installation parts include top and bottom supports for the DC/DC converter and BDCL filter modules and side plate kit.

Used with ...	Qty	Ordering code	Kit code	Illustration
600 mm Rittal VX25 enclosure	1 for each BD-CL-13LC filter module	3AXD50001101305	L-6-7-319-VX	 Instruction code: 3AXD50001107161
600 mm Rittal VX25 enclosure	1 for each DC/DC converter module (frame R7i)	3AXD50001013547	L-6-7-038-VX	 Instruction code: 3AXD50001034382

Used with ...	Qty	Ordering code	Kit code	Illustration
Rittal VX25 enclosure	1 for each DC/DC converter module (frame R7i)	3AXD50000360543	L-468-8-020-VX	 Instruction code: 3AXD50000327591

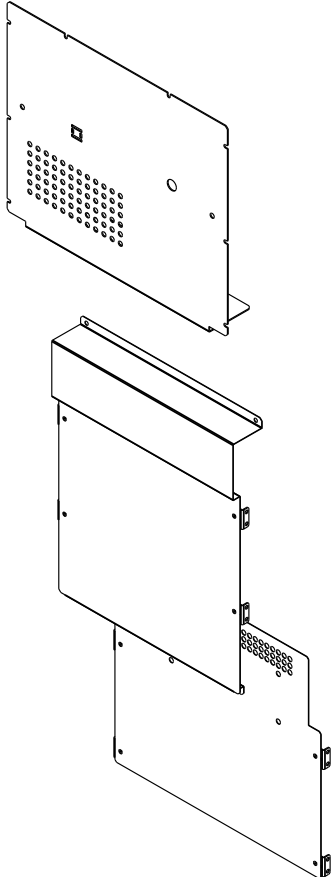
Swing-out frame (for Rittal VX25 enclosures)

The swing-out frame is a hinged compartment that can be used as a mounting base for control electronics and auxiliary voltage circuit components.

Used with ...	Qty	Ordering code	Kit code	Illustration
600 mm Rittal VX25 enclosure	1 for each DC/DC converter module (frame R7i)	3AXD50001102524	L-6-7-054-VX	 Instruction code: 3AXD50001107093

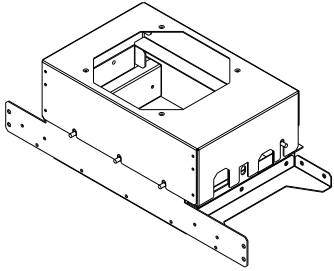
Shrouds

Shrouds are used for IP20 touch protection with the cabinet doors open.

Used with ...	Qty	Ordering code	Kit code	Illustration
600 mm Rittal VX25 enclosure	1 for each DC/DC converter module (frame R7i)	3AXD50001102517	L-6-7-354-VX	 Instruction code: 3AXD50001107222

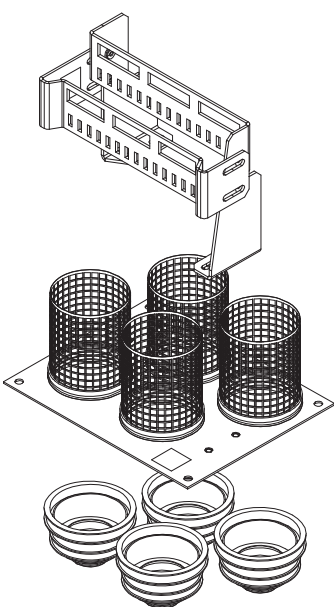
Heat exchanger mechanics kit

The heat exchanger mechanics kit contains the mounting base for the heat exchanger and fan.

Used with ...	Qty	Ordering code	Kit code	Illustration
600 mm Rittal VX25 enclosure	1 for each DC/DC converter module (frame R7i)	3AXD50001102418	L-6-7-449-VX	 Instruction code: 3AXD50001107178

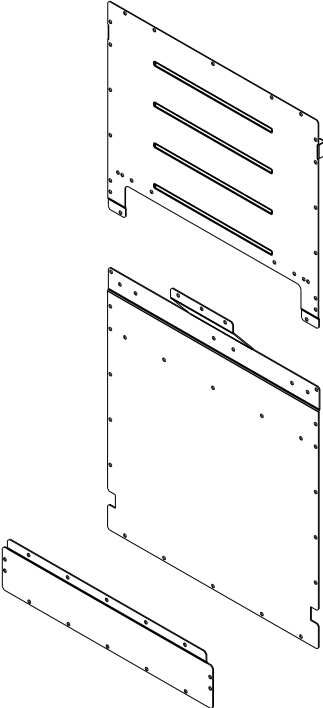
Bottom cable entry

This kit is to be installed on the bottom plate of the enclosure. It contains four cable entries for energy storage cables with grommets, wire meshing for 360° grounding, and a strain relief bracket.

Used with ...	Qty	Ordering code	Kit code	Illustration
Rittal VX25 enclosure Generic cabinet	2	3AXD50000004385	A-468-8-441	 Instruction code: 3AXD50000004817

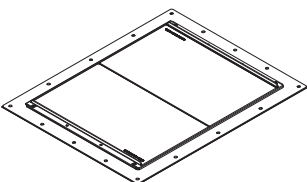
Marine kit

The marine support kit contains cabinet reinforcement plates for marine use.

Used with ...	Qty	Ordering code	Kit code	Illustration
600 mm Rittal VX25 enclosure	1 for each cubicle	3AXD50001102531	L-6-7-505-VX	 Instruction code: 3AXD50001106997

Pressure relief vent kit

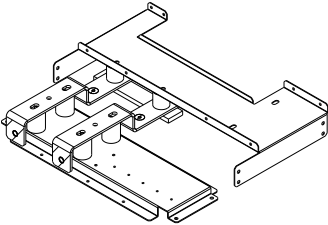
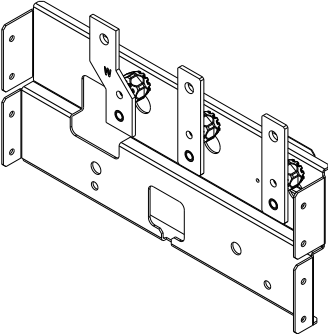
The pressure relief vent is installed onto the cabinet roof.

Used with ...	Qty	Ordering code	Kit code	Illustration
600 mm Rittal VX25 enclosure	1 for each cubicle	3AXD50000667277	L-68-X-461-VX	 Instruction code: 3AXD50000666430

■ **Electrical installation accessories**

Busbars and quick connectors for connecting DC/DC converter module and filter

Busbars provide connection from the DC/DC converter module to the BDCL filter.

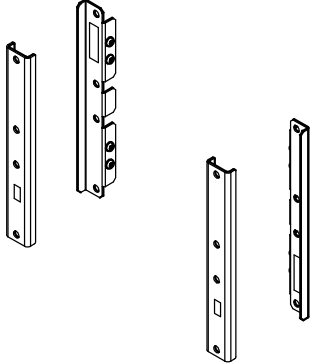
Used with ...	Qty	Ordering code	Kit code	Illustration
600 mm Rittal VX25 enclosure	1 for each DC/DC converter module (frame R7i)	3AXD50001102449	L-6-7-239-VX	 Instruction code: 3AXD50001106966
600 mm Rittal VX25 enclosure	1 for each DC/DC converter module (frame R7i)	3AXD50001102432	L-6-7-240-VX	 Instruction code: 3AXD50001106959

Common DC Flat-PLS assembly

The bracket in this kit act as a mounting base for the busbar supports of the Rittal Flat-PLS DC bus and ensure its correct placement and alignment inside the cabinet line-up.

Note: The designs shown in this manual for Rittal VX25 enclosures use the Rittal Flat-PLS busbar system.

Make sure that the current carrying capability of the busbars is sufficient for the application.

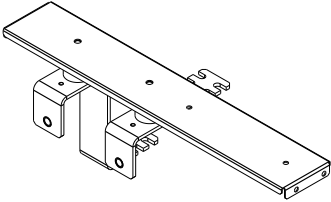
Used with ...	Qty	Ordering code	Kit code	Illustration
Rittal VX25 enclosure	1 for each cubicle	3AXD50000333387	A-468-X-001-VX	 Instruction code: 3AXD50000333639

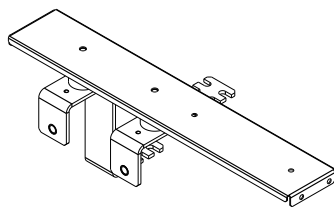
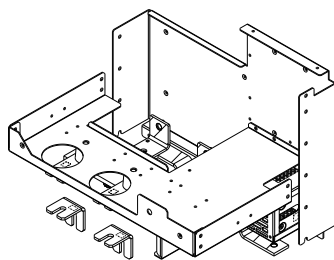
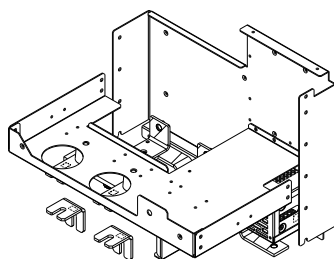
DC connection with DC switch-disconnector and charging

You can equip the DC/DC converter with DC switch-disconnector, if quick isolation of the module from the DC bus is necessary.

These parts provide the mounting base for the charging components and connect the converter module to the DC bus.

The DC switch kit and charging kit are also necessary.

Used with ...	Qty	Ordering code	Kit code	Illustration
600 mm Rittal VX25 enclosure and OT400 switch-disconnector	1 for each DC/DC converter module (frame R7i)	3AXD50001102456	L-6-7-221-VX	 Instruction code: 3AXD50001106980

Used with ...	Qty	Ordering code	Kit code	Illustration
600 mm Rittal VX25 enclosure and OT600 switch-disconnector	1 for each DC/DC converter module (frame R7i)	3AXD50001102463	L-6-7-222-VX	 Instruction code: 3AXD50001107208
600 mm Rittal VX25 enclosure and OT400 switch-disconnector	1 for each DC/DC converter module (frame R7i)	3AXD50001102470	L-6-7-223-VX	 Instruction code: 3AXD50001107192
600 mm Rittal VX25 enclosure and OT600 switch-disconnector	1 for each DC/DC converter module (frame R7i)	3AXD50001102487	L-6-7-224-VX	 Instruction code: 3AXD50001107086

DC switch-disconnector kits

DC-switch disconnector kits are necessary, if you will equip the DC/DC converter with a DC switch-disconnector.

Used with...	Qty	Ordering code	Instruction code	Kit contents
Frame R7i	1	3AXD50000823376 (IEC)	3AXD50000823352	• OT630E11 (IEC) DC switch • OHB145J12 operating handle • OXP12X465 operating shaft • Two OA1G10 and two OA3G01 auxiliary contacts • OTZT3A and PDAL2/24DC interlocks • OHZX10 alignment ring.
Frame 2×R7i	2			

Charging kits

Charging kits are necessary, if you will equip the DC/DC converter with a DC switch-disconnector.

Used with...	Qty	Ordering code	Instruction code
Frame R7i	1	3AXD50000826933 (IEC)	3AXD50000827046
Frame 2×R7i	2		

The kit contains these components:

- OS160GD04F (IEC) charging switch with terminal shrouds
- OHB65J6 operating handle
- OXP6X290 operating shaft
- Two OA3G01 auxiliary contacts
- BSFC-12C charging controller
- 170M2676 fuses (kit 3AXD50000227013 contains FWJ-30A fuses and conversion parts)
- OHZX10 alignment ring.

Note: The charging kit does not include charging resistors and you must order them separately.

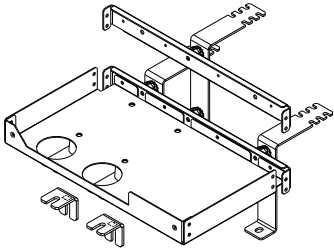
Charging resistors

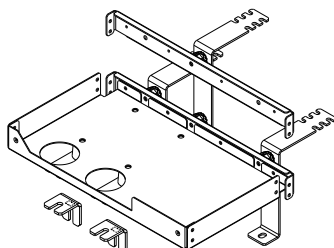
The charging resistors are not included in the charging kits and must be ordered separately.

Nominal voltage (U_n)	Used with ...	Qty	Ordering code	Rating
400 V or 500 V	1×R7i	4	10037531	24 ohm
	2×R7i	8		
690 V	1×R7i	4	10028531	33 ohm
	2×R7i	8		

DC connection without DC switch-disconnector and charging

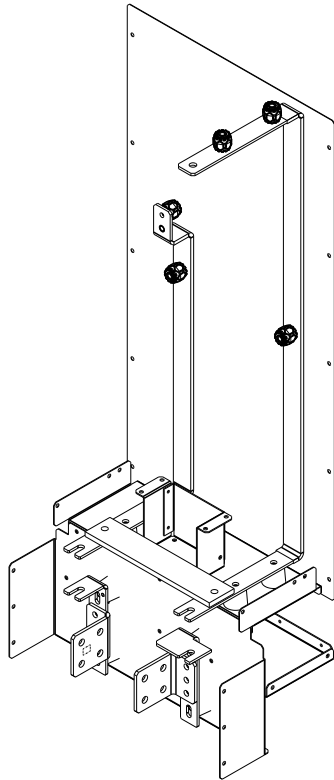
These kits provide the mounting base for the DC fuses and connect the converter module to the DC bus.

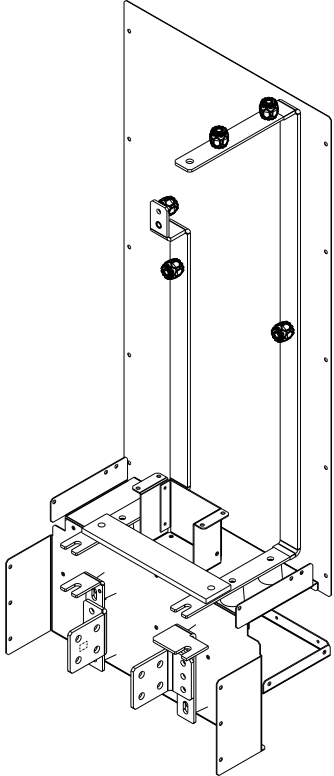
Used with ...	Qty	Ordering code	Kit code	Illustration
600 mm Rittal VX25 enclosure, if fuse size = 1	1 for each DC/DC converter module (frame R7i)	3AXD50001102494	L-6-7-225-VX	 Instruction code: 3AXD50001106973

Used with ...	Qty	Ordering code	Kit code	Illustration
600 mm Rittal VX25 enclosure, if fuse size = 3	1 for each DC/DC convert- er module (frame R7i)	3AXD50001102500	L-6-7-226-VX	 Instruction code: 3AXD50001107185

Energy storage connection

These parts are used to implement the connection between the DC/DC converter module and the output terminals for the energy storage connection.

Used with ...	Qty	Ordering code	Kit code	Illustration
600 mm Rittal VX25 enclosure, if fuse size = 1	1 for each DC/DC convert- er module (frame R7i)	3AXD50001114107	L-6-7-259-VX	 Instruction code: 3AXD50001114268

Used with ...	Qty	Ordering code	Kit code	Illustration
600 mm Rittal VX25 enclosure, if fuse size = 3	1 for each DC/DC converter module (frame R7i)	3AXD50001102425	L-6-7-250-VX	 Instruction code: 3AXD50001107055

Input DC fuses

The input DC fuses protect the module and the drive DC bus against short circuits.

Module type ACS880- 1604LC-...	Frame	Fuse		Qty	Ordering code
		Type	Rating		
U _n = 400 V					
0150A-3	R7i	170M4390	250	2	3AUA0000114933
0250A-3	R7i	170M4393	400	2	3AUA0000076327
0350A-3	R7i	170M6543	550	2	3AXD50000698752
0450A-3	R7i	170M6545	700	2	68735980
0550A-3	R7i	170M6547	900	2	63919381
0700A-3	2×R7i	170M6543	550	4	3AXD50000698752
0900A-3	2×R7i	170M6545	700	4	68735980
1100A-3	2×R7i	170M6547	900	4	63919381
U _n = 500 V					
0150A-5	R7i	170M4390	250	2	3AUA0000114933
0250A-5	R7i	170M4393	400	2	3AUA0000076327
0350A-5	R7i	170M6543	550	2	3AXD50000698752
0450A-5	R7i	170M6545	700	2	68735980
0550A-5	R7i	170M6547	900	2	63919381

Module type ACS880- 1604LC-...	Frame	Fuse		Qty	Ordering code
		Type	Rating		
0700A-5	2×R7i	170M6543	550	4	3AXD50000698752
0900A-5	2×R7i	170M6545	700	4	68735980
1100A-5	2×R7i	170M6547	900	4	63919381
$U_n = 690 \text{ V}$					
0150A-7	R7i	170M4390	250	2	3AUA0000114933
0200A-7	R7i	170M4391	315	2	3AXD50000010196
0300A-7	R7i	170M6542	500	2	3AXD50000021111
0399A-7	R7i	170M6544	630	2	63903167
0599A-7	2×R7i	170M6542	500	4	3AXD50000021111
0799A-7	2×R7i	170M6544	630	4	63903167

Output DC fuses

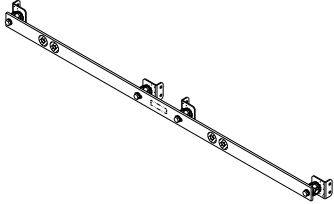
The output DC fuses protect the module against short circuits from the energy storage and the energy storage cable(s).

Module type ACS880- 1604LC-...	Frame	Fuse		Qty	Ordering code
		Type	Rating		
U _n = 400 V					
0150A-3	R7i	170M4390	250	2	3AUA0000114933
0250A-3	R7i	170M4393	400	2	3AUA0000076327
0350A-3	R7i	170M6543	550	2	3AXD50000698752
0450A-3	R7i	170M6545	700	2	68735980
0550A-3	R7i	170M6547	900	2	63919381
0700A-3	2×R7i	170M6543	550	4	3AXD50000698752
0900A-3	2×R7i	170M6545	700	4	68735980
1100A-3	2×R7i	170M6547	900	4	63919381
U _n = 500 V					
0150A-5	R7i	170M4390	250	2	3AUA0000114933
0250A-5	R7i	170M4393	400	2	3AUA0000076327
0350A-5	R7i	170M6543	550	2	3AXD50000698752
0450A-5	R7i	170M6545	700	2	68735980
0550A-5	R7i	170M6547	900	2	63919381
0700A-5	2×R7i	170M6543	550	4	3AXD50000698752
0900A-5	2×R7i	170M6545	700	4	68735980
1100A-5	2×R7i	170M6547	900	4	63919381
U _n = 690 V					
0150A-7	R7i	170M4390	250	2	3AUA0000114933
0200A-7	R7i	170M4391	315	2	3AXD50000010196
0300A-7	R7i	170M6542	500	2	3AXD50000021111
0399A-7	R7i	170M6544	630	2	63903167
0599A-7	2×R7i	170M6542	500	4	3AXD50000021111

Module type ACS880- 1604LC-...	Frame	Fuse		Qty	Ordering code
		Type	Rating		
0799A-7	2×R7i	170M6544	630	4	63903167

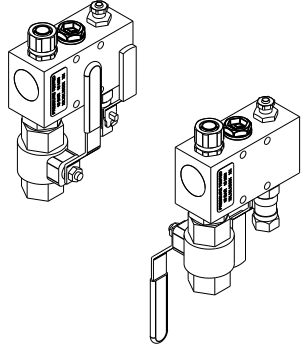
Parallel connection busbar kit

The parallel connection busbar kit is used to connect two converter modules in parallel.

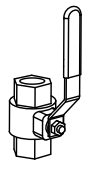
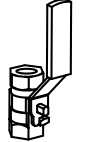
Used with ...	Qty	Ordering code	Kit code	Illustration
Rittal VX25 enclosure, if frame size 2×R7i	1	3AXD50001118198	L-X-7-260-VX	 Instruction code: 3AXD50001118167

■ **Cooling system parts**

Coolant distribution manifold kits

Enclosure	Qty	Ordering code	Kit code	Illustration
All enclosure types	1 kit for each DC/DC converter module (frame R7i)	3AXD50000899111	L-468-8-444-VX	 Instruction code: 3AXD50000898978

The manifold kits contain:

-  Inlet and outlet manifolds
-  Inlet and outlet valves
-  Drain valves

-  Nipples for connecting the valves to manifolds
-  Connectors for PA piping
-  Plugs for unused piping connectors

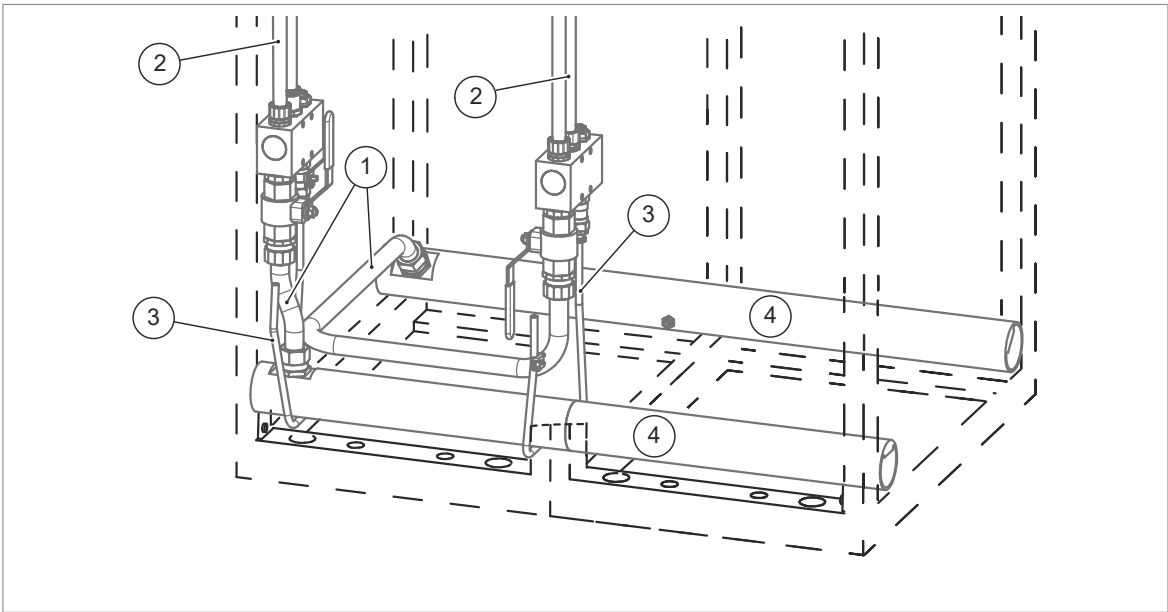
You must order the following parts separately as they are not included in the manifold kits:

- Connectors to attach to inlet, outlet and drain valves
- Connectors to attach to main pipes
- Pipes between main pipe and inlet/outlet valves
- Main pipes
- Drain pipes.

Note: The inlet and outlet valves have an R3/4" internal thread. The drain valves have an R3/8" internal thread.

Piping

PA (polyamide) pipe is available in various diameters on reels. Refer to the figure below for application.



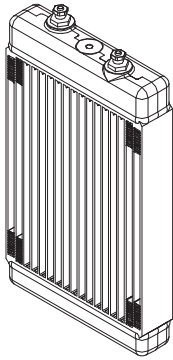
Item	Data	Ordering code
1	PA12P40, 22/18 mm, 50 m	3AXD50000441419
2	PA12P40, 16/13 mm, 50 m ¹⁾	3AXD50000047488
3	PA11P40, 8/6 mm, 50 m ²⁾	3AXD50000419302
4	Not part of standard product offering	

¹⁾ Used between the converter module and the coolant distribution manifold.
²⁾ Used between the coolant distribution manifold, heat exchanger, and BDCL filter.

For a pipe routing example, refer to section [Pipe routing example \(page 54\)](#).

Heat exchanger

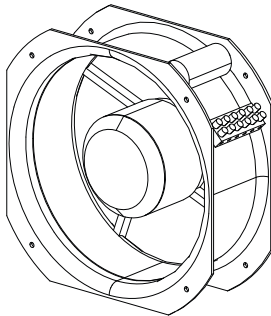
The kit includes the heat exchanger and the connectors for piping.

Used with ...	Qty	Ordering code	Kit code	Illustration
All enclosure types	1 for each DC/DC converter module (frame R7i)	3AXD50000479795	L-468-8-446	

Cooling fan

The fan blows air through the heat exchanger and the module, circulating the air inside the cabinet.

The fan is selected according to the auxiliary voltage.

Frame size	Auxiliary voltage	Qty	Ordering code	Illustration
R7i	230 V AC (50/60 Hz)	1 for each module	3AXD50000045295	
R7i	115 V AC (50/60 Hz)	1 for each module	3AXD50000045278	

Frame R8i and multiples

■ DC/DC converter modules

Converter units consisting of frame R8i converter modules are to be ordered as separate modules. For converter unit ratings, see the technical data.

DC/DC converter unit		Modules used	
Type	Frame size	Qty	Ordering code (for options, see below)
$U_n = 690\text{ V}$			
ACS880-1604LC-0400A-7	R8i	1	ACS880-104LC-0480A-7+E205
ACS880-1604LC-0500A-7	R8i	1	ACS880-104LC-0530A-7+E205
ACS880-1604LC-0600A-7	R8i	1	ACS880-104LC-0600A-7+E205
ACS880-1604LC-0700A-7	R8i	1	ACS880-104LC-0670A-7+E205
ACS880-1604LC-0800A-7	R8i	1	ACS880-104LC-0750A-7+E205
ACS880-1604LC-0900A-7	R8i	1	ACS880-104LC-0850A-7+E205
ACS880-1604LC-1000A-7	2×R8i	2	ACS880-104LC-0530A-7+E205
ACS880-1604LC-1200A-7	2×R8i	2	ACS880-104LC-0600A-7+E205
ACS880-1604LC-1400A-7	2×R8i	2	ACS880-104LC-0670A-7+E205
ACS880-1604LC-1600A-7	2×R8i	2	ACS880-104LC-0750A-7+E205
ACS880-1604LC-1800A-7	2×R8i	2	ACS880-104LC-0850A-7+E205

Ordering code format	Option codes
[Module type] + code [+code] ... For example: ACS880-104LC-0480A-7+E205	+E205: Internal du/dt filtering. Standard with 690 V R8i modules.

Note: The energy storage is not included in the ACS880 module product offering. The customer must equip the DC/DC converter with an applicable energy storage system. For more information, see [Selecting the energy storage \(page 90\)](#).

Note: These components are always required to construct a working unit and must be ordered separately:

- DC/DC converter module(s)
- BDCL filter module(s). One filter module is necessary for each DC/DC converter module.
- Control unit kit
- Fiber optic cables
- Module quick connectors (3AUA0000119227), one kit for each converter or filter module.

Other parts given in this chapter can be required by the application or make the installation of the module easier.

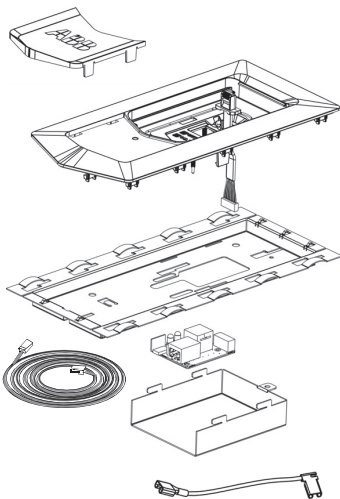
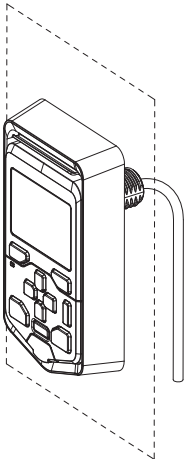
■ **BDCL filters**

DC/DC converter unit type ACS880-1604LC-...	Frame size	L-filter		
		Type	Qty	Ordering code
U _n = 690 V				
0400A-7	R8i	BDCL-14LC-7+V112	1	3AXD50000997893
0500A-7	R8i	BDCL-14LC-7+V112	1	3AXD50000997893
0600A-7	R8i	BDCL-15LC-7+V112	1	3AXD50000997886
0700A-7	R8i	BDCL-15LC-7+V112	1	3AXD50000997886
0800A-7	R8i	BDCL-15LC-7+V112	1	3AXD50000997886
0900A-7	R8i	BDCL-15LC-7+V112	1	3AXD50000997886
1000A-7	2×R8i	BDCL-14LC-7+V112	2	3AXD50000997893
1200A-7	2×R8i	BDCL-15LC-7+V112	2	3AXD50000997886
1400A-7	2×R8i	BDCL-15LC-7+V112	2	3AXD50000997886
1600A-7	2×R8i	BDCL-15LC-7+V112	2	3AXD50000997886
1800A-7	2×R8i	BDCL-15LC-7+V112	2	3AXD50000997886

■ Control panel

The control panel is not included with the module but must be ordered separately. One control panel is required for the commissioning of an ACS880 drive system, even if the Drive Composer PC tool is used.

The control panel can be flush mounted on the cabinet door with the help of a door mounting kit. For more information on the control panel, see [ACS-AP-I, -S, -W and ACH-AP-H, -W Assistant control panels user's manual \(3AUA0000085685 \[English\]\)](#).

Type	Description	Ordering code	Illustration
ACS-AP-W	Control panel with Bluetooth	3AXD50000025965	
DPMP-01	Door mounting kit (IP55)	3AUA0000108878	
DPMP-02	Door mounting kit (IP65)	3AXD50000009374	

For more information on the door mounting kits, such as the contents of the kit, see the installation manuals:

- [DPMP-01 mounting platform for control panels installation guide \(3AUA0000100140 \[English\]\)](#)
- [DPMP-02/03 mounting platform for control panels installations guide \(3AUA0000136205 \[English\]\)](#).

■ **Control electronics**

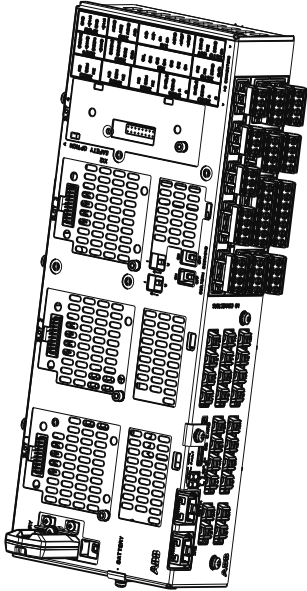
The customer must do the installation and wiring of the electronics outside the module. The current consumption of the main components in the auxiliary circuit is given in the technical data.

A control unit controls the DC/DC converter module(s). You must acquire the control unit and connect it to each DC/DC converter module with a pair of fiber optic cables. You can supply power (24 V DC) to the control unit from the DC/DC converter module, or from a power supply.

You must also acquire the cables. Use a suitable standard installation cable. Use the applicable plug connector [X53] for the connection to the DC/DC converter module. Refer to section [Control circuit plug connectors \(page 185\)](#).

Control unit (BCU)

The control unit delivery contains a memory unit with the ACS880 DC/DC converter control program.

Converter module frame size	Control unit type	Qty	Ordering code	Illustration
R8i	BCU-02	1	3AXD50000022059	
2×R8i	BCU-12*	1	3AXD50000022060	

*BCU-02 can be used as an alternative to BCU-12, if the BAMU voltage/current measurement unit is not used.

Fiber optic cables

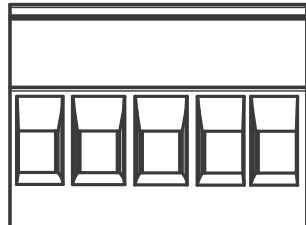
The fiber optic cables are needed between the control unit and the DC/DC converter module. You need one kit per each module. Select a kit with suitable length.

The following kits, each consisting of a pair of plastic fiber optic cables, are available from ABB:

Length	Kit type designation	Ordering code
2 m (6.6 ft)	NLWC-02	58988821
3 m (9.8 ft)	NLWC-03	58948233
5 m (16.4 ft)	NLWC-05	58948250
7 m (23 ft)	NLWC-07	58948268
10 m (32.8 ft)	NLWC-10	58948276

Control circuit plug connectors

Plug connectors for X51, X52 and X53 are included in the module kit. You can order these plug connectors as spare parts.

Connector	Data	Qty	Ordering code	Illustration
X51...X53	1 × MSTB 2,5/5-ST-5,08 BK 2 × MSTB 2,5/5-ST-5,08 YE 2.50 mm ² , 12 A, 320 V	1 per module	3AXD50000003541	

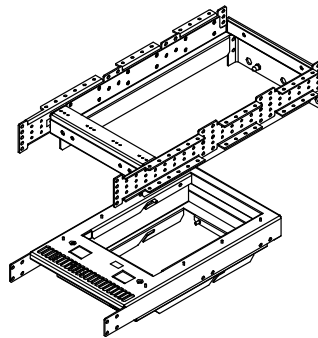
Options

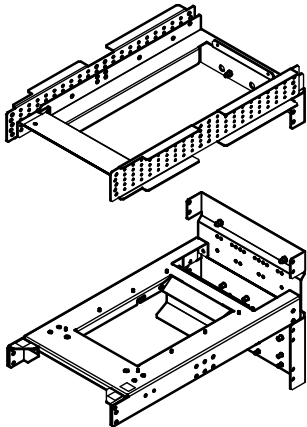
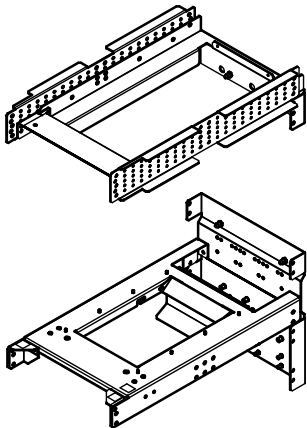
For more information related to available control panel, fieldbus, I/O module and DDCS communication options, contact ABB.

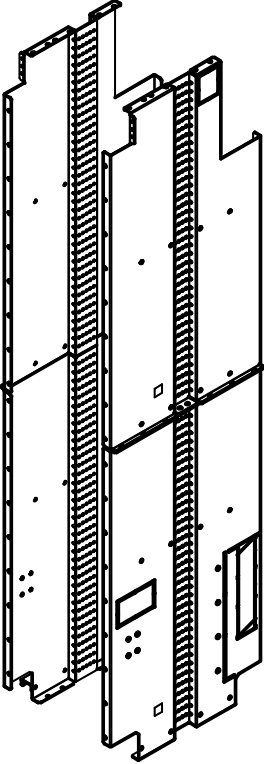
■ Mechanical installation accessories

Module installation parts

Module installation parts include top and bottom supports for the DC/DC converter and BDCL filter modules and side plate kit.

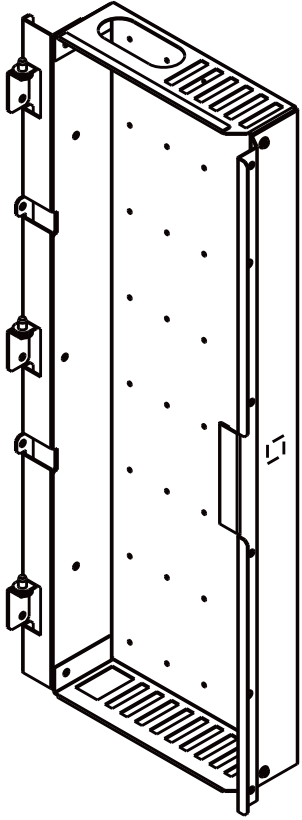
Used with ...	Qty	Ordering code	Kit code	Illustration
Generic cabinet	1 for each DC/DC converter module (frame R8i)	3AXD50000043678	L-4-8-301	 Instruction code: 3AXD50000714537

Used with ...	Qty	Ordering code	Kit code	Illustration
400 mm Rittal VX25 enclosure	1 for each BD- CL module (frame R8i)	3AXD50000437207	L-4-8-312-VX	 Instruction code: 3AXD50000437993
400 mm Rittal VX25 enclosure	1 for each DC/DC convert- er module (frame R8i)	3AXD50000360598	L-4-8-301-VX	 Instruction code: 3AXD50000330461

Used with ...	Qty	Ordering code	Kit code	Illustration
Rittal VX25 enclosure	1 for each DC/DC converter module	3AXD50000360543	L-468-8-020-VX	 Instruction code: 3AXD50000327591

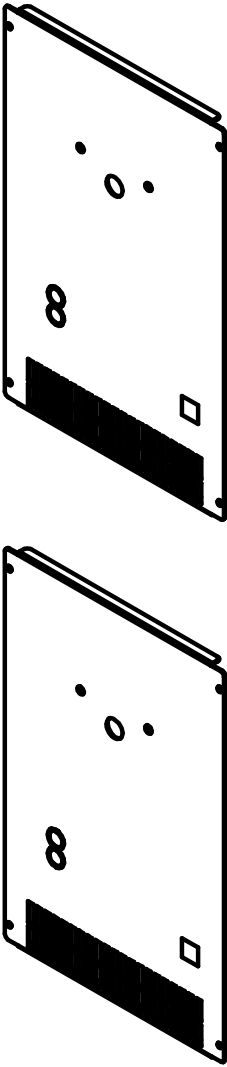
Swing-out frame (for Rittal VX25 enclosures)

The swing-out frame is a hinged compartment that can be used as a mounting base for control electronics and auxiliary voltage circuit components.

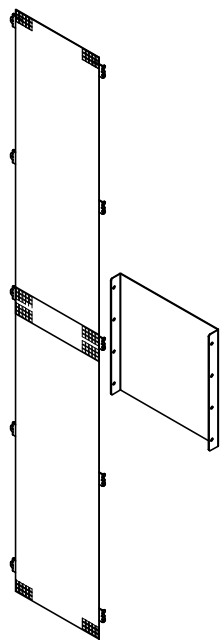
Used with ...	Qty	Ordering code	Kit code	Illustration
400 mm Rittal VX25 enclosure	1 for each DC/DC converter module (frame R8i)	3AXD50000361045	L-4-x-051-VX	 Instruction code: 3AXD50000345106

Shrouds

Shrouds are used for IP20 touch protection with the cabinet doors open.

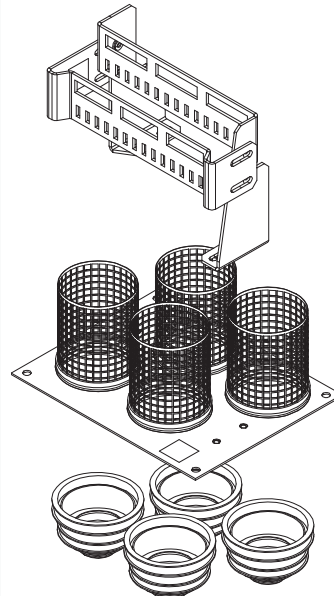
Used with ...	Qty	Ordering code	Kit code	Illustration
400 mm Rittal VX25 enclosure	1 for each DC/DC convert- er module (frame R8i)	3AXD50000361083	L-4-8-022-VX	 Instruction code: 3AXD50000353354

190 Ordering information

Used with ...	Qty	Ordering code	Kit code	Illustration
400 mm Rittal VX25 enclosure	1 for each BD-CL filter module (frame R8i)	3AXD50000441822	L-4-8-030-VX	 Instruction code: 3AXD50000444106

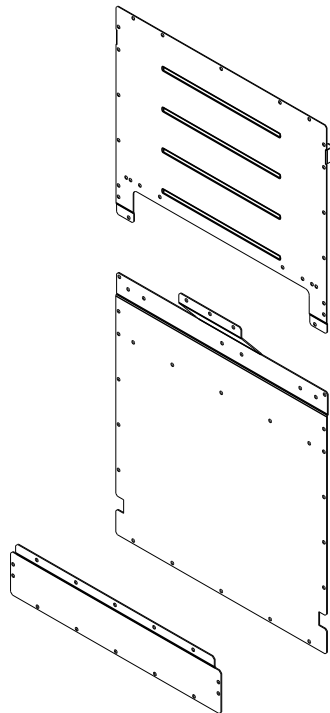
Bottom cable entry

This kit is to be installed on the bottom plate of the enclosure. It contains four cable entries for energy storage cables with grommets, wire meshing for 360° grounding, and a strain relief bracket.

Used with ...	Qty	Ordering code	Kit code	Illustration
Rittal VX25 enclosure Generic cabinet	2	3AXD50000004385	A-468-8-441	 Instruction code: 3AXD50000004817

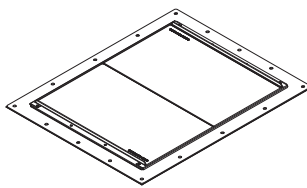
Marine kit

The marine support kit contains cabinet reinforcement plates for marine use.

Used with ...	Qty	Ordering code	Kit code	Illustration
600 mm Rittal VX25 enclosure	1 for each cu-bicle	3AXD50001102531	L-6-7-505-VX	 Instruction code: 3AXD50001106997

Pressure relief vent kit

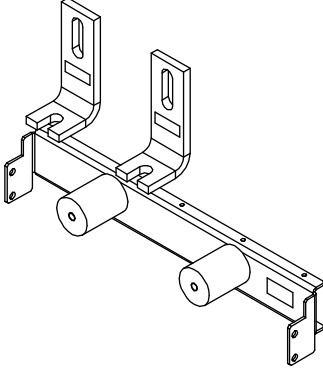
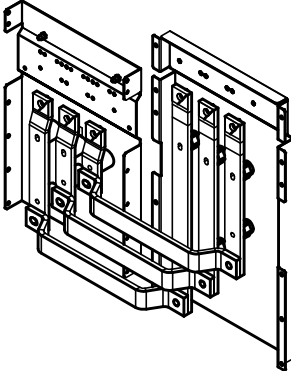
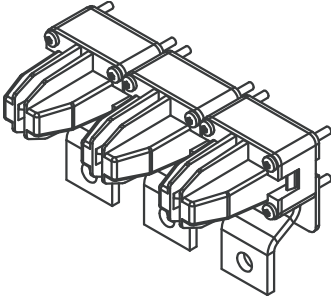
The pressure relief vent is installed onto the cabinet roof.

Used with ...	Qty	Ordering code	Kit code	Illustration
600 mm Rittal VX25 enclosure	1 for each cu-bicle	3AXD50000667277	L-68-X-461-VX	 Instruction code: 3AXD50000666430

■ Electrical installation accessories

Busbars and quick connectors for connecting DC/DC converter module and filter

Busbars provide connection from the DC/DC converter module to the BDCL filter.

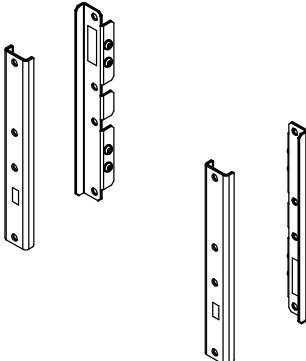
Used with ...	Qty	Ordering code	Kit code	Illustration
Generic DC fuse busbar kit	1 for each DC/DC converter module (frame R8i)	3AXD50000540150	L-3-8-259	 Instruction code: 3AXD100001284446
Rittal VX25 enclosure	1 for each DC/DC converter module (frame R8i)	3AXD50000437191	L-4-8-258-VX	 Instruction code: 3AXD50000437146
All enclosure types	1 for each DC/DC converter module (frame R8i)	3AUA0000119227	A-468-8-100	 Instruction code: 3AUA0000118667

Common DC Flat-PLS assembly

The bracket in this kit act as a mounting base for the busbar supports of the Rittal Flat-PLS DC bus and ensure its correct placement and alignment inside the cabinet line-up.

Note: The designs shown in this manual for Rittal VX25 enclosures use the Rittal Flat-PLS busbar system.

Make sure that the current carrying capability of the busbars is sufficient for the application.

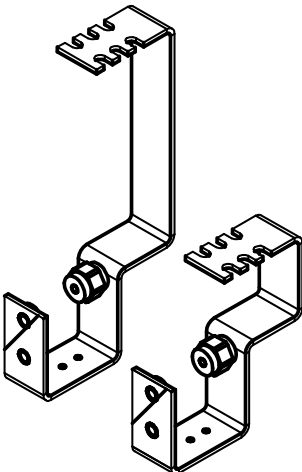
Used with ...	Qty	Ordering code	Kit code	Illustration
Rittal VX25 enclosure	1 for each cubicle	3AXD50000333387	A-468-X-001-VX	 Instruction code: 3AXD50000333639

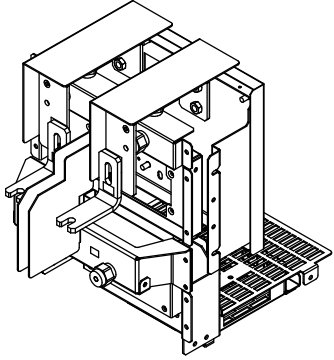
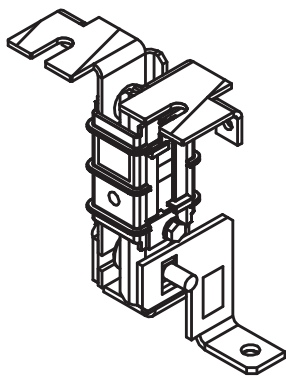
DC connection with DC switch-disconnector and charging

You can equip the DC/DC converter with DC switch-disconnector, if quick isolation of the module from the DC bus is necessary.

These parts provide the mounting base for the charging components and connect the converter module to the DC bus.

The DC switch kit and charging kit are also necessary.

Used with ...	Qty	Ordering code	Kit code	Illustration
400 mm / 600 mm Rittal VX25 enclosure with DC switch-disconnector and charging	1 for each DC/DC converter module (frame R8i)	3AXD50000360567	L-46-8-207-VX	 Instruction code: 3AXD50000343614

Used with ...	Qty	Ordering code	Kit code	Illustration
400 mm Rittal VX25 enclosure with DC switch-disconnector and charging	1 for each DC/DC converter module (frame R8i)	3AXD50000361038	L-4-8-254-VX	 Instruction code: 3AXD50000342600
Rittal VX25 enclosure with DC switch-disconnector and charging	1 for each DC/DC converter module (frame R8i)	3AXD5000041264	L-468-8-230	 Instruction code: 3AXD50000205042

DC switch-disconnector kits

DC-switch disconnector kits are necessary, if you will equip the DC/DC converter with a DC switch-disconnector.

Used with...	Qty	Ordering code	Instruction code	Kit contents
Frame R8i	1	3AXD50000227037 (IEC) 3AXD50000227068 (UL)	3AXD50000330720	• OT1600E11 (IEC) or OT1200U11 (UL) DC switch • OHB150J12P operating handle • OXP12X395 operating shaft • Two OA1G10 and two OA3G01 auxiliary contacts • OTZT4A and PDAL2/24DC interlocks • OHZX10 alignment ring.
Frame 2×R8i	2			

Charging kits

Charging kits are necessary, if you will equip the DC/DC converter with a DC switch-disconnector.

Used with...	Qty	Ordering code	Instruction code
Frame R8i	1	3AXD50000226801 (IEC) 3AXD50000227013 (UL)	3AXD50000450978
Frame 2×R8i	2		

The kit contains these components:

- OS160GD04F (IEC) or OS100GJ04FP (UL) charging switch with terminal shrouds
- OHB65J6 operating handle
- OXP6X290 operating shaft
- Two OA3G01 auxiliary contacts
- BSFC-12C charging controller
- 170M2676 fuses (kit 3AXD50000227013 contains FWJ-30A fuses and conversion parts)
- OHZX10 alignment ring.

Note: The charging kit does not include charging resistors, and you must order them separately.

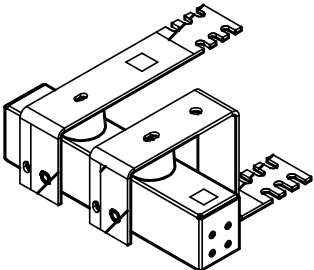
Charging resistors

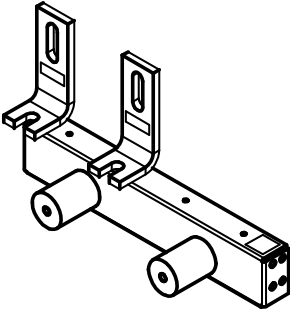
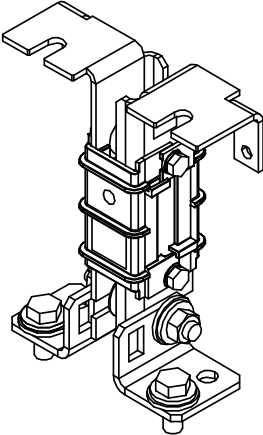
The charging resistors are not included in the charging kits and must be ordered separately.

Nominal voltage (U_n)	Used with ...	Qty	Ordering code	Rating
690 V	1×R8i	4	10028531	33 ohm
	2×R8i	8		

DC connection without DC switch-disconnector and charging

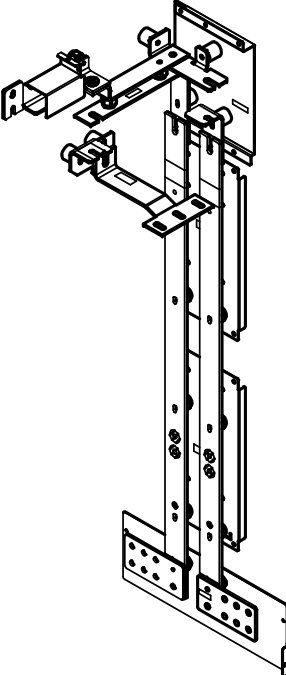
These kits provide the mounting base for the DC fuses and connect the converter module to the DC bus.

Used with ...	Qty	Ordering code	Kit code	Illustration
400 mm Rittal VX25 enclosure	1 for each DC/DC converter module (frame R8i)	3AXD50000360604	L-4-8-201-VX	 Instruction code: 3AXD50000332861

Used with ...	Qty	Ordering code	Kit code	Illustration
400 mm Rittal VX25 enclosure	1 for each DC/DC converter module (frame R8i)	3AXD50000361021	L-4-8-251-VX	 Instruction code: 3AXD50000332885
Rittal VX25 enclosure	1 for each DC/DC converter module (frame R8i)	3AXD50000200368	L-46-8-233	 Instruction code: 3AXD50000041311

Energy storage connection

These parts are used to implement the connection between the DC/DC converter module and the output terminals for the energy storage connection.

Used with ...	Qty	Ordering code	Kit code	Illustration
400 mm Rittal VX25 enclosure	1 for each DC/DC convert- er module (frame R8i)	3AXD50000437313	L-4-8-257-VX	 Instruction code: 3AXD50000438006

Input DC fuses

The input DC fuses protect the module and the drive DC bus against short circuits.

Module type ACS880- 1604LC-...	Frame	Fuse		Qty	Ordering code
		Type	Rating		
U _n = 690 V					
0400A-7	R8i	170M6544	630	2	63903167
0500A-7	R8i	170M6546	800	2	63919128
0600A-7	R8i	170M6548	1000	2	63916749
0700A-7	R8i	170M6549	1100	2	68736021
0800A-7	R8i	170M6500	1250	2	63919462
0900A-7	R8i	170M6501	1400	2	3AUA0000086673
1000A-7	2×R8i	170M6546	800	4	63919128
1200A-7	2×R8i	170M6548	1000	4	63916749
1400A-7	2×R8i	170M6549	1100	4	68736021
1600A-7	2×R8i	170M6500	1250	4	63919462
1800A-7	2×R8i	170M6501	1400	4	3AUA0000086673

Note: All fuses listed are UL Recognized.

Output DC fuses

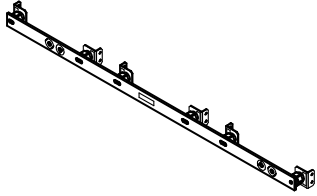
The output DC fuses protect the module against short circuits from the energy storage and the energy storage cable(s).

Module type ACS880- 1604LC-...	Frame	Fuse		Qty	Ordering code
		Type	Rating		
U _n = 690 V					
0400A-7	R8i	170M6544	630	2	63903167
0500A-7	R8i	170M6546	800	2	63919128
0600A-7	R8i	170M6548	1000	2	63916749
0700A-7	R8i	170M6549	1100	2	68736021
0800A-7	R8i	170M6500	1250	2	63919462
0900A-7	R8i	170M6501	1400	2	3AUA0000086673
1000A-7	2×R8i	170M6546	800	4	63919128
1200A-7	2×R8i	170M6548	1000	4	63916749
1400A-7	2×R8i	170M6549	1100	4	68736021
1600A-7	2×R8i	170M6500	1250	4	63919462
1800A-7	2×R8i	170M6501	1400	4	3AUA0000086673

Note: All fuses listed are UL Recognized.

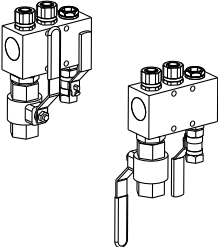
Parallel connection busbar kit

The parallel connection busbar kit is used to connect two converter modules in parallel.

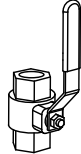
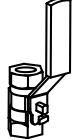
Used with ...	Qty	Ordering code	Kit code	Illustration
Rittal VX25 enclosure, if frame size 2×R8i	1	3AXD50000442164	L-X-8-209-VX	 Instruction code: 3AXD50000442409

■ Cooling system parts

Coolant distribution manifold kits

Enclosure	Qty	Ordering code	Kit code	Illustration
400/600/800mm VX25 and gener- ic enclosure (2 modules)	1 kit for each DC/DC convert- er module (frame R8i)	3AXD50000044182	L-468-8-442	 Instruction code: 3AXD50000048258

The manifold kits contain:

-  Inlet and outlet manifolds
-  Inlet and outlet valves
-  Drain valves
-  Nipples for connecting the valves to manifolds
-  Connectors for PA piping
-  Plugs for unused piping connectors

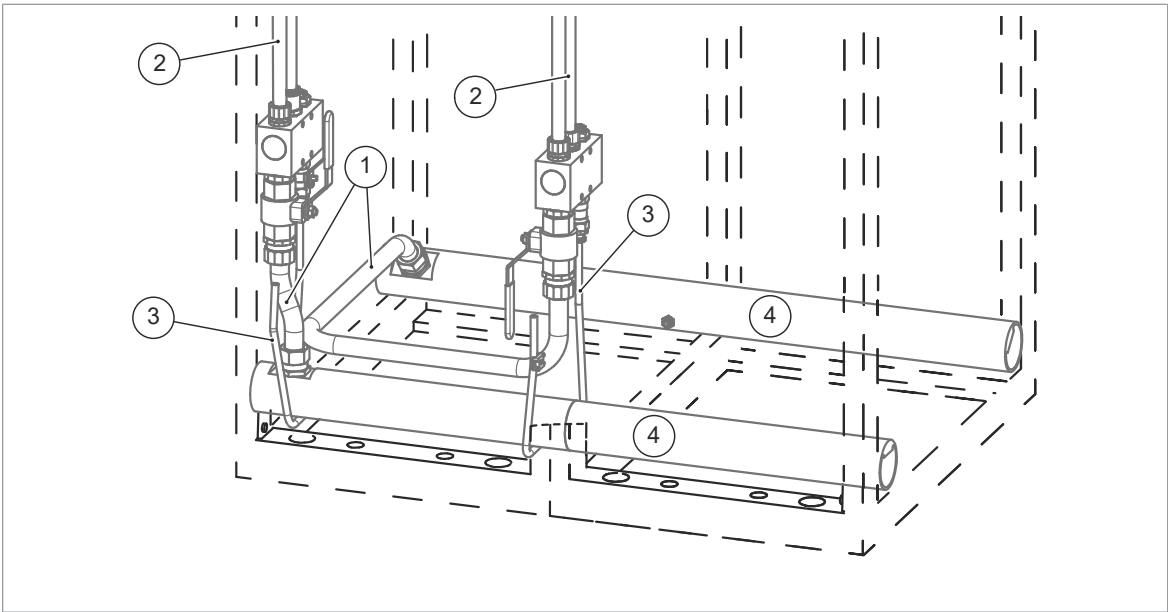
You must order the following parts separately as they are not included in the manifold kits:

- Connectors to attach to inlet, outlet and drain valves
- Connectors to attach to main pipes
- Pipes between main pipe and inlet/outlet valves
- Main pipes
- Drain pipes.

Note: The inlet and outlet valves have an R3/4" internal thread. The drain valves have an R3/8" internal thread.

Piping

PA (polyamide) pipe is available in various diameters on reels. Refer to the figure below for application.



Item	Data	Ordering code
1	PA12P40, 22/18 mm, 50 m	3AXD50000441419
2	PA12P40, 16/13 mm, 50 m ¹⁾	3AXD50000047488
3	PA11P40, 8/6 mm, 50 m ²⁾	3AXD50000419302
4	Not part of standard product offering	

¹⁾ Used between the coolant distribution manifolds, the converter module, filter module and heat exchangers.

²⁾ Used for bleeding.

For a pipe routing example, refer to section [Pipe routing example \(page 74\)](#).

Heat exchanger

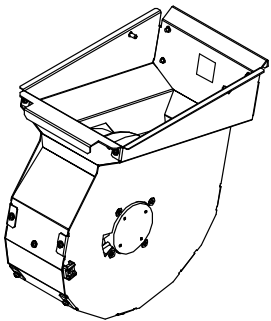
The kit includes the heat exchanger and the connectors for piping.

Used with ...	Qty	Ordering code	Kit code	Illustration
All enclosure types	1 for each DC/DC converter module (frame R8i)	3AXD50000041265	L-468-8-440	

Cooling fan

The fan blows air through the heat exchanger and the module, circulating the air inside the cabinet. The R8i kit contains the fan installed into its cowling which mounts to the module bottom guide.

The fan is selected according to the auxiliary voltage.

Frame size	Auxiliary voltage	Qty	Ordering code	Illustration
R8i	230 V AC (50/60 Hz)	1 for each module	3AXD50000043886	
R8i	115 V AC (50/60 Hz)	1 for each module	3AXD50000045414	

Miscellaneous

■ BAMU voltage/current measurement unit

The BAMU voltage/current measurement unit is not included in the module delivery, but can be ordered separately. If you use a BAMU unit to measure the energy storage voltage, the converter measures its output voltage (and thus also the energy storage voltage) automatically. In this case, you do not need an additional voltage measurement for the converter.

To use the BAMU voltage/current measurement unit, the control unit must have a sufficient number of fiber optic connections. If the converter unit has two converter modules and a BAMU unit, you must use a BCU-12 or UCU-23 control unit.

Type	Qty	Ordering code	Kit contents
BAMU-12 kit for DDC	1	3AXD50000360734 (IEC)	- BAMU-12 unit (3AXD50000045879) - Miniature circuit breaker S804S-UCB10 (3AXD50000251131) - Auxiliary contact for MCB S800-AUX (3AXD50000256532) 2× shorting plug for MCB S802-LINK50 (3AUA0000053609) - Fiber optic cable kit NLWC-03 (2 × 3 m fiber optic cables with connectors) (58948233) - Kit instruction (3AXD50000360758)
		3AXD50000360741 (UL)	- BAMU-12 unit (3AXD50000045879) - Fuse holder PS272PREMCPS (3AXD50000012958) 2× fuse 1021 CP URB 27X60/32 (3AUA0000089196) 4× plastic shroud for fuse (3AXD50000014357) - Fiber optic cable kit NLWC-03 (2 × 3 m fiber optic cables with connectors) (58948233) - Kit instruction (3AXD50000360758)

■ CIO-01 I/O module

CIO-01 I/O module for distributed I/O bus control is not included in the module delivery, but can be ordered separately. The distributed I/O bus controls and supervises each cabinet fan separately. It indicates malfunctioning fans by warning or fault messages. One CIO-01 can monitor and control up to 4 cabinet fans.

For more information, see [CIO-01 I/O module for distributed I/O bus control \(3AXD50000126880 \[English\]\)](#).

202 Ordering information

Type	Data	Qty	Ordering code
CIO-01	CIO-01 I/O module for distributed I/O bus control	1	3AXD50000041983

12

Internal cooling circuit

Contents of this chapter

The cooling system of a liquid-cooled drive consists of two circuits: the internal cooling circuit and the external cooling circuit. The internal cooling circuit covers the heat-generating electrical components of the drive and transfers the heat to the cooling unit. In the cooling unit, the heat is transferred to the external cooling circuit which is usually part of a larger external cooling system. This chapter deals with the internal cooling circuit.

Applicability

The information in this chapter is applicable to cabinet-built ACS880 liquid-cooled drives. Except where otherwise indicated, the information is also applicable to drives built out of ACS880 liquid-cooled multidrives modules.

Internal cooling system

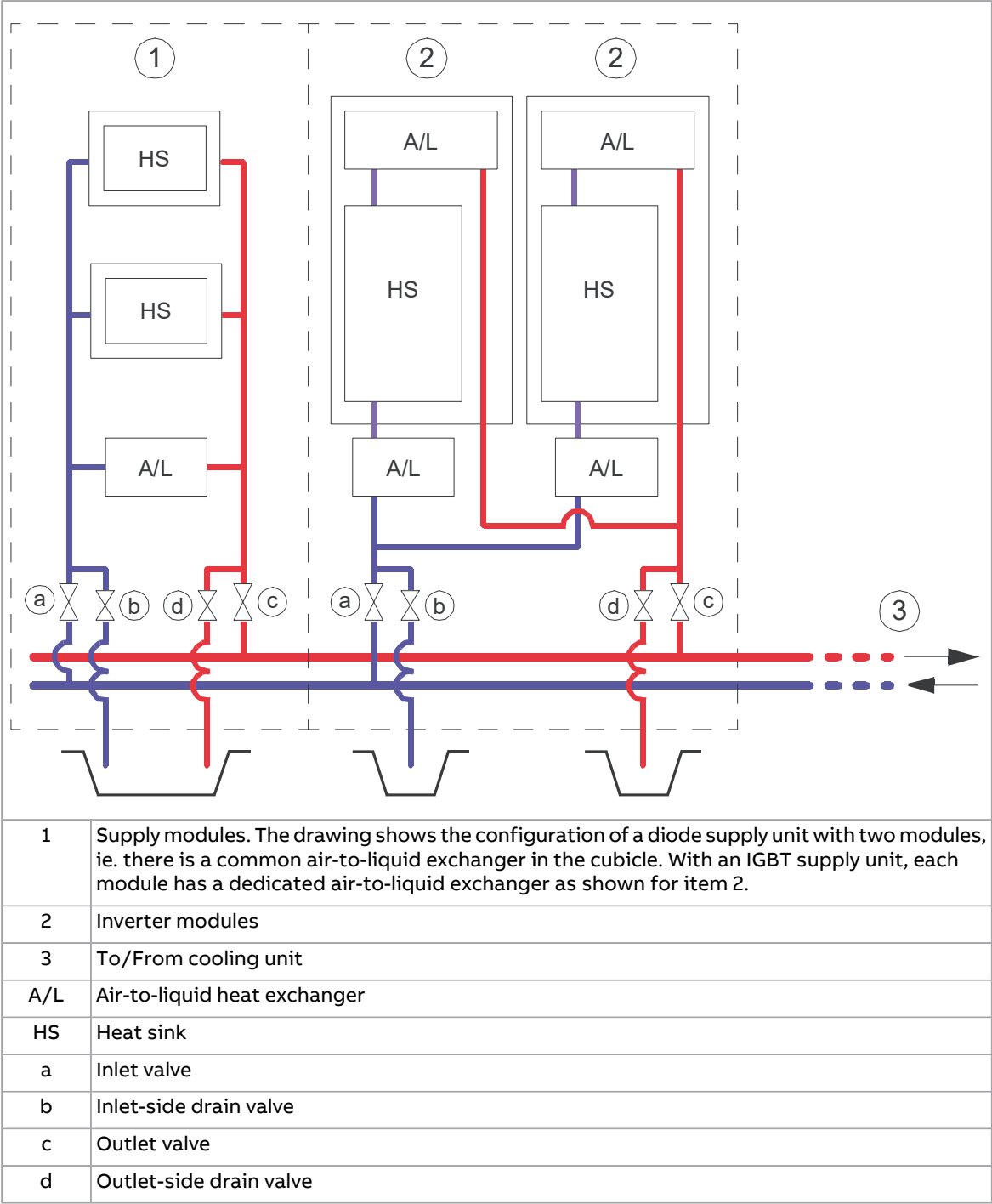
Each cubicle has an inlet and an outlet manifold, fitted with a stop valve and a drain valve. The stop valves can be closed to isolate all modules in the cubicle from the main cooling circuit.

In cabinet line-ups built by ABB, valves are color-coded:

- Blue – Open during operation
- Red – Closed during operation

The following diagram shows the coolant pipe connections in a drive system consisting of a supply unit and an inverter unit. Other units, such as brake units, DC/DC converter units have similar cooling arrangements. Other cubicles containing components that require cooling may also contain heat exchangers.

204 Internal cooling circuit



The coolant used with ACS880 liquid-cooled drive systems is Antifrogen® L 25% or 50% mixture. See [Coolant specification \(page 208\)](#).

Connection to a cooling unit

■ Connection to an ACS880-1007LC cooling unit

Refer to [ACS880-1007LC cooling unit user's manual \(3AXD50000129607 \[English\]\)](#).

■ Connection to a custom cooling unit

General requirements

Equip the system with an expansion vessel to damp pressure rise due to volume changes when the temperature varies. Equip the system with a pump that provides a nominal flow and pressure. Keep the pressure within the limits specified in [Technical data \(page 208\)](#). Install a pressure regulator to make sure that the maximum permissible operating pressure is not exceeded.

Install a bleed valve at the highest point of the cooling circuit, and a drain valve at the lowest point.

The materials that can be used are listed in [Cooling circuit materials \(page 210\)](#).

Coolant temperature control

The temperature of the coolant in the internal cooling circuit must be kept within the limits specified in [Technical data \(page 208\)](#). Note that the minimum temperature is dependent on ambient temperature and relative humidity.

Filling up and bleeding the internal cooling circuit

Both the drive and coolant must be at room temperature before filling up the cooling circuit.



WARNING!

Make sure that the maximum permissible operating pressure is not exceeded. When necessary regulate the pressure to appropriate level by draining excess coolant out of the system.



WARNING!

Bleeding of the cooling circuit is very important and has to be done with great care. Air bubbles in the cooling circuit may reduce or completely block coolant flow and lead to overheating. Let the air out of the cooling system while filling in coolant and, eg. after any power module replacements.

■ **Drive line-ups with an ACS880-1007LC cooling unit**

Obey the filling up and bleeding instructions in [ACS880-1007LC cooling unit user's manual \(3AXD50000129607 \[English\]\)](#).

■ **Drive line-ups with a custom cooling unit**

Note:

- In filling up the system, the drain valves in the line-up are used only to vent the air from the circuit so that it can be displaced by the coolant. The actual bleeding of the circuit must be done via an external bleed valve installed at the highest point of the cooling circuit. The most practical location for the valve is usually near or at the cooling unit.
 - Observe the instructions given by the manufacturer of the cooling unit. Pay special attention to filling up and bleeding the pumps properly as they may be damaged if operated when dry.
 - Draining coolant into the sewer system is not allowed.
1. Open the bleed valve at the cooling unit.
 2. Open the inlet valve and the outlet-side drain valve of one cubicle. Keep the outlet valve and the inlet-side drain valve closed.
 3. Attach a hose to the outlet-side drain valve and lead it into a suitable container.
 4. Fill the circuit with coolant. For the coolant specification, refer to section [Coolant specification \(page 208\)](#).
To minimize foaming, do not exceed the filling flow rate of 5 l/min (1.3 US gallon/min).
 5. As the piping and modules in the cubicle fills up, coolant starts to flow from the hose. Let some coolant flow out, then close the drain valve.
 6. Close the inlet valve.
 7. Repeat steps 2...6 for all cubicles in the line-up.
 8. Open the inlet and outlet valves in all cubicles. Let any air remaining in the system out through the bleed valve at the cooling unit.
-

9. Close the bleed valve at the cooling unit.
10. Continue to fill in coolant until a base pressure of approximately 250 kPa is achieved.
11. Open the bleed valve of the pump to let out any air.
12. Re-check the pressure and add coolant if necessary.
13. Start the coolant pump. Let any air remaining in the system out through the bleed valve at the cooling unit.
14. After one to two minutes, stop the pump or block the coolant flow with a valve.
15. Re-check the pressure and add coolant if necessary.
16. Repeat steps 13...15 a few times until all air is let out of the cooling circuit. Listen for a humming sound and/or feel the piping for vibration to find out if there is still air left in the circuit.

Draining the internal cooling circuit

The modules in each cubicle can be drained through the drain valves without draining the whole internal cooling circuit.



WARNING!

Hot, pressurized coolant can be present in the cooling circuit. Do not work on the cooling circuit before the pressure is released by stopping the pumps and draining coolant.

1. Attach hoses to each drain valve in the cubicle to be drained. Lead the hoses into a suitable container. Make sure the ends of the hoses are not immersed in coolant at any point so that air can displace the coolant in the system.
2. Open the drain valves. Wait until all coolant has drained.

Note: Draining coolant into the sewer system is not allowed.
3. If required, dry the piping with compressed oil-free air of less than 6 bar.
4. If the drive is to be stored in temperatures below 0 °C (32 °F),
 - dry the cooling circuit with air,
 - fill the cooling circuit with coolant specified under [Coolant specification \(page 208\)](#).
 - drain the cooling circuit again.

Maintenance intervals

As a general rule, the quality of the coolant should be checked at intervals of two years. This can be done by distributors of Antifrogen® L (see www.clariant.com) if a 250 milliliter sample is provided.

Technical data

■ Coolant specification

Coolant type

Antifrogen® L (by Clariant International Ltd, www.clariant.com) 25% or 50% mixture, available from Clariant distributors and ABB Service representatives.

Do not dilute the coolant. It is ready to use.

Antifrogen® L 25% mixture is usable in storage temperatures down to -16 °C (3.2 °F).
Antifrogen® L 50% mixture is usable in storage temperatures down to -40 °C (-40 °F).

Note that operation below 0 °C (32 °F) is not permitted regardless of the freezing point of the coolant.



WARNING!

The warranty does not cover damage that occurs from the use of incorrect coolant.

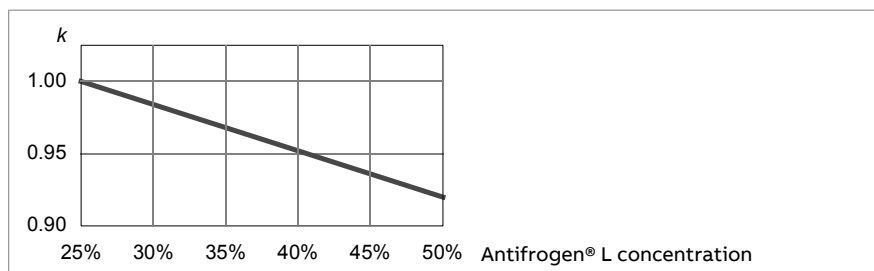
■ Temperature limits

Ambient temperature: See the technical data of the drive/unit.

Freeze protection: The freezing point of the coolant is determined by the concentration of heat transfer fluid in the mixture.

The higher the concentration of heat transfer fluid, the higher the viscosity of the coolant. This results in a higher pressure loss in the system. See [Pressure limits \(page 210\)](#).

The nominal current ratings of drive system modules apply to an Antifrogen® L / water solution of 25/75% (volume). With the Antifrogen® L concentration between 25% and 50%, the drive output current must be derated by 1/3 percentage point per 1 p.p. increase in Antifrogen® L concentration. The drawing below shows the derating factor (k) in relation to Antifrogen® L concentration.



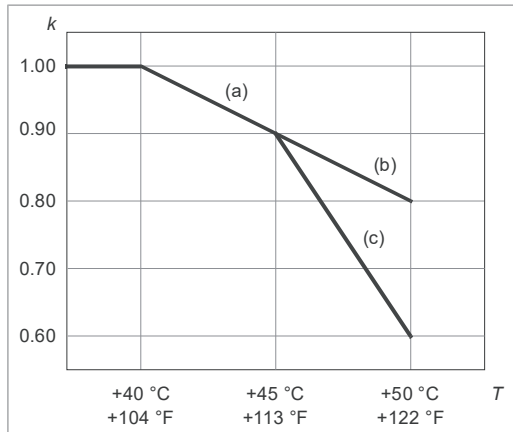
Incoming coolant temperature:

- 0...40 °C (32...104 °F): no drive output current derating required
- 40...45 °C (104...113 °F): drive output current must be derated by 2 percentage points per 1 °C (1.8 °F) temperature increase, as shown by curve (a).
- 45...50 °C (113...122 °F):
 - If components with a maximum operating temperature of 55 °C (131 °F) are installed in the same space as the drive modules, drive output current must

be derated by 6 percentage points per 1 °C (1.8 °F) temperature increase, as shown by curve (c).

- If there are no components with a maximum operating temperature of 55 °C (131 °F) installed in the same space as the drive modules, drive output current must be derated by 2 percentage points per 1 °C (1.8 °F) temperature increase, as shown by curve (b).

The drawing below shows the derating factor (k) in relation to coolant temperature.



Condensation is not permitted. The minimum coolant temperature to avoid condensation (at an atmospheric pressure of 1 bar) is shown below as a function of relative humidity (RH) and ambient temperature (T_{air}).

T_{air} (°C)	Min. T_{coolant} (°C)				
	RH = 95%	RH = 80%	RH = 65%	RH = 50%	RH = 40%
5	4.3	1.9	-0.9	-4.5	-7.4
10	9.2	6.7	3.7	-0.1	-3.0
15	14.2	11.5	8.4	4.6	1.5
20	19.2	16.5	13.2	9.4	6.0
25	24.1	21.4	17.9	13.8	10.5
30	29.1	26.2	22.7	18.4	15.0
35	34.1	31.1	27.4	23.0	19.4
40	39.0	35.9	32.2	27.6	23.8
45	44.0	40.8	36.8	32.1	28.2
50	49.0	45.6	41.6	36.7	32.8
55	53.9	50.4	46.3	42.2	37.1
	= Not permitted as standard but the coolant temperature must be 0 °C (32 °F) or more.				
Example:	At an air temperature of 45 °C and relative humidity of 65% the coolant temperature must not be less than +36.8 °C				

Maximum temperature rise: Depends on heat losses and mass flow. Typically 10 °C (18 °F) with nominal losses and flow.

■ Pressure limits

Base pressure: 250 kPa (recommended); 300 kPa (maximum). “Base pressure” denotes the pressure of the system compared with the atmospheric pressure when the cooling circuit is filled with coolant.

Air counterpressure in expansion vessel (with ACS880-1007LC cooling unit): 80 kPa

Design pressure (PS): 600 kPa

Nominal pressure difference: 120 kPa with Antifrogen® L 25% coolant solution, 140 kPa with Antifrogen® L 50% coolant solution. This has to be taken into account when dimensioning the liquid cooling circuit.

Maximum pressure difference: 160 kPa

■ Coolant flow rate limits

The maximum coolant flow rate for all drive equipment is $1.3 \times$ nominal. See the technical data chapter for nominal values.

■ Cooling circuit materials

Materials used in the internal cooling circuit are listed below.

- stainless steel AISI 316L (UNS 31603)
- heavy gauge aluminum
- plastic materials such as PA, PEX and PTFE

Note: PVC hoses are not suitable for use with antifreeze.

- rubber gasketing NBR (nitrile rubber).



WARNING!

If you connect external piping to the internal cooling circuit, use only materials that are specified above. Other materials can cause galvanic corrosion. If the external piping contains other materials, use a cooling unit with a heat exchanger (for example, ACS880-1007LC) to keep the external piping separate from the internal cooling circuit.

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Technical data

Contents of this chapter

This chapter contains technical data for ACS880-1604LC DC/DC converter modules.

Ratings

ACS880-1604LC-...	Frame	No-overload use							
		I_{DC} input	I_{rms} out-put	$P_{contmax}$	$P_{contmax}$	I_{max} output	S_n	I_{p2p}	f_{SW} out
		A (DC)	A (DC)	kW	hp	A (DC)	kVA	A	Hz
$U_n = 400\text{ V}$									
0150A-3	R7i	147	150	76	102	188	76	7	12000
0250A-3	R7i	244	250	127	171	313	127	7	12000
0350A-3	R7i	342	350	178	239	438	178	7	12000
0450A-3	R7i	439	450	229	307	563	229	7	12000
0550A-3	R7i	537	550	280	375	688	280	7	12000
0700A-3	2×R7i	682	700	356	478	875	356	4	24000
0900A-3	2×R7i	877	900	458	614	1125	458	4	24000
1100A-3	2×R7i	1073	1100	560	751	1375	560	4	24000
$U_n = 500\text{ V}$									
0150A-5	R7i	147	150	95	128	188	95	9	12000
0250A-5	R7i	244	250	159	213	313	159	9	12000
0350A-5	R7i	341	350	223	299	438	223	9	12000
0450A-5	R7i	439	450	286	384	563	286	9	12000
0550A-5	R7i	536	550	350	469	688	350	9	12000
0700A-5	2×R7i	682	700	446	597	875	446	5	24000

ACS880-1604LC-...	Frame	No-overload use							
		I_{DC} input	I_{rms} out-put	$P_{contmax}$	$P_{contmax}$	I_{max} output	S_n	I_{p2p}	f_{sw} out
		A (DC)	A (DC)	kW	hp	A (DC)	kVA	A	Hz
0900A-5	2×R7i	876	900	572	768	1125	572	5	24000
1100A-5	2×R7i	1071	1100	700	939	1375	700	5	24000
$U_n = 690$ V									
0150A-7	R7i	147	150	132	177	188	132	13	12000
0200A-7	R7i	196	200	176	236	250	176	13	12000
0300A-7	R7i	293	300	263	353	375	263	13	12000
0399A-7	R7i	390	400	351	471	500	351	13	12000
0599A-7	2×R7i	585	600	527	707	750	527	6	24000
0799A-7	2×R7i	780	800	703	942	1000	703	6	24000
0400A-7	R8i	391	400	351	471	500	351	38	12000
0500A-7	R8i	490	500	439	589	625	439	38	12000
0600A-7	R8i	590	600	527	707	750	527	56	12000
0700A-7	R8i	690	700	615	824	875	615	56	12000
0800A-7	R8i	790	800	703	942	1000	703	56	12000
0900A-7	R8i	880	900	790	1060	1125	790	56	12000
1000A-7	2×R8i	980	1000	878	1178	1250	878	19	24000
1200A-7	2×R8i	1180	1200	1054	1413	1500	1054	28	24000
1400A-7	2×R8i	1370	1400	1230	1649	1750	1230	28	24000
1600A-7	2×R8i	1570	1600	1405	1884	2000	1405	28	24000
1800A-7	2×R8i	1760	1800	1581	2120	2250	1581	28	24000

ACS880-1604LC-...	Frame	Short time overload use		Heavy overload use	
		$I_{\text{short time}}$	$P_{\text{short time}}$	I_{Hd}	P_{Hd}
		A	kW	A	kW
$U_n = 400\text{ V}$					
0150A-3	R7i	94	48	113	58
0250A-3	R7i	156	80	189	96
0350A-3	R7i	219	111	265	135
0450A-3	R7i	281	143	340	173
0550A-3	R7i	344	175	416	212
0700A-3	2×R7i	437	223	529	269
0900A-3	2×R7i	562	286	680	346
1100A-3	2×R7i	687	350	831	423
$U_n = 500\text{ V}$					
0150A-5	R7i	94	60	113	72
0250A-5	R7i	156	99	189	120
0350A-5	R7i	219	139	265	168
0450A-5	R7i	281	179	340	216
0550A-5	R7i	344	219	416	265

ACS880-1604LC-...	Frame	Short time overload use		Heavy overload use	
		$I_{\text{short time}}$	$P_{\text{short time}}$	I_{Hd}	P_{Hd}
		A	kW	A	kW
0700A-5	2×R7i	437	278	529	337
0900A-5	2×R7i	562	358	680	433
1100A-5	2×R7i	687	437	831	529
$U_n = 690 \text{ V}$					
0150A-7	R7i	94	82	113	100
0200A-7	R7i	125	110	151	133
0300A-7	R7i	187	165	227	199
0399A-7	R7i	250	219	302	266
0599A-7	2×R7i	375	329	453	398
0799A-7	2×R7i	500	439	605	531
0400A-7	R8i	250	219	302	266
0500A-7	R8i	312	274	378	332
0600A-7	R8i	375	329	453	398
0700A-7	R8i	437	384	529	465
0800A-7	R8i	500	439	605	531
0900A-7	R8i	562	494	680	597
1000A-7	2×R8i	625	549	756	664
1200A-7	2×R8i	750	658	907	797
1400A-7	2×R8i	874	768	1058	929
1600A-7	2×R8i	999	878	1209	1062
1800A-7	2×R8i	1124	987	1360	1195

U_n Nominal supply voltage of the drive

$I_{\text{DC input}}$ Maximum continuous DC input current from DC bus

$I_{\text{rms output}}$ Maximum continuous output current to/from energy storage

P_{contmax} Maximum continuous output power to/from energy storage

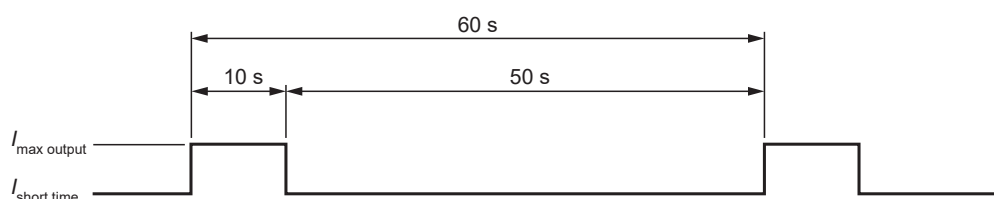
$I_{\text{max output}}$ Maximum output current to/from energy storage. Available for 10 seconds at start, otherwise as long as permitted by drive temperature.

S_n Nominal apparent power

I_{p2p} Peak-to-peak value of output current ripple measured after the filter

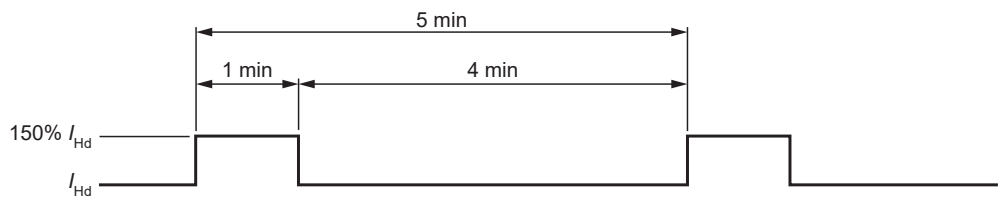
$f_{\text{sw out}}$ Switching frequency at output terminals (energy storage connection) measured after the filter

$I_{\text{short time}}$ Continuous output current allowing 10 s of $I_{\text{max output}}$ every 60 s



$P_{\text{short time}}$ Continuous output power allowing 10 s of $I_{\text{max output}}$ every 60 s

I_{Hd} Continuous output current allowing 150% I_{Hd} for 1 min every 5 min

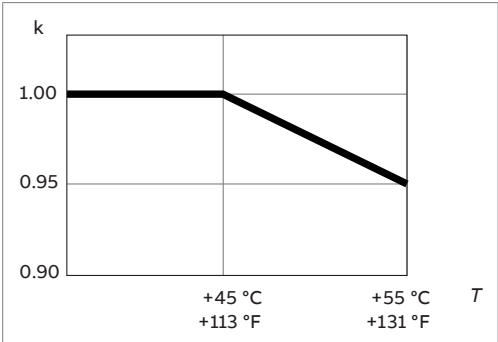


P_{Hd} Continuous output power allowing 150% I_{Hd} for 1 min every 5 min

■ **Derating**

Surrounding air temperature derating

In the temperature range +45...55 °C (+113...131 °F), the rated output current is derated by 0.5 percentage points 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.

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

For coolant derating, refer to section [Temperature limits \(page 208\)](#).

Type equivalence table

Converter module type	Basic module type			BDCL filter	
	ACS880-104LC-...	Frame size	Qty	Type	Qty
$U_n = 400\text{ V}$					
0150A-3	0120A-3	R7i	1	BDCL-13LC-7	1
0250A-3	0140A-3	R7i	1	BDCL-13LC-7	1
0350A-3	0210A-3	R7i	1	BDCL-13LC-7	1
0450A-3	0250A-3	R7i	1	BDCL-13LC-7	1
0550A-3	0470A-3	R7i	1	BDCL-13LC-7	1
0700A-3	0210A-3	R7i	2	BDCL-13LC-7	2
0900A-3	0250A-3	R7i	2	BDCL-13LC-7	2

Converter module type	Basic module type			BDCL filter	
ACS880-1604LC-...	ACS880-104LC-...	Frame size	Qty	Type	Qty
1100A-3	0470A-3	R7i	2	BDCL-13LC-7	2
$U_n = 500 \text{ V}$					
0150A-5	0120A-5	R7i	1	BDCL-13LC-7	1
0250A-5	0140A-5	R7i	1	BDCL-13LC-7	1
0350A-5	0200A-5	R7i	1	BDCL-13LC-7	1
0450A-5	0240A-5	R7i	1	BDCL-13LC-7	1
0550A-5	0460A-5	R7i	1	BDCL-13LC-7	1
0700A-5	0200A-5	R7i	2	BDCL-13LC-7	2
0900A-5	0240A-5	R7i	2	BDCL-13LC-7	2
1100A-5	0460A-5	R7i	2	BDCL-13LC-7	2
$U_n = 690 \text{ V}$					
0150A-7	0100A-7	R7i	1	BDCL-13LC-7	1
0200A-7	0140A-7	R7i	1	BDCL-13LC-7	1
0300A-7	0220A-7	R7i	1	BDCL-13LC-7	1
0399A-7	0389A-7	R7i	1	BDCL-13LC-7	1
0599A-7	0220A-7	R7i	2	BDCL-13LC-7	2
0799A-7	0389A-7	R7i	2	BDCL-13LC-7	2
0400A-7	0480A-7	R8i	1	BDCL-14LC-7	1
0500A-7	0530A-7	R8i	1	BDCL-14LC-7	1
0600A-7	0600A-7	R8i	1	BDCL-15LC-7	1
0700A-7	0670A-7	R8i	1	BDCL-15LC-7	1
0800A-7	0750A-7	R8i	1	BDCL-15LC-7	1
0900A-7	0850A-7	R8i	1	BDCL-15LC-7	1
1000A-7	0530A-7	R8i	2	BDCL-14LC-7	2
1200A-7	0600A-7	R8i	2	BDCL-15LC-7	2
1400A-7	0670A-7	R8i	2	BDCL-15LC-7	2
1600A-7	0750A-7	R8i	2	BDCL-15LC-7	2
1800A-7	0850A-7	R8i	2	BDCL-15LC-7	2

Fuses

The fuses are given in the ordering information.

Filter module data

Filter module type	Nominal inductance / phase	DC resistance / phase
	μH	ohm
BDCL-13LC	1610	8
BDCL-14LC	540	7
BDCL-15LC	360	7

Losses, cooling data and noise

ACS880-1604LC-...	Frame	Losses ¹⁾			Noise		Efficiency ²⁾
		P_{loss} (converter)	P_{loss} (filter)	P_{loss} total	L_{WA} ³⁾	L_{PA} ⁴⁾	
		kW	kW	kW	dBA	dBA	%
$U_n = 400 \text{ V}$							
0150A-3	R7i	0.5	0.3	0.9	*	*	99.0
0250A-3	R7i	0.8	0.5	1.3	*	*	99.0
0350A-3	R7i	1.1	0.7	1.9	*	*	99.0
0450A-3	R7i	1.5	1.0	2.5	*	*	98.9
0550A-3	R7i	1.7	1.4	3.2	*	*	98.8
0700A-3	2×R7i	2.1	1.4	3.6	*	*	99.0
0900A-3	2×R7i	2.8	2.0	4.8	*	*	98.9
1100A-3	2×R7i	3.3	2.7	6.1	*	*	98.8
$U_n = 500 \text{ V}$							
0150A-5	R7i	0.6	0.5	1.1	*	*	99.1
0250A-5	R7i	1.0	0.6	1.6	*	*	99.1
0350A-5	R7i	1.3	0.8	2.1	*	*	99.1
0450A-5	R7i	1.7	1.1	2.8	*	*	99.0
0550A-5	R7i	2.0	1.5	3.5	*	*	99.0
0700A-5	2×R7i	2.5	1.6	4.1	*	*	99.1
0900A-5	2×R7i	3.2	2.2	5.4	*	*	99.0
1100A-5	2×R7i	3.8	2.9	6.7	*	*	99.0
$U_n = 690 \text{ V}$							
0150A-7	R7i	1.2	0.7	1.8	*	*	98.9
0200A-7	R7i	1.5	0.8	2.3	*	*	98.9
0300A-7	R7i	2.0	1.0	3.0	*	*	98.9
0399A-7	R7i	2.7	1.2	3.9	*	*	98.9
0599A-7	2xR7i	3.9	1.9	5.7	*	*	99.0
0799A-7	2xR7i	5.3	2.4	7.6	*	*	98.9
0400A-7	R8i	3.3	0.9	4.2	82	64	98.8
0500A-7	R8i	4.1	1.2	5.3	82	64	98.8
0600A-7	R8i	4.7	1.5	6.2	82	64	98.8
0700A-7	R8i	5.5	1.8	7.3	82	64	98.8
0800A-7	R8i	6.4	2.1	8.5	82	64	98.8
0900A-7	R8i	7.2	2.5	9.7	82	64	98.8
1000A-7	2×R8i	8.9	2.3	11.2	84	66	98.7
1200A-7	2×R8i	10.6	3.0	13.6	84	66	98.7
1400A-7	2×R8i	12.7	3.6	16.3	84	66	98.7
1600A-7	2×R8i	14.8	4.2	19.0	84	66	98.6
1800A-7	2×R8i	17.1	4.9	22.0	84	66	98.6

¹⁾ These losses are not calculated according to the ecodesign standard IEC 61800-9-2.

- 2) Efficiency at nominal current and nominal power (U_{DC} typical and U_{ES} at 90% of U_{DC}).
The efficiency is not calculated according to the ecodesign standard IEC 61800-9-2.
- 3) Measured in a hemi-anechoic room in accordance with ISO 9614-2 standard.
- 4) Estimated sound pressure level at 1 m (3.3 ft) distance from the cabinet.

* Data was not available at the time of publication of this manual.

ACS880-1604LC-...	Frame	Coolant volume		Coolant flow rate		Pressure loss
		Module(s)	BDCL filter	Module(s)	BDCL filter	kPa
		l	l	l/min	l/min	
U _n = 400 V						
0150A-3	R7i	0.2	0.8	13	2	120
0250A-3	R7i	0.2	0.8	13	2	120
0350A-3	R7i	0.2	0.8	13	2	120
0450A-3	R7i	0.2	0.8	13	2	120
0550A-3	R7i	0.2	0.8	13	2	120
0700A-3	2×R7i	0.4	1.6	26	4	120
0900A-3	2×R7i	0.4	1.6	26	4	120
1100A-3	2×R7i	0.4	1.6	26	4	120
U _n = 500 V						
0150A-5	R7i	0.2	0.8	13	2	120
0250A-5	R7i	0.2	0.8	13	2	120
0350A-5	R7i	0.2	0.8	13	2	120
0450A-5	R7i	0.2	0.8	13	2	120
0550A-5	R7i	0.2	0.8	13	2	120
0700A-5	2×R7i	0.4	1.6	26	4	120
0900A-5	2×R7i	0.4	1.6	26	4	120
1100A-5	2×R7i	0.4	1.6	26	4	120
U _n = 690 V						
0150A-7	R7i	0.2	0.8	13	2	120
0200A-7	R7i	0.2	0.8	13	2	120
0300A-7	R7i	0.2	0.8	13	2	120
0399A-7	R7i	0.2	0.8	13	2	120
0599A-7	2xR7i	0.4	1.6	26	4	120
0799A-7	2xR7i	0.4	1.6	26	4	120
0400A-7	R8i	1.9	2.6	16	20	120
0500A-7	R8i	1.9	2.6	16	20	120
0600A-7	R8i	1.9	2.6	16	20	120
0700A-7	R8i	1.9	2.6	16	20	120
0800A-7	R8i	1.9	2.6	16	20	120
0900A-7	R8i	1.9	2.6	16	20	120
1000A-7	2×R8i	3.8	5.2	32	40	120
1200A-7	2×R8i	3.8	5.2	32	40	120
1400A-7	2×R8i	3.8	5.2	32	40	120
1600A-7	2×R8i	3.8	5.2	32	40	120
1800A-7	2×R8i	3.8	5.2	32	40	120

Dimensions and weights

For dimensions, refer to chapter [Dimension drawings](#).

This table gives the module weights.

Module type	Weight	
	kg	lbs
DC/DC converter modules		
Frame R7i	32	70
Frame R8i	63	139
Filter modules		
BDCL-13LC-7 filter module	125	275
BDCL-14LC-7 filter module	172	379
BDCL-15LC-7 filter module	181	399

Free space requirements

- Left and right sides, front and back: None
- Below: Space needed by heat exchanger and cooling fan.
- Above: The cooling air flow through the module should not be restricted.

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

Input power (DC bus) connection

Voltage (U_1)	ACS880-1604LC-xxxxx-3 = 566 V DC. This is indicated in the type designation label as typical input voltage levels 566 V DC. ACS880-1604LC-xxxxx-5 = 566...707 V DC. This is indicated in the type designation label as typical input voltage levels 566 / 679 / 707 V DC. ACS880-1604LC-xxxxx-7 = 742...976 V DC. This is indicated in the type designation label as typical input voltage levels 742 / 849 / 976 V DC (849 V DC for UL/CSA).
Input terminals, converter module	<u>Frame R7i</u>: Quick connector. <u>Frame R8i</u>: M12. Torque: 70 N·m (52 lbf·ft). Maximum intrusion into module 20 mm (0.8 in).
Input terminals, filter module	<u>BDCL-13LC</u>: M12. Torque: 70 N·m (52 lbf·ft). <u>BDCL-14LC and BDCL-15LC</u>: M10. Torque: 42 N·m (31 lbf·ft). Maximum intrusion into module 20 mm (0.8 in).

Output power (energy storage) connection

Voltage (U_2)	ACS880-1604LC-xxxxx-3 = Maximum output voltage 50 V...95% of U_{DC} (Drive DC voltage in the DC bus). This is indicated in the type designation label as typical output voltage range 50...509 V DC. ACS880-1604LC-xxxxx-5 = Maximum output voltage 50 V...95% of U_{DC} (Drive DC voltage in the DC bus). This is indicated in the type designation label as typical output voltage range 50...509 / 611 / 636 V DC. ACS880-1604LC-xxxxx-7 = Maximum output voltage 50 V...95% of U_{DC} (Drive DC voltage in the DC bus). This is indicated in the type designation label as typical output voltage range 50...668 / 764 / 878 V DC (764 V DC for UL/CSA). Recommended output voltage 150 V...80% of U_{DC}.
Current	See the ratings data.
Output terminals, converter module	Quick connector.
Maximum energy storage cable length	100 m (328 ft)

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	
mm ²	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	
mm ²	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
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

Control accuracy – Current and voltage control performance data

Current control dynamic response	Step response time < 10 ms for a reference step 0...50% of the drive nominal current
Current control accuracy (static)	Current error < 1% of the drive nominal current rating For the DC current ripple, refer to the ratings data.
Energy storage voltage control accuracy (static)	Voltage error < 1% of the drive nominal voltage (converter with the optional BAMU voltage/current measurement unit) Note: If the converter does not include the BAMU voltage/current measurement unit, the voltage measurement accuracy depends on the customer's measurement device.

Control unit connection data

Refer to chapter [The control unit](#).

Coolant connections

Tube fitting, quick coupler for 16/13 mm polyamide (PA) pipe.

Protection classes

Degrees of protection (IEC/EN 60529)	IP00
Enclosure types (UL 50/50E)	UL Open Type
Overvoltage category (IEC/EN 60664-1)	III
Protective class (IEC/EN 61800-5-1)	I

Energy efficiency data (ecodesign)

Energy efficiency data is not provided for the drive/unit. Multidrive 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).

Ambient conditions

This section gives the environmental requirements for the converter module. The converter module must be used in a heated indoor controlled environment.

	Operation installed for stationary use	Storage in protective package	Transportation in protective package
Altitude above sea level	0...4000 m (13123 ft)* Output derated above 1000 m (3281 ft). See section Altitude derating. *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 ... +45 °C (+32 ... +113 °F), no condensation allowed. Output derated in the range +45 ... +55 °C (+113 ... +131 °F).	-40 ... +70 °C (-40 ... +158 °F)	-40 ... +70 °C (-40 ... +158 °F)
Relative humidity	Maximum 95%, no condensation allowed No condensation allowed. Maximum allowed relative humidity is 60% in the presence of corrosive gases.	Maximum 95%, no condensation allowed	Maximum 95%, no condensation allowed
Contamination	IEC/EN 60721-3-3:2002: Classification of environmental conditions - Part 3-3: Classification of groups of environmental parameters and their severities - Stationary use of weather protected locations	IEC 60721-3-1:1997	IEC 60721-3-2:1997
Chemical gases	Class 3C2	Class 1C2	Class 2C2
Solid particles	Class 3S1 No conductive dust allowed.	Class 1S3 (packing must support this, otherwise 1S2)	Class 2S2

	Operation installed for stationary use	Storage in protective package	Transportation in protective package
Vibration	IEC 61800-5-1 IEC 60068-2-6:2007, EN 60068-2-6:2008 Environmental testing Part 2: Tests - Test Fc: Vibration (sinusoidal) 10 ... 57 Hz, max. 0.075 mm amplitude 57 ... 150 Hz 1 g Tested in a typical cabinet assembly according to: Max. 1 mm (0.04 in.) (peak value, 5 ... 13.2 Hz), max. 0.7 g (13.2 ... 100 Hz) sinusoidal	IEC/EN 60721-3-1:1997	IEC/EN 60721-3-1:1997
Shock IEC 60068-2-27:2008, EN 60068-2-27:2009 Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock	Not allowed	With packing max. 100 m/s ² (330 ft./s ²) 11 ms	With packing max. 100 m/s ² (330 ft./s ²) 11 ms

Materials

■ Module

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

■ Package materials for module products

This is a complete list of the package materials. The materials vary depending on the frame size (packages do not contain all materials listed below).

- Cardboard (heavy duty quality with wet strength glue in large modules)
- Molded pulp
- Plywood
- Wood
- PP (strapping)
- EPP (foam)
- PE (plastic bag and/or VCI film)
- Metal (fixing clamps, screws).

■ Disposal

The main parts of the drive can be recycled to preserve natural resources and energy. Product parts and materials should be dismantled and separated.

Generally all metals, such as steel, aluminum, copper and its alloys, and precious metals can be recycled as material. Plastics, rubber, cardboard and other packaging material can be used in energy recovery.

Printed circuit boards and 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-lifeservices.

Auxiliary current consumption

Device	U_n	f Hz	I_{cont} A	P_{cont} W	S_{cont} VA
BAMU-12C auxiliary measurement unit	24 V DC $\pm 10\%$	-	0.25	-	-
BCU control unit	24 V DC ($\pm 10\%$)	-	2.0	48	-
UCU control unit	24 V DC (+30%/-20%)	-	2.9	70	-
BSFC-12C charging controller	24 V DC ($\pm 10\%$)	-	0.15	-	-
CIO-01 I/O module	24 V DC (+20%/-15%)	-	0.1	-	-
PDAL2 switch/disconnector interlock coil	24 V DC (+10%/-30%)	-	-	-	9
R7i module: internal electronics	230 V AC (+15%/-20%)	50	0.37	85	-
	115 V AC (+15%/-20%)	60	0.74	85	-
R8i module: internal electronics	230 V AC (+15%/-20%)	50	0.41	95	-
	115 V AC (+15%/-20%)	60	0.83	95	-

■ Cooling fans

Frame size	U_n	f Hz	I_{cont} A
R7i	230 V AC (200...240 V AC)	50/60	0.35
R8i	230 V AC (200...240 V AC)	50/60	1.4
	115 V AC (100...130 V AC)	50/60	2.4

■ Definitions

f	Supply frequency
I_{cont}	Continuous current consumption
I_{start}	Calculated load current at start
P_{cont}	Continuous input power
U_N	Voltage requirement

Applicable standards

Refer to [ACS880 liquid-cooled multidrives modules electrical planning \(3AXD50000048634 \[English\]\)](#).

Markings

Refer to [ACS880 liquid-cooled multidrives modules electrical planning \(3AXD50000048634 \[English\]\)](#).

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.

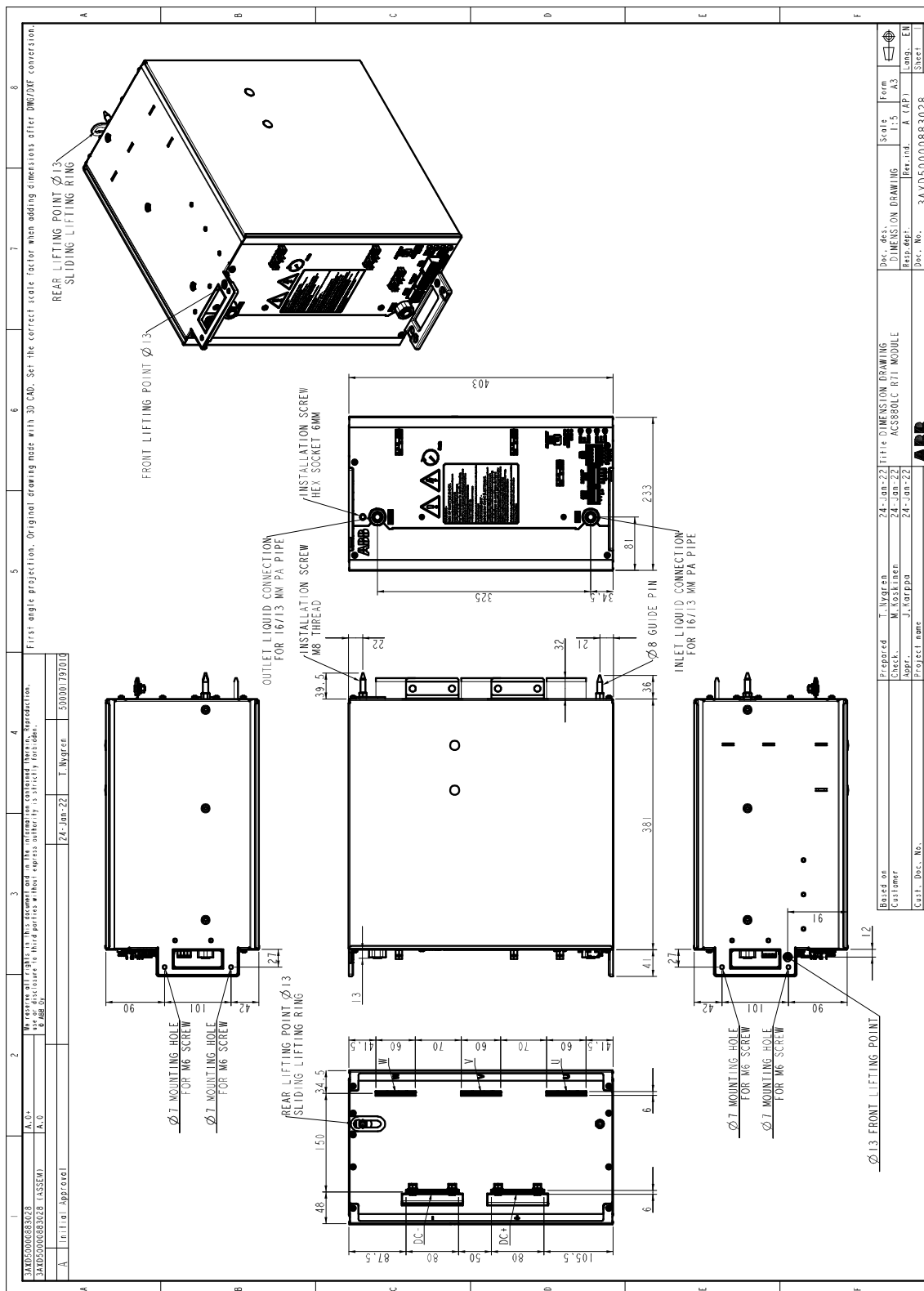
ABB and its affiliates are not liable for damages and/or losses related to such security breaches, any unauthorized access, interference, intrusion, leakage and/or theft of data or information.

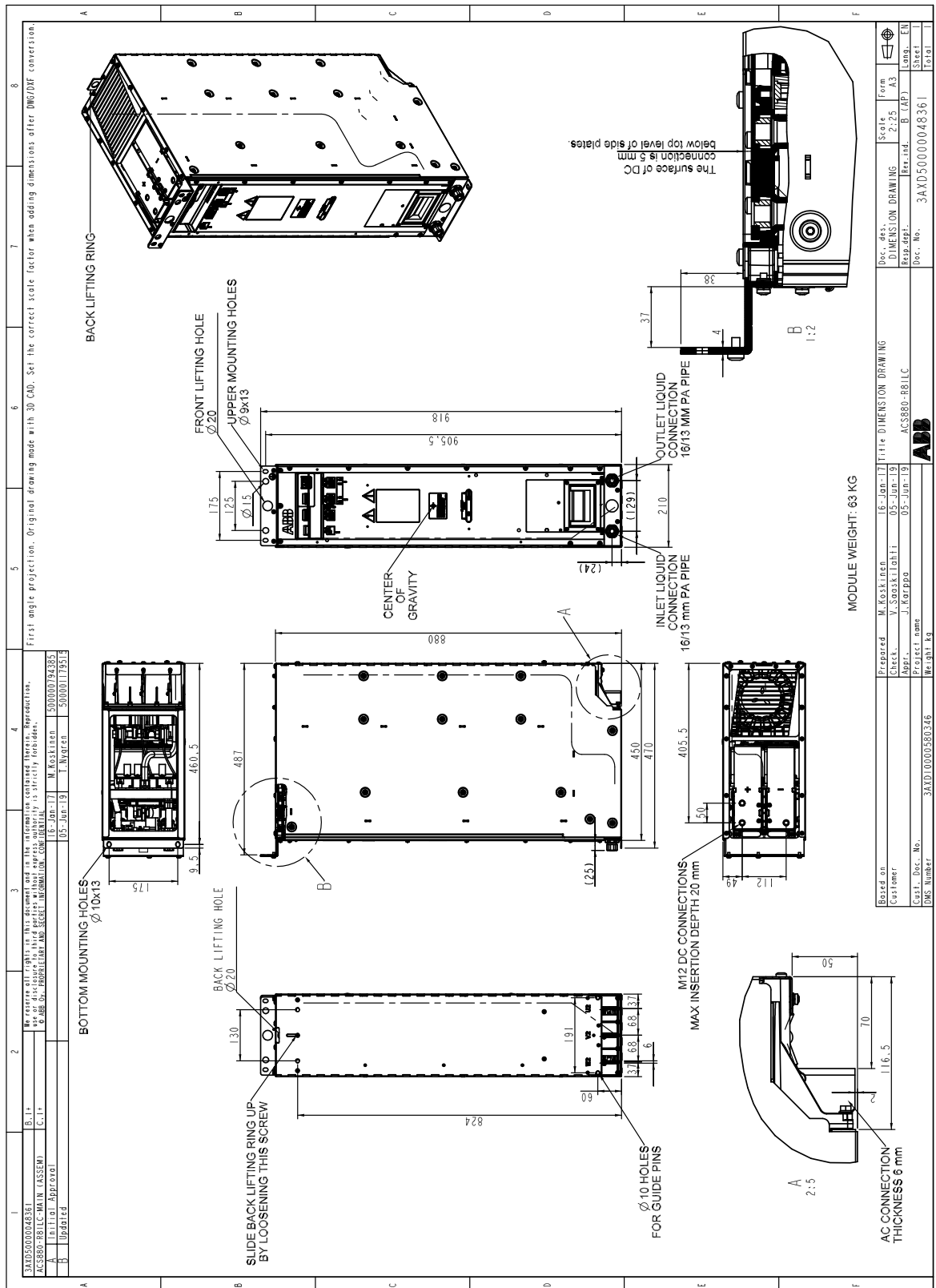
14

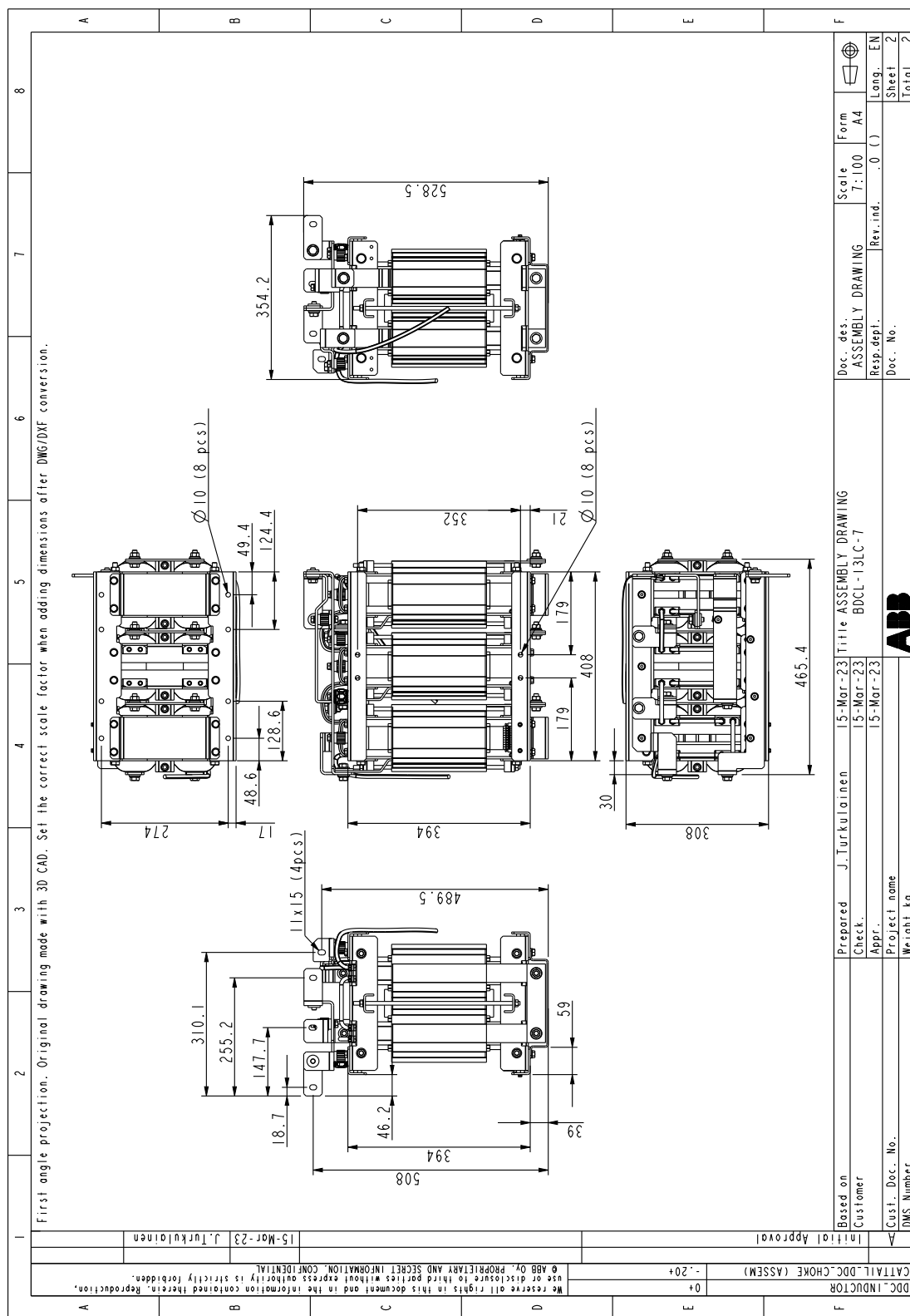
Dimension drawings

Contents of this chapter

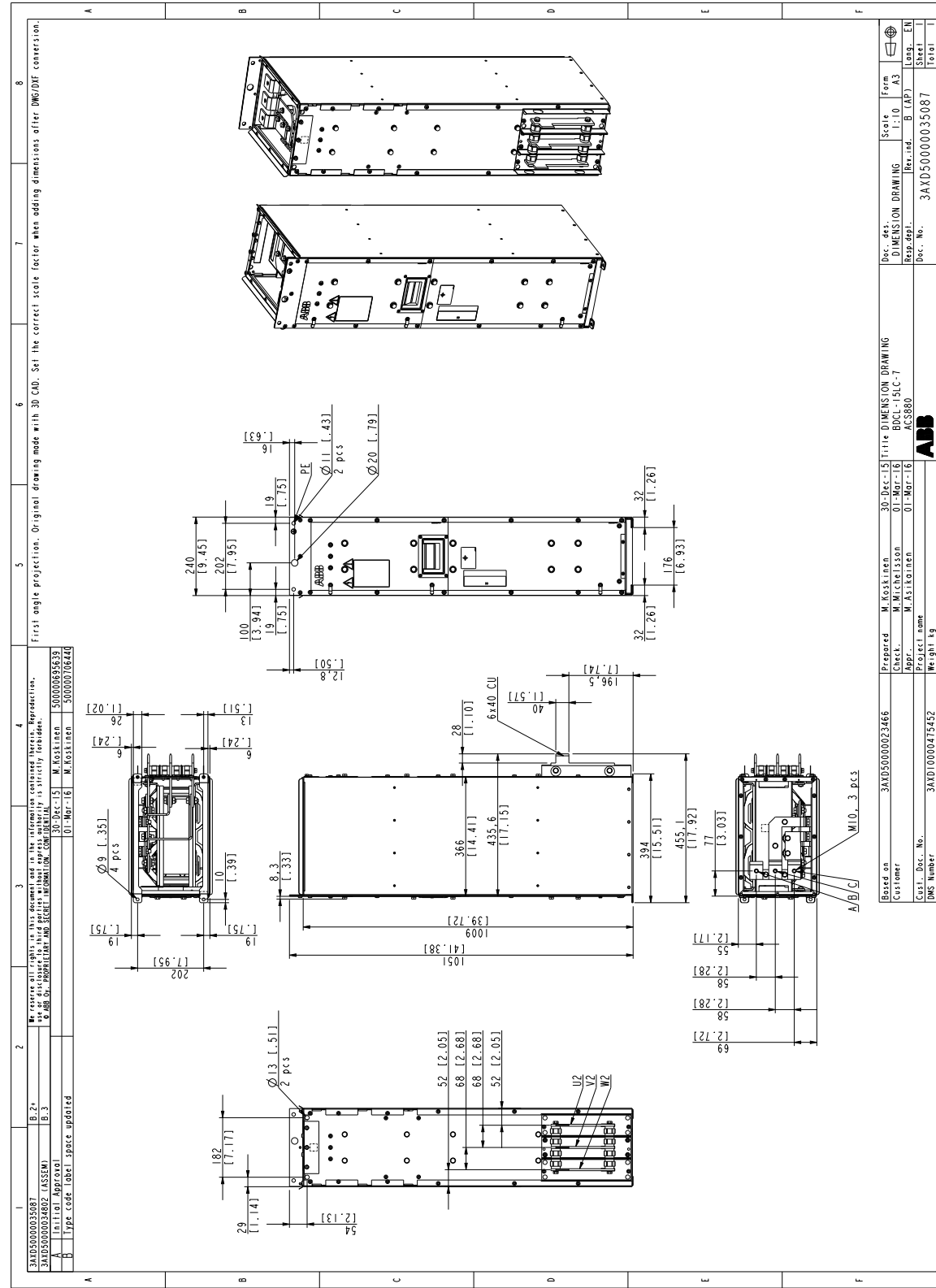
This chapter shows the dimensions of the ACS880-1604LC DC/DC converter modules and accessories.



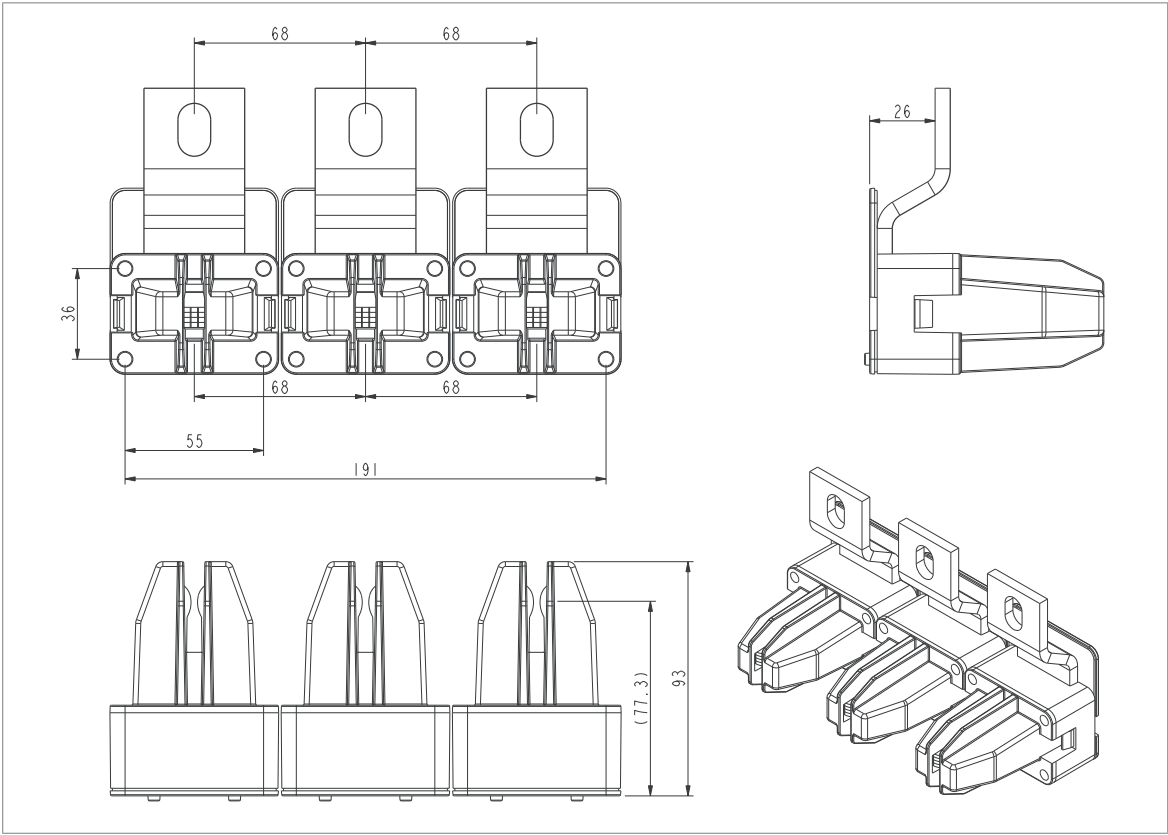




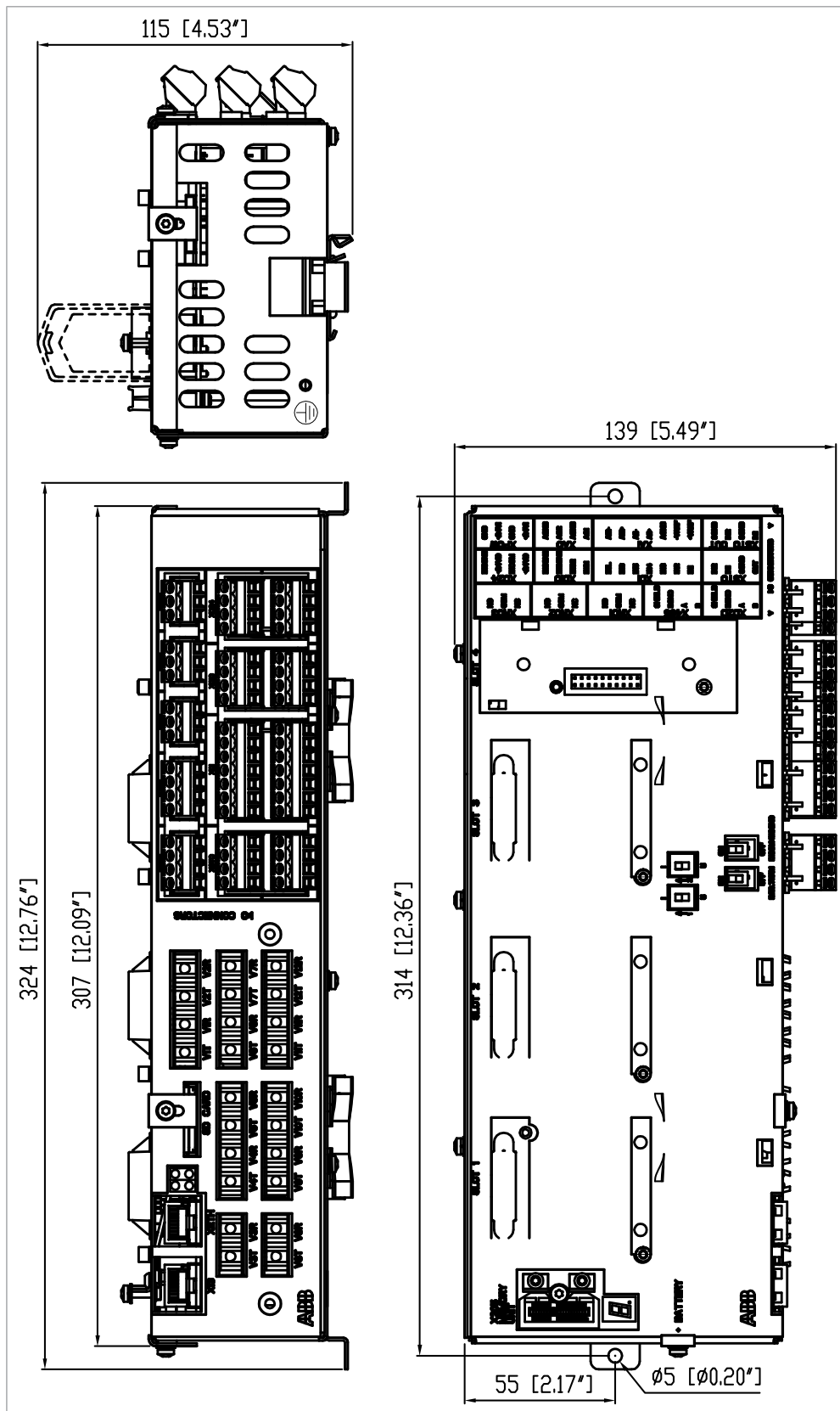
BDCL filter module for R8i DC/DC converter module



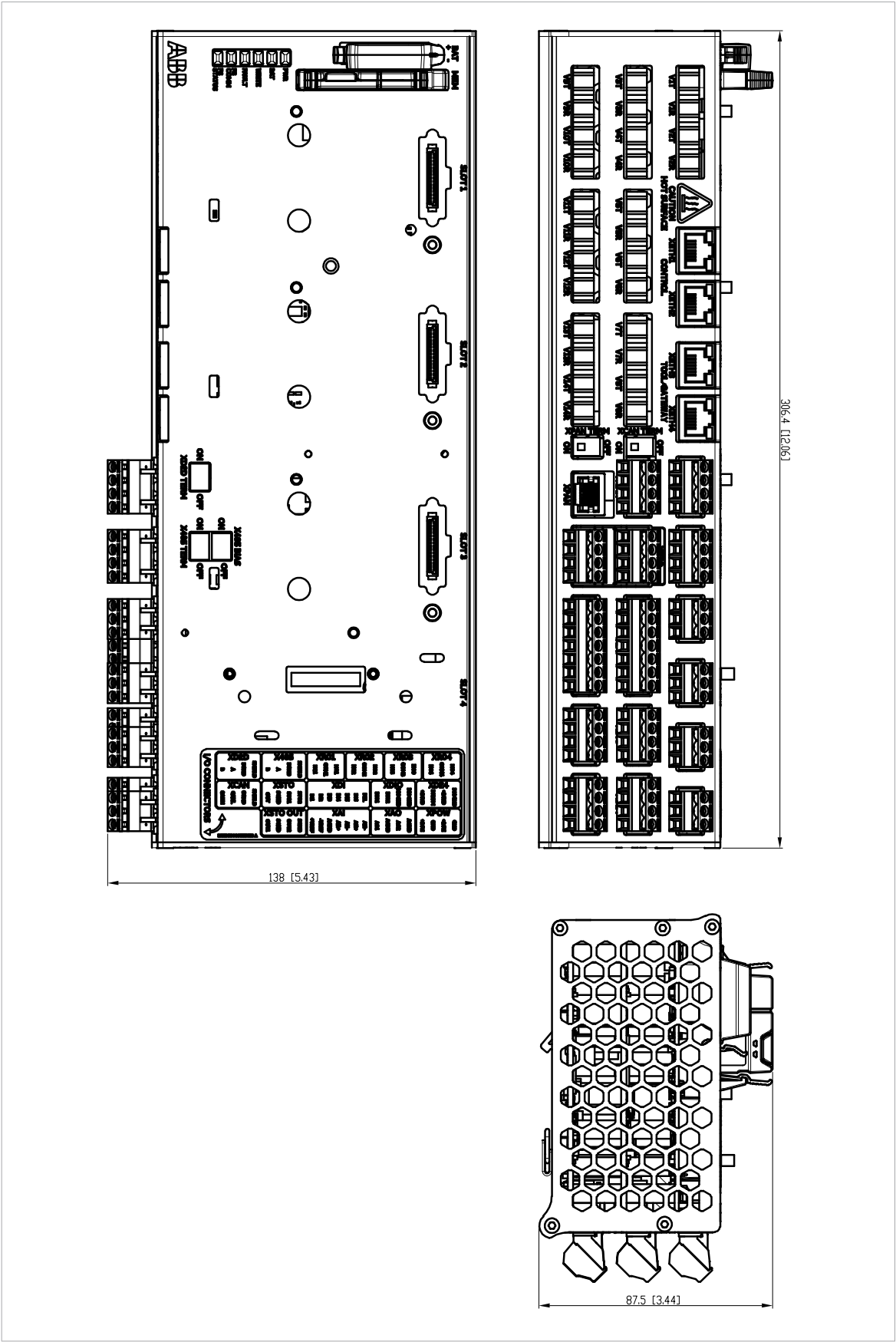
Quick connector



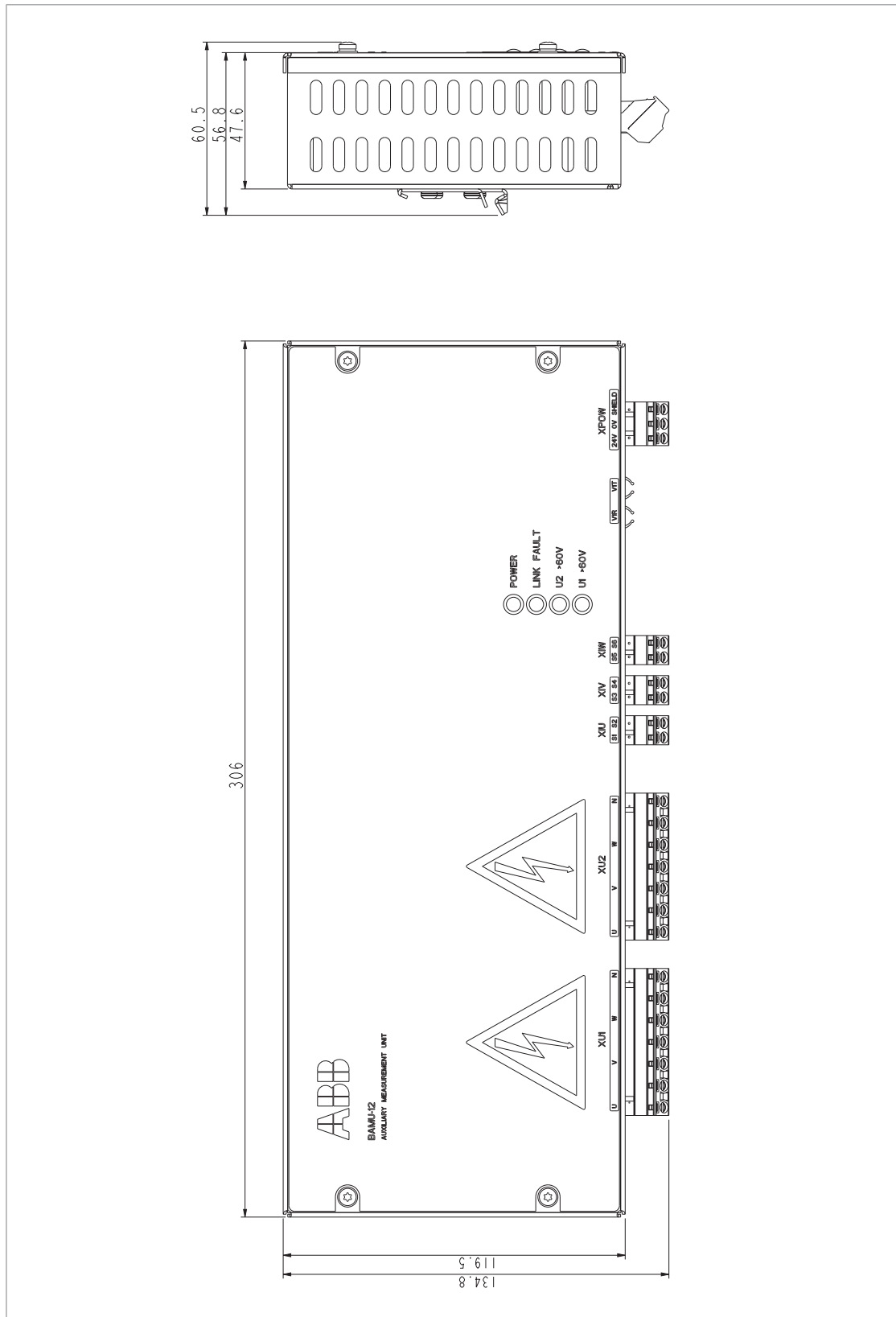
BCU control unit



UCU control unit



BAMU voltage/current measurement unit

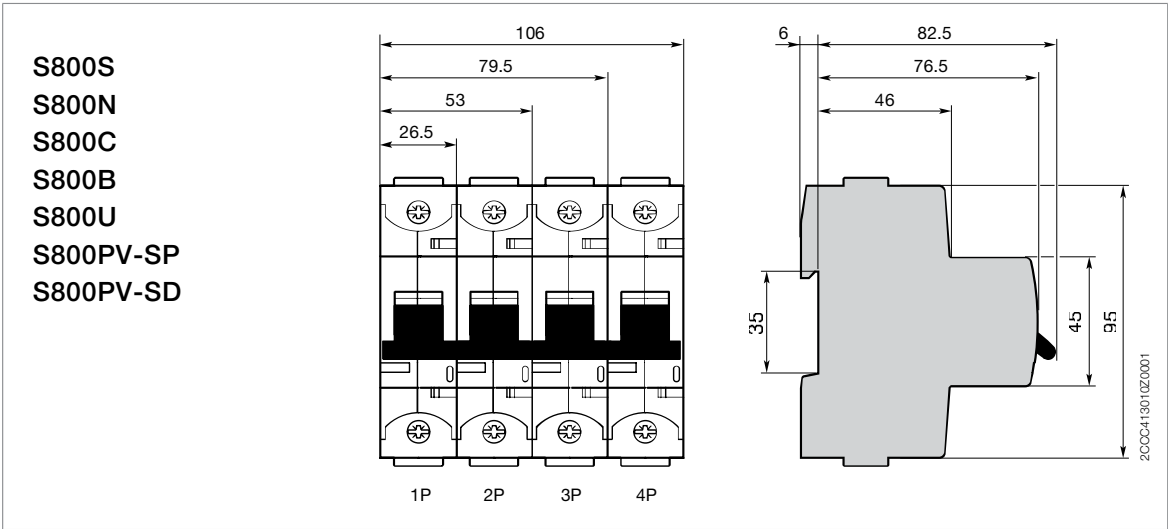


Dimensions in mm

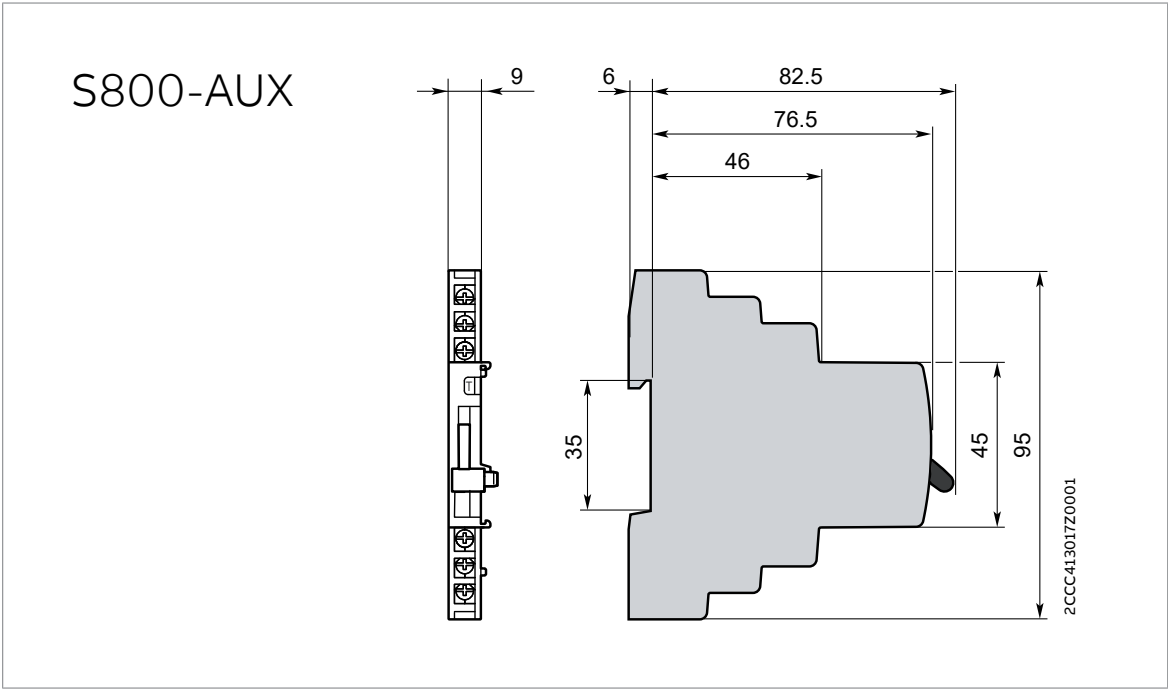
1 mm = 0.0394 in

BAMU accessories

■ Miniature circuit breaker S804S-UCB10



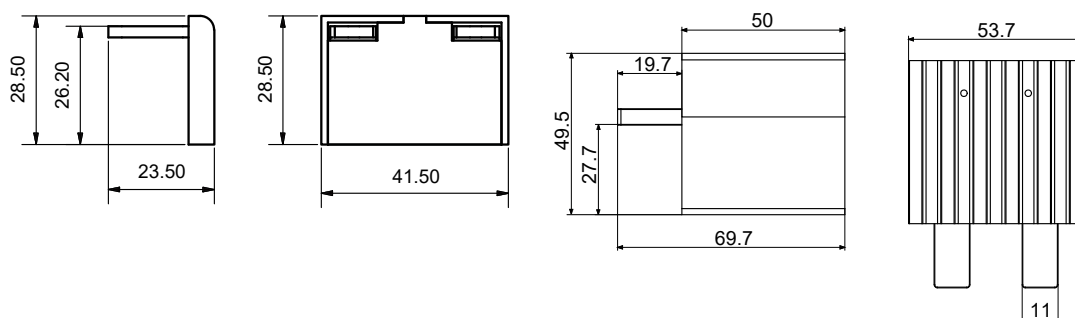
■ Auxiliary contact S800-AUX



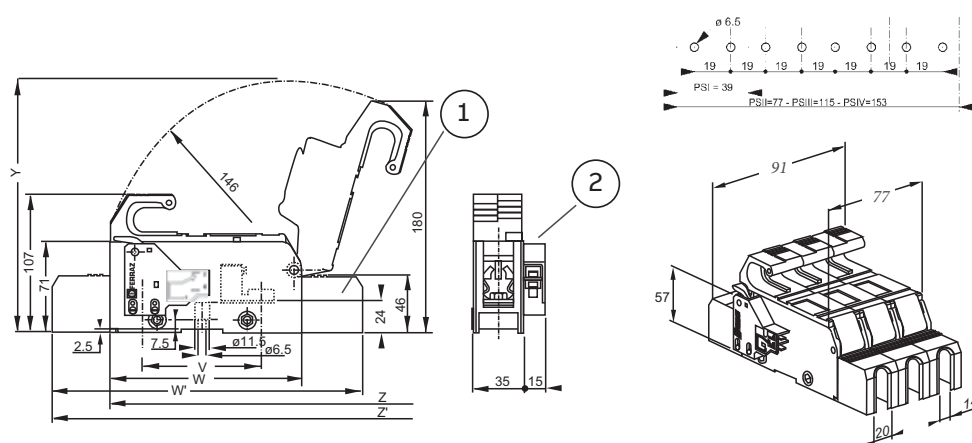
■ Shorting plug S802-LINK50

S802-LINK50

S802-LINK125



■ Mersen PS272PREMCPS fuse disconnecter



1 Twin terminal covers

PS 27

Part #: A 220087

Weight: 30 g

Packaging: 3 twins

2 MC PS

V 93 Connecting distance between centers

W 150 Without terminals cover length

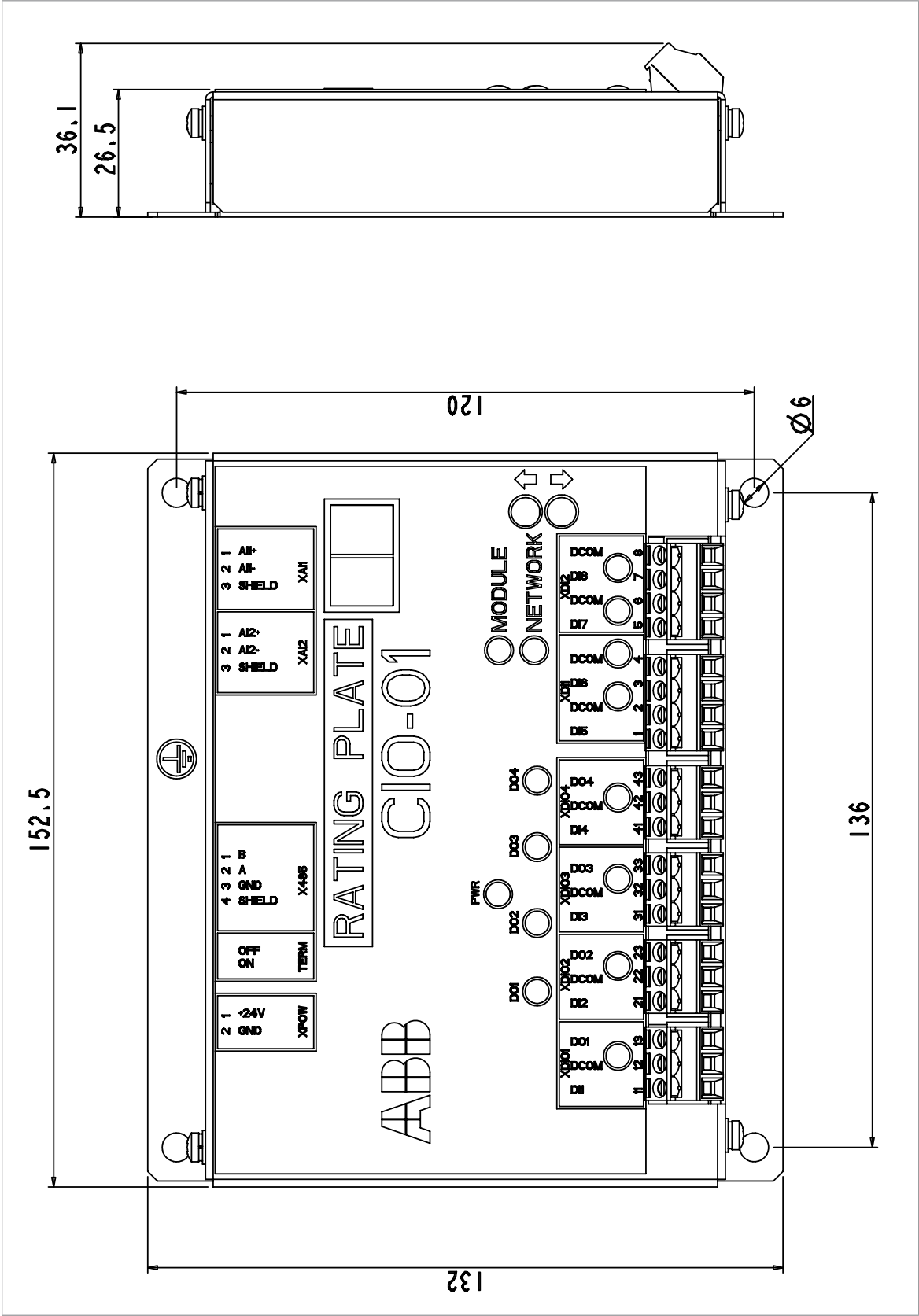
W' 240 With terminals cover length

Y 196 Space factor with a 90° fuse carrier position

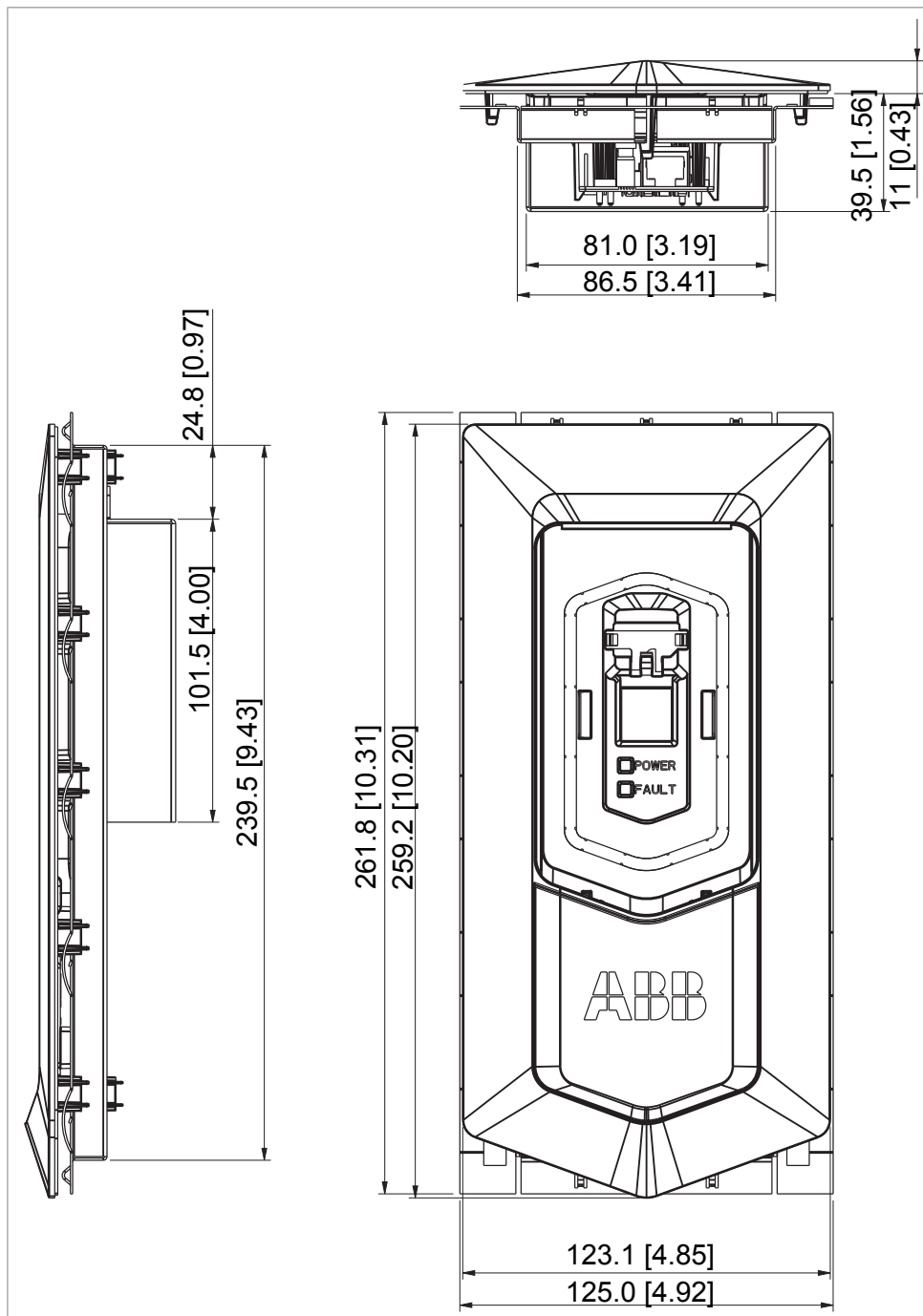
Z 284 Without terminal cover, space factor with a 180° fuse carrier position

Z' 279 With terminal cover, space factor with a 180° fuse carrier position

CIO-01 I/O module



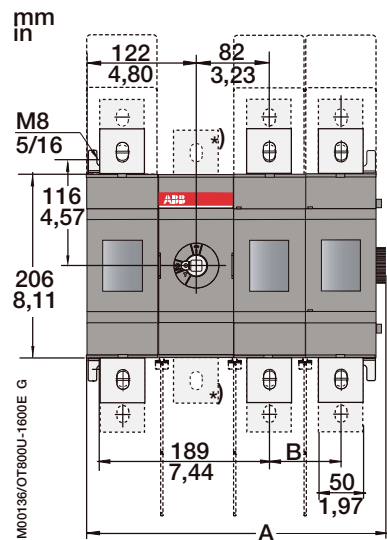
DPMP-01 door mounting kit



Switchgear and charging components

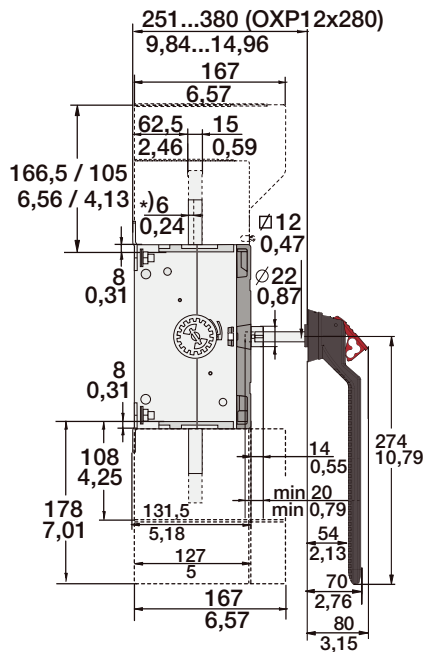
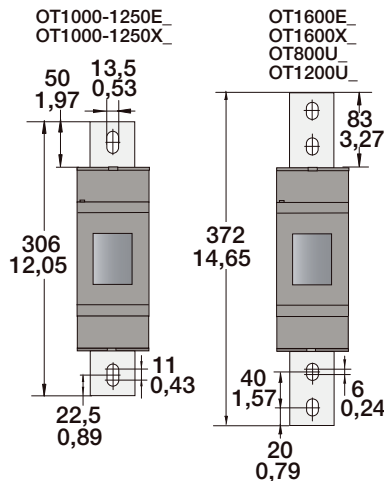
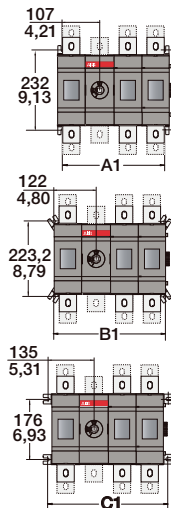
■ DC switch-disconnectors

OT1200U11, OT1600E11



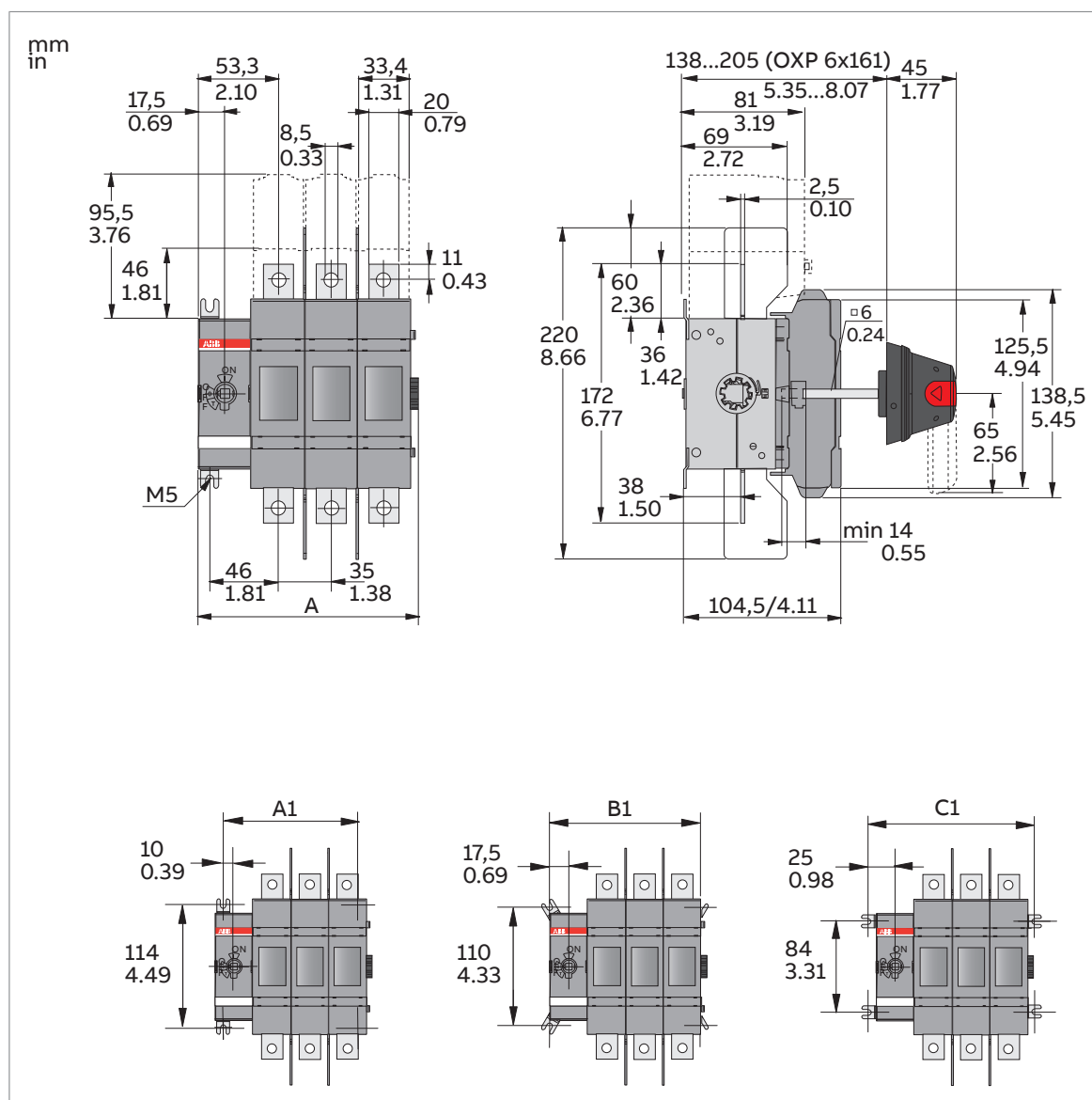
*) N3 types

	_11 mm (in)	_22 mm (in)
A	254.50 (10.02)	414.50 (16.32)
B	-	80 (3.15)
A1	214 (8.43)	374 (14.72)
B1	244 (9.61)	404 (15.91)
C1	270 (10.63)	430 (16.93)



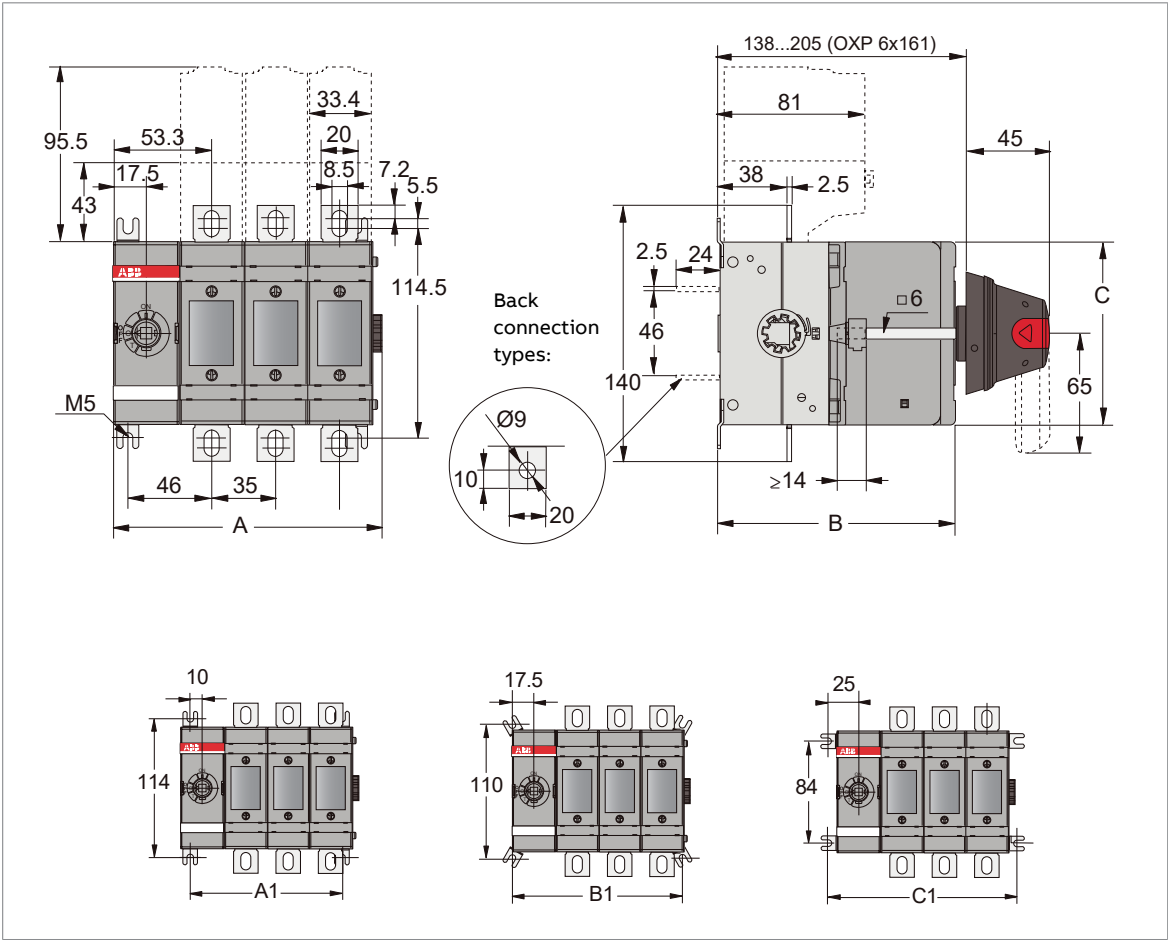
■ Charging switches

OS100GJ04FP



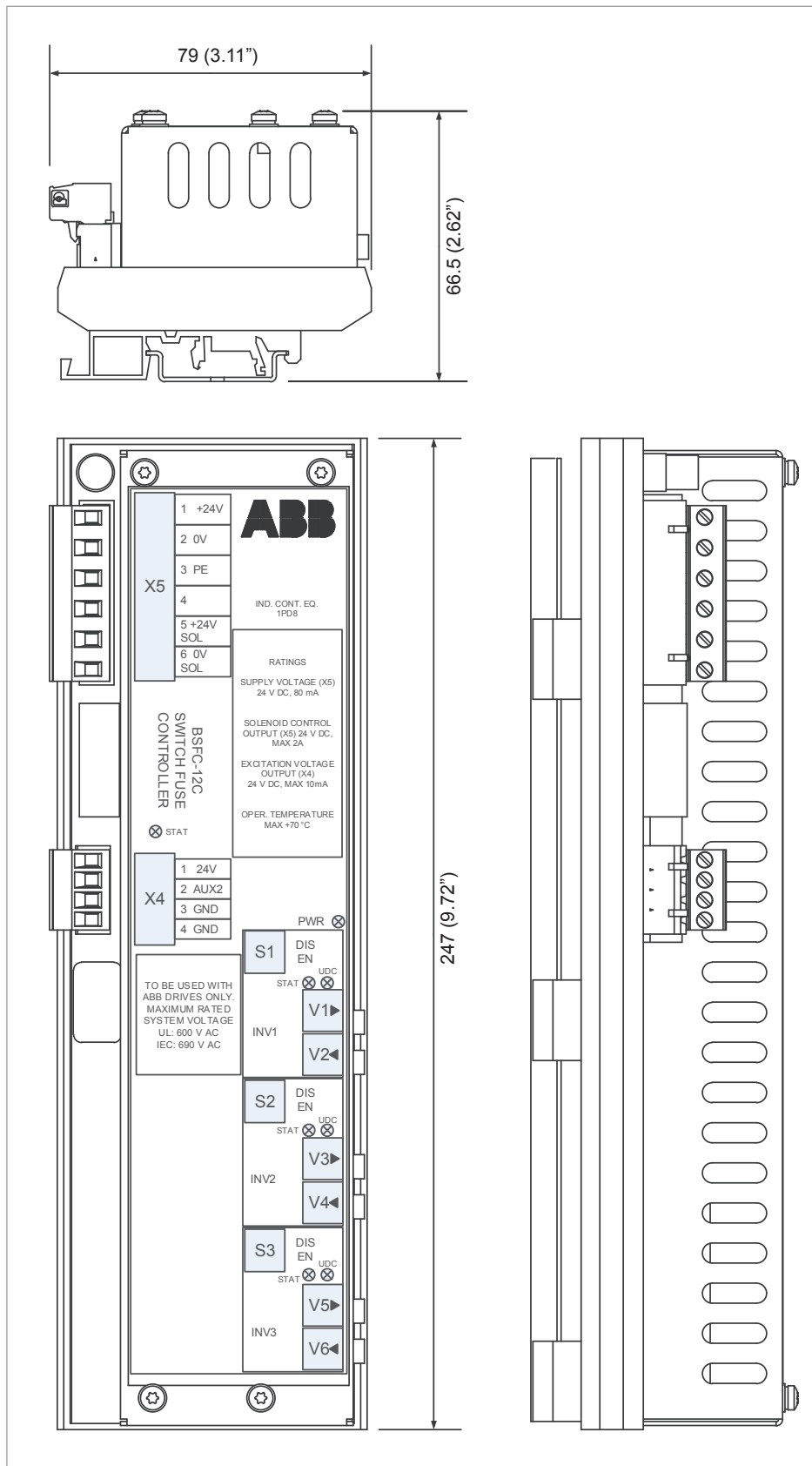
[mm/in]	OS100GJ01	OS100GJ02	OS100GJ03	OS100GJ04
A	76.5/3.01	111.5/4.39	146.5/5.77	181.5/7.15
A1	55/2.17	90/3.54	125/4.92	160/6.30
B1	70/2.76	105/4.13	140/5.51	175/6.89
C1	85/3.35	120/4.72	155/6.10	190/7.48

OS160GD04F



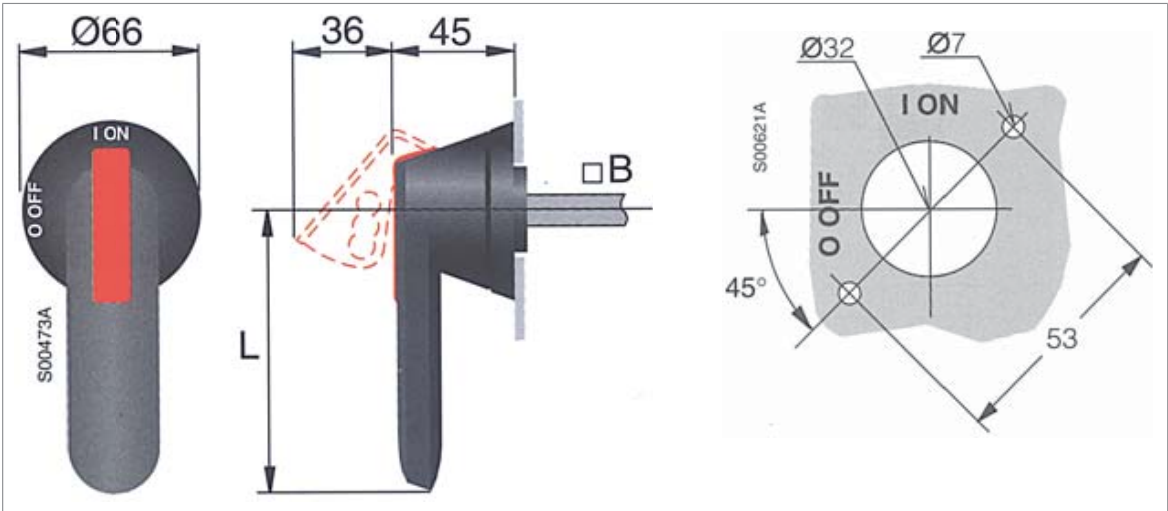
	mm
A	181.5
B	130
C	100
A1	160
B1	175
C1	190

■ Charging controller BSFC-12C



■ Handles

OHB65J6

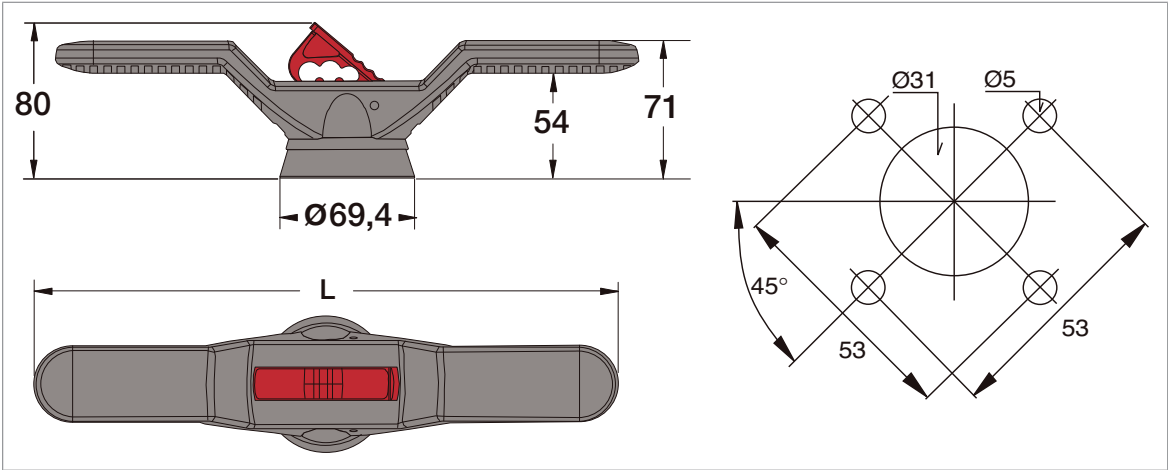


Handle type	L (mm)	B (mm)
OHB65J6	65	6

Dimensions in mm

1 mm = 0.0394 in

OHB150J12P



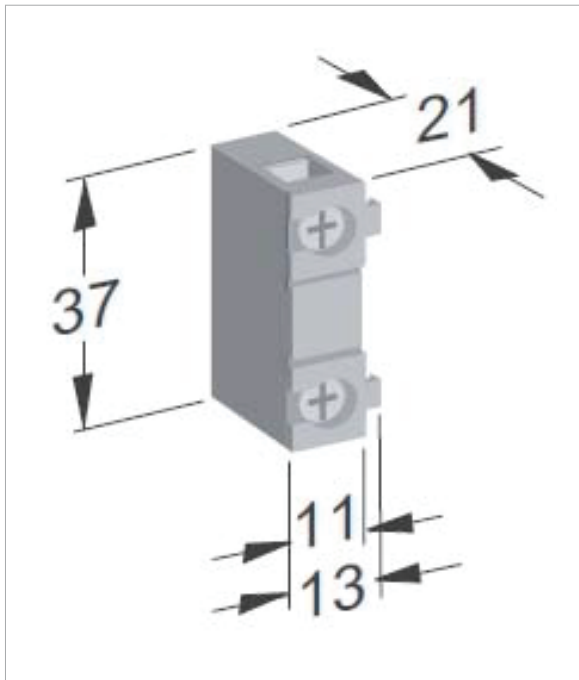
Handle type	L (mm)	Shaft (mm)	Notes
OHB150J12P	300	12 × 395 mm	Used with switch-disconnector units

Dimensions in mm

1 mm = 0.0394 in

■ Contacts

Auxiliary contact OA1G10

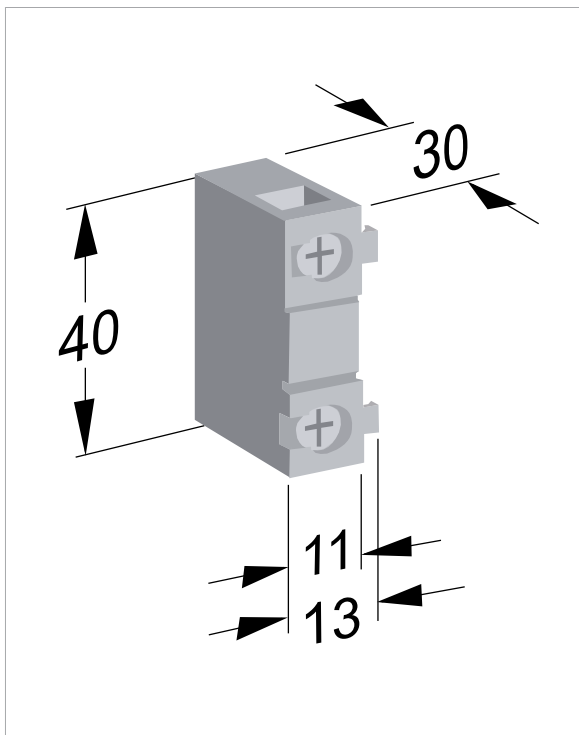


2×0.75...2.5 mm² (2×18...14 AWG)

0.8 N·m (7 lbf·in)

Pozidriv M3.5 Form 2

Auxiliary contact OA3G01

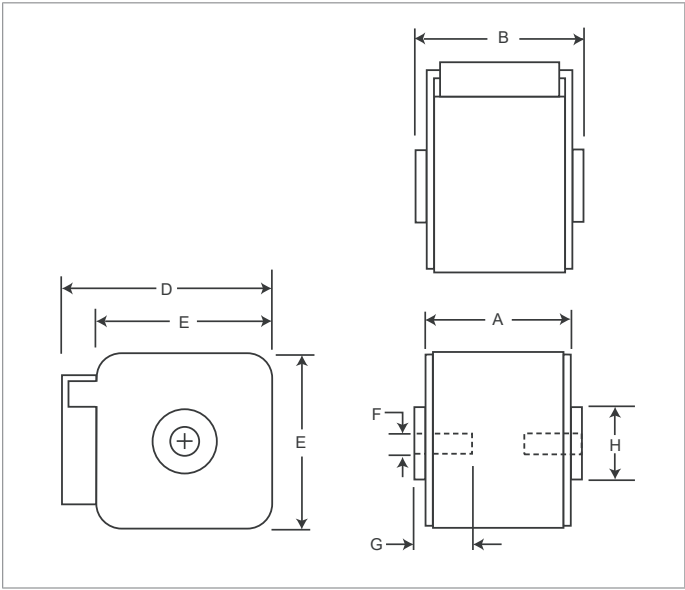


2×0.75...2.5 mm² (2×18...14 AWG)

0.8 N·m (7 lb.in)

Pozidriv M3.5 Form 2

DC fuses



1000 ... 1250 V fuses (as used with 690 V units)								
Type	Size	A (mm)	B (mm)	D (mm)	E (mm)	F (mm)	G (mm)	H (mm)
BKN80	3	81	83	92	76	M12	10	30
BKN90	3	81	91	92	76	M12	10	30

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Example circuit diagrams

Contents of this chapter

This chapter contains example circuit diagrams of a DC/DC converter module.

Note: These diagrams do not necessarily match the installation-specific circuit diagrams of a tailor-made cabinet-installed unit.

The example circuit diagrams help you to:

- understand the internal connections and operation of the cabinet-installed DC/DC converter unit, and
- learn how to connect DC/DC converter modules when installed in a user-defined cabinet.

Contents of the example circuit diagrams

■ ACS880-1604LC DC/DC converter unit 1×R7i, 3AXD10002083731

- R7i DC/DC converter module
 - BDCL-13LC filter module
 - DC switch
 - DC charging
 - DC fuses for module and energy storage
 - External auxiliary voltage supply
 - UCU-22 control unit
 - Cabinet fans
 - BAMU auxiliary voltage measurement
-

- Control panel, panel mounting kit
- CIO-01 module for distributed IO bus control

■ **ACS880-1604LC DC/DC converter unit 1×R8i, 3AXD10000878887**

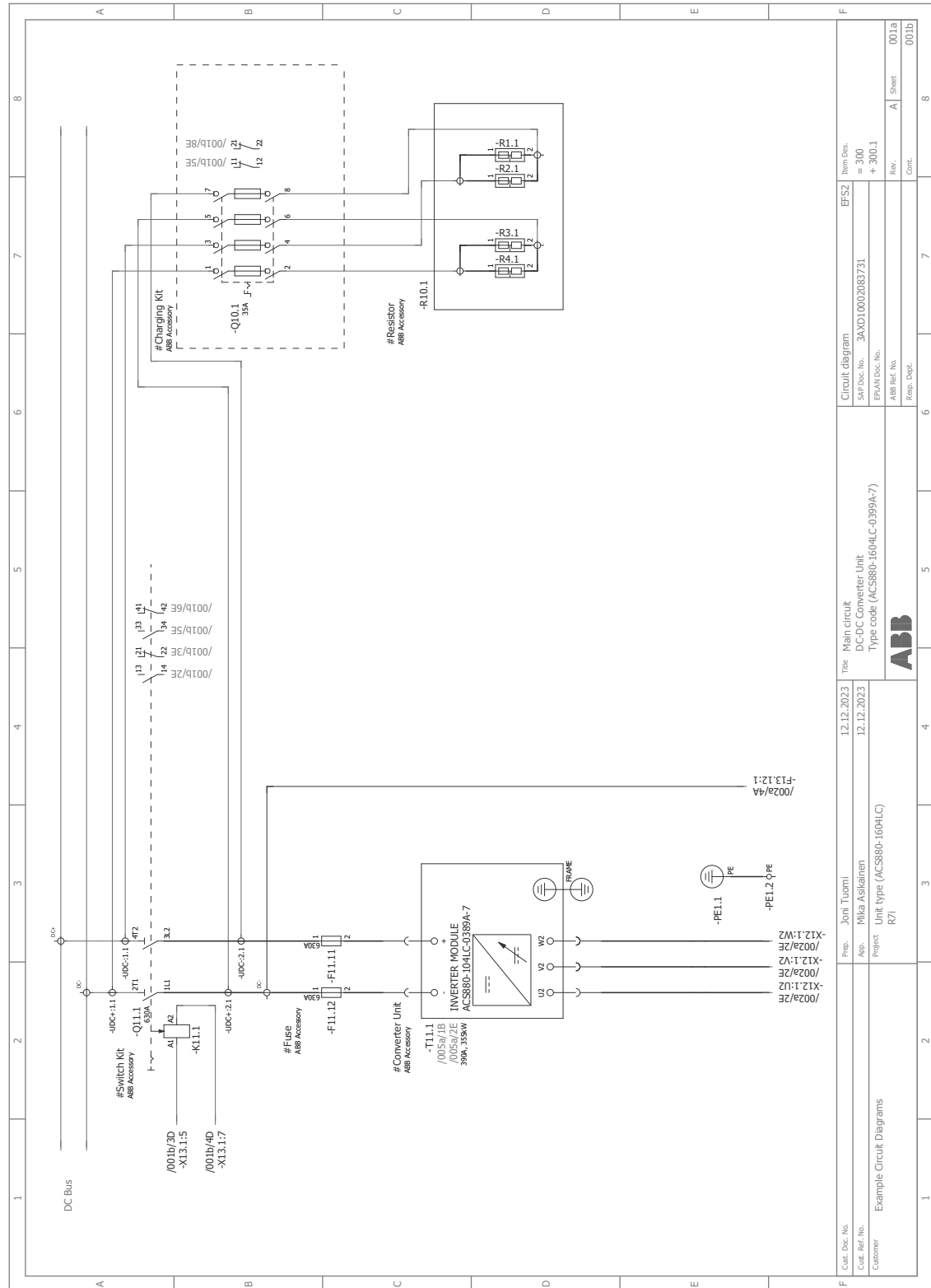
- R8i DC/DC converter module
- BDCL-15LC filter module
- DC switch
- DC charging
- DC fuses for module and energy storage
- External auxiliary voltage supply
- BCU-02 control unit
- Cabinet fans
- BAMU auxiliary voltage measurement
- Control panel, panel mounting kit
- DDCS Communication

■ **ACS880-1604LC DC/DC converter unit 2×R8i, 3AXD10000873230**

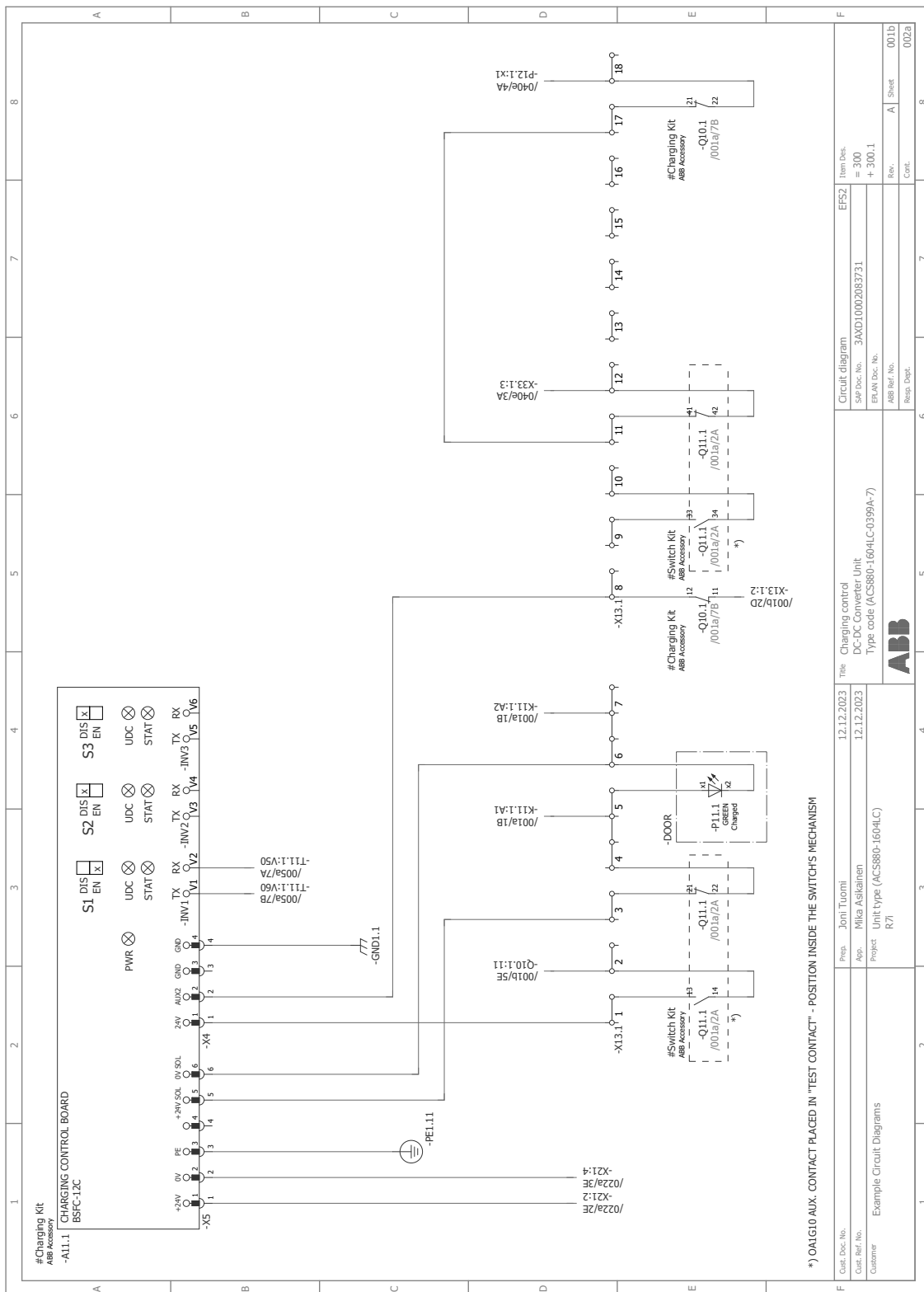
- R8i DC/DC converter module
 - BDCL-15LC filter module
 - DC switch
 - DC charging
 - DC fuses for module and energy storage
 - External auxiliary voltage supply
 - BCU-02 control unit
 - Cabinet fans
 - BAMU auxiliary voltage measurement
 - Control panel, panel mounting kit
 - DDCS Communication
 - CIO-01 module for distributed IO bus control
-

DC/DC converter unit, 1×R7i with DC switch/disconnector

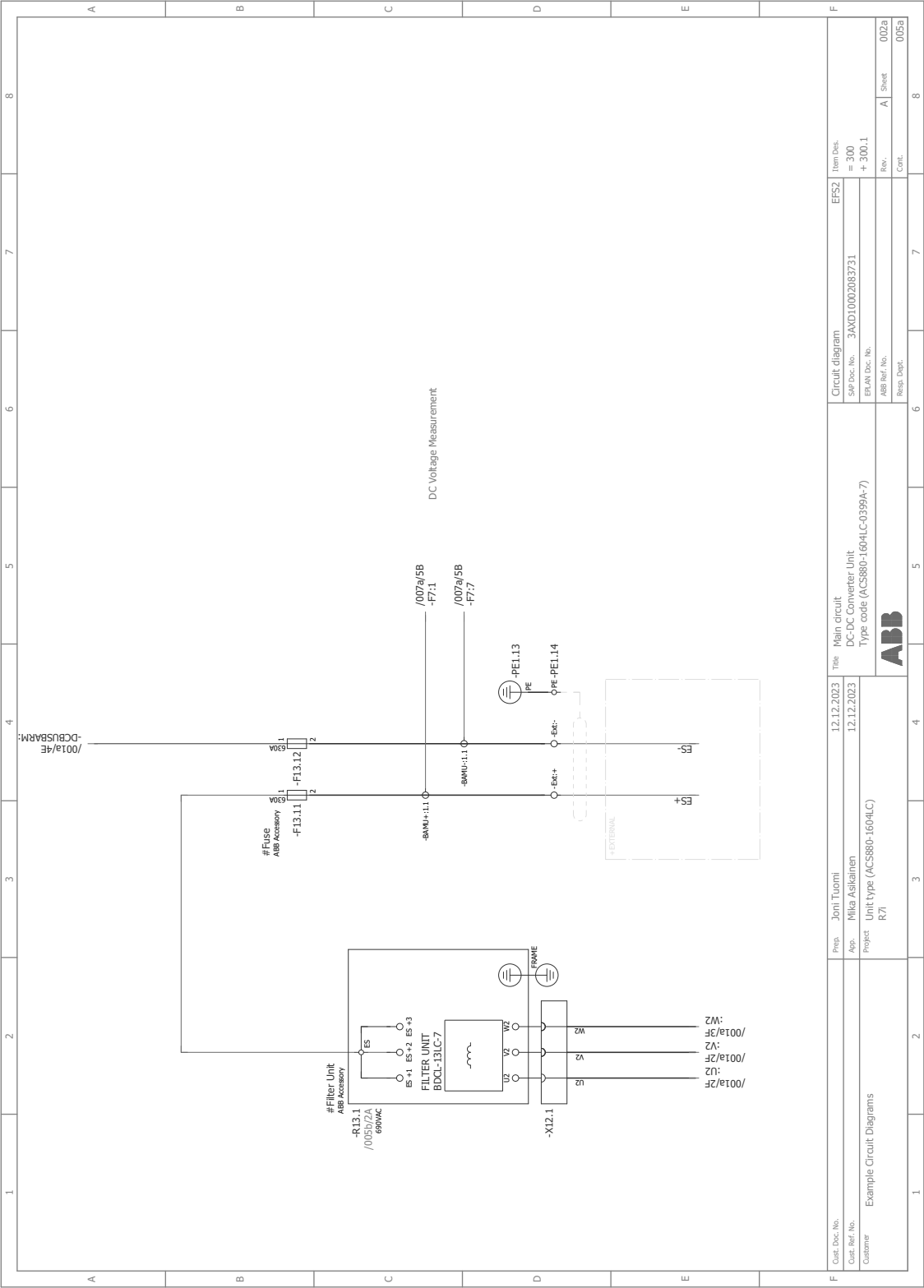
■ **Sheet 001a (Main supply)**

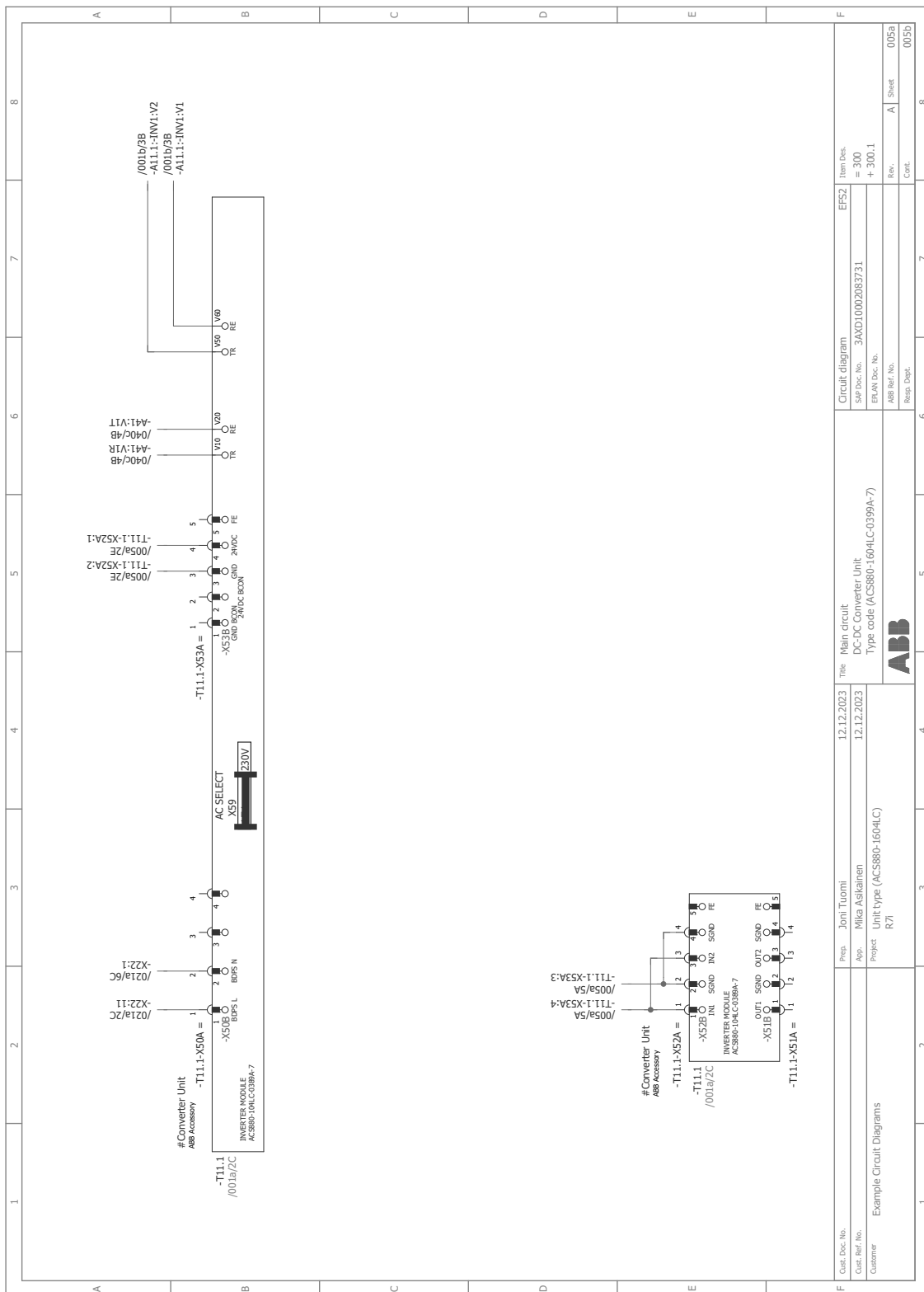


■ **Sheet 001b (Charging circuit)**

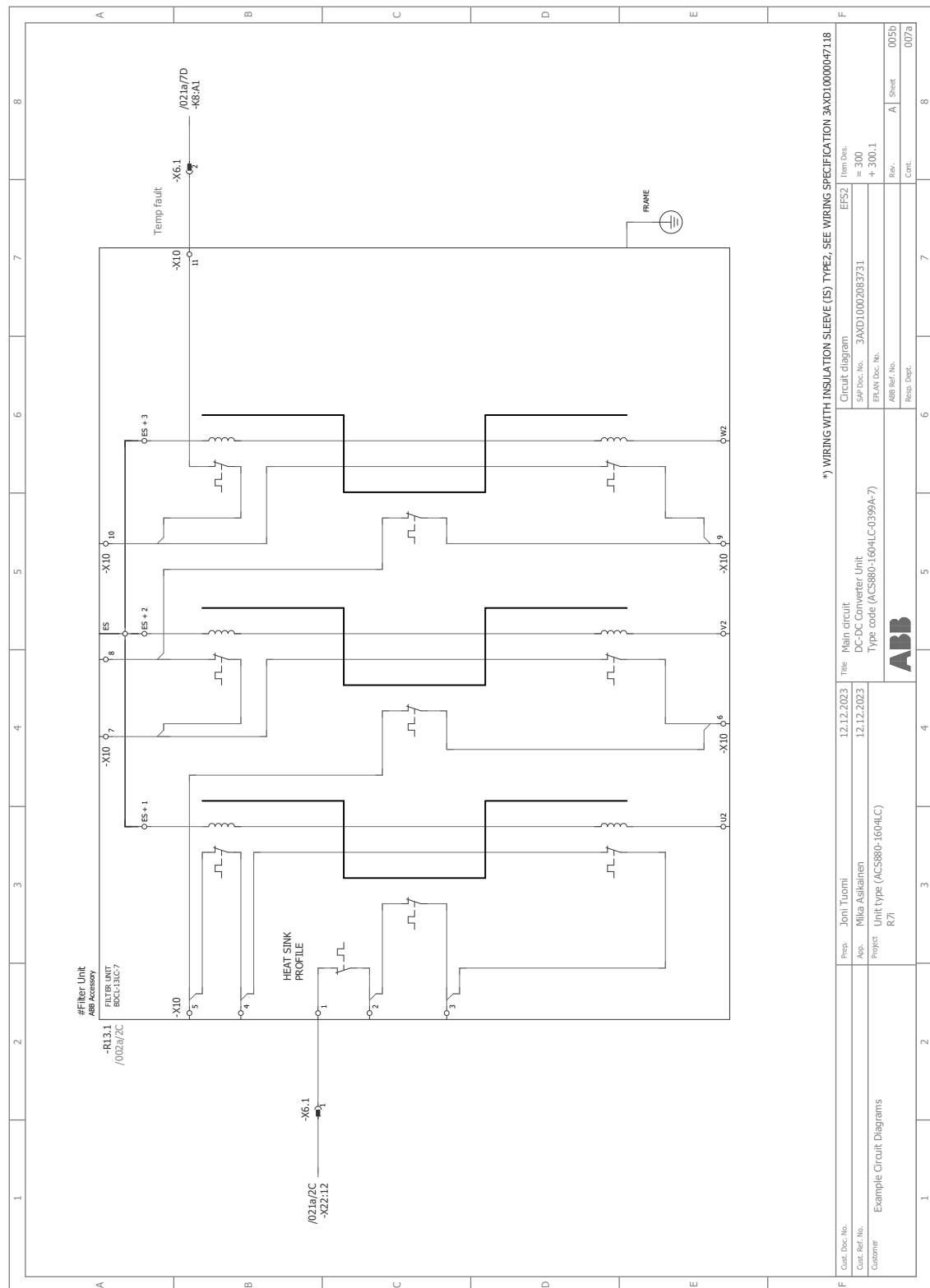


■ Sheet 002a (BDCL main circuit)

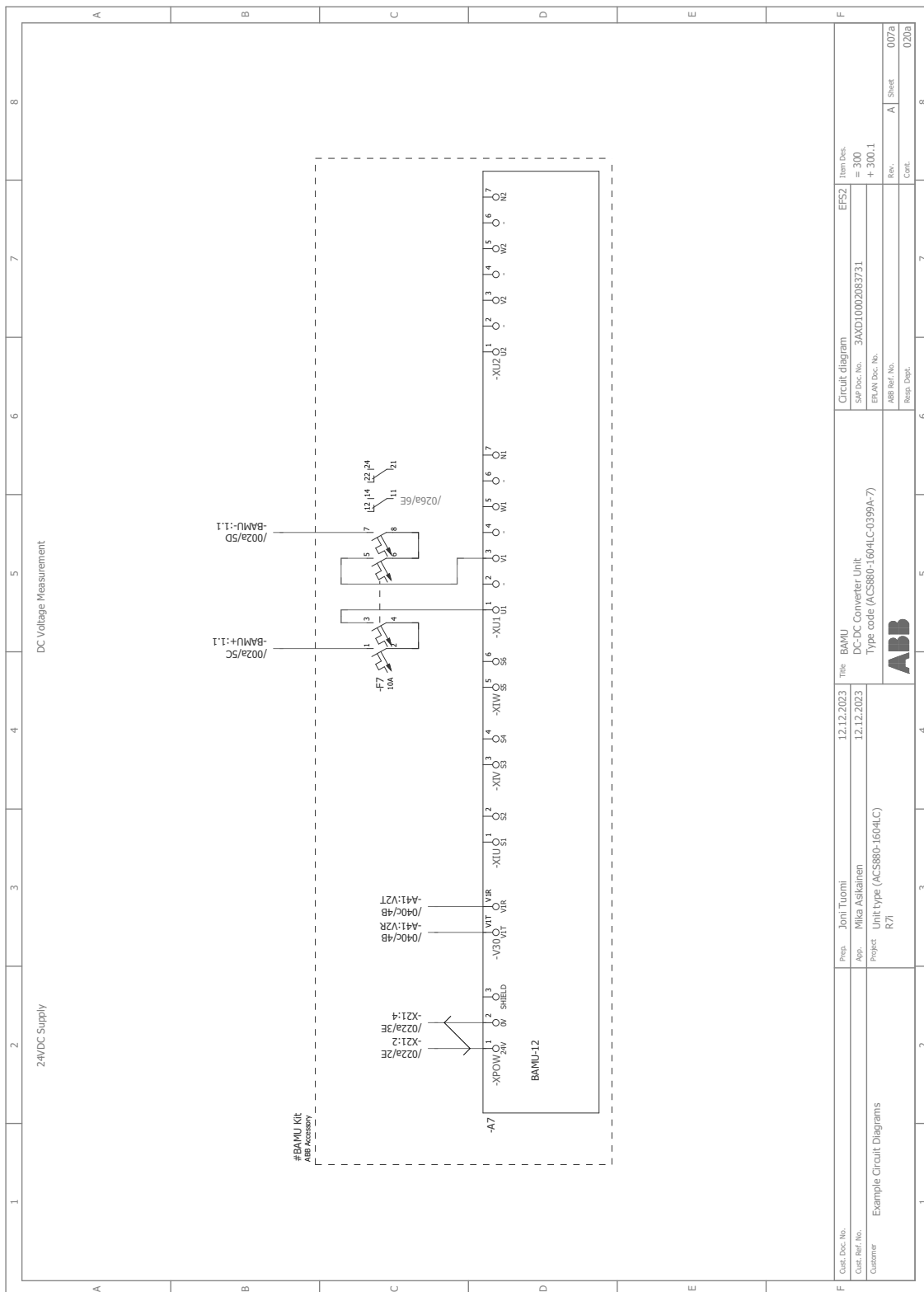




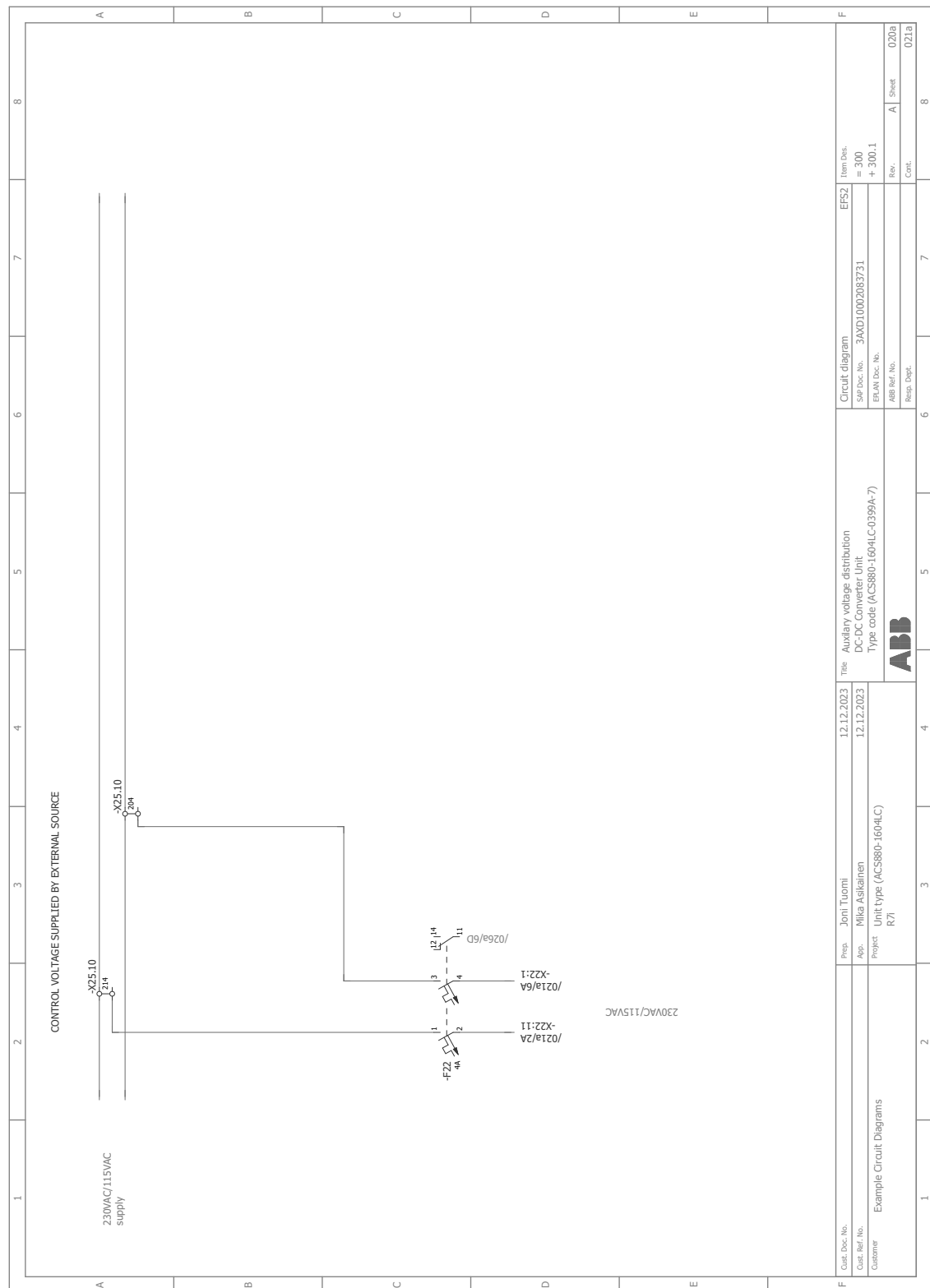
- **Sheet 005b (BDCL module connections)**



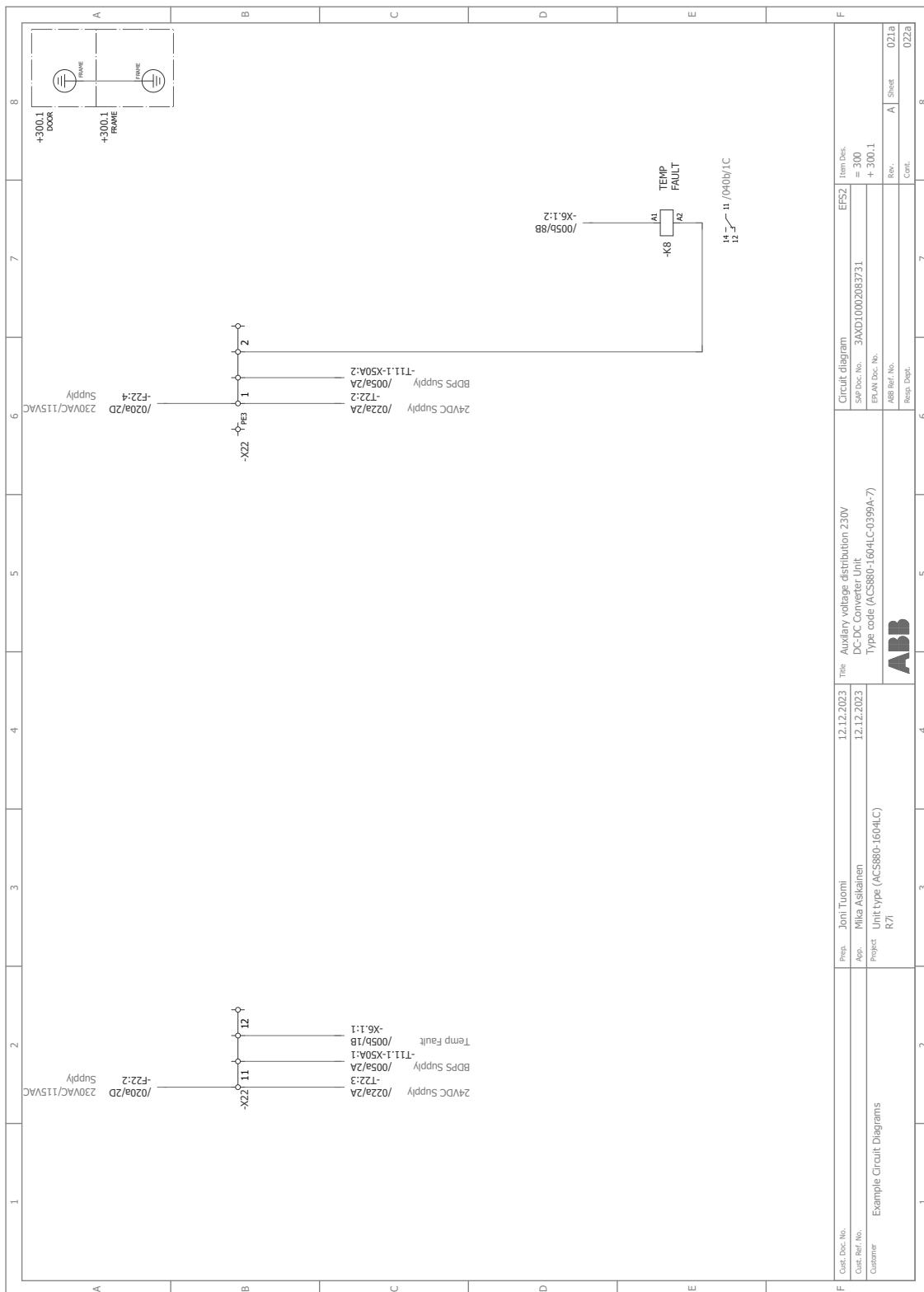
- **Sheet 007a (BAMU voltage measurement)**



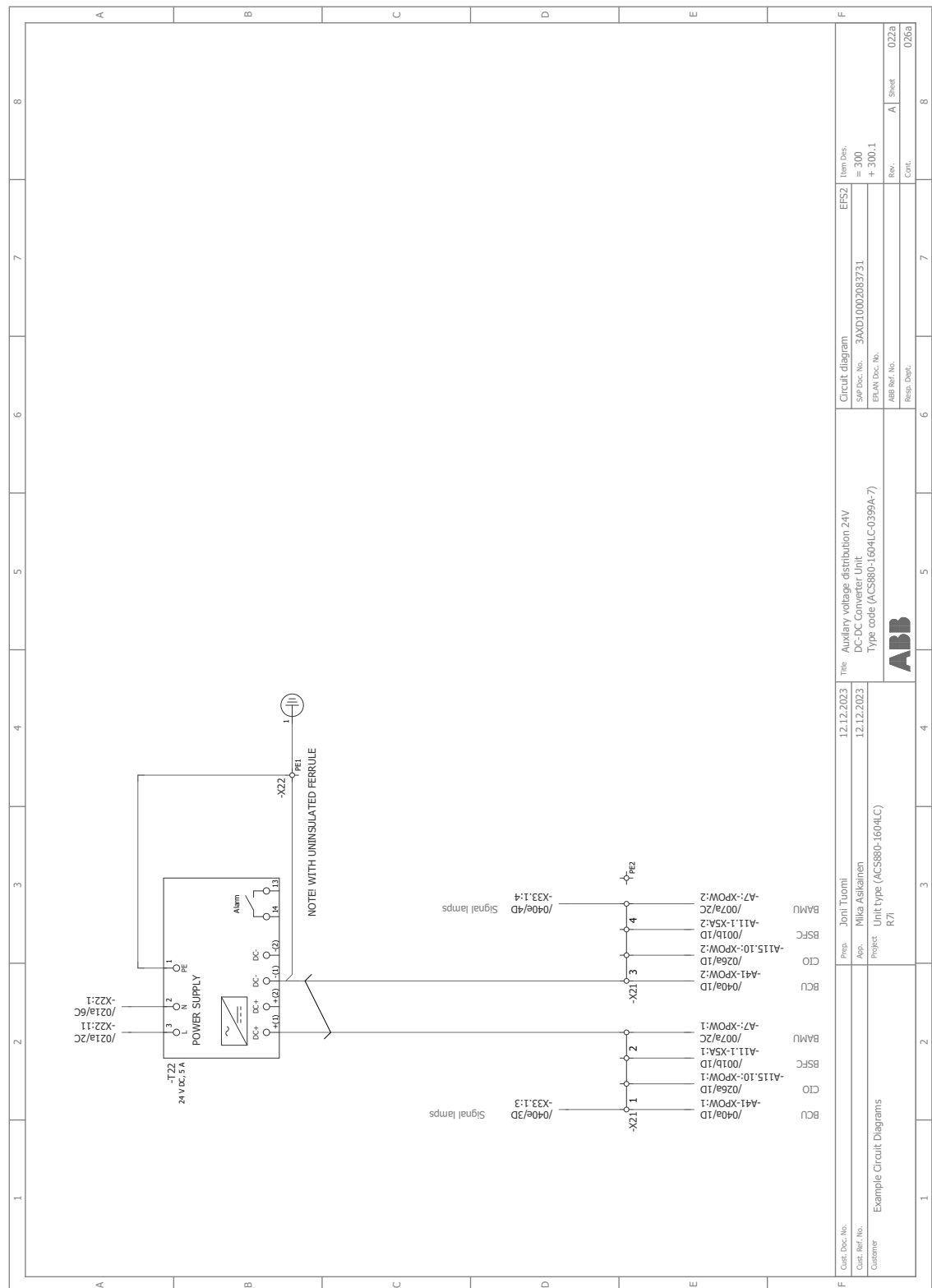
- **Sheet 020a (Auxiliary voltage distribution)**



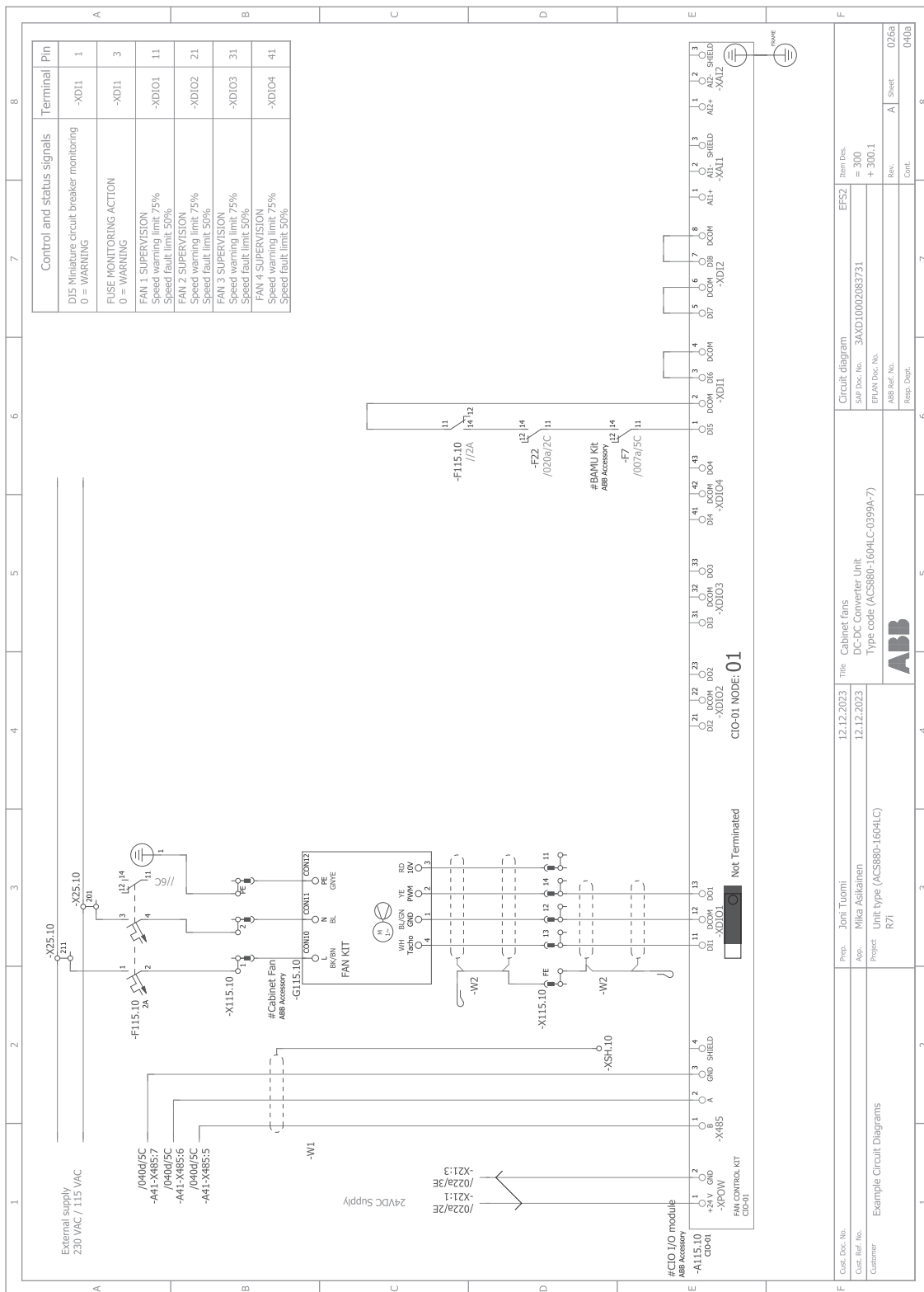
- **Sheet 021a (Auxiliary voltage distribution)**



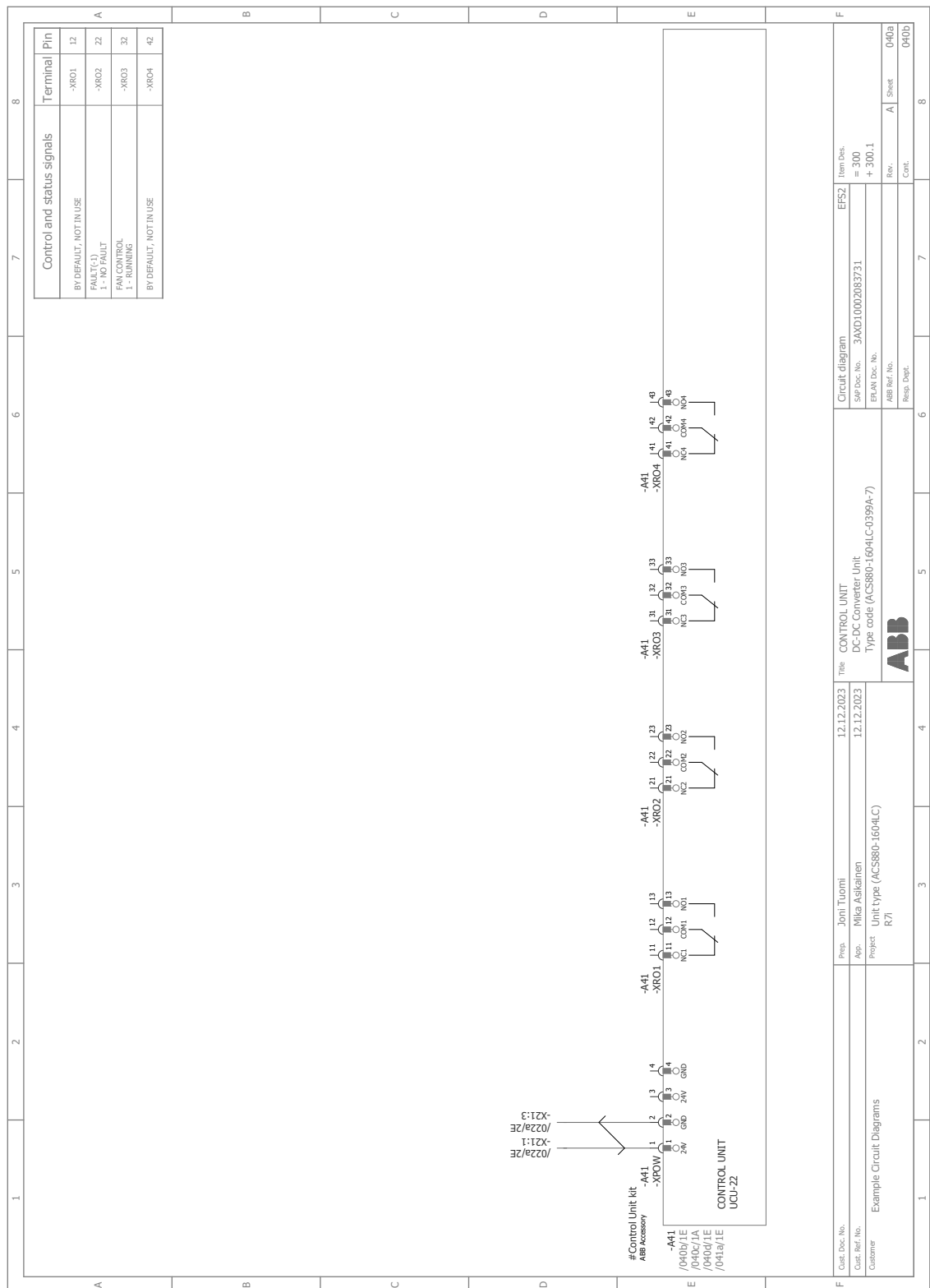
■ **Sheet 022a (24 V DC distribution)**



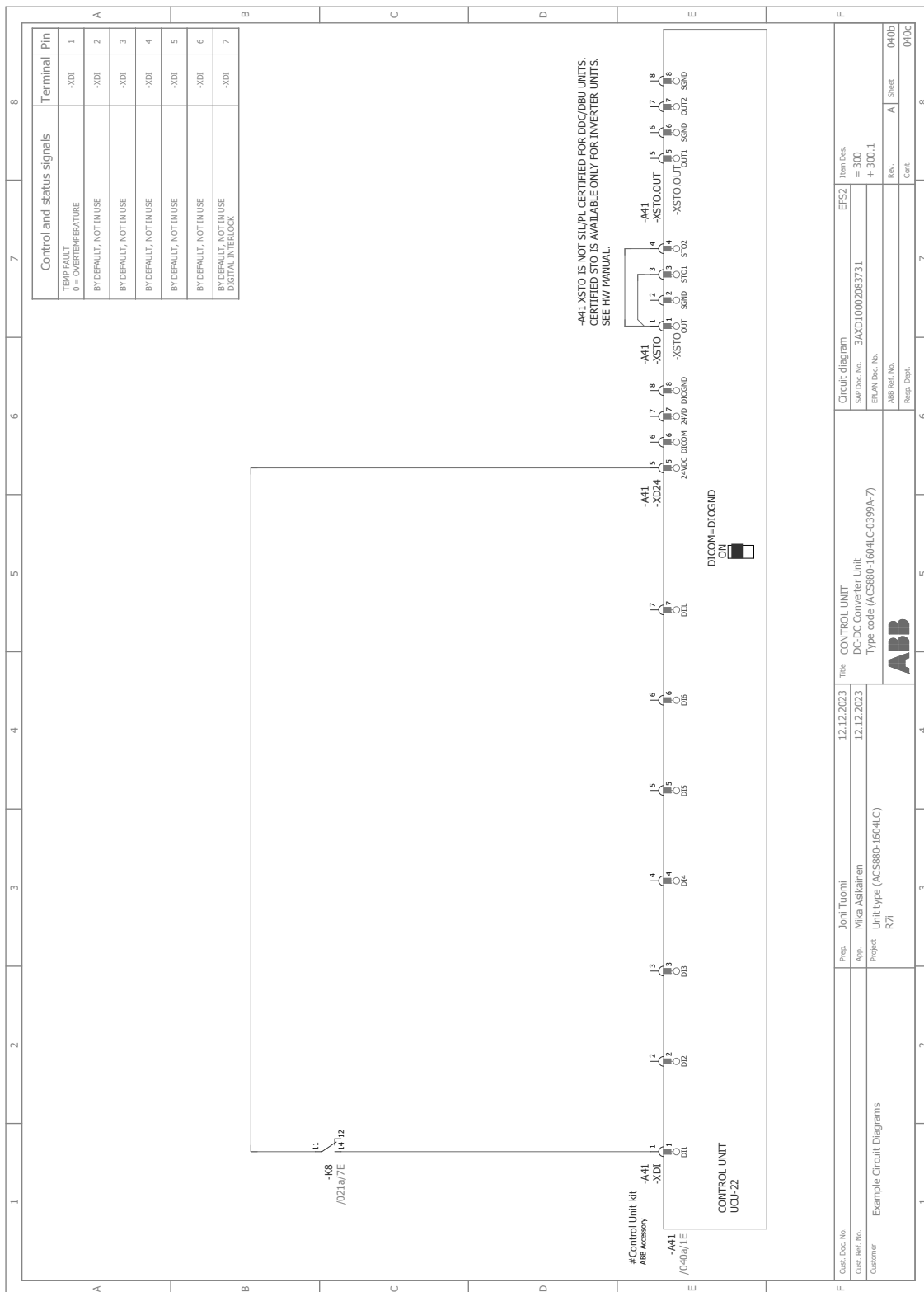
■ **Sheet 026a (Cabinet fans)**



■ **Sheet 040a (Control unit)**

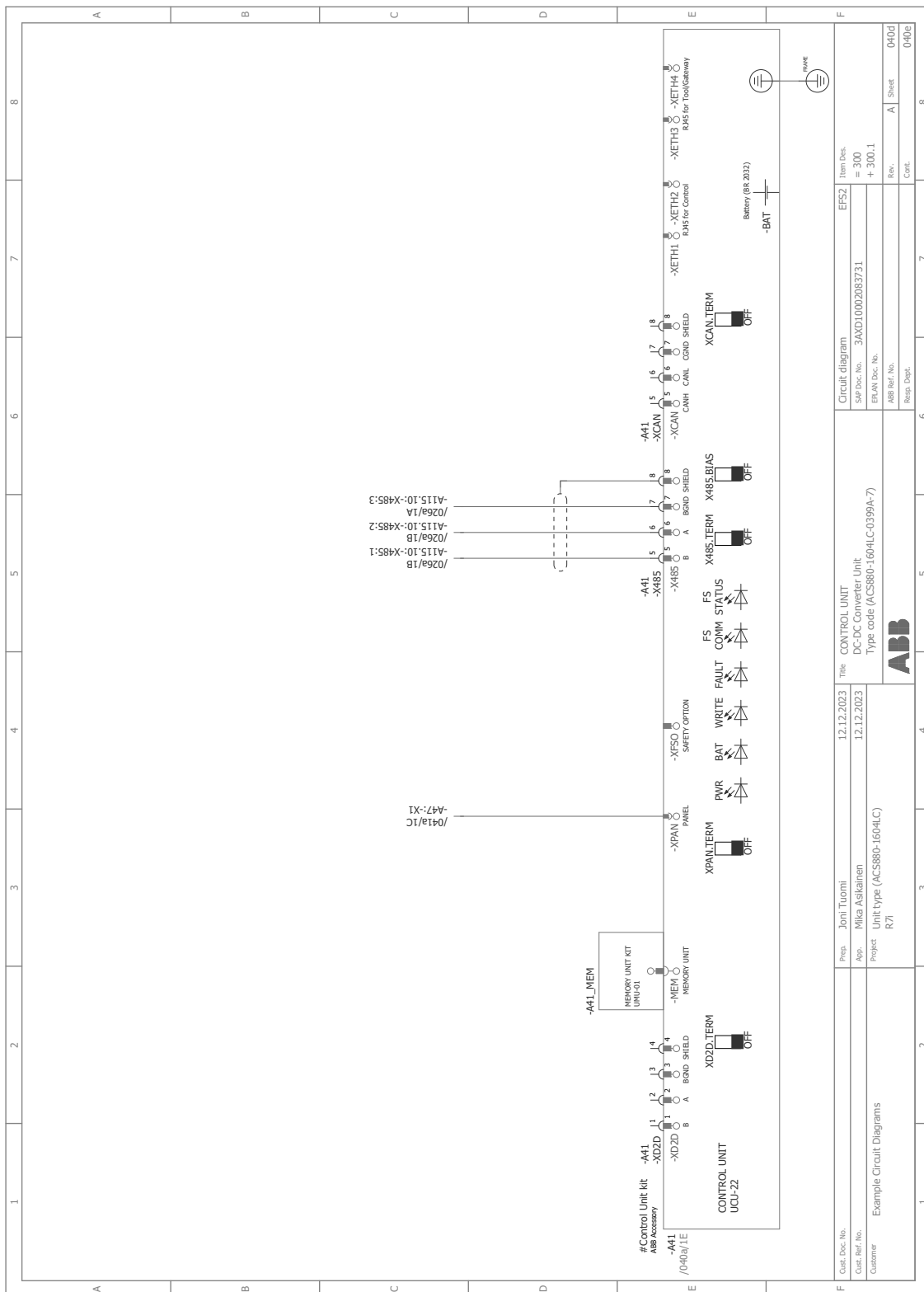


■ **Sheet 040b (Control unit)**

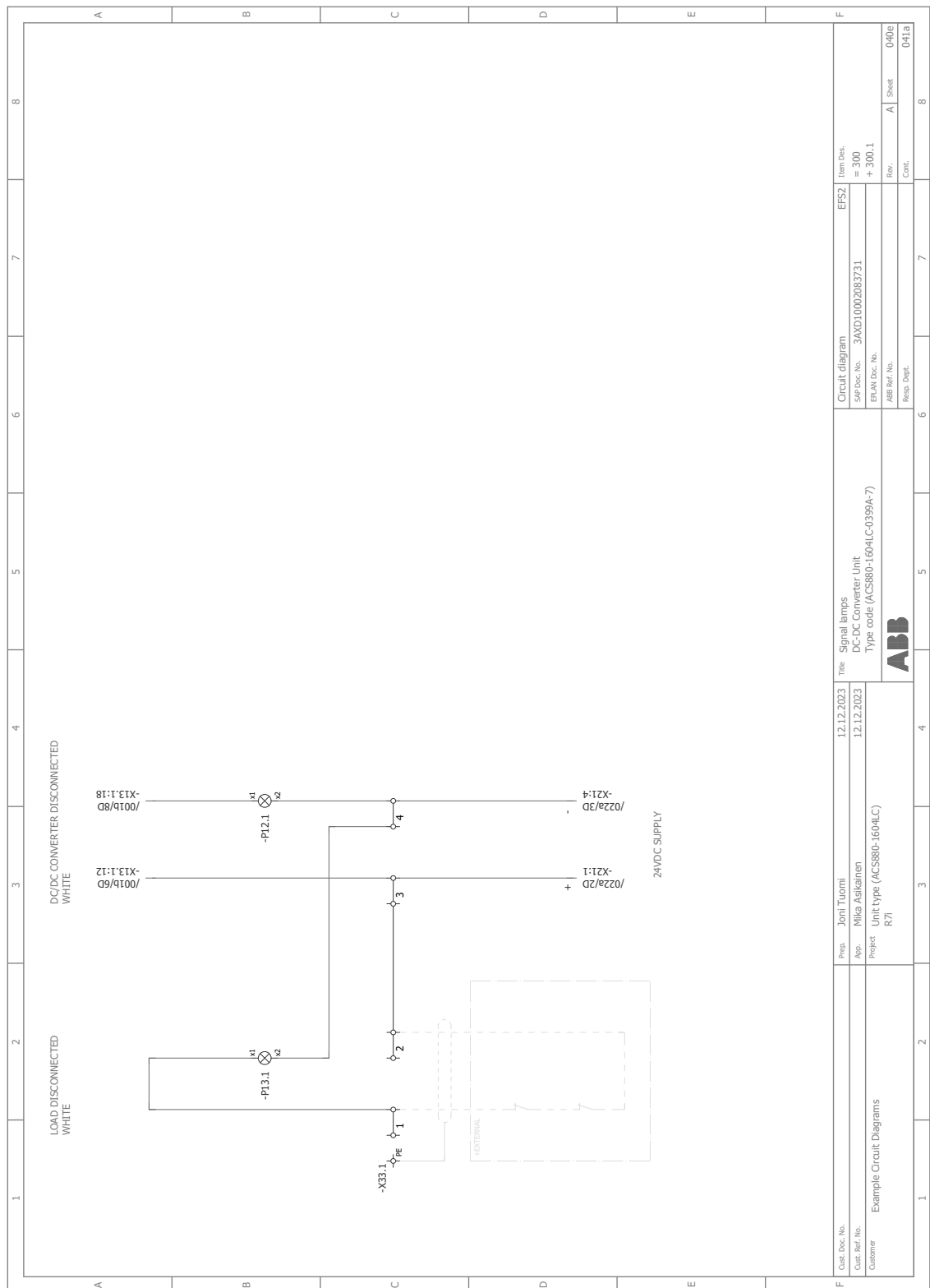


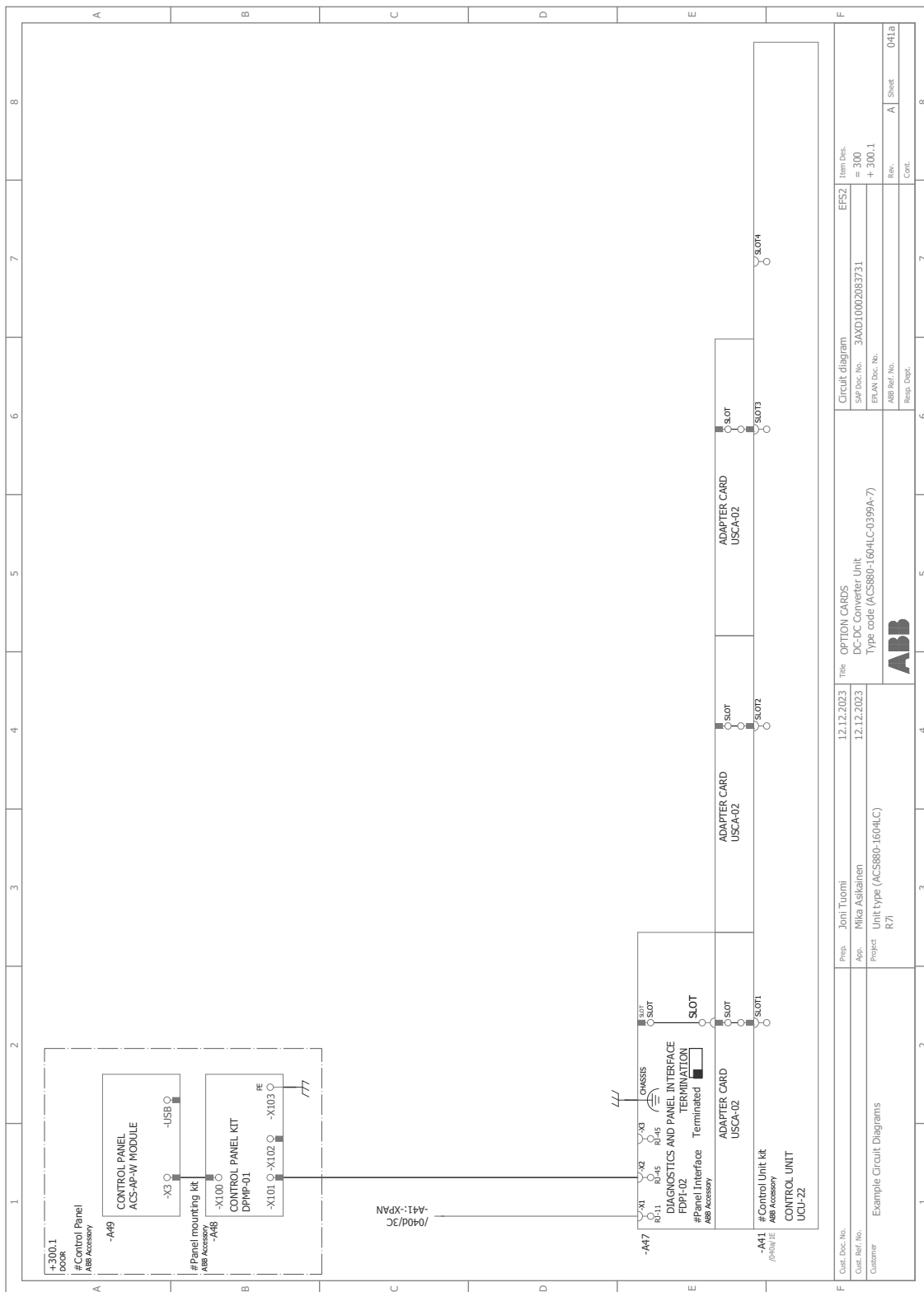


■ **Sheet 040d (Control unit)**



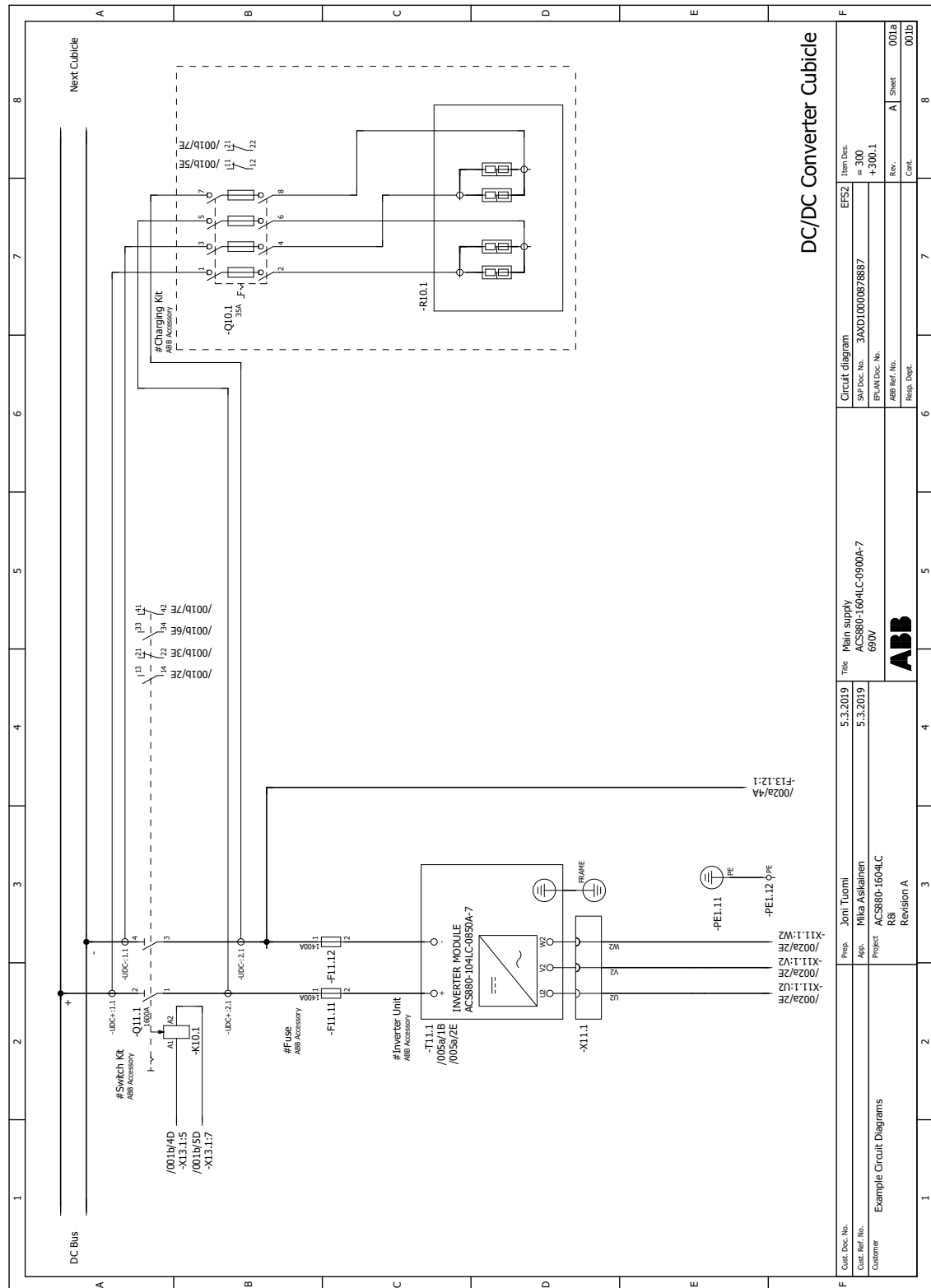
- **Sheet 040e (Signal lamps)**



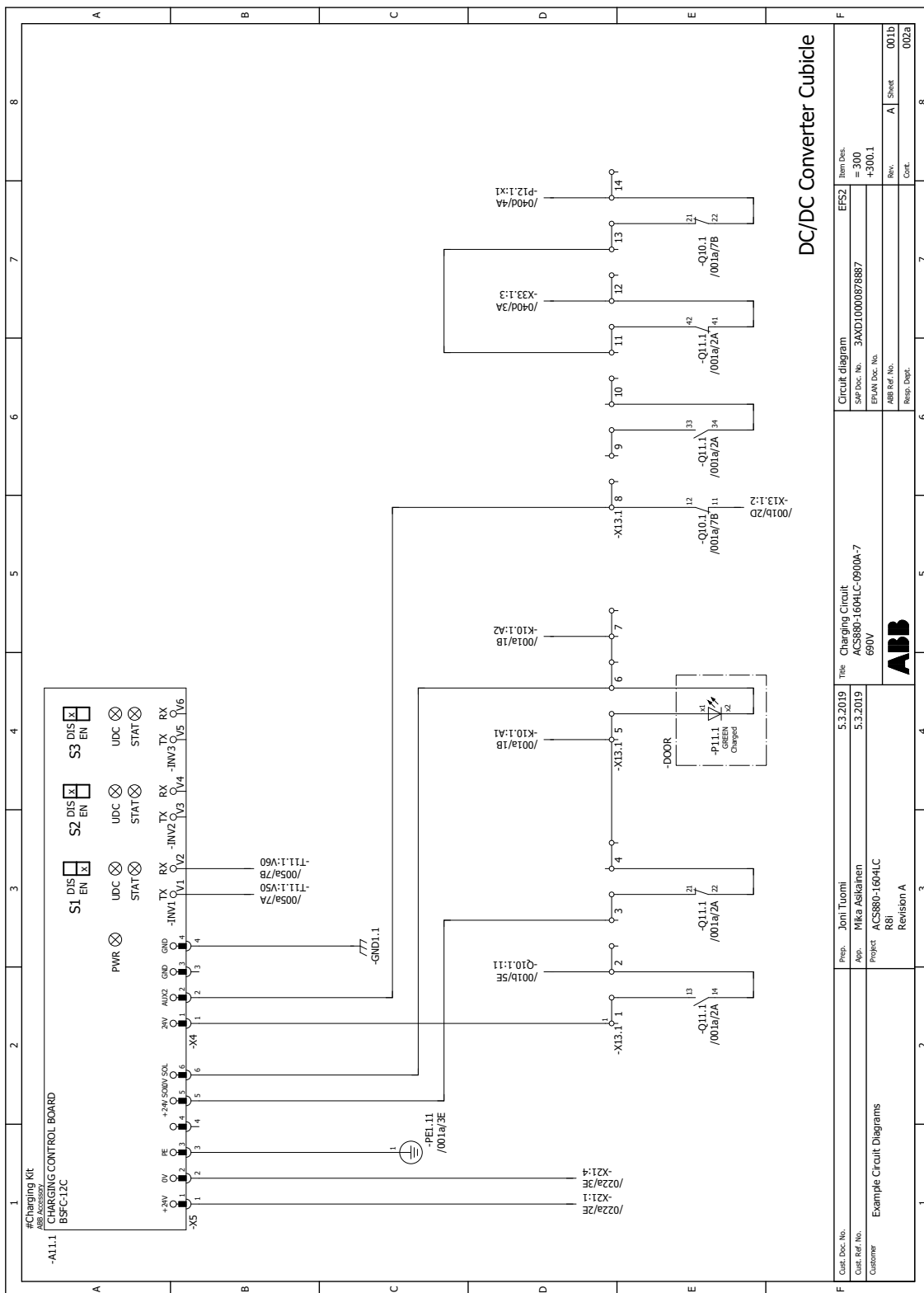


DC/DC converter unit, 1×R8i with DC switch/disconnector

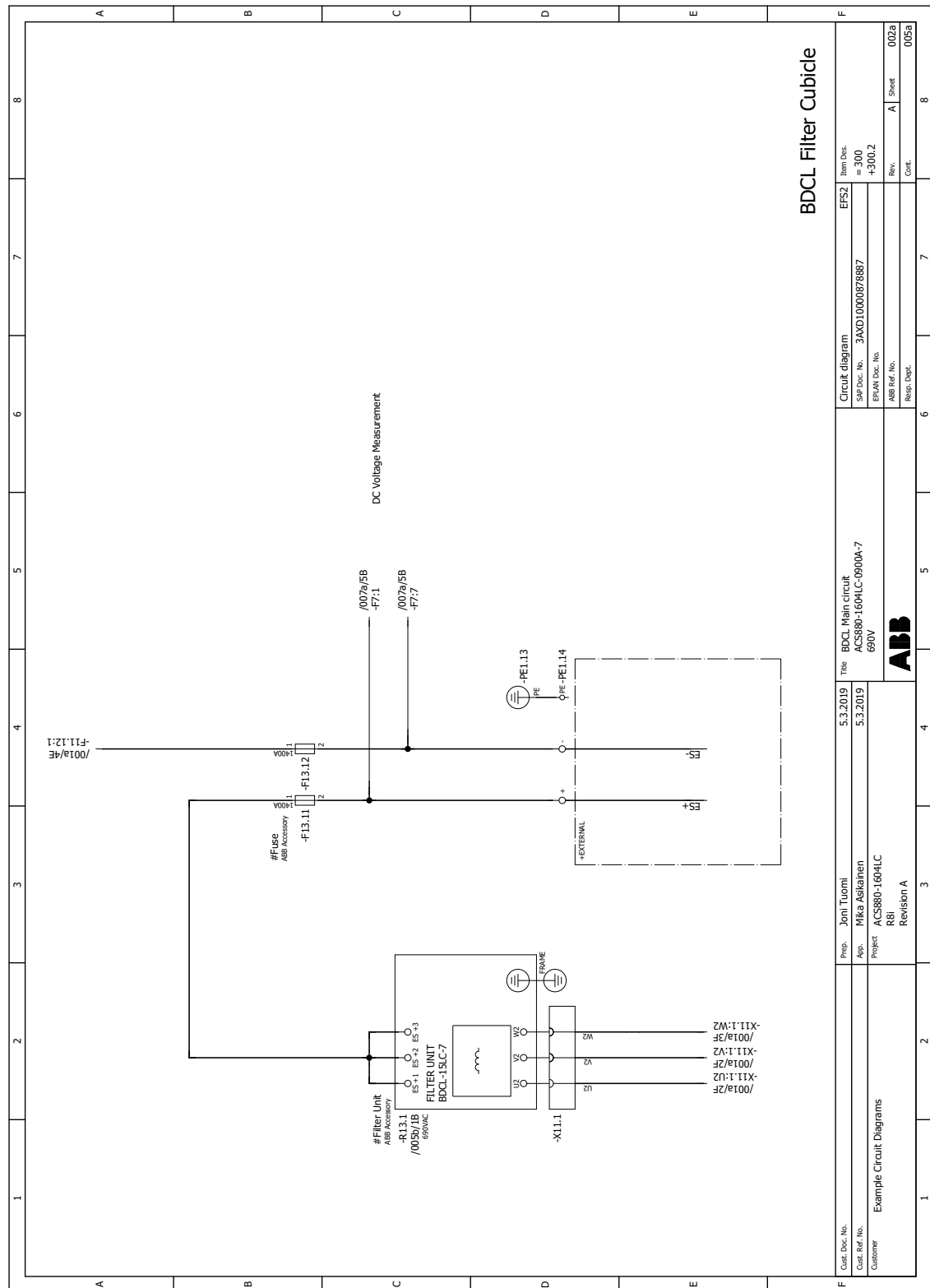
■ **Sheet 001a (Main supply)**

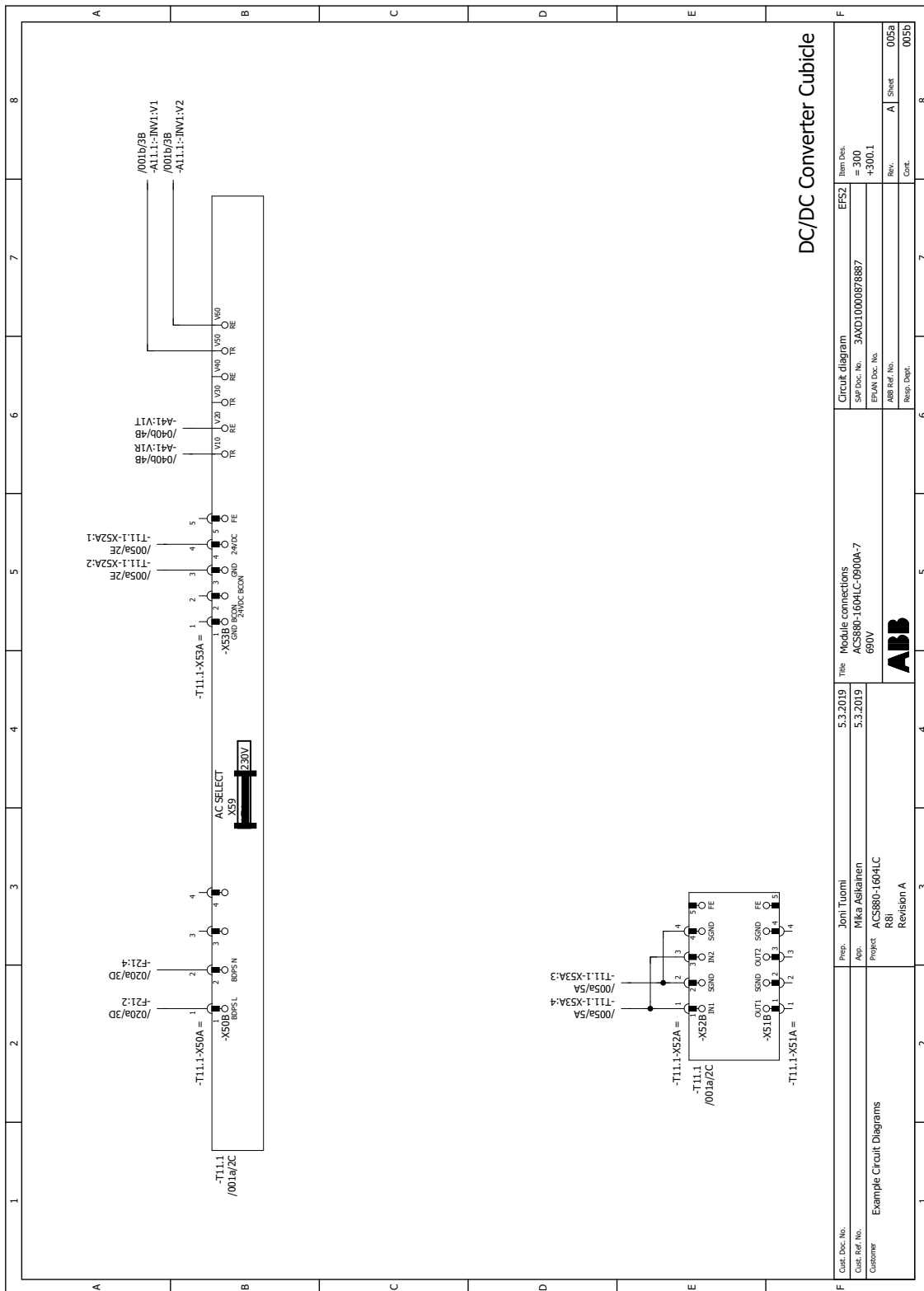


■ **Sheet 001b (Charging circuit)**

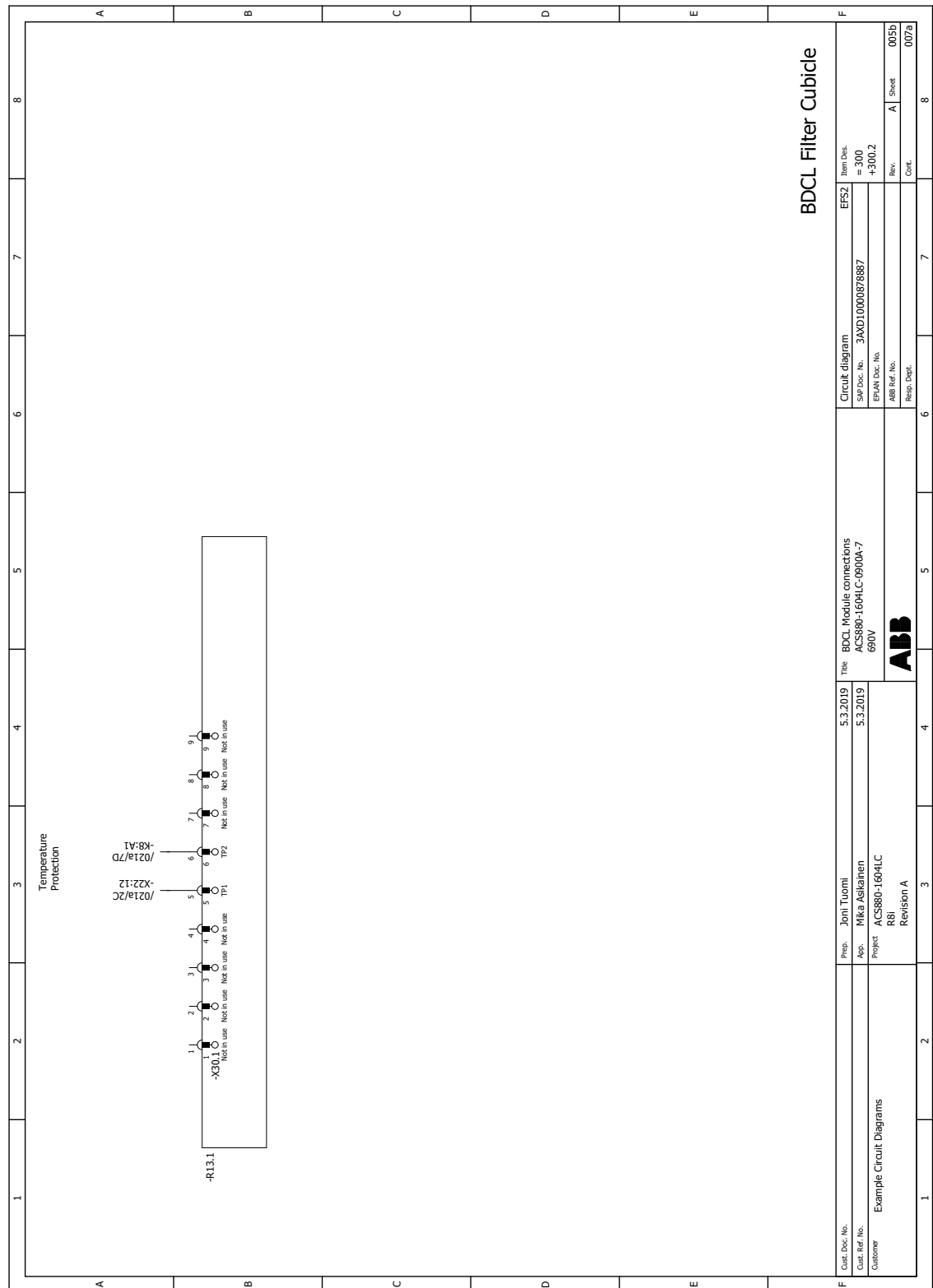


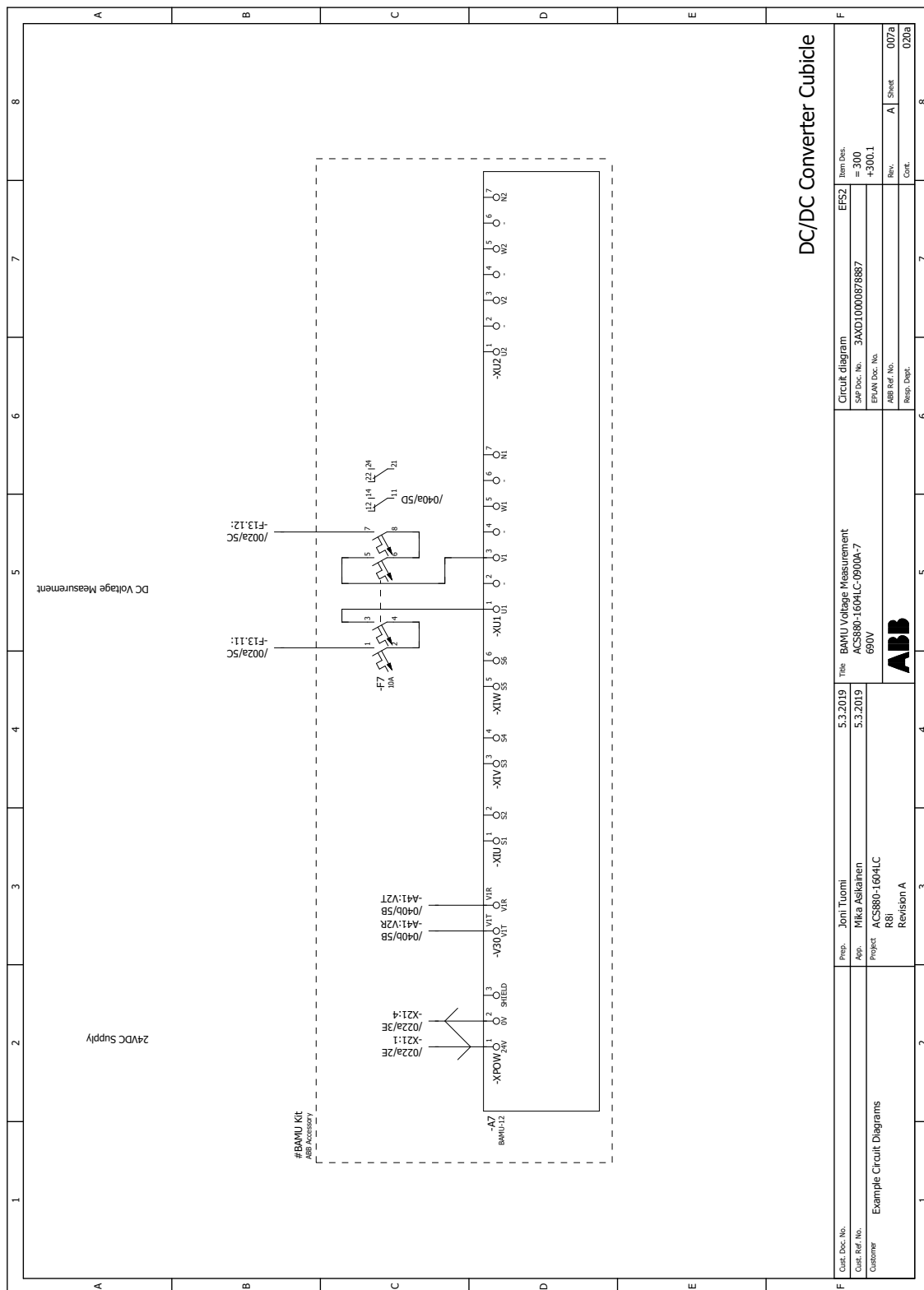
■ **Sheet 002a (BDCL main circuit)**



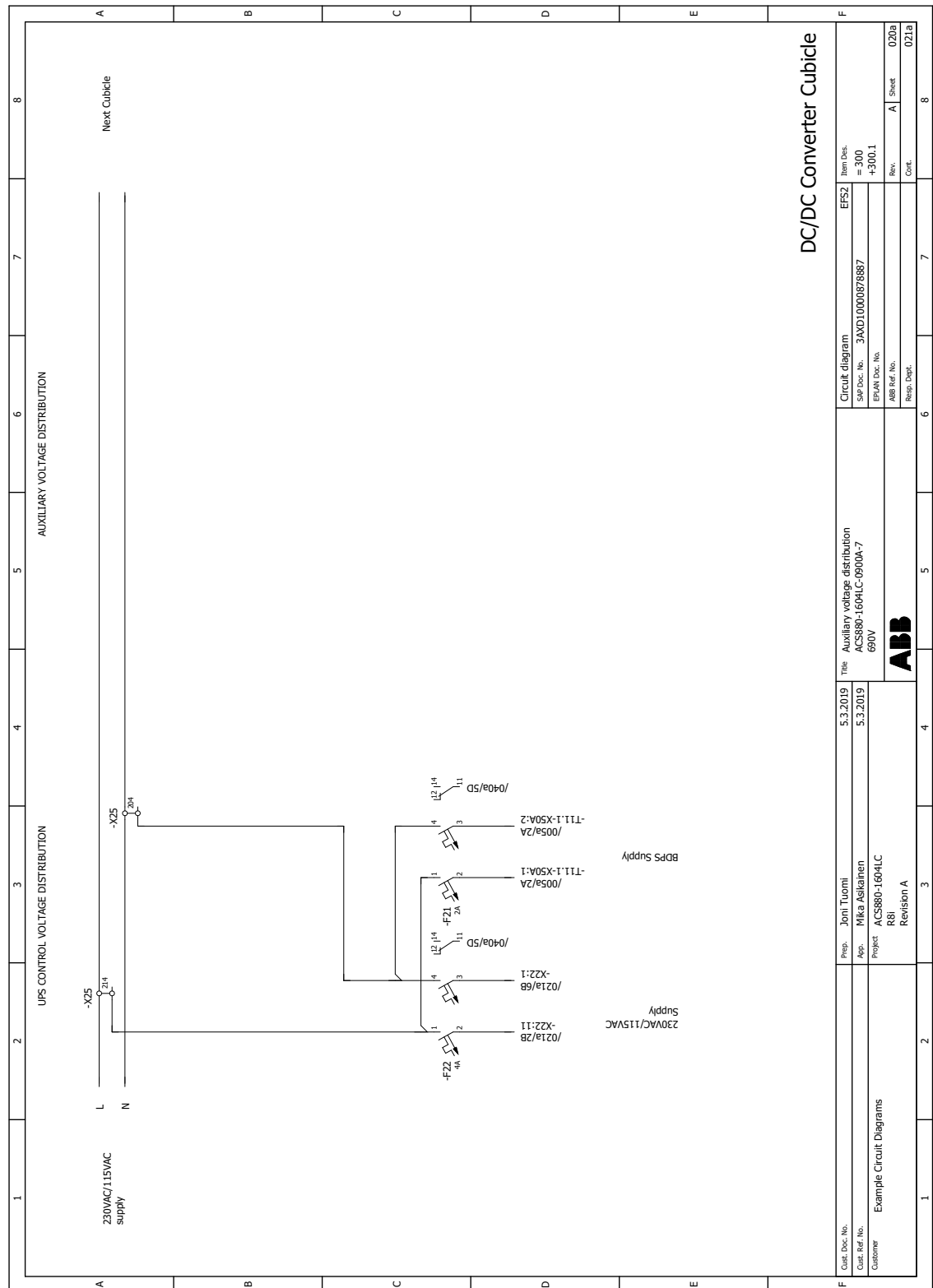


- **Sheet 005b (BDCL module connections)**

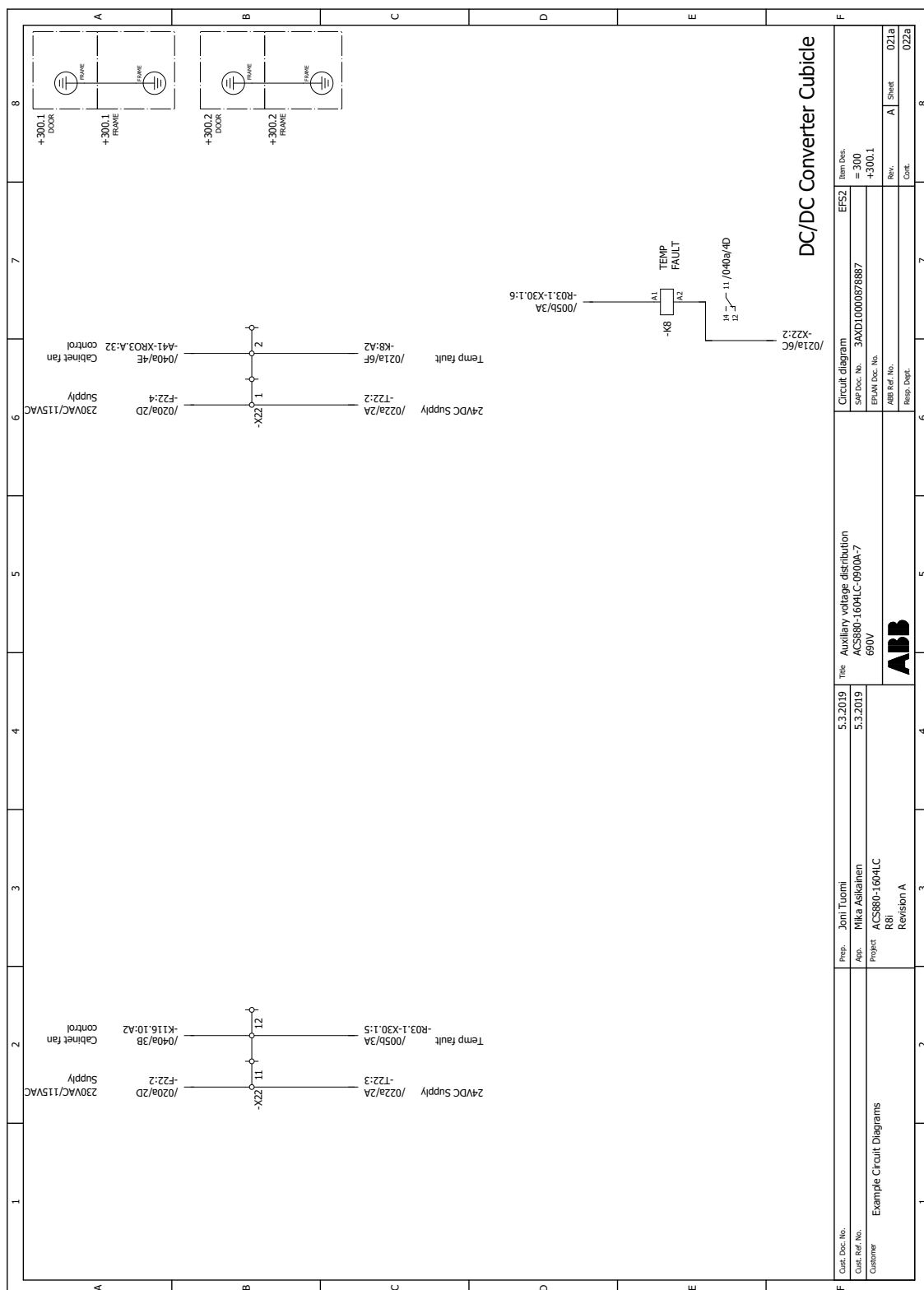




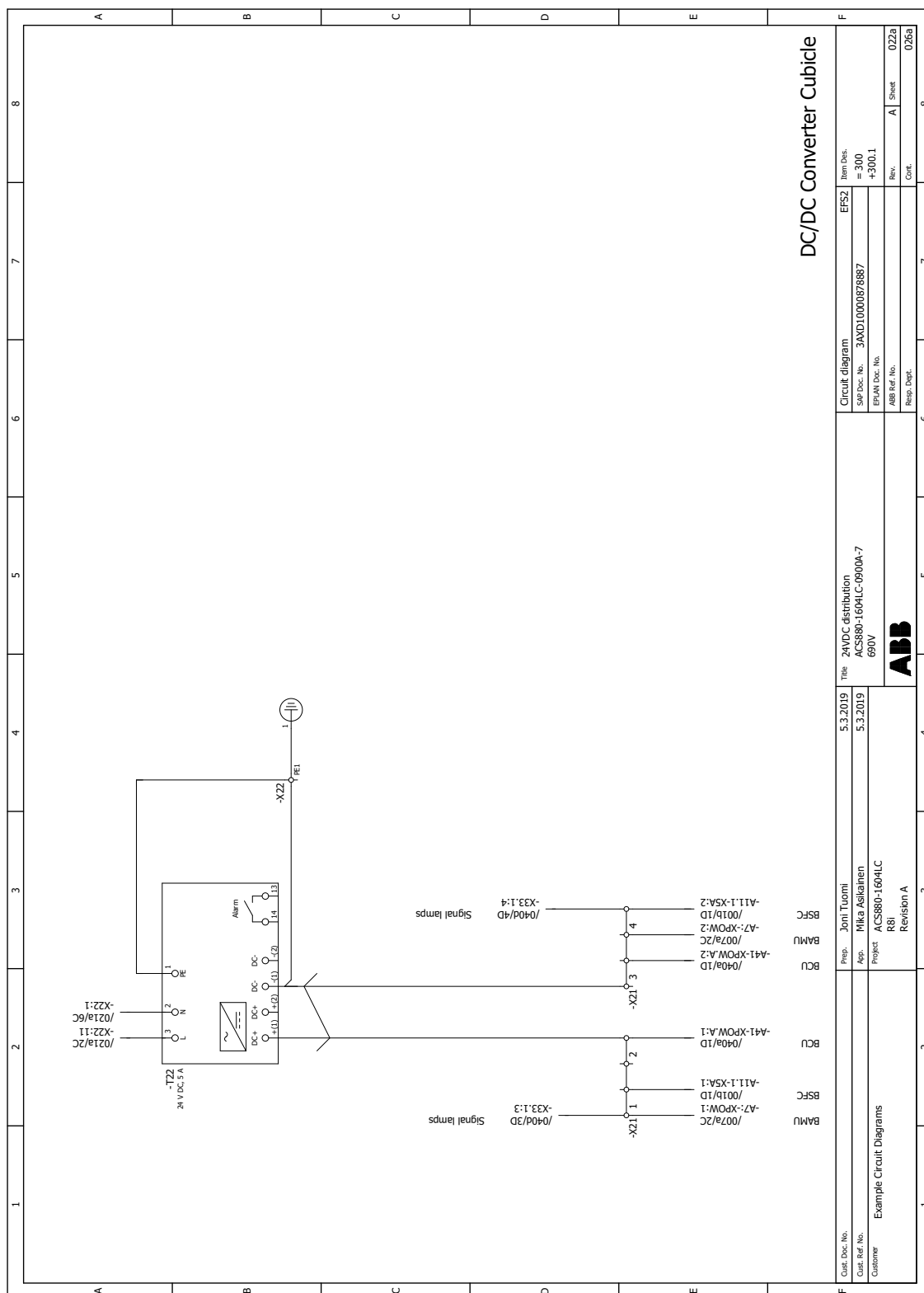
- **Sheet 020a (Auxiliary voltage distribution)**



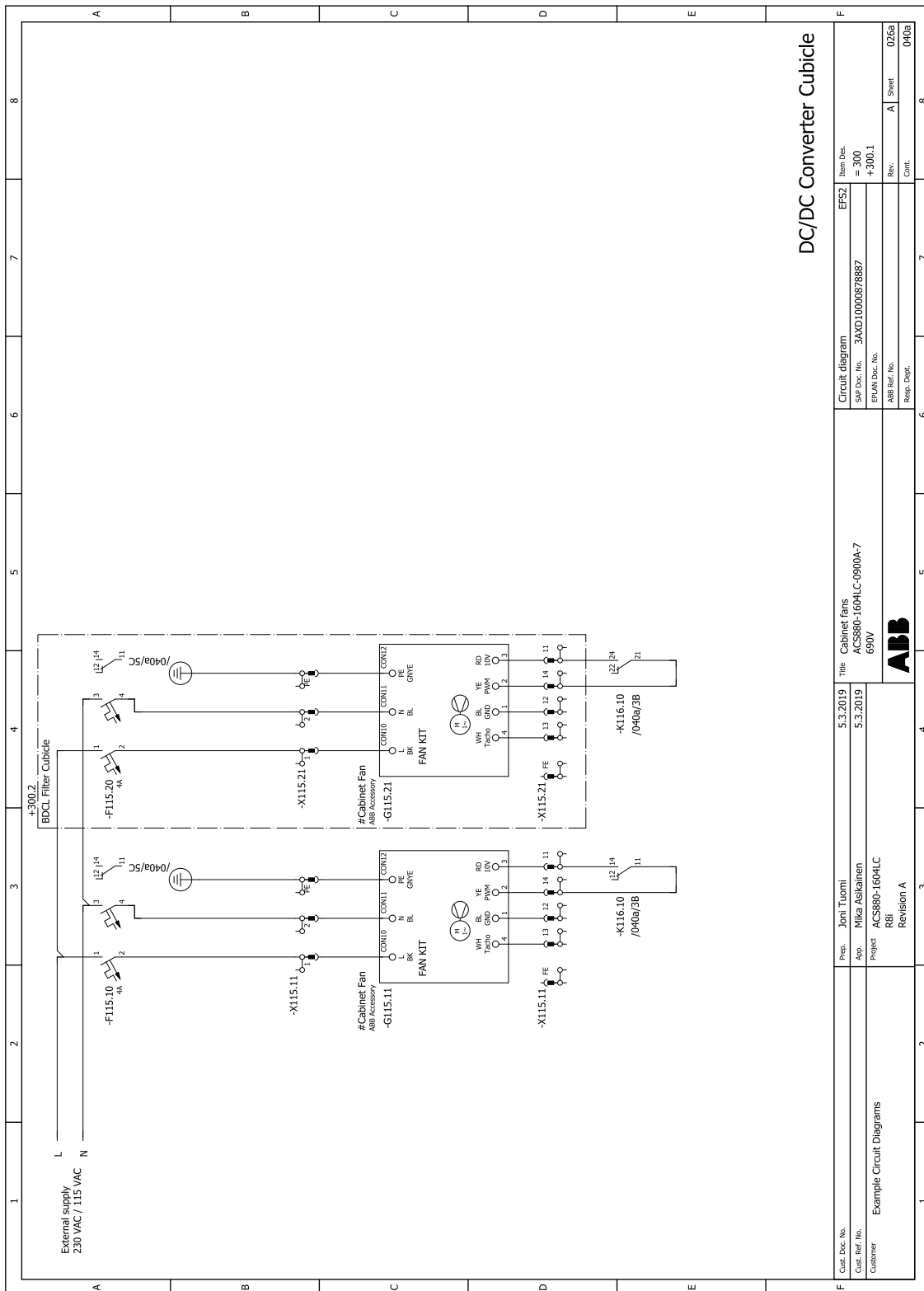
- **Sheet 021a (Auxiliary voltage distribution)**



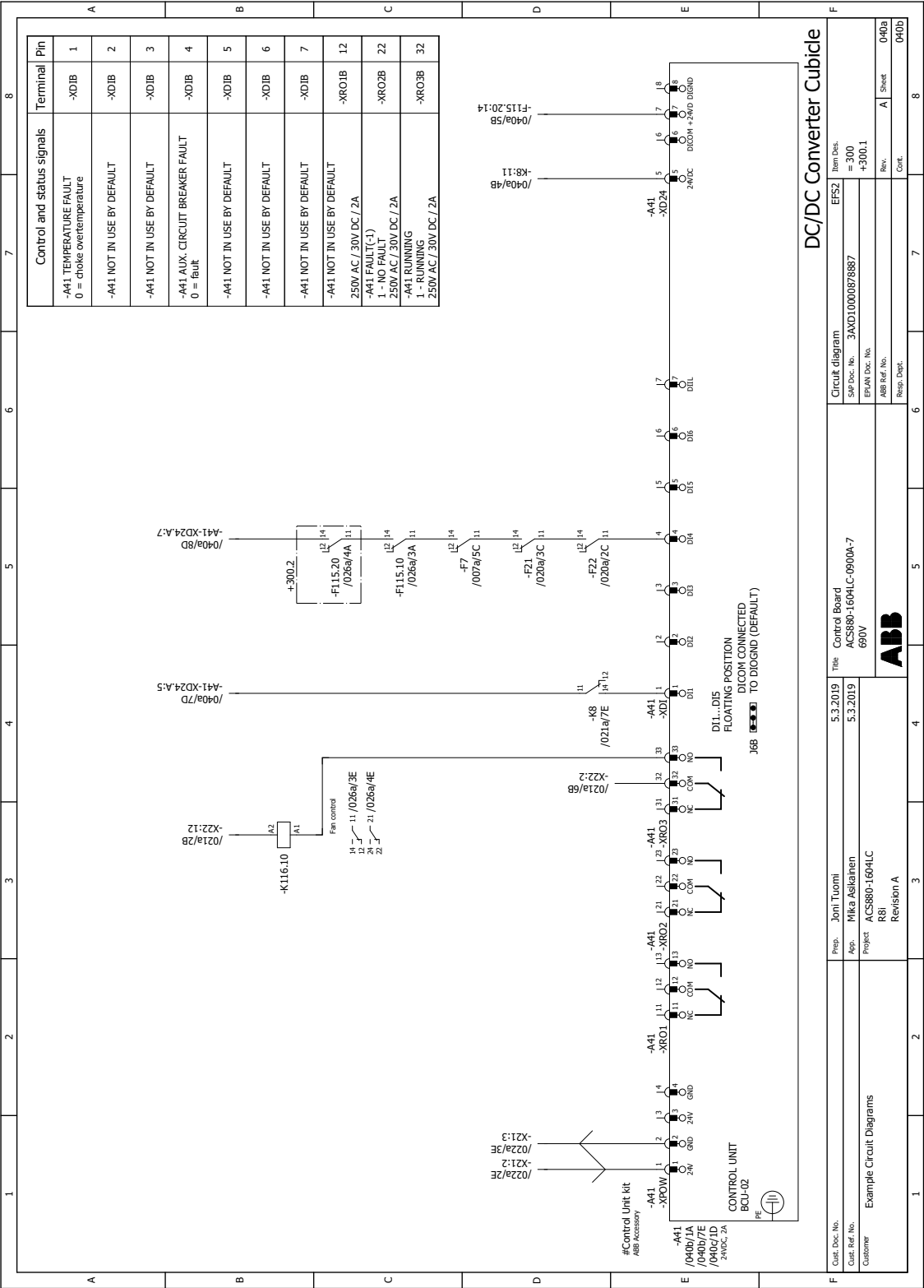
■ **Sheet 022a (24 V DC distribution)**



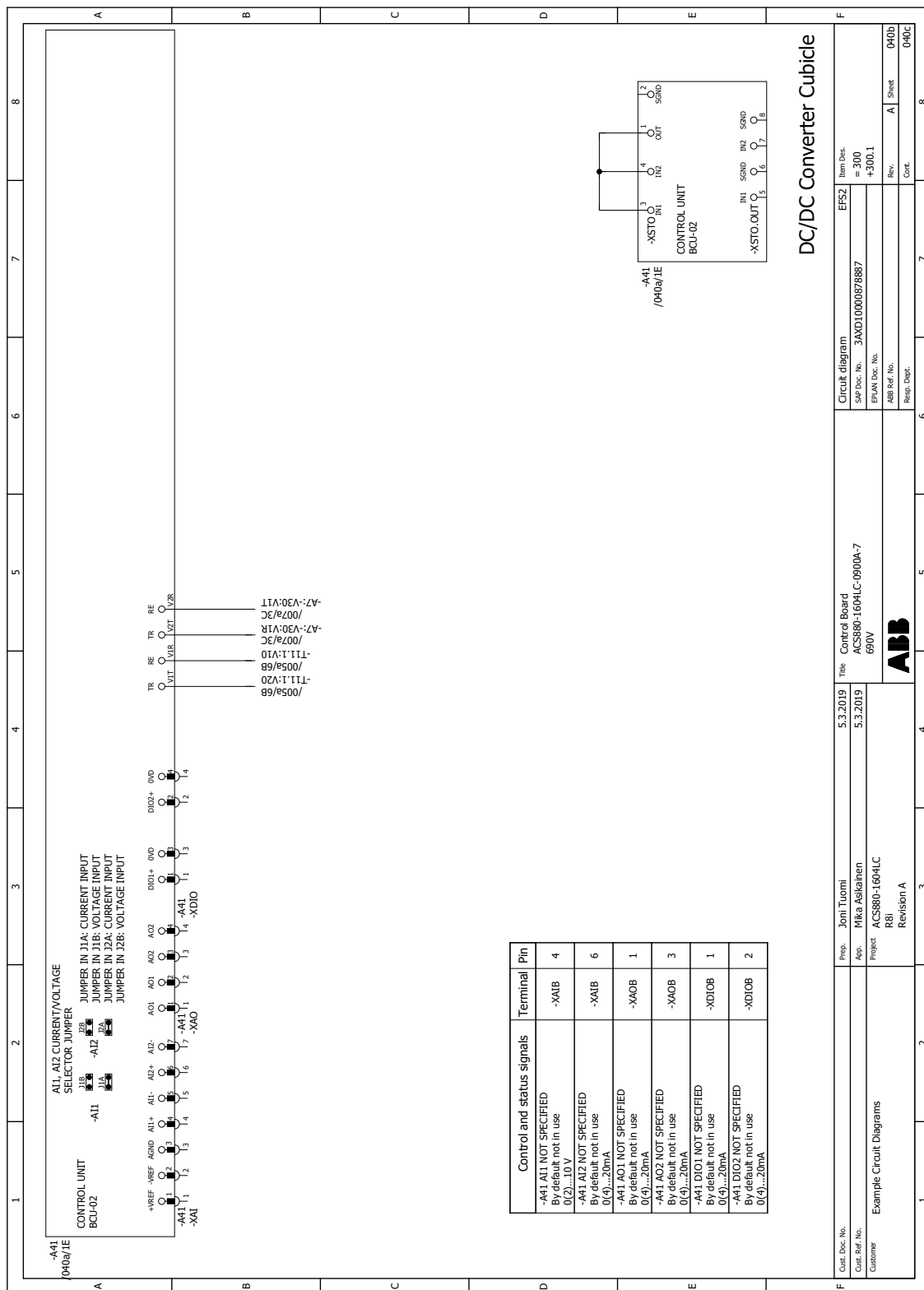
■ **Sheet 026a (Cabinet fans)**



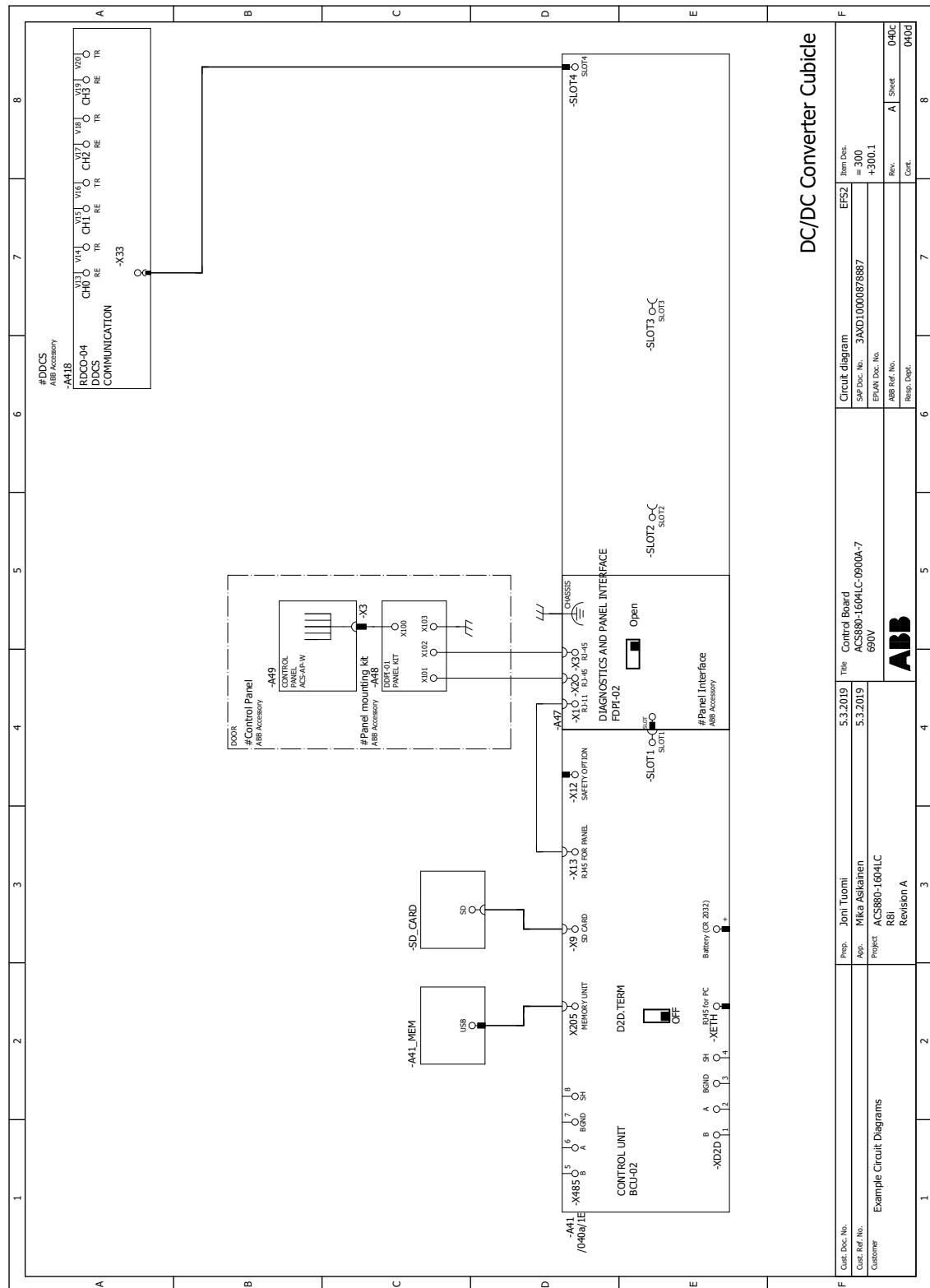
■ Sheet 040a (Control board)

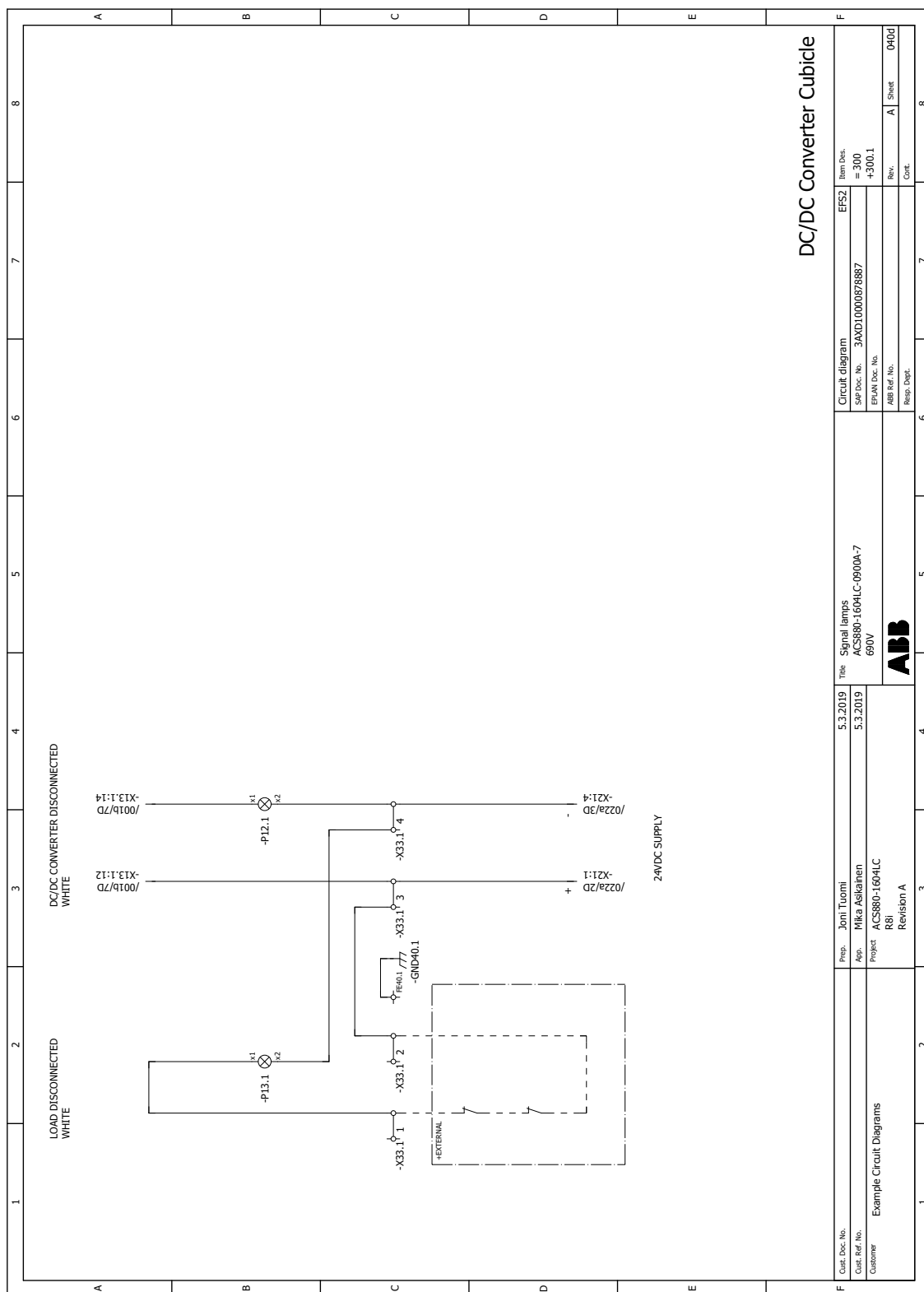


■ **Sheet 040b (Control board)**



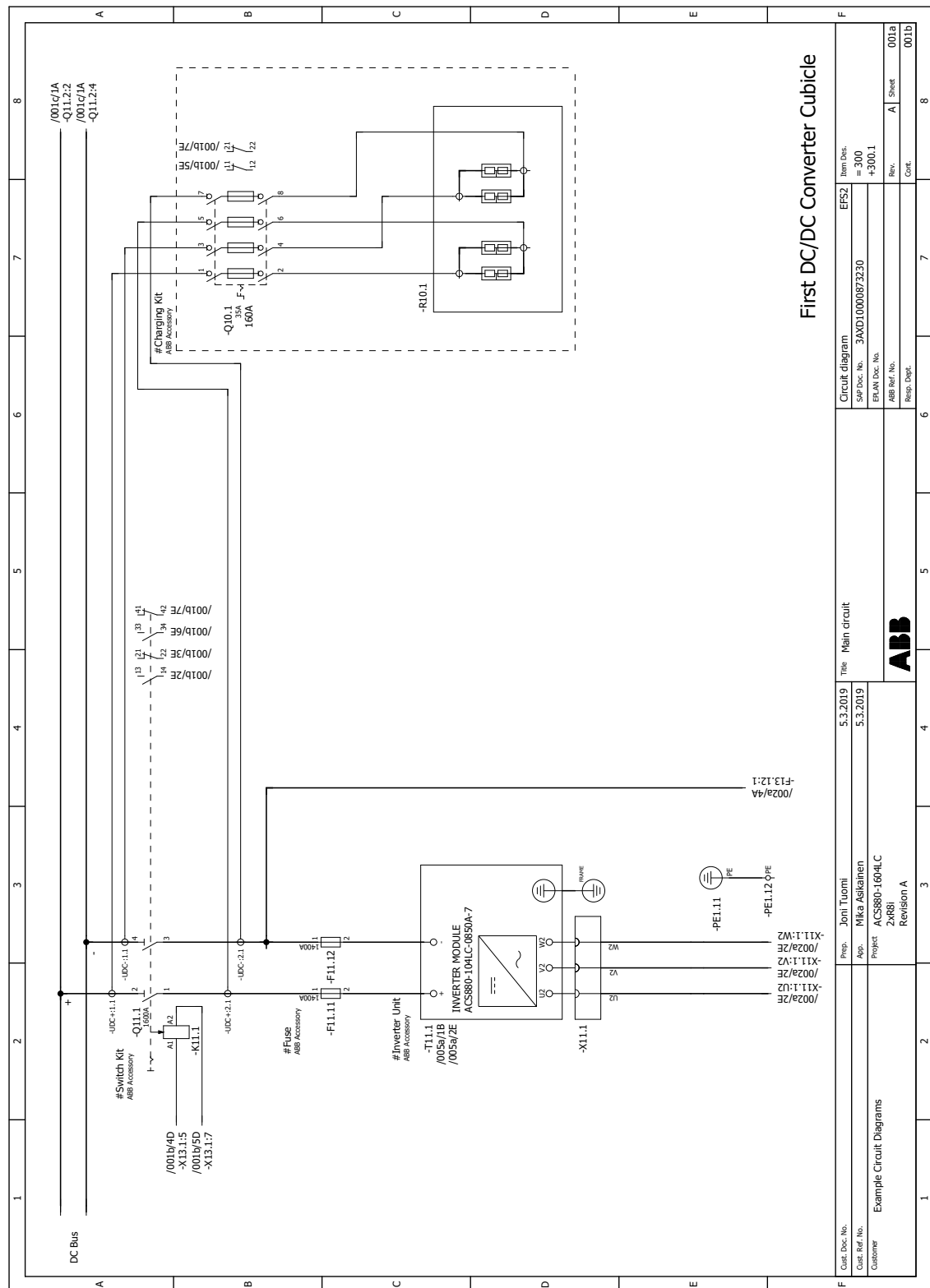
■ **Sheet 040c (Control board)**



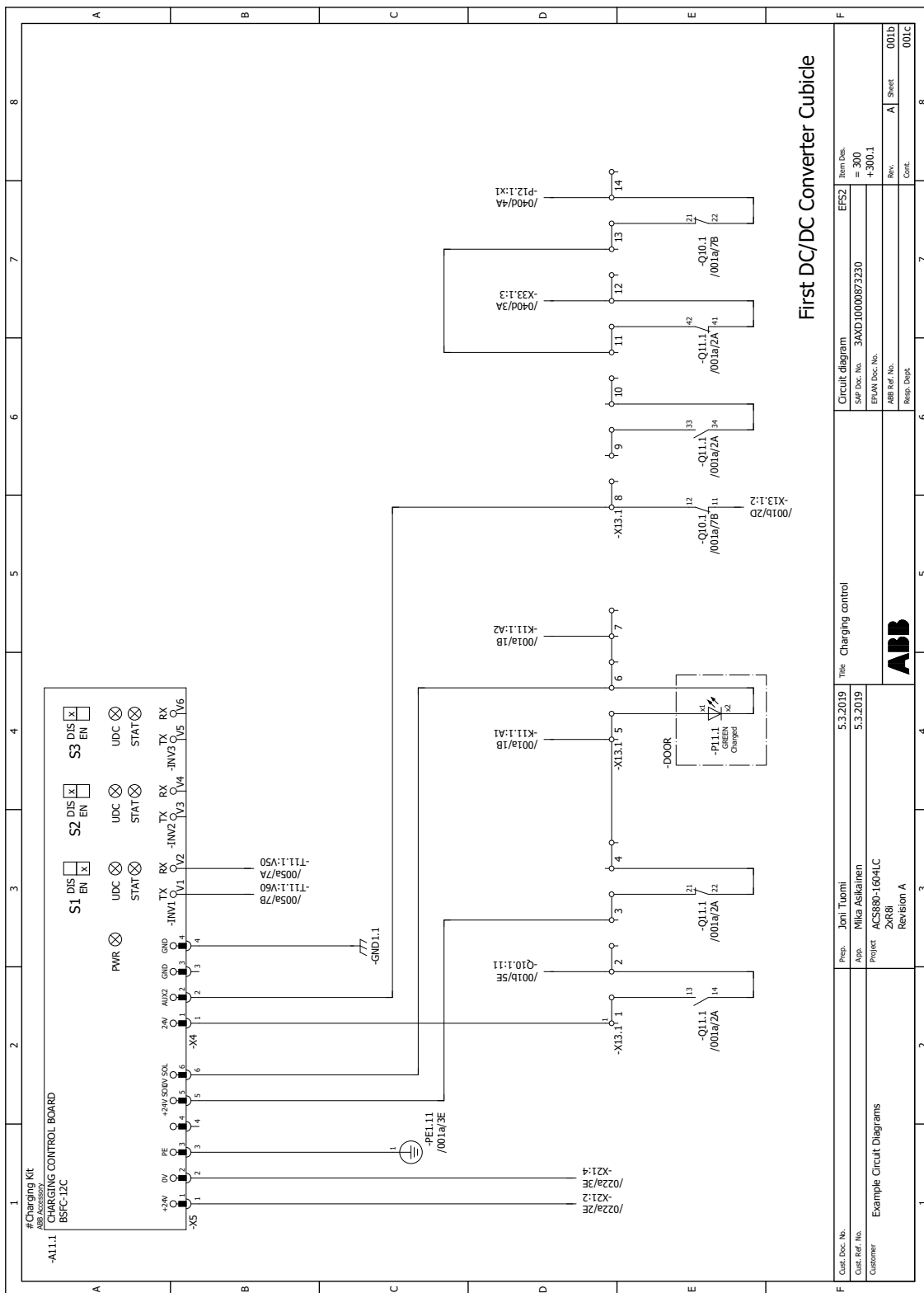


DC/DC converter unit, 2×R8i with DC switch/disconnector

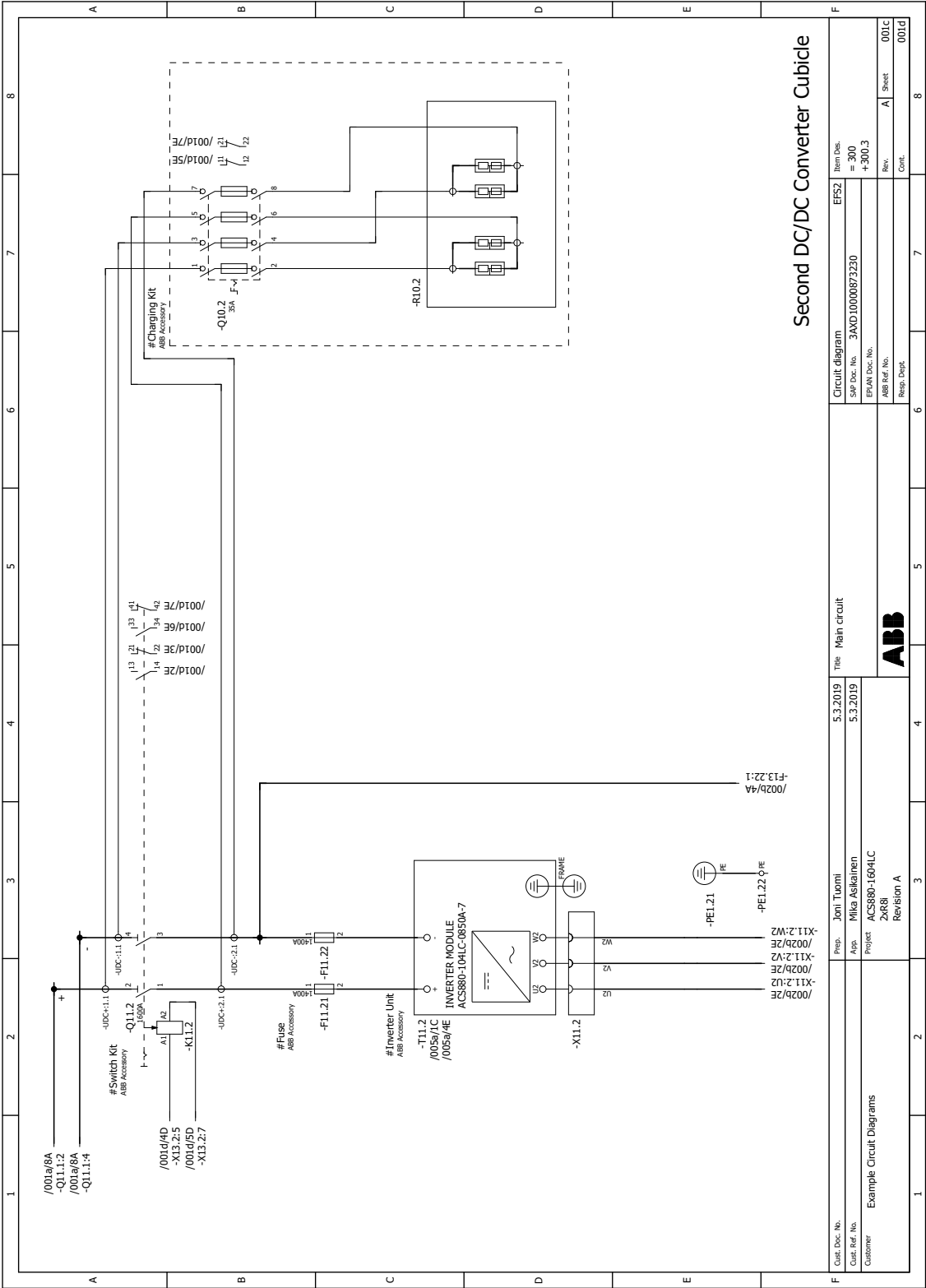
■ **Sheet 001a (Main circuit, 1st cubicle)**



- **Sheet 001b (Charging control, 1st cubicle)**



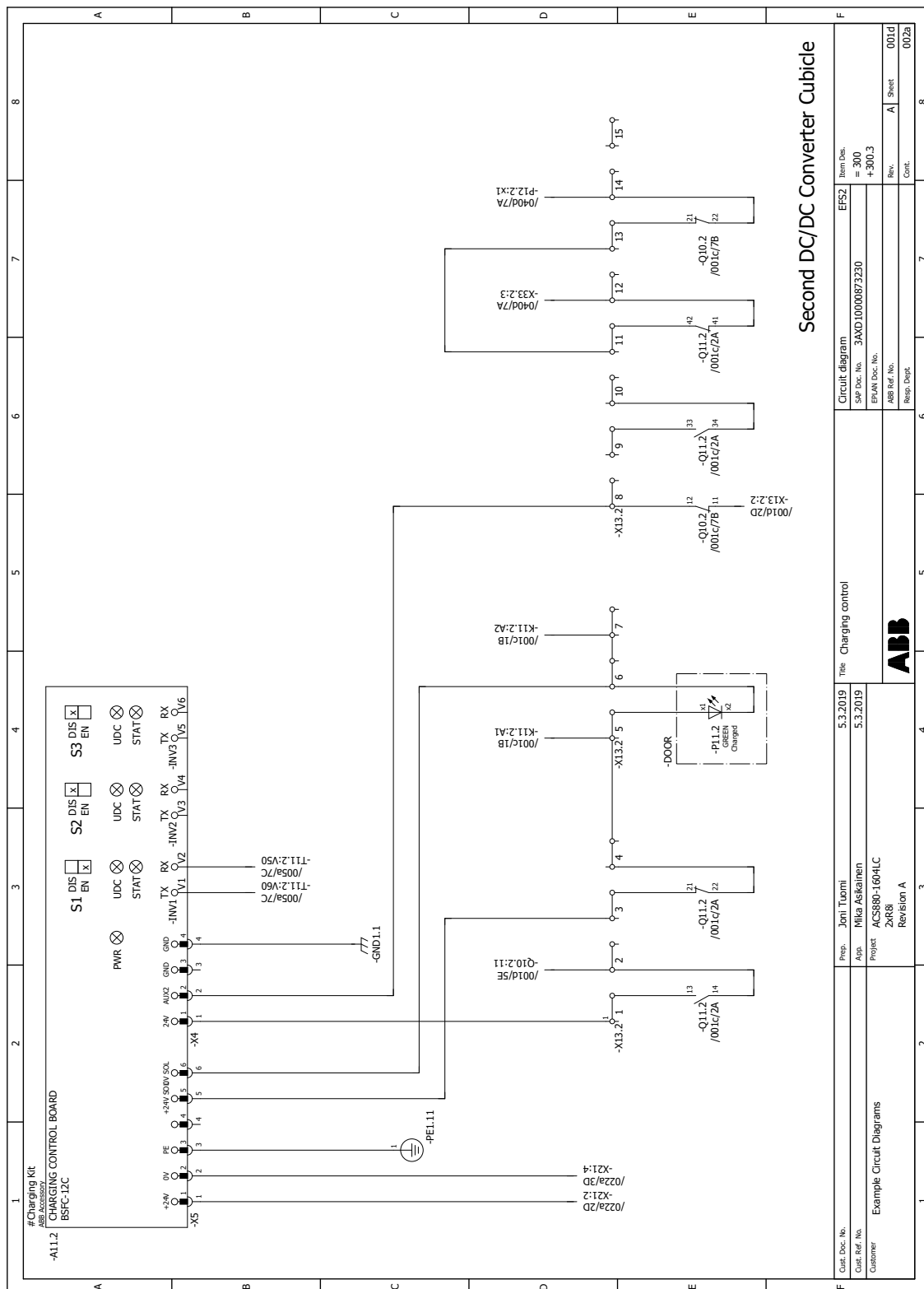
■ Sheet 001c (Main circuit, 2nd cubicle)



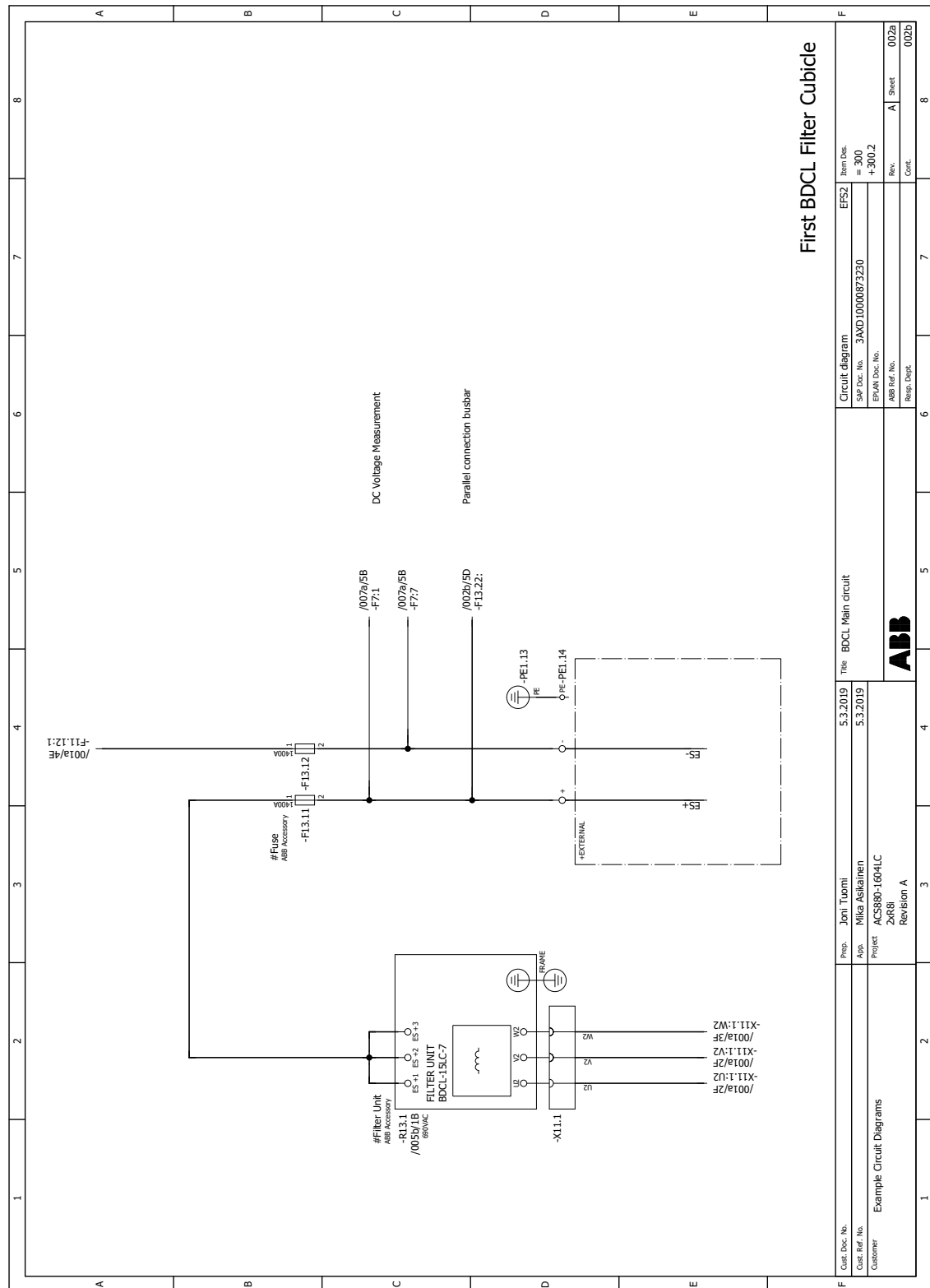
Second DC/DC Converter Cubicle

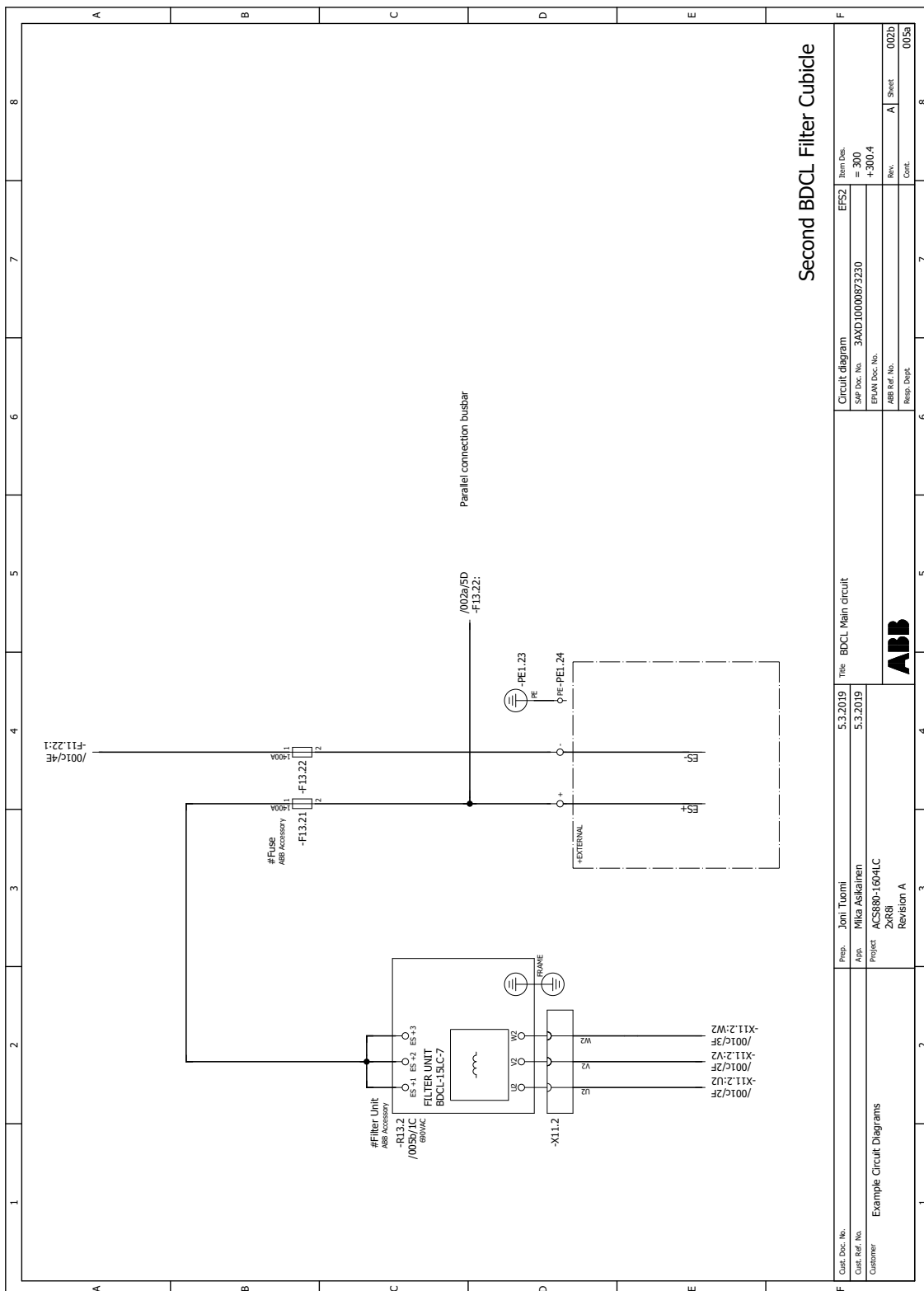
Customer	Cost. Doc. No.	Prep.	Joni Tuomi	5.3.2019	Title			Main circuit			Circuit diagram			EF52	Item Des. = 300 + 300.3	
	Cost. Ref. No.	App.	Mika Asikainen	5.3.2019							SAP Doc. No. 3AXD1000087320					
	Example Circuit Diagrams			Project			ACS880-104LC 2xR8			EPAN Doc. No.						Rev.
													ABB Ref. No.			
				Revision A			ABB			Resp. Dept.			Cont.			
1	2	3	4	5	6	7	001C								001d	

- **Sheet 001d (Charging control, 2nd cubicle)**

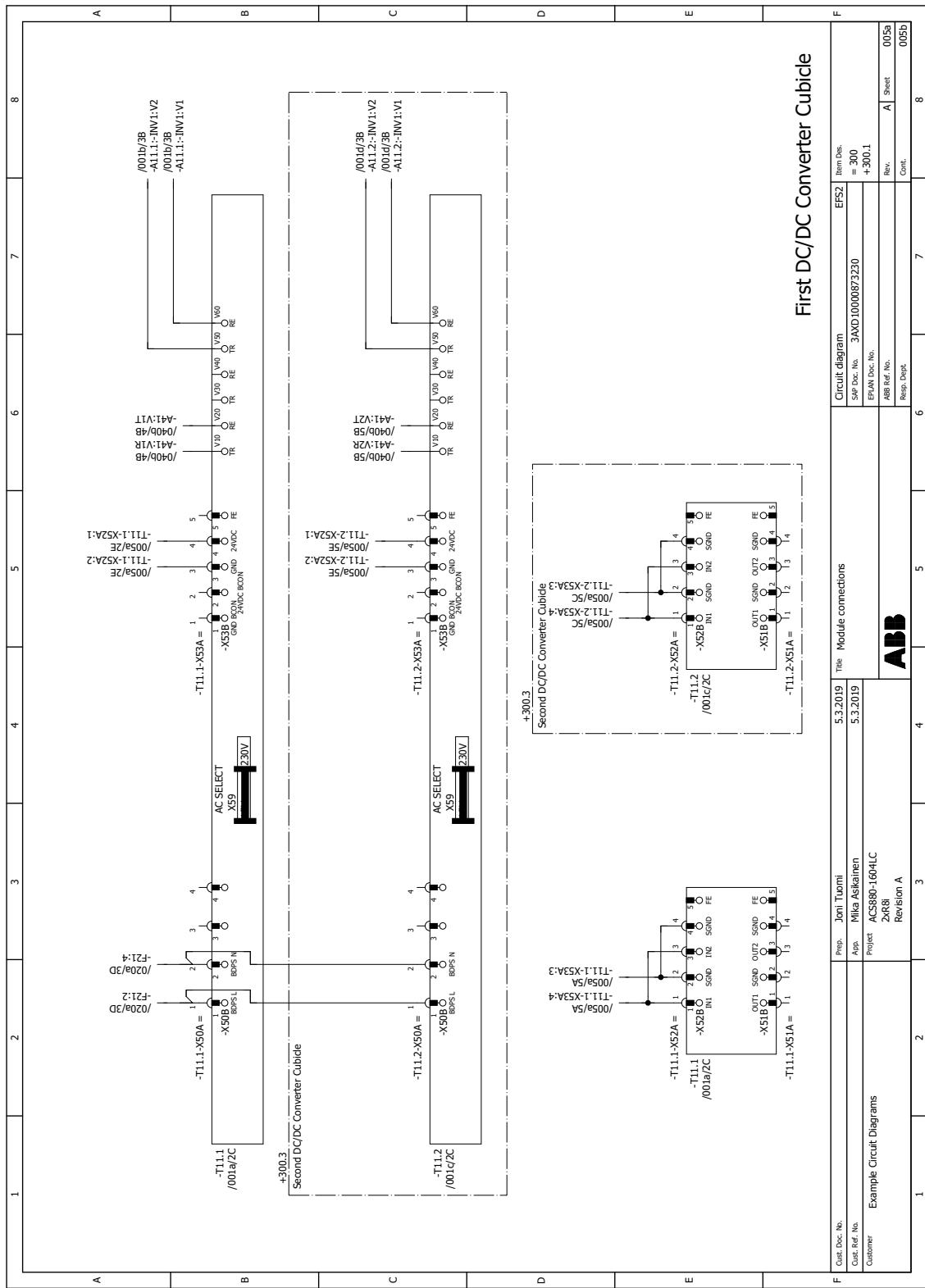


- **Sheet 002a (BDCL main circuit, 1st cubicle)**

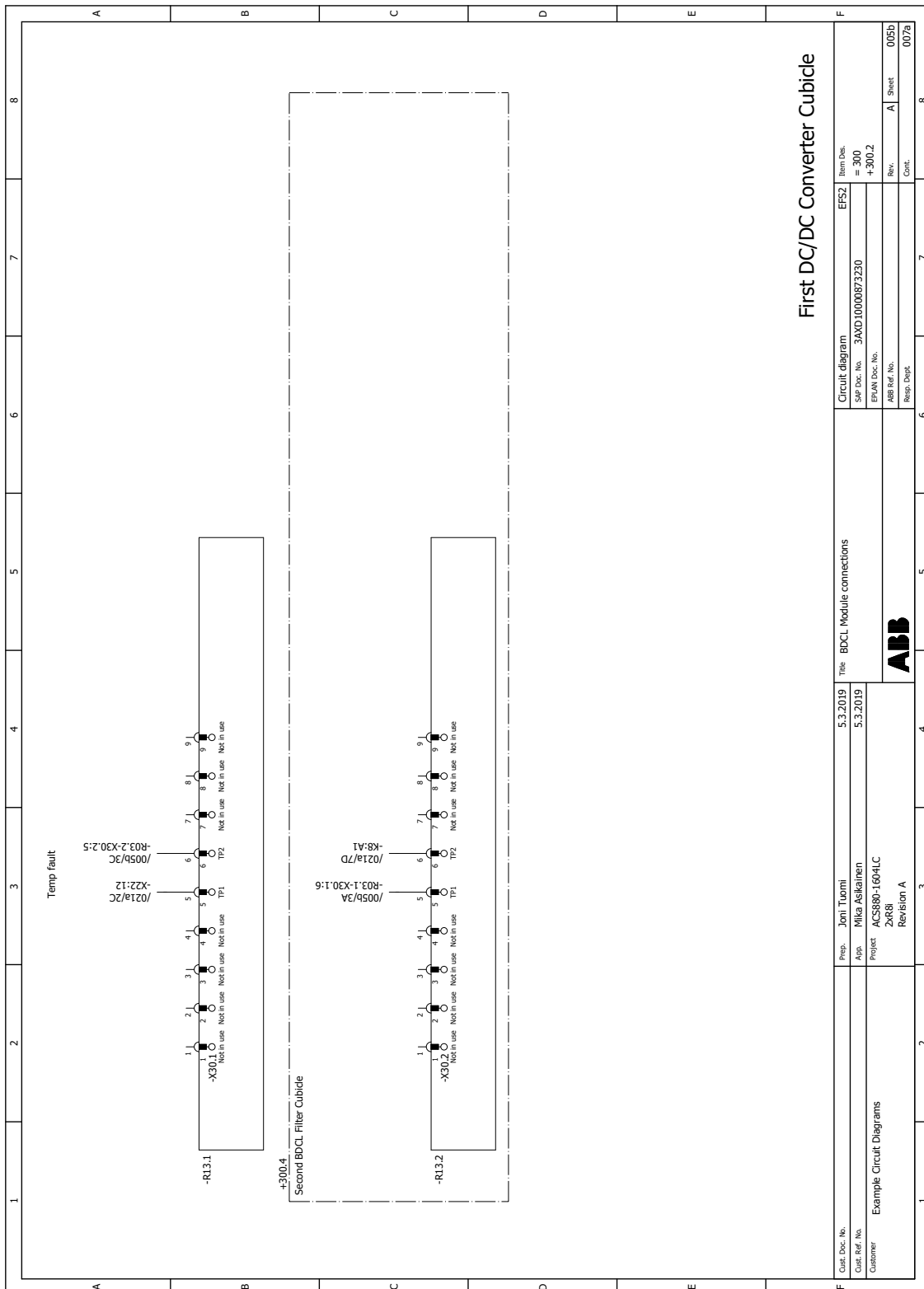




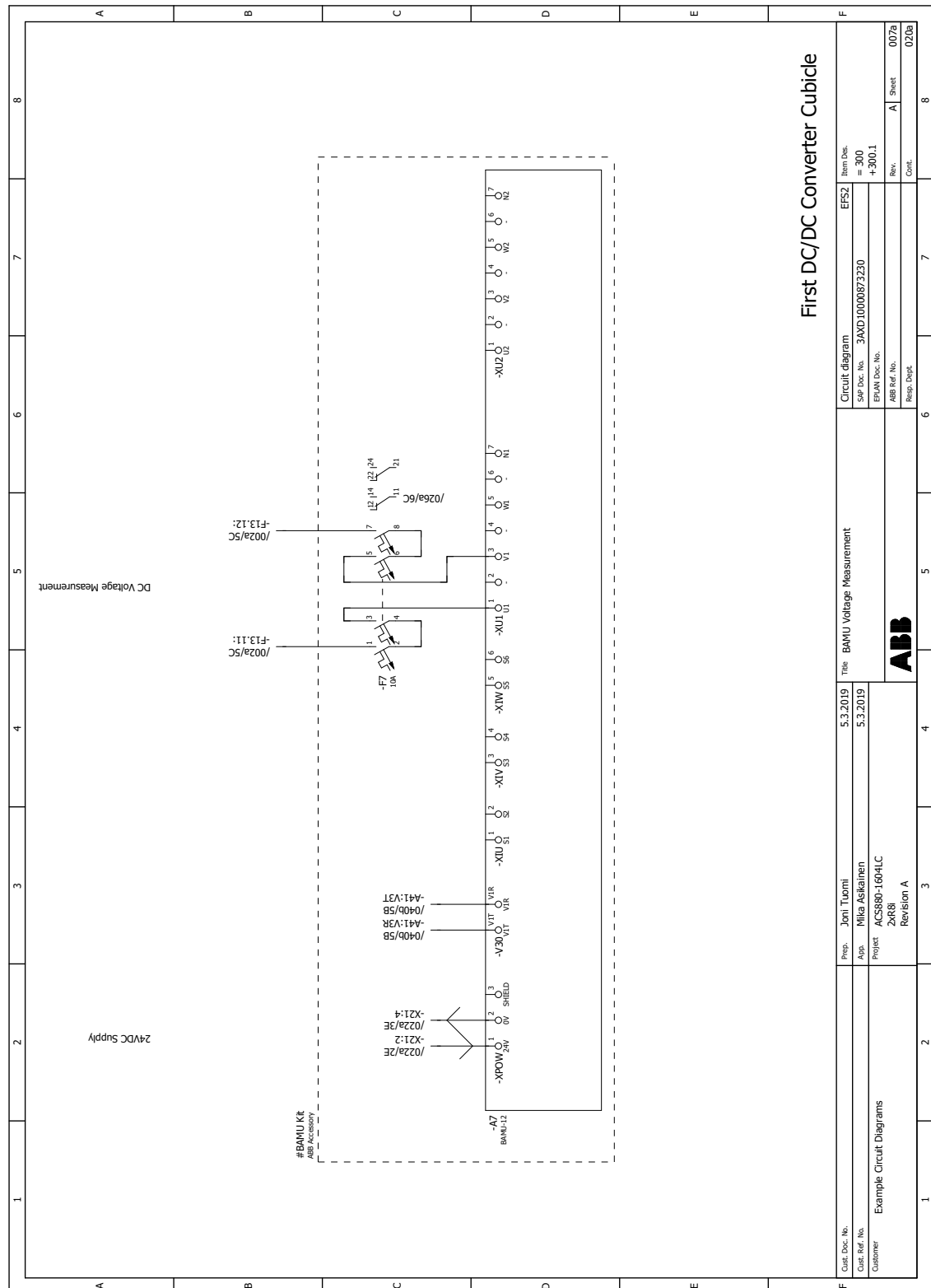
■ Sheet 005a (Module connections, 1st cubicle)

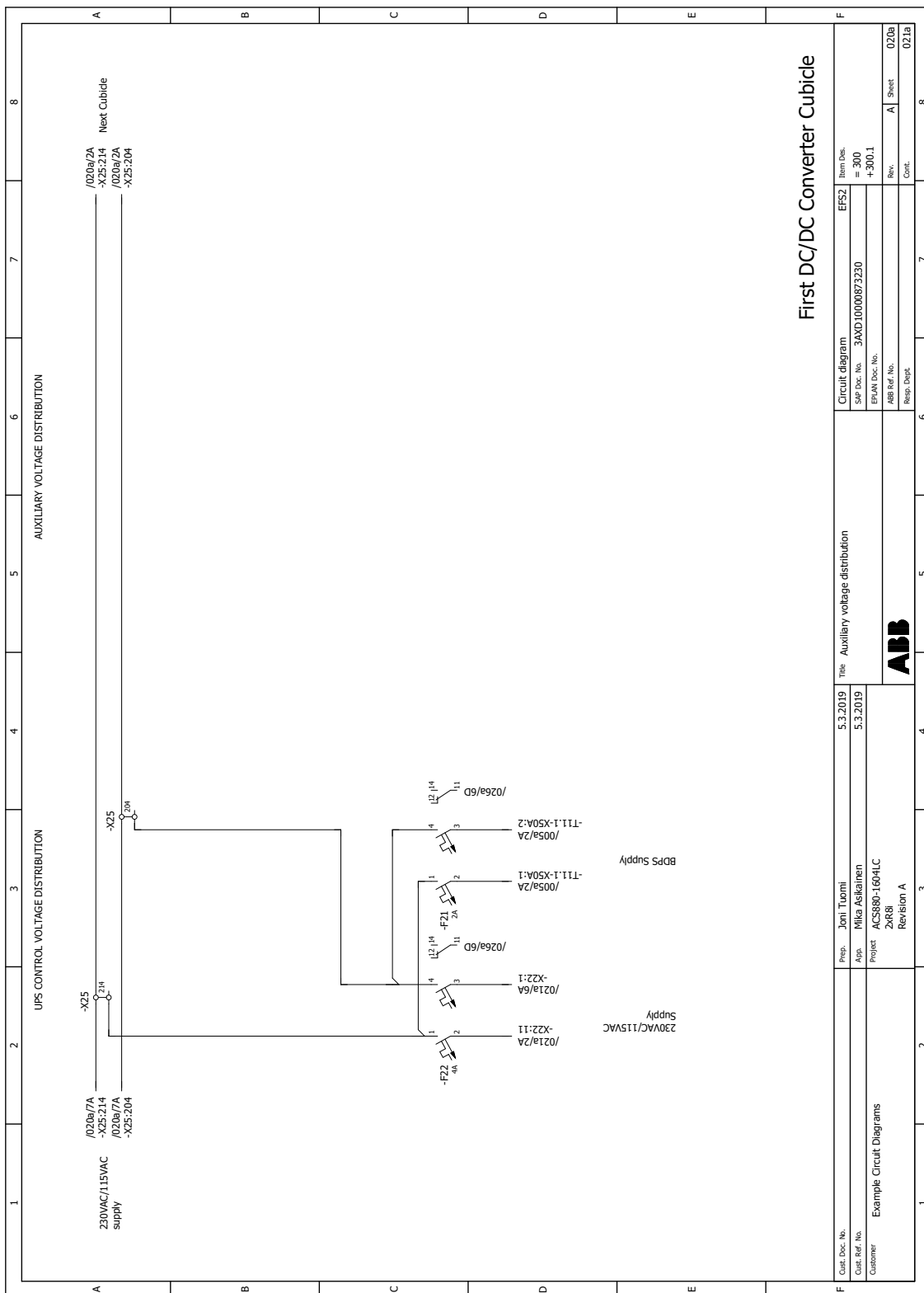


F	Cust. Doc. No.		Prep.		Title		Module connections		Circuit diagram		Item Des.	
	Cust. Ref. No.		Appr.		5.3.2019		5.3.2019		SAP Doc. No. 3AXD10000873230		= 300	
	Customer		Project		Revision A		Revision A		EPAN Doc. No.		Rev.	
Example Circuit Diagrams		Joni Tuomi		Mika Asikainen		ABB		ABB Ref. No.		A Sheet		
								2xR8		005a		
								Revision A		005b		
										Cont.		
								Resp. Dept.		7		
								6		8		
								5		005b		
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								3		8		
								2		7		
								1		8		

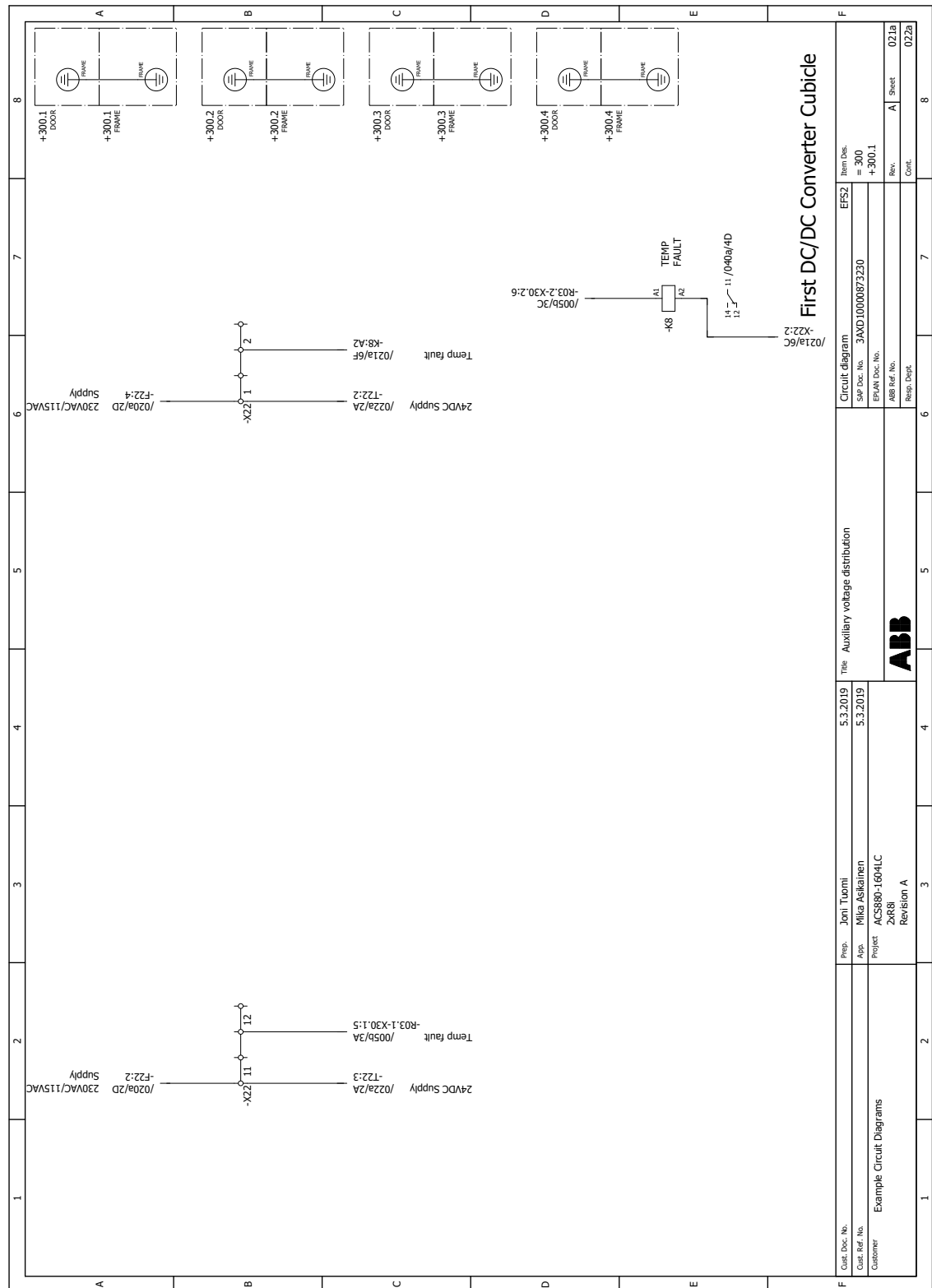


■ **Sheet 007a (BAMU voltage measurement, 1st cubicle)**

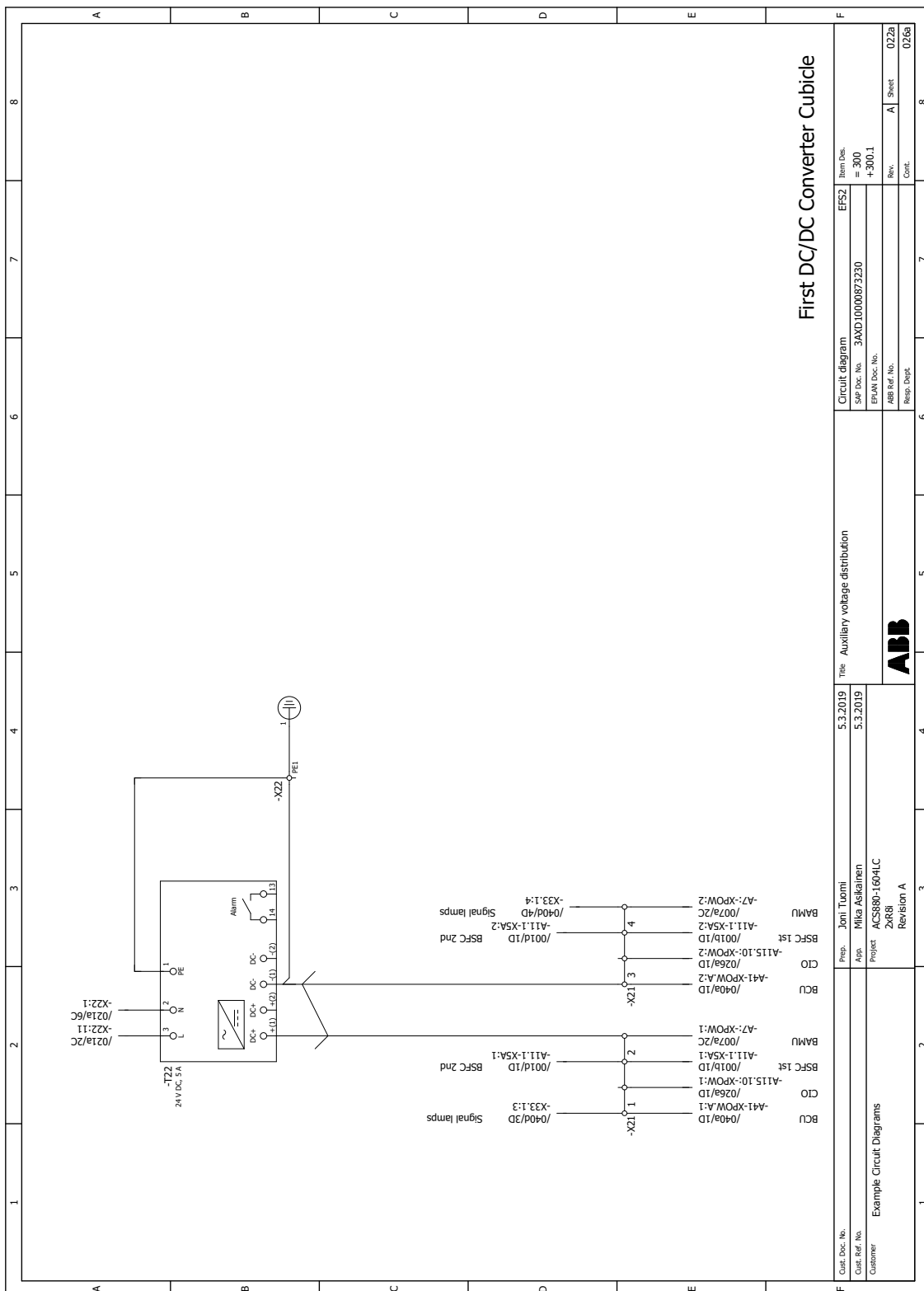




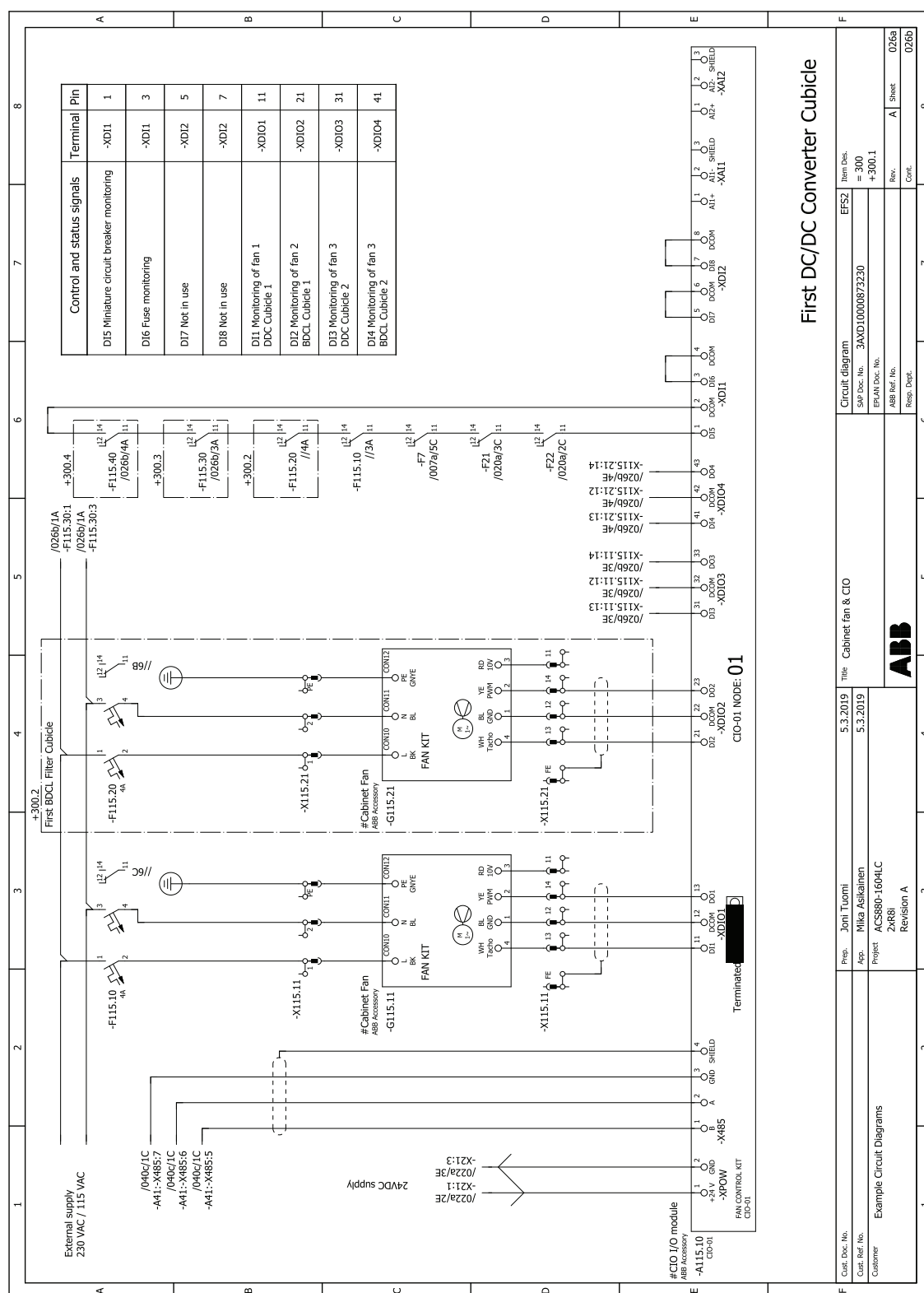
■ **Sheet 021a (Auxiliary voltage distribution, 1st cubicle)**



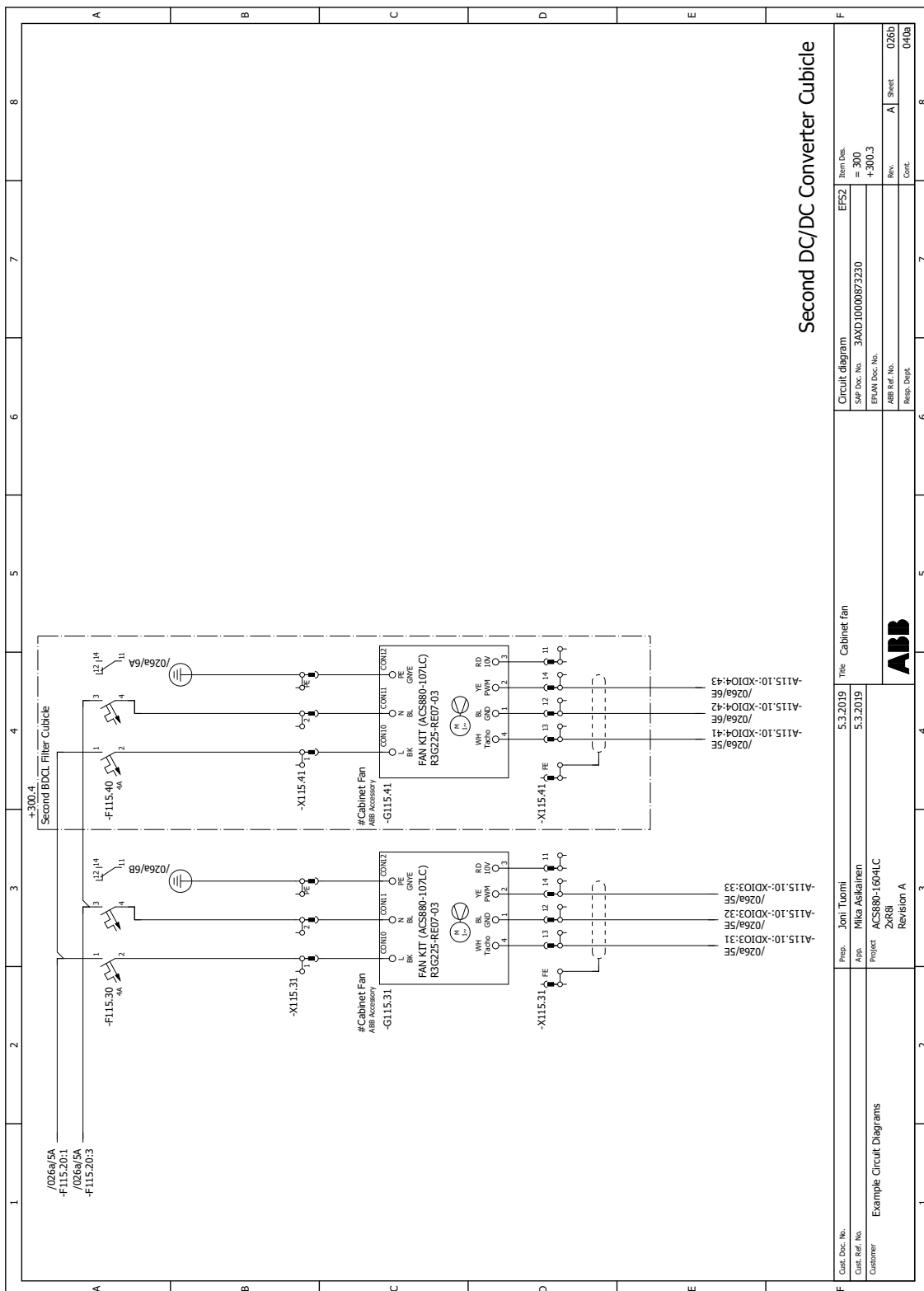
■ **Sheet 022a (Auxiliary voltage distribution, 1st cubicle)**



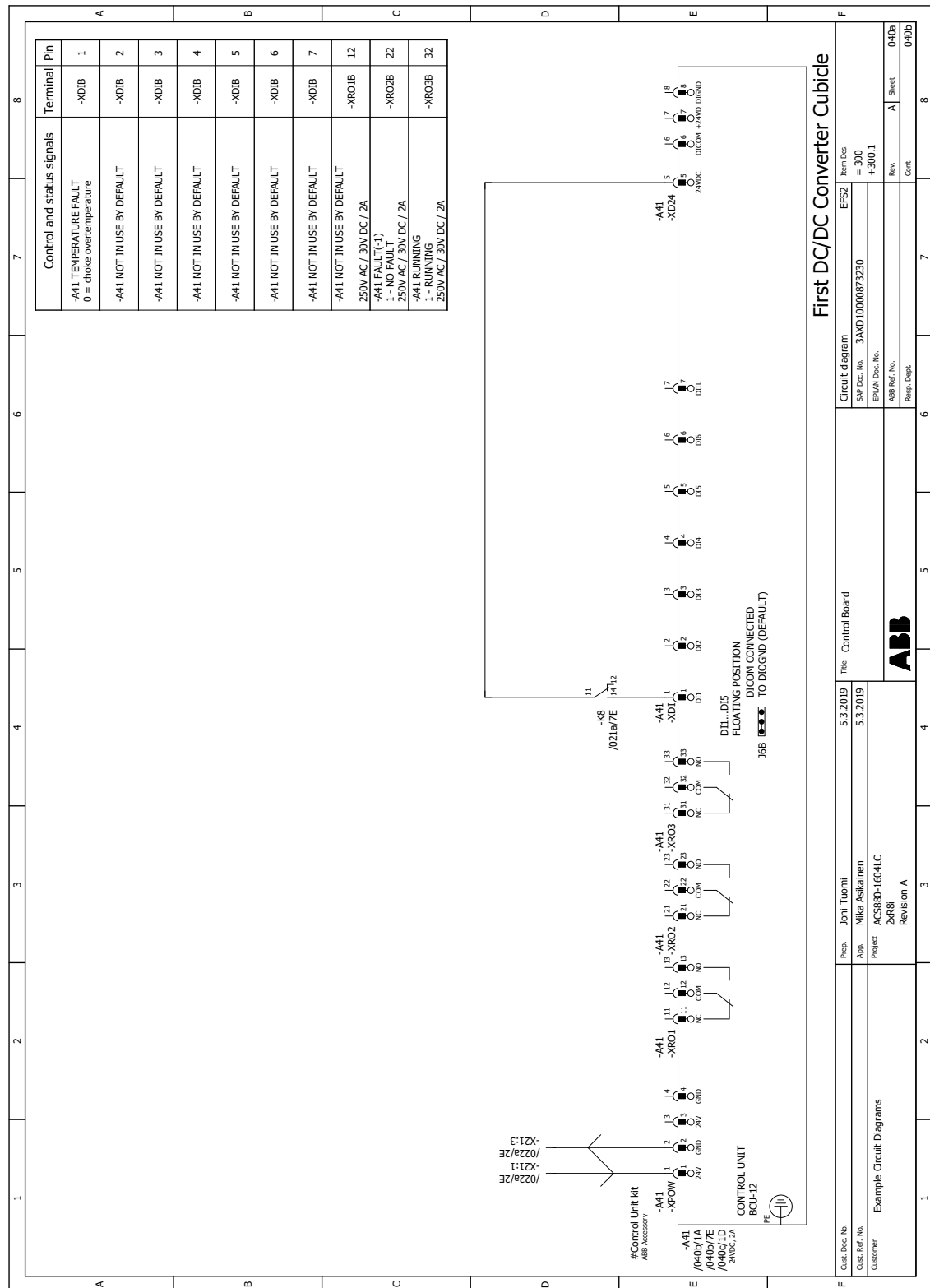
- **Sheet 026a (Cabinet fan & CIO, 1st cubicle)**

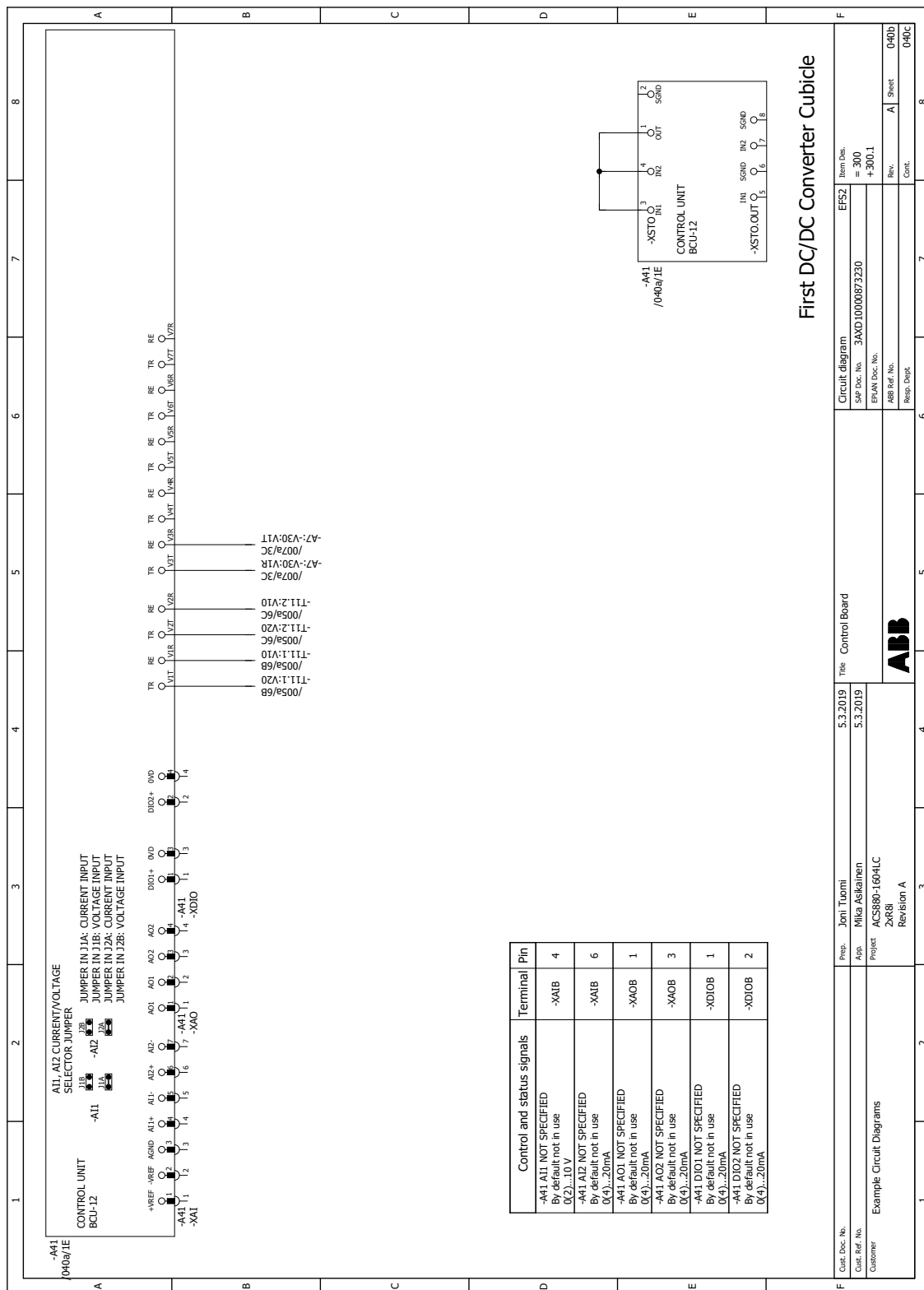


■ **Sheet 026b (Cabinet fan, 2nd cubicle)**

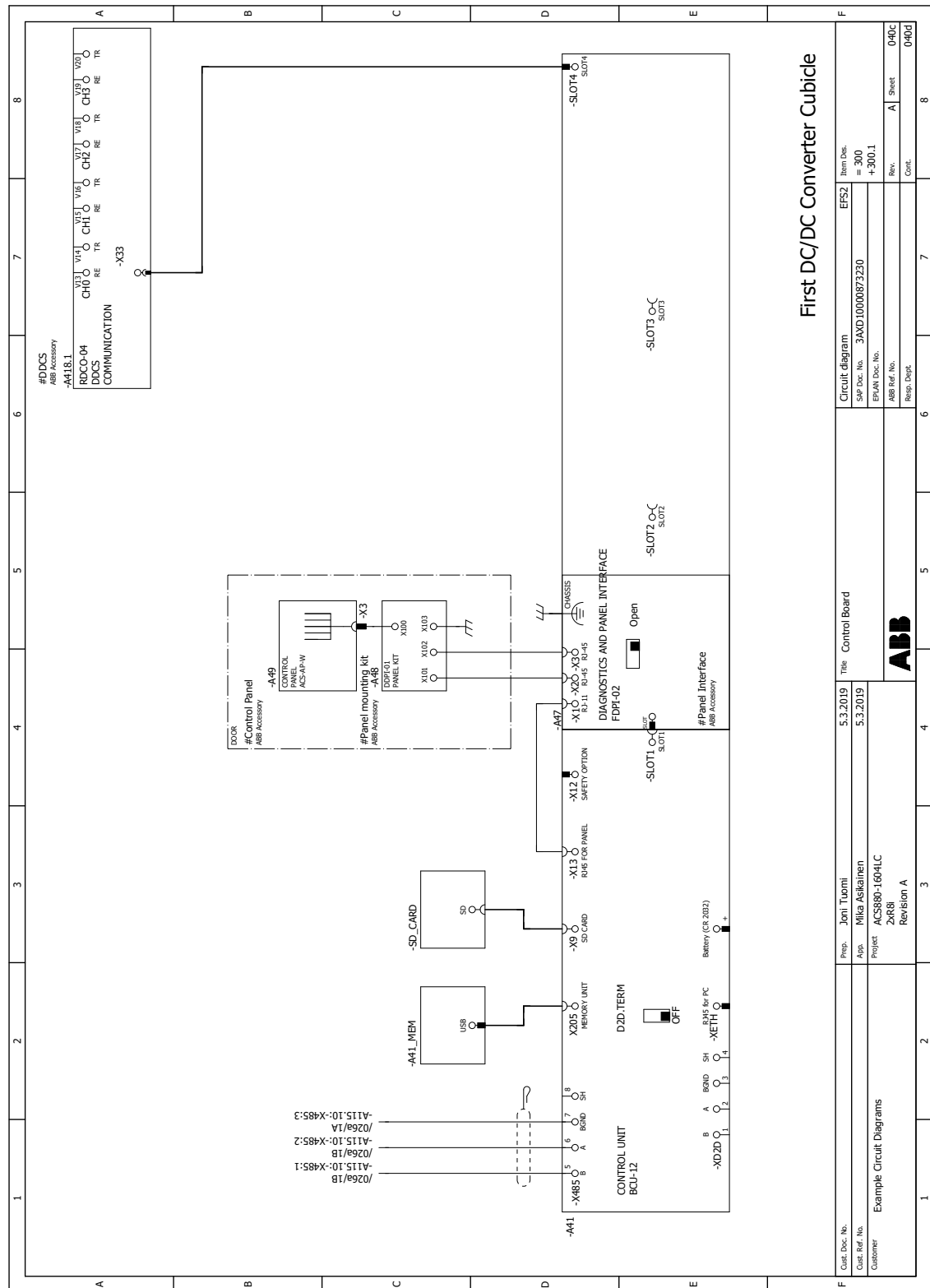


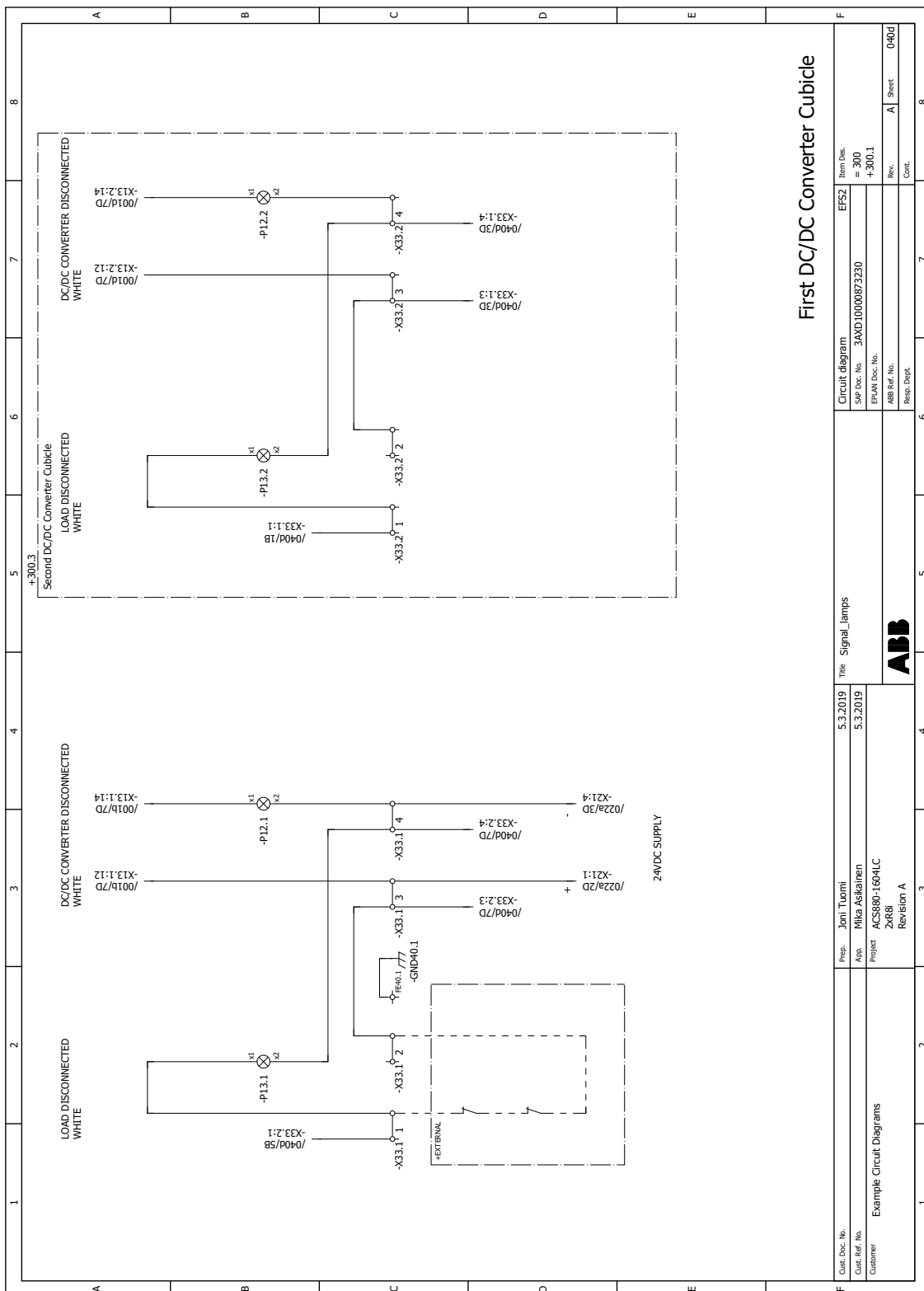
- **Sheet 040a (Control board, 1st cubicle)**





- **Sheet 040c (Control board, 1st cubicle)**







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 new.abb.com/drives/manuals-feedback-form.

Document library on the Internet

You can find manuals and other product documents in PDF format on the Internet at www.abb.com/drives/documents.



www.abb.com/drives



3AXD50000371631B