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ABB INDUSTRIAL DRIVES

# **ACS880-304LC...+A018 diode supply modules**

## Hardware manual



# ACS880-304LC...+A018 diode supply modules

Hardware manual

Table of contents



4. Cabinet construction



5. Electrical installation



7. Start-up







# Table of contents

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## 1 Introduction to the manual

Contents of this chapter .....	13
Applicability .....	13
Safety instructions .....	13
Target audience .....	13
Categorization by frame size and option code .....	14
Use of component designations .....	14
Terms and abbreviations .....	14

## 2 Operation principle and hardware description

Contents of this chapter .....	15
Operation principle .....	15
Overview diagram of the rectifier bridge .....	16
6- and 12-pulse supply connections .....	16
Overview diagram of the drive system .....	17
Overview diagrams of the supply unit .....	18
Overview diagram – 1×D8T, 6-pulse .....	19
Overview diagram – 2×D8T, 6-pulse .....	20
Overview diagram – 3×D8T, 6-pulse .....	21
Overview diagram – 2×D8T, 12-pulse .....	22
Layout drawings .....	23
Supply module layout - frame D8T .....	23
Supply module connectors X50 and X53 .....	23
Overview of the control connections of the BCU control unit .....	24
Supply unit control devices .....	25
Main disconnecting device .....	25
Auxiliary voltage switch .....	25
Operating switch .....	25
Emergency stop and emergency stop reset buttons .....	25
The control unit .....	26
Control panel [A59] .....	26
PC connection .....	26
Fieldbus control .....	26
Type designation labels .....	26
Type designation keys .....	28
Type designation key of the diode supply module .....	28

## 3 Moving and unpacking the module

Contents of this chapter .....	29
Moving and unpacking the module .....	29

## 4 Cabinet construction

Contents of this chapter .....	31
Limitation of liability .....	31
Switching, disconnecting and protecting solution .....	31

---



Installation examples .....	32
One D8T module in a 600 mm wide Rittal VX25 enclosure .....	33
Layout drawing .....	33
Pipe routing example .....	34
Construction of supply module cubicle – 1×D8T, 6-pulse, Rittal VX25 .....	35
Two D8T modules in a 600 mm wide Rittal VX25 enclosure .....	43
Layout drawing .....	43
Pipe routing example .....	44
Construction of supply module cubicle – 2×D8T, 6-pulse, Rittal VX25 .....	45
Construction of supply module cubicle – 2×D8T, 12-pulse, Rittal VX25 .....	53
One D8T module in a 600 mm wide generic enclosure .....	61
Two D8T modules in a 600 mm wide generic enclosure .....	63

## 5 Electrical installation

Contents of this chapter .....	65
Safety and liability .....	65
Electrical safety precautions .....	66
General notes .....	67
Static electricity .....	67
Optical components .....	67
Measuring the insulation resistance of the drive .....	67
Connecting the power cables and busbars .....	68
Connection diagram – 1×D8T, 6-pulse .....	68
Connection diagram – 2×D8T, 6-pulse .....	69
Connection diagram – 3×D8T, 6-pulse .....	70
Connection diagram – 2×D8T, 12-pulse .....	71
Connection procedure .....	72
Connecting auxiliary power to the diode supply module .....	74
Connection procedure .....	74
Connecting the control cables .....	74
Connection diagram .....	74
Connection procedure .....	74
Connecting a PC .....	77
Installing option modules .....	77

## 6 Installation checklist

Contents of this chapter .....	79
Checklist .....	79

## 7 Start-up

Contents of this chapter .....	83
Start-up procedure .....	84
Basic checks with no voltage connected .....	84
Starting and checking the cooling system .....	84
Connecting voltage to input terminals and auxiliary .....	84
Setting the supply unit parameters .....	85
Powering up the drive .....	85
Safety function validation .....	86
On-load checks .....	86
Switching the supply unit off .....	86
Disconnecting and temporary grounding the drive .....	86

## 8 Maintenance

Contents of this chapter .....	87
Maintenance intervals .....	87
Description of symbols .....	87
Recommended maintenance intervals after start-up .....	88
Cabinet .....	89
Cleaning the interior of the cabinet .....	89
Power connections .....	89
Retightening the power connections .....	89
Fuses .....	90
Checking and replacing the DC fuses .....	90
Checking and replacing the AC fuses .....	91
Fan .....	92
Replacing the cooling fan of a D8T supply module .....	92
Supply module .....	93
Replacing the D8T supply module .....	93
Control unit .....	97
Replacing the memory unit .....	97
Replacing the BCU control unit battery .....	97
LEDs and other status indicators .....	98
Functional safety components .....	99

## 9 Ordering information

Contents of this chapter .....	101
Kit code key .....	101
Diode supply units – 1×D8T, 6-pulse .....	104
Diode supply modules – 1×D8T, 6-pulse .....	104
Mechanical installation accessories – 1×D8T, 6-pulse, Rittal VX25 .....	105
Module top/bottom guides .....	105
Rear busbar support kit .....	105
Side plate kit .....	106
Shrouds .....	106
AC busbars .....	107
AC fuse connection .....	107
DC busbars .....	107
DC fuse connection .....	107
Fan mounting .....	108
Other components and tools – 1×D8T, 6-pulse .....	108
Diode supply units – 2×D8T, 6-pulse .....	109
Diode supply modules – 2×D8T, 6-pulse .....	109
Mechanical installation accessories – 2×D8T, 6-pulse .....	110
Module top/bottom guides .....	110
Rear busbar support kit .....	110
Side plate kit .....	111
Shrouds .....	111
Marine supports .....	112
AC busbars .....	112
AC fuse connection .....	112
DC busbars .....	113
DC fuse connection .....	113
Fan mounting .....	114

Other components and tools – 2×D8T, 6-pulse .....	114
Diode supply units – 2×D8T, 12-pulse .....	115
Diode supply modules – 2×D8T, 12-pulse .....	115
Mechanical installation accessories – 2×D8T, 12-pulse .....	116
Module top/bottom guides .....	116
Rear busbar support kit .....	116
Side plate kit .....	117
Shrouds .....	117
Marine supports .....	118
AC busbars .....	118
AC fuse connection .....	118
DC busbars .....	119
DC fuse connection .....	119
Fan mounting .....	120
Other components and tools – 2×D8T, 12-pulse .....	120
Diode supply units – 3×D8T and 4×D8T, 6-pulse .....	121
Diode supply modules – 3×D8T and 4×D8T, 6-pulse .....	121
Mechanical installation accessories – 3×D8T and 4×D8T, 6-pulse .....	121
Other components and tools – 3×D8T and 4×D8T, 6-pulse .....	121
Diode supply units – 4×D8T, 12-pulse .....	122
Diode supply modules – 4×D8T, 12-pulse .....	122
Mechanical installation accessories – 4×D8T, 12-pulse .....	122
Other components and tools – 4×D8T, 12-pulse .....	123
Brackets for Rittal Flat-PLS busbar holder .....	123
AC bus installation parts (for Rittal VX25 enclosures) .....	123
DC bus installation parts (for Rittal VX25 enclosures) .....	124
Control panel .....	125
Control electronics .....	126
Control unit .....	126
Fiber optic cables .....	127
AC fuses .....	127
Main AC fuses – 6-pulse (IEC) .....	127
Main AC fuses – 6-pulse (UL) .....	127
Main AC fuses – 12-pulse (IEC) .....	127
Main AC fuses – 12-pulse (UL) .....	128
DC fuses .....	129
Module DC fuses – 6-pulse (IEC) .....	129
Module DC fuses – 6-pulse (UL) .....	129
Module DC fuses – 12-pulse (IEC) .....	129
Module DC fuses – 12-pulse (UL) .....	129
Main circuit breakers .....	130
Main circuit breakers – 6-pulse (IEC) 230 V .....	130
Main circuit breakers – 6-pulse (UL) 230 V .....	130
Main circuit breakers – 6-pulse (IEC) 115 V .....	130
Main circuit breakers – 6-pulse (UL) 115 V .....	131
Main circuit breakers – 12-pulse (IEC) 230 V .....	131
Main circuit breakers – 12-pulse (UL) 230 V .....	131
Main circuit breakers – 12-pulse (IEC) 115 V .....	131
Main circuit breakers – 12-pulse (UL) 115 V .....	132
Main circuit breaker wagons – 6-pulse (IEC) .....	132
Main circuit breaker wagons – 6-pulse (UL) .....	132
Main circuit breaker wagons – 12-pulse (IEC) .....	132



Main circuit breaker wagons – 12-pulse (UL) .....	133
Main circuit breaker covers – 6-pulse (IEC) .....	133
Main circuit breaker covers – 6-pulse (UL) .....	133
Main circuit breaker covers – 12-pulse (IEC) .....	134
Main circuit breaker covers – 12-pulse (UL) .....	134
Bus bar shim kits .....	135
Cooling system parts .....	135
Coolant distribution manifold kits .....	135
Piping .....	137
Heat exchanger .....	137
Cooling fan .....	138
Miscellaneous .....	138
CIO-01 I/O module .....	138
Lifting device .....	139

## **10 Internal cooling circuit**

Contents of this chapter .....	141
Applicability .....	141
Internal cooling system .....	141
Connection to a cooling unit .....	143
Connection to an ACS880-1007LC cooling unit .....	143
Connection to a custom cooling unit .....	143
General requirements .....	143
Coolant temperature control .....	143
Filling up and bleeding the internal cooling circuit .....	144
Drive line-ups with an ACS880-1007LC cooling unit .....	144
Drive line-ups with a custom cooling unit .....	144
Draining the internal cooling circuit .....	146
Maintenance intervals .....	146
Technical data .....	146
Coolant specification .....	146
Coolant type .....	146
Temperature limits .....	146
Pressure limits .....	148
Coolant flow rate limits .....	148
Cooling circuit materials .....	148

## **11 Technical data**

Contents of this chapter .....	151
Ratings .....	151
Derating .....	153
Surrounding air temperature derating .....	153
Coolant temperature derating .....	153
Antifreeze content derating .....	153
Altitude derating .....	153
Type equivalence table and frame sizes .....	153
Fuses .....	154
Dimensions and weights .....	154
Free space requirements .....	154
Losses, cooling circuit data and efficiency .....	154
Energy efficiency data (ecodesign) .....	155



Auxiliary circuit current consumption .....	155
Definitions .....	155
Tightening torques .....	155
Electrical connections .....	156
Mechanical connections .....	156
Insulation supports .....	156
Cable lugs .....	156
Electrical power network specification .....	156
DC connection data .....	157
Coolant connection data .....	157
Control unit connection data .....	157
Protection classes for module .....	158
Optical components .....	158
Ambient conditions .....	158
Cooling .....	160
Colors .....	160
Materials .....	160
Module .....	160
Packaging of module .....	160
Packaging of options .....	160
Manuals .....	160
Disposal .....	160
Disclaimers .....	162
Generic disclaimer .....	162
Cybersecurity disclaimer .....	162

## 12 The control unit

Contents of this chapter .....	163
BCU-x2 layout .....	164
Default I/O diagram of the supply control unit .....	166
External power supply for the control unit (XPOW) .....	168
The X485 connector .....	168
Safe torque off (XSTO, XSTO OUT) .....	169
FSO safety functions module connection (X12) .....	169
SDHC memory card slot .....	169
Connector data .....	170
BCU-x2 ground isolation diagram .....	173

## 13 Dimension drawings

Contents of this chapter .....	175
D8T supply module .....	176
Control electronics .....	177
BCU control unit .....	177
DPMP-01 door mounting kit .....	178
DPMP-02 door mounting kit .....	179
CIO-01 board .....	180
CVAR board .....	181

## 14 Example circuit diagrams

Contents of this chapter .....	183
Component designations used in the diagrams .....	183

ACS880-304LC-0490A-7+A018 (1×D8T 6-pulse) .....	184
Sheet 001a – Main supply .....	184
Sheet 003a – Module main circuit .....	185
Sheet 005a – Module control circuit .....	186
Sheet 020a – 230 V/115 V External auxiliary circuit and fan supply .....	187
Sheet 021a – 230 V/115 V Auxiliary circuit distribution .....	188
Sheet 022a – 24 VDC Control voltage distribution .....	189
Sheet 026c – Fan control .....	190
Sheet 030a – ACB control .....	191
Sheet 050a – Control unit RO .....	192
Sheet 050b – Control unit DI .....	193
Sheet 050c – Control unit IO .....	194
Sheet 050d – Control unit .....	195
Sheet 051b – Option cards .....	196
ACS880-304LC-2940A-7+A004+A018 (4×D8T 12-pulse) .....	197
Sheet 001a – Main supply .....	197
Sheet 003a – Module main circuit .....	198
Sheet 005a – Module control circuit .....	199
Sheet 020a – 230 V/115 V External auxiliary circuit and fan supply .....	200
Sheet 021a – 230 V/115 V Auxiliary circuit distribution .....	201
Sheet 022a – 24 VDC Control voltage distribution .....	202
Sheet 026c – Fan control .....	203
Sheet 030a – ACB control .....	204
Sheet 030b – ACB control .....	205
Sheet 050a – Control unit RO .....	206
Sheet 050b – Control unit DI .....	207
Sheet 050c – Control unit IO .....	208
Sheet 050d – Control unit .....	209
Sheet 051b – Option cards .....	210

*Further information*







# 1

## Introduction to the manual

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### Contents of this chapter

This chapter contains general information on the manual.

### Applicability

The manual is applicable to liquid-cooled ACS880-304LC...+A018 diode supply modules for user-defined cabinet installations.

### Safety instructions

Obey all safety instructions delivered with the drive.

- Read the **complete safety instructions** before you install, commission, use or service the drive. The complete safety instructions are given in *ACS880 liquid-cooled multidrive cabinets and modules safety instructions* (3AXD50000048633 [English]).
- Read the **software-function-specific warnings and notes** before changing the default settings of a function. For each function, the warnings and notes are given in the section describing the related user-adjustable parameters.
- Read the **task-specific safety instructions** before starting the task. See the section describing the task.

### Target audience

This manual is intended for people who plan the installation, install, commission and do maintenance work on the drive, or create instructions for the end user of the drive concerning the installation and maintenance of the drive.

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

---

## Categorization by frame size and option code

Some descriptions, instructions, technical data and dimensional drawings which concern only a certain group of units are marked with the symbol of the frame size (such as “D8T”, “2×D8T” etc.). The marking derives from the quantity and basic construction of the modules that form a supply unit. For example, frame size “2×D8T” indicates that the supply unit consists of two frame size D8T modules connected in parallel.

The frame size is marked on the type designation labels. The frame size of each module is also shown in the rating tables in the technical data. The content which concern only certain optional selections are marked with option codes (such as +A018). The options included in the drive, unit or module 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
BCU	Type of control unit
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 link	DC circuit between rectifier and inverter
Diode supply module	Diode rectifier and related components enclosed in a metal frame or enclosure. Intended for cabinet installation.
Diode supply unit	Diode supply modules under control of one control board, and related components.
Drive	Frequency converter for controlling AC motors
DSU	Diode supply unit
EMC	Electromagnetic compatibility
Frame, frame size	Physical size of the drive or power module
FSO-12, FSO-21	Optional functional safety modules
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.
Power module	Common term for drive module, inverter module, supply module, brake chopper module etc.
Single drive	Drive for controlling one motor
STO	Safe torque off (IEC/EN 61800-5-2)
Supply unit	Supply module(s) under control of one control unit, and related components.

# 2

## Operation principle and hardware description

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### Contents of this chapter

This chapter contains a description of the diode supply unit. The information is valid for the units with ACS880-304LC...+A018 diode supply modules.

### Operation principle

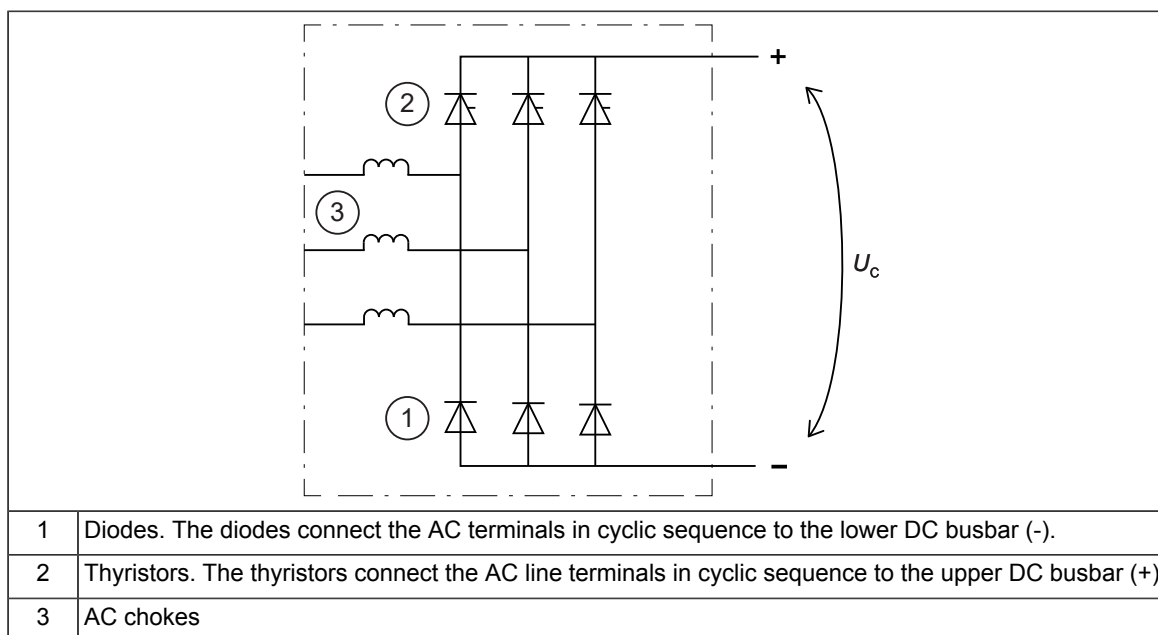
The core of the diode supply unit is a diode-thyristor bridge. It rectifies three-phase AC current to direct current for the intermediate DC link of the drive. The intermediate DC link supplies the inverters that run the motors. There can be one inverter unit only (single drives) or several inverter units (multidrives) connected to the intermediate circuit. The DSU modules have inbuilt AC chokes. The AC chokes smoothen the current waveform in the power supply network and voltage in the DC link of the drive.

The main difference between the ordinary diode-diode bridge and the controlled diode-thyristor bridge is the controllability. You cannot control the operation of the diodes but you can control the thyristors. By controlling the thyristors, you can limit the AC current of the drive at the power up without additional charging circuit in the supply unit or in inverter units.

There are two control modes for the upper leg thyristor firing: the charging mode and the normal mode:

- The charging mode is in operation a short period after the power switch on: the supply control program controls the thyristor firing angle gradually towards zero while the intermediate circuit capacitors located in the inverter module(s) get charged.
  - In the normal mode, the thyristor firing angle is 0 degrees: The thyristors operate as diodes.
-

## ■ Overview diagram of the rectifier bridge



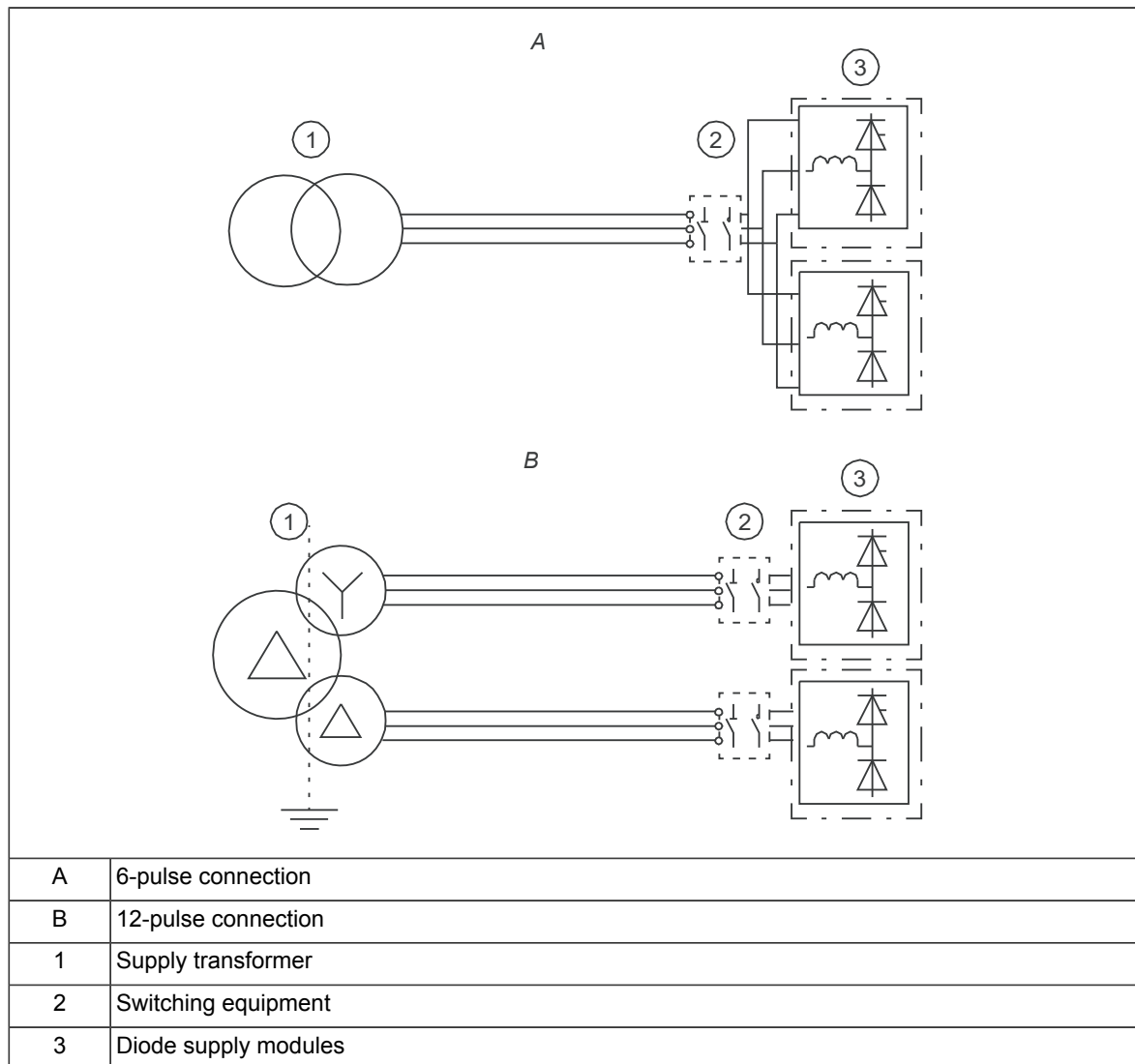
## ■ 6- and 12-pulse supply connections

The figure below illustrates the difference between 6-pulse and 12-pulse AC supply connections. 6-pulse connection is standard.

If the drive has an even number of supply modules, you can order it as a 12-pulse version (option +A004).

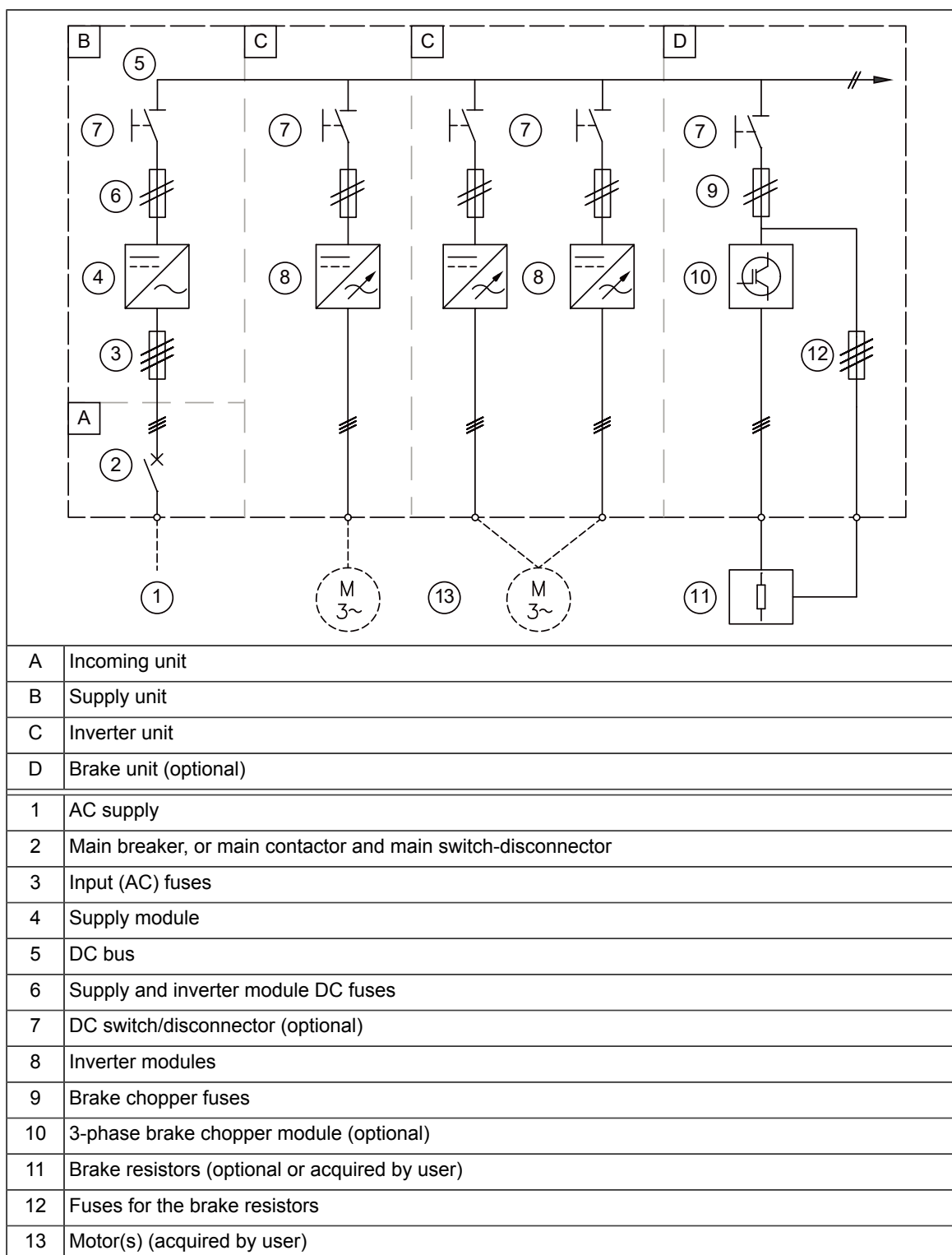
The 12-pulse supply connection eliminates the fifth and seventh harmonics, which substantially reduces the harmonic distortion of the line current and the conducted emissions.

The 12-pulse connection requires a three-winding transformer, or two separate transformers. There is a phase shift of 30-degrees between the two 6-pulse supply lines, which are connected to different supply modules through electrically separate switching equipment.



## Overview diagram of the drive system

This diagram shows an example of a multidrive. The supply unit connects the drive to the AC supply network. It converts the AC voltage into DC. The DC voltage is distributed through the DC bus to all inverter units and optional brake units. The inverter unit converts the DC back to AC that rotates the motor. The brake unit (optional) conveys energy to brake resistors whenever needed.

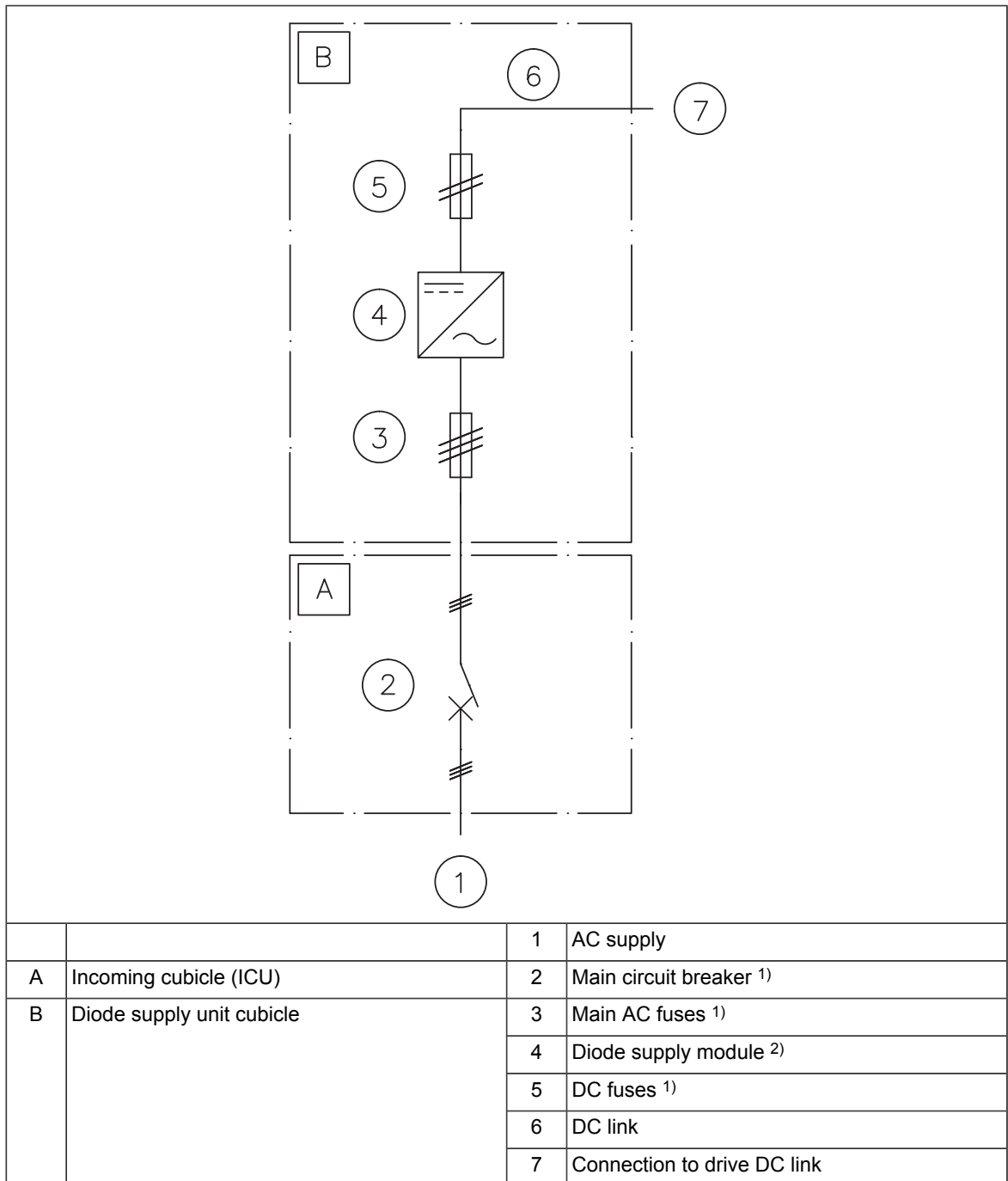


## Overview diagrams of the supply unit

This section contains main circuit overview diagrams. The diagrams show the power line connections, and the connections between the components. The diagrams also show examples of division of components in cubicles, and indicate which components you can order from ABB and which you need to acquire separately.

### ■ Overview diagram – 1×D8T, 6-pulse

This is an overview diagram of a 6-pulse supply unit with one D8T supply module.

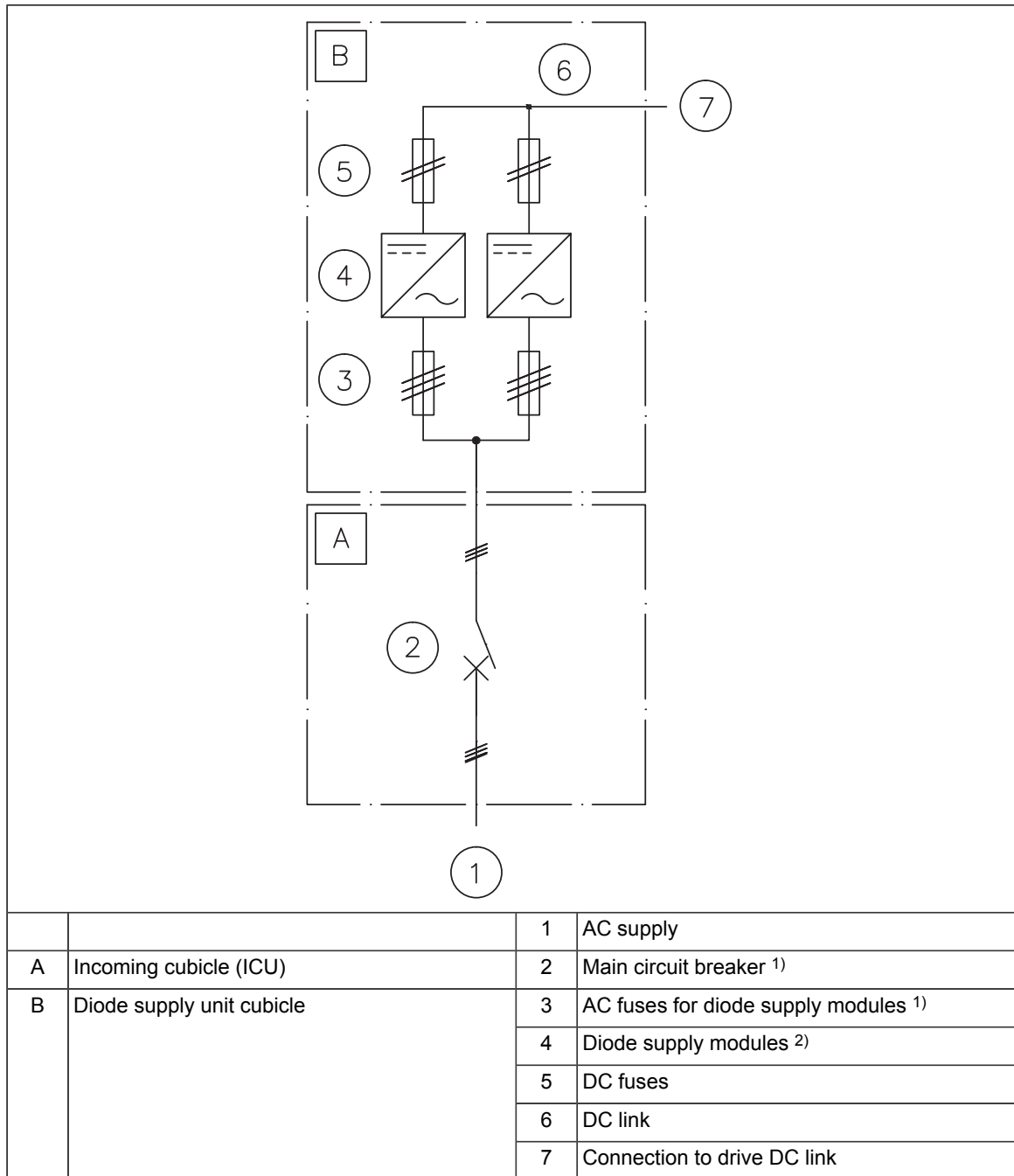


<sup>1)</sup> Available through ABB or third party

<sup>2)</sup> Available through ABB

### ■ Overview diagram – 2×D8T, 6-pulse

This is an overview diagram of a 6-pulse supply unit with two D8T supply modules. For more information, see [Switching, disconnecting and protecting solution \(page 31\)](#).



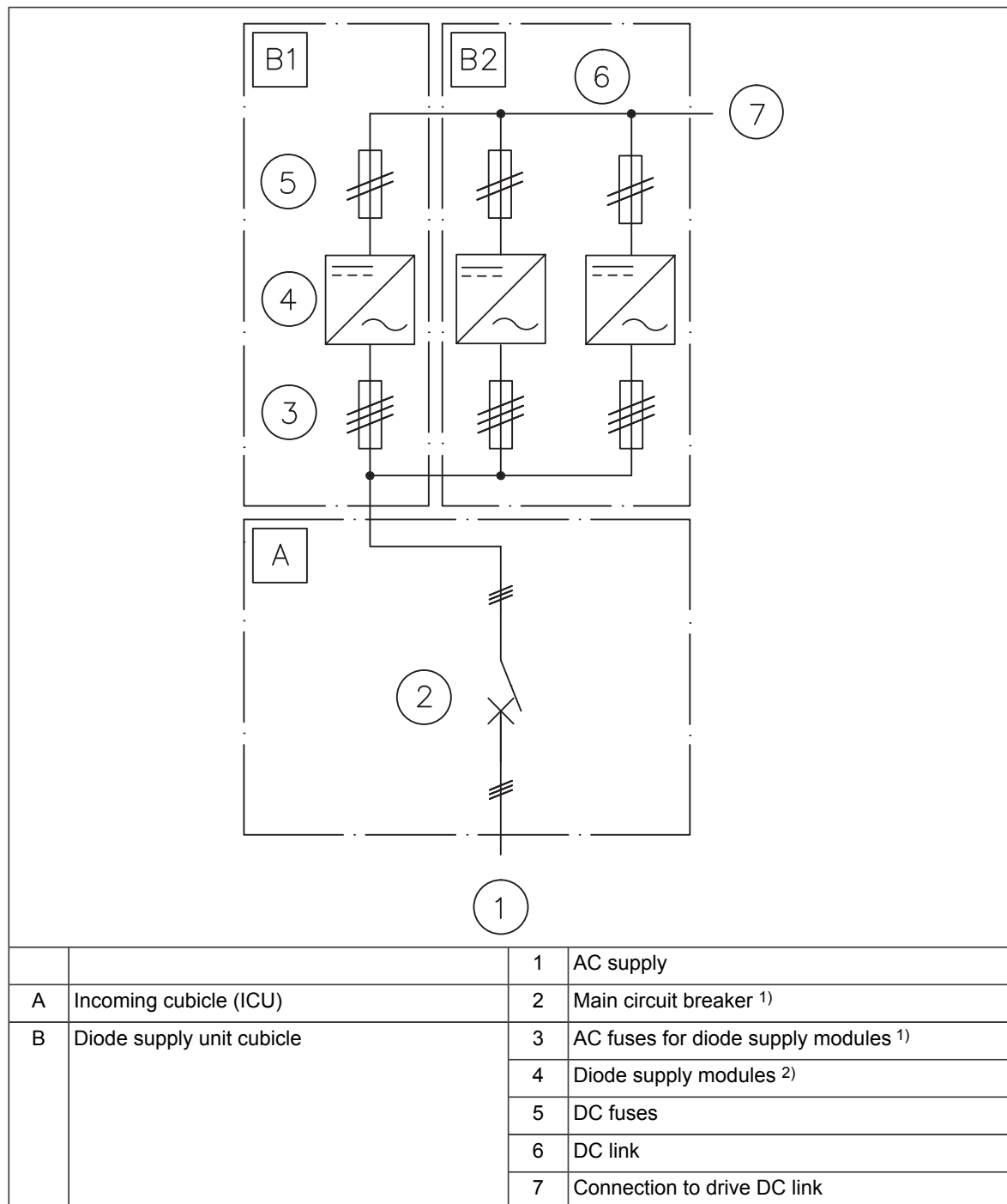
<sup>1)</sup> Available through ABB or third party

<sup>2)</sup> Available through ABB



### ■ Overview diagram – 3×D8T, 6-pulse

This is an overview diagram of a 6-pulse supply unit with three D8T supply modules.

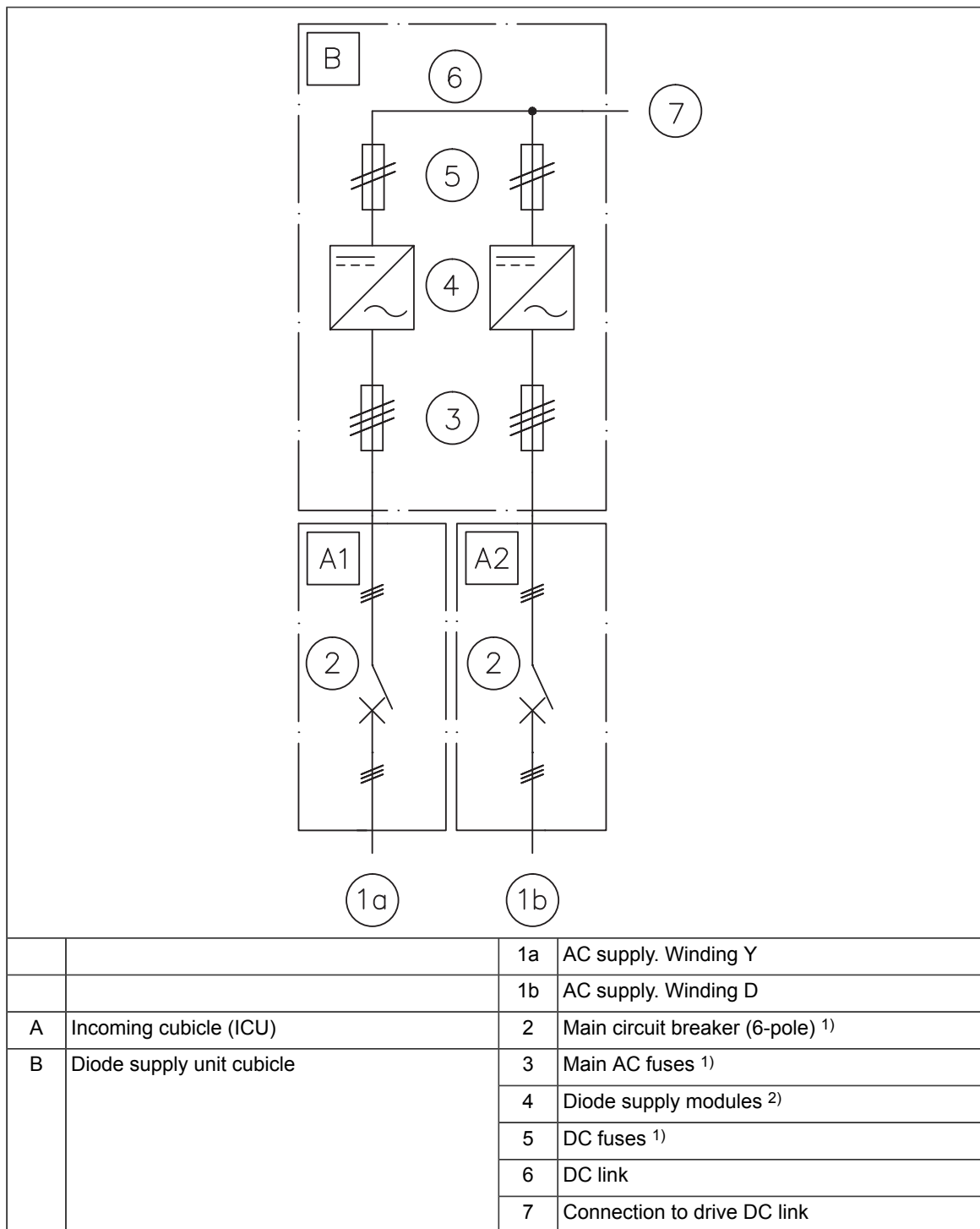


<sup>1)</sup> Available through ABB or third party

<sup>2)</sup> Available through ABB

## ■ Overview diagram – 2×D8T, 12-pulse

This is an overview diagram of a 12-pulse supply unit with two D8T supply modules.

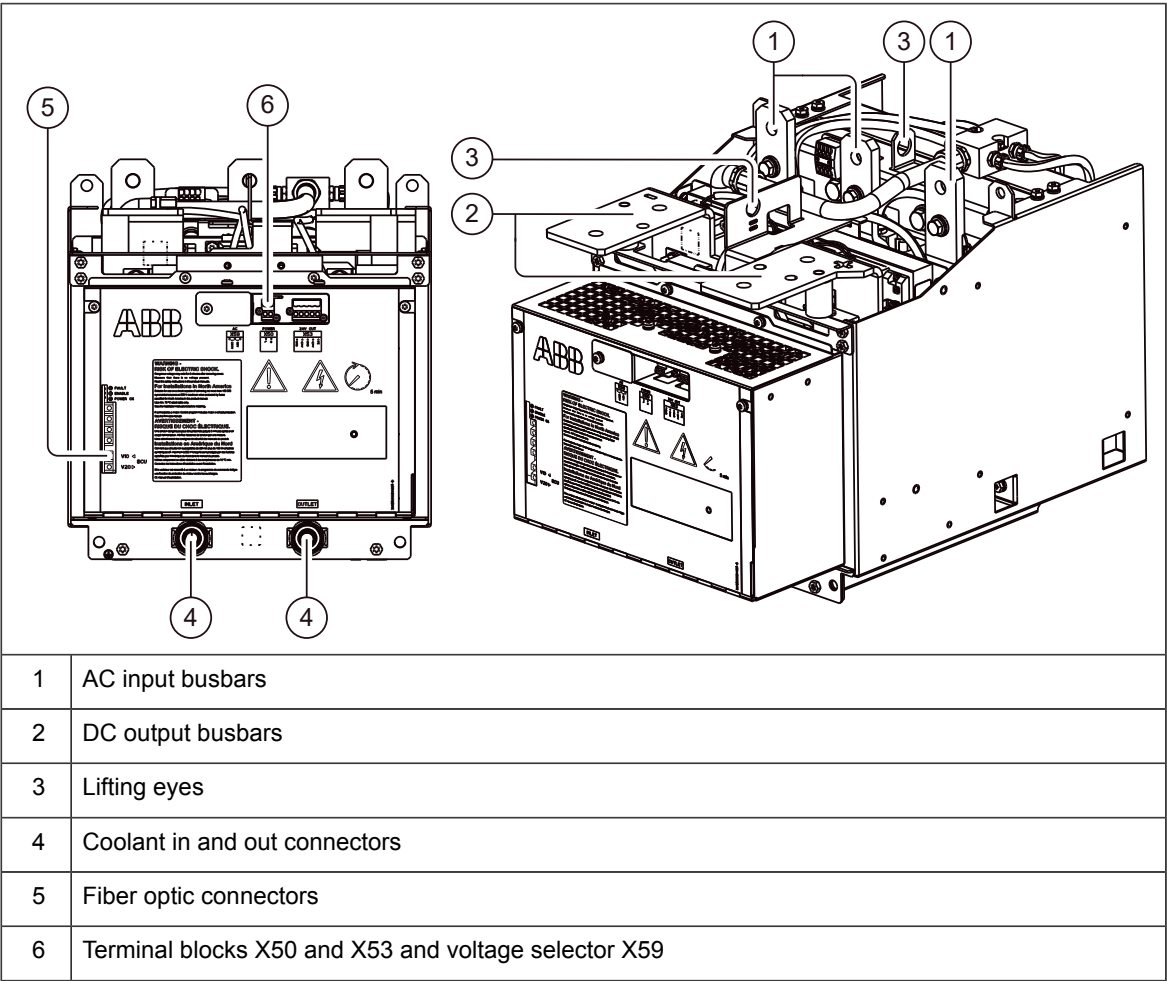


<sup>1)</sup> Available through ABB or third party

<sup>2)</sup> Available through ABB

## Layout drawings



### ■ Supply module layout - frame D8T



### ■ Supply module connectors X50 and X53

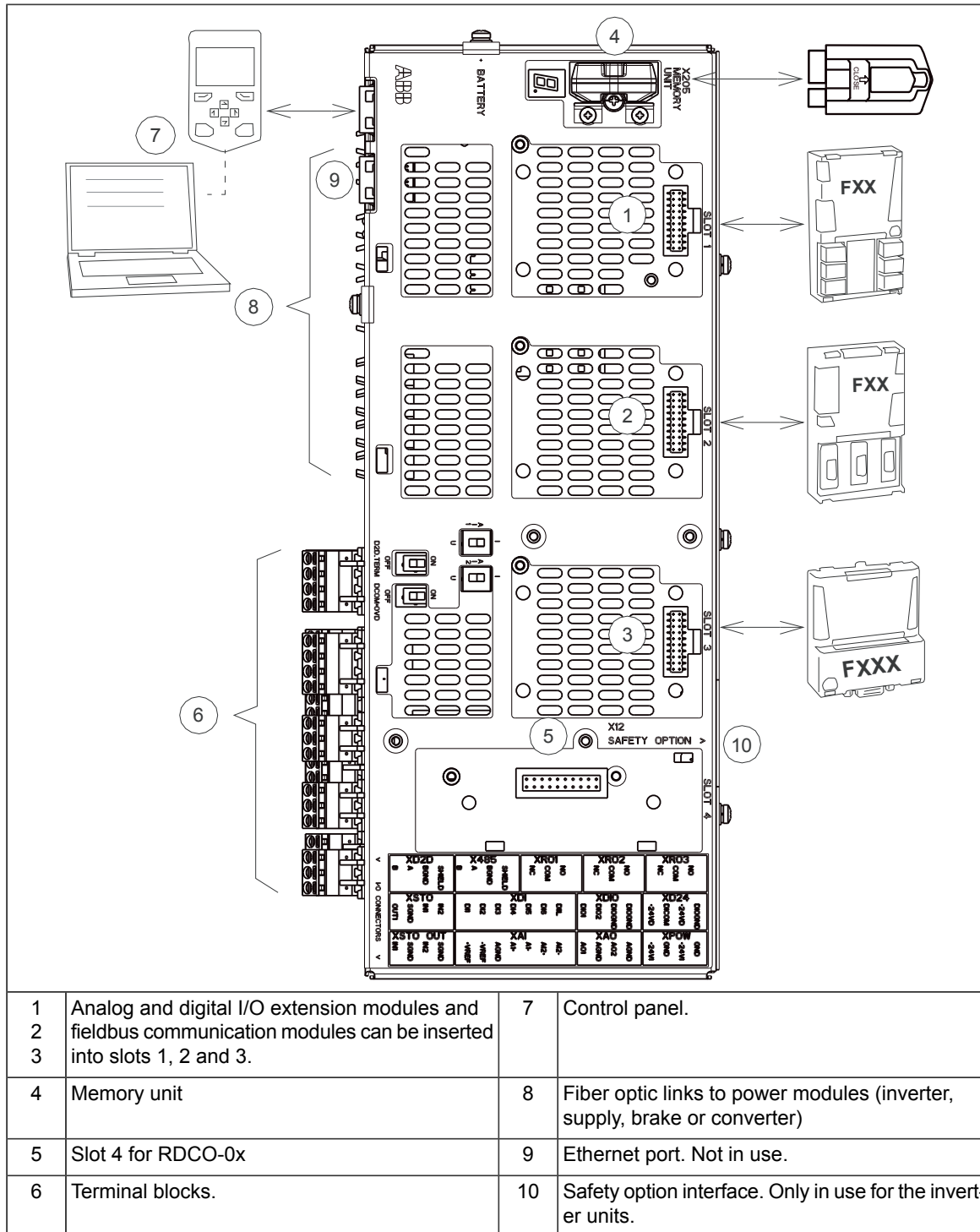
X50 connector is needed for supplying external voltage to BDPS and other module boards. Voltage selector X59 is used to select 115 V or 230 V for external supply voltage.

X53 connector provides two outputs for 24 VDC voltage from module BDPS to for example BCU. Not in use by default.

Connector X50			Connector X53					
	POWER			24 V OUT				
	X50			X53				
	L	N		GND	+24V	GND	+24V	FE

## Overview of the control connections of the BCU control unit

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



## Supply unit control devices

Run enable is the main control signal of the supply unit. The control program reads it from digital input DI2. You can control the signal, for example, with an operating switch installed on the supply module cubicle door, and wired to DI2. When the digital input DI2 is on, it is also possible to control the Run enable signal from a control panel, through fieldbus interface, or from the inverter unit.

For other control signals, see the firmware manual and the default I/O connection diagram.

### ■ Main disconnecting device

You must equip the supply unit with a main disconnecting device. For example, you can use a withdrawable main circuit breaker [Q1]. With this switch, you can isolate the main circuit of the drive from the power line.



#### **WARNING!**

The main disconnecting device does not isolate the input power terminals or the auxiliary circuit from the power line. To isolate the input power terminals, open the main breaker of the supply transformer and lock it to the open position.

---

### ■ Auxiliary voltage switch

You can equip the unit with an auxiliary voltage switch [Q20, Q22]. Using the switch, you can disconnect the auxiliary circuit from the power line.

We recommend to equip the auxiliary voltage supply with disconnecting device(s), to be able to disconnect also auxiliary voltages from the supply module cubicles for maintenance work.

### ■ Operating switch

You can equip the supply unit with the two-position operating switch [S21]. Connect the switch to Run/Enable digital input of the control unit.

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

- The Run/Enable position: The control program receives the Run/Enable and Start command through digital input DI2. The control program closes the main breaker with relay output RO3. The module starts rectifying and charges the DC link of the drive.
- The Off position: The control program does not receive the Run/Enable command through the digital input. The program opens the main breaker with the relay output and the module stops rectifying. The drive DC link and inverters are de-energized after the DC capacitors de-charge.

For more information on the on/off control logic, see *ACS880 diode supply control program firmware manual* (3AUA0000103295 [English]).

### ■ Emergency stop and emergency stop reset buttons

The cabinet can be equipped with an emergency stop button and an emergency stop reset button.

**Note:** The customer is fully responsible for implementing and testing the functional safety circuits according to the relevant legislation and acceptance testing regulations. The functional safety option manuals give examples on implementing the safety circuits in cabinet-installed ACS880 multidrives.

---

## ■ The control unit

The supply module is controlled by a BCU control unit.

## ■ Control panel [A59]

With the control panel, the user can:

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

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

## ■ PC connection

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

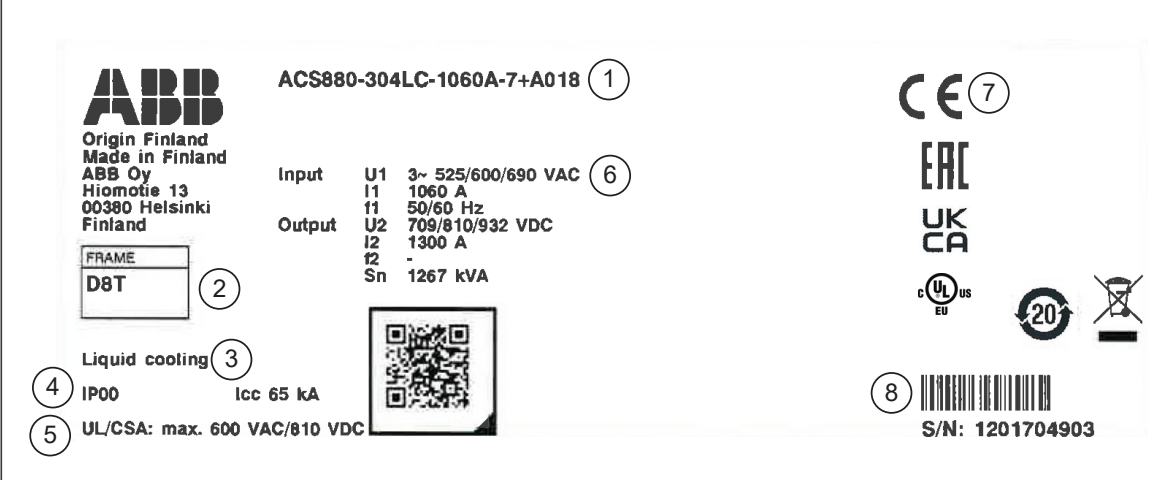
## ■ Fieldbus control

You can control the 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 the parameters. For information on the parameters, see the firmware manual.

**Note:** To be able to switch the main circuit breaker [Q1] and the supply unit on and off (Run enable signal) through the fieldbus, the Run enable command at digital input DI2 must be on (1).

## Type designation labels

Each diode supply module has a type designation label. The type designation stated on the label contains information on the specifications and configuration of the module.

Supply module	
 <p>The image shows the front panel of an ABB ACS880-304LC-1060A-7+A018 supply module. It includes the ABB logo, origin information (Finland), frame size (D8T), input/output ratings, cooling method (liquid cooling), degree of protection (IP00), and various certification marks (CE, EAC, UKCA, UL, etc.). A QR code is also present for identification.</p>	
1	Type designation
2	Frame size
3	Cooling method
4	Degree of protection
5	UL/CSA data
6	Ratings
7	Valid markings. See <i>Electrical planning instructions for ACS880 liquid-cooled multidrive cabinets and modules</i> (3AXD50000048634 [English]).
8	Serial number. The first digit of the serial number refers to the manufacturing plant. The next four digits refer to the unit's manufacturing year and week, respectively. The remaining digits complete the serial number so that there are no two units with the same number.

## Type designation keys

### ■ Type designation key of the diode supply module

The type designation describes the composition of the module in short. The complete designation code is divided in subcodes:

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

Code	Description
<b>Basic codes</b>	
ACS880	Product series
304LC	Construction: Liquid cooled diode supply module, IP00 (UL Open Type), AC-choke, circuit boards with coating, CE approval
<b>Size</b>	
0780A	Refer to the technical data.
<b>Voltage range</b>	
7	525...690 V. This is indicated in the type designation label as typical input voltage levels 3~525/600/690 V AC.
<b>Plus codes</b>	
A018	Half-controlled diode-thyristor bridge (as standard)
C132	Marine type approval
C209	Marine product certification (only with +C132)
P904	Extended warranty 24/30
P909	Extended warranty 36/42
P911	Extended warranty 60/66



# 3

## Moving and unpacking the module

---

### Contents of this chapter

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

---



**WARNING!**

For the safety instructions, see *Safety instructions for ACS880 liquid-cooled multidrive cabinets and modules* (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.

For moving and lifting the module, see section [Replacing the D8T supply module \(page 93\)](#).  
For moving the D8T modules you need a lifting device.

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.

### Switching, disconnecting and protecting solution

To arrange the switching, disconnection and protection of the supply modules, you can use the following solution:

1. Equip the drive with a disconnecting device. A withdrawable main breaker operates as a disconnecting device, and at a same time it is a main switch device (can make and break the load current of the drive). See [Main circuit breakers \(page 130\)](#).
  2. Make sure that the disconnecting device separates the main circuit of the drive from the AC power line, including the AC fuses.
-

3. Equip the drive with AC fuses to protect the unit in short circuit. Protect each input phase of the supply module with a fuse of its own. For more information, see [AC fuses \(page 127\)](#).
4. Equip the drive with DC fuses to protect the DC link of the drive in short circuit. Protect each output busbar of the supply module with a fuse of its own. For more information, see [DC fuses \(page 129\)](#).

See also [Electrical safety precautions \(page 66\)](#) and [Example circuit diagrams \(page 183\)](#).

## Installation examples

This section includes installation examples of inverter modules in Rittal VX25 series as well as generic enclosures. Each example includes a table that lists:

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

You can find kit-specific assembly drawings, step-by-step instructions and kit information on the Internet (<https://sites-apps.abb.com/sites/lvacdrivesengineeringsupport/content>).

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.

For general instructions, refer to *Cabinet design and construction instructions for ACS880/ACS880LC multidrive modules* (3AUA0000107668 [English]).



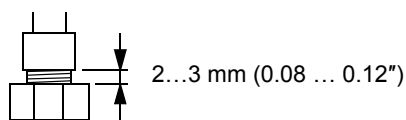
### WARNING!

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.



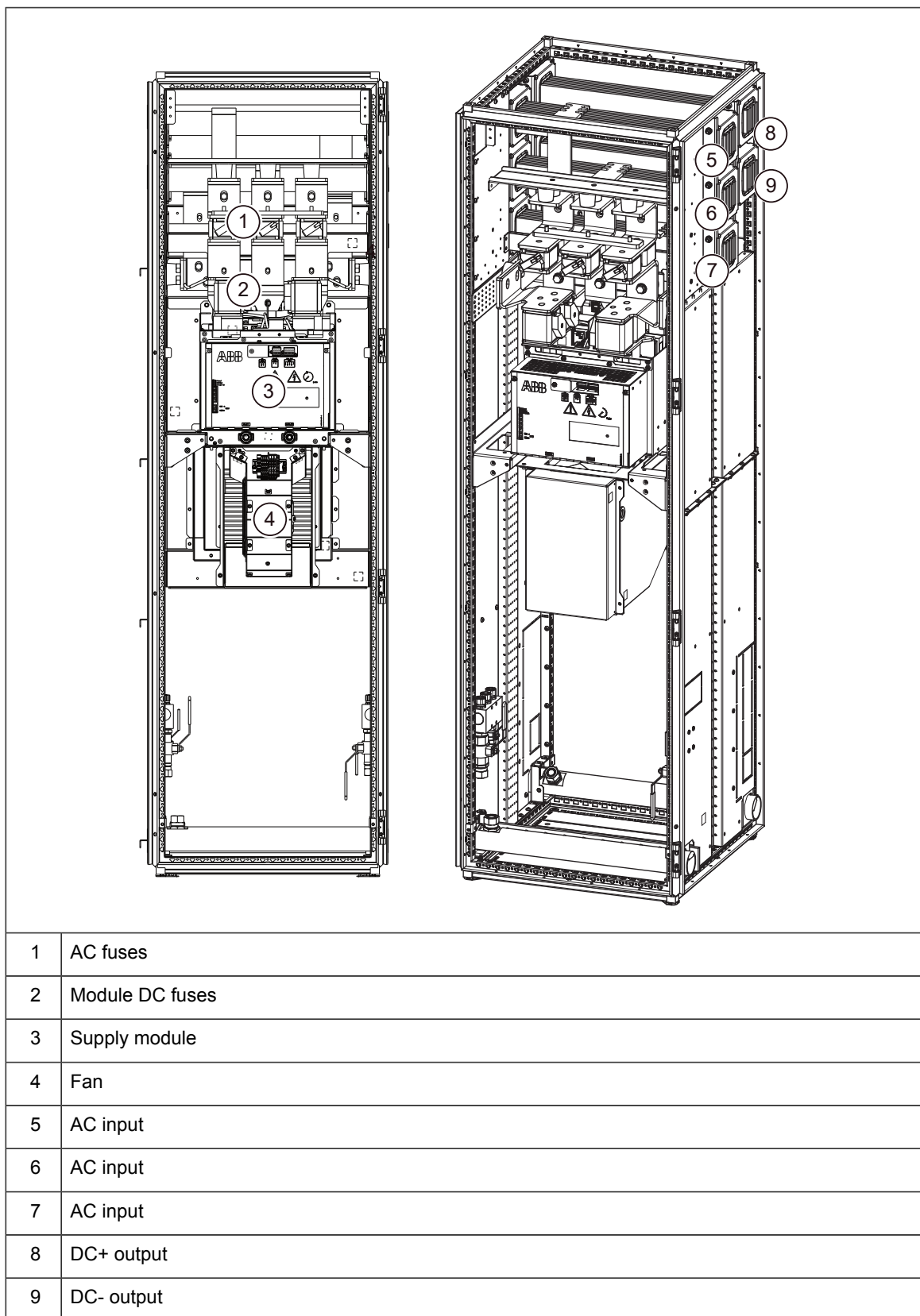
### WARNING!

To avoid breaking the coolant pipes, do not overtighten the nuts of the unions. Leave 2 to 3 millimeters (0.08 to 0.12 inches) of thread visible.

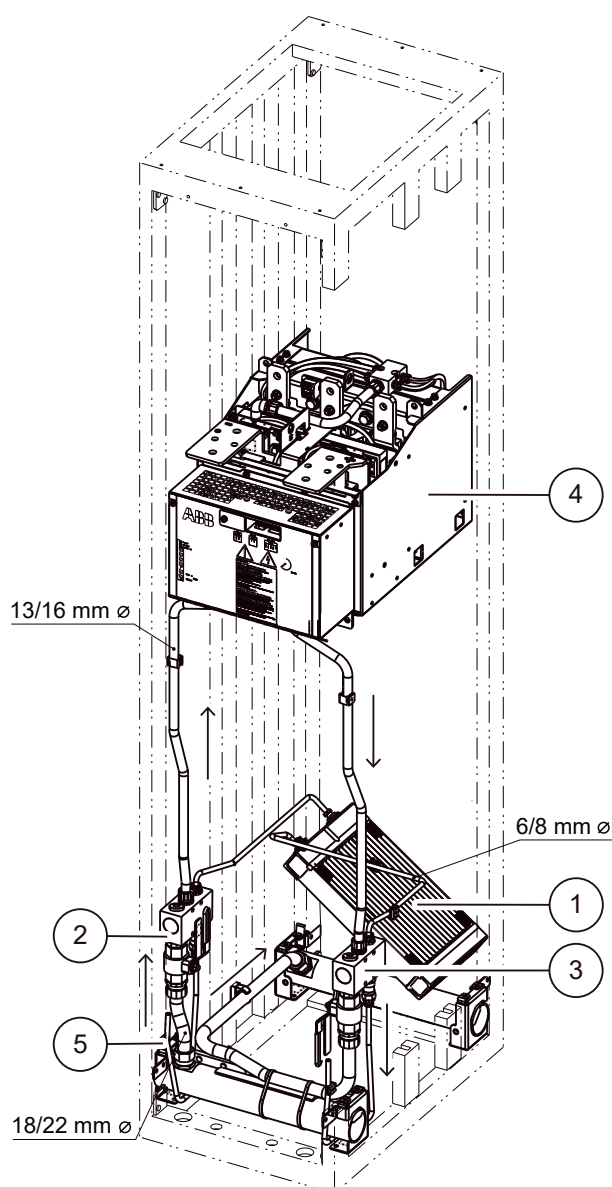


■ One D8T module in a 600 mm wide Rittal VX25 enclosure

Layout drawing



## Pipe routing example



1	Heat exchanger
2	Inlet manifold with stop and drain valves
3	Outlet manifold with stop and drain valves
4	Supply module
5	Drain pipes

**Construction of supply module cubicle – 1×D8T, 6-pulse, Rittal VX25**


#	Installation stage	Instruction code	Kit code	Kit ordering code
1	Common assembly installations			
	LCL side plate kit	3AXD50000429653	L-468-8-314-VX	3AXD50000426652
	Flat-PLS support kit for AC	3AXD50000370870	L-468-X-012-VX	3AXD50000371013
	Flat-PLS support kit for DC	3AXD50000333639	A-468-X-001-VX	3AXD50000333387
2	Module installation parts and DC connection			
	DC connection kit 1	3AXD50000627820	L-6-8-210-VX	3AXD50000609970
	Mounting mechanics kit 1	3AXD50000623594	L-6-8-316-VX	3AXD50000609932
	Rear busbar support kit	3AXD50000626717	L-6-8-034-VX	3AXD50000609963
3	DC fuse connection	3AXD50000627301	L-6-8-235-VX	3AXD50000609994
4	Cooling components and AC fuse connection			
	AC connection 6-pulse kit 1	3AXD50000628926	L-6-8-111-VX	3AXD50000610259
	AC fuse connection kit 1	-	L-6-8-134-VX (IEC)	3AXD50000610211 (IEC)
	Fan kit	- -	- -	3AXD50000043886 (230 V) 3AXD50000045414 (115 V)
	Fan mechanics	3AXD50000625574	L-6-8-406-VX	3AXD50000609956
	LCL heat exchanger kit	-	L-468-8-446	3AXD50000479795
	Cooling components kit 1	-	L-468-8-441	3AXD50000044084
5	Module and fuse installation			
6	Shroud installation	-	L-6-8-350-VX	3AXD50000610280



KITS FOR ACS880-304LC 1xD8T 6P 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.

10

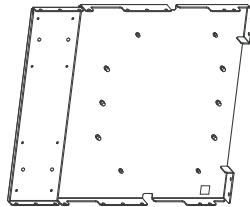
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	Appr.		Resp. dipl.	Res. ind.	- 3 (DR)	Long. EN
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Cont. No.	Sheet No.					
Cont. No.	Sheet No.					



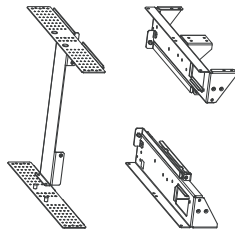
### Stage 1: Common assembly installations



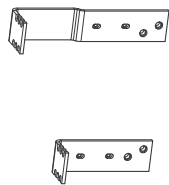
STAGE 2: D8T MOUNTING MECH 1, D8T REAR BUSBAR SUPP KIT AND  
D8T DC CONN KIT 1 INSTALLATION  
See assembly drawings for details



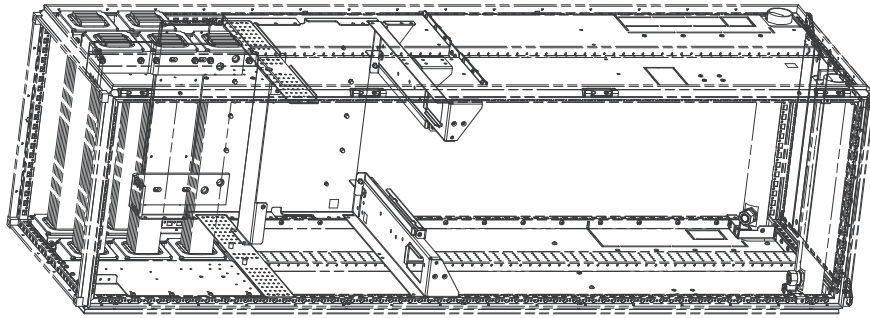
D8T REAR BUSBAR SUPP KIT  
KIT L-6-8-034-VX  
Ordering code: 3AXD50000609963  
See drawing: 3AXD50000626717



D8T MOUNTING MECH I  
KIT L-6-8-316-VX  
Ordering code: 3AXD5000609932  
See drawing: 3AXD5000623594



D8T DC CONN KIT I  
KIT L-6-8-210-VX  
Ordering code: 3AXD50000609970  
See drawing: 3AXD50000627820



110

[illegible]

### Stage 3: DC fuse connection

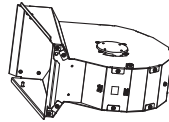
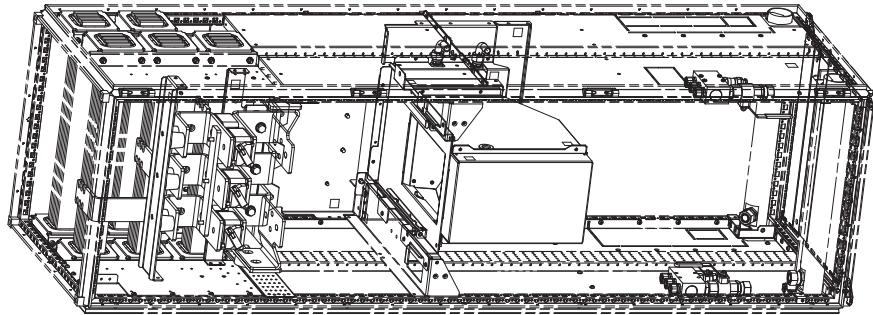
STAGE 3: D8T DC FUSE CONN KIT I INSTALLATION  
See assembly drawings for details

D8T DC FUSE CONN KIT I  
KIT L-6-8-235-VX  
Ordering code: 3AXD5000060994  
See drawing: 3AXD50000627301

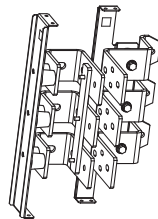
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Cust. Doc. No.	Appr.:		Rev. no.:	3 (DR)
Project name:			Date:	1:10



STAGE 4: AC CONNECTION 6P I, D8T AC FUSE CONN I,  
D8T FAN MECHANICS, LCL HEAT EXCHANGER KIT, R8i FAN KIT AND  
COOLING COMPONENTS KIT I INSTALLATION  
See assembly drawings for details



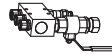
**R8i FAN KIT**  
Ordering codes:  
3AXD50000043886 (230V)  
3AXD50000045414 (115V)



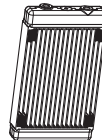
D8T AC FUSE CONN I

FOR IEC: KIT L-6-8-134-VX  
Ordering code:  
3AXD50000610211

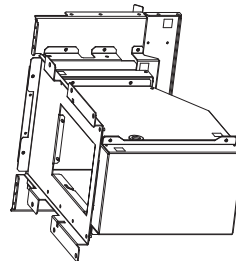
FOR UL: KIT L-6-8-135-VX  
Ordering code:  
3AXD50000610228



COOLING COMPONENTS KIT I  
KIT L-468-8-441  
Ordering code:  
3AXD50000044084




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



D8T FAN MECHANICS  
KIT L-6-8-406-VX  
Ordering code: 3AXD50000609956  
Drawing code: 3AXD50000625574

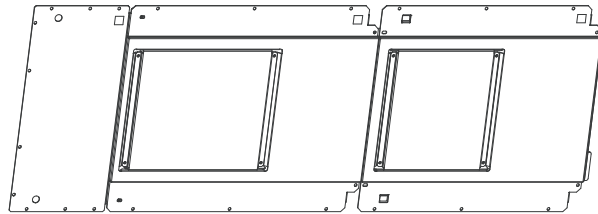
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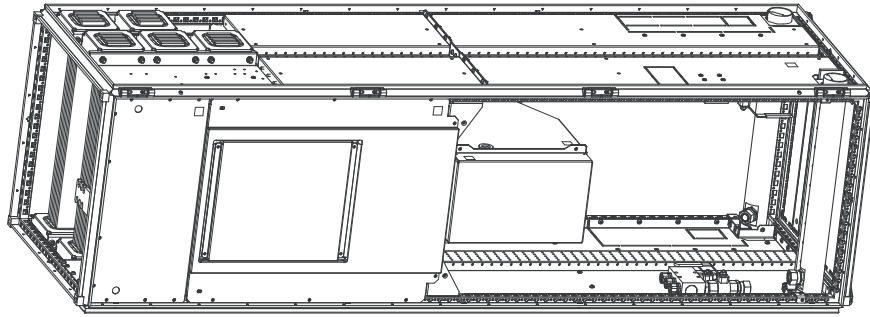
### Stage 5: Module and fuse installation

[illegible]

STAGE 6: D8T SHROUD KIT INSTALLATION  
See assembly drawings for details



D8T SHROUD KIT  
KIT L-6-8-350-VX  
Ordering code:  
3AXD50000610280

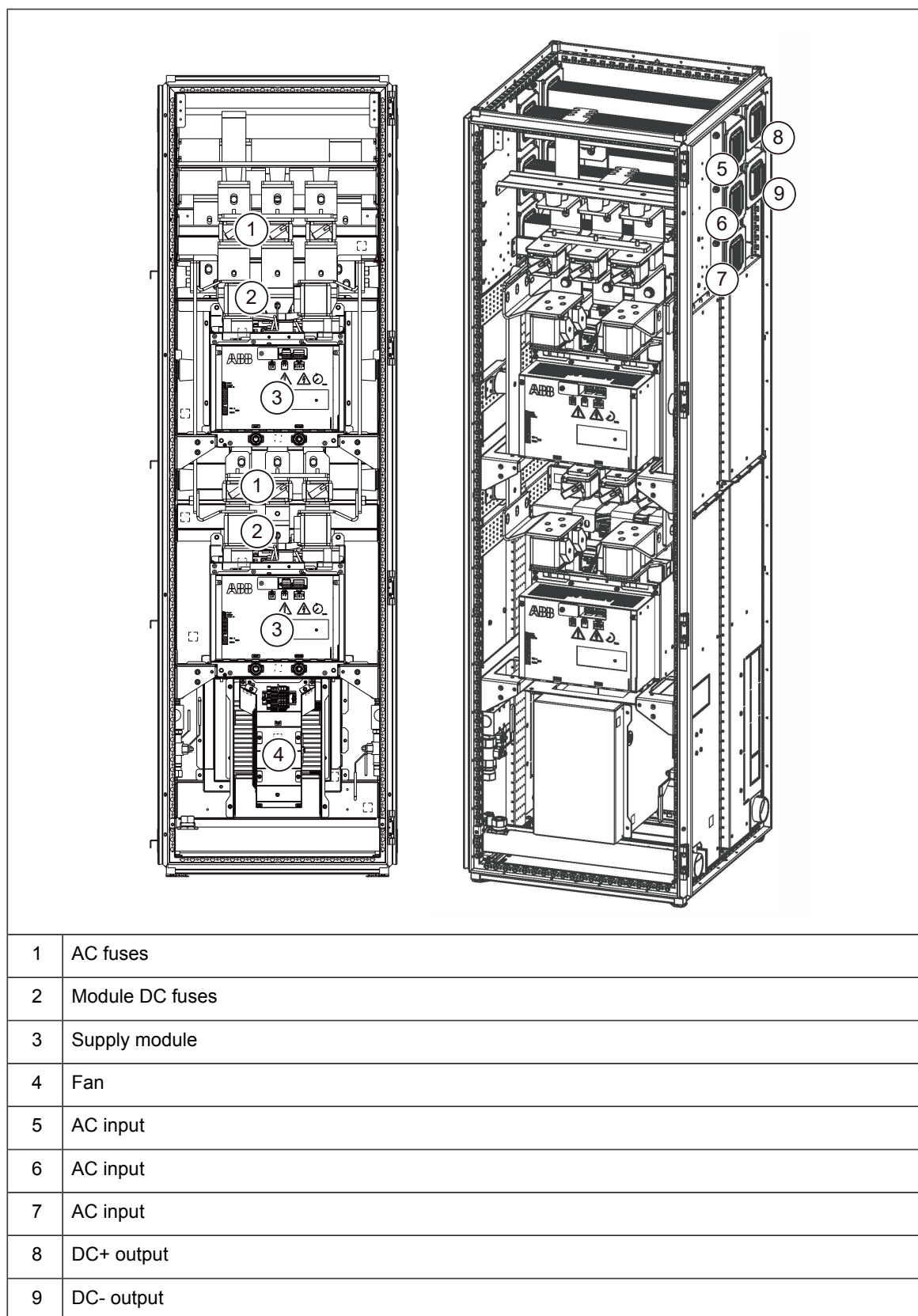


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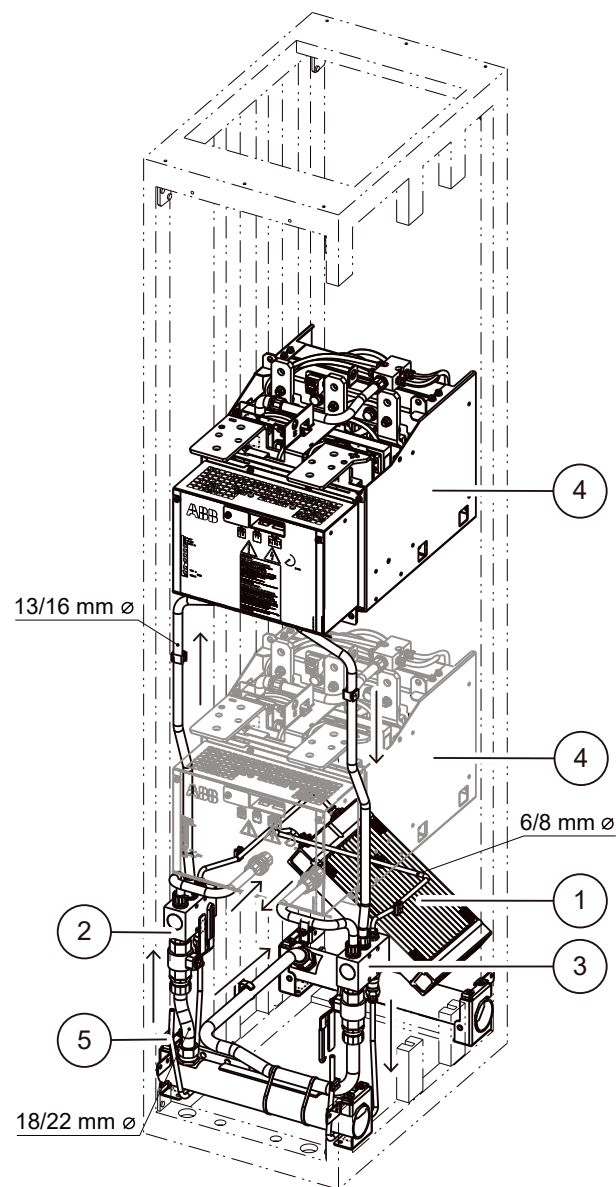
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	68833_42		Total	7

## ■ Two D8T modules in a 600 mm wide Rittal VX25 enclosure

### Layout drawing



Pipe routing example



1	Heat exchanger
2	Inlet manifold with stop and drain valves
3	Outlet manifold with stop and drain valves
4	Supply module
5	Drain pipes



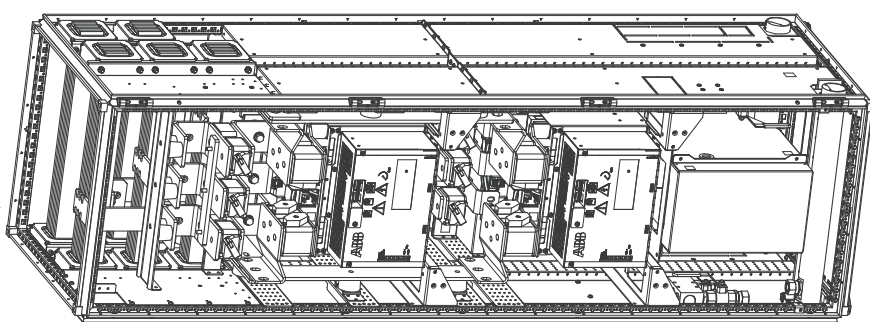
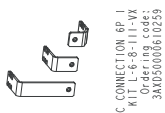
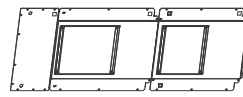



**Construction of supply module cubicle – 2×D8T, 6-pulse, Rittal VX25**

#	Installation stage	Instruction code	Kit code	Kit ordering code
1	Common assembly installations			
	LCL side plate kit	3AXD50000429653	L-468-8-314-VX	3AXD50000426652
	Flat-PLS support kit for AC	3AXD50000370870	L-468-X-012-VX	3AXD50000371013
	Flat-PLS support kit for DC	3AXD50000333639	A-468-X-001-VX	3AXD50000333387
2	Module installation parts			
	DC connection kit 2	3AXD50000628506	L-6-8-211-VX	3AXD50000609987
	AC connection 6-pulse kit 2	-	L-6-8-112-VX	3AXD50000610266
	AC fuse connection kit 2	3AXD50000629992 (IEC)	L-6-8-136-VX (IEC)	3AXD50000610235 (IEC)
	Mounting mechanics 1	3AXD50000623594	L-6-8-316-VX	3AXD50000609932
	Mounting mechanics 2	3AXD50000624331	L-6-8-317-VX	3AXD50000609949
	Rear busbar support kit	3AXD50000626717	L-6-8-034-VX	3AXD50000609963
3	DC fuse connection	3AXD50000628919	L-6-8-236-VX	3AXD50000610006
4	Cooling components and AC connection			
	AC connection 6-pulse kit 1	3AXD50000628926	L-6-8-111-VX	3AXD50000610259
	AC fuse connection kit 1	-	L-6-8-134-VX (IEC)	3AXD50000610211 (IEC)
	Fan kit	-	-	3AXD50000043886 (230 V) 3AXD50000045414 (115 V)
	Fan mechanics	3AXD50000625574	L-6-8-406-VX	3AXD50000609956
	LCL heat exchanger kit	-	L-468-8-446	3AXD50000479795
	Cooling components kit 2	-	L-468-8-442	3AXD50000044182
5	Module and fuse installation			
6	Shroud and marine supports installation			
	D8T shroud kit	-	L-6-8-350-VX	3AXD50000610280
	D8T marine supports	-	L-6-8-501-VX	3AXD50000610297



KITS FOR ACS880-304LC 2xD8T 6P 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.

	1	2	3	4	5	6	7	8
A	ACS880-304LC-D8T-VZ2S-2V6P ACS880-304LC-D8T-VZ2S-ASSEM --59*	...I --59*	First angle projection. Original drawing made with 3D CAD. Set the correct scale factor when adding dimensions after DWG/DXF conversion.					
B	D8T MOUNTING MECH I KIT L-6-8-316-VX Ordering code: 3AXD5000609352	D8T MOUNTING MECH 2 KIT L-6-8-317-VX Ordering code: 3AXD5000609349	D8T REAR BUSBAR SUPP KIT KIT L-6-8-034-VX Ordering code: 3AXD5000609363	KITS FOR ACS880-304LC 2xD8T 6P 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.		D8T AC FUSE CONN 1 FOR IEC: KIT L-6-8-134-VX Ordering code: 3AXD5000610211  FOR UL: KIT L-6-8-135-VX Ordering code: 3AXD5000610228	D8T AC FUSE CONN 2 FOR IEC: KIT L-6-8-136-VX Ordering code: 3AXD5000610235  FOR UL: KIT L-6-8-137-VX Ordering code: 3AXD5000610242	D8T MARINE SUPPORTS KIT L-6-8-501-VX Ordering code: 3AXD5000610297
C	LCL SIDE PLATE KIT KIT L-466-8-314-VX Ordering code: 3AXD5000626652	FLAT-PLS SUPPORT KIT FOR DC KIT L-466-8-001-VX Ordering code: 3AXD5000633387	FLAT-PLS SUPPORT KIT FOR AC KIT L-466-8-001-VX Ordering code: 3AXD50006371013		 AC CONNECTION GP 1 KIT L-6-8-112-VX Ordering code: 3AXD5000610259  AC CONNECTION GP 2 KIT L-6-8-112-VX Ordering code: 3AXD5000610266	 D8T SHROUD KIT KIT L-6-8-001-VX Ordering code: 3AXD5000610280	 R81 FAN KIT Ordering code: 3AXD5000626886 (230V) 3AXD5000645414 (115V)	 LCL HEAT EXCHANGER KIT KIT L-466-8-446 Ordering code: 3AXD5000647995
D					 COOLING COMPONENTS KIT 2 KIT L-466-8-442 Ordering code: 3AXD5000647982			
E		D8T DC CONN KIT 2 KIT L-6-8-211-VX Ordering code: 3AXD5000609967						
F	D8T FEM MECHANICS KIT L-6-8-406-VI Ordering code: 3AXD5000609956							
					1 : 10			
					Based on	Title	Dec. des.	Scale
					Customer	Check.	Recip. dep.	1:25
					Calc., Dec. No.	Project name: 43883_7/3	Rev. no.	A3
					Drawn	Approved	Conq.	Form
					Sheet	Sheet	Sheet	EN

### Stage 1: Common assembly installations

1 ACS880-394LC-1B1-VX25-240P  
2 ACS880-394LC-1B1-VX25-1X51EM 1-53\*

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.

Note! See Cabinet design and construction instructions for ACS880 multistage modules (3AUA0000107668 [English])  
STAGE 1: Common assembly installations (LCL SIDE PLATES KIT, FLAT-PLS SUPPORT KIT FOR AC, FLAT-PLS SUPPORT KIT FOR DC)  
See assembly drawings for details

LCL SIDE PLATE KIT  
KIT L-468-8-314-VX  
Ordering code: 3AXD50000426652  
See drawing: 3AXD50000429653

FLAT-PLS SUPPORT KIT FOR AC  
KIT L-468-X-012-VX  
Ordering code: 3AXD50000371013  
See drawing: 3AXD50000370870

FLAT-PLS SUPPORT KIT FOR DC  
KIT A-468-X-001-VX  
Ordering code: 3AXD50000333387  
See drawing: 3AXD50000333639

1:10

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Customer:  
Prepared on:  
Check:  
Appr.:  
Castl. Dec. No.:  
Project name:

Title:  
Doc. des.:  
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A3  
Rev. no.:  
3 (DR)  
Rev. ind.:  
Doc. No.:  
Long. EN  
Sheet 2



1 2 3 4 5 6 7 8

ACS880-384LC-D8T-VF25-216P  
ACS880-384LC-D8T-VF25-ASSEM  
-1-14  
-1-60+

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STAGE 2: D8T MOUNTING MECH 1, D8T MOUNTING MECH 2,  
D8T REAR BUSBAR SUPP KIT, D8T DC CONN KIT 2,  
D8T AC FUSE CONN 2 AND AC CONNECTION 6P 2 INSTALLATION  
See assembly drawings for details

D8T DC CONN KIT 2  
KIT L-6-8-211-987  
Ordering code: 3AXD50000609987  
See drawing: 3AXD50000628506

AC CONNECTION 6P 2  
KIT L-6-8-112-VX  
Ordering code: 3AXD50000610266

D8T MOUNTING MECH 1  
KIT L-6-8-316-VX  
Ordering code: 3AXD50000609932  
See drawing: 3AXD50000623594

D8T MOUNTING MECH 2  
KIT L-6-8-317-VX  
Ordering code: 3AXD50000609949  
See drawing: 3AXD50000624331

D8T REAR BUSBAR SUPP KIT  
KIT L-6-8-034-VX  
Ordering code: 3AXD50000609963  
See drawing: 3AXD50000626717

D8T AC FUSE CONN 2  
FOR IEC: KIT L-6-8-136-VX  
Ordering code: 3AXD50000610235  
See drawing: 3AXD50000629992  
FOR UL: KIT L-6-8-137-VX  
Ordering code: 3AXD50000610242  
See drawing: 3AXD50000630288

1:10

Based on:  
Customer:  
Cust. Dec. No.  
Project name: 636003 v3

Prepared:  
Check:  
Appr.:

Title:

Dec. des.:  
Dec. repl.:  
Res. ind.:  
Scale:  
Form:  
A3

1:25  
-1-23 (D8T)

Long.:  
Sheet:  
3

EN

### Stage 3: DC fuse connection

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.

AC3880-30ALC-D8T-VX25-240P  
AC3880-30ALC-D8T-VX25-185SEM  
1:1  
1:40

STAGE 3: D8T DC FUSE CONN KIT 2 INSTALLATION  
See assembly drawings for details

1:10

D8T DC FUSE CONN KIT 2  
KIT L-6-8-236-VX  
Ordering code: 3AXD50000610006  
See drawing: 3AXD50000628919

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Customer:  
Project name:  
Cust. Doc. No.

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Appr.:

Title:

Doc. des.  
Res. app.  
Doc. No.

Scale  
1:25

Form  
A3

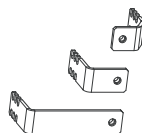
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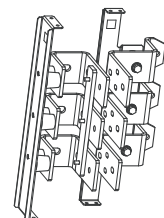


## STAGE 4: AC CONNECTION 6P 1, D8T AC FUSE CONN 1, D8T FAN MECHANICS, LCL HEAT EXCHANGER KIT, R8i FAN KIT AND COOLING COMPONENTS KIT 2 INSTALLATION

See assembly drawings for details

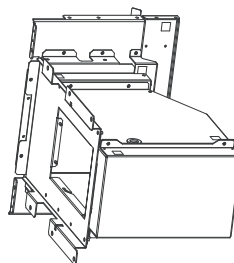


AC CONNECTION 6P I  
KIT L-6-8-III-VX  
Ordering code: 3AYD50000610259  
See drawing: 3AYD50000628926



D8T AC FUSE CONN I  
FOR IEC; KIT L-6-8-134-VX  
Ordering code:  
3AXD50000610211

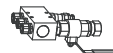
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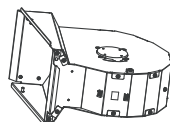
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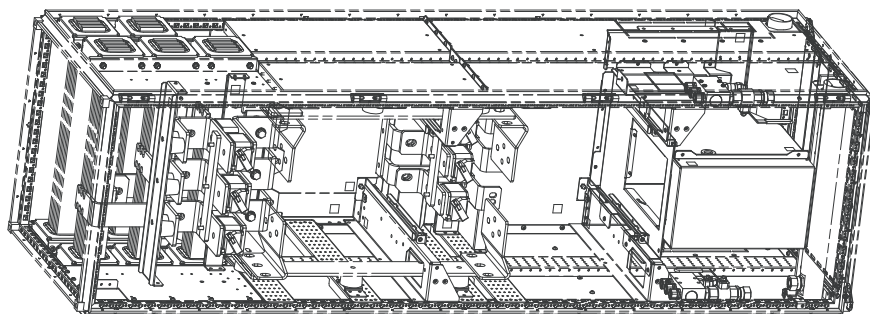
LCL HEAT EXCHANGER KIT  
KIT L-468-8-446  
Ordering code:  
3AXD50000479795



COOLING COMPONENTS KIT 2  
KIT L-468-8-442  
Ordering code:  
3AXD50000044182



R8i FAN KIT  
Ordering codes:  
3AXD50000043886 (230V)  
3AXD50000045414 (115V)



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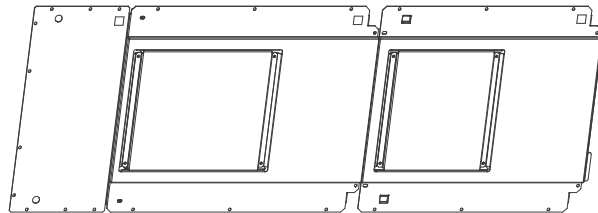
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### Stage 5: Module and fuse installation

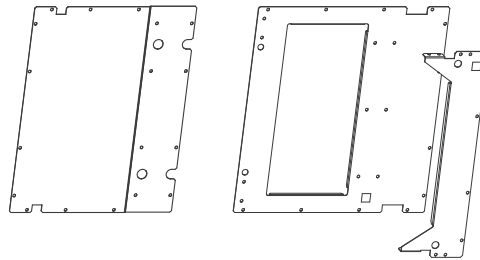
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## STAGE 6: D8T SHROUD KIT AND D8T MARINE SUPPORTS INSTALLATION

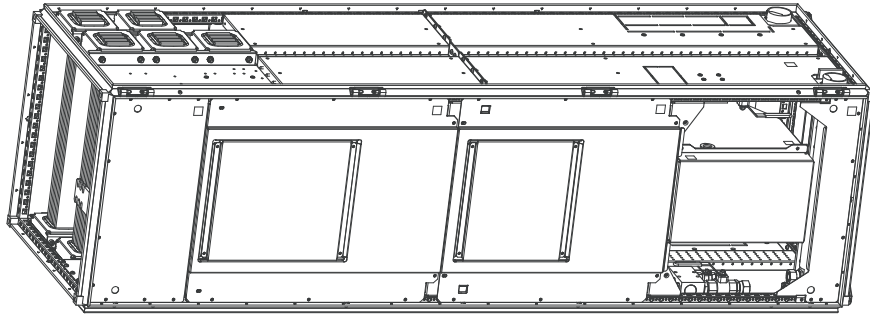
See assembly drawings for details




D8T SHROUD KIT  
KIT L-6-8-350-VX  
Ordering code:  
3AXD50000610280



D8T MARINE SUPPORTS  
KIT L-6-8-501-VX  
Ordering code:  
3AXD50000610297


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DMS Number		Doc. No.			Sheet	7
Weight kg		<b>ABB</b>			Total	7



**Construction of supply module cubicle – 2×D8T, 12-pulse, Rittal VX25**

#	Installation stage	Instruction code	Kit code	Kit ordering code
1	Common assembly installations			
	LCL side plate kit	3AXD50000429653	L-468-8-314-VX	3AXD50000426652
	Flat-PLS support kit for AC	3AXD50000370870	L-468-X-012-VX	3AXD50000371013
	Flat-PLS support kit for DC	3AXD50000333639	A-468-X-001-VX	3AXD50000333387
2	Module installation parts and DC connection			
	DC connection kit 2	3AXD50000628506	L-6-8-211-VX	3AXD50000609987
	AC connection 12-pulse	-	L-6-8-113-VX	3AXD50000610273
	AC fuse connection kit 2	3AXD50000629992 (IEC)	L-6-8-136-VX (IEC)	3AXD50000610235 (IEC)
	Mounting mechanics 1	3AXD50000623594	L-6-8-316-VX	3AXD50000609932
	Mounting mechanics 2	3AXD50000624331	L-6-8-317-VX	3AXD50000609949
	Rear busbar support kit	3AXD50000626717	L-6-8-034-VX	3AXD50000609963
3	DC fuse connection	3AXD50000628919	L-6-8-236-VX	3AXD50000610006
4	Cooling components and AC fuse connection			
	AC fuse connection kit 1	-	L-6-8-134-VX (IEC)	3AXD50000610211 (IEC)
	Fan kit	-	-	3AXD50000043886 (230 V) 3AXD50000045414 (115 V)
	Fan mechanics	3AXD50000625574	L-6-8-406-VX	3AXD50000609956
	LCL heat exchanger kit	-	L-468-8-446	3AXD50000479795
	Cooling components kit 2	-	L-468-8-442	3AXD50000044182
5	Module and fuse installation			
6	Shroud and marine supports installation			
	D8T shroud kit	-	L-6-8-350-VX	3AXD50000610280
	D8T marine supports	-	L-6-8-501-VX	3AXD50000610297



KITS FOR ACS880-304LC D8T 12P 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.

**Exploded View Diagram of Rittal VX25 2000x600x600 Cabinet**

The diagram illustrates the internal structure and components of the Rittal VX25 2000x600x600 cabinet. Key components and their assembly positions are shown, including:

- Top Section:** Shows the top of the cabinet with various support and connection kits.
- Internal Components:** Includes busbars, fuse connections, and cooling components.
- Bottom Section:** Shows the base of the cabinet with support and connection kits.

**Component Labels and Part Numbers:**

- Top Section:**
  - DBT MARINE SUPPORTS KIT L-6-8-501-VX (Ordering code: 3AXD50000610297)
  - DBT AC FUSE CONN 2 FOR IEC: KIT L-6-8-136-VX (Ordering code: 3AXD50000610235)
  - FOR IUL: KIT L-6-8-137-VX (Ordering code: 3AXD50000610242)
  - DBT AC FUSE CONN 1 FOR IEC: KIT L-6-8-134-VX (Ordering code: 3AXD50000610211)
  - FOR IUL: KIT L-6-8-135-VX (Ordering code: 3AXD50000610228)
  - AC CONNECTION 12P KIT L-6-8-113-VX (Ordering code: 3AXD50000610273)
  - R8: FAN KIT (Ordering code: 3200V) 3AXD5000065414 (115V)
  - DBT FAN MECHANICS KIT L-6-8-406-VX (Ordering code: 3AXD50000609566)
  - LCL HEAT EXCHANGER KIT KIT L-488-8-442 (Ordering code: 3AXD5000044182)
  - COOLING COMPONENTS KIT 2 KIT L-488-8-442 (Ordering code: 3AXD5000044182)
- Internal Components:**
  - DBT REAR BUSBAR SUPP KIT KIT L-6-8-134-VX (Ordering code: 3AXD50000609565)
  - DBT MOUNTING MECH 2 KIT L-6-8-317-VX (Ordering code: 3AXD50000609949)
  - DBT MOUNTING MECH 1 KIT L-6-8-316-VX (Ordering code: 3AXD50000609952)
  - DBT MOUNTING MECH 3 KIT L-6-8-315-VX (Ordering code: 3AXD50000609955)
  - DBT MOUNTING MECH 4 KIT L-6-8-314-VX (Ordering code: 3AXD50000609958)
  - DBT MOUNTING MECH 5 KIT L-6-8-313-VX (Ordering code: 3AXD50000609961)
  - DBT MOUNTING MECH 6 KIT L-6-8-312-VX (Ordering code: 3AXD50000609964)
  - DBT MOUNTING MECH 7 KIT L-6-8-311-VX (Ordering code: 3AXD50000609967)
  - DBT MOUNTING MECH 8 KIT L-6-8-310-VX (Ordering code: 3AXD50000609970)
  - DBT MOUNTING MECH 9 KIT L-6-8-309-VX (Ordering code: 3AXD50000609973)
  - DBT MOUNTING MECH 10 KIT L-6-8-308-VX (Ordering code: 3AXD50000609976)
  - DBT MOUNTING MECH 11 KIT L-6-8-307-VX (Ordering code: 3AXD50000609979)
  - DBT MOUNTING MECH 12 KIT L-6-8-306-VX (Ordering code: 3AXD50000609982)
  - DBT MOUNTING MECH 13 KIT L-6-8-305-VX (Ordering code: 3AXD50000609985)
  - DBT MOUNTING MECH 14 KIT L-6-8-304-VX (Ordering code: 3AXD50000609988)
  - DBT MOUNTING MECH 15 KIT L-6-8-303-VX (Ordering code: 3AXD50000609991)
  - DBT MOUNTING MECH 16 KIT L-6-8-302-VX (Ordering code: 3AXD50000609994)
  - DBT MOUNTING MECH 17 KIT L-6-8-301-VX (Ordering code: 3AXD50000609997)
  - DBT MOUNTING MECH 18 KIT L-6-8-300-VX (Ordering code: 3AXD50000609999)
- Bottom Section:**
  - DBT SHROUD KIT KIT L-6-8-350-VX (Ordering code: 3AXD50000610280)
  - DBT DC FUSE CONN KIT 2 KIT L-6-8-211-VX (Ordering code: 3AXD50000609987)
  - DBT DC FUSE CONN KIT 1 KIT L-6-8-210-VX (Ordering code: 3AXD50000609989)
  - DBT DC FUSE CONN KIT 3 KIT L-6-8-209-VX (Ordering code: 3AXD50000609992)
  - DBT DC FUSE CONN KIT 4 KIT L-6-8-208-VX (Ordering code: 3AXD50000609995)
  - DBT DC FUSE CONN KIT 5 KIT L-6-8-207-VX (Ordering code: 3AXD50000609998)
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  - DBT DC FUSE CONN KIT 7 KIT L-6-8-205-VX (Ordering code: 3AXD50000609999)
  - DBT DC FUSE CONN KIT 8 KIT L-6-8-204-VX (Ordering code: 3AXD50000609999)
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  - DBT DC FUSE CONN KIT 13 KIT L-6-8-199-VX (Ordering code: 3AXD50000609999)
  - DBT DC FUSE CONN KIT 14 KIT L-6-8-198-VX (Ordering code: 3AXD50000609999)
  - DBT DC FUSE CONN KIT 15 KIT L-6-8-197-VX (Ordering code: 3AXD50000609999)
  - DBT DC FUSE CONN KIT 16 KIT L-6-8-196-VX (Ordering code: 3AXD50000609999)
  - DBT DC FUSE CONN KIT 17 KIT L-6-8-195-VX (Ordering code: 3AXD50000609999)
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  - DBT DC FUSE CONN KIT 24 KIT L-6-8-188-VX (Ordering code: 3AXD50000609999)
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  - DBT DC FUSE CONN KIT 29 KIT L-6-8-183-VX (Ordering code: 3AXD50000609999)
  - DBT DC FUSE CONN KIT 30 KIT L-6-8-182-VX (Ordering code: 3AXD50000609999)
  - DBT DC FUSE CONN KIT 31 KIT L-6-8-181-VX (Ordering code: 3AXD50000609999)
  - DBT DC FUSE CONN KIT 32 KIT L-6-8-180-VX (Ordering code: 3AXD50000609999)
  - DBT DC FUSE CONN KIT 33 KIT L-6-8-179-VX (Ordering code: 3AXD50000609999)
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  - DBT DC FUSE CONN KIT 35 KIT L-6-8-177-VX (Ordering code: 3AXD50000609999)
  - DBT DC FUSE CONN KIT 36 KIT L-6-8-176-VX (Ordering code: 3AXD50000609999)
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  - DBT DC FUSE CONN KIT 48 KIT L-6-8-164-VX (Ordering code: 3AXD50000609999)
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### Stage 1: Common assembly installations

**Note!** See Cabinet design and construction instructions for ACS880 multistage modules (3AUA0000107668 [English])

**STAGE I:** Common assembly installations (LCL SIDE PLATES KIT, FLAT-PLS SUPPORT KIT FOR AC, FLAT-PLS SUPPORT KIT FOR DC)

See assembly drawings for details

**LCL SIDE PLATE KIT**  
KIT L-468-8-314-VX  
Ordering code: 3AXD50000426652  
See drawing: 3AXD50000426653

**FLAT-PLS SUPPORT KIT FOR AC**  
KIT L-468-X-012-VX  
Ordering code: 3AXD50000371013  
See drawing: 3AXD500003710870

**FLAT-PLS SUPPORT KIT FOR DC**  
KIT A-468-X-001-VX  
Ordering code: 3AXD50000333387  
See drawing: 3AXD50000333639

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**STAGE 2: D8T MOUNTING MECH 1, D8T MOUNTING MECH 2,  
D8T REAR BUSBAR SUPP KIT, D8T DC CONN KIT 2,  
D8T AC FUSE CONN 2 AND AC CONNECTION I2P INSTALLATION**

See assembly drawings for details

**D8T DC CONN KIT 2**  
KIT L-6-8-211-VX  
Ordering code: 3AXD50000609987  
See drawing: 3AXD50000628506

**AC CONNECTION I2P**  
KIT L-6-8-113-VX  
Ordering code:  
3AXD50000610273

**D8T AC FUSE CONN 2**  
FOR IEC: KIT L-6-8-136-VX  
Ordering code: 3AXD50000610235  
See drawing: 3AXD50000629992  
  
FOR UL: KIT L-6-8-137-VX  
Ordering code: 3AXD50000610242  
See drawing: 3AXD50000630288

**D8T REAR BUSBAR SUPP KIT**  
KIT L-6-8-034-VX  
Ordering code: 3AXD50000609963  
See drawing: 3AXD50000626717

**D8T MOUNTING MECH 1**  
KIT L-6-8-316-VX  
Ordering code: 3AXD50000609932  
See drawing: 3AXD50000623594

**D8T MOUNTING MECH 2**  
KIT L-6-8-317-VX  
Ordering code: 3AXD50000609949  
See drawing: 3AXD50000624331

### Stage 3: DC fuse connection

Technical drawing of a DC FUSE CONN KIT 2 installation. The drawing shows a perspective view of a metal frame with various components like brackets, bolts, and a central assembly. Dimensions are provided for various parts.

**STAGE 3: D8T DC FUSE CONN KIT 2 INSTALLATION**  
See assembly drawings for details

D8T DC FUSE CONN KIT 2  
KIT L-6-8-236-VX  
Ordering code: 3AXD50000610006  
See drawing: 3AXD50000628919

**Technical Drawing Data:**

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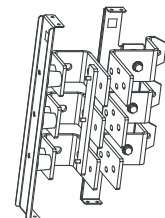
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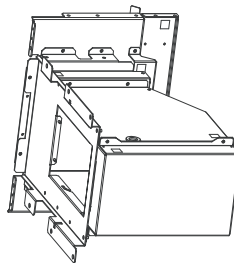
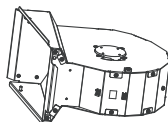
STAGE 4: D8T AC FUSE CONN 1, D8T FAN MECHANICS  
LCL HEAT EXCHANGER KIT, R8i FAN KIT AND  
COOLING COMPONENT KIT 2 INSTALLATION

See assembly drawings for details

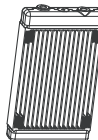


D8T AC FUSE CONN I

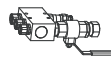
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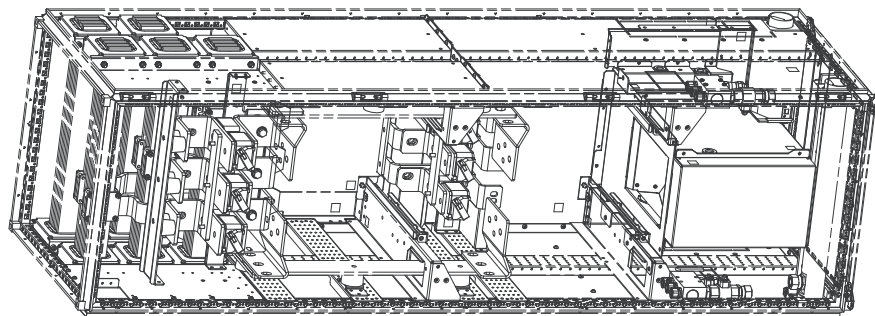
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KIT L-6-8-406-VX  
Ordering code: 3AXD5000609956  
Drawing code: 3AXD5000625574



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



COOLING COMPONENTS KIT 2  
KIT L-468-8-442  
Ordering code:  
3AXD50000044182



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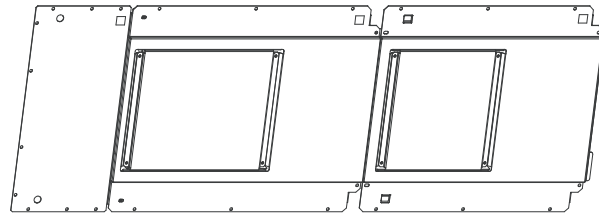
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DMS Number				Total

### Stage 5: Module and fuse installation

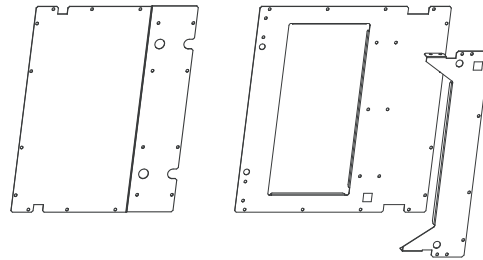


## STAGE 6: D8T SHROUD KIT AND D8T MARINE SUPPORTS INSTALLATION

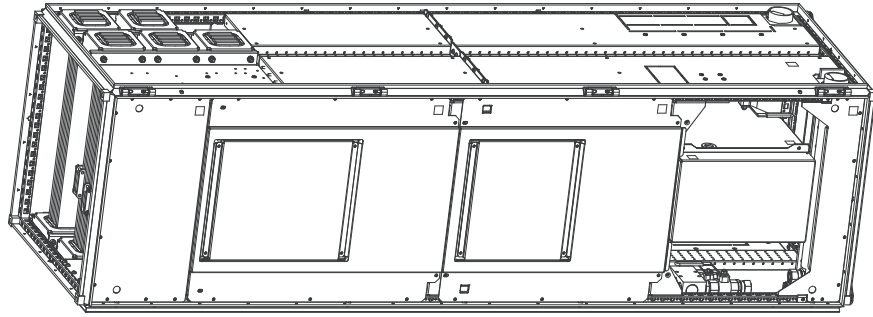
See assembly drawings for details




D8T SHROUD KIT  
KIT L-6-8-350-VX  
Ordering code:  
3AXD50000610280



D8T MARINE SUPPORTS  
KIT L-6-8-501-VX  
Ordering code:  
3AXD50000610297



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■ **One D8T module in a 600 mm wide generic enclosure**

Parts to be installed	Instruction code	Kit code	Kit ordering code
Mounting mechanics kit 1	3AXD50000623594	L-6-8-316-VX	3AXD50000609932
DC fuse connection	3AXD50000627301	L-6-8-235-VX	3AXD50000609994
AC fuse connection kit 1	- -	L-6-8-134-VX (IEC) L-6-8-135-VX (UL)	3AXD50000610211 (IEC) 3AXD50000610228 (UL)
Cooling components kit	3AXD50000048217	L-468-8-441	3AXD50000044084
Fan mechanics	3AXD50000625574	L-6-8-406-VX	3AXD50000609956
LCL heat exchanger kit	-	L-468-8-446	3AXD50000479795
Fan kit	- -	- -	3AXD50000043886 (230 V) 3AXD50000045414 (115 V)



Prepared	L. Lehtisalo	31-Dec-20	Title	ASSEMBLY DRAWING	Doc. des.	Scale	Form
Checked	M. Mäkinen	31-Dec-20	ACS880-30ALC /V08T	DRAWING	1:25	A3	
Appr.	M. A. Kariinen	31-Dec-20	IN GENERIC CABINET		Rev. date		
Project name	24700000382751				Rev. int.	- 0 (DRI)	
Plant name	6400E-NZ				Doc. No.	3AYD50000715640	Sheet
Plant Loc.					Rev.		Scale
Plant, Doc. No.							
Plant, Cust. Doc. No.							

■ **Two D8T modules in a 600 mm wide generic enclosure**

Parts to be installed	Instruction code	Kit code	Kit ordering code
Mounting mechanics 1	3AXD50000623594	L-6-8-316-VX	3AXD50000609932
Mounting mechanics 2	3AXD50000624331	L-6-8-317-VX	3AXD50000609949
AC fuse connection kit 1	-	L-6-8-134-VX (IEC)	3AXD50000610211 (IEC)
	-	L-6-8-135-VX (UL)	3AXD50000610228 (UL)
AC fuse connection kit 2	3AXD50000629992 (IEC)	L-6-8-136-VX (IEC)	3AXD50000610235 (IEC)
	3AXD50000630288 (UL)	L-6-8-137-VX (UL)	3AXD50000610242 (UL)
DC fuse connection	3AXD50000628919	L-6-8-236-VX	3AXD50000610006
Rear busbar support kit	3AXD50000626717	L-6-8-034-VX	3AXD50000609963
Cooling components kit 2	-	L-468-8-442	3AXD50000044182
Fan mechanics	3AXD50000625574	L-6-8-406-VX	3AXD50000609956
LCL heat exchanger kit	-	L-468-8-446	3AXD50000479795
Fan kit	-	-	3AXD50000043886 (230 V)
	-	-	3AXD50000045414 (115 V)



[illegible]

## 5

## Electrical installation

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### 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

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**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.



### **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. Clearly identify the work location and equipment.
2. Disconnect all possible voltage sources. Make sure that re-connection is not possible. Lock out and tag out.
  - Open the main disconnecting device of the drive.
  - Open the charging switch if present.
  - Open the disconnecter 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.)
  - If the drive is equipped with a DC/DC converter unit (optional) or a DC feeder unit (optional): Open the DC switch-disconnector [Q11] of the unit. Open the disconnecting device of the energy storage connected to the unit (outside the drive cabinet).
  - Open the auxiliary voltage switch-disconnector (if present), and all other possible disconnecting devices that isolate the drive from dangerous voltage sources.
  - 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.
  - Disconnect all dangerous external voltages from the control circuits.
  - After you disconnect power from the drive, always wait 5 minutes to let the intermediate circuit capacitors discharge before you continue.
3. Protect any other energized parts in the work location against contact.
4. Take special precautions when close to bare conductors.
5. Measure that the installation is de-energized. 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 measuring the installation, verify the operation of the voltage tester on a known voltage source.
  - Make sure that the voltage between the drive input power terminals (L1, L2, L3) and the grounding (PE) busbar is zero.
  - Make sure that the voltage between the drive output terminals (T1/U, T2/V, T3/W) and the grounding (PE) busbar is zero.

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 terminals (UDC+ and UDC-) and the grounding (PE) terminal is zero. In cabinet-built drives, measure between the drive DC busbars (+ and -) and the grounding (PE) busbar.
6. 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

### ■ Static electricity



#### **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.

### ■ Optical components



#### **WARNING!**

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

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

## Measuring the insulation resistance of the drive



#### **WARNING!**

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

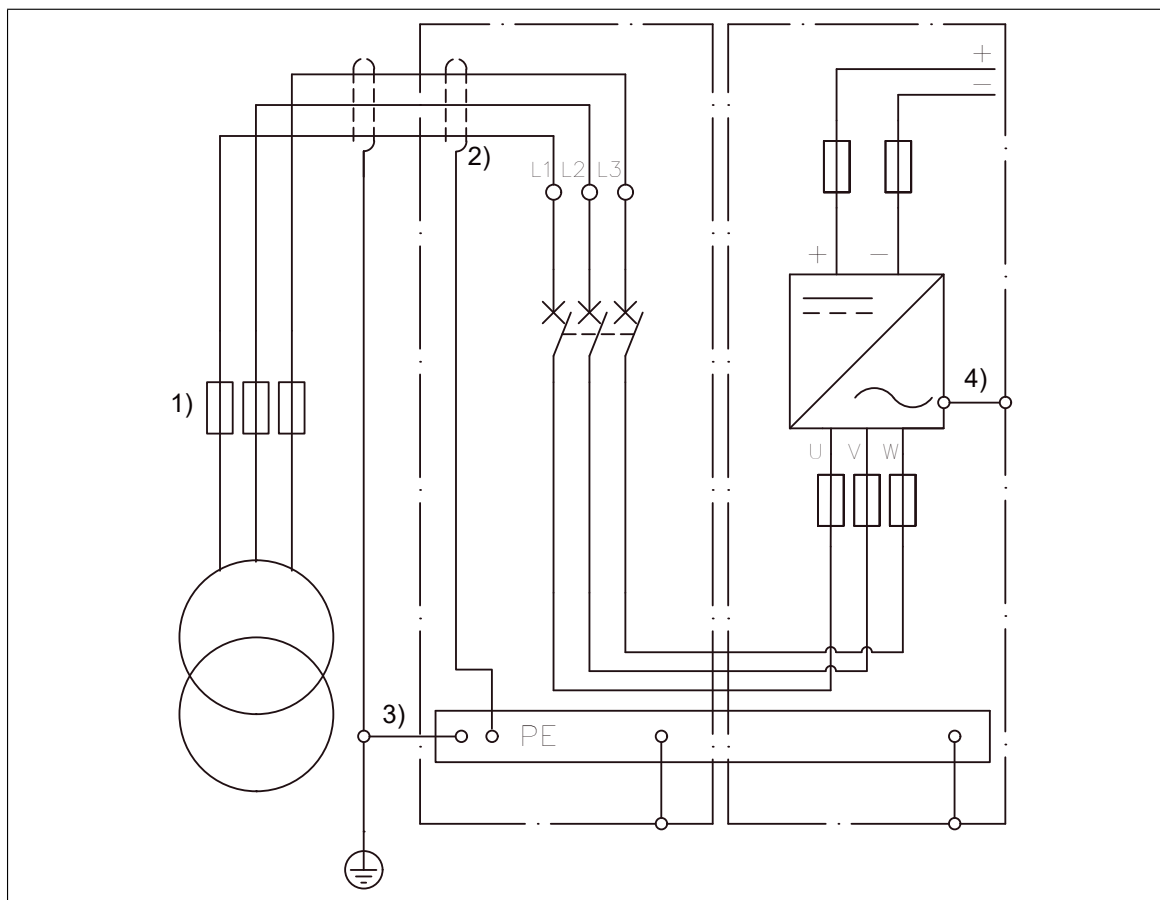
## Connecting the power cables and busbars

The diagrams in this section are templates for the final main circuit diagrams. They do not contain details, such as terminal markings, etc. and are not suitable for the installation work as such. The designer of the cabinet-installed drive must:

- prepare the final circuit diagrams
- provide the final circuit diagrams to the installer(s).

The electricians that do the connections must use the final circuit diagrams.

### ■ Connection diagram – 1×D8T, 6-pulse



1) Fuses or other protection means.

2) Ground the cable shield 360 degrees at the cable entry (recommendation). See section [Connection procedure \(page 72\)](#).

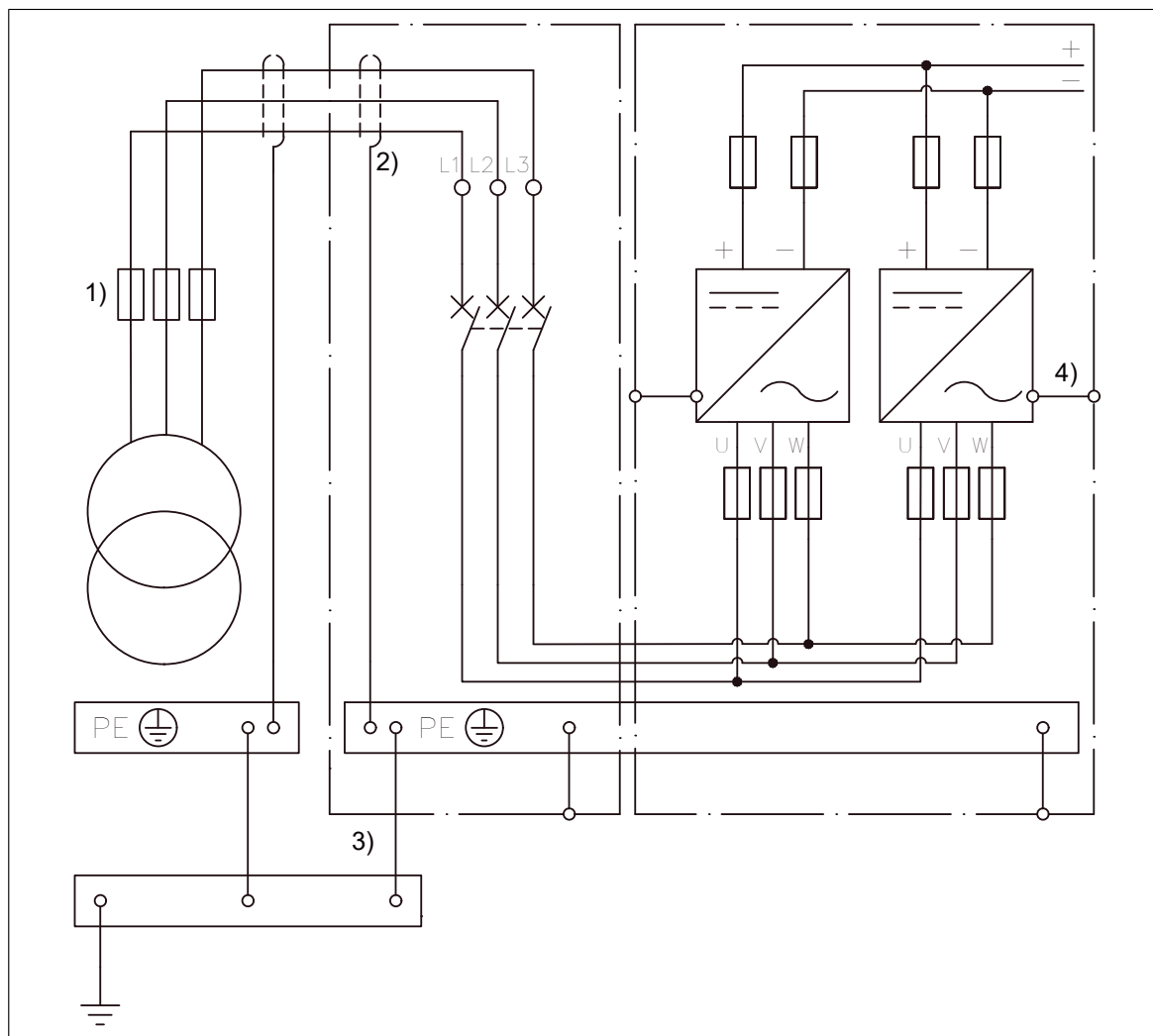
3) Use a separate PE conductor in addition to the input cable shield if the conductivity of the shield does not meet the requirement for the PE conductor. See *ACS880 multidrive cabinets and modules electrical planning instructions* (3AUA0000120324 [English]).

4) The supply modules and other components connect to the cabinet grounding point [PE] through their mounting points and frame of the cabinet. Make sure that there are good electrical contacts (bare metal to metal, no paint or dirt). Use separate grounding wires in addition where necessary. See section [Connection procedure \(page 72\)](#).

**Note:** For the cable selection instructions, see *ACS880 multidrive cabinets and modules electrical planning instructions* (3AUA0000120324 [English]).



## ■ Connection diagram – 2×D8T, 6-pulse



1) Fuses or other protection means.

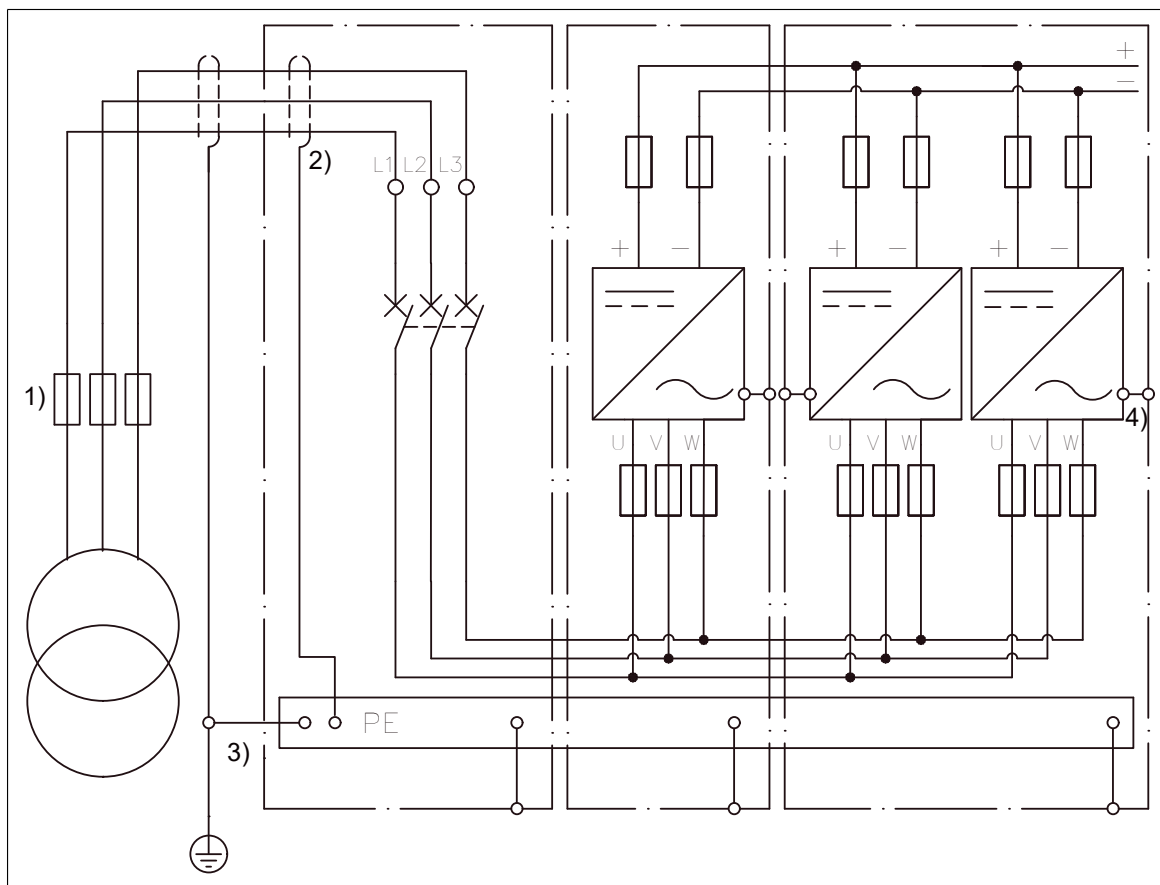
2) Ground the cable shield 360 degrees at the cable entry (recommendation). See section [Connection procedure \(page 72\)](#).

3) Use a separate PE conductor in addition to the input cable shield if the conductivity of the shield does not meet the requirement for the PE conductor. See *ACS880 multidrive cabinets and modules electrical planning instructions* (3AUA0000120324 [English]).

4) The supply modules and other components connect to the cabinet grounding point [PE] through their mounting points and frame of the cabinet. Make sure that there are good electrical contacts (bare metal to metal, no paint or dirt). Use separate grounding wires in addition where necessary. See section [Connection procedure \(page 72\)](#).

**Note:** For the cable selection instructions, see *ACS880 multidrive cabinets and modules electrical planning instructions* (3AUA0000120324 [English]).

## ■ Connection diagram – 3×D8T, 6-pulse



1) Fuses or other protection means.

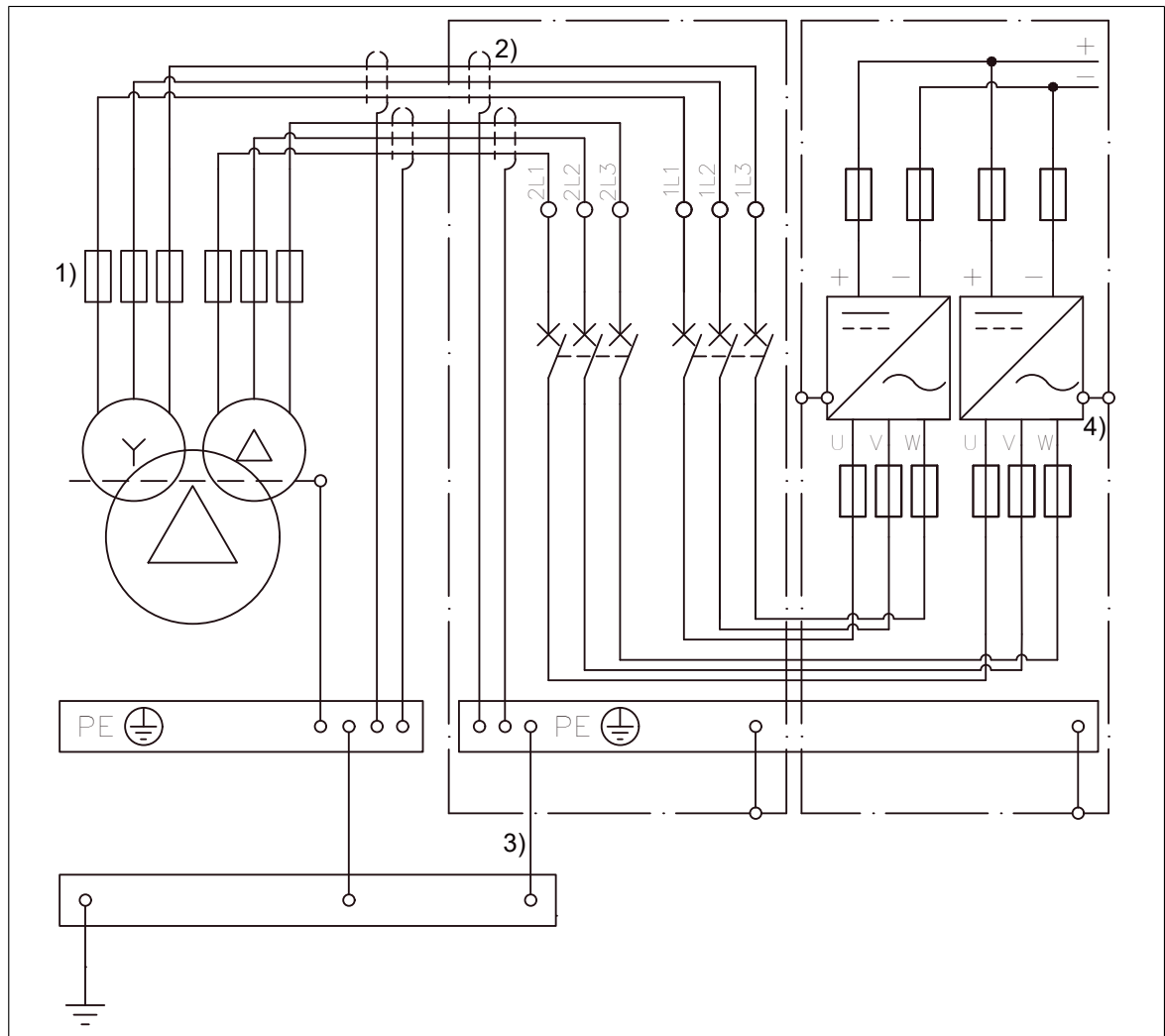
2) Ground the cable shield 360 degrees at the cable entry (recommendation). See section [Connection procedure \(page 72\)](#).

3) Use a separate PE conductor in addition to the input cable shield if the conductivity of the shield does not meet the requirement for the PE conductor. See *ACS880 multidrive cabinets and modules electrical planning instructions* (3AUA0000120324 [English]).

4) The supply modules and other components connect to the cabinet grounding point [PE] through their mounting points and frame of the cabinet. Make sure that there are good electrical contacts (bare metal to metal, no paint or dirt). Use separate grounding wires in addition where necessary. See section [Connection procedure \(page 72\)](#).

**Note:** For the cable selection instructions, see *ACS880 multidrive cabinets and modules electrical planning instructions* (3AUA0000120324 [English]).

## ■ Connection diagram – 2×D8T, 12-pulse



1) Fuses or other protection means.

2) Ground the cable shield 360 degrees at the cable entry (recommendation). See section [Connection procedure \(page 72\)](#).

3) Use a separate PE conductor in addition to the input cable shield if the conductivity of the shield does not meet the requirement for the PE conductor. See *ACS880 multidrive cabinets and modules electrical planning instructions* (3AUA0000120324 [English]).

4) The supply modules and other components connect to the cabinet grounding point [PE] through their mounting points and frame of the cabinet. Make sure that there are good electrical contacts (bare metal to metal, no paint or dirt). Use separate grounding wires in addition where necessary. See section [Connection procedure \(page 72\)](#).

**Note:** For the cable selection instructions, see *ACS880 multidrive cabinets and modules electrical planning instructions* (3AUA0000120324 [English]).

## ■ Connection procedure

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**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 66)* before you start the work.
2. Make the connections in between the main circuit components inside the cabinet if not done yet. Do the connections according to the final circuit diagrams for the drive. If the connections are ready, check them against the final circuit diagrams. Do not use the example circuit diagrams in this manual as the sole source of information when doing or checking the connections.

For the tightening torques, see the technical data.

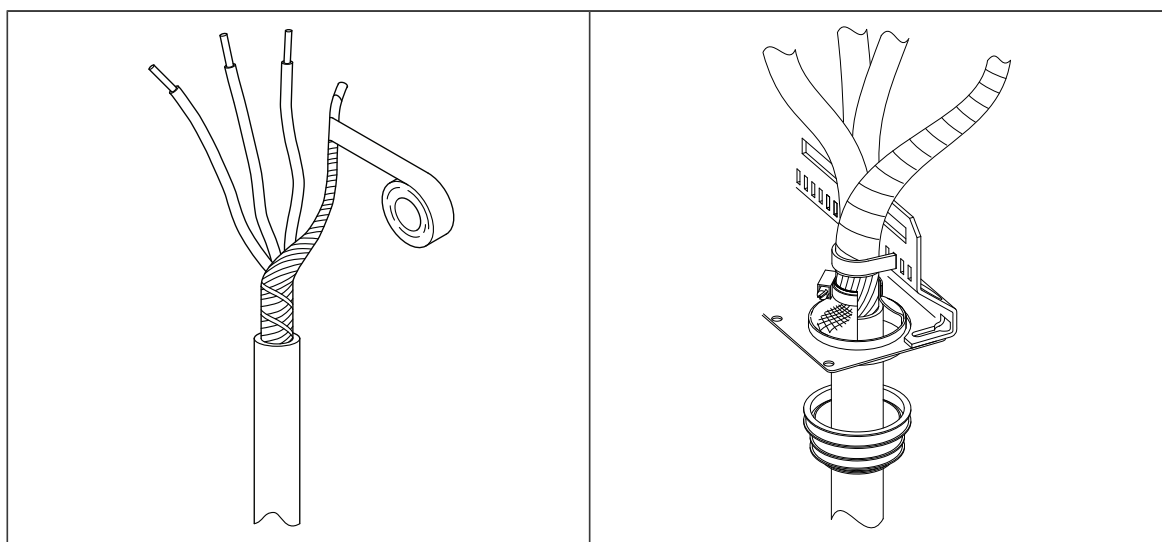
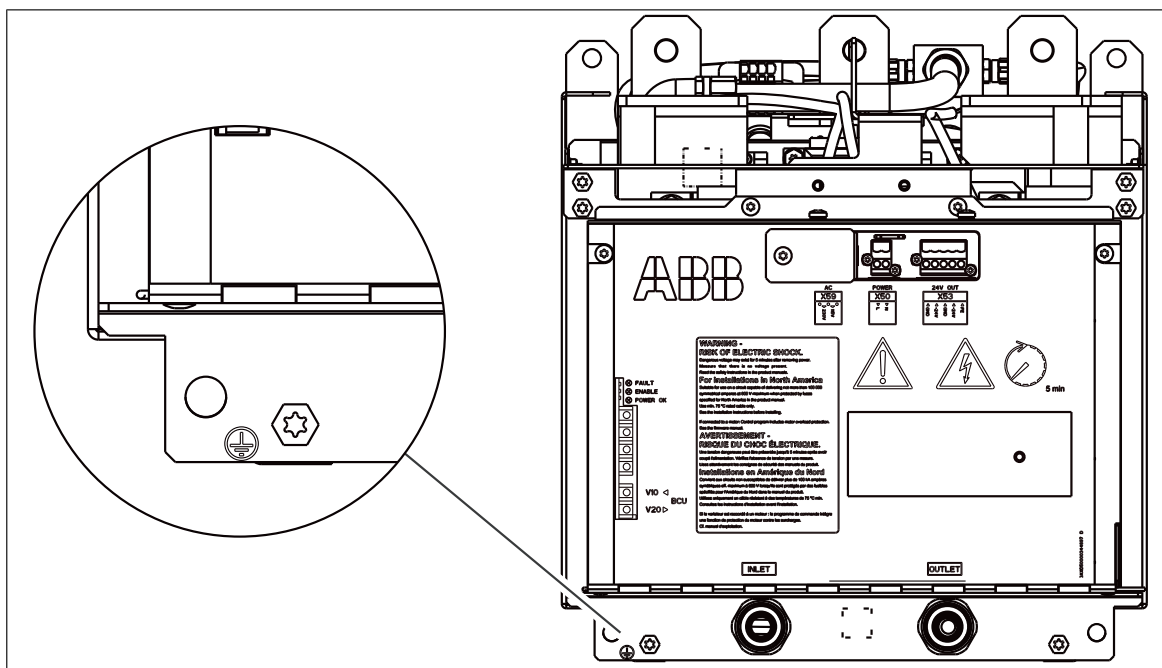
3. Ground the modules by the bottom edge of the front plate. The grounding point is marked on the module. Connect the front plate to the frame support bracket with screws. The frame support bracket should have a galvanic connection to the PE busbar through the cabinet frame.

**Note:** If the cabinet frame is painted, 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 merely through the mounting screws and the cabinet chassis is not always good enough. 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). See *ACS880 multidrive cabinets and modules electrical planning instructions* (3AUA0000120324 [English]).

4. Lead the input power cables into the inside of the cabinet.
  5. Strip the input power cables and twist the cable shields to bundles and connect to cabinet PE (ground) busbar. Connect the separate ground conductors/cables to cabinet PE (ground) busbar. We recommend also 360-degree grounding of the cable shield at the cabinet entry to suppress interference.
  6. Connect the phase conductors to the input terminals of the main breaker [Q1].  
For the tightening torque, see the technical data.
- 





## Connecting auxiliary power to the diode supply module

The cabinet builder can arrange an auxiliary AC power supply of 230 V AC or 115 V AC to connector X50 to power the electronics of each supply module. There is an internal power supply (BDPS) in the module that produces 24 V DC from the auxiliary voltage for the internal circuit boards.

For connectors, see [Supply module connectors X50 and X53 \(page 23\)](#).

### ■ Connection procedure



#### **WARNING!**

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

1. Stop the drive and do the steps in section [Electrical safety precautions \(page 66\)](#) before you start the work.
2. Route the cable. Obey the general routing guidelines in section [Connecting the control cables \(page 74\)](#).
3. Connect the cable from the auxiliary power supply to plug connector X50.
4. Connect the plug connector X50 to its counterpart in the module.

## Connecting the control cables

### ■ Connection diagram

See the example circuit diagrams, and the default I/O diagram.

### ■ 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 following procedure instructs how to connect the control cables of a supply unit. In the example, the power cables are routed to the cabinet through the bottom. Note that the figures in the procedure are examples.



#### **WARNING!**

Obey the safety instructions given in *ACS880 liquid-cooled multidrive 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.

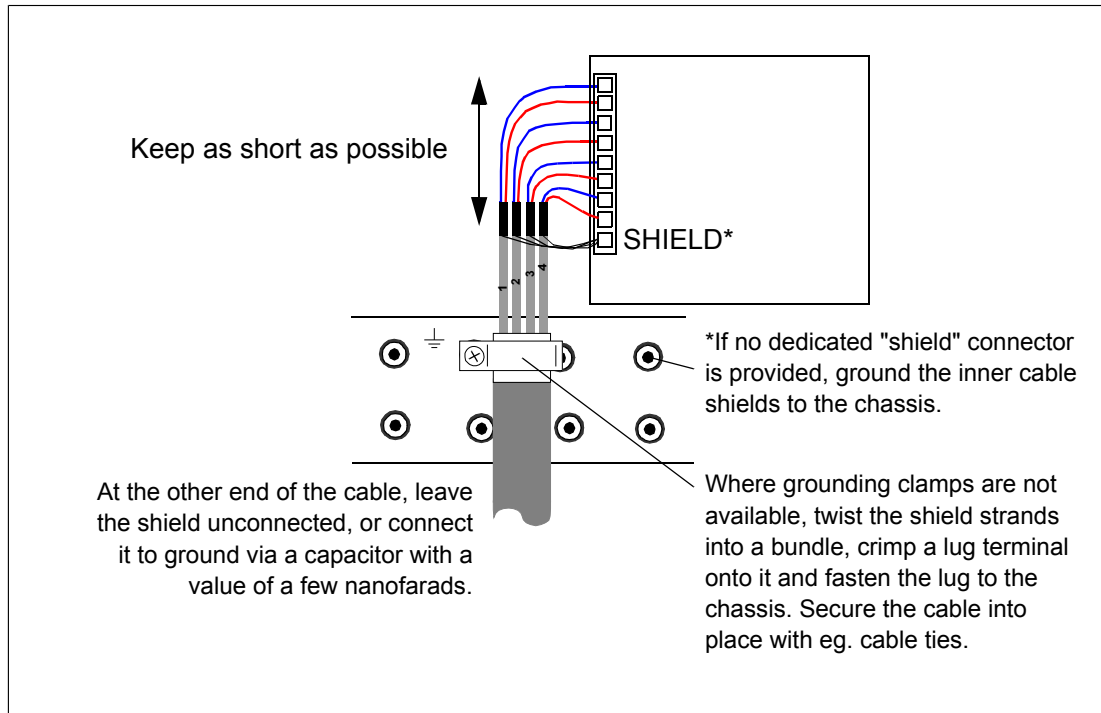
If the outer surface of the shield is non-conductive, turn the shield inside out as shown below and wrap copper foil around the cable to keep the shielding continuous. Do not cut the grounding wire (if present).

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

4. Run the cables to the appropriate terminals. Wherever possible:
- Use the existing cable trunking in the cabinet.
  - Use sleeving wherever the cables are laid against sharp edges.
  - Tie the cables to provide strain relief.

BCU	V10		Control unit connection. Must be done by the user.
	V20		

5. Cut the cables to suitable 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 appropriate terminals.
8. Fasten the shrouds (if any).
9. Close the doors.





## Connecting a PC

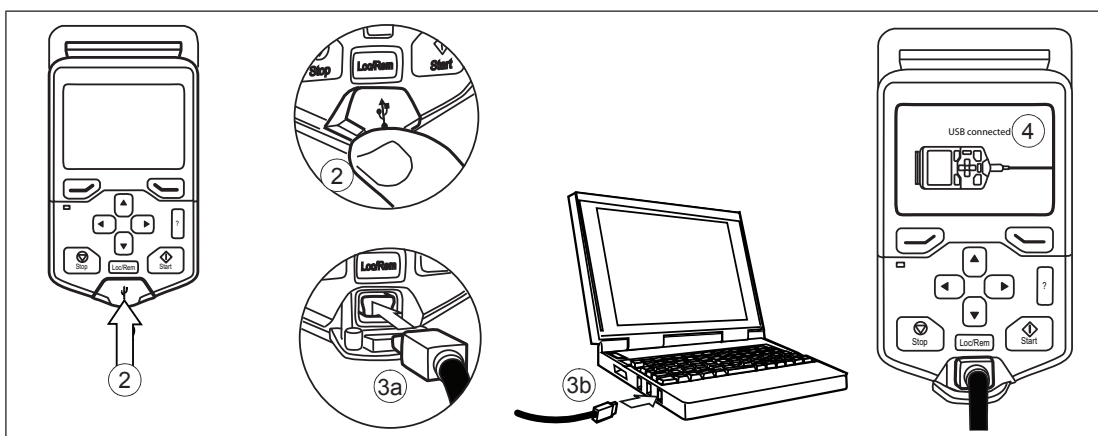


### WARNING!

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

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

1. Connect a ACS-AP-... or ACH-AP-... control panel to the unit either
  - by inserting the control panel into the panel holder or platform, or
  - by using an Ethernet (eg, Cat 5e) networking cable.
2. Remove the USB connector cover on the front of the control panel.
3. Connect an USB cable (Type A to Type Mini-B) between the USB connector on the control panel (3a) and a free USB port on the PC (3b).
4. The panel will display an indication whenever the connection is active.
5. See the documentation of the PC tool for setup instructions.



## Installing option modules

See the appropriate option module manual.



# 6

## 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 \(page 66\)](#) before you start the work.

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

## 80 Installation checklist

<b>Make sure that ...</b>	<input checked="" type="checkbox"/>
<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.	<input type="checkbox"/>
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.	<input type="checkbox"/>
The main circuit connections inside the drive cabinet correspond to the circuit diagrams.	<input type="checkbox"/>
The control unit has been connected. See the circuit diagrams.	<input type="checkbox"/>
Appropriate AC fuses and main disconnecting device are installed.	<input type="checkbox"/>
Appropriate DC fuses are installed.	<input type="checkbox"/>
There is an adequately sized protective earth (ground) conductor(s) between the drive and the switchboard, the conductor is connected to correct terminal, and the terminal is tightened to the correct torque. Proper grounding has also been measured according to the regulations.	<input type="checkbox"/>
<u>If the drive is equipped with a DC/DC converter unit:</u> There is an adequately sized protective earth (ground) conductor between the energy storage and the DC/DC converter, the conductor has been connected to appropriate terminal, and the terminal has been tightened to the proper torque. Proper grounding has also been measured according to the regulations.	<input type="checkbox"/>
<u>If the drive is equipped with a DC/DC converter unit:</u> The energy storage cable has been connected to the correct terminals of the DC/DC converter and energy storage, and the terminals have been tightened to the proper torque.	<input type="checkbox"/>
<u>If the drive is equipped with a DC/DC converter unit:</u> The energy storage has been equipped with fuses for protecting energy storage cable in a cable short-circuit situation.	<input type="checkbox"/>
<u>If the drive is equipped with a DC/DC converter unit:</u> The energy storage has been equipped with a disconnecting device.	<input type="checkbox"/>
The input power cable is connected to the correct terminals, the phase order is correct, and the terminals are tightened to the correct torque.	<input type="checkbox"/>
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. Proper grounding has also been measured according to the regulations.	<input type="checkbox"/>
The motor cable is connected to the correct terminals, the phase order is correct, and the terminals are tightened to the correct torque.	<input type="checkbox"/>
The motor cable is routed away from other cables.	<input type="checkbox"/>
No power factor compensation capacitors are connected to the motor cable.	<input type="checkbox"/>
<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. Proper grounding has also been measured according to the regulations.	<input type="checkbox"/>
<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.	<input type="checkbox"/>
<u>If an external brake resistor is connected to the drive:</u> The brake resistor cable is routed away from other cables.	<input type="checkbox"/>
The control cables are connected to the correct terminals, and the terminals are tightened to the correct torque.	<input type="checkbox"/>
<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.	<input type="checkbox"/>
There are no tools, foreign objects or dust from drilling inside the drive.	<input type="checkbox"/>
The cover(s) of the motor connection box are in place. Cabinet shrouds are in place and doors are closed.	<input type="checkbox"/>

<b>Make sure that ...</b>	<input checked="" type="checkbox"/>
The motor and the driven equipment are ready for power-up.	<input type="checkbox"/>
The coolant connections between cubicles (if any) and to the cooling circuit are tight.	<input type="checkbox"/>
<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.	<input type="checkbox"/>

---



## 7

# Start-up

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## Contents of this chapter

This chapter contains start-up instructions of the diode supply unit.

The underlined tasks are necessary only for certain cases. The symbols in brackets, for example [Q1], refer to the item designations used in the circuit diagrams. If a task is valid only for a certain option device or feature, the option code is given in brackets.

**Note:** The instructions do not cover all possible supply unit configurations.

**Note:** The start-up instructions for functional safety features are not given in this chapter. The designer of the cabinet-installed drive is responsible for the instructions of testing the functional safety systems.



### WARNING!

Obey the safety instructions during the start-up procedure. See *ACS880 liquid-cooled multidrive 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!

Before you activate the automatic fault reset or automatic restart functions of the drive control program, make sure that no dangerous situations can occur. These functions reset the drive automatically and continue operation after a fault or supply break. If these functions are activated, the installation must be clearly marked as defined in IEC/EN 61800-5-1, subclause 6.5.3, for example, "THIS MACHINE STARTS AUTOMATICALLY". If you select an external source for the start command and it is on, the drive will start immediately after fault reset. See the firmware manual.

---

## Start-up procedure

### ■ Basic checks with no voltage connected

Action	<input checked="" type="checkbox"/>
Disconnect the drive from the AC power line and make sure it is safe to start the work. See section <a href="#">Electrical safety precautions (page 66)</a> .	<input type="checkbox"/>
Set the current trip limits of the main breaker. The trip limits have been preset to generic values by the breaker manufacturer. The generic limits do not correspond the protection requirements of the application. <b>General rule</b> Make sure that the selectivity condition is fulfilled, that is the breaker trips at the lower current than the protection device of the supplying network, and that the limit is high enough to cause unnecessary trips during the intermediate DC circuit load peak at start. <b>Long term current limit</b> Rule of thumb: Set to the rated AC current of the drive. <b>Peak current limit</b> Rule of thumb: Set to a value 3...4 times the rated AC current of the drive.	<input type="checkbox"/>
Make sure that the mechanical and electrical installation of the drive is completed. See <a href="#">Installation checklist (page 79)</a> .	<input type="checkbox"/>
Check the settings of breakers/switches in the auxiliary circuits.	<input type="checkbox"/>
Make sure that the voltage settings of the auxiliary voltage transformers are according to the actual power line voltage. See the final circuit diagrams by the designer of the cabinet-installed drive.	<input type="checkbox"/>

### ■ Starting and checking the cooling system



Action	<input checked="" type="checkbox"/>
Fill up and bleed the internal cooling circuit. Start the cooling unit up. See <a href="#">Internal cooling circuit (page 141)</a> .	<input type="checkbox"/>
Check the cooling system for leaks.	<input type="checkbox"/>
Make sure that cooling circuit joints at the shipping split joining cubicles are tight and that all drain valves have been closed.	<input type="checkbox"/>
Make sure that the coolant can flow freely in all cubicles.	<input type="checkbox"/>
Install all shrouds (if removed) and close the cabinet doors.	<input type="checkbox"/>

### ■ Connecting voltage to input terminals and auxiliary

Action	<input checked="" type="checkbox"/>
Remove the temporary grounding system (if installed).	<input type="checkbox"/>
Close the circuit breakers supplying the auxiliary circuits.	<input type="checkbox"/>
Make sure that it is safe to connect voltage: <ul style="list-style-type: none"> <li>nobody is working on the unit or circuits that are wired from outside into the cabinets</li> <li>covers of the motor terminal boxes are on</li> <li>cabinet doors are closed</li> <li>the disconnecting device [Q1] is open.</li> </ul>	<input type="checkbox"/>




Action	<input checked="" type="checkbox"/>
Close the auxiliary voltage switches [Q20, Q115].	<input type="checkbox"/>


## ■ Setting the supply unit parameters

Action	<input checked="" type="checkbox"/>
<p><u>If the supply unit includes one supply module:</u></p> <ul style="list-style-type: none"> <li>• Check the correct voltage ranges by parameter <i>195.01 Supply voltage</i>.</li> <li>• Reboot the control unit by parameter <i>196.08 Control board boot</i>.</li> </ul> <p><u>If the supply unit includes more than one supply module:</u> Make sure that the value of parameter <i>195.31 Parallel connection rating id</i> corresponds to the actual number of parallel-connected diode supply modules:</p> <ul style="list-style-type: none"> <li>• Select the correct voltage range with parameter <i>195.30 Parallel type filter</i>.</li> <li>• Select the correct supply unit type with parameter <i>195.31 Parallel connection rating id</i>.</li> <li>• Reboot the control unit by parameter <i>196.08 Control board boot</i>.</li> <li>• Check the correct voltage range, parameter <i>195.01 Supply voltage</i>.</li> <li>• Reboot the control unit by parameter <i>196.08 Control board boot</i>.</li> </ul> <p>If you need more information on the use of the control panel, see <i>ACX-AP-x assistant control panels user's manual</i> (3AUA0000085685 [English]).</p>	<input type="checkbox"/>

## ■ Powering up the drive

Action	<input checked="" type="checkbox"/>
<p>Close the disconnecting device of the supply unit.</p> <p><u>Drive with main breaker [Q1]:</u> Unlock the withdrawn breaker, and crank it in.</p> <p> <b>WARNING!</b> Never use the start button of the air circuit breaker to close it. Start button bypasses normal start-up procedure and may damage the module.</p>	<input type="checkbox"/>
Make sure that the control panel [A59] is in the remote mode (Loc/Rem key of the panel).	<input type="checkbox"/>
<p><u>Drive with brake chopper:</u> Make sure that there are inverters connected to the DC bus before closing the main contactor. A rule of thumb: The sum capacitance of the inverters connected to the DC bus of the drive must be at least 50% of the sum capacitance of all inverters of the drive.</p> <p>If there is not enough capacitive load at start, the DC voltage can exceed the overvoltage limit, causing immediate start of the brake unit and continuous supply for it by the supply unit. Continuous braking will overload brake choppers and resistors and cause overheating.</p>	<input type="checkbox"/>
<p>Switch the Run enable and Start signals at digital input DI2 on (1) to start the operation of the supply unit.</p> <p>Turn the operating switch [S21] on the cabinet door to ENABLE/RUN (1) position.</p> <p>Run enable starts the supply unit power up sequence. After the program has stepped through it (approximately 3 seconds), the drive DC link is charged, the main breaker is closed and the supply unit is in operation and ready to the supply inverters.</p>	<input type="checkbox"/>
Turn the operating switch [S21] to <i>on</i> (1) position to activate the Run enable signal and to close the main breaker [Q1].	<input type="checkbox"/>

■ Safety function validation

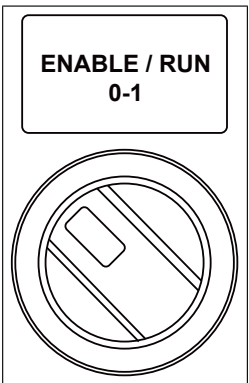
Action	<input checked="" type="checkbox"/>
Validate the operation of safety functions (for example, emergency stop).  <b>WARNING!</b> The safety functions are not safe before they are validated according to the instructions. See the function-specific manual for the validation tasks.  Safety functions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

■ On-load checks

Action	<input checked="" type="checkbox"/>
Make sure that the cooling operates properly (no overtemperature related warnings or faults).	<input type="checkbox"/>

## Switching the supply unit off

1. Stop the motors connected to inverter units.
2. Turn the operating switch [S21] to the OFF (0) position to deactivate the Run enable signal and to switch off the main disconnecting device (main breaker [Q1]).



## Disconnecting and temporary grounding the drive

See [Electrical safety precautions \(page 66\)](#).

# 8

## Maintenance

---

### Contents of this chapter

This chapter contains maintenance instructions. The information is valid for cabinet-installed ACS880-304LC...+A018 diode supply modules.



#### **WARNING!**

Obey the safety instructions given in *ACS880 liquid-cooled multidrive 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.

### Maintenance intervals

The tables below show the maintenance tasks which can be done by the end user. The complete maintenance schedule is available on the Internet (<https://new.abb.com/drives/services/maintenance/preventive-maintenance>). For more information, consult your local ABB Service representative ([www.abb.com/searchchannels](http://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

Component	Years from start-up												
	1	2	3	4	5	6	7	8	9	10	11	12	...
<b>Coolant</b>													
Coolant draining and refill						R						R	
Checking coolant quantity		P		P		P		P		P		P	
Checking coolant antifreeze concentration	P	P	P	P	P	P	P	P	P	P	P	P	P
External circuit of main heat exchanger (temperature, flow, pressure)		I		I		I		I		I		I	
<b>Cabinet fans and fan control board</b>													
Cooling fans 230 V AC 50/60 Hz									R				
Cooling fans 115 V AC 50/60 Hz						R			R			R	
CIO-module for fan control (230 V AC)									R				
CIO-module for fan control (115 V AC) <sup>1)</sup>						I/R						R	
<b>Batteries</b>													
Control panel battery									R				
Control unit battery						R						R	
<b>Control unit</b>													
BCU Control unit												R	
<b>Connections and environment</b>													
Quality of supply voltage	P	P	P	P	P	P	P	P	P	P	P	P	P
<b>Inspections</b>													
Tightness of terminals	I	I	I	I	I	I	I	I	I	I	I	I	I
Ambient conditions (dustiness, moisture, corrosion, temperature)	I	I	I	I	I	I	I	I	I	I	I	I	I
Cooling liquid pipe connections	I	I	I	I	I	I	I	I	I	I	I	I	I
<b>Spare parts</b>													
Spare part stock	I	I	I	I	I	I	I	I	I	I	I	I	I
<b>Other</b>													
ABB-SACE Air circuit breaker maintenance	I	I	I	I	I	I	I	I	I	I	I	I	I
ABB Contactors maintenance	I	I	I	I	I	I	I	I	I	I	I	I	I
<b>Functional safety</b>													
Safety function test	I See the maintenance information of the safety function.												
Safety component expiry (Mission time, $T_M$ )	20 years												

<sup>1)</sup> Replace CIO-module or reset fan counters, see *CIO-01 I/O module for distributed I/O bus control user's manual* (3AXD500000126880 [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.

## Cabinet

### ■ Cleaning the interior of the cabinet

**WARNING!**

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

**WARNING!**

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

1. Stop the drive and do the steps in section [Electrical safety precautions \(page 66\)](#) before you start the work.
2. Open the cabinet door.
3. Clean the interior of the cabinet. Use a vacuum cleaner and a soft brush.
4. Clean the air inlets of the fans and air outlets of the modules (top).
5. Clean the air inlet gratings (if any) on the door.
6. Close the door.

## Power connections

### ■ Retightening the power connections

**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 \(page 66\)](#) before you start the work.
2. Examine the tightness of the cable connections. Use the tightening torques given in the technical data.

## Fuses

### ■ Checking and replacing the DC fuses



#### **WARNING!**

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

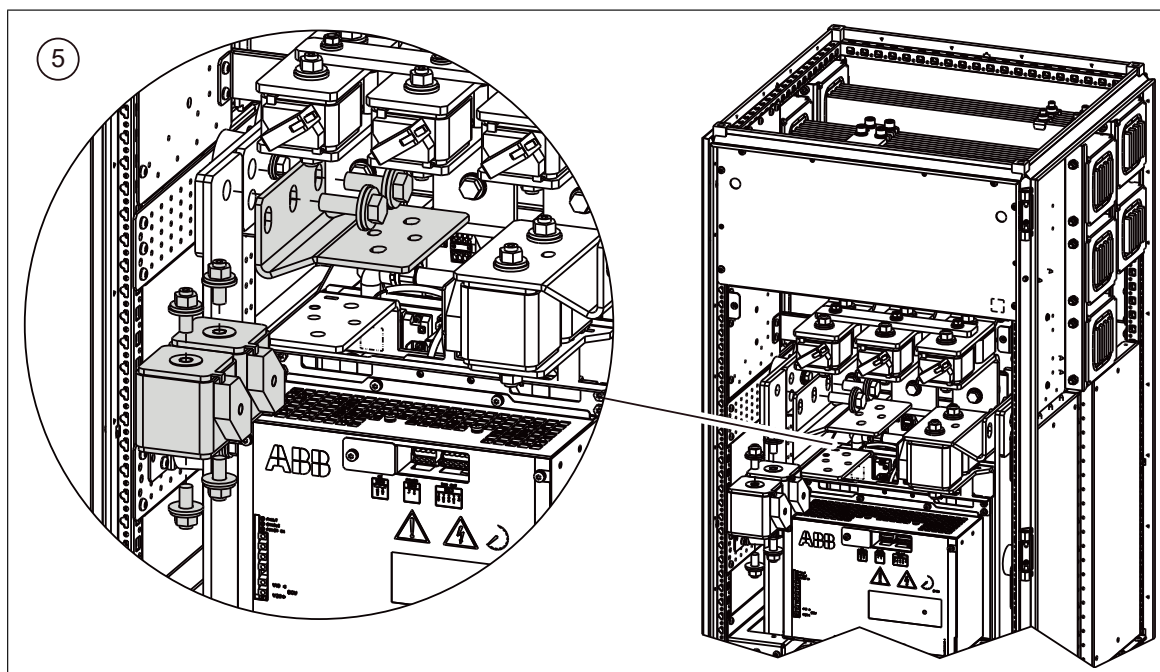
If you are not a qualified electrical professional, do not do installation or maintenance work.



#### **WARNING!**

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

1. Stop the motors connected to the drive.
2. Repeat the steps described in section [Electrical safety precautions \(page 66\)](#).
3. Open the cubicle door.
4. Remove any shrouding in front of the DC fuses.
5. Remove the screws, nuts and washers from the old fuses and attach them to the new fuses. Make sure to keep the washers in the original order.
6. Install a new fuse in reverse order.



## ■ Checking and replacing the AC fuses

**WARNING!**

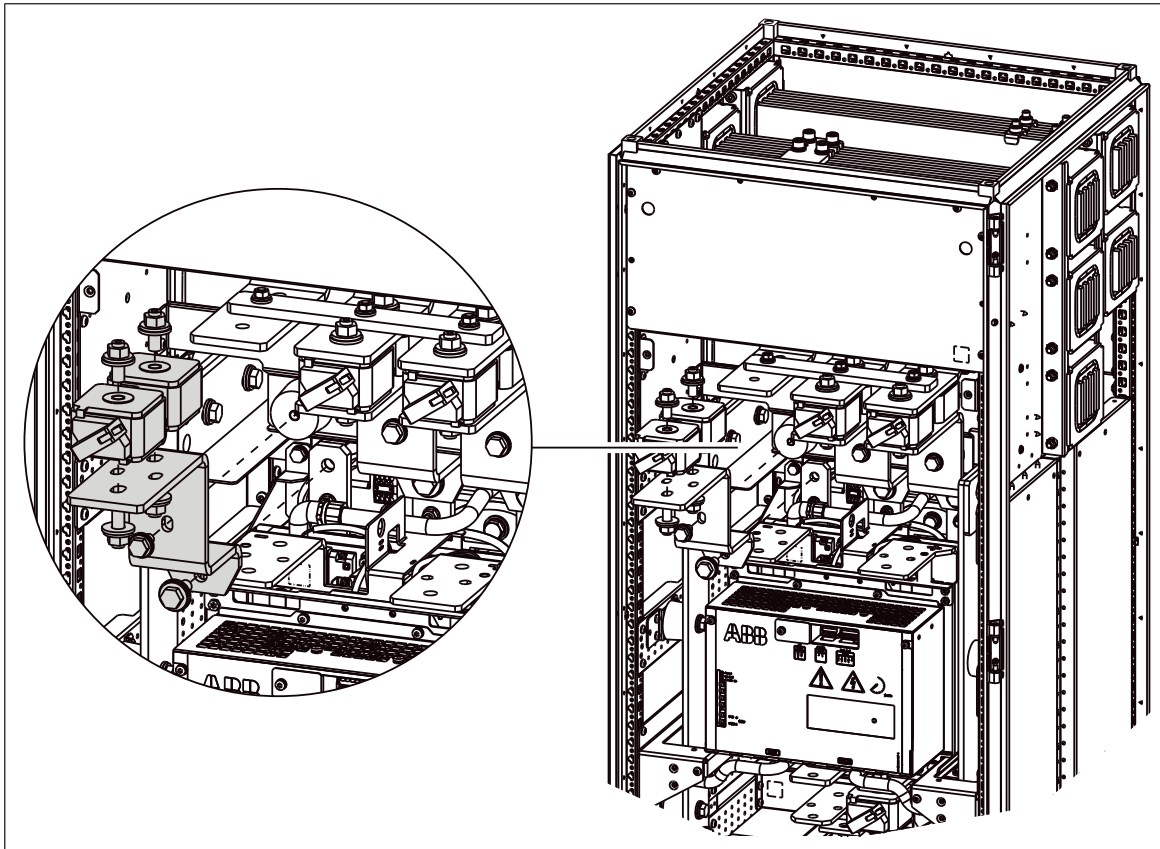
Obey the safety instructions given in *ACS880 liquid-cooled multidrive cabinets and modules safety instructions* (3AXD50000048633 [English]). If you ignore the safety instructions, injury or death, or damage to the equipment can occur.

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

**WARNING!**

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

1. Stop the motors connected to the drive.
2. Do the steps in section [Electrical safety precautions \(page 66\)](#) before you start the work.
3. Open the cubicle door.
4. Remove any shrouding in front of the AC fuses.
5. Remove the screws, nuts, washers and L-shaped busbars from the old fuses and attach them to the new fuses. Make sure to keep the washers in the original order.
6. Install the new fuses in reverse order.



## Fan

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

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

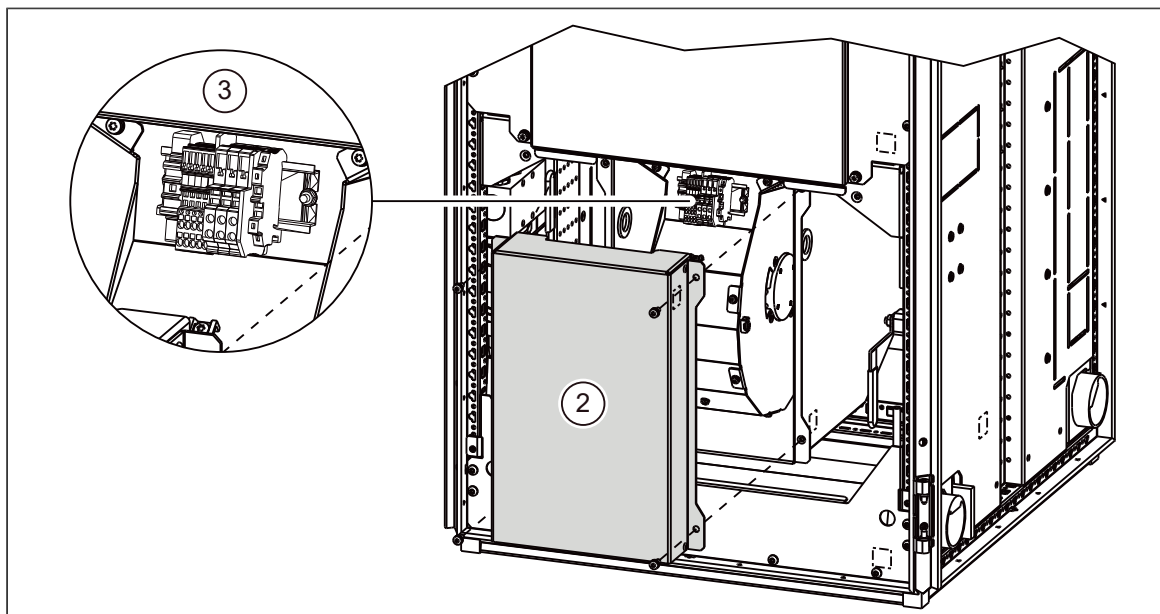
### ■ Replacing the cooling fan of a D8T supply module



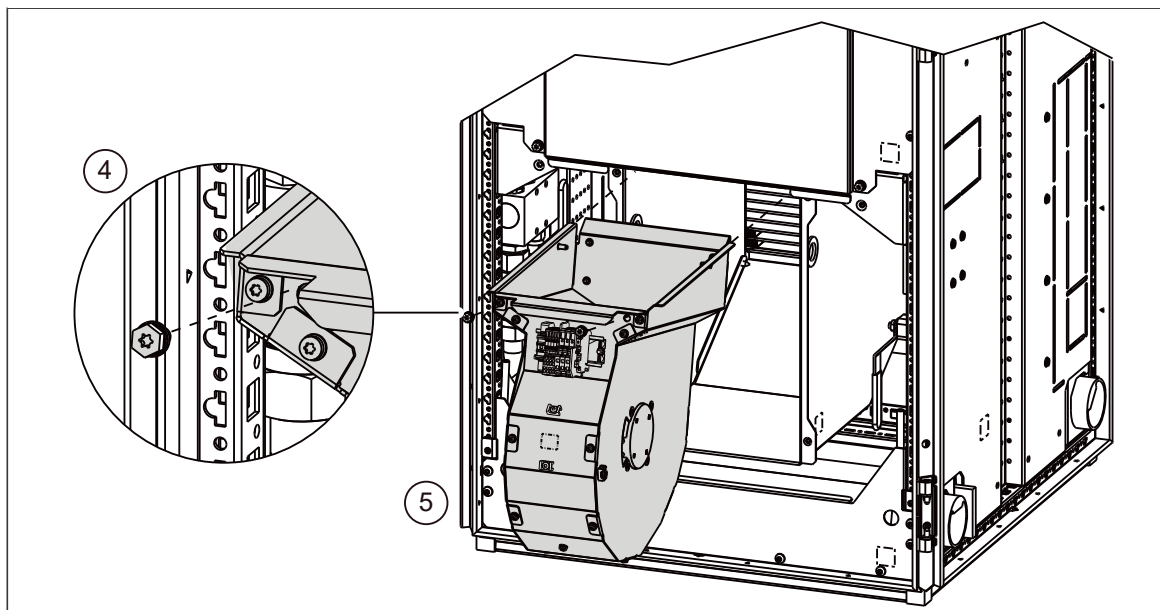
#### **WARNING!**

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

1. Repeat the steps described in section [Electrical safety precautions \(page 66\)](#).
2. Remove the cover panel in front of the fan.
3. Disconnect the fan wiring.
4. Remove the retaining screws.
5. Pull the fan outwards to separate it from the heat exchanger housing.
6. Install new fan in reverse order.







## Supply module

### ■ Replacing the D8T supply module

This section contains instructions on replacing the module from Rittal VX25 enclosure. The instructions are valid for the example Rittal installations presented in this manual.

For the lifting device ordering information, see section [Lifting device \(page 139\)](#).



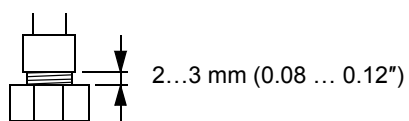
#### **WARNING!**

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!**

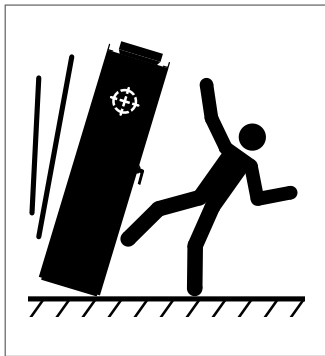
To avoid breaking the coolant pipes, do not overtighten the nuts of the unions. Leave 2 to 3 millimeters (0.08 to 0.12 inches) of thread visible.



**WARNING!**

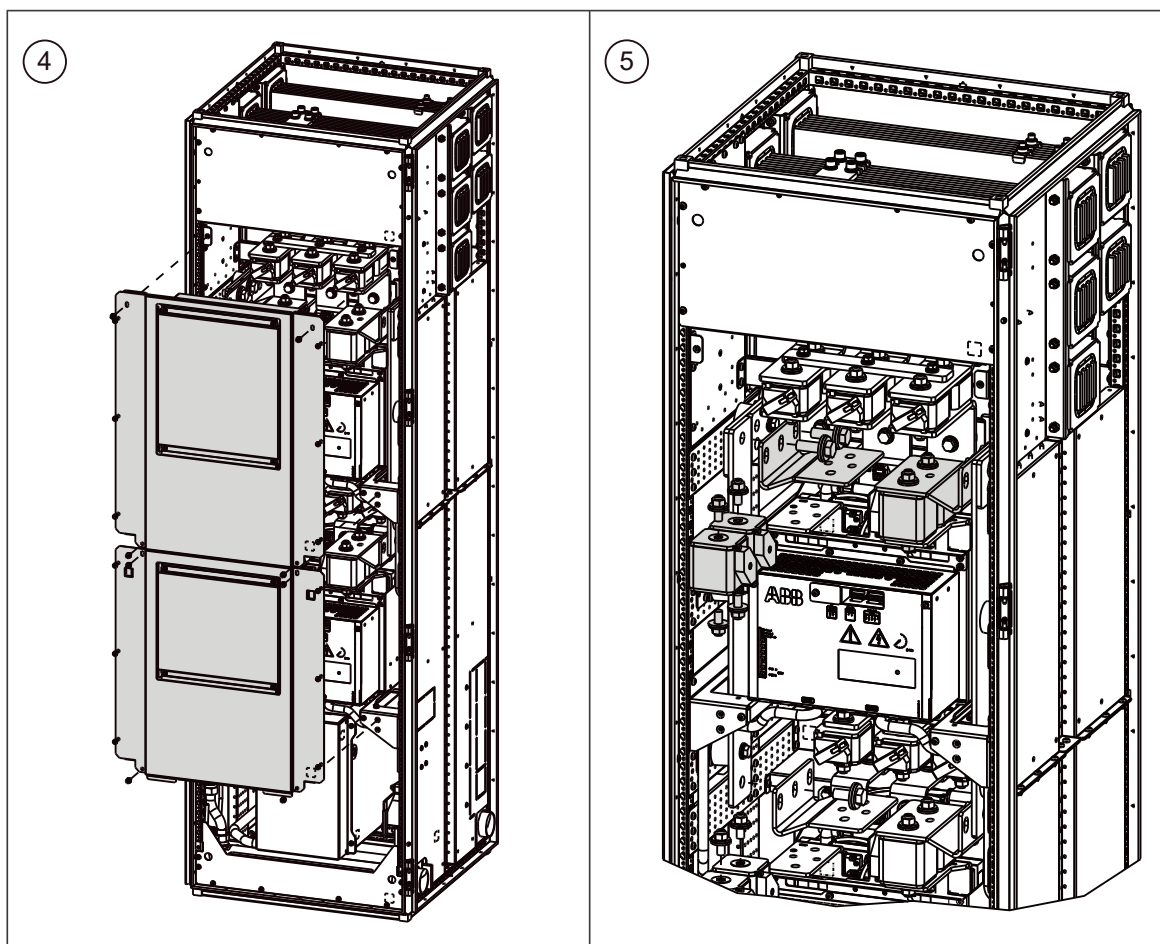
These instructions are for all personnel who do work on the drive.

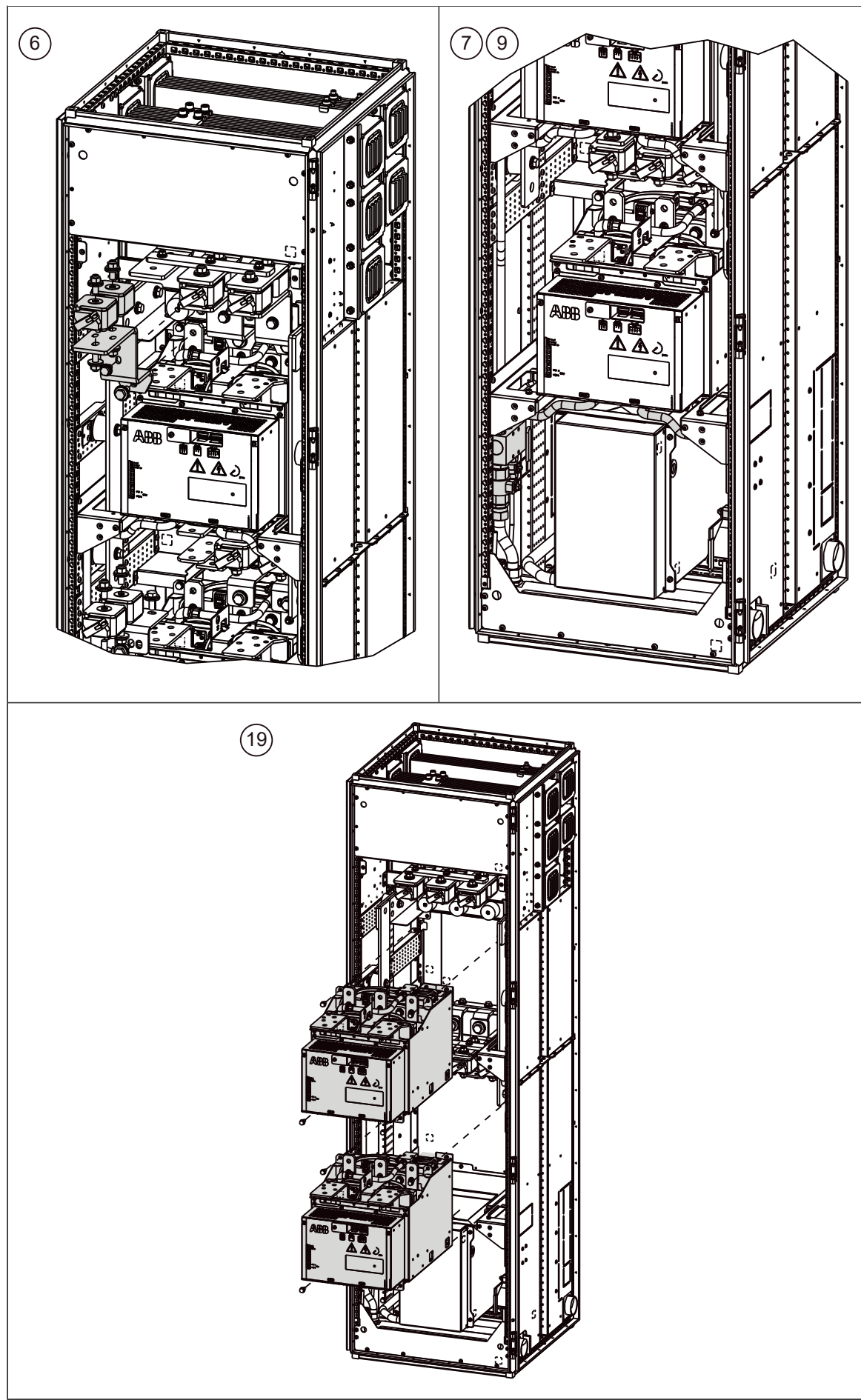
- Keep the drive in its package until you install it. After unpacking, protect the drive from dust, debris and moisture.
- Use the required personal protective equipment: safety shoes with metal toe cap, safety glasses, protective gloves and long sleeves, etc. Some parts have sharp edges.
- Lift a heavy drive with a lifting device. Use the designated lifting points. See the dimension drawings.
- Attach the drive cabinet to the floor to prevent it from toppling over. The cabinet has a high center of gravity. When you pull out heavy components or power modules, there is a risk of overturning. Attach the cabinet also to the wall when necessary.



- 
1. Stop the motors connected to the drive.
  2. Repeat the steps described in section [Electrical safety precautions \(page 66\)](#).
  3. Open the cubicle door.
  4. Remove the shrouds (if any).
  5. Remove the DC fuses. See section [Checking and replacing the DC fuses \(page 90\)](#).
  6. Remove the AC fuses. See section [Checking and replacing the AC fuses \(page 91\)](#).
  7. Close the inlet and outlet stop valves.
  8. Lead the drain hoses into a suitable container. If necessary, extend the hoses. Open the inlet and outlet drain valves. This will drain all modules in the cubicle.
  9. After the cubicle has drained, disconnect the piping from the module.
  10. 2xD8T: If lower module needs to be replaced, remove the cooling fan. See section [Replacing the D8T supply module \(page 93\)](#).
  11. Disconnect the plug connector and fiber optic connectors in front of the module.
  12. Remove the L-shaped busbars (3 pcs above the module).
  13. Remove the module fastening screws (4 pcs).
  14. Install the module lifting device to the cabinet. See *Converter module lifting device for drive cabinets hardware manual (3AXD50000210268 [English])*.
  15. Attach one lifting hook to the front lifting eye of the module and pull the module out 10 centimeters. Keep the chain tight.
-

16. Attach the second lifting hook to the rear lifting eye, and pull the module completely out of the cabinet. Keep the weight constantly on the lifting device.
17. Lower the module on a pallet. Keep the lifting chain attached to the module and attach the module safely to the pallet.
18. Remove the lifting chains from the old module and move the pallet out of the way.
19. Install the new module:
  - a. Attach the lifting hooks to the module, lift the module and place it on the module guide plate. Keep the weight on the lifting device.
  - b. Push the module into cabinet.
  - c. Fasten the module fastening screws.
  - d. Reconnect the coolant pipes to the module.
  - e. Remove the lifting chains
  - f. Reinstall the DC busbars above the module.
  - g. Connect the plug connector and fiber optic connectors.
  - h. Reconnect the coolant pipes to the module.
  - i. Fill up the cooling system. For instructions, see section *Filling up and bleeding the internal cooling circuit (page 144)*.
  - j. Reinstall all shrouds removed earlier.
  - k. Remove the lifting device.





## Control unit

### ■ Replacing the memory unit

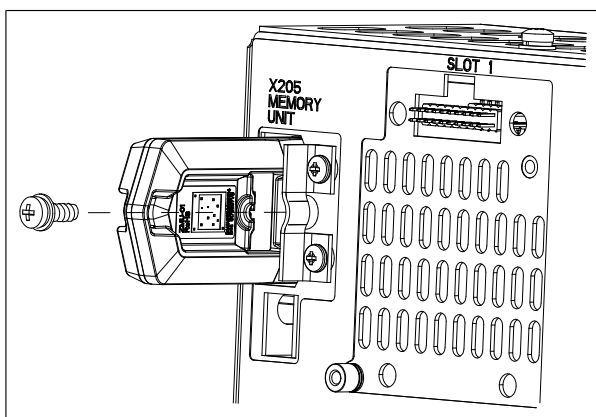
After replacing a control unit, you can keep the existing parameter settings by transferring the memory unit from the defective control unit to the new control unit.

**WARNING!**

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

---

1. Stop the drive and do the steps in section [Electrical safety precautions \(page 66\)](#) 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.

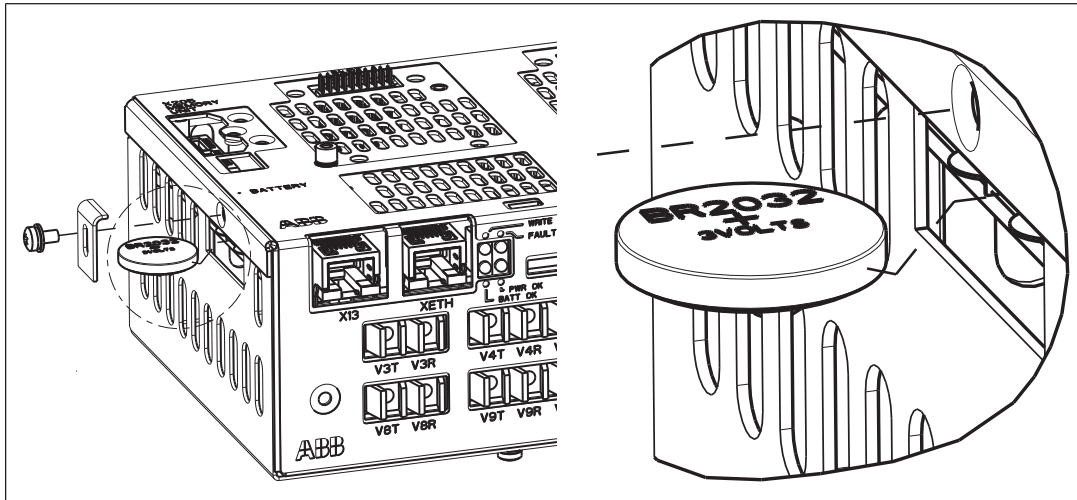


### ■ Replacing the BCU control unit battery

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 \(page 66\)](#) 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.



### ■ LEDs and other status indicators

This section instructs how to interpret the status indications of the diode supply module.

Warnings and faults reported by the control program are displayed on the control panel or in the Drive composer PC tool. For further information, see the firmware manual.

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

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

Supply modules have three LEDs. For their indications, see the following table.

Location	LED	Indication
Diode supply module (frame D8T)	FAULT (continuous red)	There is an active fault in the supply module.
	ENABLE (continuous green)	The supply module is ready for use.
	POWER OK (continuous green)	Supply voltage of the internal circuit boards is OK.

## Functional safety components

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

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

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

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

Contact your local ABB service representative for more information.





# 9

## Ordering information

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### 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
-

- 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.
-

## Diode supply units – 1×D8T, 6-pulse

This section lists the component ordering codes for a diode supply unit which:

- consists of one D8T supply module
- have a 6-pulse connection to AC power line
- is installed in the Rittal VX25 enclosure.

### ■ Diode supply modules – 1×D8T, 6-pulse

The type designations and module power ratings for the module are given in the technical data. The type designation is the ordering code of the module.

Diode supply module type	Frame	Contents
$U_N = 690 \text{ V}$		
ACS880-304LC-0490A-7+A018	D8T	<ul style="list-style-type: none"> <li>• diode supply module with half-controlled diode-thyristor bridge</li> </ul>
ACS880-304LC-0780A-7+A018	D8T	
ACS880-304LC-1060A-7+A018	D8T	

Ordering code format	Option codes
[Module type] + code [+code]... For example, <b>ACS880-304LC-0780A-7+A018</b>	<b>+C132:</b> Marine type approval <b>+C209:</b> Marine product certification (only with option +C132)

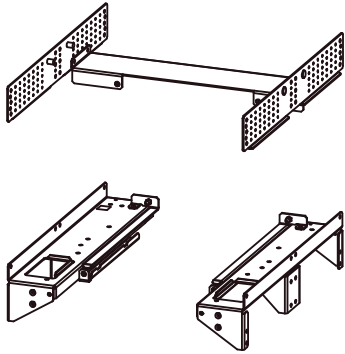
**Note:** The following components are always to be required to construct a working unit out of the modules and you must order them separately:

- Control unit kits. See section [Control unit \(page 126\)](#).
- A pair of fiber optic cables for the communication link between the control unit and each module. See section [Fiber optic cables \(page 127\)](#).

## ■ Mechanical installation accessories – 1×D8T, 6-pulse, Rittal VX25

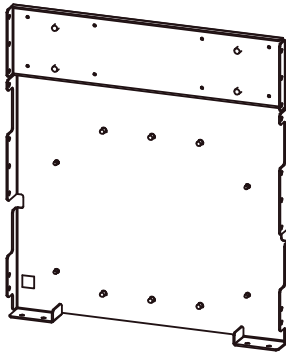
### Module top/bottom guides

This kit contains the frames that support the module at the top and the bottom.

Used with ...	Qty	Ordering code	Kit code	Illustration
600 mm VX25 enclosure	1	3AXD50000609932	L-6-8-316-VX	 <p>Instruction code: 3AXD50000623594</p>

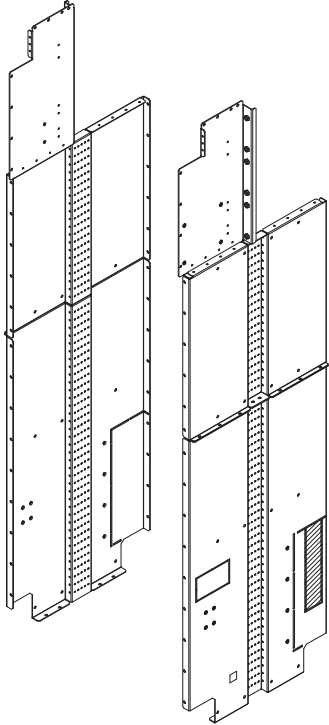
### Rear busbar support kit

This kit contains the rear side support of the VX25 enclosure frame.

Used with ...	Qty	Ordering code	Kit code	Illustration
600 mm VX25 enclosure	1	3AXD50000609963	L-6-8-034-VX	 <p>Instruction code: 3AXD50000626717</p>

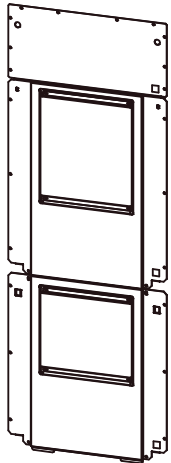
### Side plate kit

These parts attach to the left-hand and right-hand sides of the VX25 enclosure frame and act as a mounting base for the module guides.

Used with ...	Qty	Ordering code	Kit code	Illustration
400/600/800 mm VX25 enclosure	1	3AXD50000426652	L-468-8-314-VX	 <p>Instruction code: 3AXD50000429653</p>

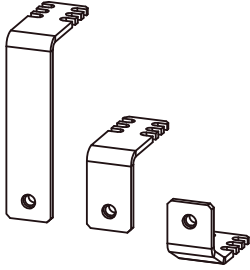
### Shrouds

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

Used with ...	Qty	Ordering code	Kit code	Illustration
600 mm VX25 enclosure	1	3AXD50000610280	L-6-8-350-VX	

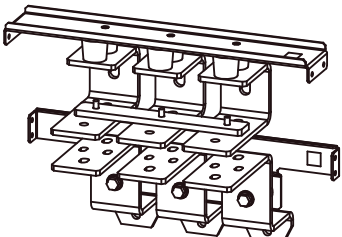
## AC busbars

AC busbars provide connection from the busbars of AC connection kit to the common AC Flat-PLS.

Used with ...	Qty	Ordering code	Kit code	Illustration
600 mm VX25 enclosure	1	3AXD50000610259	L-6-8-111-VX	 <p>Instruction code: 3AXD50000628926</p>

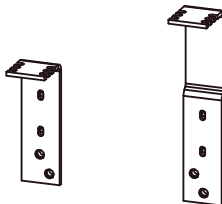
## AC fuse connection

AC fuse connection kit includes busbars for connecting AC fuses to the module.

Used with ...	Qty	Ordering code	Kit code	Illustration
600 mm VX25 enclosure IEC	1	3AXD50000610211	L-6-8-134-VX	

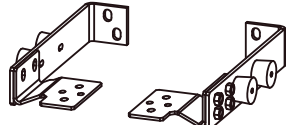
## DC busbars

DC busbars provide connection from the DC fuse connection kit to the common DC bus.

Used with ...	Qty	Ordering code	Kit code	Illustration
600 mm VX25 enclosure	1	3AXD50000609970	L-6-8-210-VX	 <p>Instruction code: 3AXD50000627820</p>

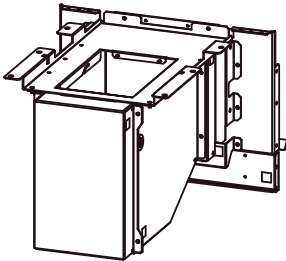
## DC fuse connection

DC fuse connection kit includes busbars for connecting DC fuses to the common DC bus.

Used with ...	Qty	Ordering code	Kit code	Illustration
600 mm VX25 enclosure	1	3AXD50000609994	L-6-8-235-VX	 <p>Instruction code: 3AXD50000627301</p>

## Fan mounting

This kit contains mechanics for the fan mounting.

Used with ...	Qty	Ordering code	Kit code	Illustration
600 mm VX25 enclosure	1	3AXD50000609956	L-6-8-406-VX	

### ■ Other components and tools – 1×D8T, 6-pulse

Component	See section...
Control panel and its door mounting	<a href="#">Control panel (page 125)</a>
Main circuit breaker	<a href="#">Main circuit breakers – 6-pulse (IEC) 230 V (page 130)</a> <a href="#">Main circuit breakers – 6-pulse (IEC) 115 V (page 130)</a>
Fuses	<a href="#">Main AC fuses – 6-pulse (IEC) (page 127)</a> <a href="#">Module DC fuses – 6-pulse (IEC) (page 129)</a>
Cooling components	<a href="#">Coolant distribution manifold kits (page 135)</a> <a href="#">Piping (page 137)</a> <a href="#">Heat exchanger (page 137)</a> <a href="#">Cooling fan (page 138)</a>
Brackets for Flat-PLS busbar holders (Rittal VX25), AC and DC busbars	<a href="#">AC bus installation parts (for Rittal VX25 enclosures) (page 123)</a> <a href="#">DC bus installation parts (for Rittal VX25 enclosures) (page 124)</a>
Lifting device	<a href="#">Lifting device (page 139)</a>



## Diode supply units – 2×D8T, 6-pulse

This section lists the component ordering codes for a diode supply unit which:

- consists of two D8T supply modules
- have a 6-pulse connection to AC power line
- is installed in the Rittal VX25 enclosure.

### ■ Diode supply modules – 2×D8T, 6-pulse

The type designations and module power ratings for the module are given in the technical data. The type designation is the ordering code of the module.

Diode supply module type	Frame	Contents
$U_N = 690 \text{ V}$		
ACS880-304LC-1470A-7+A018	2×D8T	• diode supply modules with half-controlled diode-thyristor bridges
ACS880-304LC-2000A-7+A018	2×D8T	

Ordering code format	Option codes
[Module type] + code [+code]... For example, <b>ACS880-304LC-1470A-7+A018</b>	<b>+C132:</b> Marine type approval <b>+C209:</b> Marine product certification (only with option +C132)

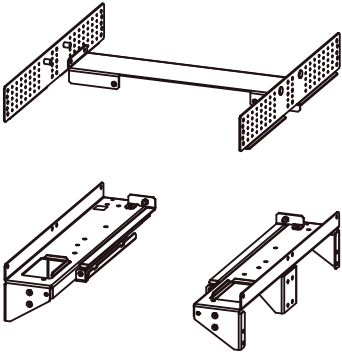
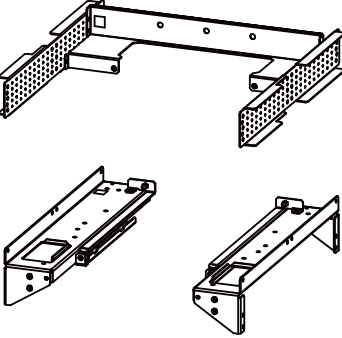
**Note:** The following components are always to be required to construct a working unit out of the modules and you must order them separately:

- Control unit kits. See section [Control unit \(page 126\)](#).
- A pair of fiber optic cables for the communication link between the control unit and each module. See section [Fiber optic cables \(page 127\)](#).

## ■ Mechanical installation accessories – 2×D8T, 6-pulse

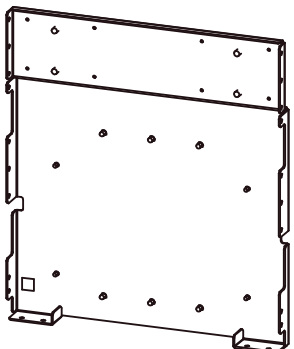
### Module top/bottom guides

This kit contains the frames that support the module at the top and the bottom.

Used with ...	Qty	Ordering code	Kit code	Illustration
600 mm VX25 enclosure	1	3AXD50000609932	L-6-8-316-VX	 <p>Instruction code: 3AXD50000623594</p>
600 mm VX25 enclosure	1	3AXD50000609949	L-6-8-317-VX	 <p>Instruction code: 3AXD50000609949</p>

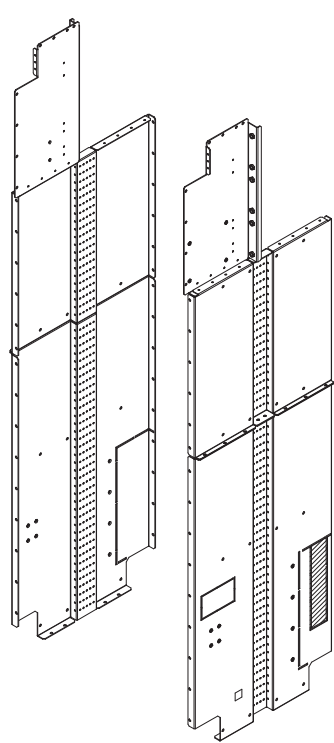
### Rear busbar support kit

This kit contains the rear side support of the VX25 enclosure frame.

Used with ...	Qty	Ordering code	Kit code	Illustration
600 mm VX25 enclosure	1	3AXD50000609963	L-6-8-034-VX	 <p>Instruction code: 3AXD50000626717</p>

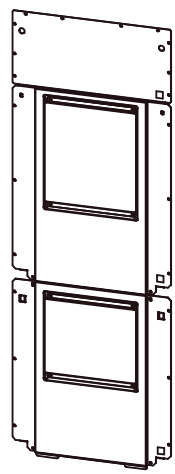
### Side plate kit

These parts attach to the left-hand and right-hand sides of the VX25 enclosure frame and act as a mounting base for the module guides.

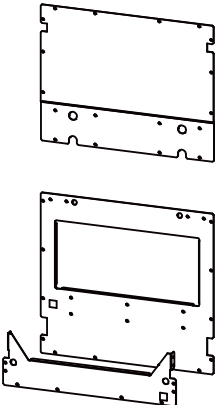
Used with ...	Qty	Ordering code	Kit code	Illustration
400/600/800 mm VX25 enclosure	1	3AXD50000426652	L-468-8-314-VX	 <p>Instruction code: 3AXD50000429653</p>

### Shrouds

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

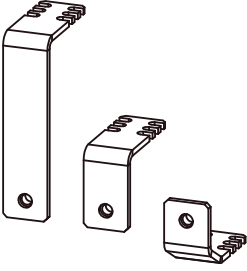
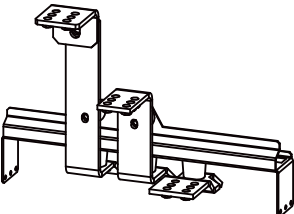
Used with ...	Qty	Ordering code	Kit code	Illustration
600 mm VX25 enclosure	1	3AXD50000610280	L-6-8-350-VX	

## Marine supports

Used with ...	Qty	Ordering code	Kit code	Illustration
600 mm VX25 enclosure	1	3AXD50000610297	L-6-8-501-VX	

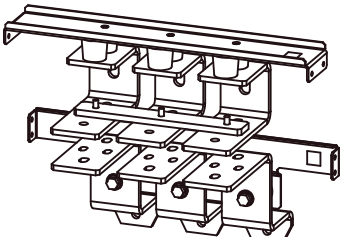
## AC busbars

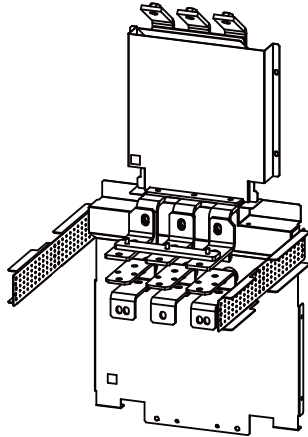
AC busbars provide connection from the busbars of AC fuse connection kit to the common AC Flat-PLS.

Used with ...	Qty	Ordering code	Kit code	Illustration
600 mm VX25 enclosure	1	3AXD50000610259	L-6-8-111-VX	 <p>Instruction code: 3AXD50000628926</p>
600 mm VX25 enclosure	1	3AXD50000610266	L-6-8-112-VX	 <p>Instruction code: 3AXD50000610266</p>

## AC fuse connection

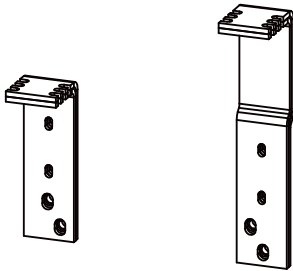
AC fuse connection kit includes busbars for connecting AC fuses to the module.

Used with ...	Qty	Ordering code	Kit code	Illustration
600 mm VX25 enclosure IEC	1	3AXD50000610211	L-6-8-134-VX	

Used with ...	Qty	Ordering code	Kit code	Illustration
600 mm VX25 enclosure IEC	1	3AXD50000610235	L-6-8-136-VX	 <p>Instruction code: 3AXD50000629992</p>

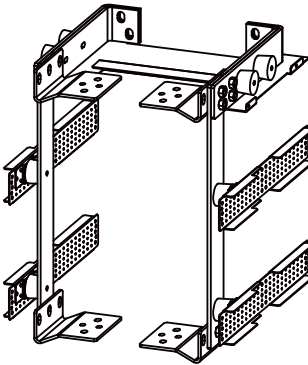
### DC busbars

DC busbars provide connection from the DC fuse connection kit to the common DC bus.

Used with ...	Qty	Ordering code	Kit code	Illustration
600 mm VX25 enclosure	1	3AXD50000609987	L-6-8-211-VX	 <p>Instruction code: 3AXD50000628506</p>

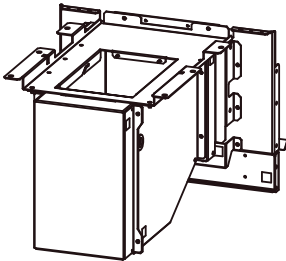
### DC fuse connection

DC fuse connection kit includes busbars for connecting DC fuses to the common DC bus.

Used with ...	Qty	Ordering code	Kit code	Illustration
600 mm VX25 enclosure	1	3AXD50000610006	L-6-8-236-VX	 <p>Instruction code: 3AXD50000628919</p>

## Fan mounting

This kit contains mechanics for the fan mounting.

Used with ...	Qty	Ordering code	Kit code	Illustration
600 mm VX25 enclosure	1	3AXD50000609956	L-6-8-406-VX	

## ■ Other components and tools – 2×D8T, 6-pulse

Component	See section...
Control panel and its door mounting	<a href="#">Control panel (page 125)</a>
Main circuit breaker	<a href="#">Main circuit breakers – 6-pulse (IEC) 230 V (page 130)</a> <a href="#">Main circuit breakers – 6-pulse (IEC) 115 V (page 130)</a>
Fuses	<a href="#">Main AC fuses – 6-pulse (IEC) (page 127)</a> <a href="#">Module DC fuses – 6-pulse (IEC) (page 129)</a>
Cooling components	<a href="#">Coolant distribution manifold kits (page 135)</a> <a href="#">Piping (page 137)</a> <a href="#">Heat exchanger (page 137)</a> <a href="#">Cooling fan (page 138)</a>
Brackets for Flat-PLS busbar holders (Rittal VX25), AC and DC busbars	<a href="#">AC bus installation parts (for Rittal VX25 enclosures) (page 123)</a> <a href="#">DC bus installation parts (for Rittal VX25 enclosures) (page 124)</a>
Lifting device	<a href="#">Lifting device (page 139)</a>

## Diode supply units – 2×D8T, 12-pulse

This section lists the component ordering codes for a diode supply unit which:

- consists of two D8T supply modules
- have a 12-pulse connection to AC power line
- is installed in the Rittal VX25 enclosure.

### ■ Diode supply modules – 2×D8T, 12-pulse

The type designations and module power ratings for the module are given in the technical data. The type designation is the ordering code of the module.

Diode supply module type	Frame	Contents
$U_N = 690 \text{ V}$		
ACS880-304LC-0920A-7+A018	2×D8T	<ul style="list-style-type: none"> <li>• diode supply modules with half-controlled diode-thyristor bridges</li> </ul>
ACS880-304LC-1470A-7+A018	2×D8T	
ACS880-304LC-2000A-7+A018	2×D8T	

Ordering code format	Option codes
[Module type] + code [+code]... For example, <b>ACS880-304LC-1470A-7+A018</b>	<b>+C132:</b> Marine type approval <b>+C209:</b> Marine product certification (only with option +C132)

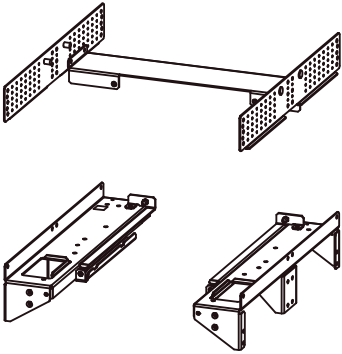
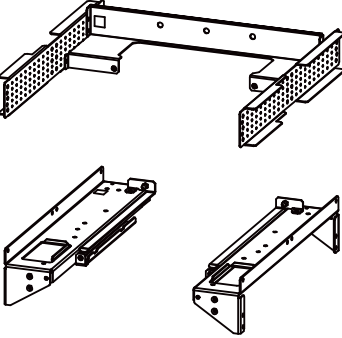
**Note:** The following components are always to be required to construct a working unit out of the modules and you must order them separately:

- Control unit kits. See section [Control unit \(page 126\)](#).
- A pair of fiber optic cables for the communication link between the control unit and each module. See section [Fiber optic cables \(page 127\)](#).

## ■ Mechanical installation accessories – 2×D8T, 12-pulse

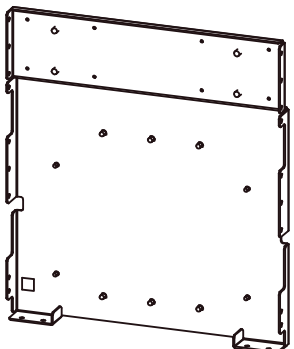
### Module top/bottom guides

This kit contains the frames that support the module at the top and the bottom.

Used with ...	Qty	Ordering code	Kit code	Illustration
600 mm VX25 enclosure	1	3AXD50000609932	L-6-8-316-VX	 <p>Instruction code: 3AXD50000623594</p>
600 mm VX25 enclosure	1	3AXD50000609949	L-6-8-317-VX	 <p>Instruction code: 3AXD50000609949</p>

### Rear busbar support kit

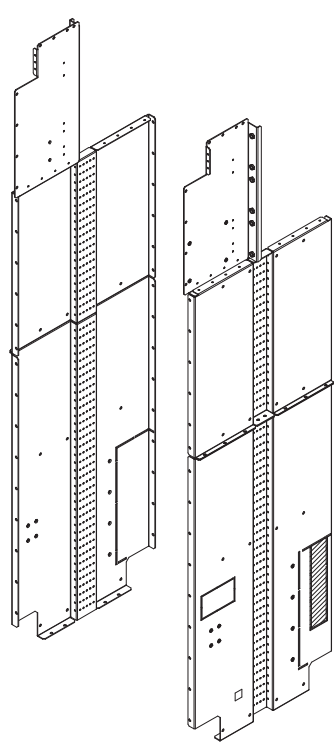
This kit contains the rear side support of the VX25 enclosure frame.

Used with ...	Qty	Ordering code	Kit code	Illustration
600 mm VX25 enclosure	1	3AXD50000609963	L-6-8-034-VX	 <p>Instruction code: 3AXD50000626717</p>



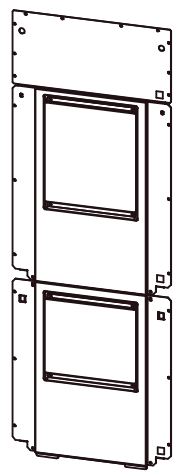
### Side plate kit

These parts attach to the left-hand and right-hand sides of the VX25 enclosure frame and act as a mounting base for the module guides.

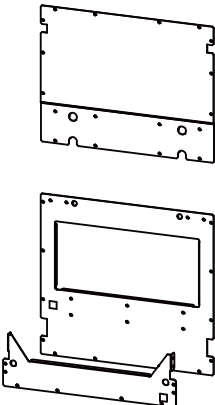
Used with ...	Qty	Ordering code	Kit code	Illustration
400/600/800 mm VX25 enclosure	1	3AXD50000426652	L-468-8-314-VX	 <p>Instruction code: 3AXD50000429653</p>

### Shrouds

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

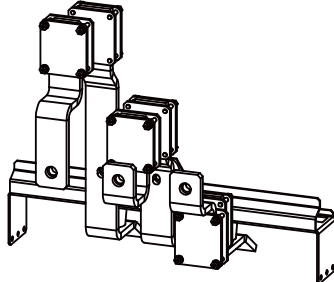
Used with ...	Qty	Ordering code	Kit code	Illustration
600 mm VX25 enclosure	1	3AXD50000610280	L-6-8-350-VX	

## Marine supports

Used with ...	Qty	Ordering code	Kit code	Illustration
600 mm VX25 enclosure	1	3AXD50000610297	L-6-8-501-VX	

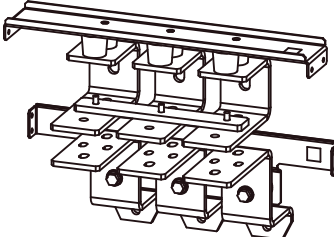
## AC busbars

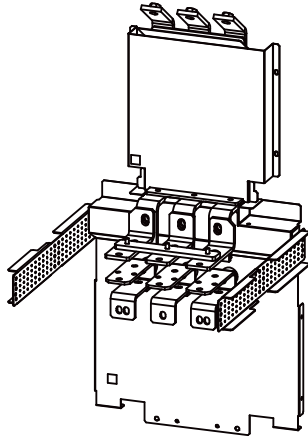
AC busbars provide connection from the busbars of AC fuse connection kit to the common AC Flat-PLS.

Used with ...	Qty	Ordering code	Kit code	Illustration
600 mm VX25 enclosure	1	3AXD50000610273	L-6-8-113-VX	

## AC fuse connection

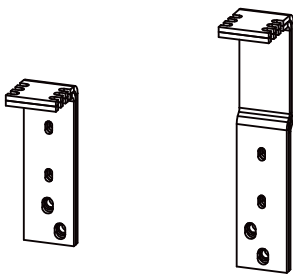
AC fuse connection kit includes busbars for connecting AC fuses to the module.

Used with ...	Qty	Ordering code	Kit code	Illustration
600 mm VX25 enclosure IEC	1	3AXD50000610211	L-6-8-134-VX	

Used with ...	Qty	Ordering code	Kit code	Illustration
600 mm VX25 enclosure IEC	1	3AXD50000610235	L-6-8-136-VX	 <p>Instruction code: 3AXD50000629992</p>

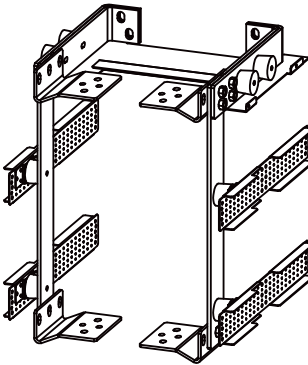
### DC busbars

DC busbars provide connection from the DC fuse connection kit to the common DC bus.

Used with ...	Qty	Ordering code	Kit code	Illustration
600 mm VX25 enclosure	1	3AXD50000609987	L-6-8-211-VX	 <p>Instruction code: 3AXD50000628506</p>

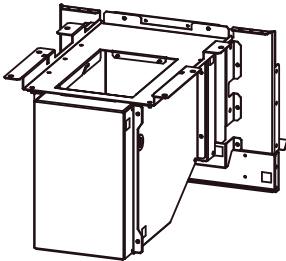
### DC fuse connection

DC fuse connection kit includes busbars for connecting DC fuses to the common DC bus.

Used with ...	Qty	Ordering code	Kit code	Illustration
600 mm VX25 enclosure	1	3AXD50000610006	L-6-8-236-VX	 <p>Instruction code: 3AXD50000628919</p>

## Fan mounting

This kit contains mechanics for the fan mounting.

Used with ...	Qty	Ordering code	Kit code	Illustration
600 mm VX25 enclosure	1	3AXD50000609956	L-6-8-406-VX	

## ■ Other components and tools – 2×D8T, 12-pulse

Component	See section...
Control panel and its door mounting	<a href="#">Control panel (page 125)</a>
Main circuit breaker	<a href="#">Main circuit breakers – 12-pulse (IEC) 230 V (page 131)</a> <a href="#">Main circuit breakers – 12-pulse (IEC) 115 V (page 131)</a>
Fuses	<a href="#">Main AC fuses – 12-pulse (IEC) (page 127)</a> <a href="#">Module DC fuses – 12-pulse (IEC) (page 129)</a>
Cooling components	<a href="#">Coolant distribution manifold kits (page 135)</a> <a href="#">Piping (page 137)</a> <a href="#">Heat exchanger (page 137)</a> <a href="#">Cooling fan (page 138)</a>
Brackets for Flat-PLS busbar holders (Rittal VX25), AC and DC busbars	<a href="#">AC bus installation parts (for Rittal VX25 enclosures) (page 123)</a> <a href="#">DC bus installation parts (for Rittal VX25 enclosures) (page 124)</a>
Lifting device	<a href="#">Lifting device (page 139)</a>

## Diode supply units – 3×D8T and 4×D8T, 6-pulse

This section lists the component ordering codes for a diode supply unit which:

- consists of multiple D8T supply modules
- have a 6-pulse connection to AC power line
- is installed in the Rittal VX25 enclosure.

### ■ Diode supply modules – 3×D8T and 4×D8T, 6-pulse

The type designations and module power ratings for the module are given in the technical data. The type designation is the ordering code of the module.

Diode supply module type	Frame	Contents
$U_N = 690\text{ V}$		
ACS880-304LC-3000A-7+A018	3×D8T	• diode supply modules with half-controlled diode-thyristor bridges
ACS880-304LC-4000A-7+A018	4×D8T	

Ordering code format	Option codes
[Module type] + code [+code]... For example, <b>ACS880-304LC-4000A-7+A018</b>	<b>+C132:</b> Marine type approval <b>+C209:</b> Marine product certification (only with option +C132)

**Note:** The following components are always to be required to construct a working unit out of the modules and you must order them separately:

- Control unit kits. See section [Control unit \(page 126\)](#).
- A pair of fiber optic cables for the communication link between the control unit and each module. See section [Fiber optic cables \(page 127\)](#).

### ■ Mechanical installation accessories – 3×D8T and 4×D8T, 6-pulse

For the mechanical installation accessories, see:

- [Mechanical installation accessories – 1×D8T, 6-pulse, Rittal VX25 \(page 105\)](#)
- [Mechanical installation accessories – 2×D8T, 6-pulse \(page 110\)](#)

### ■ Other components and tools – 3×D8T and 4×D8T, 6-pulse

Component	See section...
Control panel and its door mounting	<a href="#">Control panel (page 125)</a>
Main circuit breaker	<a href="#">Main circuit breakers – 6-pulse (IEC) 230 V (page 130)</a> <a href="#">Main circuit breakers – 6-pulse (IEC) 115 V (page 130)</a>
Fuses	<a href="#">Main AC fuses – 6-pulse (IEC) (page 127)</a> <a href="#">Module DC fuses – 6-pulse (IEC) (page 129)</a>

Component	See section...
Cooling components	<a href="#">Coolant distribution manifold kits (page 135)</a> <a href="#">Piping (page 137)</a> <a href="#">Heat exchanger (page 137)</a> <a href="#">Cooling fan (page 138)</a>
Brackets for Flat-PLS busbar holders (Rittal VX25), AC and DC busbars	<a href="#">AC bus installation parts (for Rittal VX25 enclosures) (page 123)</a> <a href="#">DC bus installation parts (for Rittal VX25 enclosures) (page 124)</a>
Lifting device	<a href="#">Lifting device (page 139)</a>

## Diode supply units – 4×D8T, 12-pulse

This section lists the component ordering codes for a diode supply unit which:

- consists of multiple D8T supply modules
- have a 6-pulse connection to AC power line
- is installed in the Rittal VX25 enclosure.

### ■ Diode supply modules – 4×D8T, 12-pulse

The type designations and module power ratings for the module are given in the technical data. The type designation is the ordering code of the module.

Diode supply module type	Frame	Contents
$U_N = 690 \text{ V}$		
ACS880-304LC-2940A-7+A018	4×D8T	<ul style="list-style-type: none"> <li>• diode supply modules with half-controlled diode-thyristor bridges</li> </ul>
ACS880-304LC-4000A-7+A018	4×D8T	

Ordering code format	Option codes
[Module type] + code [+code]... For example, <b>ACS880-304LC-4000A-7+A018</b>	<b>+C132:</b> Marine type approval <b>+C209:</b> Marine product certification (only with option +C132)

**Note:** The following components are always to be required to construct a working unit out of the modules and you must order them separately:

- Control unit kits. See section [Control unit \(page 126\)](#).
- A pair of fiber optic cables for the communication link between the control unit and each module. See section [Fiber optic cables \(page 127\)](#).

### ■ Mechanical installation accessories – 4×D8T, 12-pulse

For the mechanical installation accessories, see [Mechanical installation accessories – 2×D8T, 12-pulse \(page 116\)](#).

## ■ Other components and tools – 4×D8T, 12-pulse

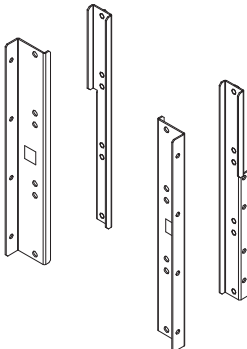
Component	See section...
Control panel and its door mounting	<a href="#">Control panel (page 125)</a>
Main circuit breaker	<a href="#">Main circuit breakers – 12-pulse (IEC) 230 V (page 131)</a> <a href="#">Main circuit breakers – 12-pulse (IEC) 115 V (page 131)</a>
Fuses	<a href="#">Main AC fuses – 12-pulse (IEC) (page 127)</a> <a href="#">Module DC fuses – 12-pulse (IEC) (page 129)</a>
Cooling components	<a href="#">Coolant distribution manifold kits (page 135)</a> <a href="#">Piping (page 137)</a> <a href="#">Heat exchanger (page 137)</a> <a href="#">Cooling fan (page 138)</a>
Brackets for Flat-PLS busbar holders (Rittal VX25), AC and DC busbars	<a href="#">AC bus installation parts (for Rittal VX25 enclosures) (page 123)</a> <a href="#">DC bus installation parts (for Rittal VX25 enclosures) (page 124)</a>
Lifting device	<a href="#">Lifting device (page 139)</a>

## Brackets for Rittal Flat-PLS busbar holder

### ■ AC bus installation parts (for Rittal VX25 enclosures)

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

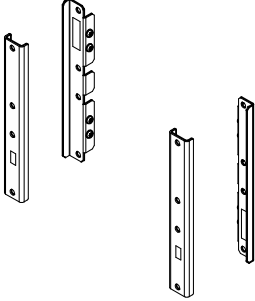
The designs shown in this manual for Rittal VX25 enclosures use the Rittal Flat-PLS busbar system. Make sure that the current in the drive system does not exceed the current-carrying capacity of the busbars.

Used with ...	Qty	Ordering code	Kit code	Illustration
400/600/800 mm VX25 enclosure	1 kit per cu- bicle	3AXD50000371013	L-468-X-012-VX	 <p>Instruction code: 3AXD50000370870</p>

### ■ DC bus installation parts (for Rittal VX25 enclosures)

The brackets 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.

The designs shown in this manual for Rittal VX25 enclosures use the Rittal Flat-PLS busbar system. Make sure that the current in the drive system does not exceed the current-carrying capacity of the busbars.


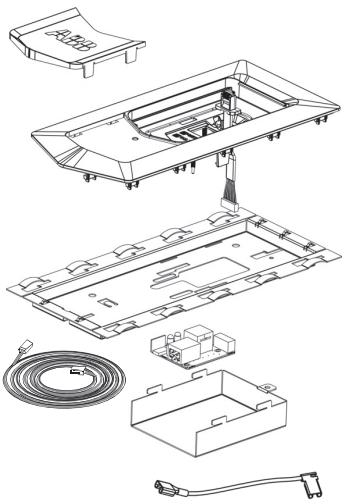
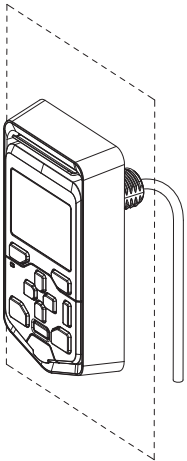
Used with ...	Qty	Ordering code	Kit code	Illustration
VX25 enclosure	1 kit per cubicle	3AXD50000333387	A-468-X-001-VX	 <p>Instruction code: 3AXD50000333639</p>



## 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 *ACX-AP-x 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* ([3AJA0000100140](#) [English])
- *DPMP-02/03 mounting platform for control panels installations guide* ([3AJA0000136205](#) [English]).

## Control electronics

### ■ Control unit

You must equip each supply unit with one control unit (and memory unit) which controls all parallel supply modules.

The control unit kit does not contain any cables but you need to acquire them separately. You must connect the control unit to each supply module with a pair of fiber optic cables. See section [Fiber optic cables \(page 127\)](#).

Supply module	Size	Control unit	Qty	Ordering code
$U_N = 690\text{ V}$				
6-pulse				
ACS880-304LC-0490A-7+A018	D8T	BCU-02 kit for DxT	1	3AXD50000006338
ACS880-304LC-0780A-7+A018				
ACS880-304LC-1060A-7+A018				
ACS880-304LC-1470A-7+A018	2×D8T	BCU-02 kit for DxT	1	3AXD50000006338
ACS880-304LC-2000A-7+A018				
ACS880-304LC-3000A-7+A018	3×D8T	BCU-12 kit for DxT	1	3AXD50000006351
ACS880-304LC-4000A-7+A018	4×D8T	BCU-12 kit for DxT	1	3AXD50000006351
12-pulse				
ACS880-304LC-0920A-7+A018	2×D8T	BCU-02 kit for DxT	1	3AXD50000006338
ACS880-304LC-1470A-7+A018				
ACS880-304LC-2000A-7+A018				
ACS880-304LC-2940A-7+A018	4×D8T	BCU-12 kit for DxT	1	3AXD50000006351
ACS880-304LC-4000A-7+A018				

**Note:** Fiber optic communication with another control unit (such as that of the supply unit) requires RDCO-0x DDCS communication module. For more information, see *RDCO-0x DDCS communication option modules user's manual* (3AFE64492209 [English]).

### ■ Fiber optic cables

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	NLWC-02	58988821
3 m	NLWC-03	58948233
5 m	NLWC-05	58948250
7 m	NLWC-07	58948268
10 m	NLWC-10	58948276

## AC fuses

### ■ Main AC fuses – 6-pulse (IEC)

Supply unit ACS880-304LC-...	Frame size	Type (Bussmann)	Data	Qty	Ordering code
0490A	D8T	170M6413	900 A, 690 V	3	3AXD50000000148
0780A	D8T	170M6416	1250 A, 690 V	3	68244463
1060A	D8T	170M6413	900 A, 690 V	6	3AXD50000000148
1470A	2×D8T	170M6416	1250 A, 690 V	6	68244463
2000A	2×D8T	170M6413	900 A, 690 V	12	3AXD50000000148
3000A	3×D8T	170M6413	900 A, 690 V	18	3AXD50000000148
4000A	4×D8T	170M6413	900 A, 690 V	24	3AXD50000000148

### ■ Main AC fuses – 6-pulse (UL)

Supply unit ACS880-304LC-...	Frame size	Type (Bussmann)	Data	Qty	Ordering code
0490A	D8T	170M6413	900 A, 690 V	3	3AXD50000000148
0780A	D8T	170M6416	1250 A, 690 V	3	68244463
1060A	D8T	170M6904	1800 A, 660 V	3	3AXD50000615735
1470A	2×D8T	170M6416	1250 A, 690 V	6	68244463
2000A	2×D8T	170M6904	1800 A, 660 V	6	3AXD50000615735
3000A	3×D8T	170M6904	1800 A, 660 V	9	3AXD50000615735
4000A	4×D8T	170M6904	1800 A, 660 V	12	3AXD50000615735

### ■ Main AC fuses – 12-pulse (IEC)

Supply unit ACS880-304LC-...	Frame size	Type (Bussmann)	Data	Qty	Ordering code
0920A	2×D8T	170M6413	900 A, 690 V	6	3AXD50000000148

Supply unit ACS880-304LC-...	Frame size	Type (Bussmann)	Data	Qty	Ordering code
1470A	2×D8T	170M6416	1250 A, 690 V	6	68244463
2000A	2×D8T	170M6413	900 A, 690 V	12	3AXD50000000148
2940A	4×D8T	170M6416	1250 A, 690 V	12	68244463
4000A	4×D8T	170M6413	900 A, 690 V	24	3AXD50000000148

### ■ Main AC fuses – 12-pulse (UL)

Supply unit ACS880-304LC-...	Frame size	Type (Bussmann)	Data	Qty	Ordering code
0920A	2×D8T	170M6413	900 A, 690 V	6	3AXD50000000148
1470A	2×D8T	170M6416	1250 A, 690 V	6	68244463
2000A	2×D8T	170M6904	1800 A, 660 V	6	3AXD50000615735
2940A	4×D8T	170M6416	1250 A, 690 V	12	68244463
4000A	4×D8T	170M6904	1800 A, 660 V	12	3AXD50000615735

## DC fuses

### ■ Module DC fuses – 6-pulse (IEC)

Supply unit ACS880-304LC-...	Frame size	Type (Bussmann)	Data	Qty	Ordering code
0490A	D8T	170M6549	1100 A, 1000 V	2	68736021
0780A	D8T	170M6546	800 A, 1250 V	4	63919128
1060A	D8T	170M6549	1100 A, 1000 V	4	68736021
1470A	2×D8T	170M6546	800 A, 1250 V	8	63919128
2000A	2×D8T	170M6549	1100 A, 1000 V	8	68736021
3000A	3×D8T	170M6549	1100 A, 1000 V	12	68736021
4000A	4×D8T	170M6549	1100 A, 1000 V	16	68736021

### ■ Module DC fuses – 6-pulse (UL)

Supply unit ACS880-304LC-...	Frame size	Type (Bussmann)	Data	Qty	Ordering code
0490A	D8T	170M6549	1100 A, 1000 V	2	68736021
0780A	D8T	170M6792	1600 A, 1250 V	2	3AXD50000568253
1060A	D8T	170M6827	2200 A, 1250 V	2	3AXD50000568284
1470A	2×D8T	170M6792	1600 A, 1250 V	4	3AXD50000568253
2000A	2×D8T	170M6827	2200 A, 1250 V	4	3AXD50000568284
3000A	3×D8T	170M6827	2200 A, 1250 V	6	3AXD50000568284
4000A	4×D8T	170M6827	2200 A, 1250 V	8	3AXD50000568284

### ■ Module DC fuses – 12-pulse (IEC)

Supply unit ACS880-304LC-...-7+A004+A018	Frame size	Type (Bussmann)	Data	Qty	Ordering code
0920A	2×D8T	170M6549	1100 A, 1000 V	4	68736021
1470A	2×D8T	170M6546	800 A, 1250 V	8	63919128
2000A	2×D8T	170M6549	1100 A, 1000 V	8	68736021
2940A	4×D8T	170M6546	800 A, 1250 V	16	63919128
4000A	4×D8T	170M6549	1100 A, 1000 V	16	68736021

### ■ Module DC fuses – 12-pulse (UL)

Supply unit ACS880-304LC-...-7+A004+A018	Frame size	Type (Bussmann)	Data	Qty	Ordering code
0920A	2×D8T	170M6549	1100 A, 1000 V	4	68736021
1470A	2×D8T	170M6792	1600 A, 1250 V	4	3AXD50000568253
2000A	2×D8T	170M6827	2200 A, 1250 V	4	3AXD50000568284
2940A	4×D8T	170M6792	1600 A, 1250 V	8	3AXD50000568253
4000A	4×D8T	170M6904	1800 A, 660 V	12	3AXD50000615735

## Main circuit breakers

You can use the main circuit breakers below for the on-off control of the AC input power. The breakers can make and break the full load current and also break a fault current. When installed in a wagon, the breakers are withdrawable and operate as main disconnecting device for the supply unit. (You must equip the electric supply of a machinery with a main disconnecting device (IEC/EN 60204-1).)

For illustrations and dimensions, see manufacturers data sheet in the Internet.

### ■ Main circuit breakers – 6-pulse (IEC) 230 V

Supply unit ACS880- 304LC-...	Frame size	Type	Data	Qty	Ordering code
0490A	D8T	E2.2S-A 800	800 A, 690 V, 3P, 65 kA	1	3AXD50000426522
0780A	D8T	E2.2S-A 1200	1200 A, 690 V, 3P, 65 kA	1	3AXD50000048328
1060A	D8T	E2.2S-A 1600	1600 A, 690 V, 3P, 65 kA	1	3AXD50000048327
1470A	2×D8T	E2.2S-A 2000	2000 A, 690 V, 3P, 65 kA	1	3AXD50000048330
2000A	2×D8T	E4.2S-A 2500	2500 A, 690 V, 3P, 65 kA	1	3AXD50000048343
3000A	3×D8T	E4.2V 4000	4000 A, 690 V, 3P, 100 kA	1	3AXD50000189571
4000A	4×D8T	E4.2S 3200	3200 A, 690 V, 3P, 65 kA	2	3AXD50000048346

### ■ Main circuit breakers – 6-pulse (UL) 230 V

Supply unit ACS880- 304LC-...	Frame size	Type	Data	Qty	Ordering code
0490A	D8T	E4.2V-A 800	800 A, 690 V, 3P, 100 kA	1	3AXD50000826018
0780A	D8T	E4.2V-A 1600	1600 A, 690 V, 3P, 100 kA	1	3AXD50000826025
1060A	D8T	E4.2V-A 1600	1600 A, 690 V, 3P, 100 kA	1	3AXD50000826025
1470A	2×D8T	E4.2V-A 2000	2000 A, 690 V, 3P, 100 kA	1	3AXD50000828128
2000A	2×D8T	E4.2V-A 2500	2500 A, 690 V, 3P, 100 kA	1	3AXD50000826049
3000A	3×D8T	E4.2V-A 2000	2000 A, 690 V, 3P, 100 kA	2	3AXD50000828128
4000A	4×D8T	E4.2V-A 2500	2500 A, 690 V, 3P, 100 kA	2	3AXD50000826049

### ■ Main circuit breakers – 6-pulse (IEC) 115 V

Supply unit ACS880- 304LC-...	Frame size	Type designation		Qty	Ordering code
0490A	D8T	E2.2S-A 800	800 A, 690 V, 3P, 65 kA	1	3AXD50000445936
0780A	D8T	E2.2S-A 1200	1200 A, 690 V, 3P, 65 kA	1	3AXD50000048351
1060A	D8T	E2.2S-A 1600	1600 A, 690 V, 3P, 65 kA	1	3AXD50000048329
1470A	2×D8T	E2.2S-A 2000	2000 A, 690 V, 3P, 65 kA	1	3AXD50000048342
2000A	2×D8T	E4.2S-A 2500	2500 A, 690 V, 3P, 65 kA	1	3AXD50000048345
3000A	3×D8T	E4.2V 4000	4000 A, 690 V, 3P, 100 kA	1	3AXD50000231980
4000A	4×D8T	E4.2S 3200	3200 A, 690 V, 3P, 65 kA	2	3AXD50000048341

### ■ Main circuit breakers – 6-pulse (UL) 115 V

Supply unit ACS880- 304LC-...	Frame size	Type designation		Qty	Ordering code
0490A	D8T	E4.2V-A 800	800 A, 690 V, 3P, 100 kA	1	3AXD50000826148
0780A	D8T	E4.2V-A 1600	1600 A, 690 V, 3P, 100 kA	1	3AXD50000826155
1060A	D8T	E4.2V-A 1600	1600 A, 690 V, 3P, 100 kA	1	3AXD50000826155
1470A	2×D8T	E4.2V-A 2000	2000 A, 690 V, 3P, 100 kA	1	3AXD50000826162
2000A	2×D8T	E4.2V-A 2500	2500 A, 690 V, 3P, 100 kA	1	3AXD50000826179
3000A	3×D8T	E4.2V-A 2000	2000 A, 690 V, 3P, 100 kA	2	3AXD50000826162
4000A	4×D8T	E4.2V-A 2500	2500 A, 690 V, 3P, 100 kA	2	3AXD50000826179

### ■ Main circuit breakers – 12-pulse (IEC) 230 V

Supply unit ACS880- 304LC-...	Frame size	Type designation	Technical data	Qty	Ordering code
0920A	2×D8T	E2.2S-A 800	800 A, 690 V, 3P, 65 kA	2	3AXD50000426522
1470A	2×D8T	E2.2S-A 1200	1200 A, 690 V, 3P, 65 kA	2	3AXD50000048328
2000A	2×D8T	E2.2S-A 1600	1600 A, 690 V, 3P, 65 kA	2	3AXD50000048327
2940A	4×D8T	E2.2S-A 2000	2000 A, 690 V, 3P, 65 kA	2	3AXD50000048330
4000A	4×D8T	E4.2S 3200	3200 A, 690 V, 3P, 65 kA	2	3AXD50000048341

### ■ Main circuit breakers – 12-pulse (UL) 230 V

Supply unit ACS880- 304LC-...	Frame size	Type designation	Technical data	Qty	Ordering code
0920A	2×D8T	E4.2V-A 800	800 A, 690 V, 3P, 100 kA	2	3AXD50000826018
1470A	2×D8T	E4.2V-A 1600	1600 A, 690 V, 3P, 100 kA	2	3AXD50000826025
2000A	2×D8T	E4.2V-A 1600	1600 A, 690 V, 3P, 100 kA	2	3AXD50000826025
2940A	4×D8T	E4.2V-A 2000	2000 A, 690 V, 3P, 100 kA	2	3AXD50000828128
4000A	4×D8T	E4.2V-A 2500	2500 A, 690 V, 3P, 100 kA	2	3AXD50000826049

### ■ Main circuit breakers – 12-pulse (IEC) 115 V

Supply unit ACS880- 304LC-...	Frame size	Type designation	Technical data	Qty	Ordering code
0920A	2×D8T	E2.2S-A 800	800 A, 690 V, 3P, 65 kA	2	3AXD50000445936
1470A	2×D8T	E2.2S-A 1200	1200 A, 690 V, 3P, 65 kA	2	3AXD50000048351
2000A	2×D8T	E2.2S-A 1600	1600 A, 690 V, 3P, 65 kA	2	3AXD50000048329
2940A	4×D8T	E2.2S-A 2000	2000 A, 690 V, 3P, 65 kA	2	3AXD50000048342
4000A	4×D8T	E4.2S 3200	3200 A, 690 V, 3P, 65 kA	2	3AXD50000048341

### ■ Main circuit breakers – 12-pulse (UL) 115 V

Supply unit ACS880- 304LC-...	Frame size	Type designation	Technical data	Qty	Ordering code
0920A	2×D8T	E4.2V-A 800	800 A, 690 V, 3P, 100 kA	2	3AXD50000826148
1470A	2×D8T	E4.2V-A 1600	1600 A, 690 V, 3P, 100 kA	2	3AXD50000826155
2000A	2×D8T	E4.2V-A 1600	1600 A, 690 V, 3P, 100 kA	2	3AXD50000826155
2940A	4×D8T	E4.2V-A 2000	2000 A, 690 V, 3P, 100 kA	2	3AXD50000826162
4000A	4×D8T	E4.2V-A 2500	2500 A, 690 V, 3P, 100 kA	2	3AXD50000826179

### ■ Main circuit breaker wagons – 6-pulse (IEC)

Supply unit ACS880- 304LC-...	Frame size	Type	Qty	Ordering code
0490A	D8T	E2.2-A_W_FP_2000HR-HR_UL,IEC,CCC AUXCONT	1	3AXD50000048354
0780A	D8T	E2.2-A_W_FP_2000HR-HR_UL,IEC,CCC AUXCONT	1	3AXD50000048354
1060A	D8T	E2.2-A_W_FP_2000HR-HR_UL,IEC,CCC AUXCONT	1	3AXD50000048354
1470A	2×D8T	E2.2-A_W_FP_2000HR-HR_UL,IEC,CCC AUXCONT	1	3AXD50000048354
2000A	2×D8T	E4.2-A_W_FP_2500HR-HR_UL,IEC,CCC AUXCONT	1	3AXD50000039281
3000A	3×D8T	E4.2 W FP 4000 V HR HR+AUXCONT	1	3AXD50000189588
4000A	4×D8T	E4.2_W_FP_3200_HR-HR_IEC AUXCONT	2	3AXD50000048356

### ■ Main circuit breaker wagons – 6-pulse (UL)

Supply unit ACS880- 304LC-...	Frame size	Type	Qty	Ordering code
0490A	D8T	E4.2-A_W_2500-HR_UL,IEC,CCC AUXCONT	1	3AXD50000039281
0780A	D8T	E4.2-A_W_2500-HR_UL,IEC,CCC AUXCONT	1	3AXD50000039281
1060A	D8T	E4.2-A_W_2500-HR_UL,IEC,CCC AUXCONT	1	3AXD50000039281
1470A	2×D8T	E4.2-A_W_2500-HR_UL,IEC,CCC AUXCONT	1	3AXD50000039281
2000A	2×D8T	E4.2-A_W_2500-HR_UL,IEC,CCC AUXCONT	1	3AXD50000039281
3000A	3×D8T	E4.2-A_W_2500-HR_UL,IEC,CCC AUXCONT	2	3AXD50000039281
4000A	4×D8T	E4.2-A_W_2500-HR_UL,IEC,CCC AUXCONT	2	3AXD50000039281

### ■ Main circuit breaker wagons – 12-pulse (IEC)

Supply unit ACS880- 304LC-...	Frame size	Type designation	Qty	Ordering code
0920A	2×D8T	E2.2-A_W_FP_2000HR-HR_UL,IEC,CCC AUXCONT	2	3AXD50000048354
1470A	2×D8T	E2.2-A_W_FP_2000HR-HR_UL,IEC,CCC AUXCONT	2	3AXD50000048354
2000A	2×D8T	E2.2-A_W_FP_2000HR-HR_UL,IEC,CCC AUXCONT	2	3AXD50000048354
2940A	4×D8T	E2.2-A_W_FP_2000HR-HR_UL,IEC,CCC AUXCONT	2	3AXD50000048354
4000A	4×D8T	E4.2_W_FP_3200_HR-HR_IEC AUXCONT	2	3AXD50000048356



### ■ Main circuit breaker wagons – 12-pulse (UL)

Supply unit ACS880- 304LC-...	Frame size	Type designation	Qty	Ordering code
0920A	2×D8T	E4.2-A_W_2500-HR_UL,IEC,CCC AUXCONT	2	3AXD50000039281
1470A	2×D8T	E4.2-A_W_2500-HR_UL,IEC,CCC AUXCONT	2	3AXD50000039281
2000A	2×D8T	E4.2-A_W_2500-HR_UL,IEC,CCC AUXCONT	2	3AXD50000039281
2940A	4×D8T	E4.2-A_W_2500-HR_UL,IEC,CCC AUXCONT	2	3AXD50000039281
4000A	4×D8T	E4.2-A_W_2500-HR_UL,IEC,CCC AUXCONT	2	3AXD50000039281

### ■ Main circuit breaker covers – 6-pulse (IEC)

One cover is needed for each main circuit breaker/wagon pair. For further details regarding arc protection, see *Drive modules cabinet design and construction instructions* (3AUA0000107668 [English]).

Supply unit ACS880- 304LC-...	Size	Data	Qty	Ordering code
0490A	D8T	IP22-IP54;PROTECTIVE COVER FOR SACE EMAX	1	3AXD50000049760
0780A	D8T			
1060A	D8T			
1470A	2×D8T	IP22-IP54;PROTECTIVE COVER FOR SACE EMAX	1	3AXD50000049760
2000A	2×D8T			
3000A	3×D8T	IP22-IP54;PROTECTIVE COVER FOR SACE EMAX	1	3AXD50000049760
4000A	4×D8T	IP22-IP54;PROTECTIVE COVER FOR SACE EMAX	2	3AXD50000049760

### ■ Main circuit breaker covers – 6-pulse (UL)

One cover is needed for each main circuit breaker/wagon pair. For further details regarding arc protection, see *Drive modules cabinet design and construction instructions* (3AUA0000107668 [English]).

Supply unit ACS880- 304LC-...	Size	Data	Qty	Ordering code
0490A	D8T	IP22-IP54;PROTECTIVE COVER FOR SACE EMAX	1	3AUA0000222786
0780A	D8T			
1060A	D8T			
1470A	2×D8T	IP22-IP54;PROTECTIVE COVER FOR SACE EMAX	1	3AUA0000222786
2000A	2×D8T			
3000A	3×D8T	IP22-IP54;PROTECTIVE COVER FOR SACE EMAX	2	3AUA0000222786
4000A	4×D8T	IP22-IP54;PROTECTIVE COVER FOR SACE EMAX	2	3AUA0000222786

### ■ Main circuit breaker covers – 12-pulse (IEC)

One cover is needed for each main circuit breaker/wagon pair. For further details regarding arc protection, see *Drive modules cabinet design and construction instructions* (3AUA0000107668 [English]).

Supply unit ACS880- 304LC-...	Size	Data	Qty	Ordering code
0920A	2×D8T	IP22-IP54;PROTECTIVE COVER FOR SACE EMAX	2	3AXD50000049760
1470A	2×D8T			
2000A	2×D8T			
2940A	4×D8T	IP22-IP54;PROTECTIVE COVER FOR SACE EMAX	2	3AXD50000049760
4000A	4×D8T			

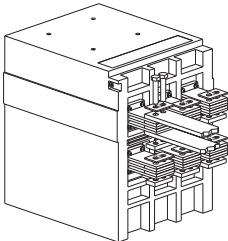
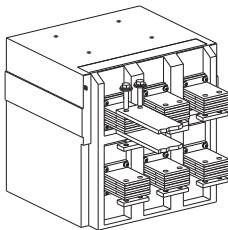
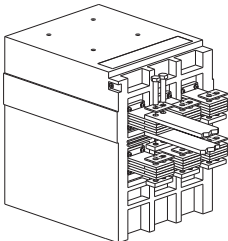
### ■ Main circuit breaker covers – 12-pulse (UL)

One cover is needed for each main circuit breaker/wagon pair. For further details regarding arc protection, see *Drive modules cabinet design and construction instructions* (3AUA0000107668 [English]).

Supply unit ACS880- 304LC-...	Size	Data	Qty	Ordering code
0920A	2×D8T	IP22-IP54;PROTECTIVE COVER FOR SACE EMAX	2	3AUA0000222786
1470A	2×D8T			
2000A	2×D8T			
2940A	4×D8T	IP22-IP54;PROTECTIVE COVER FOR SACE EMAX	2	3AUA0000222786
4000A	4×D8T			

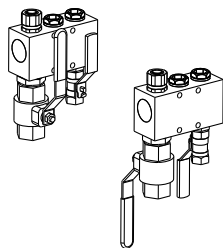
## ■ Bus bar shim kits

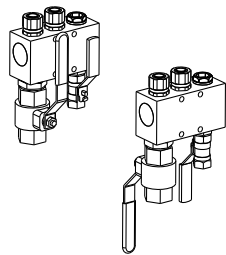
The following shim kits are available for adapting E2.2S-A and E4.2S-A air circuit breakers to IEC bus bars.

Supply unit ACS880-304LC-...	Size	Type designation	Qty	Ordering code	Illustration
6-pulse					
0490A	D8T	EMAX2 E2.2 BUS BAR SHIM KIT	1	3AXD50000286324	
0780A	D8T	EMAX2 E2.2 BUS BAR SHIM KIT	1	3AXD50000286324	
1060A	D8T	EMAX2 E2.2 BUS BAR SHIM KIT	1	3AXD50000286324	
1470A	2×D8T	EMAX2 E2.2 BUS BAR SHIM KIT	1	3AXD50000286324	
2000A	2×D8T	EMAX2 E4.2 BUS BAR SHIM KIT	1	3AXD50000286782	
3000A	3×D8T	EMAX2 E4.2 BUS BAR SHIM KIT	1	3AXD50000286782	
4000A	4×D8T	EMAX2 E4.2 BUS BAR SHIM KIT	1	3AXD50000286782	
12-pulse					
0920A	2×D8T	EMAX2 E2.2 BUS BAR SHIM KIT	2	3AXD50000286324	
1470A	2×D8T	EMAX2 E2.2 BUS BAR SHIM KIT	2	3AXD50000286324	
2000A	2×D8T	EMAX2 E2.2 BUS BAR SHIM KIT	2	3AXD50000286324	
2940A	4×D8T	EMAX2 E2.2 BUS BAR SHIM KIT	2	3AXD50000286324	
4000A	4×D8T	EMAX2 E2.2 BUS BAR SHIM KIT	2	3AXD50000286324	

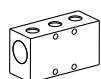
## Cooling system parts

### ■ Coolant distribution manifold kits

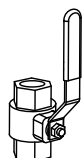
Enclosure	Qty	Ordering code	Kit code	Illustration
400/600/800 mm VX25 enclosure	1 kit per 1×D8T	3AXD50000044084	L-468-8-441	 <p>Instruction code: 3AXD50000048217</p>

Enclosure	Qty	Ordering code	Kit code	Illustration
400/600/800 mm VX25 enclosure	1 kit per 2×D8T	3AXD50000044182	L-468-8-442	 <p>Instruction code: 3AXD50000048258</p>

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



Chokes for flow limitation.

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.

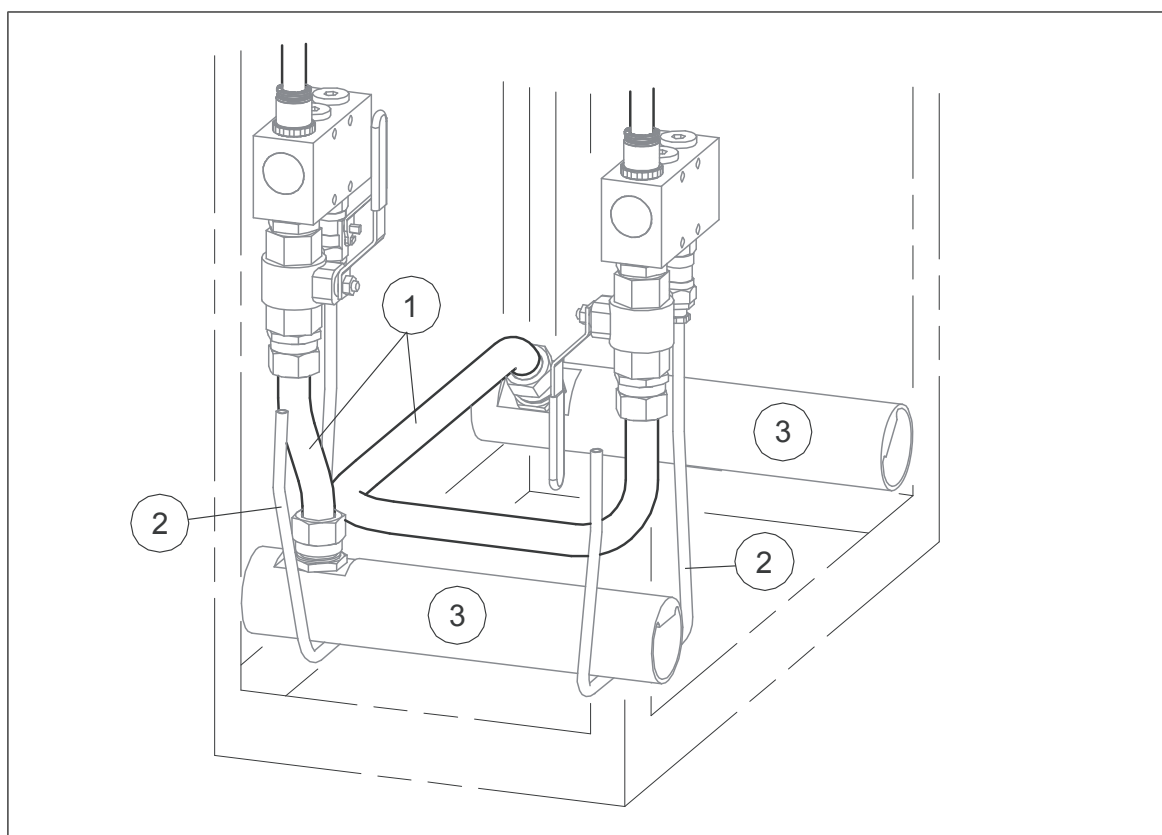
**Note:** The inlet and outlet valves have an R3/4" internal thread. The drain valves have an R3/8" internal thread.

## ■ Piping

The PA (polyamide) pipe can be used for all piping inside the cubicle between the manifolds.

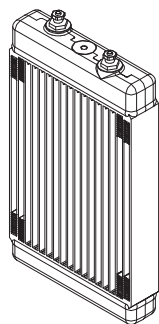
Component		Ordering code
PA pipe	Data	
PA pipe	50 m, PA12P40, 16/13 mm	3AXD50000047488
PA pipe	50 m, PA11P40, 8/6 mm, L50m	3AXD50000419302

**Note:** The piping between the manifolds and main pipes (1), the drain pipes (2), or the main pipes (3) are not part of the standard offering. Contact ABB for availability.



## ■ Heat exchanger

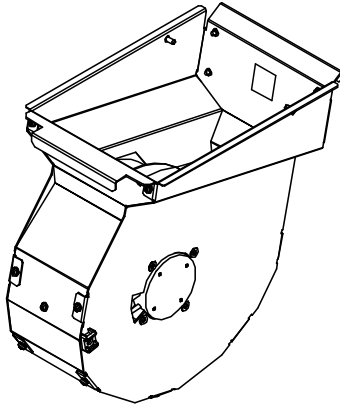
The kits include the heat exchanger and the connectors for piping.

Used with ...	Qty	Ordering code	Kit code	Illustration
All enclosure types	1 kit per cubicle for 1×D8T, 2×D8T	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 kit contains the fan installed into its cowl which mounts to the module bottom guide.

The fan is selected according to the auxiliary voltage.

Auxiliary voltage	Qty	Ordering code	Illustration
230 V AC (50/60 Hz)	1 per module	3AXD50000043886	
115 V AC (50/60 Hz)	1 per module	3AXD50000045414	

## Miscellaneous

### ■ CIO-01 I/O module

CIO-01 I/O module for distributed I/O bus control is not included in the module delivery but must 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]).

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

### ■ Lifting device

Use the lifting device when replacing a module in the Rittal VX25 enclosure.

Frame	Enclosure	Qty	Ordering code	Illustration
D8T	Rittal VX25	1	3AXD50000439997	 <p>Instruction code: 3AXD50000210268, 3AXD50000439409</p>





# 10

## 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 multidrive modules.

### Internal cooling system

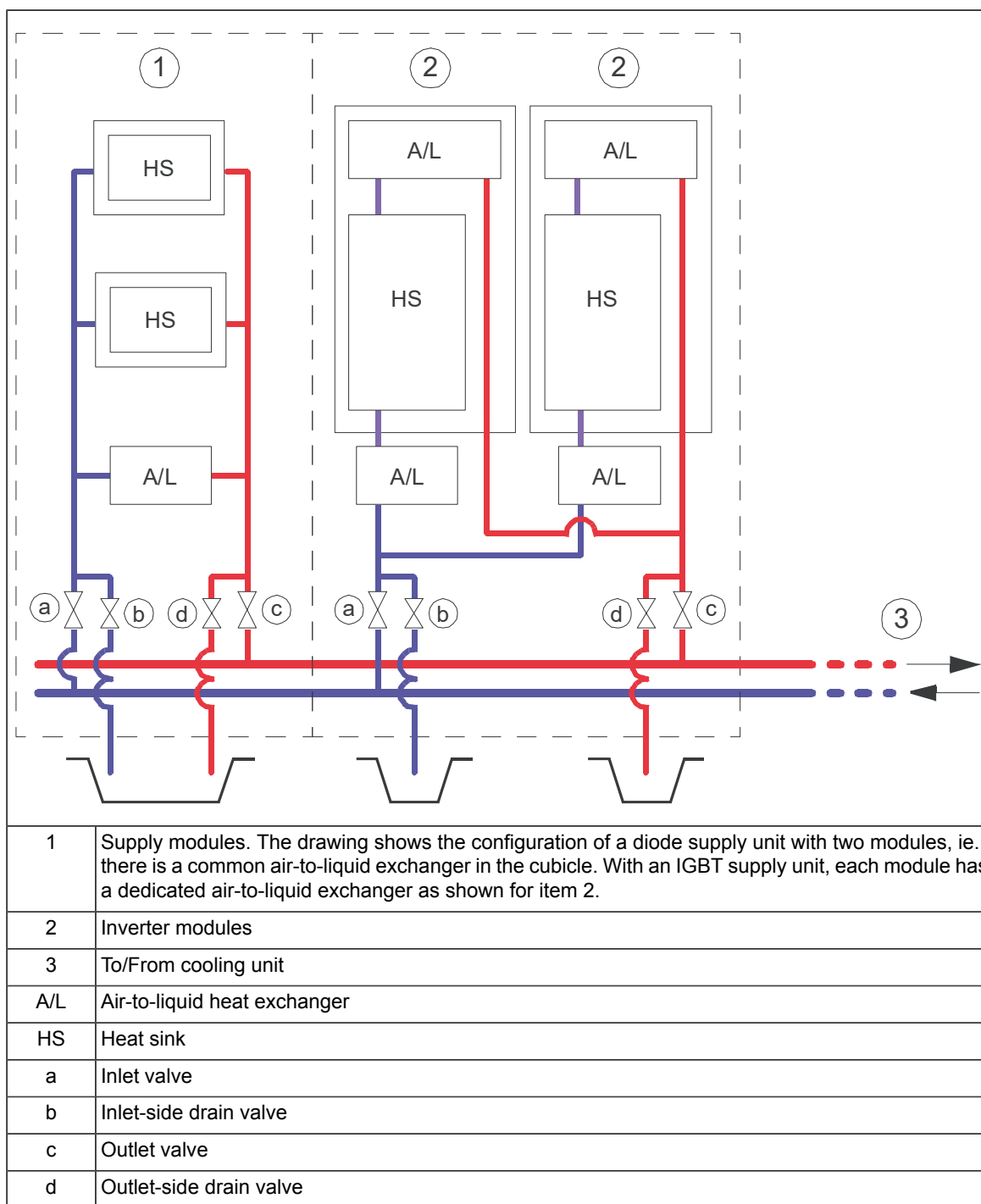
Each cubicle has an inlet and an outlet manifold, fitted with a stop valve and a drain valve. The stop valves can be closed to isolate all modules in the cubicle from the main cooling circuit.

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.

---



The coolant used with ACS880 liquid-cooled drive systems is Antifrogen® L 25% or 50% mixture. See [Coolant specification \(page 146\)](#).

## 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 \(page 146\)](#). 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 \(page 148\)](#).

#### Coolant temperature control

The temperature of the coolant in the internal cooling circuit must be kept within the limits specified in [Technical data \(page 146\)](#). 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 coolant specification, see [Coolant specification \(page 146\)](#). 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 to 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 100...150 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 to 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 146)*.
  - 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](http://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](http://www.clariant.com)) 25% or 50% mixture, available from Clariant distributors and ABB Service representatives.

**Note:** 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

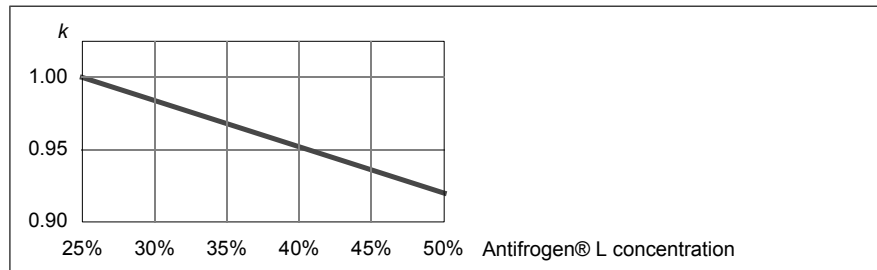
**Ambient temperature:** See the technical data of the drive/unit.

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**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 \(page 148\)](#).

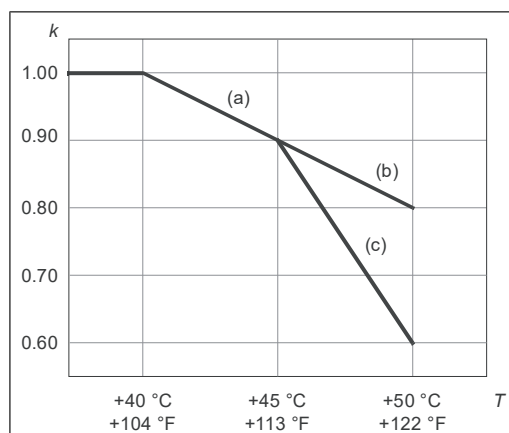
The nominal current ratings of drive system modules apply to an Antifrogen® L / water solution of 25/75% (volume). With the Antifrogen® L concentration between 25% and 50%, the drive output current must be derated by 1/3 percentage point per 1 p.p. increase in Antifrogen® L concentration. The drawing 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 ( $T_{\text{air}}$ ).

$T_{\text{air}}$ (°C)	Min. $T_{\text{coolant}}$ (°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 × 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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# 11

## Technical data

### Contents of this chapter

This chapter contains the technical data for ACS880-304LC...+A018 diode supply modules.

### Ratings

Module type ACS880- 304LC-...	No overload use						Light overload use		Heavy-duty use	
	$I_1$	$I_2$	$I_{\max\_1}$	$S_N$	$I_{\max\_2}$	$P_N$	$I_{Ld}$	$P_{Ld}$	$I_{Hd}$	$P_{Hd}$
	A (AC)	A (DC)	A (DC)	kVA	A (AC)	kW (DC)	A (DC)	kW (DC)	A (DC)	kW (DC)
$U_N = 690 \text{ V}$										
6-pulse										
0490A-7+A018	490	600	900	585	735	559	576	537	449	418
0780A-7+A018	780	955	1430	932	1170	890	917	854	714	666
1060A-7+A018	1060	1300	1950	1267	1590	1211	1248	1163	972	906
1470A-7+A018	1470	1800	2700	1757	2205	1677	1728	1610	1346	1255
2000A-7+A018	2000	2450	3675	2390	3000	2283	2352	2192	1833	1708
3000A-7+A018	3000	3670	5505	3585	4500	3420	3523	3283	2745	2558
4000A-7+A018	4000	4900	7350	4780	6000	4566	4704	4383	3665	3415
12-pulse										
0920A-7+A018	920	1130	1695	1100	1380	1053	1085	1011	845	788
1470A-7+A018	1470	1800	2700	1757	2205	1677	1728	1610	1346	1255
2000A-7+A018	2000	2450	3675	2390	3000	2283	2352	2192	1833	1708
2940A-7+A018	2940	3600	5400	3514	4410	3355	3456	3220	2693	2509

Module type ACS880- 304LC-...	No overload use						Light overload use		Heavy-duty use	
	$I_1$	$I_2$	$I_{\max\_1}$	$S_N$	$I_{\max\_2}$	$P_N$	$I_{Ld}$	$P_{Ld}$	$I_{Hd}$	$P_{Hd}$
	A (AC)	A (DC)	A (DC)	kVA	A (AC)	kW (DC)	A (DC)	kW (DC)	A (DC)	kW (DC)
4000A-7+A018	4000	4900	7350	4780	6000	4566	4704	4383	3665	3415

## Definitions

### Nominal ratings

- $U_N$  Nominal input voltage. For  $U_1$ , see [Electrical power network specification \(page 156\)](#). For  $U_2$ , see [DC connection data \(page 157\)](#).
- $I_1$  Continuous rms input (AC) current. No overload capability at the coolant temperature of 40 °C (104 °F) and air temperature of 45 °C (113 °F).
- $I_2$  Continuous rms output (DC) current. No overload capability at the coolant temperature of 40 °C (104 °F) and air temperature of 45 °C (113 °F).
- $I_{\max\_1}$  Maximum output (DC) current. Available for 10 s at start, otherwise as long as allowed by module temperature.
- $S_N$  Nominal apparent (AC) power
- $I_{\max\_2}$  Maximum input (AC) current
- $P_N$  Nominal output (DC) power

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

- $I_{Ld}$  Continuous current. 10% overload is allowed for one minute every 5 minutes.
- $P_{Ld}$  Output power in light-overload use

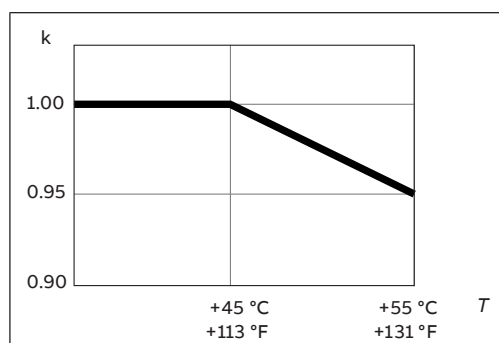
### Heavy-duty use (50% overload capability) ratings

- $I_{Hd}$  Continuous current. 50% overload is allowed for one minute every 5 minutes.
- $P_{Hd}$  Output power in heavy-duty use

## 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 ( $k$ ):



### ■ Coolant temperature derating

For the coolant temperature derating, see [Temperature limits \(page 146\)](#).

### ■ Antifreeze content derating

For the antifreeze content derating, see [Temperature limits \(page 146\)](#).

### ■ Altitude derating

At altitudes above 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.

## Type equivalence table and frame sizes

Module type	Basic module type	Frame
$U_N = 690\text{ V}$		
6-pulse		
ACS880-304LC-0490A-7+A018	ACS880-304LC-0490A-7+A018	D8T
ACS880-304LC-0780A-7+A018	ACS880-304LC-0780A-7+A018	D8T
ACS880-304LC-1060A-7+A018	ACS880-304LC-1060A-7+A018	D8T
ACS880-304LC-1470A-7+A018	ACS880-304LC-0780A-7+A018	2×D8T
ACS880-304LC-2000A-7+A018	ACS880-304LC-1060A-7+A018	2×D8T
ACS880-304LC-3000A-7+A018	ACS880-304LC-1060A-7+A018	3×D8T
ACS880-304LC-4000A-7+A018	ACS880-304LC-1060A-7+A018	4×D8T
12-pulse		
ACS880-304LC-0920A-7+A018	ACS880-304LC-0490A-7+A018	2×D8T
ACS880-304LC-1470A-7+A018	ACS880-304LC-0780A-7+A018	2×D8T
ACS880-304LC-2000A-7+A018	ACS880-304LC-1060A-7+A018	2×D8T
ACS880-304LC-2940A-7+A018	ACS880-304LC-0780A-7+A018	4×D8T

Module type	Basic module type	Frame
ACS880-304LC-4000A-7+A018	ACS880-304LC-1060A-7+A018	4×D8T

## Fuses

The fuses are given in the ordering information.

## Dimensions and weights

Module type	Height	Width	Depth	Weight
ACS880-304LC-...	mm	mm	mm	kg
6-pulse				
0490A-7+A018	374	339	518	83
0780A-7+A018	374	339	518	86
1060A-7+A018	374	339	518	88
1470A-7+A018	374	339	518	86
2000A-7+A018	374	339	518	88
3000A-7+A018	374	339	518	88
4000A-7+A018	374	339	518	88
12-pulse				
0920A-7+A018	374	339	518	83
1470A-7+A018	374	339	518	86
2000A-7+A018	374	339	518	88
2940A-7+A018	374	339	518	86
4000A-7+A018	374	339	518	88
3AXD00000601909				

For the dimension drawings, see [D8T supply module \(page 176\)](#).

## Free space requirements

Leave 400 mm free space above the cabinet.

## Losses, cooling circuit data and efficiency

Module type ACS880-304LC-....	Frame	Power loss <sup>1)</sup>			Coolant volume		Coolant flow rate		Pres- sure loss	Effi- ciency <sup>2)</sup>
		Total	Into coolant	Into air	Mod- ules	Mod- ules + cabinet	Mod- ules	Mod- ules + cabinet		
		kW	kW	kW	l	l	l/min	l/min		
U <sub>N</sub> = 690 V										
6-pulse										
0490A-7+A018	D8T	3.0	2.9	0.1	0.6	3.5	14	20	120	99.5
0780A-7+A018	D8T	4.6	4.5	0.1	0.6	3.5	14	20	120	99.5
1060A-7+A018	D8T	6.2	6.0	0.2	0.6	3.5	14	20	120	99.5

Module type ACS880- 304LC-...	Frame	Power loss <sup>1)</sup>			Coolant volume		Coolant flow rate		Pres- sure loss  kPa	Effi- ciency <sup>2)</sup>  %
		Total	Into coolant	Into air	Mod- ules	Mod- ules + cabinet	Mod- ules	Mod- ules + cabinet		
		kW	kW	kW	l	l	l/min	l/min		
1470A-7+A018	2×D8T	8.7	8.5	0.2	1.2	4.2	28	34	120	99.5
2000A-7+A018	2×D8T	11.7	11.4	0.3	1.2	4.2	28	34	120	99.5
3000A-7+A018	3×D8T	17.5	17.1	0.4	1.8	7.7	42	54	120	99.5
4000A-7+A018	4×D8T	23.4	22.8	0.6	2.4	8.4	56	68	120	99.5
12-pulse										
0920A-7+A018	2×D8T	5.6	5.5	0.1	1.2	4.2	28	34	120	99.5
1470A-7+A018	2×D8T	8.7	8.5	0.2	1.2	4.2	28	34	120	99.5
2000A-7+A018	2×D8T	11.7	11.4	0.3	1.2	4.2	28	34	120	99.5
2940A-7+A018	4×D8T	18.0	17.6	0.5	2.4	8.4	56	68	120	99.5
4000A-7+A018	4×D8T	23.4	22.8	0.6	2.4	8.4	56	68	120	99.5

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

<sup>2)</sup> The efficiency is not calculated according to the ecodesign standard IEC 61800-9-2.

## Energy efficiency data (ecodesign)

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

## Auxiliary circuit current consumption

Device	$U_N$	$f$	$I_{\text{cont}}$	$P_{\text{cont}}$
	V	Hz	A	W
BCU control unit	24 V DC (±10%)	-	2.0	48
CIO-01 I/O module	24 V DC (+20%/-15%)	-	0.1	-
D8T module: internal electronics	230 V AC (+15%/-20%)	50	0.45	105
	115 V AC (+15%/-20%)	60	0.9	105
Cooling fan	200...240 V AC	50/60	1.4	180...340
	100...130 V AC	50/60	2.4	240...310

### ■ Definitions

$f$	Supply frequency
$I_{\text{cont}}$	Continuous current consumption
$P_{\text{cont}}$	Continuous input power
$U_N$	Voltage requirement

## Tightening torques

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

## ■ Electrical connections

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

## ■ Mechanical connections

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

## ■ Insulation supports

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

## ■ Cable lugs

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

## Electrical power network specification

Specifications in this section are valid for modules installed in Rittal VX25 or generic cabinets with kits and components defined in the manual or corresponding cabinet structure. Cabinet construction and busbars placement must be dimensioned according to the short-circuit requirements indicated in this manual.

Voltage ( $U_1$ )	Both 6-pulse and 12-pulse supply modules: ACS880-304LC-xxxxA-7+A018: 525 ... 690 V AC 3-phase $\pm 10\%$ (525 ... 600 V AC $\pm 10\%$ in UL/CSA installations, or corner-grounded TN systems). This is indicated in the type designation label as typical input voltage levels 3 ~ 525/600/690 V AC.
Network type	TN (grounded) and IT (ungrounded) systems



Short-circuit withstand strength (IEC/EN 61439-1)	Supply units with the ABB-defined main breaker and fuses: <ul style="list-style-type: none"> <li>Rated conditional short circuit current (<math>I_{cc}</math>) of one D8T module with module AC fuses given in this manual: 65 kA.</li> </ul>
Short-circuit current protection (UL 508A, CSA C22.2 No. 14-13)	The drive is suitable for use on a circuit capable of delivering not more than 100.000 rms symmetrical amperes at 600 V maximum when the input cable is protected with class T fuses.
Frequency ( $f_1$ )	50/60 Hz, variation $\pm 5\%$ of the nominal frequency
Imbalance	Maximum 3% of nominal phase-to-phase voltage
Fundamental power factor ( $\cos \phi_1$ )	0.98 (at nominal load)

## DC connection data

Voltage ( $U_2$ ) 6-pulse modules	ACS880-304LC-xxxxA-7+A018: 709 ... 932 V DC. This is indicated in the type designation label as typical output voltage levels 709/810/932 V DC.
Voltage ( $U_2$ ) 12-pulse modules	ACS880-304LC-xxxxA-7+A018: 735 ... 966 V DC. This is indicated in the type designation label as typical output voltage levels 735/840/966 V DC.

## Coolant connection data

The coolant connectors are for 16/13 mm PA (polyamide) pipe. See the ordering information.

## Control unit connection data

See chapter [The control unit \(page 163\)](#).

## Protection classes for module

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

## Optical components

The specifications of the optic cable are as follows:

- Storage temperature: -55 ... +85 °C (-67 ... +185 °F)
- Installation temperature: -20 ... +70 °C (-4 ... +158 °F)
- Maximum short-term tensile force: 50 N (11.2 lbf)
- Minimum short-term bend radius: 25 mm (1.0 in)
- Minimum long-term bend radius: 35 mm (1.4 in)
- Maximum long-term tensile load: 1 N (3.6 ozf)
- Flexing: Max. 1000 cycles

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

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

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

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

## Ambient conditions

The unit is to be used in a heated indoor controlled environment.			
	<b>Operation</b> installed for stationary use	<b>Storage</b> in protective package	<b>Transportation</b> in protective package

<b>Altitude above sea level</b>	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.	-	-
<b>Air temperature</b>	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)
<b>Relative humidity</b>	Maximum 95%, no condensation allowed	Maximum 95%, no condensation allowed	Maximum 95%, no condensation allowed
	No condensation allowed. Maximum allowed relative humidity is 60% in the presence of corrosive gases.		
<b>Contamination</b>	IEC/EN 60721-3-3:2002: Classification of environmental conditions - Part 3-3: Classification of groups of environmental parameters and their severities - Stationary use of weather protected locations	IEC 60721-3-1:1997	IEC 60721-3-2:1997
Chemical gases	Class 3C2	Class 1C2	Class 2C2
Solid particles	Class 3S1	Class 1S3 (packing must support this, otherwise 1S2)	Class 2S2
	No conductive dust allowed.		
<b>Vibration</b>	IEC 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
<b>Shock</b> 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 <sup>2</sup> (330 ft./s <sup>2</sup> ) 11 ms	With packing max. 100 m/s <sup>2</sup> (330 ft./s <sup>2</sup> ) 11 ms

## Cooling

Cooling method: Liquid cooling

## Colors

PMS 1C Cool Gray, PMS Process Black

## Materials

### ■ Module

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

### ■ Packaging of module

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<sup>1)</sup>
- Molded pulp
- Plywood
- Wood
- PP (strapping)
- EPP (foam)
- PE (plastic bag and/or VCI foil)
- Metal (fixing clamps, screws).

<sup>1)</sup> Cardboard heavy duty quality with wet strength glue in large modules.

### ■ Packaging of options

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

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

### ■ Manuals

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

## Disposal

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

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Generally all metals, such as steel, aluminum, copper and its alloys, and precious metals can be recycled as material. Plastics, rubber, cardboard and other packaging material can be used in energy recovery. Printed circuit boards and large electrolytic capacitors need selective treatment according to IEC 62635 guidelines. To aid recycling, plastic parts are marked with an appropriate identification code.

Contact your local ABB distributor for further information on environmental aspects and recycling instructions for professional recyclers. End of life treatment must follow international and local regulations. See [ACS880 cabinet-installed drives and multidrive modules recycling instructions and environmental information \(3AXD50000153909 \[English\]\)](#).

## Disclaimers

### ■ **Generic disclaimer**

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

### ■ **Cybersecurity disclaimer**

This product can be connected to and communicate information and data via a network interface. The HTTP protocol, which is used between the commissioning tool (Drive Composer) and the product, is an unsecured protocol. For independent and continuous operation of product such connection via network to commissioning tool is not necessary. However 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, prevention of physical access, 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.

Notwithstanding any other provision to the contrary and regardless of whether the contract is terminated or not, ABB and its affiliates are under no circumstances liable for damages and/or losses related to such security breaches, any unauthorized access, interference, intrusion, leakage and/or theft of data or information.

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# 12

## The control unit

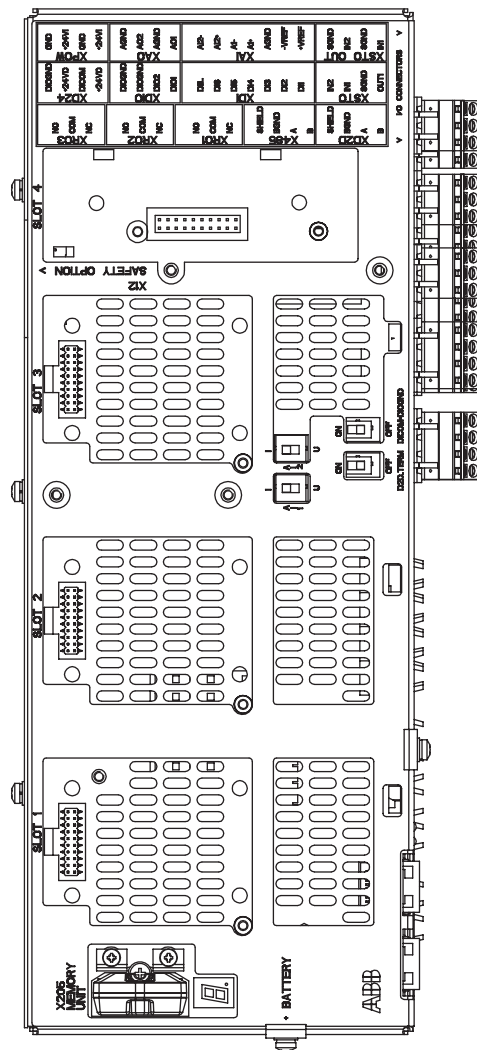
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### Contents of this chapter

This chapter

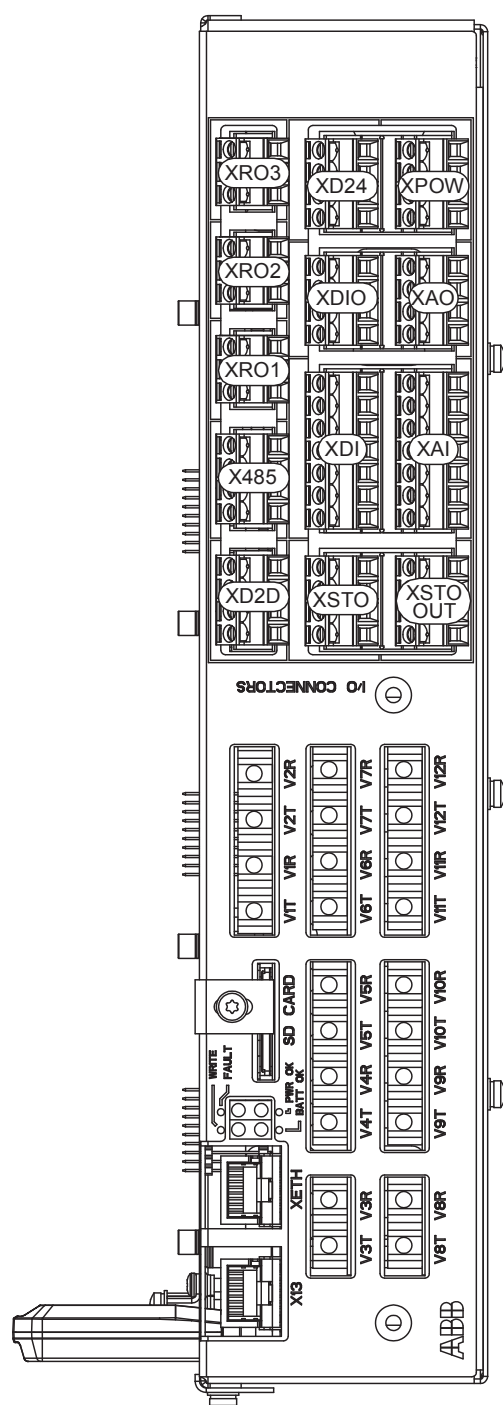
- describes the connections of the control unit
- contains the specifications of the inputs and outputs of the control unit.

# BCU-x2 layout



	Description
I/O	I/O terminals (see following diagram)
SLOT 1	I/O extension, encoder interface or fieldbus adapter module connection. (This is the sole location for an FDPI-02 diagnostics and panel interface.)
SLOT 2	I/O extension, encoder interface or fieldbus adapter module connection
SLOT 3	I/O extension, encoder interface, fieldbus adapter or FSO 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.
<b>7-segment display</b> Multicharacter indications are displayed as repeated sequences of characters	
	("U" is indicated briefly before "o".) Control program running
	Control program startup in progress
	(Flashing) Firmware cannot be started. Memory unit missing or corrupted
	Firmware download from PC to control unit in progress
	At power-up, the display may show short indications of eg. "1", "2", "b" or "U". These are normal indications immediately after power-up. If the display ends up showing any other value than those described, it indicates a hardware failure.









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

## Default I/O diagram of the supply control unit

The diagram below shows the default I/O connections on the supply control unit (A51), and describes the use of the connections in the supply unit.

The wire size accepted by all screw terminals (for both stranded and solid wire) is 0.5 ... 2.5 mm<sup>2</sup> (22...12 AWG). The tightening torque is 0.45 N·m (4 lbf·in).

Terminal			Description	
XD2D			Drive-to-drive link	
<div><div>1</div><div>2</div><div>3</div><div>4</div></div>	<div>1</div> <div>2</div> <div>3</div> <div>4</div>	<div>B</div> <div>A</div> <div>BGND</div> <div>Shield</div>	Not in use by default	
	D2D.TERM		Drive-to-drive link termination switch <sup>1)</sup>	
X485			RS485 connection	
<div><div>5</div><div>6</div><div>7</div><div>8</div></div>	<div>5</div> <div>6</div> <div>7</div> <div>8</div>	<div>B</div> <div>A</div> <div>BGND</div> <div>Shield</div>	Cooling fan monitoring (CIO module)	
XRO1, XRO2, XRO3			Relay outputs	
<div><div>11</div><div>12</div><div>13</div><div>21</div><div>22</div><div>23</div><div>31</div><div>32</div><div>33</div></div>	11	NC	Norm. closed	XRO1: <b>Running</b> <sup>2)</sup> (Energized = running) 250 V AC / 30 V DC, 2 A
	12	COM	Common	
	13	NO	Norm. open	
	21	NC	Norm. closed	XRO2: <b>Fault (-1)</b> <sup>2)</sup> (Energized = no fault) 250 V AC / 30 V DC, 2 A
	22	COM	Common	
	23	NO	Norm. open	
	31	NC	Norm. closed	XRO3: <b>MCB ctrl</b> <sup>3)</sup> (Energized = closes main contactor/breaker) 250 V AC / 30 V DC, 2 A
	32	COM	Common	
	33	NO	Norm. open	
XSTO, XSTO OUT			Safe torque off <sup>4)</sup>	
<div><div>1</div><div>2</div><div>3</div><div>4</div><div>5</div><div>6</div><div>7</div><div>8</div></div>	<div>1</div> <div>2</div> <div>3</div> <div>4</div> <div>5</div> <div>6</div> <div>7</div> <div>8</div>	<div>OUT</div> <div>SGND</div> <div>IN1</div> <div>IN2</div> <div>IN1</div> <div>SGND</div> <div>IN2</div> <div>SGND</div>	XSTO: Factory connection. Both circuits must be closed for the drive to start (IN1 and IN2 must be connected to OUT).	
			XSTO OUT: Not in use.	
XDI			Digital inputs	

Terminal			Description
<div><div>1</div><div>2</div><div>3</div><div>4</div><div>5</div><div>6</div><div>7</div></div>	1	DI1	<b>Temp fault</b> <sup>2)</sup> (0 = overtemperature)
	2	DI2	<b>Run enable</b> <sup>2)</sup> (1 = run enable)
	3	DI3	<b>MCB feedback</b> <sup>3)</sup> (0 = main contactor/breaker open)
	4	DI4	<b>Auxiliary circuit breaker fault</b> <sup>2)</sup>
	5	DI5	Not in use by default. Can be used for eg. earth fault monitoring.
	6	DI6	<b>Reset</b> <sup>2)</sup> (0 -> 1 = fault reset)
	7	DIIL	Not in use by default. Can be used for eg. emergency stop.
XDIO			Digital input/outputs
<div><div>1</div><div>2</div><div>3</div><div>4</div></div>	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
<div><div>5</div><div>6</div><div>7</div><div>8</div></div>	5	+24VD	+24 V DC 200 mA <sup>5)</sup>
	6	DICOM	Digital input ground
	7	+24VD	+24 V DC 200 mA <sup>5)</sup>
	8	DIOGND	Digital input/output ground
	DICOM=DIOGND		Ground selection switch <sup>6)</sup>
XAI			Analog inputs, reference voltage output
<div><div>1</div><div>2</div><div>3</div><div>4</div><div>5</div><div>6</div><div>7</div></div>	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 <sup>7)</sup>
	5	AI1-	
	6	AI2+	Not in use by default. 0(4)...20 mA, $R_{in}$ = 100 ohm <sup>8)</sup>
	7	AI2-	
	AI1		AI1 current/voltage selection switch
	AI2		AI2 current/voltage selection switch
XAO			Analog outputs
<div><div>1</div><div>2</div><div>3</div><div>4</div></div>	1	AO1	<b>Zero</b> (no signal indicated) <sup>2)</sup> 0...20 mA, $R_L$ < 500 ohm
	2	AGND	
	3	AO2	<b>Zero</b> (not signal indicated) <sup>2)</sup> 0...20 mA, $R_L$ < 500 ohm
	4	AGND	
XPOW			External power input
<div><div>1</div><div>2</div><div>3</div><div>4</div></div>	1	+24VI	24 V DC, 2.05 A
	2	GND	
	3	+24VI	
	4	GND	
X12			Not in use in supply units
X13			Control panel connection

Terminal	Description
X205	Memory unit connection

- 1) Must be set to ON when the supply unit is the first or last unit on the drive-to-drive (D2D) link. On intermediate units, set termination to OFF.
- 2) 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) Use of the signal in the control program (fixed). See also the delivery-specific circuit diagrams.
- 4) This input only acts as a true Safe torque off input in inverter units. In other applications (such as a supply or brake unit), de-energizing the IN1 and/or IN2 terminal will stop the unit but not constitute a true safety function.
- 5) Total load capacity of these outputs is 4.8 W (200 mA at 24 V) minus the power taken by DIO1 and DIO2.
- 6) Determines whether DICOM is separated from DIOGND (ie, common reference for digital inputs floats). ON: DICOM connected to DIOGND. OFF: DICOM and DIOGND separate.
- 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 AI1. Change of setting requires reboot of control unit.
- 8) 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.

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

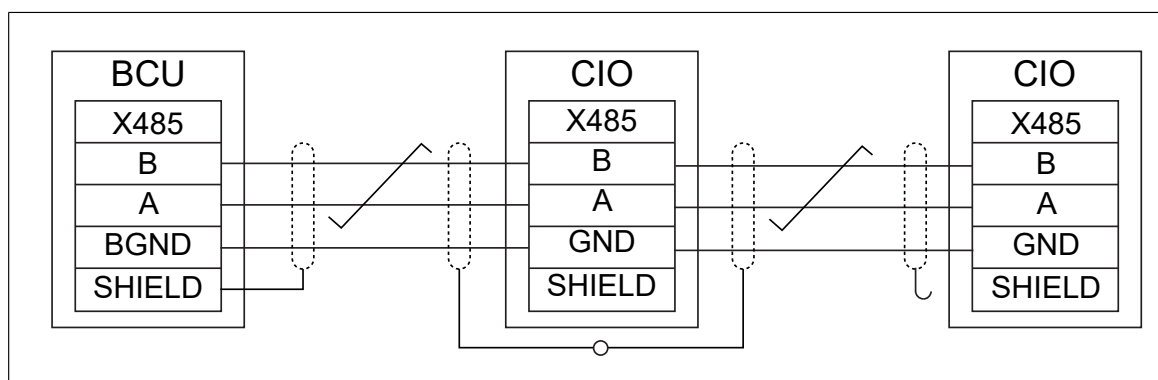
The control unit is powered from a 24 V DC, 2 A supply through terminal block XPOW. With a type BCU control unit, a second supply can be connected to the same terminal block for redundancy.

Using an external supply is recommended if

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

## The X485 connector

The X485 provides a connection for optional CIO-01 I/O module. The following diagram shows the wiring for the CIO module.



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

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

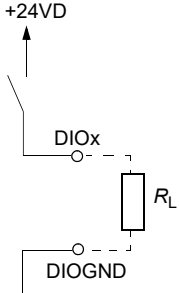
## **FSO safety functions module connection (X12)**

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.

## **SDHC memory card slot**

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

## Connector data

Power supply (XPOW)	<p>Connector pitch 5 mm, wire size 0.5 ... 2.5 mm<sup>2</sup> (22...12 AWG)</p> <p>Tightening torque 0.45 N·m (4 lbf·in)</p> <p>24 V (±10%) DC, 2 A</p> <p>External power input.</p> <p>Two supplies can be connected to the BCU-x2 for redundancy.</p>
Relay outputs RO1...RO3 (XRO1...XRO3)	<p>Connector pitch 5 mm, wire size 0.5 ... 2.5 mm<sup>2</sup> (22...12 AWG)</p> <p>Tightening torque 0.45 N·m (4 lbf·in)</p> <p>250 V AC / 30 V DC, 2 A</p> <p>Protected by varistors</p>
+24 V output (XD24:2 and XD24:4)	<p>Connector pitch 5 mm, wire size 0.5 ... 2.5 mm<sup>2</sup> (22...12 AWG)</p> <p>Tightening torque 0.45 N·m (4 lbf·in)</p> <p>Total load capacity of these outputs is 4.8 W (200 mA / 24 V) minus the power taken by DIO1 and DIO2.</p>
Digital inputs DI1...DI6 (XDI:1...XDI:6)	<p>Connector pitch 5 mm, wire size 0.5 ... 2.5 mm<sup>2</sup> (22...12 AWG)</p> <p>Tightening torque 0.45 N·m (4 lbf·in)</p> <p>24 V logic levels: "0" &lt; 5 V, "1" &gt; 15 V</p> <p><math>R_{in}</math>: 2.0 kohm</p> <p>Input type: NPN/PNP (DI1...DI5), PNP (DI6)</p> <p>Hardware filtering: 0.04 ms, digital filtering up to 8 ms</p> <p>DI6 (XDI:6) can alternatively be used as an input for a PTC sensor. "0" &gt; 4 kohm, "1" &lt; 1.5 kohm.</p> <p><math>I_{max}</math>: 15 mA (DI1...DI5), 5 mA (DI6)</p>
Start interlock input DIIL (XDI:7)	<p>Connector pitch 5 mm, wire size 0.5 ... 2.5 mm<sup>2</sup> (22...12 AWG)</p> <p>Tightening torque 0.45 N·m (4 lbf·in)</p> <p>24 V logic levels: "0" &lt; 5 V, "1" &gt; 15 V</p> <p><math>R_{in}</math>: 2.0 kohm</p> <p>Input type: NPN/PNP</p> <p>Hardware filtering: 0.04 ms, digital filtering up to 8 ms</p>
<p>Digital inputs/outputs DIO1 and DIO2 (XDIO:1 and XDIO:2)</p> <p>Input/output mode selection by parameters.</p> <p>DIO1 can be configured as a frequency input (0...16 kHz with hardware filtering of 4 microseconds) for 24 V level square wave signal (sinusoidal or other wave form cannot be used). DIO2 can be configured as a 24 V level square wave frequency output. See the firmware manual, parameter group 111/11.</p>	<p>Connector pitch 5 mm, wire size 0.5 ... 2.5 mm<sup>2</sup> (22...12 AWG)</p> <p>Tightening torque 0.45 N·m (4 lbf·in)</p> <p><u>As inputs:</u> 24 V logic levels: "0" &lt; 5 V, "1" &gt; 15 V. <math>R_{in}</math>: 2.0 kohm. Filtering: 1 ms.</p> <p><u>As outputs:</u> Total output current from +24VD is limited to 200 mA</p> 
Reference voltage for analog inputs +VREF and -VREF (XAI:1 and XAI:2)	<p>Connector pitch 5 mm, wire size 0.5 ... 2.5 mm<sup>2</sup> (22...12 AWG)</p> <p>Tightening torque 0.45 N·m (4 lbf·in)</p> <p>10 V ±1% and -10 V ±1%, <math>R_{load}</math> 1...10 kohm</p> <p>Maximum output current: 10 mA</p>

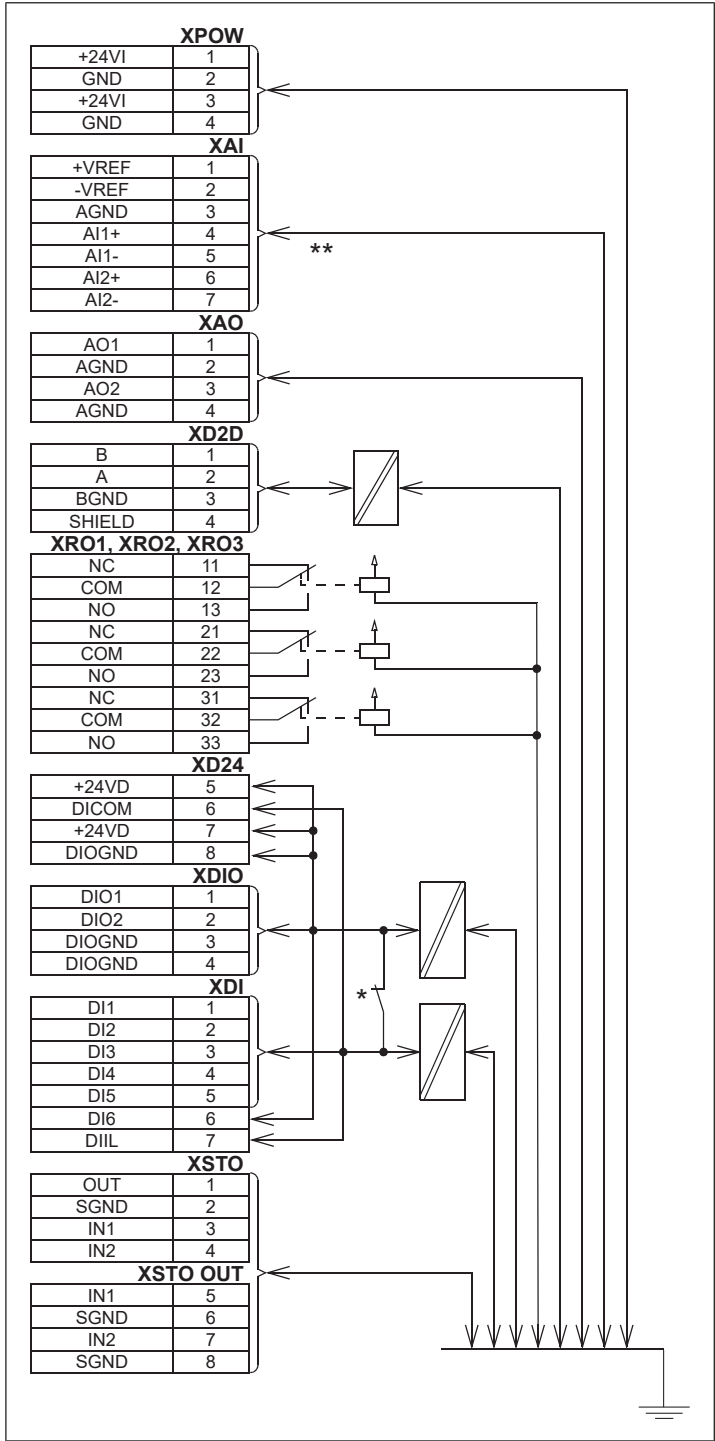
Analog inputs AI1 and AI2 (XAI:4 ... XAI:7). Current/voltage input mode selection by switches	Connector pitch 5 mm, wire size 0.5 ... 2.5 mm <sup>2</sup> (22...12 AWG) Tightening torque 0.45 N·m (4 lbf·in) Current input: -20...20 mA, $R_{in} = 100 \text{ ohm}$ Voltage input: -10...10 V, $R_{in} > 200 \text{ kohm}$ Differential inputs, common mode range $\pm 30 \text{ V}$ Sampling interval per channel: 0.25 ms Hardware filtering: 0.25 ms, adjustable digital filtering up to 8 ms Resolution: 11 bit + sign bit Inaccuracy: 1% of full scale range
Analog outputs AO1 and AO2 (XAO)	Connector pitch 5 mm, wire size 0.5 ... 2.5 mm <sup>2</sup> (22...12 AWG) Tightening torque 0.45 N·m (4 lbf·in) 0...20 mA, $R_{load} < 500 \text{ ohm}$ 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 <sup>2</sup> (22...12 AWG) 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 <sup>2</sup> (22...12 AWG) 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)
Safe torque off connection (XSTO)	Connector pitch 5 mm, wire size 0.5 ... 2.5 mm <sup>2</sup> (22...12 AWG) Tightening torque 0.45 N·m (4 lbf·in) Input voltage range: -3...30 V DC Logic levels: "0" < 5 V, "1" > 17 V.  <b>Note:</b> For the unit to start, both connections must be "1". This applies to all control units (including drive, inverter, supply, brake, DC/DC converter etc. control units), but true Safe torque off functionality is only achieved through the XSTO connector of the drive/inverter control unit. EMC (immunity) according to IEC 61326-3-1
Safe torque off output (XSTO OUT)	Connector pitch 5 mm, wire size 0.5 ... 2.5 mm <sup>2</sup> (22...12 AWG) Tightening torque 0.45 N·m (4 lbf·in) To STO connector of inverter module.
Control panel connection (X13)	Connector: RJ-45 Cable length < 3 m (9.8 ft)
Ethernet connection (XETH)	Connector: RJ-45 This connection is not supported by the firmware.
SDHC memory card slot (SD CARD)	Memory card type: SDHC Maximum memory size: 4 GB

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.

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# ■ BCU-x2 ground isolation diagram



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

DICOM=DIOGND: ON

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

DICOM=DIOGND: OFF

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

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



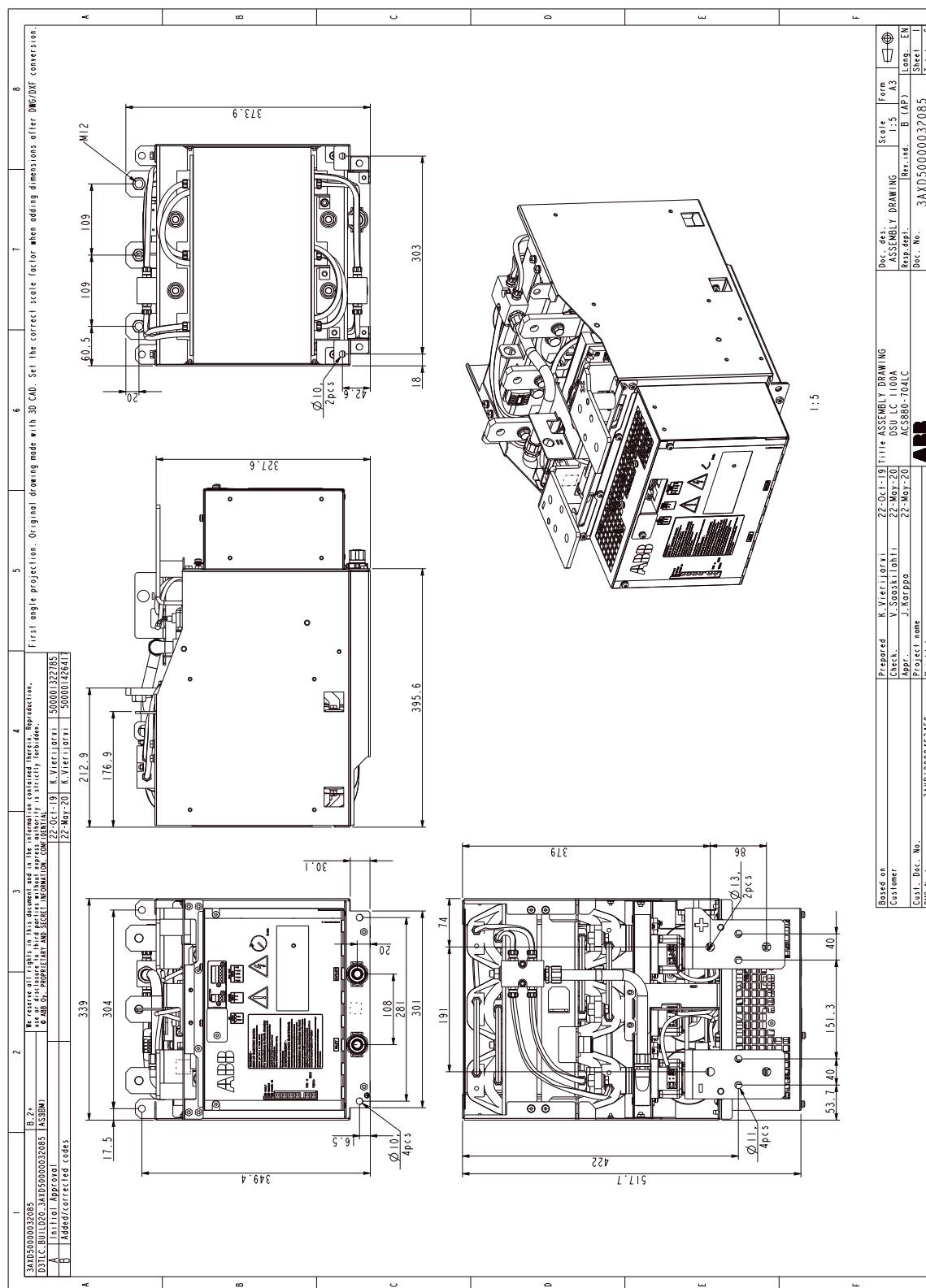
# 13

## Dimension drawings

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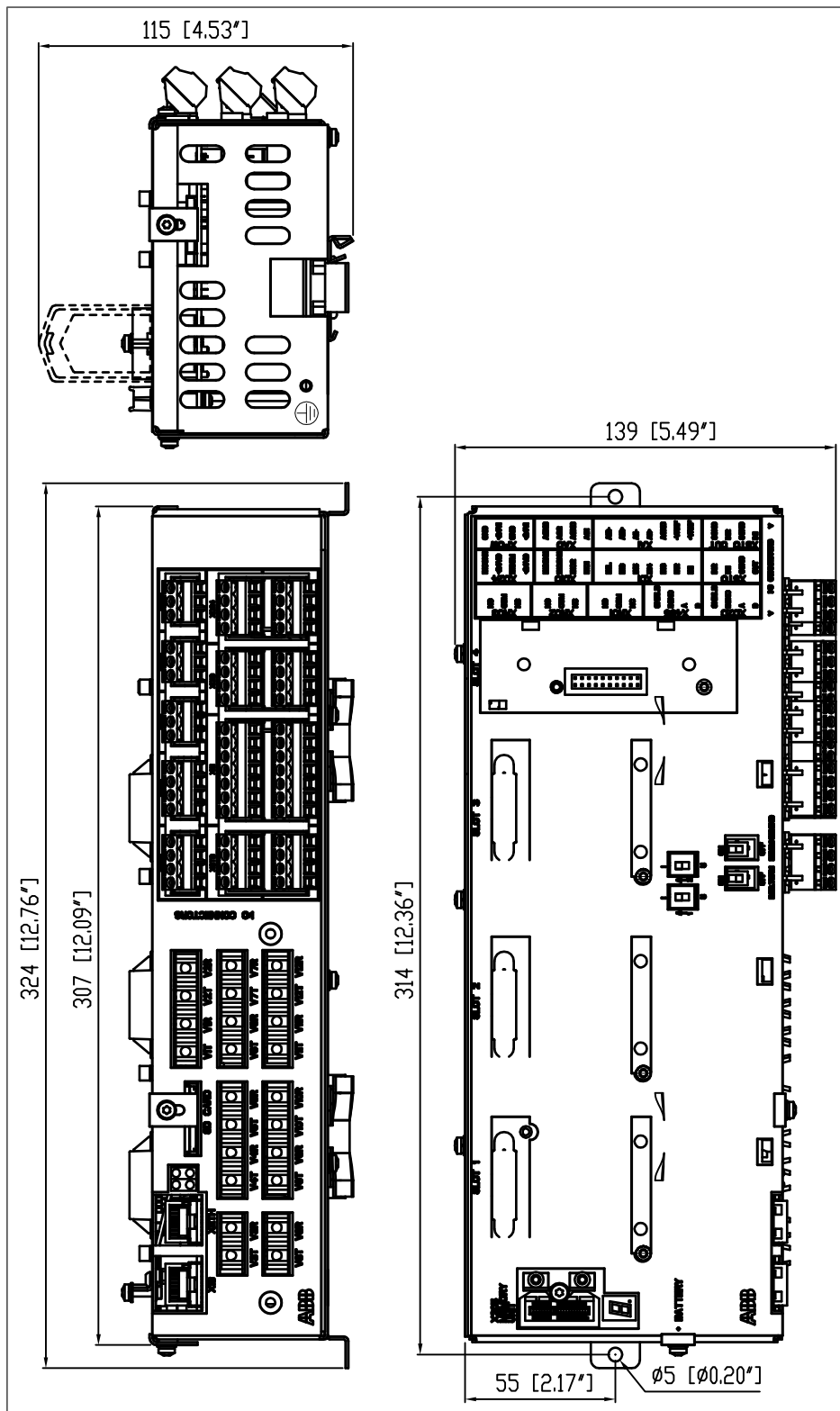
### Contents of this chapter

This chapter shows dimensions of the ACS880-304LC...+A018 diode supply modules and related accessories.

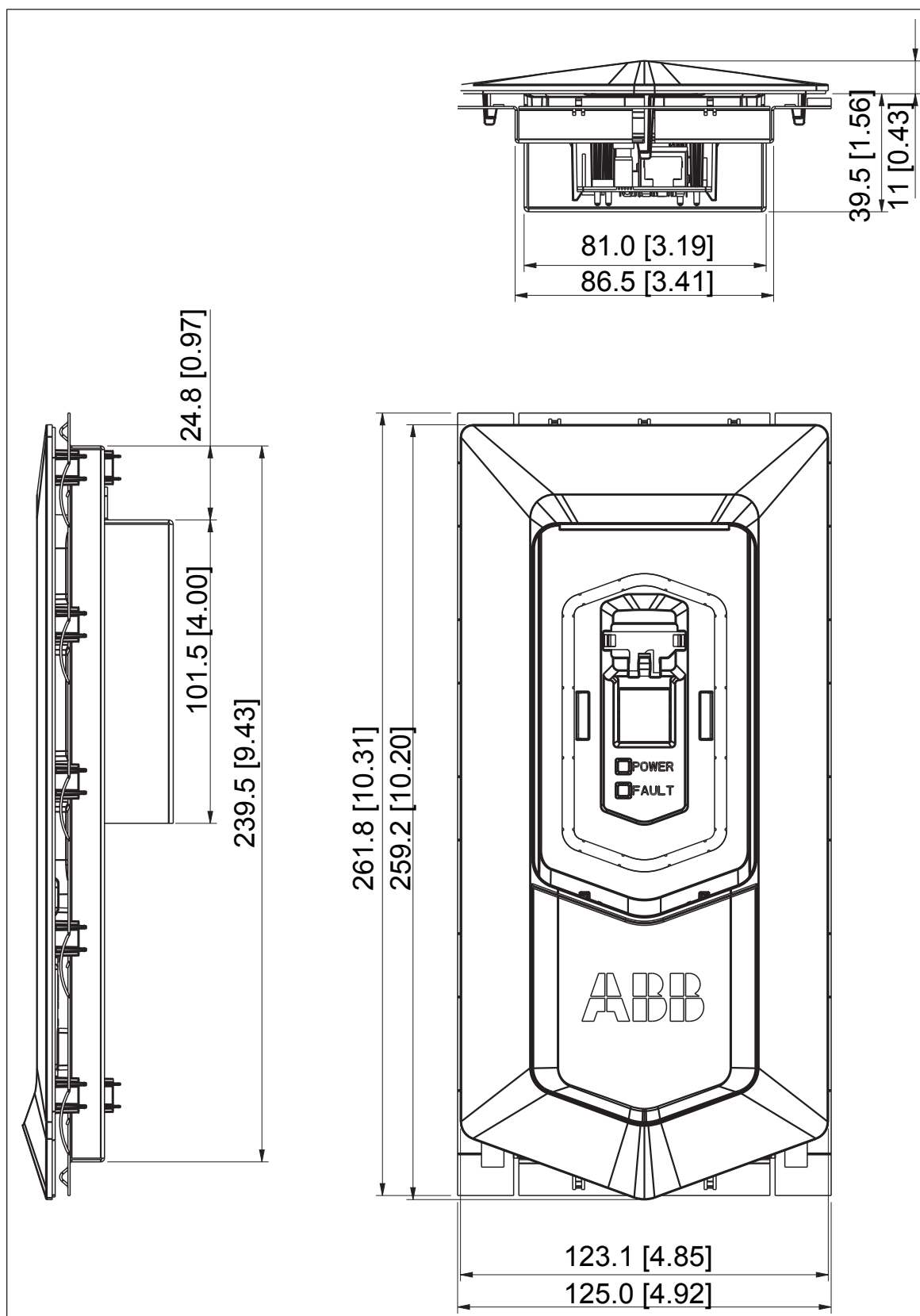


## Control electronics

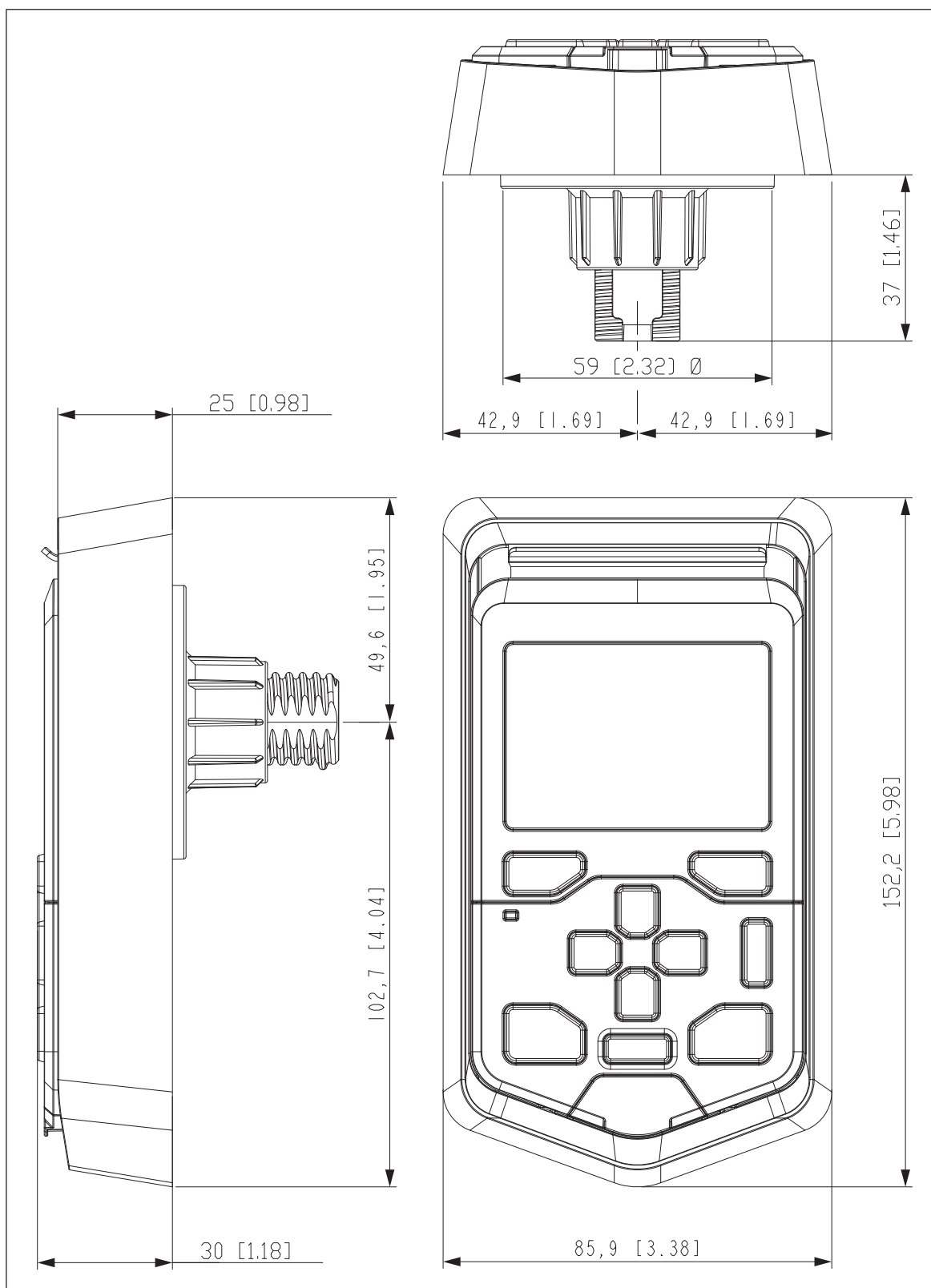
### ■ BCU control unit



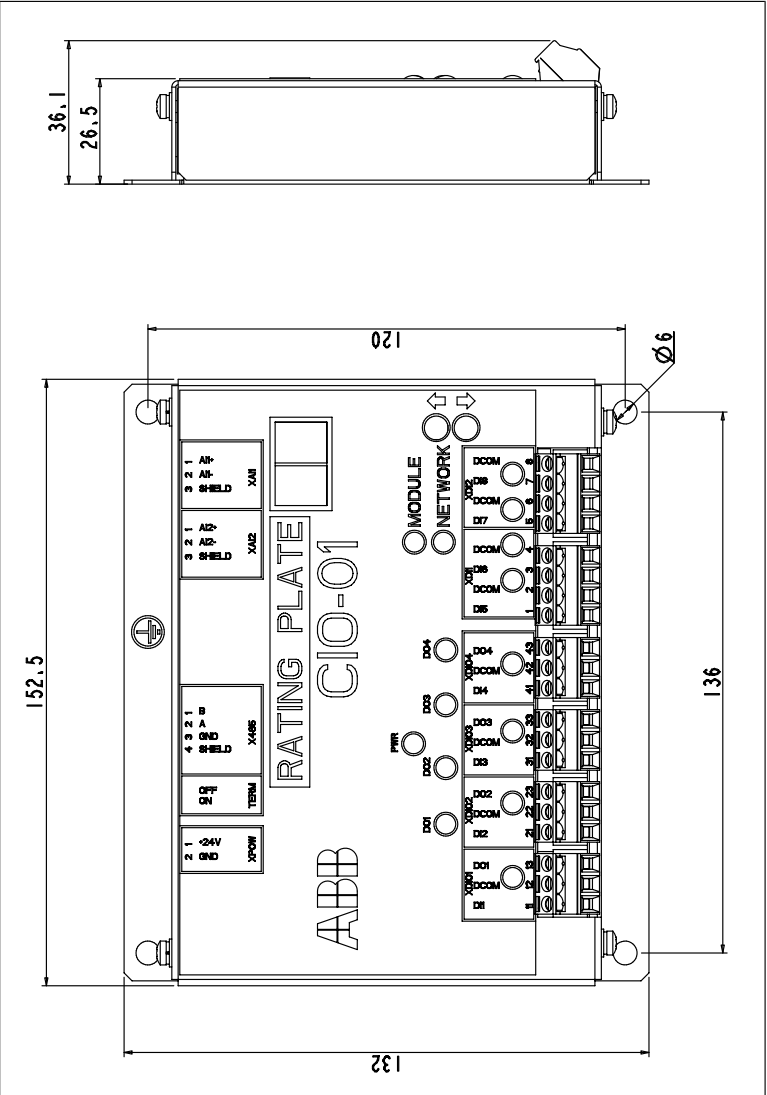
■ DPMP-01 door mounting kit



■ DPMP-02 door mounting kit

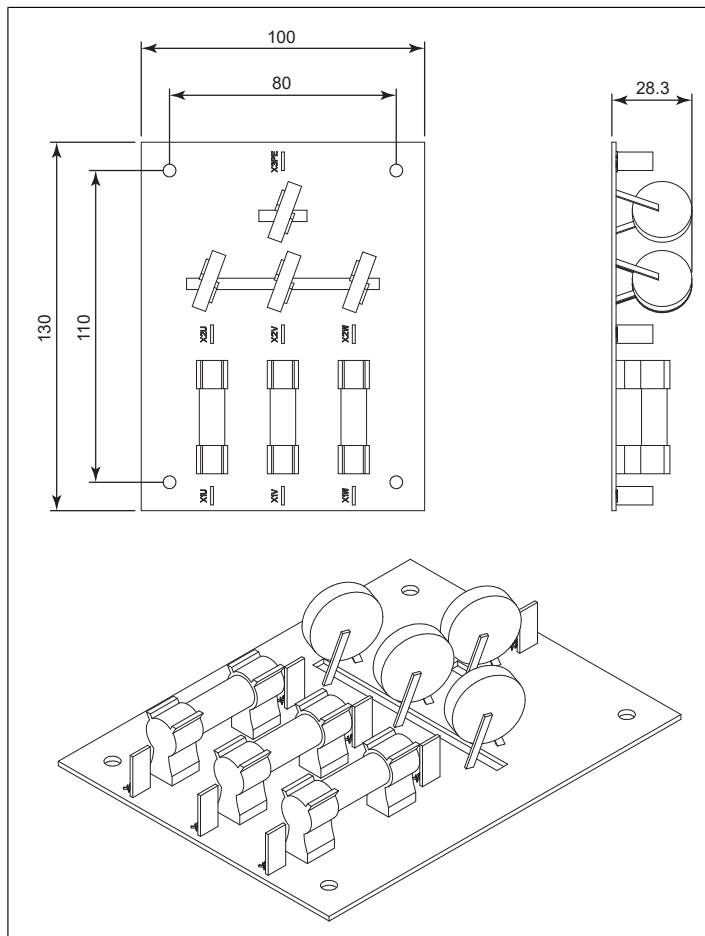


CIO-01 board





## CVAR board





# 14. Example circuit diagrams

## Contents of this chapter

This chapter contains example circuit diagrams of a diode supply module.

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

The purpose of these diagrams is to help in:

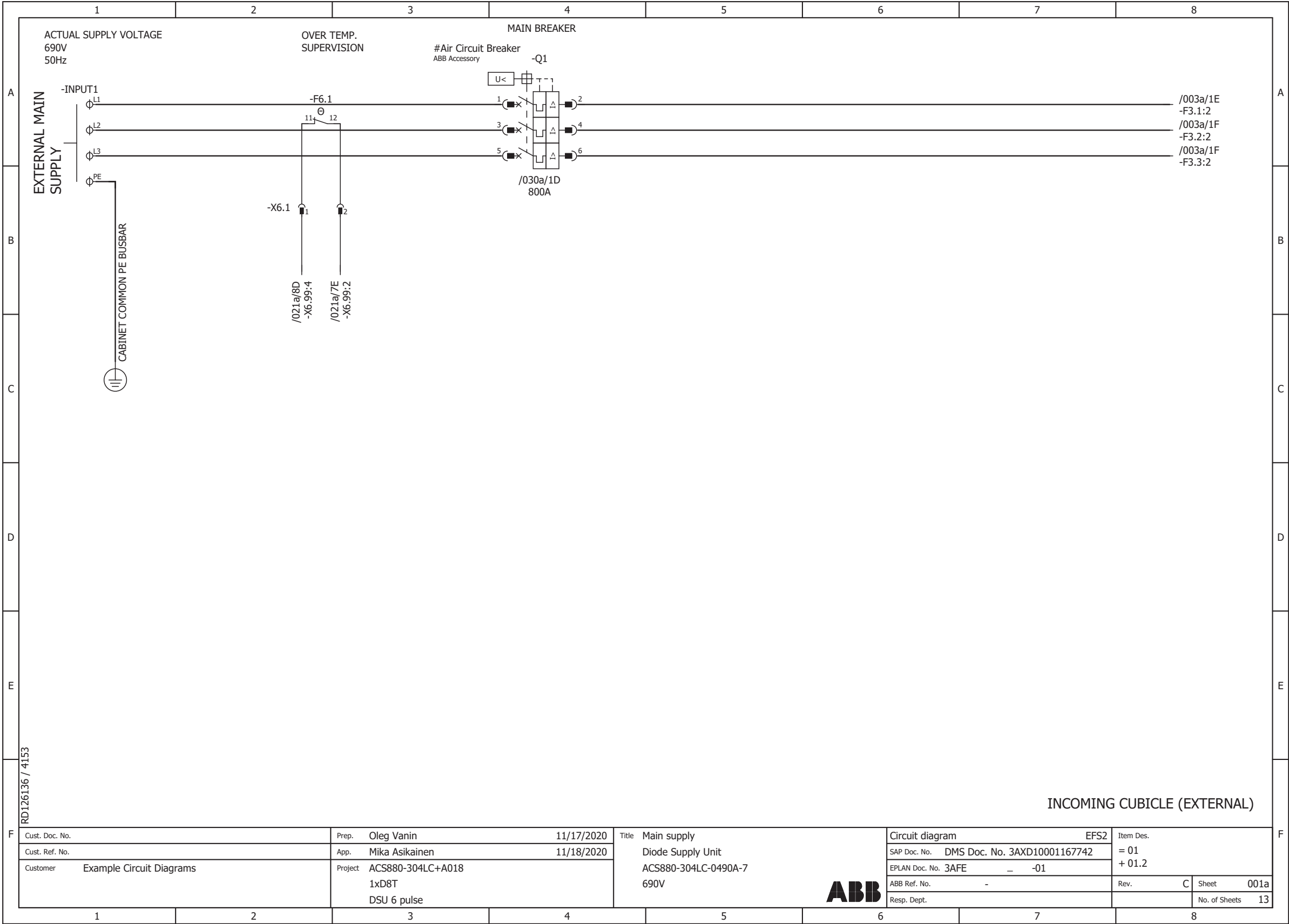
- understanding the internal connections and operation of the cabinet-installed drive with a diode supply unit, and
- learning how to wire a (ACS880-304LC...+A018) diode supply module when installed in a user-defined cabinet.

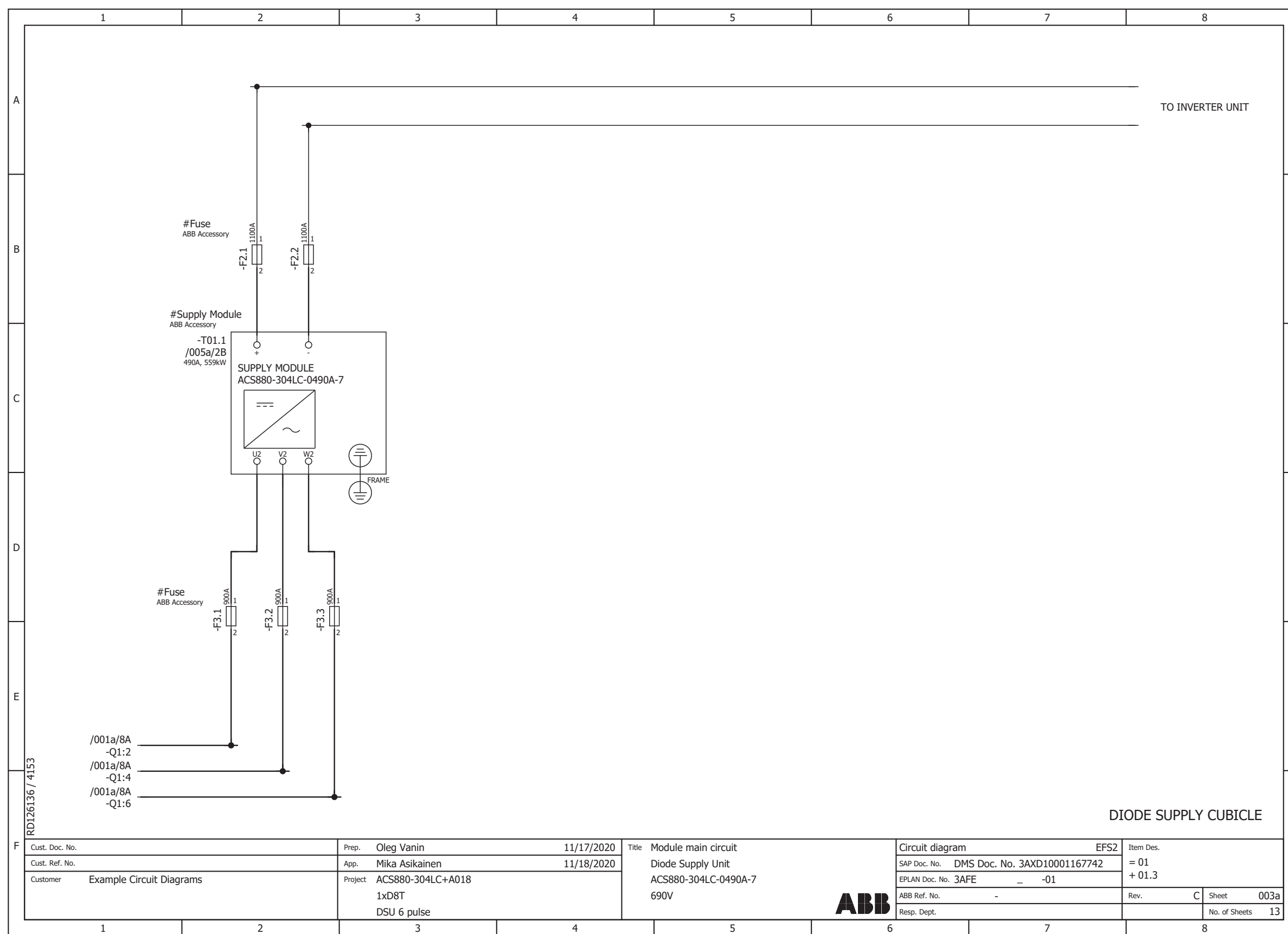
## Component designations used in the diagrams

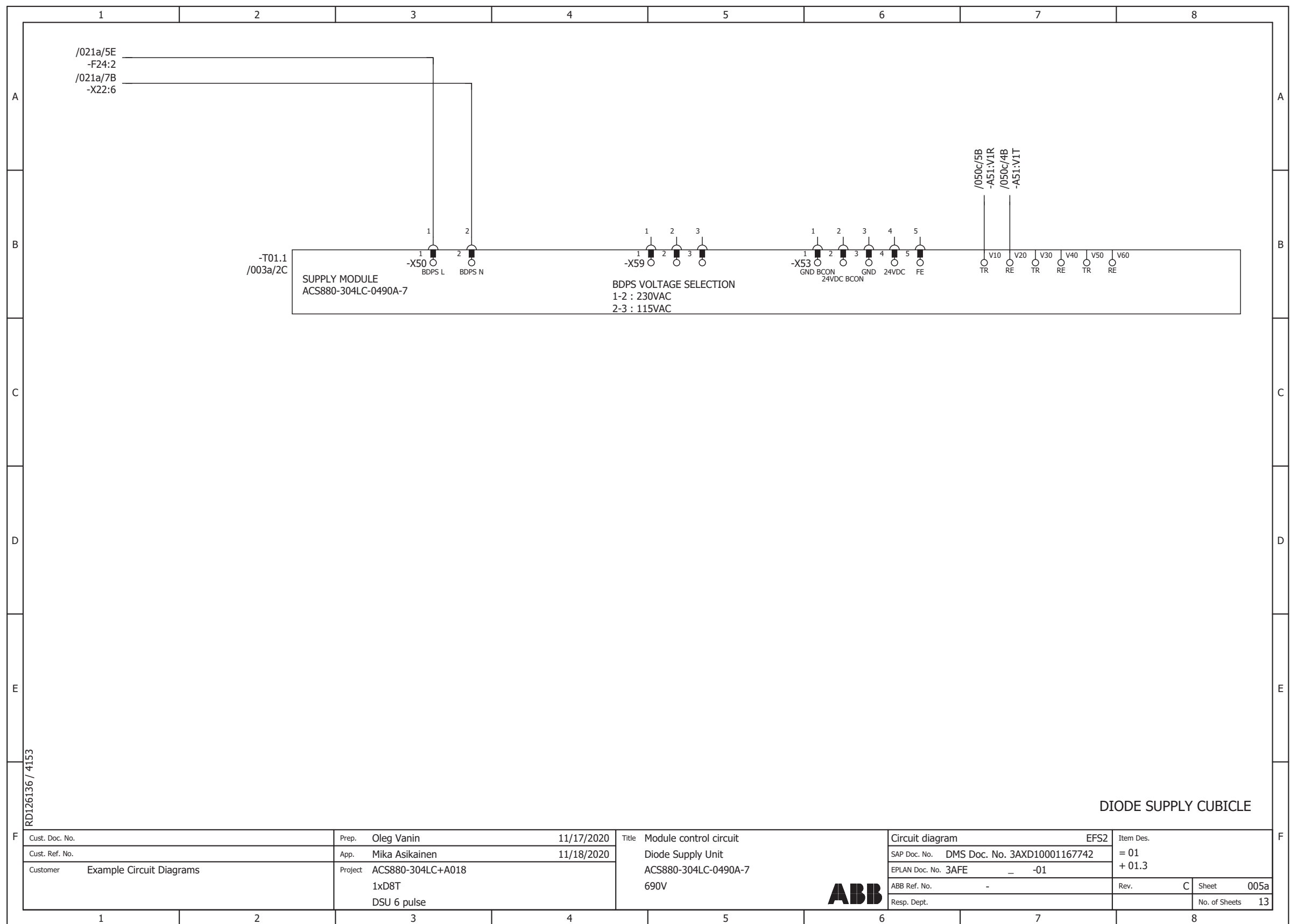
Designation	Component
A51	BCU control unit
A51_MEM	ZMU-02 memory unit kit
A57	Fieldbus kit / panel bus adapter
A58	DPMP-01 door mounting kit for control panel
A59	ACS-AP-x control panel kit
Q1	Air circuit breaker
A115	CIO-01 fan control kit
F2	Fuse 170M6549
F3	Fuse 170M6413
G115	Fan: <ul style="list-style-type: none"> <li>• 230 V kit (3AXD50000043886)</li> <li>• 115 V kit (3AXD50000045414).</li> </ul>
T01	Supply module

ACS880-304LC-0490A-7+A018 (1×D8T 6-pulse)

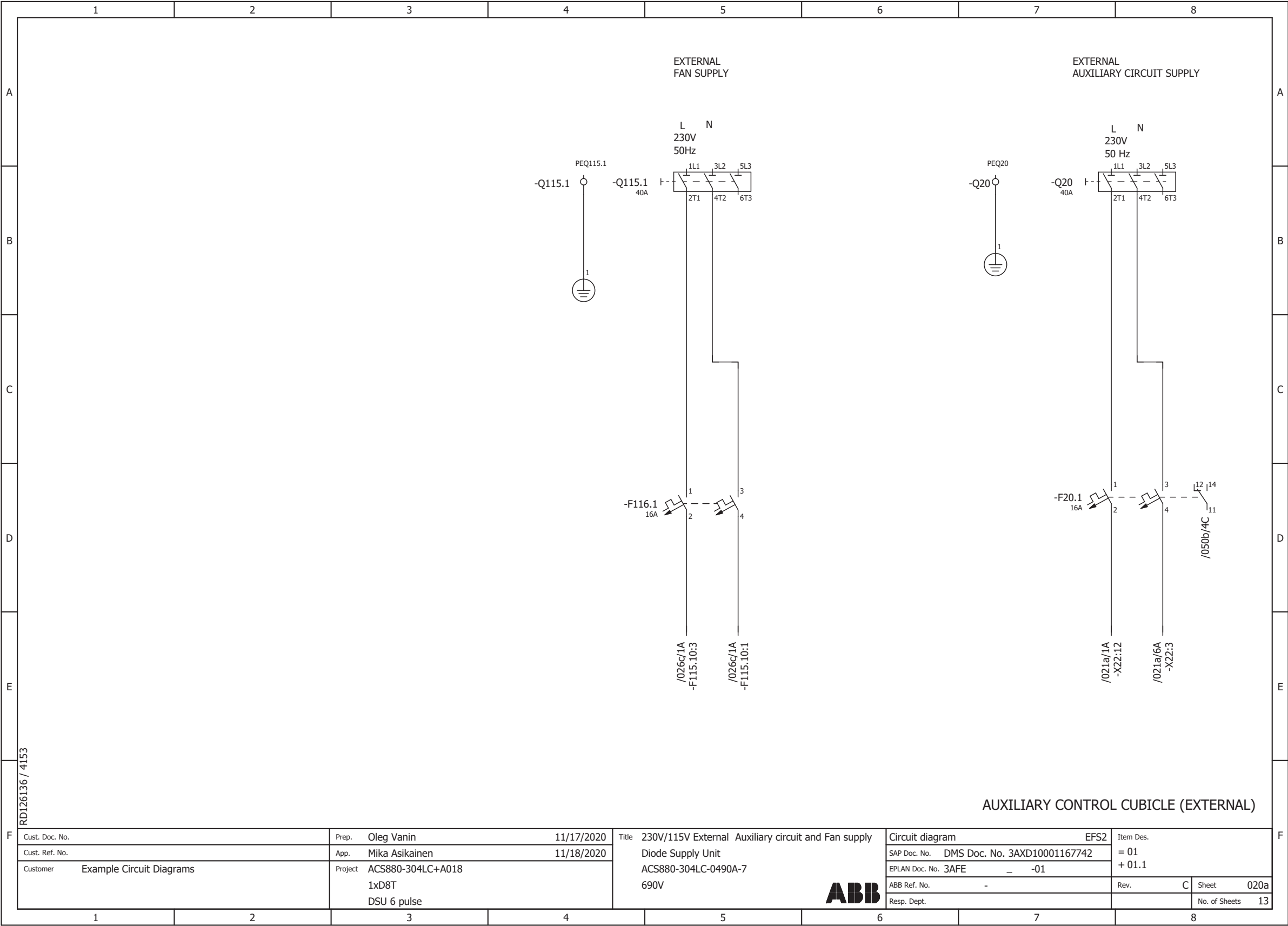
■ Sheet 001a – Main supply







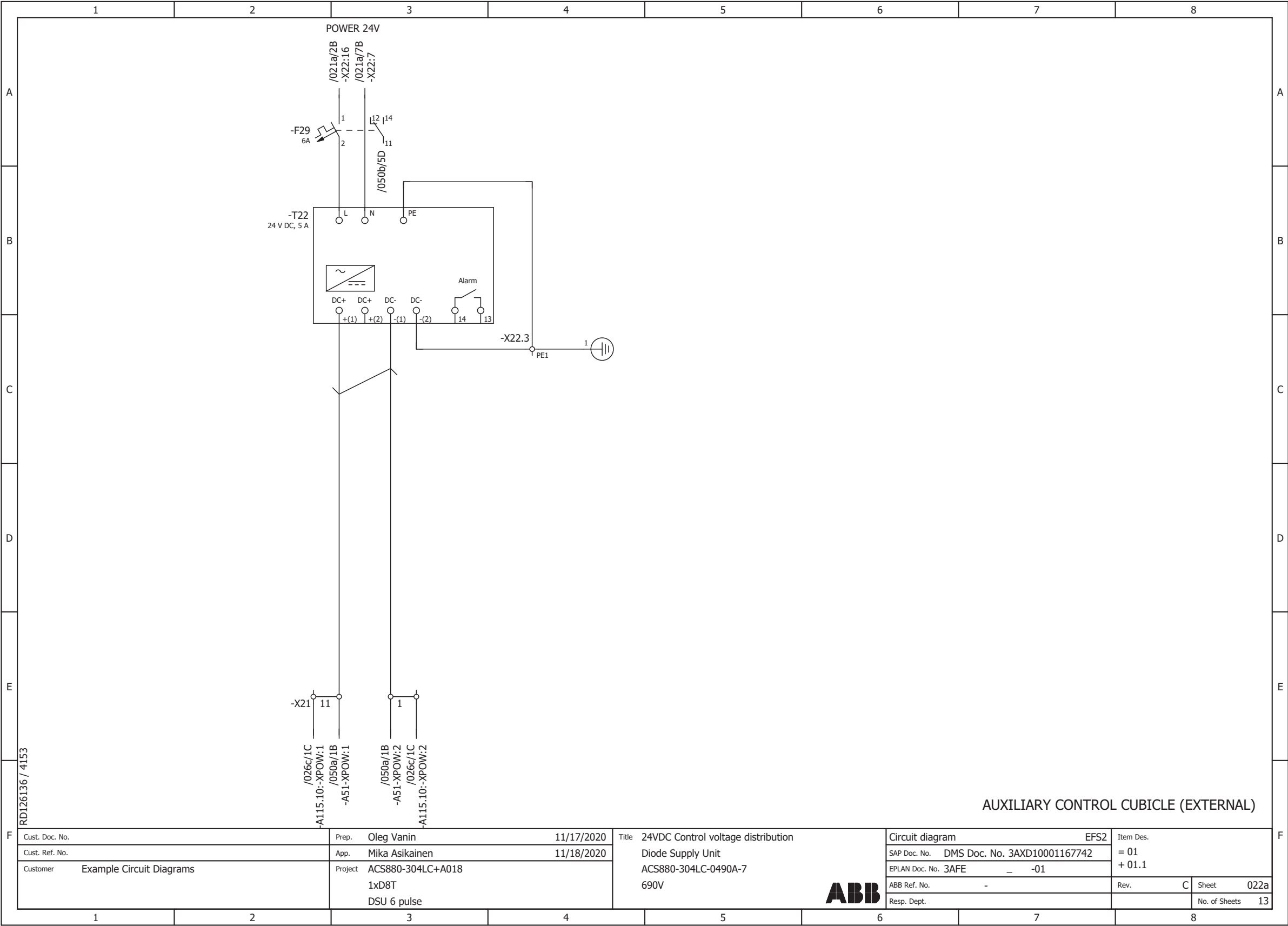
■ Sheet 020a – 230 V/115 V External auxiliary circuit and fan supply



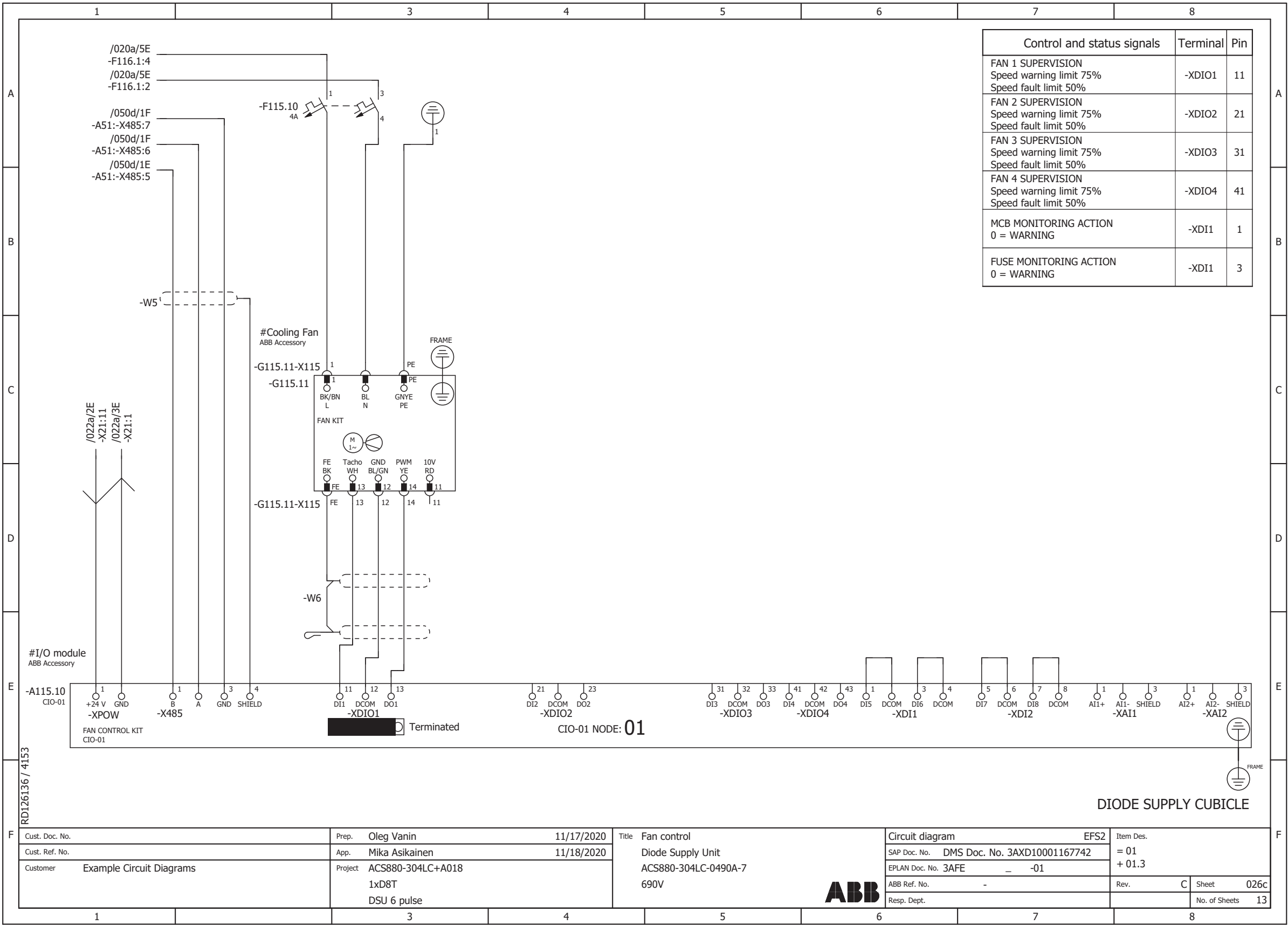


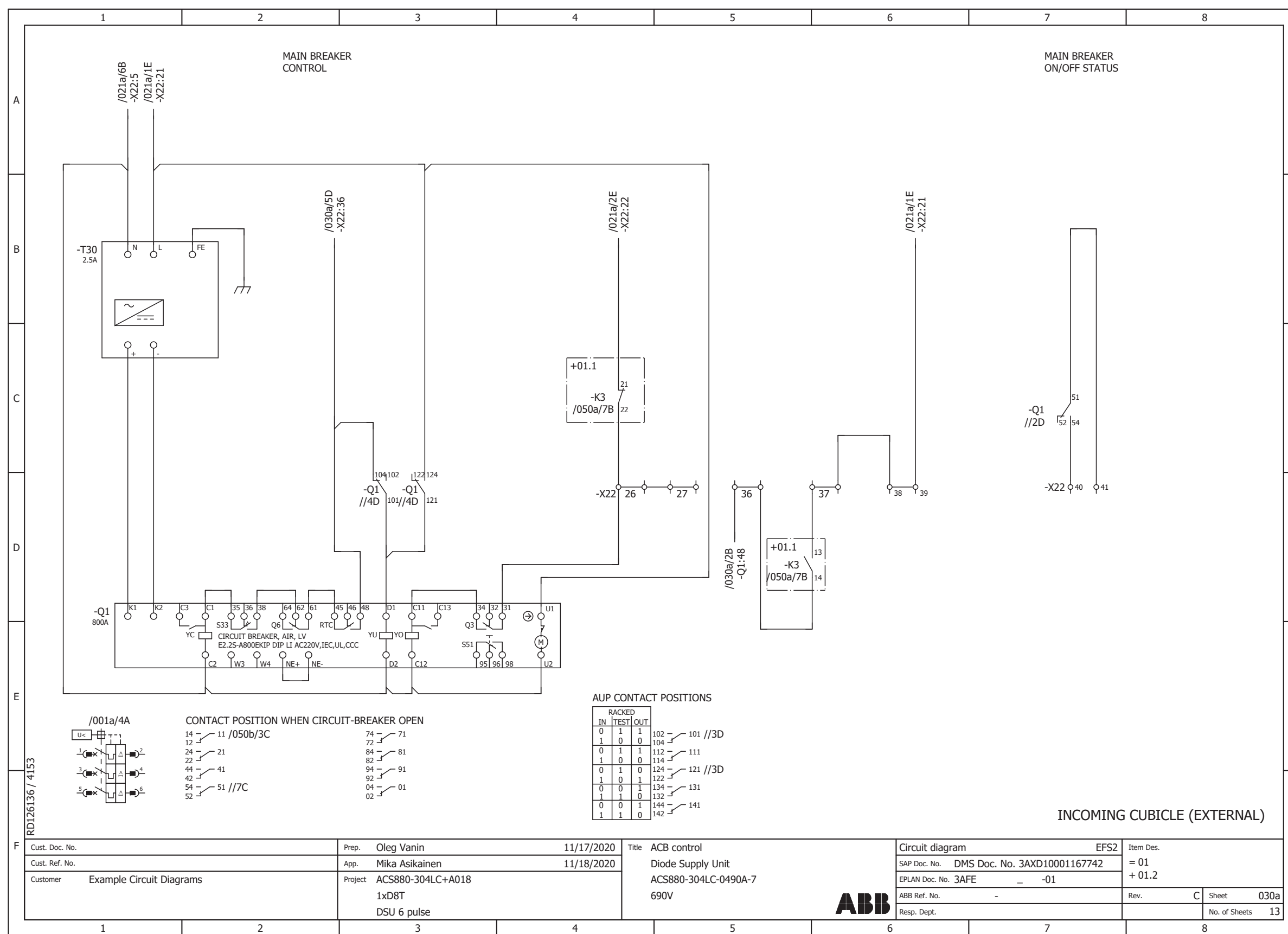


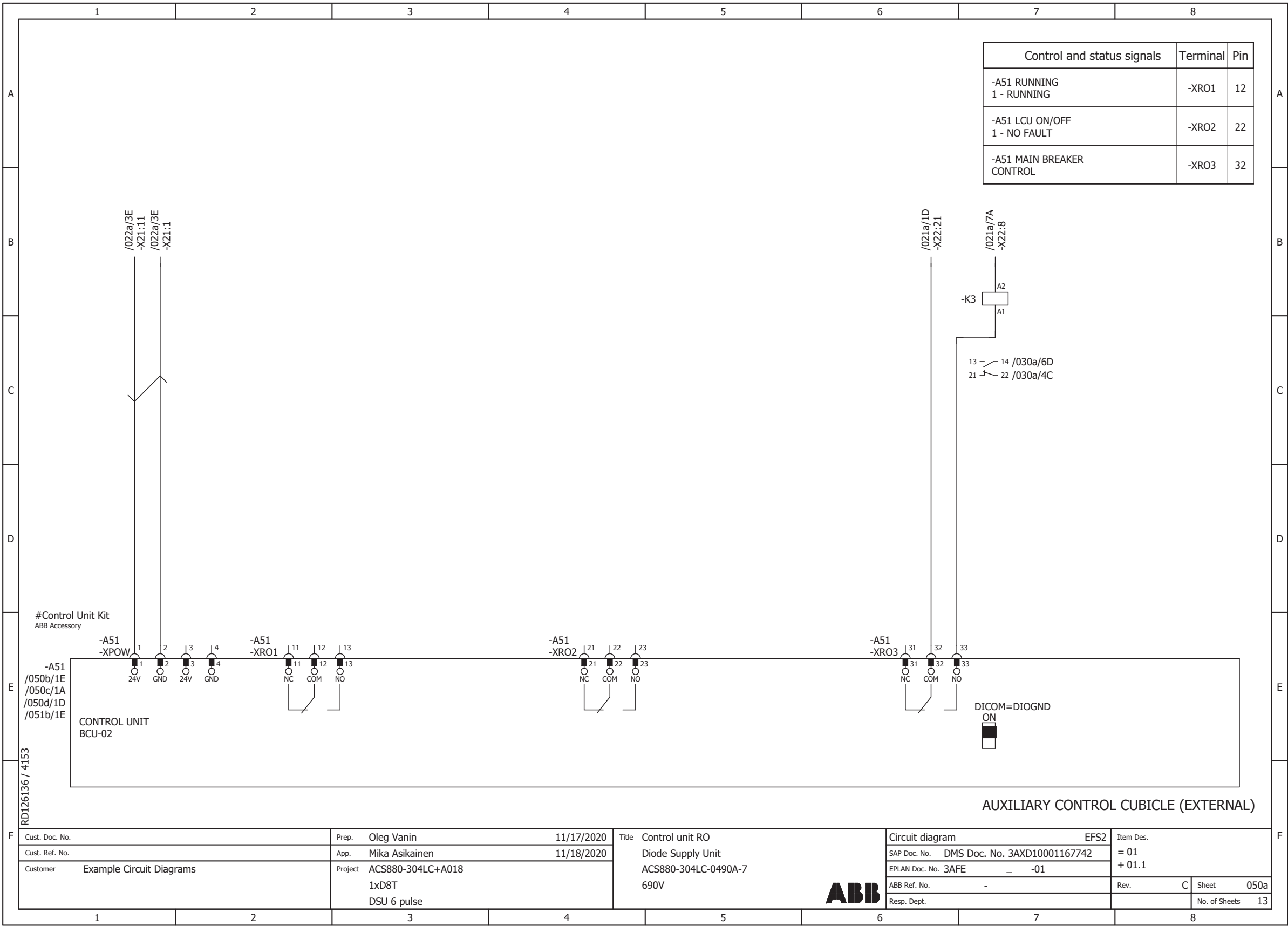
■ Sheet 022a – 24 VDC Control voltage distribution



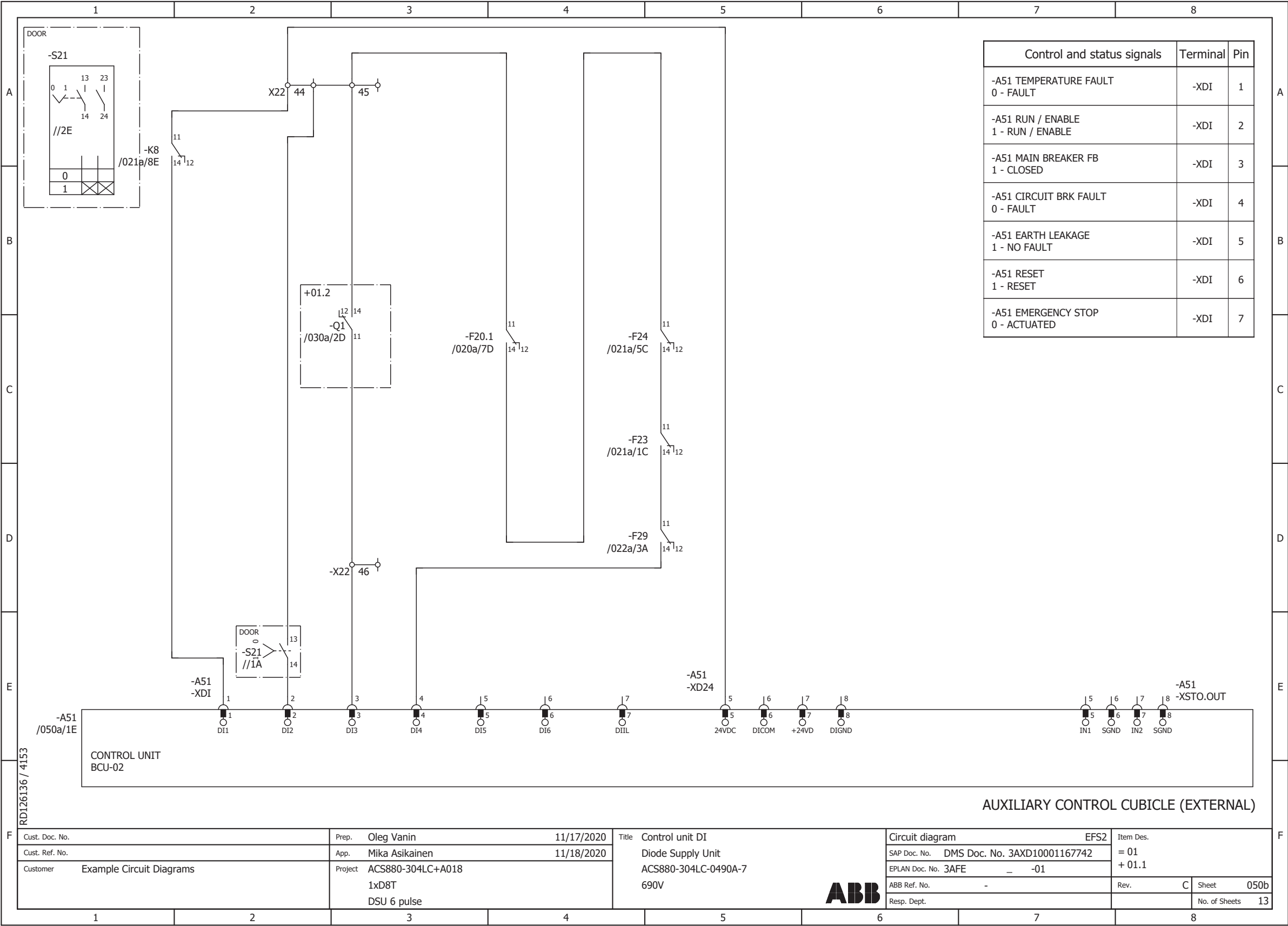
■ Sheet 026c – Fan control

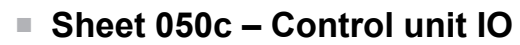




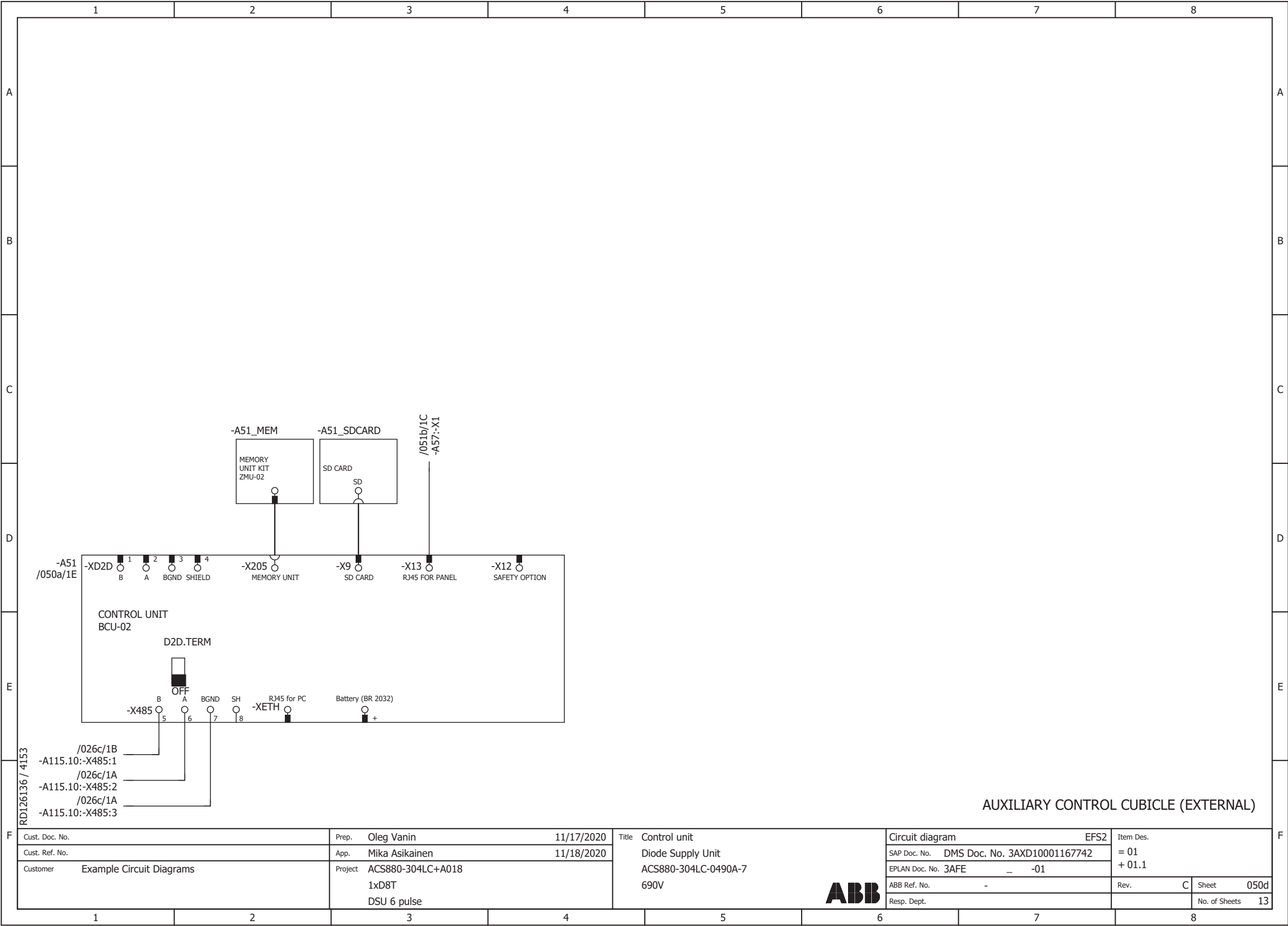


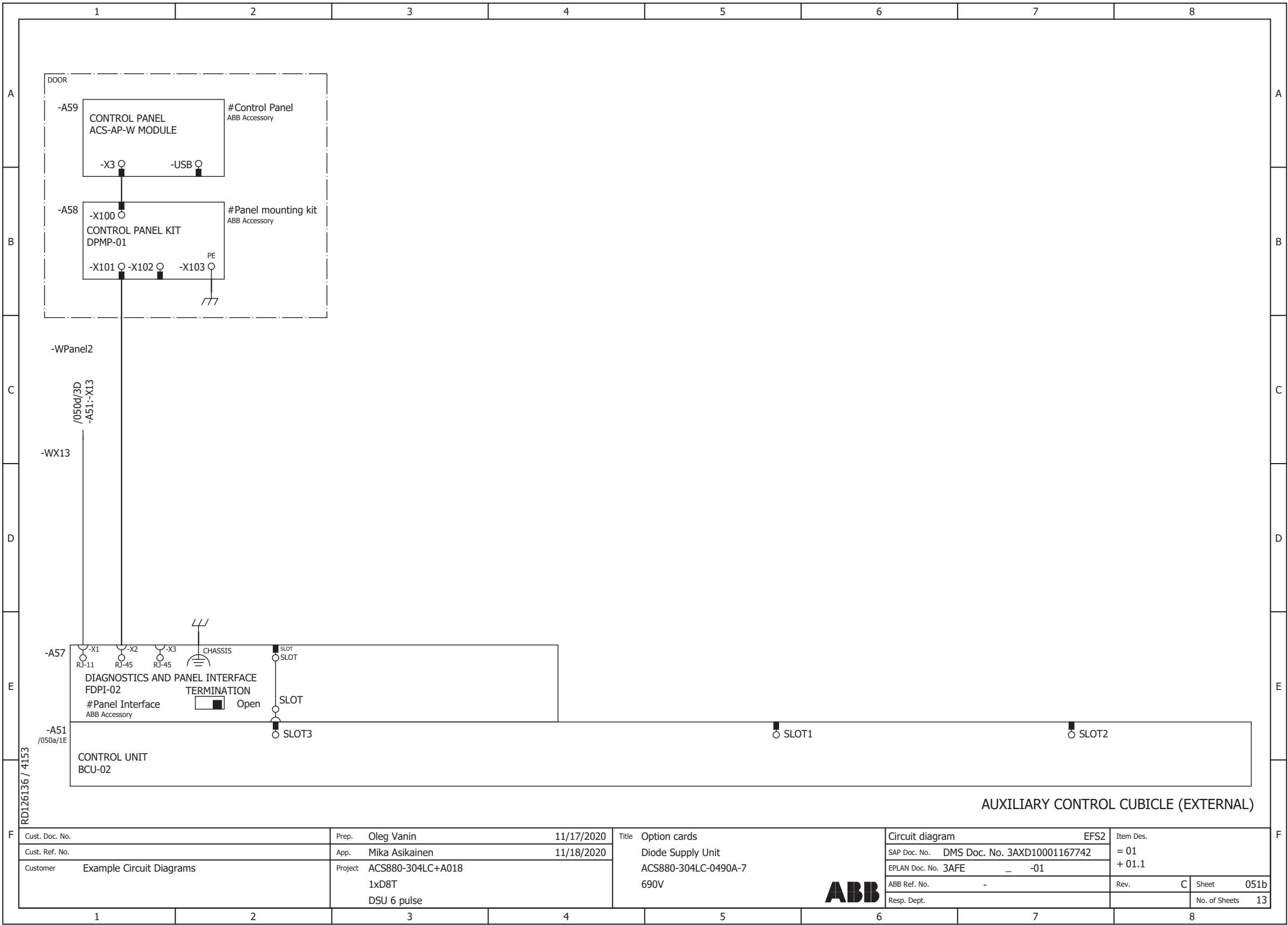
■ Sheet 050b – Control unit DI





■ Sheet 050d – Control unit

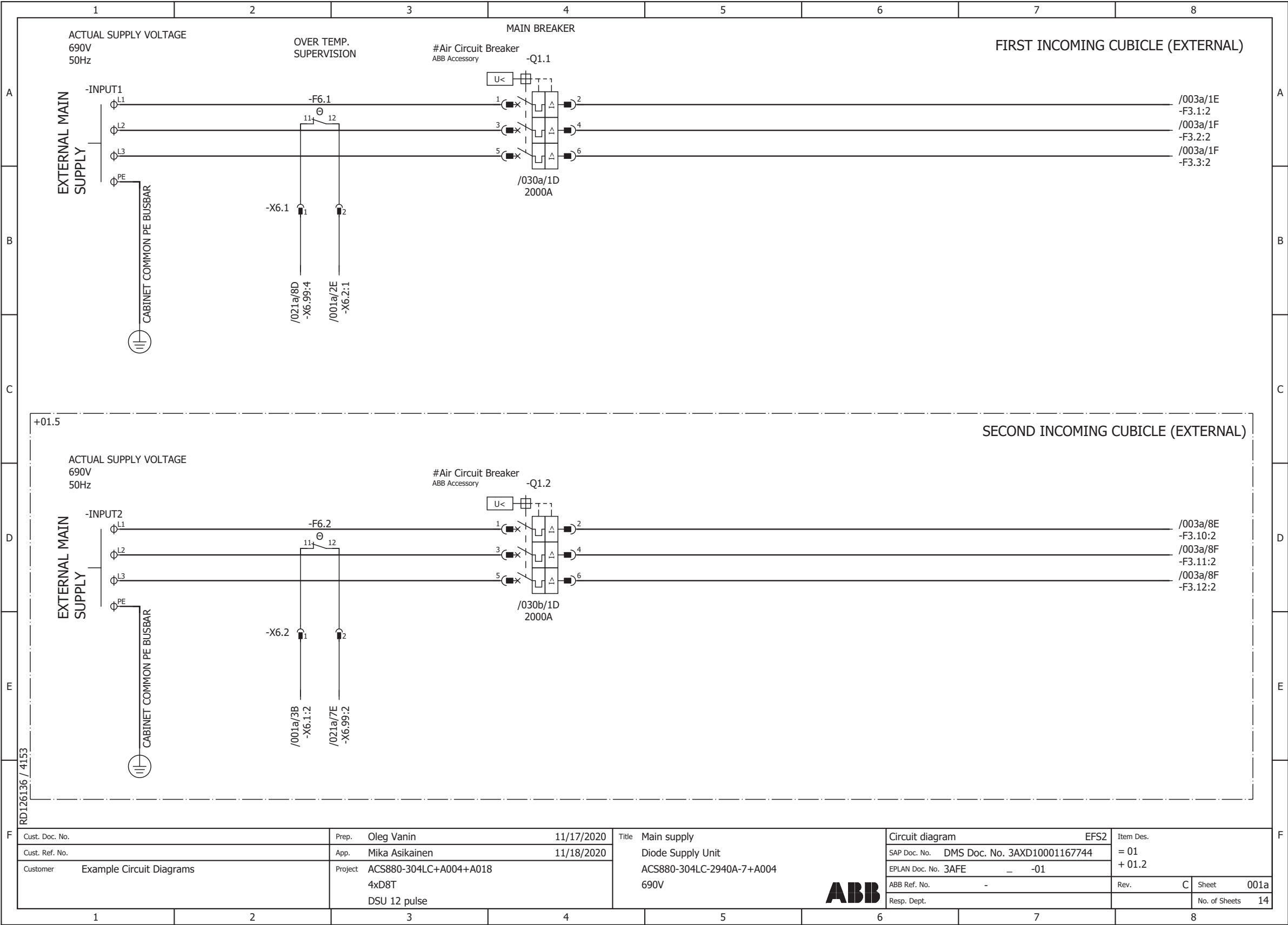


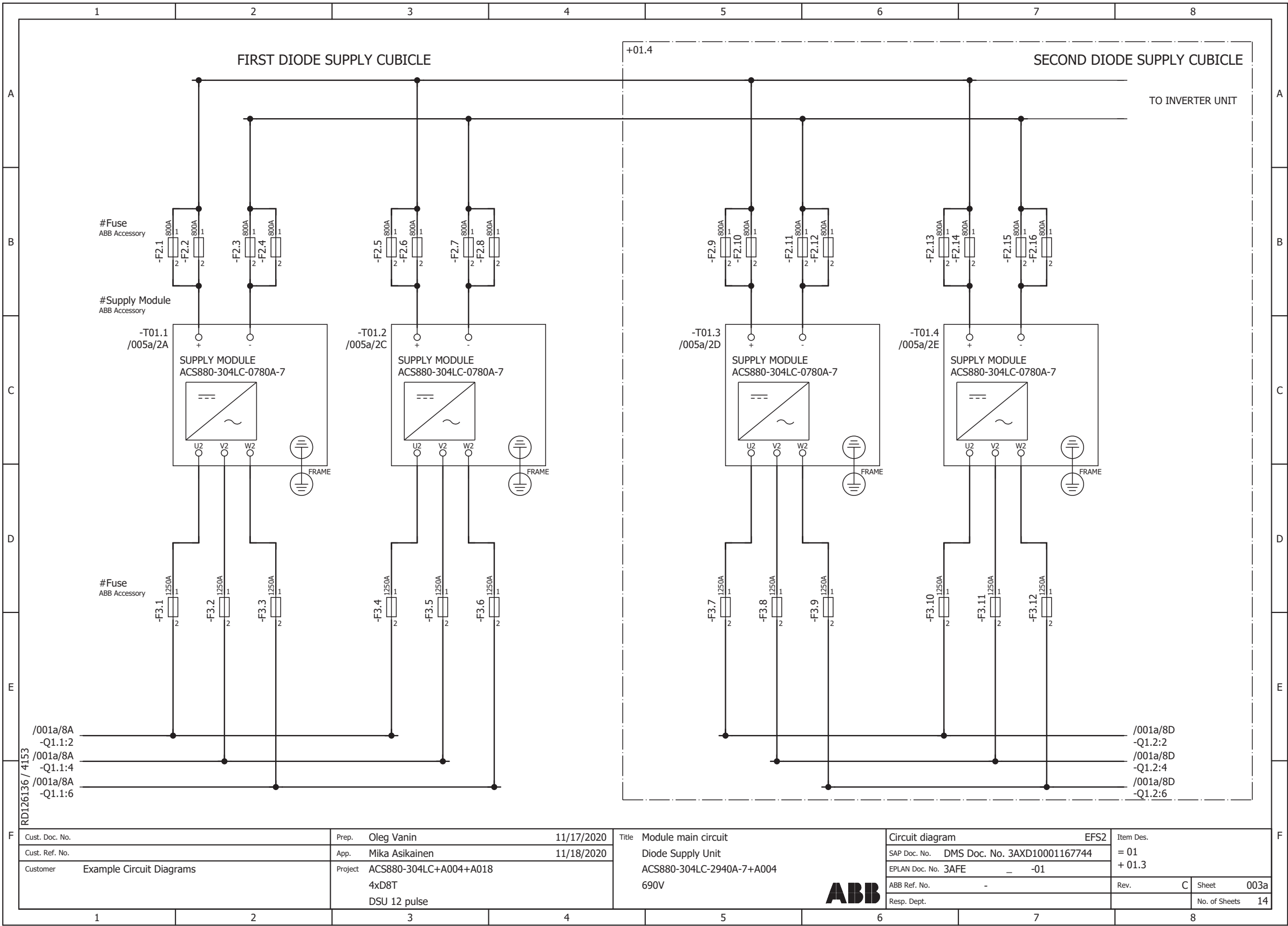




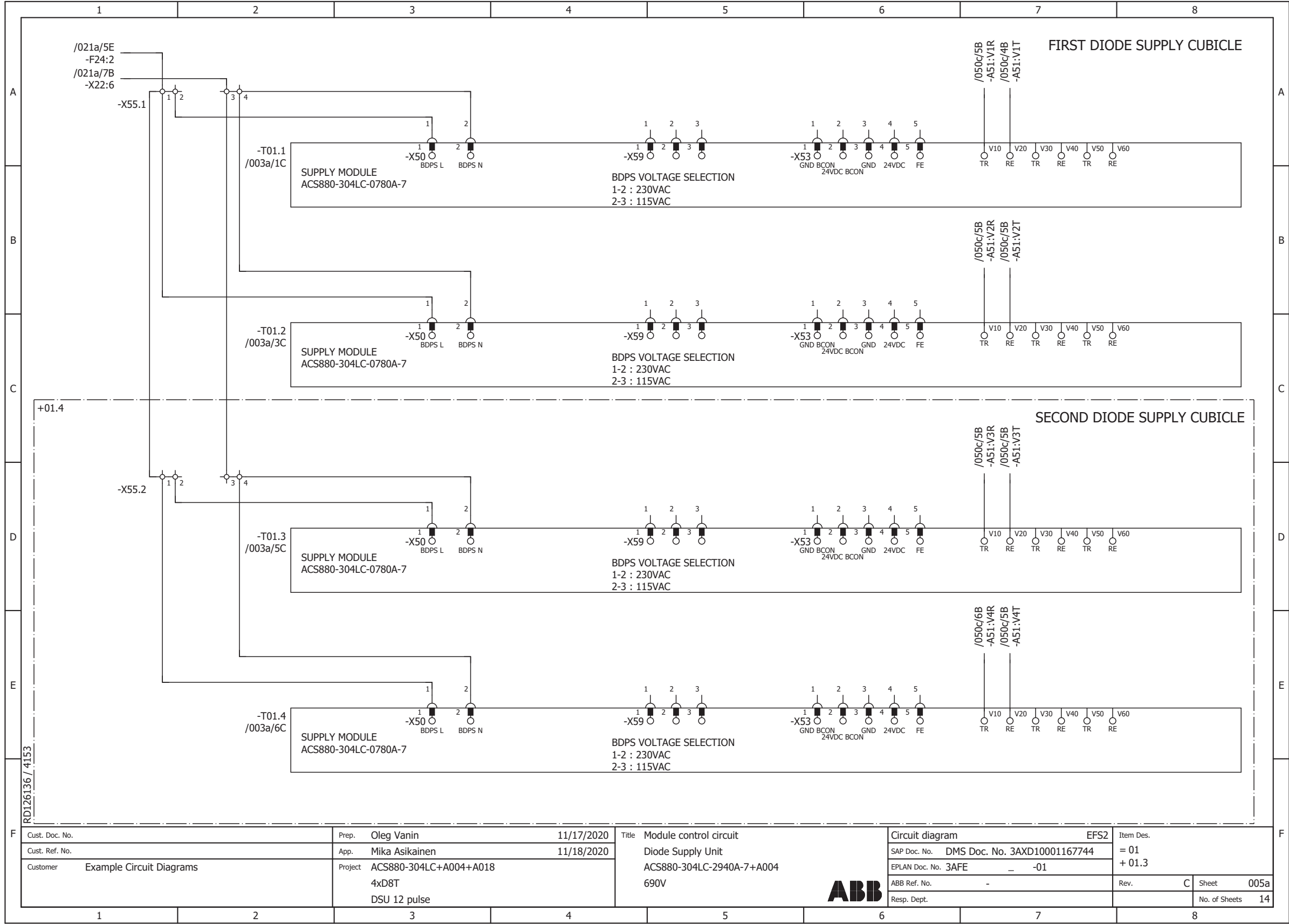
ACS880-304LC-2940A-7+A004+A018 (4xD8T 12-pulse)

■ Sheet 001a – Main supply





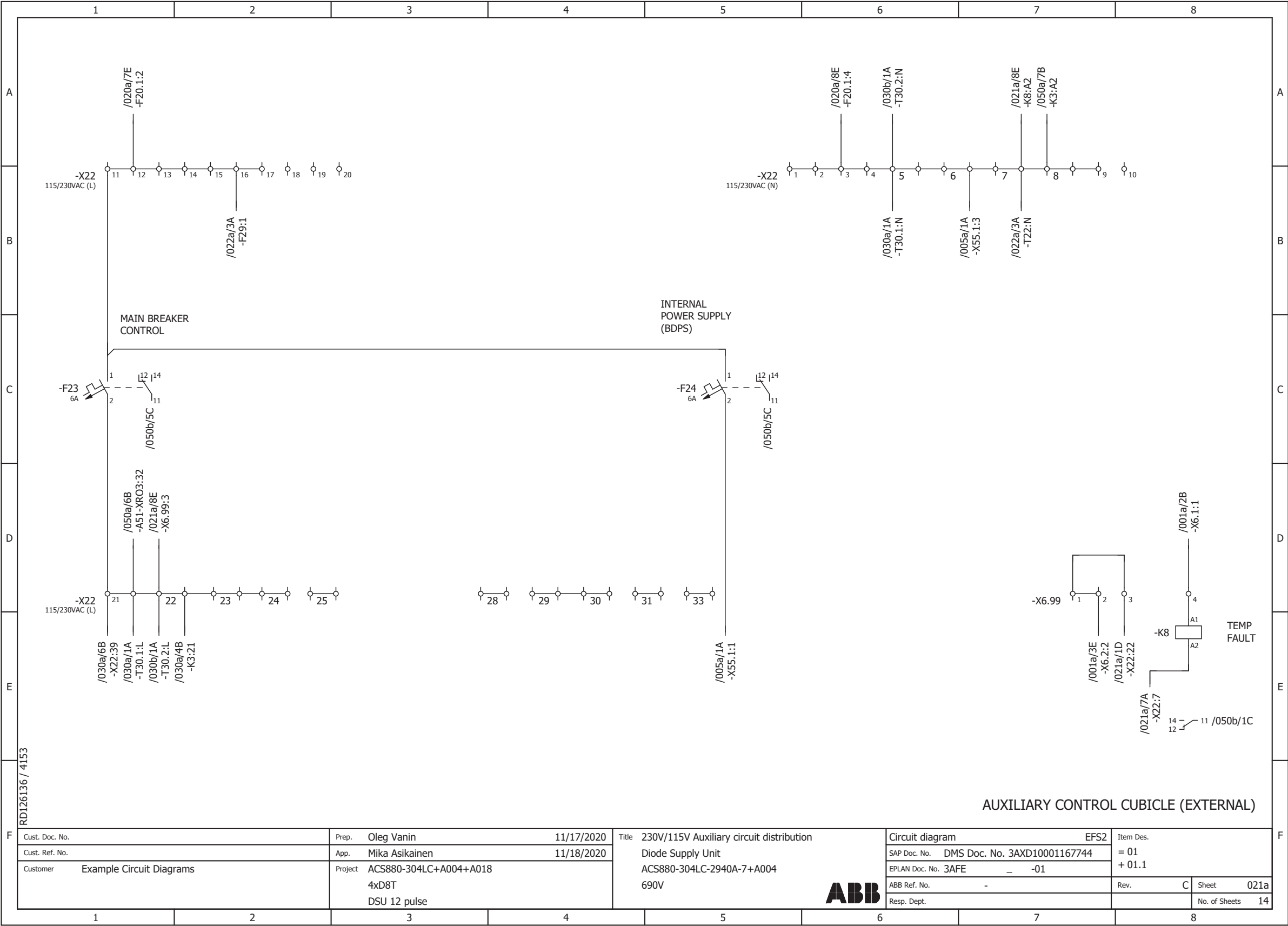
■ Sheet 005a – Module control circuit



Cust. Doc. No.	Prep. Oleg Vanin11/17/2020	Title Module control circuit	Circuit diagramEFS2	Item Des.
Cust. Ref. No.	App. Mika Asikainen11/18/2020	Diode Supply Unit	SAP Doc. No. DMS Doc. No. 3AXD10001167744	= 01
Customer Example Circuit Diagrams	Project ACS880-304LC+A004+A018	ACS880-304LC-2940A-7+A004	EPLAN Doc. No. 3AFE-01	+ 01.3
	4xD8T	690V	ABB Ref. No. -	Rev. C
	DSU 12 pulse		Resp. Dept.	Sheet 005a
				No. of Sheets 14



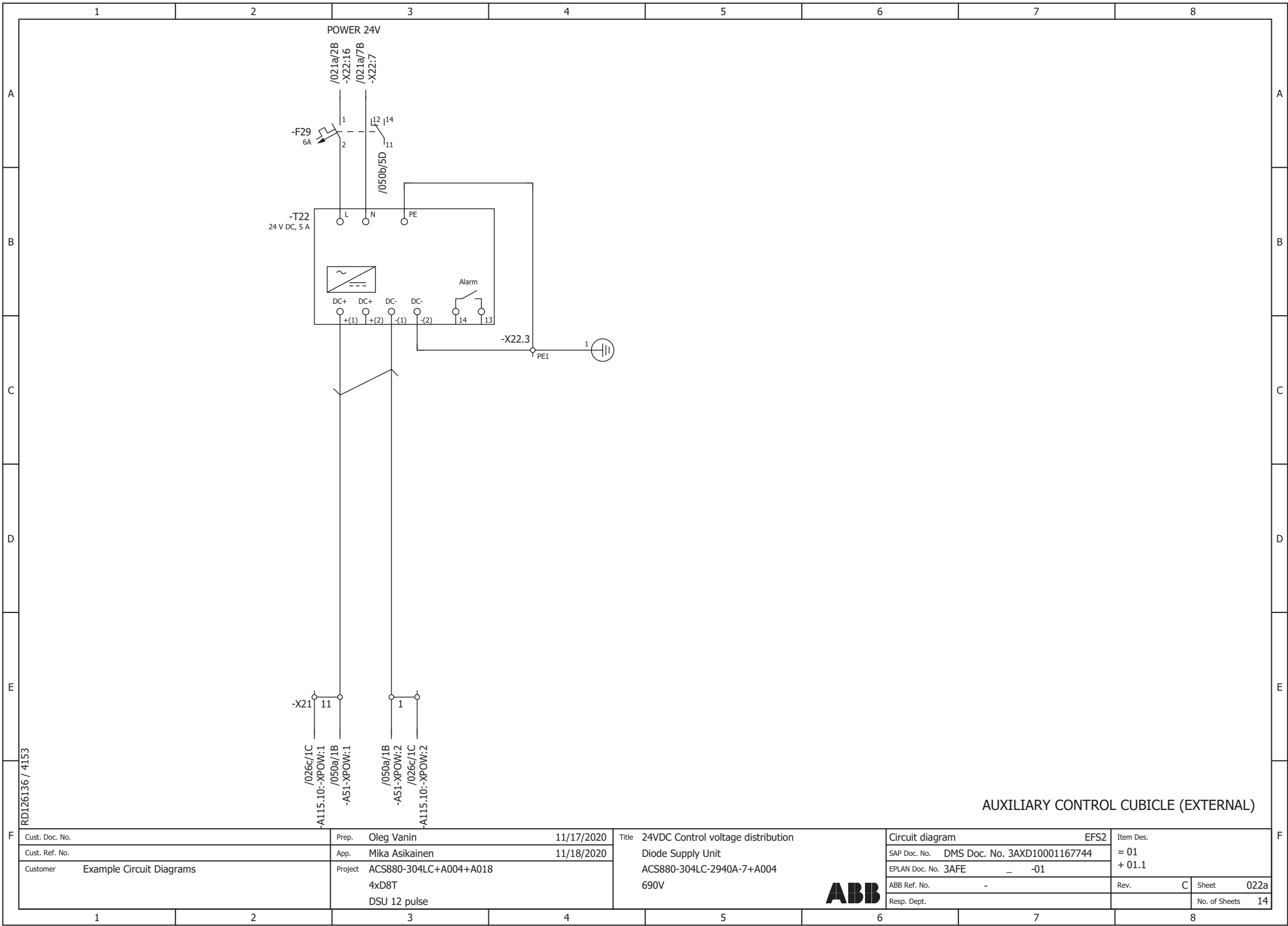
■ Sheet 021a – 230 V/115 V Auxiliary circuit distribution



RD126136 / 4153

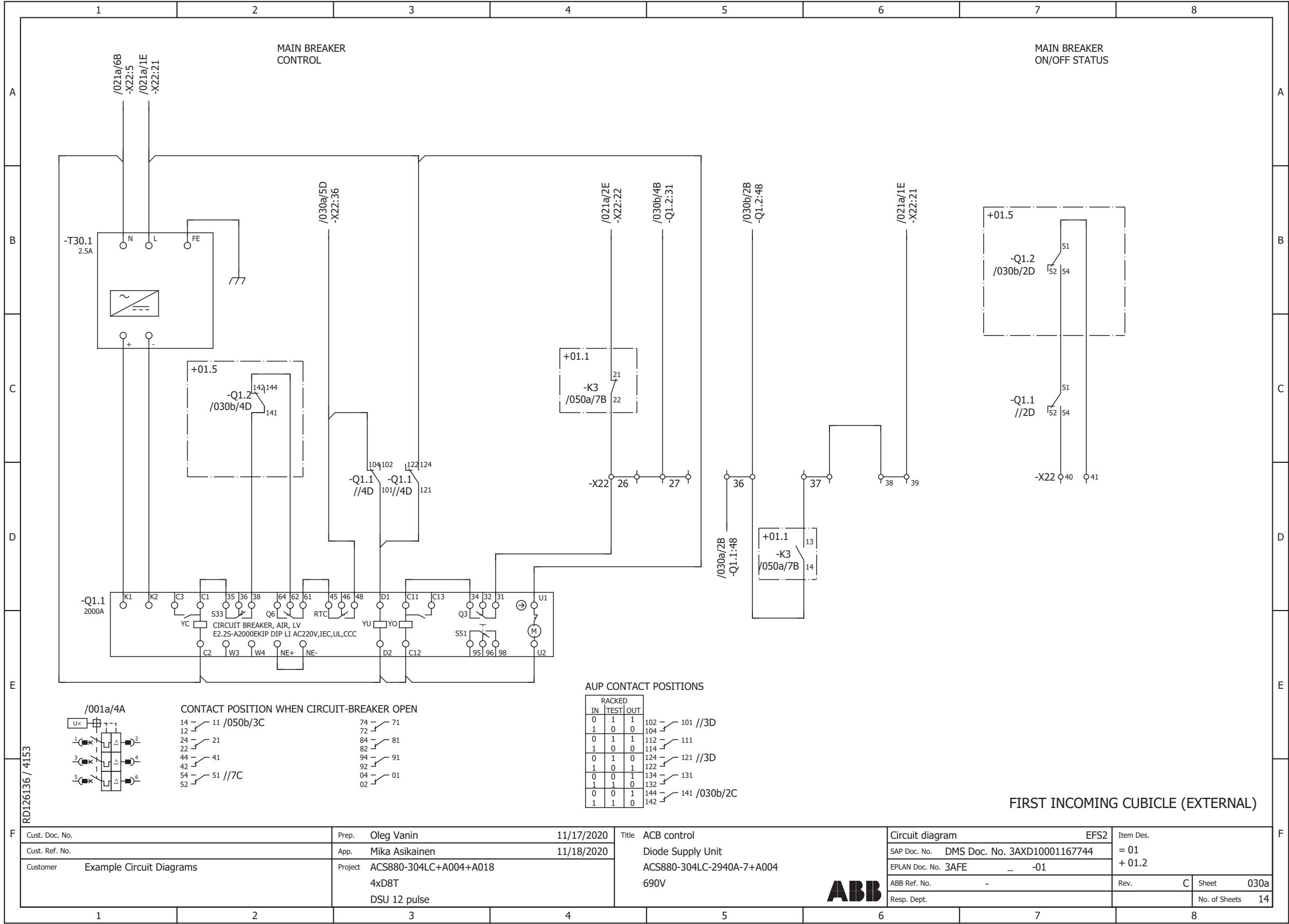
F	Cust. Doc. No.			Prep.	Oleg Vanin	11/17/2020	Title	230V/115V Auxiliary circuit distribution			Circuit diagram			EFS2	Item Des.			F								
	Cust. Ref. No.			App.	Mika Asikainen	11/18/2020		Diode Supply Unit			SAP Doc. No.			DMS Doc. No.	3AXD10001167744	= 01										
	Customer			Project				ACS880-304LC+A004+A018 4xD8T DSU 12 pulse			ACS880-304LC-2940A-7+A004 690V			EPLAN Doc. No.			3AFE		—	-01	Rev.			C	Sheet	021a
																	ABB Ref. No.			—				—		
												Resp. Dept.														

■ Sheet 022a – 24 VDC Control voltage distribution



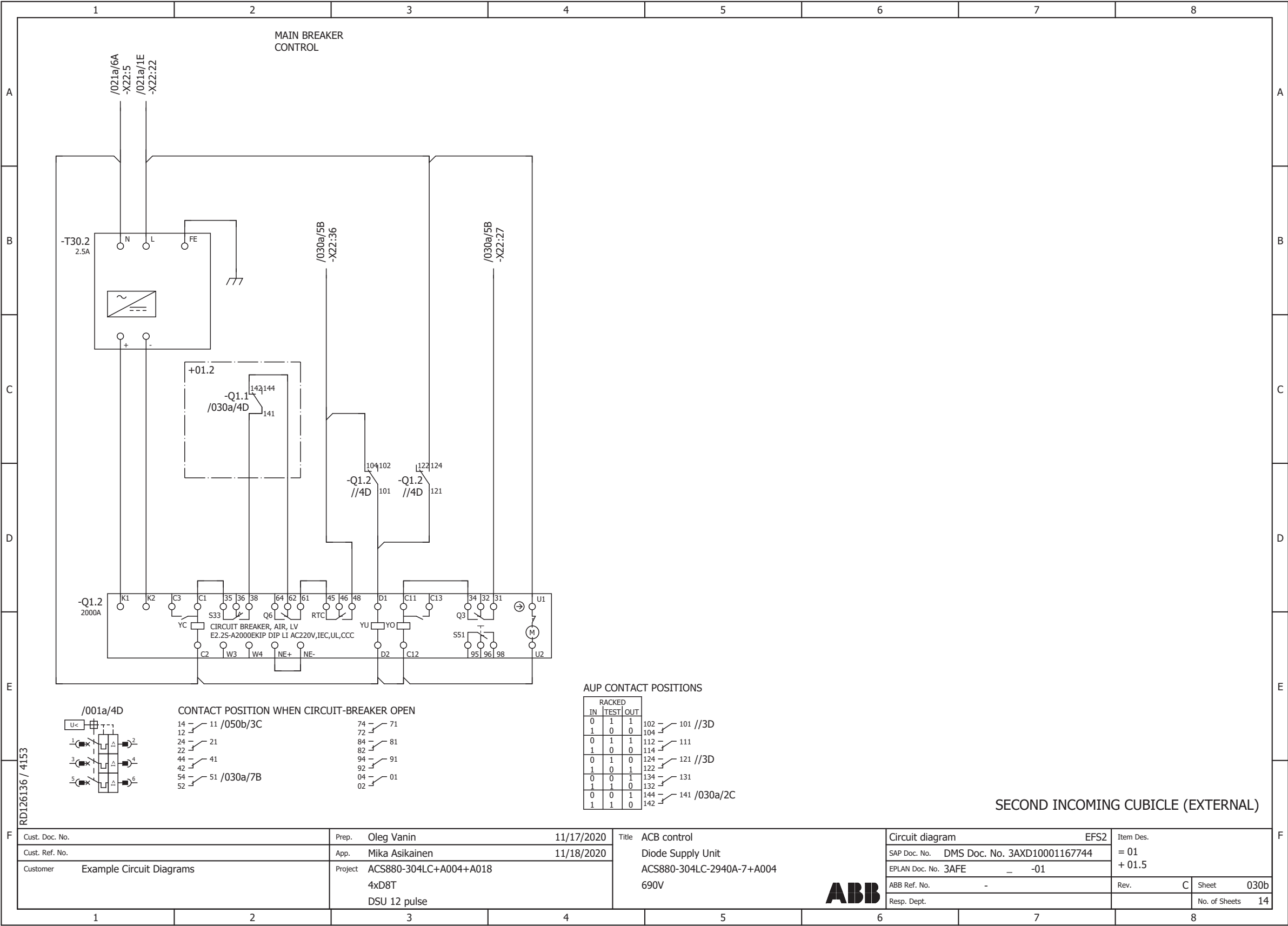
ABB

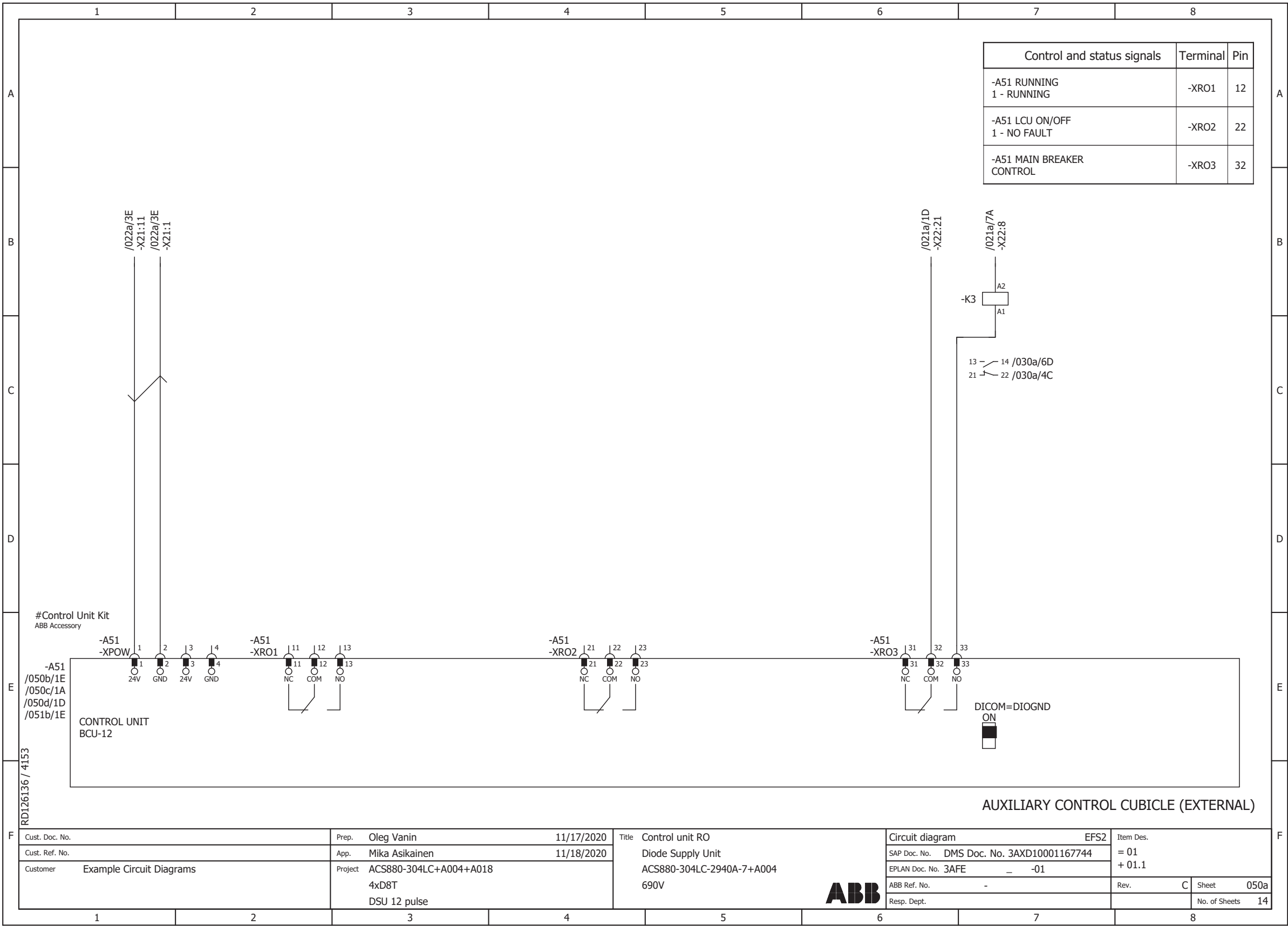






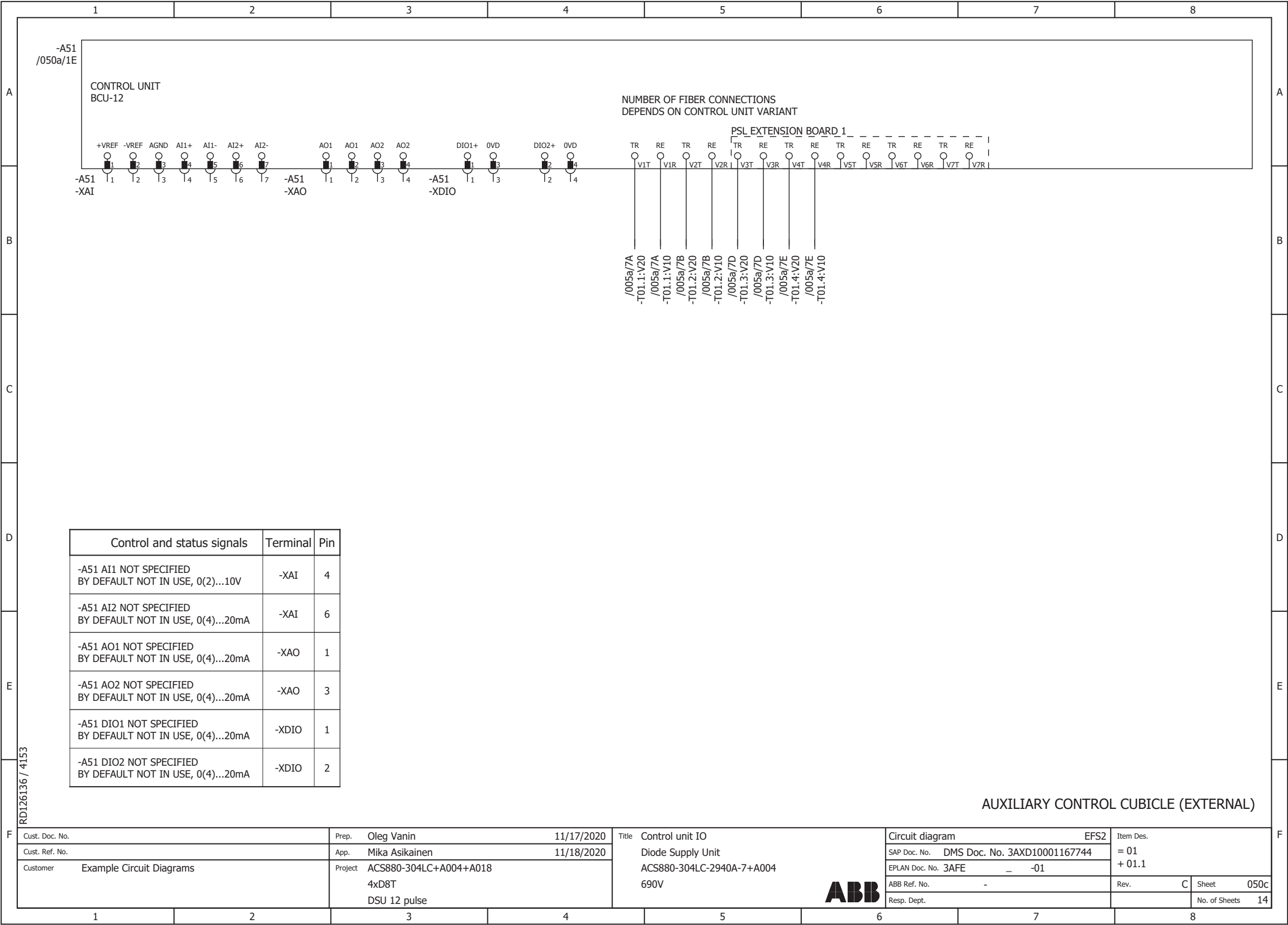
■ Sheet 030b – ACB control







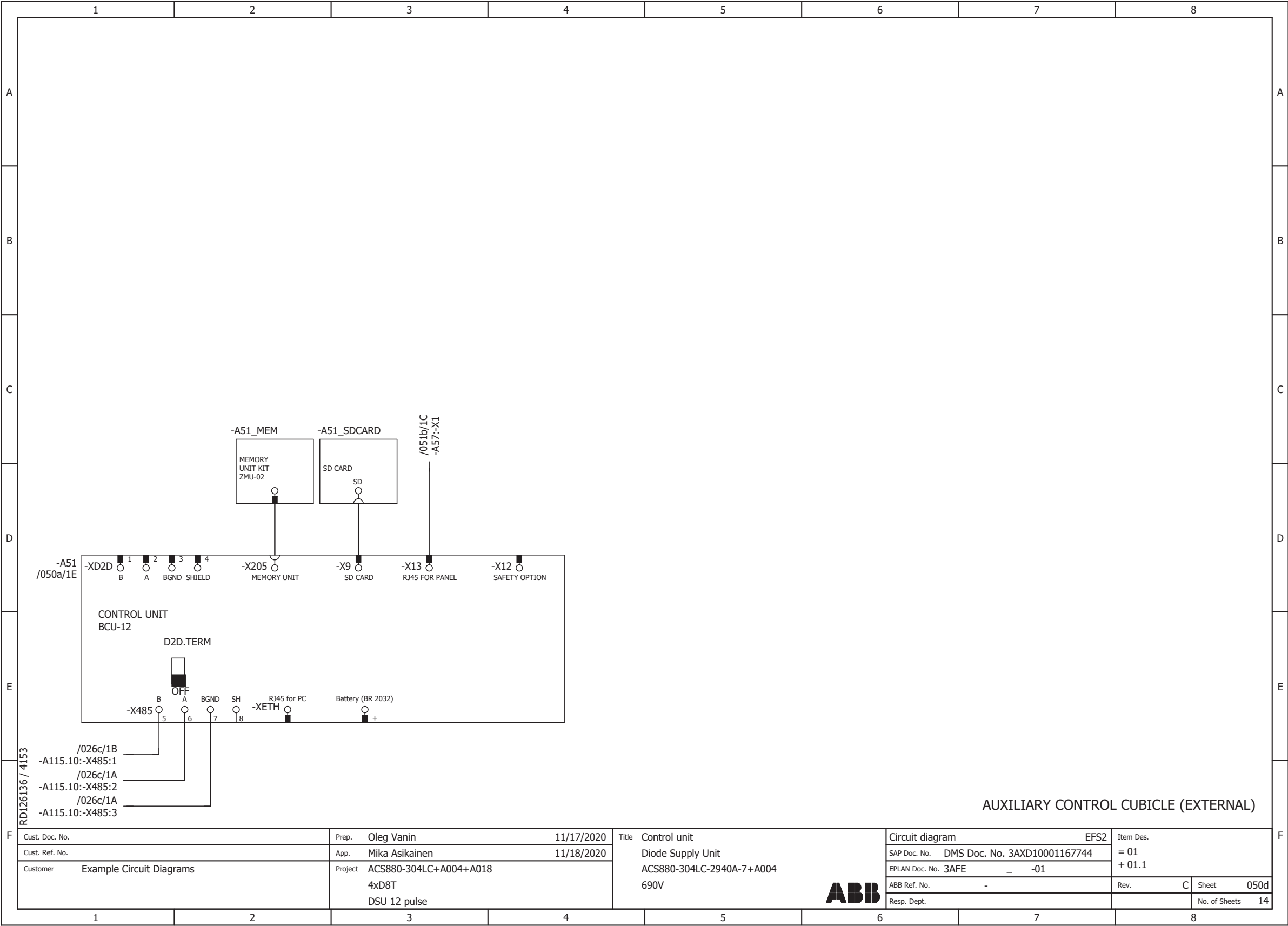
■ Sheet 050c – Control unit IO

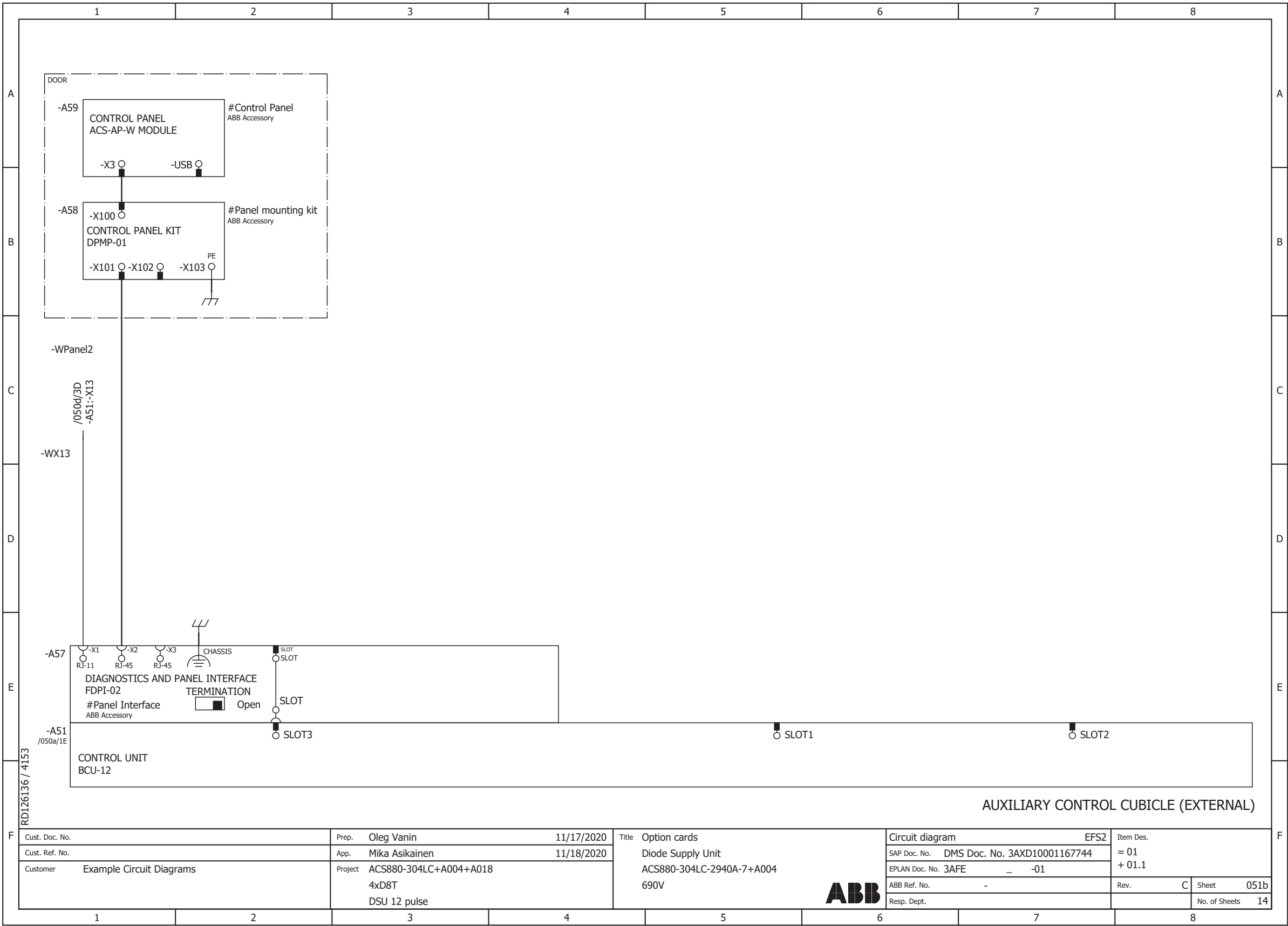


RD126136 / 4153

ABB

■ Sheet 050d – Control unit





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# Further information

## **Product and service inquiries**

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

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