ABB INDUSTRIAL DRIVES

ACS880-204LC IGBT supply modules
Hardware manual
ACS880-204LC IGBT supply modules

Hardware manual

Table of contents

5. Electrical installation

7. Start-up
# Table of contents

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
- Related documents ......................................................................... 15

2 Operation principle and hardware description
- Contents of this chapter ................................................................. 17
- Operation principle ......................................................................... 17
  - Simplified main circuit diagram .................................................. 18
  - Charging ...................................................................................... 18
- Overview diagram of the drive system ............................................ 19
- Cooling system ............................................................................... 19
- Single-line circuit diagrams of the supply unit ................................ 20
  - Frame 1×R8i ............................................................................. 20
  - Frame R8i multiples .................................................................. 21
- IGBT supply module hardware ....................................................... 22
  - Frame R8i hardware .................................................................. 22
  - Module layout ........................................................................... 22
  - Coolant connectors .................................................................... 23
  - Connectors X50...X59 .................................................................. 23
  - Fiber optic connectors ............................................................... 24
- Control interfaces ........................................................................... 24
  - BCU control unit of frame R8i and multiples ................................. 24
  - Overview of the control connections of the BCU control unit ....... 25
- Supply unit control devices ............................................................. 26
  - Main disconnecting device ......................................................... 26
  - Auxiliary voltage switch ............................................................ 26
  - Operating switch ....................................................................... 26
  - Emergency stop and emergency stop reset buttons ....................... 26
  - Control panel ............................................................................ 26
  - Line-up charging switch ............................................................ 27
  - Local charging control switch .................................................... 27
  - DC switch-disconnector ............................................................ 27
  - Charging switch for unit charging .............................................. 27
  - DC switch-disconnector for line-up charging ............................... 27
  - PC connection ........................................................................... 27
  - Fieldbus control ........................................................................ 28
- Type designation labels .................................................................. 28
- Type designation key ....................................................................... 29
- IGBT supply module ..................................................................... 29
- LCL filter ....................................................................................... 30
3 Moving and unpacking the module

Contents of this chapter ................................................................. 31
Moving and unpacking the module .................................................. 31

4 Cabinet construction

Contents of this chapter ................................................................. 33
Limitation of liability .................................................................. 33
Switching, disconnecting and protecting solution .......................... 33
Frame R8i ............................................................................. 33
Cabinet temperature supervision ................................................... 34
Installation examples ................................................................. 35
BLCL-15LC-7 / BLCL-24LC-7 in a 600 mm wide Rittal VX25 enclosure 36
Layout drawing ..................................................................... 36
Pipe routing example (BLCL-15LC-7) ........................................... 37
Pipe routing example (BLCL-24LC-7 and BLCL-25LC-7) ................. 37
Installation stages .................................................................... 38
Overview of kits ..................................................................... 39
Stage 1: Installation of common parts .......................................... 40
Stage 2: Installation of LCL side plates and common AC bus .......... 41
Stage 3: Installation of brackets for Flat-PLS holder ....................... 42
Stage 4A: BLCL-15LC-7: AC connection and fuse busbars installation 43
Stage 4B: BLCL-24LC-7: AC connection and fuse busbars installation .... 44
Stage 5: Installation of LCL choke mounting mechanics and LCL ISU connection 45
Stage 6: LCL choke and LCL choke busbar installation .................. 46
Stage 7: Heat exchanger, heat exchanger mechanics and cooling components installation 47
Stage 8A: BLCL-15LC-7: LCL capacitor support, fan support mechanics and fan installation ........................................... 48
Stage 8B: BLCL-24LC-7: LCL capacitor support, fan support mechanics and fan installation ........................................... 48
Stage 9: Installation of LCL shroud kit ......................................... 49
BLCL-15LC-7 / BLCL-24LC-7 in a 600 mm wide generic enclosure .... 51
BLCL-25LC-7 in a 600 mm wide generic enclosure ......................... 53
Installation stages .................................................................... 53
Overview of kits ..................................................................... 54
Stage 1: Installation of common parts .......................................... 55
Stage 2: Installation of LCL side plates and common AC bus .......... 56
Stage 3: Installation of brackets for Flat-PLS holder ....................... 57
Stage 4: AC connection and fuse busbars installation .................... 58
Stage 5: Installation of LCL choke mounting mechanics and LCL ISU connection 59
Stage 6: LCL choke and LCL choke busbar installation .................. 60
Stage 7: Heat exchanger, heat exchanger mechanics and cooling components installation 61
Stage 8: LCL capacitor support, fan support mechanics and fan installation .... 62
Stage 9: Installation of LCL shroud kit ......................................... 63
BLCL-25LC-7 in a 600 mm wide generic enclosure ......................... 64
One R8i module in a 400 mm wide Rittal VX25 enclosure ................. 66
Layout drawing ..................................................................... 66
Pipe routing example ................................................................ 67
Installation stages .................................................................... 68
Overview of kits ..................................................................... 69
5 Electrical installation

Contents of this chapter ................................................................. 109
Safety and liability ........................................................................ 109
Electrical safety precautions .......................................................... 109
Isolation from AC supply networks .................................................. 112
Isolation from common DC bus ....................................................... 113
General notes ................................................................................ 114
  Printed circuit boards .................................................................. 114
  Optical components ................................................................... 114
Checking the insulation of the assembly ........................................... 114
  Measuring the insulation resistance of the input power cable ......... 114
Checking the compatibility with IT (ungrounded) systems ........................................... 114
Connecting the input power cables/busbars ................................................................. 115
  Connection diagram ................................................................................................. 115
  Connection procedure for power connections inside the IGBT supply module cubicle . 116
  Connection procedure ............................................................................................. 117
Connecting the LCL filter ........................................................................................... 119
Main breaker / contactor ............................................................................................ 120
Installing the charging circuit ..................................................................................... 120
Connecting the external power supply cable for the auxiliary circuit ......................... 120
Connecting the control cables .................................................................................... 121
  Connection diagram ................................................................................................. 121
  Connection procedure ............................................................................................. 121
  Connectors X50…X59 and fiber optic connectors (frame R8i) ..................................... 122
Connecting a PC ........................................................................................................ 122
Installing option modules .......................................................................................... 123
Installing and using CIO-01 I/O module ................................................................... 124

6 Installation checklist

Contents of this chapter ............................................................................................... 125
Checklist ...................................................................................................................... 125

7 Start-up

Contents of this chapter ............................................................................................... 129
Start-up procedure ....................................................................................................... 130
Switching the supply unit off ....................................................................................... 132
Additional instructions for closing the DC switch-disconnector .................................. 132

8 Maintenance

Contents of this chapter ............................................................................................... 133
Maintenance intervals .................................................................................................. 133
  Description of symbols ............................................................................................. 133
  Recommended maintenance intervals after start-up .................................................. 134
Maintenance timers and counters ............................................................................... 135
Cooling system ............................................................................................................ 135
Cabinet ....................................................................................................................... 135
  Cleaning the interior of the cabinet ......................................................................... 135
Power connections ....................................................................................................... 136
  Retightening the power connections ........................................................................ 136
Cooling fans ................................................................................................................ 136
  Replacing the cooling fan of the IGBT supply module (frame R8i) ......................... 136
  Replacing the cooling fan of the LCL filter .............................................................. 138
IGBT supply module ................................................................................................... 139
  Replacing the IGBT supply module (frame R8i) ...................................................... 139
    Removing the module .............................................................................................. 139
    Reinstalling the module ......................................................................................... 142
Capacitors ................................................................................................................... 143
  Reforming the capacitors .......................................................................................... 143
Control panel ............................................................................................................... 143
  Cleaning the control panel ....................................................................................... 143
  Replacing the battery .............................................................................................. 143
Control unit ...................................................................................................................... 144
Replacing the memory unit .......................................................................................... 144
Replacing the BCU control unit battery ..................................................................... 145
LEDs and other status indicators ................................................................................ 145
Control panel and panel platform/holder LEDs .......................................................... 145
R8i module LEDs ......................................................................................................... 146
Reduced run .................................................................................................................. 146
Starting reduced run operation ................................................................................... 146
Resuming normal operation ......................................................................................... 147
Functional safety components ...................................................................................... 147

9 Ordering information

Contents of this chapter ............................................................................................... 149
Kit code key .................................................................................................................. 150
Frame R8i and multiples ............................................................................................... 152
IGBT supply modules ................................................................................................... 152
LCL filters ....................................................................................................................... 153
Control panel ................................................................................................................ 154
Control electronics ........................................................................................................ 155
Control unit ................................................................................................................... 155
Fiber optic cables ......................................................................................................... 155
Auxiliary measurement unit (BAMU) ......................................................................... 155
CIO-01 I/O module ........................................................................................................ 156
Mechanical installation accessories ............................................................................ 157
Adapter kit (for Rittal VX25 enclosures) ..................................................................... 157
Module top/bottom guides ............................................................................................ 158
Shrouding ....................................................................................................................... 160
Marine support kit for LCL filters ............................................................................... 161
Lifting device ................................................................................................................ 161
AC-side components .................................................................................................... 162
Main circuit breakers and wagons ............................................................................... 162
IEC busbar shim kits ..................................................................................................... 170
Main circuit breaker and wagon cover ........................................................................ 170
AC fuses ........................................................................................................................ 171
AC-DC charging kits for line-up charging .................................................................. 172
Varistor board kit for UL/CSA installations ................................................................. 173
AC busbars for LCL filters ........................................................................................... 174
LCL fuse busbars .......................................................................................................... 175
LCL choke installation kits ............................................................................................ 175
LCL capacitor installation kits ....................................................................................... 177
LCL ISU connection kits ............................................................................................... 178
AC busbars .................................................................................................................... 179
Quick connector ............................................................................................................ 179
DC-side components .................................................................................................... 180
DC bus installation parts (for Rittal VX25 enclosures) ............................................... 180
DC connection parts 1 of 2 (for Rittal VX25 enclosures) ............................................ 181
DC connection parts 1 of 2 (for generic enclosures) .................................................... 182
DC fuses ....................................................................................................................... 185
DC switch-disconnector kits for unit charging ............................................................ 186
DC charging kits for unit charging (for units with DC switch-disconnector) ............. 187
Charging resistors for unit charging (for units with DC switch-disconnector) .......... 188
DC switch-disconnector for line-up charging ............................................................... 188

Table of contents 9
10 Table of contents

DC connection parts 2 of 2 ................................................................. 189
Flat-PLS busbars (common DC) for LCL filters ................................. 189
Charging mechanics ........................................................................ 190
DC connection charging mechanics .................................................. 190
Common mode filter busbars ............................................................ 191
Common mode filters ...................................................................... 191
Cooling system parts ....................................................................... 191
Coolant distribution manifold kits ................................................. 191
Piping ............................................................................................. 193
Heat exchanger .............................................................................. 193
Cooling system parts for LCL filters ............................................... 194
Cooling fans for LCL filters ............................................................. 195
Cooling fans for IGBT supply modules .......................................... 196

10 Internal cooling circuit

Contents of this chapter .................................................................... 197
Applicability ..................................................................................... 197
Internal cooling system .................................................................... 197
Connection to a cooling unit ............................................................ 199
Connection to an ACS880-1007LC cooling unit .................................. 199
Connection to a custom cooling unit ................................................ 199
General requirements ...................................................................... 199
Coolant temperature control ............................................................ 200
Filling up and bleeding the internal cooling circuit ............................ 200
Drive line-ups with an ACS880-1007LC cooling unit .......................... 200
Drive line-ups with a custom cooling unit ....................................... 200
Draining the internal cooling circuit ................................................... 202
Maintenance intervals ..................................................................... 202
Technical data .................................................................................. 202
Coolant specification ...................................................................... 202
Coolant type ..................................................................................... 202
Temperature limits ......................................................................... 202
Pressure limits ............................................................................... 204
Coolant flow rate limits .................................................................. 204
Cooling circuit materials ................................................................. 204

11 Technical data

Contents of this chapter .................................................................... 207
Ratings ............................................................................................. 208
Definitions ....................................................................................... 208
Derating ............................................................................................ 209
Surrounding air temperature derating .............................................. 209
Altitude derating ............................................................................. 209
Type equivalence table .................................................................... 209
Fuses ................................................................................................. 210
LCL filters ......................................................................................... 210
Kit contents ...................................................................................... 210
Technical data .................................................................................. 210
Charging kit contents ...................................................................... 211
Dimensions and weights .................................................................. 211
Free space requirements .................................................................. 211
Table of contents

11 Allowable mounting orientations ................................................................. 211
11 Losses, cooling data and noise ..................................................................... 212
11 Tightening torques .......................................................................................... 214
   Electrical connections ..................................................................................... 214
   Mechanical connections .................................................................................. 214
   Insulation supports ....................................................................................... 214
   Cable lugs ...................................................................................................... 214
11 Typical power cable sizes .............................................................................. 215
11 Electrical power network specification .......................................................... 217
11 Control unit connection data .......................................................................... 217
11 Coolant connections ..................................................................................... 217
11 Efficiency ....................................................................................................... 218
11 Energy efficiency data (ecodesign) ................................................................ 218
11 Protection classes for module ....................................................................... 218
11 Optical components ..................................................................................... 218
11 Ambient conditions ...................................................................................... 219
11 Cooling ........................................................................................................... 220
11 Materials ....................................................................................................... 220
   Module housing ............................................................................................. 220
   Internal cooling circuit .................................................................................. 220
11 Color .............................................................................................................. 220
11 Package .......................................................................................................... 220
11 Disposal .......................................................................................................... 220
11 Auxiliary circuit current consumption ............................................................ 221
   Control equipment ....................................................................................... 221
   Cooling fans ................................................................................................. 221
   Definitions ..................................................................................................... 221
11 Standards and markings ................................................................................ 221
11 Disclaimers .................................................................................................... 222
   Generic disclaimer ....................................................................................... 222
   Cybersecurity disclaimer .............................................................................. 222

12 The control unit

Contents of this chapter ..................................................................................... 223
   General ........................................................................................................... 223
   BCU-x2 layout ............................................................................................... 224
   Default I/O diagram of the supply control unit .............................................. 226
   External power supply for the control unit (XPOW) ........................................ 228
   The X485 connector ..................................................................................... 228
   Safe torque off (XSTO, XSTO OUT) ............................................................... 229
   FSO-xx safety functions module connection (X12) ....................................... 229
   SDHC memory card slot ............................................................................... 229
   Connector data ............................................................................................. 230
   BCU-x2 ground isolation diagram ............................................................... 232

13 Dimension drawings

Contents of this chapter ..................................................................................... 233
   Frame R8i module ....................................................................................... 234
   Quick connector ........................................................................................... 235
   LCL filter components .................................................................................. 236
   Grid-side choke (BLCL-15LC-7 and BLCL-24LC-7) ....................................... 236
14 Example circuit diagrams

Contents of this chapter ................................................................. 249
Contents of example circuit diagrams .............................................. 249
ACS880-204LC IGBT supply unit 2×R8i (3AXD10000695767) .............. 249
ACS880-204LC IGBT supply unit 4×R8i (3AXD10000695768) .............. 250
Frame 2×R8i .............................................................................. 251
Frame 4×R8i .............................................................................. 274

Further information
Introduction to the manual

Contents of this chapter
This chapter gives basic information on the manual.

Applicability
The manual is applicable to the ACS880-204LC liquid-cooled IGBT 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, start up and do maintenance work on the drive, or create instructions for the end user of the drive concerning the installation and maintenance of the drive.

Read the manual before working on the drive. You are expected to know the fundamentals of electricity, wiring, electrical components and electrical schematic symbols.
Categorization by frame size and option code

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

The module size can be identified from the basic code visible on the type designation label, for example, “ACS880-204LC-0400A-7”, where 0400A is the module size. The option codes of the module are listed after a plus sign. Chapter Ordering information, section Frame R8i and multiples explains the type designation code in detail.

The frame size of the module can be, for example, R8i or 2×R8i, the latter representing a supply unit consisting of two parallel-connected R8i supply modules. The table under section Ratings lists the units and frame sizes.

Use of component designations

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

Terms and abbreviations

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACS-AP-...</td>
<td>Assistant control panel</td>
</tr>
<tr>
<td>BAMU</td>
<td>Auxiliary measurement unit</td>
</tr>
<tr>
<td>BCON</td>
<td>Type of control board</td>
</tr>
<tr>
<td>BCU</td>
<td>Type of control unit</td>
</tr>
<tr>
<td>BDPS</td>
<td>Module internal power supply board</td>
</tr>
<tr>
<td>CIO</td>
<td>I/O module for controlling cooling fans</td>
</tr>
<tr>
<td>Control unit</td>
<td>The part in which the control program runs.</td>
</tr>
<tr>
<td>Cubicle</td>
<td>One section of a cabinet-installed drive. A cubicle is typically behind a door of its own.</td>
</tr>
<tr>
<td>DC link</td>
<td>DC circuit between rectifier and inverter</td>
</tr>
<tr>
<td>DDCS</td>
<td>Distributed drives communication system protocol</td>
</tr>
<tr>
<td>DI</td>
<td>Digital input</td>
</tr>
<tr>
<td>Drive</td>
<td>Frequency converter for controlling AC motors</td>
</tr>
<tr>
<td>EMC</td>
<td>Electromagnetic compatibility</td>
</tr>
<tr>
<td>EMI</td>
<td>Electromagnetic interference</td>
</tr>
<tr>
<td>Frame, frame size</td>
<td>Physical size of the drive or power module</td>
</tr>
<tr>
<td>ICU</td>
<td>Incoming unit</td>
</tr>
<tr>
<td>IGBT</td>
<td>Insulated gate bipolar transistor</td>
</tr>
<tr>
<td>IGBT supply module</td>
<td>IGBT bridge and related components enclosed inside a metal frame or enclosure. Intended for cabinet installation.</td>
</tr>
<tr>
<td>IGBT supply unit</td>
<td>IGBT supply module(s) under control of one control unit, and related components.</td>
</tr>
<tr>
<td>Incoming unit</td>
<td>Part of the cabinet line-up that contains the input power cable terminals. Can also contain switching equipment etc.</td>
</tr>
<tr>
<td>Intermediate circuit</td>
<td>DC circuit between rectifier and inverter</td>
</tr>
<tr>
<td>INU</td>
<td>Inverter unit</td>
</tr>
<tr>
<td>Inverter module</td>
<td>Inverter bridge, related components and drive DC link capacitors enclosed in a metal frame or enclosure. Intended for cabinet installation.</td>
</tr>
<tr>
<td>ISU</td>
<td>IGBT supply unit</td>
</tr>
<tr>
<td>LCL filter</td>
<td>Inductor-capacitor-inductor filter</td>
</tr>
<tr>
<td>Multidrive</td>
<td>Drive for controlling several motors which are typically coupled to the same machinery. Includes one supply unit, and one or several inverter units.</td>
</tr>
</tbody>
</table>
Term | Description
---|---
Parameter | In the drive control program, user-adjustable operation instruction to the drive, or signal measured or calculated by the drive. In some (for example fieldbus) contexts, a value that can be accessed as an object, eg, variable, constant, or signal.
RDCO | Optical DDCS communication module
RFI | Radio-frequency interference
Supply unit | Supply module(s) under control of one control unit, and related components.

**Related documents**

<table>
<thead>
<tr>
<th>Manual</th>
<th>Code</th>
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<tr>
<td><strong>General manuals</strong></td>
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<tr>
<td>ACS880 liquid-cooled multidrive cabinets and modules safety instructions</td>
<td>3AXD5000048633</td>
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<td>ACS880 liquid-cooled multidrive cabinets and modules electrical planning instructions</td>
<td>3AXD5000048634</td>
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<td>Drive modules cabinet design and construction instructions</td>
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<tr>
<td>BCU-02/12/22 control units hardware manual</td>
<td>3AUA0000113605</td>
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<tr>
<td>CIO-01 I/O module for distributed I/O bus control user’s manual</td>
<td>3AXD50000126880</td>
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<td><strong>Supply module manuals</strong></td>
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<td>ACS880-204LC IGBT supply modules hardware manual</td>
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<td>ACS880 IGBT supply control program firmware manual</td>
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<tr>
<td>ACS880 multidrives, Optimal grid control (option +N8053) supplement</td>
<td>3AXD5000020717</td>
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<tr>
<td>Optimal grid control of ACS880 IGBT supply control program supplement</td>
<td>3AXD50000164745</td>
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<td>ACS880-304LC…+A018 diode supply modules hardware manual</td>
<td>3AXD50000568963</td>
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<tr>
<td>ACS880-304LC…+A019 diode supply modules hardware manual</td>
<td>3AXD50000045157</td>
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<tr>
<td>ACS880 diode supply control program firmware manual</td>
<td>3AUA0000103295</td>
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<tr>
<td><strong>Inverter module manuals and guides</strong></td>
<td></td>
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<tr>
<td>ACS880-104LC inverter modules hardware manual</td>
<td>3AXD5000045610</td>
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<tr>
<td>ACS880 primary control program firmware manual</td>
<td>3AUA0000085967</td>
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<tr>
<td>ACS880 primary control program quick start-up guide</td>
<td>3AUA0000098062</td>
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<tr>
<td><strong>Brake module and DC/DC converter module manuals</strong></td>
<td></td>
</tr>
<tr>
<td>ACS880-604LC 1-phase brake chopper modules hardware manual</td>
<td>3AXD50000184378</td>
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<tr>
<td>ACS880-604LC 3-phase dynamic brake modules as units hardware manual</td>
<td>3AXD50000581641</td>
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<tr>
<td>ACS880 (3-phase) brake control program firmware manual</td>
<td>3AXD5000020967</td>
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<tr>
<td>ACS880-1604LC DC/DC converter modules hardware manual</td>
<td>3AXD50000371631</td>
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<td>ACS880 DC/DC converter control program firmware manual</td>
<td>3AXD5000024671</td>
</tr>
<tr>
<td><strong>Option manuals</strong></td>
<td></td>
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<tr>
<td>ACS880-1007LC liquid cooling unit user’s manual</td>
<td>3AXD50000129607</td>
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<td>ACX-AP-x assistant control panels user’s manual</td>
<td>3AUA0000085685</td>
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<tr>
<td>BAMU-12C auxiliary measurement unit hardware manual</td>
<td>3AXD50000117840</td>
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<tr>
<td>Drive composer start-up and maintenance PC tool user’s manual</td>
<td>3AUA0000094606</td>
</tr>
<tr>
<td>Drive application programming (IEC 61131-3) manual</td>
<td>3AUA0000127808</td>
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16 Introduction to the manual

<table>
<thead>
<tr>
<th>Manual</th>
<th>Code</th>
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</thead>
<tbody>
<tr>
<td>Converter module lifting device for drive cabinets hardware manual</td>
<td>3AXD50000210268</td>
</tr>
<tr>
<td>Manuals and quick guides for I/O extension modules, fieldbus adapters, safety functions modules, etc.</td>
<td></td>
</tr>
</tbody>
</table>


You can find all documentation related to the multidrive modules on the Internet at [https://sites-apps.abb.com/sites/lvacdrivesengineeringsupport/content](https://sites-apps.abb.com/sites/lvacdrivesengineeringsupport/content).
Operation principle and hardware description

Contents of this chapter
This chapter describes how the IGBT supply unit works and the hardware of the ACS880-204LC IGBT supply module.

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

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

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

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

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

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

ACS880-204LC contains two charging circuits: AC-DC charging circuit charges the cabinet line-up, and DC-DC charging circuit charges the DC capacitors of one cubicle.
Overview diagram of the drive system

The following figure shows a simplified diagram of a common DC bus drive system.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AC supply</td>
</tr>
<tr>
<td>2</td>
<td>Input AC fuses</td>
</tr>
<tr>
<td>3</td>
<td>LCL filter</td>
</tr>
<tr>
<td>4</td>
<td>IGBT supply unit</td>
</tr>
<tr>
<td>5</td>
<td>Supply unit DC fuses</td>
</tr>
<tr>
<td>6</td>
<td>DC bus</td>
</tr>
<tr>
<td>7</td>
<td>Inverter DC fuses (with or without DC switch-disconnector)</td>
</tr>
<tr>
<td>8</td>
<td>Inverter units (in the example, one of the two units consists of two inverter modules connected in parallel)</td>
</tr>
<tr>
<td>9</td>
<td>DC fuses for optional brake chopper</td>
</tr>
<tr>
<td>10</td>
<td>Optional brake chopper</td>
</tr>
<tr>
<td>11</td>
<td>Motor(s)</td>
</tr>
</tbody>
</table>

Cooling system

See chapter *Internal cooling circuit (page 197)*.
Single-line circuit diagrams of the supply unit

The following figures are examples of possible IGBT supply unit configurations. The tables give explanations for the numbers and letters of the diagrams. They also indicate if the customer can order the components from ABB or if the customer needs to acquire them separately. For components, see the chapter *Ordering information*.

### Frame 1×R8i

The following figure shows a connection example of a supply unit with one frame R8i module.

---

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AC supply</td>
</tr>
<tr>
<td>A</td>
<td>Incoming cubicle</td>
</tr>
<tr>
<td>2</td>
<td>Main circuit breaker</td>
</tr>
<tr>
<td>3</td>
<td>AC-DC charging kit (line-up charging)</td>
</tr>
<tr>
<td>4</td>
<td>DC switch-disconnector for line-up charging</td>
</tr>
<tr>
<td>B</td>
<td>LCL filter cubicle</td>
</tr>
<tr>
<td>5</td>
<td>AC fuses</td>
</tr>
<tr>
<td>6</td>
<td>LCL filter kit</td>
</tr>
<tr>
<td>C</td>
<td>IGBT supply module cubicle</td>
</tr>
<tr>
<td>7</td>
<td>DC-DC charging kit</td>
</tr>
<tr>
<td>8</td>
<td>DC link</td>
</tr>
<tr>
<td>9</td>
<td>DC switch-disconnector</td>
</tr>
<tr>
<td>10</td>
<td>DC fuse</td>
</tr>
<tr>
<td>11</td>
<td>Common mode filter</td>
</tr>
<tr>
<td>12</td>
<td>IGBT supply module (frame R8i)</td>
</tr>
</tbody>
</table>
- **Frame R8i multiples**

The following figure shows a connection example of a supply unit with multiple frame R8i modules (3×R8i).

![Diagram of Frame R8i multiples](image)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AC supply</td>
</tr>
<tr>
<td>A</td>
<td>Incoming cubicle</td>
</tr>
<tr>
<td>2</td>
<td>Main circuit breaker</td>
</tr>
<tr>
<td>3</td>
<td>AC-DC charging kit (line-up charging)</td>
</tr>
<tr>
<td>4</td>
<td>DC switch-disconnector for line-up charging</td>
</tr>
<tr>
<td>B1, B2</td>
<td>LCL filter cubicles</td>
</tr>
<tr>
<td>5</td>
<td>AC fuses</td>
</tr>
<tr>
<td>6</td>
<td>LCL filter kit</td>
</tr>
<tr>
<td>C</td>
<td>IGBT supply module cubicle</td>
</tr>
<tr>
<td>7</td>
<td>DC-DC charging kit</td>
</tr>
<tr>
<td>8</td>
<td>DC link</td>
</tr>
<tr>
<td>9</td>
<td>DC switch-disconnector</td>
</tr>
<tr>
<td>10</td>
<td>DC fuse</td>
</tr>
<tr>
<td>11</td>
<td>Common mode filter</td>
</tr>
<tr>
<td>12</td>
<td>IGBT supply module (frame R8i)</td>
</tr>
</tbody>
</table>
IGBT supply module hardware

- Frame R8i hardware

Module layout

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DC connection busbars, + (a) and - (b)</td>
</tr>
<tr>
<td>2</td>
<td>Lifting eyes, front (a) and back (b)</td>
</tr>
<tr>
<td>3</td>
<td>Coolant in (a) and out (b) connectors</td>
</tr>
<tr>
<td>4</td>
<td>Handle</td>
</tr>
<tr>
<td>5</td>
<td>Fiber optic connectors</td>
</tr>
<tr>
<td>6</td>
<td>Quick connector (AC connection) (the counterpart fastened to the cabinet behind the module)</td>
</tr>
<tr>
<td>7</td>
<td>Terminal block X50 (auxiliary power input for internal boards)</td>
</tr>
<tr>
<td>8</td>
<td>Terminal block X51 and X52 (Safe torque off in inverter modules only)</td>
</tr>
<tr>
<td>9</td>
<td>Terminal block X53 (24 V DC power output)</td>
</tr>
<tr>
<td>10</td>
<td>Auxiliary voltage selector (115 or 230 V)</td>
</tr>
<tr>
<td>11</td>
<td>Unpainted fastening hole. The grounding point between module frame and cabinet frame.</td>
</tr>
</tbody>
</table>
Coolant connectors

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

**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.

Connectors X50…X59

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

**Note:** With parallel-connected R8i modules, it is strongly recommended to use an external 24 V DC supply to power the BCU control unit.

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

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

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

### Auxiliary voltage inputs for internal power supply (BDPS)

<table>
<thead>
<tr>
<th>AC IN</th>
<th>X50</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>N</td>
</tr>
<tr>
<td>POWER</td>
<td></td>
</tr>
</tbody>
</table>

Auxiliary voltage inputs for internal power supply (BDPS)

<table>
<thead>
<tr>
<th>24V OUT</th>
<th>X53</th>
</tr>
</thead>
<tbody>
<tr>
<td>GND</td>
<td>+24V</td>
</tr>
<tr>
<td></td>
<td>GND</td>
</tr>
<tr>
<td></td>
<td>+24V</td>
</tr>
<tr>
<td>FE</td>
<td></td>
</tr>
</tbody>
</table>

24 V DC output (for eg. BCU control unit)

<table>
<thead>
<tr>
<th>STO IN</th>
<th>X52</th>
</tr>
</thead>
<tbody>
<tr>
<td>+24V</td>
<td></td>
</tr>
<tr>
<td>GND</td>
<td>+24V</td>
</tr>
<tr>
<td>GND</td>
<td>+24V</td>
</tr>
<tr>
<td>FE</td>
<td></td>
</tr>
</tbody>
</table>

STO connectors of the module. Must be connected to 24 V DC for the supply module to start.

<table>
<thead>
<tr>
<th>STO OUT</th>
<th>X51</th>
</tr>
</thead>
<tbody>
<tr>
<td>+24V</td>
<td></td>
</tr>
<tr>
<td>GND</td>
<td>+24V</td>
</tr>
<tr>
<td>GND</td>
<td>+24V</td>
</tr>
<tr>
<td>FE</td>
<td></td>
</tr>
</tbody>
</table>

Not in use.

### Fiber optic connectors

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSFC</td>
<td>Charging controller connection. Must be connected by the installer.</td>
</tr>
<tr>
<td>BCU</td>
<td>Control unit connection. Must be connected by the installer.</td>
</tr>
</tbody>
</table>

### Control interfaces

- **BCU control unit of frame R8i and multiples**

Frame R8i (and multiples, if any) modules are controlled by a single BCU control unit installed separately from the module(s). The control unit is connected to each module by a fiber optic link. The control unit can be powered from the module (terminal block X53), from an external source.

For LCL filter hardware, see chapter *Cabinet construction (page 33).*
24 V DC supply, or both for redundancy. The control unit contains the basic I/Os and slots for optional I/O modules. Other equipment is primarily installed on separate mounting plates.

- **Overview of the control connections of the BCU control unit**

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

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

■ Main disconnecting device

The unit must be equipped with a main circuit breaker [Q1]. With this device, you can isolate the main circuit of the drive from the power line.

WARNING!
The breaker 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

The unit can be equipped with an auxiliary voltage switch [Q21]. Using the switch, you can disconnect the auxiliary circuit from the power line.

■ Operating switch

The cabinet can be equipped with an operating switch [S21].

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

- The ENABLE/RUN position: The control program closes the charging contactor [Q4] and the main DC link is charged. After the DC link is charged, the main circuit breaker [Q1] will be closed and the charging contactor [Q4] opened. The module starts operating.
- The OFF position: The control program opens the main circuit breaker [Q1] and the module stops rectifying.

■ Emergency stop and emergency stop reset buttons

The cabinet can be equipped with an emergency stop button and an emergency stop reset button. Pressing the emergency stop button activates the emergency stop function of the supply unit. The button locks to open position automatically. You must release the button before you can return to the normal operation. Before the restart, you also need to reset the emergency stop circuit with the 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 ACS880 liquid-cooled multidrives.

■ Control panel

The control panel is the user interface of the unit. With the control panel, you 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 and external control.

To be able to start and stop the unit by the control panel, you must have the Run enable signal and Start enable signal on (1) on the control board. Normally this means, that you must have the operating switch on the cabinet door in ENABLE/RUN position. The control
panel must also be in local control mode. You can select the mode with the Loc/Rem key on the panel.

For the instructions on the use of the panel, see *ACX-AP-x Assistant control panels user's manual* (3AU00000085685 [English]).

- **Line-up charging switch**
  The supply unit can be equipped with a charging switch for AC-DC line-up charging [Q3].

- **Local charging control switch**
  The cabinet can be equipped with a local charging control switch [S4]. Position "1" enables closing of the DC switch-disconnector [Q11].

- **DC switch-disconnector**
  The supply unit can be equipped with a DC switch-disconnector [Q11] which allows the isolation of the unit from the DC link. Before the unit is reconnected to the DC link, the capacitors of the supply module(s) must be charged through a charging circuit.

  **Note:** If the unit consists of multiple supply module cubicles, each cubicle is equipped with a DC switch-disconnector and charging circuit. The DC switch-disconnector controls only the supply modules within that particular cubicle.

- **Charging switch for unit charging**
  Before closing the DC switch-disconnector [Q11], the user closes the charging switch for DC-DC unit charging [Q10]. After the precharging completes, the DC switch-disconnector [Q11] can be closed, and the charging switch [Q10] opened.

  **Note:** The charging switch [Q10] must be opened before the supply unit can be started.

---

**WARNING!** Do not operate the DC switch-disconnectors under load.

---

**WARNING!** Do not operate the DC fuse disconnectors under load or under voltage.

---

**WARNING!** With frame n×R8i units, both the DC switch-disconnector [Q11] and the charging switch [Q10] must be opened to disconnect the inverter unit from the DC link.

- **DC switch-disconnector for line-up charging**
  The supply unit can be equipped with a DC switch-disconnector for line-up charging [Q40]. DC switch-disconnector [Q40] is needed for isolating the line-up charging circuit from the DC link when the supply unit has the DC switch disconnector [Q11] and AC-DC line-up charging circuit.

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

Quote the complete type designation and serial number when contacting technical support on the subject of individual IGBT supply module.

Example label is shown below.

![Example label]

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Type designation</td>
</tr>
<tr>
<td>2</td>
<td>Frame size</td>
</tr>
<tr>
<td>3</td>
<td>Cooling method</td>
</tr>
<tr>
<td>4</td>
<td>Degree of protection</td>
</tr>
<tr>
<td>5</td>
<td>UL/CSA data</td>
</tr>
<tr>
<td>6</td>
<td>Ratings</td>
</tr>
<tr>
<td>7</td>
<td>Valid markings. See <em>Electrical planning instructions for ACS880 liquid-cooled multidrive cabinets and modules</em> (3AXD50000048634 [English]).</td>
</tr>
<tr>
<td>8</td>
<td>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.</td>
</tr>
</tbody>
</table>
**Type designation key**

- **IGBT supply module**

Type designation describes the composition of the module in short. Note that in the type designation label of an IGBT supply module (ACS880-204LC), the type of the module is ACS880-104LC. The complete designation code is divided in subcodes:

- The first 1…20 digits form the basic code. It describes the basic construction of the unit. The fields in the basic code are separated by hyphens.
- The plus codes follow the basic code. Each plus code starts with an identifying letter (common for the whole product series), followed by descriptive digits. The plus codes are separated by plus signs.

The following table lists the fields of basic code ACS880-204LC-0400A-7 as an example, and the plus codes of the IGBT supply module.

<table>
<thead>
<tr>
<th>CODE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic codes</td>
<td></td>
</tr>
<tr>
<td>ACS880</td>
<td>Product series</td>
</tr>
<tr>
<td>104LC</td>
<td>Construction: liquid-cooled IGBT supply module</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>0400A</td>
</tr>
<tr>
<td>Refer to section <em>Ratings (page 208)</em>.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Voltage range</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
</tr>
<tr>
<td>Input voltage range: 525…690 V. This is indicated in type designation label as typical input voltage levels (3~ 525/600/690 V AC).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Plus codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>For the plus codes, see chapter <em>Ordering information</em>.</td>
</tr>
<tr>
<td>E205</td>
</tr>
<tr>
<td>Internal du/dt filters (When the module is used as an IGBT supply module, it must always be ordered with +E205.)</td>
</tr>
</tbody>
</table>

**Weak supply networks**: In weaker supply networks with a short-circuit ratio less than 8, it is highly recommended to install a BAMU auxiliary measurement unit to the drive. In such networks, there is a risk of nuisance DC overvoltage tripping due to disturbances caused by probable high-voltage THD in the supply voltage. Short-circuit ratio is defined as the supply network's apparent short-circuit power $S_{k,\text{net}}$ divided by the drive's nominal apparent power $S_n$ ($S_{k,\text{net}} / S_n < 8$).
## LCL filter

<table>
<thead>
<tr>
<th>CODE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>BLCL</td>
<td>LCL filter for frame R8i IGBT supply module</td>
</tr>
<tr>
<td>15LC, 24LC or 25LC</td>
<td>Refer to chapter <em>Technical data.</em></td>
</tr>
</tbody>
</table>

### Voltage range

| Voltage rating: 525…690 V. This is indicated in type designation label as typical input voltage levels (3~ 525/600/690 V AC, 600 UL, CSA). |
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 (3AXD5000048633 [English]).

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

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

Dispose of or recycle the packaging according to the local regulations.
If you need to pack the modules, see the package information in the technical data.
Cabinet construction

Contents of this chapter
This chapter instructs in placing 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 ACS880-204LC module, you can use the following solutions depending on the frame size.

- Frame R8i
The switching, disconnecting and protecting equipment can be placed outside the drive cabinet in the following way:

1. The AC supply is connected to the main circuit breaker [Q1].
2. The AC fuses are connected after the breaker.
3. AC-DC charging circuit (line-up charging) for precharging the DC link capacitors is connected to the AC supply. See section Single-line circuit diagrams of the supply unit (page 20).

For the connection diagram, see chapter Electrical installation.
Cabinet temperature supervision

In liquid-cooled drive systems, the cabinet can be totally sealed from the ambient air. The air inside the cabinet must be able to circulate freely. You can install a fan inside the cabinet to push air through a heat exchanger.

You can use thermal switches [F6.10...11] to supervise the temperature inside the cabinet. Install the thermal switches on the hottest element of the cabinet. In this example, the thermal switches are on the DC busbar above the AC fuses [F6.10] and below the LCL filter capacitors [F6.11]. ABB recommends to use thermal switch with 110 °C (230 °F) temperature limit for the AC fuses and thermal switch with 70 °C (158 °F) temperature limit for the LCL filter capacitors. Make sure that components located in other cubicles are properly cooled.

Wire the switches to a digital input (DI) of the supply control unit (1 = OK, 0 = overtemperature). In case of overtemperature, the switch opens and trips the supply unit on a fault. You can adjust the delay time by parameters. For the example wirings, see chapter Example circuit diagrams.

Note: If you install the switches on the busbars, make sure there is proper insulation between the busbars and thermal switches. The module has its own temperature supervision. See ACS880 IGBT supply control program firmware manual (3AUA0000131562 [English]).
Installation examples

This section instructs in placing the drive and additional equipment into a Rittal VX25 enclosure.

Each example includes a table that lists:

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

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

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

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

---

**WARNING!**

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

---

**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.

![Image of 2...3 mm (0.08 ... 0.12")]
36 Cabinet construction

- BLCL-15LC-7 / BLCL-24LC-7 in a 600 mm wide Rittal VX25 enclosure

Layout drawing
Below is an example layout of an LCL filter.

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AC connection from incoming cabinet (Rittal Flat-PLS)</td>
</tr>
<tr>
<td>2</td>
<td>AC fuses</td>
</tr>
<tr>
<td>3</td>
<td>Grid-side choke (behind the capacitors)</td>
</tr>
<tr>
<td>4</td>
<td>Capacitors (amount varies depending on the LCL filter size)</td>
</tr>
<tr>
<td>5</td>
<td>Connection to capacitors by cables</td>
</tr>
<tr>
<td>6</td>
<td>Converter-side choke (behind the capacitors)</td>
</tr>
<tr>
<td>7</td>
<td>AC connection to IGBT supply unit (Rittal Flat-PLS)</td>
</tr>
<tr>
<td>8</td>
<td>Outlet manifold with stop and drain valves</td>
</tr>
<tr>
<td>9</td>
<td>Inlet manifold with stop and drain valves</td>
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<tr>
<td>10</td>
<td>Cooling fan and heat exchanger</td>
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Pipe routing example (BLCL-15LC-7)

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<td>2</td>
<td>Inlet manifold with stop and drain valves</td>
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<td>Heat exchanger</td>
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<td>Outlet manifold with stop and drain valves</td>
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Thicker pipe is of type 16/13 and thinner pipe of type 8/6.

Pipe routing example (BLCL-24LC-7 and BLCL-25LC-7)

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<td>Inlet manifold with stop and drain valves</td>
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<td>Heat exchanger</td>
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<td>Outlet manifold with stop and drain valves</td>
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## Installation stages

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Overview of kits
Stage 1: Common assembly installations (Common DC bus, cabinet floor).
See assembly drawings for details.
Stage 2: Installation of LCL side plates and common AC bus
Stage 3: Common AC connection bus installation (busbars from filter unit to R8I cabinet).
See assembly drawing 3AX000004370870 for details.
Stage 4A (for BLCL-15LC-7): AC connection kit and fuse busbar kit installation.
See assembly drawings 3AXD50000248476 and 3AXD50000431601 for details.
Stage 4B: BLCL-24LC-7: AC connection and fuse busbars installation
Stage 5: Installation of LCL choke mounting mechanics and LCL ISU connection
Stage 6: LCL choke and LCL choke busbar installation
Stage 7: Heat exchanger, heat exchanger mechanics kit and cooling components kit installation. See assembly drawing 3AXD60000431886 for installation details. For piping routing see drawing 3AXD50000479488 (B:C:CL-15:C-7) or 3AXD50000479634 (B:C:CL-24:C-7)
Stage 8A: BLCL-15LC-7: LCL capacitor support, fan support mechanics and fan installation
Stage 8B: BLCL-24LC-7: LCL capacitor support, fan support mechanics and fan installation

See assembly drawings 323503000303001 and 323503000303002 for details.
STAGE 9: Touch protection shroud kit installation. See assembly drawing 3AXD50000431632 for details.
## BLCL-15LC-7 / BLCL-24LC-7 in a 600 mm wide generic enclosure

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<th>Instruction code</th>
<th>Kit code</th>
<th>Kit ordering code</th>
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## BLCL-25LC-7 in a 600 mm wide Rittal VX25 enclosure

### Installation stages

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Stage 1: Installation of common parts
Stage 2: Installation of LCL side plates and common AC bus

See assembly drawings 3X06002486C and 3X06002486D for details.
STAGE 3: Common AC connection bus Installation (busbars from filter unit to R81 cabinet).
See assembly drawing 3AXD5000037087 for details.
Stage 4: AC connection kit and Fuse busbar kit installation.

See assembly drawings 3AXD50000248534 and 3AXD50000431724 for details.
Stage 5: Installation of LCL choke mounting mechanics and LCL ISU connection
Stage 6: LCL choke and LCL choke busbar installation

See assembly drawing 3/X500024/000 for details.
Stage 7: Heat exchanger, heat exchanger mechanics and cooling components installation
Stage 8: LCL capacitor support kit, fan support mechanics kit and fan kit installation.
See assembly drawings 3AXD0000431987 and 3AXD0000244086 for details.
Stage 9: Installation of LCL shroud kit
### BLCL-25LC-7 in a 600 mm wide generic enclosure

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One R8i module in a 400 mm wide Rittal VX25 enclosure

Layout drawing

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<td>Cooling fan</td>
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<td>AC connection to LCL filter (Rittal Flat-PLS)</td>
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Pipe routing example

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### Installation stages

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Overview of kits
Note! See Cabinet design and construction instructions for ACS880 multivdrive modules (DISA098107668 [English]).
STAGE 1: Common assembly installations (Saying parts, Common DC).
See assembly drawings for details.
Stage 2: Side plate, module mounting mechanics and quick connectors
Stage 3: Flat-PLS support kit for AC and common AC connection busbars

See assembly drawings for details and required additional Rittal and standard parts.
Stage 4: Fan, heat exchanger and cooling components
Stage 5A: Installation of DC busbars
Stage 5B: Installation of DC switch kit W400, DC connection kit W400 and R81 CHNF busbars kit installation

See assembly drawings for details and required additional Rittal and standard parts.
Stage 6: Module installation
STAGE 7: SHROUD KIT W400 INSTALLATION
See assembly drawings for details and required additional Rittal and standard parts.
### One R8i module in a 400 mm wide generic enclosure

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<td>Shrouding</td>
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\(^1\) With this configuration, it is possible to install the kits to a 300 mm wide enclosure.
- Two R8i modules in a 600 mm wide Rittal VX25 enclosure

Layout drawing

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<tr>
<th>No.</th>
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<td>Common DC busbars (Rittal Flat-PLS)</td>
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<tr>
<td>2</td>
<td>DC fuses and optional DC switch</td>
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<tr>
<td>3</td>
<td>Common mode filter</td>
</tr>
<tr>
<td>4</td>
<td>IGBT supply module</td>
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<tr>
<td>5</td>
<td>Heat exchanger</td>
</tr>
<tr>
<td>6</td>
<td>Cooling fan</td>
</tr>
<tr>
<td>7</td>
<td>AC connection to LCL filter (Rittal Flat-PLS)</td>
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<td>8</td>
<td>Inlet and outlet manifold with valves</td>
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Pipe routing example

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<tr>
<td>2</td>
<td>Inlet manifold with stop and drain valves</td>
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<td>3</td>
<td>Heat exchanger</td>
</tr>
<tr>
<td>4</td>
<td>IGBT supply module</td>
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<tr>
<td>5</td>
<td>Outlet manifold with stop and drain valves</td>
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<td>Coolant out</td>
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### Installation stages

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<th>Kit ordering code</th>
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<td>Flat-PLS support kit for AC and common AC connection busbars</td>
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<td>DC bus bars</td>
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<td>Module installation</td>
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<td>7</td>
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<td>L-6-8-023-VX</td>
<td>3AXD50000361267</td>
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**82 Cabinet construction**
Overview of kits
Stage 1: Installation of common parts

Note: See cabinet design and construction instructions for ACS880 multilevel modules (3A00000197668 [English]).
STAGE 1: Common assembly installations (Baying parts, Common DC).
See assembly drawings for details.
STAGE 2: SIDE PLATE KIT, MODULE MOUNTING MECHANICS KIT AND QUICK CONNECTOR KIT INSTALLATION

See assembly drawings for details and required additional Rittal and standard parts.
Stage 3: Flat-PLS support kit for AC and common AC connection busbars
Stage 4: Fan, heat exchanger and cooling components
STAGES 5A: R81 DC CONN BUSBAR KIT 6000, DC FUSE BUSBAR KIT 6000 AND
R81 CONN BUSBARS KIT INSTALLATION
See assembly drawings for details and required additional Rittal and standard parts.
Stage 5B: Installation of DC switch, DC connection and common mode filter busbar kits
Stage 6: Module installation
Stage 7: Installation of shrouding
### Two R8i modules in a 600 mm wide generic enclosure

<table>
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<tr>
<th>Parts to be installed</th>
<th>Instruction code</th>
<th>Kit code</th>
<th>Kit ordering code</th>
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<td>3AUA0000119227</td>
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<td>3AXD50000041265</td>
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<td>Shrouding</td>
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1) With this configuration, it is possible to install the kits to a 500 mm wide enclosure.
KITS FOR ACS880-204 LC 2X-R81 IN GENERIC 2000x600x600 CABINET

Note: Only parts included in ACS kits are shown here.
See kit assembly drawings for details.
- Three R8i modules in a 800 mm wide Rittal VX25 enclosure

**Note:** 3×R8i design with DC switches is not suitable for UL installations.

**Layout drawing**

<table>
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<td>Common DC busbars (Rittal Flat-PLS)</td>
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<td>2</td>
<td>DC fuses and optional DC switch</td>
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<td>3</td>
<td>Common mode filter</td>
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<td>4</td>
<td>IGBT supply module</td>
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<td>5</td>
<td>Heat exchanger</td>
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<td>Cooling fan</td>
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<td>7</td>
<td>AC connection to LCL filter (Rittal Flat-PLS)</td>
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<td>Inlet and outlet manifold with valves</td>
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94 Cabinet construction
Pipe routing example

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<th>Description</th>
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<tr>
<td>2</td>
<td>Inlet manifold with stop and drain valves</td>
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<td>Heat exchanger</td>
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<td>4</td>
<td>IGBT supply module</td>
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<td>5</td>
<td>Outlet manifold with stop and drain valves</td>
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<td>6</td>
<td>Coolant out</td>
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## Installation stages

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<th>Kit code</th>
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Overview of kits
Stage 1: Installation of common parts

Note: See Cabinet design and construction instructions for
ACS880 multivoltage modules (SAUA0000107668 [English]).
STAGE 1: Common assembly installations (Baying parts, Common DC).
See assembly drawings for details.
Stage 2: Side plate, module mounting mechanics and quick connectors
Stage 3: Flat-PLS support kit for AC and common AC connection busbars
Stage 4: Fan, heat exchanger and cooling components
STAGES A: R81 DC CONN BUSBAR KIT W900, DC FUSE BUSBAR KIT W900 AND R81 CONN BUSBARS KIT INSTALLATION

See assembly drawings for details and required additional Rittal and standard parts.
Stage 5B: Installation of DC switch, DC connection and common mode filter busbar kits
Stage 6: Module installation
STAGE7: SHROUD KIT W300 INSTALLATION

See assembly drawings for details and required additional Rittal and standard parts.
### Three R8i modules in a 800 mm wide generic enclosure

<table>
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<tr>
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<th>Instruction code</th>
<th>Kit code</th>
<th>Kit ordering code</th>
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<td>Shrouding</td>
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</table>

1) With this configuration, it is possible to install the kits to a 700 mm wide enclosure.
KITS FOR ACS880-204LC 3xR8i IN GENERIC 2000x600x800 CABINET

Only parts included in ABB kits are shown here.
See kit assembly drawings for details.
Electrical installation

Contents of this chapter

This chapter describes the electrical installation of the modules.

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

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

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

Safety and liability

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

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

Electrical safety precautions

These electrical safety precautions are for all personnel who do work on the drive, motor cable or motor.
WARNING!
Obey these instructions. If you ignore them, injury or death, or damage to the equipment can occur.

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

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

1. Clearly identify the work location and equipment.
2. Disconnect all possible voltage sources. Make sure that re-connection is not possible. Lock out and tag out.
   - Open the main disconnecting device of the drive.
   - Open the charging switch if present.
   - Open the disconnector of the supply transformer. (The main disconnecting device in the drive cabinet does not disconnect the voltage from the AC input power busbars of the drive cabinet.)
   - 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 even 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.

---

**WARNING!** In case of DC bus remaining alive, Personal Protective Equipment (PPE) of Level 2 is required for doing maintenance. Note that this is valid for work on every cabinet of the device.
Isolation from AC supply networks

1. Clearly identify the work location.

2. Disconnect all possible voltage sources.
   - Open the main switch-disconnector [Q1], or rack out the main breaker [Q1] of the drive (whichever is present). Note that some drives have two switch-disconnectors or main breakers [Q1.1 and Q1.2].
   - Open the disconnector of the supply transformer as the main disconnecting device of the drive does not remove the voltage from the input busbars of the drive or from the voltmeter, or BAMU auxiliary measurement unit, auxiliary control voltage switch [Q21], charging circuit disconnector [Q4] or others.
   - Make sure that reconnection is not possible. Lock the disconnectors to open position and attach a warning notice to them.
   - Disconnect any external power sources from the control circuits before you do work on the control cables.
   - After you disconnect the drive, always wait for 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 multimeter with an impedance of at least 1 Mohm.
   - Make sure that the voltage between the drive input power terminals and the grounding (PE) busbar is close to 0 V.

6. Install temporary grounding as required by the local regulations. Close the grounding switch (if present), or connect the AC and DC busbars to PE with a temporary grounding tool.

7. Ask for a permit to work from the person in control of the electrical installation work.
Isolation from common DC bus

In case of units with DC voltage remaining: if there are several power sources for the DC bus, the supply unit which shall be isolated must be equipped with a DC switch-disconnector. In order to isolate the supply unit from the live DC bus, open the DC switch-disconnector [Q11] and also the charging switch [Q10] in EVERY cubicle containing supply modules. In addition, open the DC switch-disconnector of the AC circuit [Q40].

1. Clearly identify the work location.

2. Disconnect all possible voltage sources. Note that energy to the DC bus can also be fed back by motors, energy storages, etc.
   - Make sure that reconnection is not possible. Lock the disconnectors to open position and attach a warning notice to them.
   - Disconnect any external power sources from the control circuits before you do work on the control cables.
   - After you disconnect the drive, always wait for 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 multimeter with an impedance of at least 1 Mohm.
   - Make sure that the voltage between the drive input power terminals and the grounding (PE) busbar is close to 0 V.

6. Install temporary grounding as required by the local regulations. Connect the DC busbars to PE with a temporary grounding tool.

7. Ask for a permit to work from the person in control of the electrical installation work.
General notes

■ Printed circuit boards

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

■ Optical components

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

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

Checking the insulation of the assembly

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

■ Measuring the insulation resistance of the input power cable

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

Checking the compatibility with IT (ungrounded) systems

The RFI filter is not suitable for use in IT (ungrounded) systems. Disconnect the filter before connecting the drive to the supply network. For instructions on how to do this, contact your local ABB representative.

WARNING!
If a drive with an RFI filter is installed on an IT system (an ungrounded power system), the system will be connected to earth potential through the filter capacitors of the drive. This can cause danger, or damage the unit.
Connecting the input power cables/busbars

- Connection diagram

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

Components for main charging circuit. For details, see chapter *Example circuit diagrams*.

Components for DC charging circuit. For details, see chapter *Example circuit diagrams*.

- **Incoming cubicle**
- **LCL filter cubicle**
- **IGBT supply module cubicle**

**Notes:**

For the conductivity requirements for the shield and the PE conductor, see *ACS880 liquid-cooled multidrives and multidrive modules planning the electrical installation* (3AXD50000048634 [English]).

For the cable selection instructions, see *Electrical planning instructions for ACS880 liquid-cooled multidrive cabinets and modules* (3AXD50000048634 [English]).

For the tightening torques, see *Cabinet design and construction instructions for ACS880 air-cooled and liquid cooled multidrive modules* (3AUA0000107668 [English]).
Connection procedure for power connections inside the IGBT supply module cubicle

For the cable types, see Electrical planning instructions for ACS880 multidrive cabinets and modules (3AXD50000048634 [English]).

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

1. Stop the drive and do the steps in section Electrical safety precautions (page 109) before you start the work.
2. Open the door of the IGBT supply module cubicle and remove the shrouding (if any).
3. Make the connections in between the main circuit components inside the cabinet if not done yet. Do the connections according to the circuit diagrams delivered with 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.
4. Ground the modules by the top edge of the front plate. The grounding point is marked on the module (a). Connect the front plate to the frame support bracket (b) 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 (for example, Rittal VX25 enclosures), it is important to make sure that a good galvanic connection to ground (PE busbar) is achieved. You can, for example, remove the paint from the connection points and use star washers.

**Note:** The connection to ground 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 *Electrical planning instructions for ACS880 multidrive cabinets and modules* (3AXD50000048634 [English]).

5. Refit any shrouding removed earlier and close the cubicle doors.

- **Connection procedure**

  ![Diagram](image)

  **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!**

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

With the frame size R8i IGBT supply modules, the input power cables are connected outside the IGBT supply module cubicle, typically inside the incoming cubicle (ICU).
1. Stop the drive and do the steps in section Electrical safety precautions (page 109) before you start the work.
2. Open the door of the incoming cubicle and remove the shrouding.
3. Make sure that you have the following components installed in the incoming cubicle:
   - input power cable busbars
   - main breaker Q1
   - charging circuit.
4. Make the interconnections (if not made yet) between:
   a. input power cable busbars
   b. main breaker Q1
   c. AC busbars of the LCL cabinet.
5. Lead the input power cables into the cabinet. 360° grounding of the cable shield at the entry is recommended to suppress interference.
6. Twist the input power cable shields to bundles and connect to cabinet PE (ground) busbar. Connect the separate ground conductors/cables to cabinet PE (ground) busbar.
7. Connect the phase conductors to the input power cable busbars. See the tightening torques in technical data.
8. Lead the charging circuit supply cable into the cabinet. 360° grounding of the cable shield at the entry is recommended to suppress interference (not shown in the figure).
9. Twist the cable shield of the charging circuit cable to a bundle and connect to the cabinet PE (ground) busbar (not shown in the figure). Connect the separate ground conductors/cables to cabinet PE (ground) busbar.
10. Connect the phase conductors of the charging circuit supply cable to the charging circuit. The connections of the ABB-defined charging circuit with the terminal markings are shown in example circuit diagrams. See the tightening torques in technical data.
11. Inside the IGBT supply module cubicle, push the IGBT supply module into the quick connectors.
12. Ground the module (if not made yet). If the grounding via the module fixing screws is not good enough, connect a separate cable between the module grounding point and the cabinet PE busbar. The grounding point is marked on the module.

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

Note: The connection to ground through fixing 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).
Connecting the LCL filter

By default, the LCL filter is protected against overheating (caused by a faulty fan, for example) with a thermistor, that is located in the choke of the LCL filter. If the filter temperature becomes too high, the IGBT supply module is automatically stopped. Temperature monitoring of the chokes and other temperature protections must always be connected to digital input XDI:1 on the control unit.

WARNING!
If the overheating protection is removed with parameter settings, the filter may be damaged permanently or cause a fire.

WARNING!
Use the LCL filter only with an ACS880-204LC IGBT supply module. Use the filter only with an IGBT supply module of an appropriate frame size.
Main breaker / contactor

A main breaker or contactor is needed for the following reasons:

- If the LCL filter is connected to the AC input power supply while the IGBT supply module is not modulating/active, there is a risk that the filter responds to disturbance frequencies in a distorted AC input and starts resonating, which may cause permanent damage to the IGBT supply module, LCL filter and equipment connected to the DC bus. If the IGBT supply module is stopped, faulty or otherwise inactive, it cannot counteract the resonance of the filter.

- The IGBT supply module and the LCL filter cannot prevent power flow from the AC input to the DC bus and further to the ACS880-104LC inverter module(s). Even if the modulation of the IGBT supply module is stopped, the anti-parallel diodes in it enable power flow to the DC bus and to the inverter(s). In other words, merely stopping the IGBT supply module does not stop the system.

- The IGBT supply module is not protected against excessive current drawn from the DC bus. If the motoring power (power demanded from the DC bus) exceeds the supplying capability of the IGBT supply module, it trips. If the current demand remains or increases, the IGBT supply module is damaged.

See also *Electrical planning instructions for ACS880 liquid-cooled multidrive cabinets and modules* [3AXD50000048634 (English)].

Installing the charging circuit

The cabinet builder must install and connect the charging circuit. For connections, see chapter *Example circuit diagrams*. Consult ABB for more information on the components and wirings needed. Note that ACS880-204LC contains two separate charging circuits: AC-DC charging circuit (line-up charging) and DC-DC charging circuit.

Activate and tune the charging function in the control program. For information on tuning the parameters, see *ACS880 IGBT supply control program firmware manual* [3AUA0000131562 (English)].

Connecting the external power supply cable for the auxiliary circuit

Connectors are described in chapter *Operation principle and hardware description*. 
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).

![Cable Connection Diagram](image)

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>Stripped cable</td>
<td>Conductive surface of the shield exposed</td>
<td>Stripped part covered with copper foil</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Cable shield</td>
<td>Copper foil</td>
<td>Shielded twisted pair</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>Grounding wire</td>
</tr>
<tr>
<td>Copper cable</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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.
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.

- **Connectors X50…X59 and fiber optic connectors (frame R8i)**

Connectors X50…X59 and fiber optic connectors are described in chapter *Operation principle and hardware description*.

**Connecting a PC**

---

**WARNING!**

Do not connect the PC directly to the control panel connector of the control unit as this can cause damage.
A PC (with eg, the Drive composer PC tool) can be connected as follows:

1. Connect an ACx-AP-x control panel to the unit either
   • by inserting the control panel into the panel holder or platform, or
   • by using an Ethernet (eg, Cat 5e) networking cable.

2. Remove the USB connector cover on the front of the control panel.

3. Connect an USB cable (Type A to Type Mini-B) between the USB connector on the control panel (3a) and a free USB port on the PC (3b).

4. The panel will display an indication whenever the connection is active.

5. See the documentation of the PC tool for setup instructions.

---

**Installing option modules**

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

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

1. Repeat the steps described in *Electrical safety precautions (page 109).*

2. Pull out the lock (a).
   
   **Note:** The location of the lock depends on the module type.

3. Install the module to a free option module slot on the control unit.

4. Push in the lock (a).
5. Tighten the grounding screw (b) to a torque of 0.8 N·m (7 lbf·in).

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

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

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

**Installing and using CIO-01 I/O module**

See *CIO-01 I/O module for distributed I/O bus control user’s manual* (3AXD50000126880 [English]).
Installation checklist

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

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

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

**WARNING!**
Stop the drive and do the steps in section *Electrical safety precautions (page 109)* before you start the work.

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

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

Contents of this chapter

This chapter instructs how to start up the IGBT supply unit. The instructions are valid for the example IGBT supply unit with ACS880-204LC IGBT supply modules. The default device designations (if any) are given in square brackets, for example, main circuit breaker [Q1]. The same device designations are also used in the circuit diagrams, typically. They refer to the circuit diagram of the example installation by ABB.

Note: These instructions do not cover all possible cabinet constructions. Always refer to the delivery-specific circuit diagrams when proceeding with the start-up.

WARNING!

Only qualified electricians are allowed to do the work described in this chapter. Read the complete safety instructions and repeat the steps described in section Electrical safety precautions (page 109). The complete safety instructions are given in Safety instructions for ACS880 liquid-cooled multivide cabinets and modules (3AXD50000048633 [English]). Ignoring the instructions can cause physical injury or death, or damage to the equipment.

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 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

## Tasks

<table>
<thead>
<tr>
<th>Safety</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WARNING!</strong> Obey the safety instructions during the start-up procedure. See <em>Safety instructions for ACS880 liquid-cooled multidrive cabinets and modules</em> (3AXD50000048633 [English]). Only qualified electricians are allowed to start-up the drive.</td>
</tr>
</tbody>
</table>

## Checks/Settings with no voltage connected

| **WARNING!** Ensure that the disconnector of the supply transformer is locked to the off (0) position, that means no voltage is, or can not be, connected to drive inadvertently. |

The no-load current of the IGBT supply unit must be taken into account if pretests (e.g., factory tests) are made on the IGBT supply unit by using a temporary main AC supply. The no-load current circulates between the supply network and the LCL filter capacitors and therefore stresses the supply transformer. To avoid supply transformer overload, the supply transformer must be dimensioned according to 15% of IGBT supply unit nominal current. The transformer should be dedicated for the IGBT supply unit only, no other (sensitive) load shall be connected in same transformer secondary to avoid disturbance and malfunction.

In case a generator is used as a supply, it should be dimensioned according to the nominal current of the IGBT supply unit.

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

- always use BAMU auxiliary measurement unit
- short-circuit ratio of the grid \( > 3 \)
- short-circuit ratio of the generator \( 1/X_k > 2 \)
- generator nominal power \( P_{gen} > 0.3 \times P_{ISU} \)

Check that the main disconnecting device (main switch-disconnector or main circuit breaker) [Q1] is switched off.

Check the mechanical and electrical installation. See chapter *Installation checklist*. 

Check the settings of breakers switches in the auxiliary circuits.

Drives with a charging switch [Q3] and a DC switch-disconnector for line-up charging [Q40]: Open the charging circuit switch [Q3] and the DC switch-disconnector for line-up charging [Q40].

If time relays, or relays with delayed make contact or break contact are used in emergency stop circuits, check the relay time settings. See delivery-specific circuit diagrams and safety function specific documentation (if applicable).

Disconnect the unfinished or unchecked 230 V AC cables that lead from the terminal blocks to the outside of the equipment.
### Tasks

<table>
<thead>
<tr>
<th>Task</th>
<th>Complete</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check that both circuits of STO terminals on the supply control unit are closed (IN1 and IN2 must be connected to OUT). The supply unit cannot start if either circuit is open. Refer to the wiring diagrams delivered with the drive and chapter <em>The control unit</em>.</td>
<td>☐</td>
</tr>
<tr>
<td>Check that both channels of STO IN (X52) connector on IGBT supply module are connected to 24 V DC for the supply unit to start.</td>
<td>☐</td>
</tr>
</tbody>
</table>

### Starting and checking the cooling system

<table>
<thead>
<tr>
<th>Task</th>
<th>Complete</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fill up and bleed the internal cooling circuit. Start the cooling unit up. See section <em>Filling up and bleeding the internal cooling circuit</em> (page 200).</td>
<td>☐</td>
</tr>
<tr>
<td>Check the cooling system for leaks. Make sure that cooling circuit joints at the shipping split joining cubicles are tight and that all drain valves have been closed.</td>
<td>☐</td>
</tr>
<tr>
<td>Make sure that the coolant can flow freely in all cubicles. Make sure that the drive system cools down.</td>
<td>☐</td>
</tr>
</tbody>
</table>

### Powering up the IGBT supply unit

<table>
<thead>
<tr>
<th>Task</th>
<th>Complete</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make sure that it is safe to connect voltage. Ensure that: • nobody is working on the unit or circuits that have been wired from outside into the cabinets • covers of the motor terminal boxes are on.</td>
<td>☐</td>
</tr>
<tr>
<td>Close the circuit breakers supplying the auxiliary circuits [F22,...., F26].</td>
<td>☐</td>
</tr>
<tr>
<td>Close the cabinet doors.</td>
<td>☐</td>
</tr>
<tr>
<td>Close the main breaker of the supply transformer.</td>
<td>☐</td>
</tr>
<tr>
<td>Switch the auxiliary voltage switch [Q21] on.</td>
<td>☐</td>
</tr>
</tbody>
</table>

### Setting up the supply unit parameters

<table>
<thead>
<tr>
<th>Task</th>
<th>Complete</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check the correct voltage range, parameter 195.01 <em>Supply voltage</em>.</td>
<td>☐</td>
</tr>
<tr>
<td>If your supply unit consists of more than one module, parameters 195.30 <em>Parallel type filter</em> and 195.31 <em>Parallel connection rating id</em> need to be set. First, select the correct voltage range with parameter 195.30 <em>Parallel type filter</em>. Then, select the correct supply unit type with parameter 195.31 <em>Parallel connection rating id</em>.</td>
<td>☐</td>
</tr>
<tr>
<td>If you need more information on the use of the control panel, see <em>ACX-AP-x assistant control panels user's manual</em> (3AUA0000085685 [English]).</td>
<td>☐</td>
</tr>
<tr>
<td>Switch the control panel to the remote mode (Loc/Rem key) to enable control of the supply unit with the operating switch [S21].</td>
<td>☐</td>
</tr>
</tbody>
</table>

### Switching the supply unit on

#### WARNING!

If the drive is equipped with a brake unit, make sure there are inverters connected to the intermediate circuit before closing the main circuit breaker [Q1]. A rule of thumb: The sum capacitance of the inverters connected must be at least 50% of the sum capacitance of all inverters.

If there is not enough capacitive load at start, the DC voltage will overshoot the overvoltage limit, causing immediate start of the brake unit. Constant braking will overload brake choppers and resistors and cause overheating.

**Units with a DC switch-disconnector [Q11]:** Make sure that all DC switch-disconnectors [Q11] are closed and charging switches [Q10] are open in all IGBT supply module cubicles. See also *Additional instructions for closing the DC switch-disconnector* (page 132).

<table>
<thead>
<tr>
<th>Task</th>
<th>Complete</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switch the main disconnecting device (main switch-disconnector or main circuit breaker) [Q1] on.</td>
<td>☐</td>
</tr>
</tbody>
</table>
Switching the supply unit off

1. Stop the motors connected to inverter units.
2. Deactivate the Run enable signal to open the main circuit breaker [Q1]. This can be done, for example, with an operating switch [S21].

Additional instructions for closing the DC switch-disconnector

If the DC bus is not alive and the main DC switch-disconnector [Q11] is in OFF position, the main DC switch-disconnector [Q11] is mechanically locked to OFF position by interlock [K11]. In order to get the supply unit started there are two possibilities: the DC bus is powered up by another supply unit (if applicable), or the DC bus must be powered by means of the local charging control switch [S4], which forces the charging circuit on.

IGBT supply modules can then be charged as follows:

**Note:** Before local operation of the charging circuit via local charging control switch [S4], make sure that the main breaker(s) of the supply unit is racked in and the DC switch-disconnector for line-up charging [Q40] is closed.

- Force the charging circuit of the unit on via setting the local charging control switch [S4] to position “1”.
- Wait for a few seconds for the DC bus charging up to nominal voltage level.
- Charge the IGBT supply modules: close the charging switch [Q10] of the units that are to be powered up.
- After the IGBT supply modules are charged and the charging light [P11] on the cabinet door illuminates, the lock of DC switch-disconnector [Q11] is released. The main DC switch-disconnector [Q11] can now be closed, and the charging switch [Q10] opened.
- Repeat this for all IGBT supply module cubicles belonging to this supply unit.
- After that, set the local charging control switch [S4] back into OPEN position and the DC bus will be discharged again.

When the DC switch-disconnector [Q11] is in ON position, follow the normal start-up procedure to charge the line-up and to start the operation of the supply unit.
Contents of this chapter

This chapter instructs how to maintain the IGBT supply module and how to interpret its fault conditions. The information is valid for ACS880-204LC IGBT supply modules and the cabinet construction examples presented in this manual.

WARNING!
Only qualified electricians are allowed to do the work described in this chapter. Read the complete safety instructions before you install, commission, use or service the converter. The complete safety instructions are given in Safety instructions for ACS880 liquid-cooled multidrive cabinets and modules (3AXD50000048633 [English]).

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

- Description of symbols

<table>
<thead>
<tr>
<th>Action</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Inspection (visual inspection and maintenance action if needed)</td>
</tr>
<tr>
<td>P</td>
<td>Performance of on/off-site work (commissioning, tests, measurements or other work)</td>
</tr>
<tr>
<td>R</td>
<td>Replacement</td>
</tr>
</tbody>
</table>
### Recommended maintenance intervals after start-up

<table>
<thead>
<tr>
<th>Maintenance task/object</th>
<th>Years from start-up</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td><strong>Coolant</strong></td>
<td></td>
</tr>
<tr>
<td>Checking coolant antifreeze concentration</td>
<td>P</td>
</tr>
<tr>
<td>Coolant draining and replacement</td>
<td>R</td>
</tr>
<tr>
<td>External circuit of main heat exchanger (temperature/flow/pressure)</td>
<td>I</td>
</tr>
<tr>
<td><strong>Coolant pump</strong></td>
<td></td>
</tr>
<tr>
<td>Pump and motor</td>
<td>R</td>
</tr>
<tr>
<td>Expansion tank</td>
<td>R</td>
</tr>
<tr>
<td>Inspection of expansion tank air pressure</td>
<td>P</td>
</tr>
<tr>
<td>ACS880-1007LC control Unit fan (24 V DC)</td>
<td>R</td>
</tr>
<tr>
<td><strong>Cooling fan and fan control</strong></td>
<td></td>
</tr>
<tr>
<td>Cooling fan (230 V AC)</td>
<td>R</td>
</tr>
<tr>
<td>Cooling fan (115 V AC)</td>
<td>R</td>
</tr>
<tr>
<td>CIO module for fan control (230 V AC)</td>
<td>R</td>
</tr>
<tr>
<td>CIO module for fan control (115 V AC)</td>
<td>R</td>
</tr>
<tr>
<td><strong>Aging</strong></td>
<td></td>
</tr>
<tr>
<td>DC circuit electrolytic capacitors and discharging resistors</td>
<td>R</td>
</tr>
<tr>
<td>Module internal control boards (BINT, BGDR, BDPS)</td>
<td>R</td>
</tr>
<tr>
<td>Flat ribbon cables (when control boards are replaced)</td>
<td>R</td>
</tr>
<tr>
<td>Control unit</td>
<td>R</td>
</tr>
<tr>
<td>Control unit battery</td>
<td>R</td>
</tr>
<tr>
<td>Control panel battery</td>
<td>R</td>
</tr>
<tr>
<td>Cabinet auxiliary power supplies</td>
<td>R</td>
</tr>
<tr>
<td>Buffer module 24 V DC (+F276 Ride-through function)</td>
<td>R</td>
</tr>
<tr>
<td><strong>Connections and environment</strong></td>
<td></td>
</tr>
<tr>
<td>Quality of supply voltage</td>
<td>P</td>
</tr>
<tr>
<td><strong>Spare parts</strong></td>
<td></td>
</tr>
<tr>
<td>Spare parts</td>
<td>I</td>
</tr>
<tr>
<td>DC circuit capacitor reforming (spare modules and spare capacitors)</td>
<td>P</td>
</tr>
<tr>
<td><strong>Inspections by user</strong></td>
<td></td>
</tr>
<tr>
<td>Checking tightness of cable and busbar terminals. Tightening if needed.</td>
<td>I</td>
</tr>
<tr>
<td>Checking ambient conditions (dustiness, corrosion, temperature)</td>
<td>I</td>
</tr>
<tr>
<td>Checking coolant pipe connections</td>
<td>I</td>
</tr>
</tbody>
</table>
### Maintenance task/object

| Years from start-up | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | ...
<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ABB SACE main circuit breaker maintenance</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ABB contactors maintenance</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Functional safety

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety function test</td>
<td>See the maintenance information of the safety function.</td>
</tr>
<tr>
<td>Safety component expiry (Mission time, $T_M$)</td>
<td>20 years</td>
</tr>
</tbody>
</table>

(3AXD10000578918 L)

1) To replace CIO module or reset fan counters, see CIO-01 I/O module for distributed I/O bus control user’s manual (3AXD50000126880 [English]).

### Note:

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

### Maintenance timers and counters

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

### Cooling system

For instructions on coolant replacement and checking the cooling system, see chapter Internal cooling circuit (page 197).

### 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 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 109)* 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 or maintenance work.

  1. Stop the drive and do the steps in section *Electrical safety precautions (page 109)* before you start the work.

  2. Examine the tightness of the cable connections. Use the tightening torques given in the technical data.

### Cooling fans

The life span of the cooling fan depends on the running time of the fan, 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 the IGBT supply module (frame R8i)**

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

  **WARNING!**
  
  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 109).*

  2. Remove any shrouding in front of the cooling fan.

  3. Disconnect the fan wiring.

  4. Undo the two retaining screws (a).

  5. Pull the fan outwards to separate it from the heat exchanger housing.

  6. Install new fan in reverse order. Align the guide pins (b) at the rear of the fan cowlng with the slots (c) in the module bottom guide, then reinstall the retaining screws (a).
Replacing the cooling fan of the LCL filter

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

1. Repeat the steps described in section *Electrical safety precautions (page 109).*
2. Remove any shrouding in front of the cooling fan.
3. Disconnect the fan wiring.
4. Remove the four fastening screws.
5. Pull the fan housing outwards.
6. Install a new fan in reverse order.
IGBT supply module

- Replacing the IGBT supply module (frame R8i)

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

**WARNING!**
Beware of hot coolant. Do not work on the liquid cooling system until the pressure is lowered down by stopping the pumps and draining the coolant. High-pressure warm coolant (6 bar, max. 50 °C) is present in the internal cooling circuit when it is in operation.

**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.

2…3 mm (0.08 … 0.12“)

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

**Removing the module**

1. Repeat the steps described in section *Electrical safety precautions (page 109).*
2. Remove the shrouding in front of the module.
3. Undo the locking screws of the swing-out frame (if present) and open it.
4. Unplug the wiring from the module and move it aside. Use cable ties to keep the wiring out of the way.
5. Remove the L-shaped DC busbars at the top of the module. Make note of the orientation of the screws as well as the order of the washers.

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

7. After the module has drained, disconnect the piping from the module.
8. Remove the module retaining screws at the top and the bottom of the module.
9. Pull the module carefully out onto a table or other platform. Keep the module secured to a hoist or equivalent to prevent the module from falling. For information on using the lifting device, see *Converter module lifting device for drive cabinets hardware manual* (3AXD50000210268 [English]).

**Reinstalling the module**

1. Push the module carefully into its bay.
2. Fasten the retaining screws at the top and the bottom of the module.
3. Reinstall the DC busbars at the top of the module.
4. Reconnect the coolant pipes to the module.

![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.

5. Reconnect the control wiring to the module.

6. Fill up the cooling system. For instructions, see section *Filling up and bleeding the internal cooling circuit*.

7. Close the swing-out frame (if present). Reinstall all shrouds removed earlier.

**Capacitors**

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

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

- **Reforming the capacitors**

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

**Control panel**

For detailed information on the control panel, see *ACx-AP-x assistant control panels user’s manual* ([3AUA0000085685](https://library.abb.com/en)) in English.

- **Cleaning the control panel**

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

- **Replacing the battery**

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

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

Note: Contact ABB for ZCU-12 (Supply control unit) battery replacement.

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 109) 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 109)* 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**

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 delivered with the IGBT supply module.

- **Control panel and panel platform/holder LEDs**

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

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

### R8i module LEDs

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

### Reduced run

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

In principle, reduced run is possible with only one module, but the physical requirements of operating the motor still apply; for example, the modules remaining in use must be able to provide enough current. For allowed configurations when using reduced run function, see ACS880 IGBT supply control program firmware manual (3AUA000131562 [English]).

### Starting reduced run operation

**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 drive and do the steps in section *Electrical safety precautions (page 109)* before you start the work.

2. If the control unit is powered from the faulty module, connect the control unit to another 24 V DC power supply. ABB strongly recommends using an external power supply with supply/rectifier units consisting of parallel-connected modules.

3. Remove the module to be serviced from its bay.

4. Install an air baffle (for example, plexiglass) to the top module guide to block the airflow through the empty module bay.

5. Switch on the power to the supply/rectifier unit.

6. Enter the number of supply/rectifier modules present into parameter *195.13 Reduced run mode*.

7. Reset all faults and start the supply/rectifier unit. The maximum current limit is now automatically set according to the new configuration. A mismatch between the number of detected modules (parameter *195.14*) and the value set in *195.13* will generate a fault.

### Resuming normal operation

**WARNING!**
Obey the safety instructions given in *ACS880 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. Stop the drive and do the steps in section *Electrical safety precautions (page 109)* before you start the work.

2. Remove the air baffle from the module bay.

3. Reinstall the module into its bay.

4. Switch on the power to the supply/rectifier unit.

5. Enter "0" into parameter *195.13 Reduced run mode*.

### 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.
Ordering information

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

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

Note:

- This chapter only lists the installation accessories available from ABB. All other parts must be sourced from a third party (such as Rittal) by the system integrator. For a listing, refer to the kit-specific installation instructions available at https://sites-apps.abb.com/sites/lvacdrivesengineeringsupport/content. For access, contact your local ABB representative.
- Parts that are labeled suitable for generic enclosures are not designed for any specific enclosure system. These parts are intended as a basis for further engineering, and may require additional parts to be fully usable.

Installation accessories designed for generic enclosures are in fact designed for an inside width of 50 mm less than the nominal width of the enclosure. For example, a mechanical kit intended for 800 mm wide generic enclosure is designed for an inside width of 750 mm, and will not fit a 800 mm wide Rittal VX25 enclosure.
Kit code key

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

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

- x = cooling method
  - A = air-cooled (some of these kits are also used with liquid-cooled drives)
  - L = liquid-cooled

- w = cabinet width
  - 4 = 400 mm
  - 6 = 600 mm
  - 8 = 800 mm

- s = module frame size / sizes
  - 1 = R1i
  - 2 = R2i
  - 3 = R3i
  - 4 = R4i
  - 5 = R5i
  - 6 = R6i/D6D
  - 7 = R7i/D7D/D7T
  - 8 = R8i/D8D/D8T

- X = any, or not defined.
• yyy = consecutive numbering
  • 001…099 = Kits related to cabinets, for example, adapter plates
    001…019 Common AC- and DC-related kits
    020…049 Cabinet mechanics kits
    050…059 Swing frame kits
  • 100…199 = Kits related to AC connection, for example, busbars
    100…129 Kits with connection to AC
    130…149 Kits with connection to module
    150…199 Other kits related to AC connection
  • 200…299 = Kits related to DC connection, for example, busbars
    200…229 Kits with connection to common DC
    230…249 Kits with connection to module
    250…299 Other kits related to DC connection
  • 300…399 = Kits related to module installation, for example, mechanical supports
    300…330 Module supporting kits, basic mechanical support
    350…379 Shroud kits
  • 400…499 = Other kits
    400…419 Fan kits
    420…439 Air guides
    440…459 Cooling circuit kits
  • VX = Kit specifically designed for the Rittal VX25 enclosure system. Many kits without this designation are also used with the VX25 system.
Frame R8i and multiples

### IGBT supply modules

IGBT supply units consisting of frame R8i IGBT supply modules are to be ordered as separate modules.

<table>
<thead>
<tr>
<th>IGBT supply unit</th>
<th>Modules used</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
<td><strong>Frame size</strong></td>
</tr>
<tr>
<td>ACS880-204LC-0360A-7</td>
<td>R8i</td>
</tr>
<tr>
<td>ACS880-204LC-0400A-7</td>
<td>R8i</td>
</tr>
<tr>
<td>ACS880-204LC-0450A-7</td>
<td>R8i</td>
</tr>
<tr>
<td>ACS880-204LC-0480A-7</td>
<td>R8i</td>
</tr>
<tr>
<td>ACS880-204LC-0560A-7</td>
<td>R8i</td>
</tr>
<tr>
<td>ACS880-204LC-0620A-7</td>
<td>R8i</td>
</tr>
<tr>
<td>ACS880-204LC-0700A-7</td>
<td>R8i</td>
</tr>
<tr>
<td>ACS880-204LC-0770A-7</td>
<td>R8i</td>
</tr>
<tr>
<td>ACS880-204LC-0930A-7</td>
<td>2×R8i</td>
</tr>
<tr>
<td>ACS880-204LC-1090A-7</td>
<td>2×R8i</td>
</tr>
<tr>
<td>ACS880-204LC-1180A-7</td>
<td>2×R8i</td>
</tr>
<tr>
<td>ACS880-204LC-1360A-7</td>
<td>2×R8i</td>
</tr>
<tr>
<td>ACS880-204LC-1500A-7</td>
<td>2×R8i</td>
</tr>
<tr>
<td>ACS880-204LC-1800A-7</td>
<td>3×R8i</td>
</tr>
<tr>
<td>ACS880-204LC-2020A-7</td>
<td>3×R8i</td>
</tr>
<tr>
<td>ACS880-204LC-2220A-7</td>
<td>3×R8i</td>
</tr>
<tr>
<td>ACS880-204LC-2670A-7</td>
<td>4×R8i</td>
</tr>
<tr>
<td>ACS880-204LC-2930A-7</td>
<td>4×R8i</td>
</tr>
</tbody>
</table>

**Ordering code format**

[Module type] +code [+code] ...

For example, ACS880-104LC-0480A-7 +E205

**Option codes**


**Note:** The following components are also required to construct a working IGBT supply unit and must be ordered separately:

- LCL filter
- An ACS-AP-x control panel is required for the commissioning of an ACS880 drive system, even if the Drive composer PC tool is used.
- Control unit
- Common mode filters
- Quick connector
- Fiber optic cabling from control unit to each IGBT supply module.
The other parts listed in this chapter for this frame size
• may be required by the application, or
• make the installation or use of the module easier.

## LCL filters

LCL filter delivery contains LCL filter components as loose parts. LCL filter contains the grid-side choke, converter-side choke, capacitors and resistor. For contents, see Kit contents of the LCL filters.

<table>
<thead>
<tr>
<th>ACS880-204LC-...</th>
<th>LCL filter</th>
<th>Qty</th>
<th>Ordering code</th>
</tr>
</thead>
<tbody>
<tr>
<td>$U_N = 690$ V</td>
<td>LCL filter type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0360A-7</td>
<td>BLCL-15LC-7</td>
<td>1</td>
<td>3AXD50000234417</td>
</tr>
<tr>
<td>0400A-7</td>
<td>BLCL-15LC-7</td>
<td>1</td>
<td>3AXD50000234417</td>
</tr>
<tr>
<td>0450A-7</td>
<td>BLCL-15LC-7</td>
<td>1</td>
<td>3AXD50000234417</td>
</tr>
<tr>
<td>0480A-7</td>
<td>BLCL-15LC-7</td>
<td>1</td>
<td>3AXD50000234417</td>
</tr>
<tr>
<td>0560A-7</td>
<td>BLCL-15LC-7</td>
<td>1</td>
<td>3AXD50000234417</td>
</tr>
<tr>
<td>0620A-7</td>
<td>BLCL-15LC-7</td>
<td>1</td>
<td>3AXD50000234417</td>
</tr>
<tr>
<td>0700A-7</td>
<td>BLCL-15LC-7</td>
<td>1</td>
<td>3AXD50000234417</td>
</tr>
<tr>
<td>0770A-7</td>
<td>BLCL-15LC-7</td>
<td>1</td>
<td>3AXD50000234417</td>
</tr>
<tr>
<td>0930A-7</td>
<td>BLCL-24LC-7</td>
<td>1</td>
<td>3AXD50000234431</td>
</tr>
<tr>
<td>1090A-7</td>
<td>BLCL-24LC-7</td>
<td>1</td>
<td>3AXD50000234431</td>
</tr>
<tr>
<td>1180A-7</td>
<td>BLCL-24LC-7</td>
<td>1</td>
<td>3AXD50000234431</td>
</tr>
<tr>
<td>1360A-7</td>
<td>BLCL-25LC-7</td>
<td>1</td>
<td>3AXD50000234448</td>
</tr>
<tr>
<td>1500A-7</td>
<td>BLCL-25LC-7</td>
<td>1</td>
<td>3AXD50000234448</td>
</tr>
<tr>
<td>1800A-7</td>
<td>BLCL-24LC-7</td>
<td>2</td>
<td>3AXD50000234431</td>
</tr>
<tr>
<td>2020A-7</td>
<td>BLCL-24LC-7</td>
<td>2</td>
<td>3AXD50000234431</td>
</tr>
<tr>
<td>2220A-7</td>
<td>BLCL-24LC-7</td>
<td>2</td>
<td>3AXD50000234431</td>
</tr>
<tr>
<td>2670A-7</td>
<td>BLCL-25LC-7</td>
<td>2</td>
<td>3AXD50000234448</td>
</tr>
<tr>
<td>2930A-7</td>
<td>BLCL-25LC-7</td>
<td>2</td>
<td>3AXD50000234448</td>
</tr>
</tbody>
</table>
## 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]).

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Ordering code</th>
<th>Illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACS-AP-W</td>
<td>Control panel with Bluetooth</td>
<td>3AXD50000025965</td>
<td><img src="image" alt="Control panel" /></td>
</tr>
<tr>
<td>DPMP-01</td>
<td>Door mounting kit (IP55)</td>
<td>3AUA0000108878</td>
<td><img src="image" alt="Door mounting kit" /></td>
</tr>
</tbody>
</table>

The door mounting kit contains:

- front cover
- flat cable (between DDPI-01 board and the panel)
- DDPI-01 board, cover and M4×8 combi screw for the cover
- EMC shield
- control panel mounting platform
- grounding wire
- Ethernet cable (3 m [9.8 ft]).

*DPMP-01 mounting platform for ACS-AP control panel installation guide* (3AUA0000100140 [English]).
Control electronics

Control unit

One BCU control unit is required per IGBT supply unit. The type of the control unit depends on the number of IGBT supply modules as shown below. The control unit is delivered with a memory unit containing the ACS880 IGBT supply control program.

<table>
<thead>
<tr>
<th>Frame size</th>
<th>Control unit type</th>
<th>Ordering code</th>
</tr>
</thead>
<tbody>
<tr>
<td>R8i</td>
<td>BCU-02</td>
<td>3AXD50000002937</td>
</tr>
<tr>
<td>2×R8i...4×R8i</td>
<td>BCU-12</td>
<td>3AXD50000015806</td>
</tr>
</tbody>
</table>

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

For more information on optional modules, see appropriate option module manual.

Fiber optic cables

Each frame R8i module is connected to the control unit with a pair of fiber optic cables.

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

<table>
<thead>
<tr>
<th>Length</th>
<th>Kit type designation</th>
<th>Ordering code</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 m</td>
<td>NLWC-02</td>
<td>58988821</td>
</tr>
<tr>
<td>3 m</td>
<td>NLWC-03</td>
<td>58948233</td>
</tr>
<tr>
<td>5 m</td>
<td>NLWC-05</td>
<td>58948250</td>
</tr>
<tr>
<td>7 m</td>
<td>NLWC-07</td>
<td>58948268</td>
</tr>
<tr>
<td>10 m</td>
<td>NLWC-10</td>
<td>58948276</td>
</tr>
</tbody>
</table>

Auxiliary measurement unit (BAMU)

BAMU is a measurement unit for precise voltage and current measurements.

<table>
<thead>
<tr>
<th>Frame size</th>
<th>Unit type</th>
<th>Ordering code</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>BAMU-12C</td>
<td>3AXD50000045879</td>
</tr>
</tbody>
</table>

For more information, see BAMU-12C auxiliary measurement unit hardware manual (3AXD50000117840 [English]).

Note: You must have BCU-12 control unit to have enough fiber optic connections if you use BAMU auxiliary measurement unit for 2×R8i IGBT supply modules.

Weak supply networks: In weaker supply networks with a short-circuit ratio less than 8, it is highly recommended to install a BAMU auxiliary measurement unit to the drive. In such networks, there is a risk of nuisance DC overvoltage tripping due to disturbances caused by probable high-voltage THD in the supply voltage. Short-circuit ratio is defined as the supply network’s apparent short-circuit power $S_{k,net}$ divided by the drive’s nominal apparent power $S_n$ ($S_{k,net} / S_n < 8$).
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]).

<table>
<thead>
<tr>
<th>Type</th>
<th>Data</th>
<th>Qty</th>
<th>Ordering code</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIO-01</td>
<td>CIO-01 I/O module for distributed I/O bus control</td>
<td>1</td>
<td>3AXD50000041983</td>
</tr>
</tbody>
</table>
### Mechanical installation accessories

These kits include parts that are used for installing the module and LCL filter in the enclosure.

#### Adapter kit (for Rittal VX25 enclosures)

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 of the supply modules.

<table>
<thead>
<tr>
<th>Used with...</th>
<th>Qty</th>
<th>Ordering code</th>
<th>Kit code</th>
<th>Illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>400/600/800 mm VX25 enclosure</td>
<td>1</td>
<td>3AXD50000360543</td>
<td>L-468-8-020-VX</td>
<td><img src="image1.png" alt="Illustration" /></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Instruction code: 3AXD50000327591</td>
</tr>
<tr>
<td>BLCL-15LC-7, BLCL-24LC-7 and BLCL-25LC-7 (600 mm Rittal VX25 enclosure)</td>
<td>1</td>
<td>3AXD50000426652</td>
<td>L-468-8-314-VX</td>
<td><img src="image2.png" alt="Illustration" /></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Instruction code: 3AXD50000429653</td>
</tr>
</tbody>
</table>
## Module top/bottom guides

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

<table>
<thead>
<tr>
<th>Used with…</th>
<th>Qty</th>
<th>Ordering code</th>
<th>Kit code</th>
<th>Illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>400 mm generic enclosure</td>
<td>1</td>
<td>3AXD50000043678</td>
<td>L-4-8-301</td>
<td><img src="image1.png" alt="Diagram" /></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Instruction code:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3AXD50000043726</td>
</tr>
<tr>
<td>400 mm Rittal VX25 enclosure</td>
<td>1</td>
<td>3AXD500000360598</td>
<td>L-4-8-301-VX</td>
<td><img src="image2.png" alt="Diagram" /></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Instruction code:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3AXD50000330461</td>
</tr>
<tr>
<td>600 mm generic enclosure</td>
<td>1</td>
<td>3AXD50000041710</td>
<td>L-6-8-302</td>
<td><img src="image3.png" alt="Diagram" /></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Instruction code:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3AXD50000041836</td>
</tr>
</tbody>
</table>

158 Ordering information
<table>
<thead>
<tr>
<th>Used with</th>
<th>Qty</th>
<th>Ordering code</th>
<th>Kit code</th>
<th>Illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>600 mm Rittal VX25 enclosure</td>
<td>1</td>
<td>3AXD50000361090</td>
<td>L-6-8-302-VX</td>
<td><img src="image1.png" alt="Image" /></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Instruction code:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3AXD50000330201</td>
<td></td>
<td></td>
</tr>
<tr>
<td>800 mm generic enclosure</td>
<td>1</td>
<td>3AXD50000041248</td>
<td>L-8-8-303</td>
<td><img src="image2.png" alt="Image" /></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Instruction code:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3AXD50000041461</td>
<td></td>
<td></td>
</tr>
<tr>
<td>800 mm Rittal VX25 enclosure</td>
<td>1</td>
<td>3AXD50000361274</td>
<td>L-8-8-303-VX</td>
<td><img src="image3.png" alt="Image" /></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Instruction code:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3AXD50000329502</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Shrouding**

This kit contains the shroud to cover the top part of the cubicle with the necessary brackets and screws.

<table>
<thead>
<tr>
<th>Used with…</th>
<th>Qty</th>
<th>Ordering code</th>
<th>Kit code</th>
<th>Illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>400 mm Rittal VX25 enclosure</td>
<td>1</td>
<td>3AXD50000361083</td>
<td>L-4-8-022-VX</td>
<td>![Illustration of shroud for 400 mm enclosure]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Instruction code: 3AXD50000353354</td>
</tr>
<tr>
<td>600 mm Rittal VX25 enclosure</td>
<td>1</td>
<td>3AXD50000361267</td>
<td>L-6-8-023-VX</td>
<td>![Illustration of shroud for 600 mm enclosure]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Instruction code: 3AXD50000353521</td>
</tr>
<tr>
<td>800 mm Rittal VX25 enclosure</td>
<td>1</td>
<td>3AXD50000361427</td>
<td>L-8-8-024-VX</td>
<td>![Illustration of shroud for 800 mm enclosure]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Instruction code: 3AXD50000353125</td>
</tr>
</tbody>
</table>
### Marine support kit for LCL filters

<table>
<thead>
<tr>
<th>Used with…</th>
<th>Qty</th>
<th>Ordering code</th>
<th>Kit code</th>
<th>Illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>BLCL-15LC-7, BLCL-24LC-7 and BLCL-25LC-7 (600 mm Rittal VX25 enclosure)</td>
<td>1</td>
<td>3AXD50000426638</td>
<td>A-6-8-027-VX</td>
<td><img src="image1" alt="Illustration" /></td>
</tr>
</tbody>
</table>

- Instruction code: 3AXD50000431632

### Lifting device

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

<table>
<thead>
<tr>
<th>Frame</th>
<th>Enclosure</th>
<th>Qty</th>
<th>Ordering code</th>
<th>Illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>R8i</td>
<td>Rittal VX25</td>
<td>1</td>
<td>3AXD50000439997</td>
<td><img src="image2" alt="Illustration" /></td>
</tr>
</tbody>
</table>

- Instruction code: 3AXD50000210268, 3AXD50000439409
### AC-side components

**Main circuit breakers and wagons**

You must equip the electric supply of a machinery with a main disconnecting device (IEC/EN60204-1). The main power line is equipped with a main a main circuit breaker [Q1]. This section lists suitable main circuit breakers.

<table>
<thead>
<tr>
<th>IGBT supply unit</th>
<th>Main circuit breakers (230 V, IEC)</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>$U_N = 690$ V</strong></td>
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<tr>
<td>ACS880-204LC-0360A-7</td>
<td>E2.2S-A800EKIP DIP LI AC220V,IEC,UL,CCC</td>
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<td>Main circuit breakers (230 V, UL/CSA)</td>
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<td><strong>Type</strong></td>
<td><strong>Ordering code</strong></td>
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### 164 Ordering information

Content of the 230 V air circuit breakers:

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<tr>
<th>Description</th>
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<td>1SDA077658R1</td>
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<td>1SDA077668R1</td>
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<td>1SDA078458R1</td>
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<td>1SDA072501R1</td>
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<td>1SDA079138R1</td>
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<tr>
<td>YO E1.2..E6.2 220-240 Vac/dc</td>
<td>1SDA073674R1</td>
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<tr>
<td>YC E1.2..E6.2 220-240 Vac/dc</td>
<td>1SDA073687R1</td>
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<td>YU E1.2..E6.2 220-240 Vac/dc</td>
<td>1SDA073700R1</td>
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<tr>
<td>M E2.2..E6.2 220-250 Vac/dc</td>
<td>1SDA073725R1</td>
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<tr>
<td>MOC E2.2..E6.2</td>
<td>1SDA073781R1</td>
</tr>
<tr>
<td>AUX 6Q 400V E2.2..E6.2</td>
<td>1SDA073756R1</td>
</tr>
<tr>
<td>KLC-S Key lock open N.20005 E2.2..E6.2</td>
<td>1SDA073792R1</td>
</tr>
<tr>
<td>KLP-S Key lock raked in/out N.20005 E2.2...E6.2 1st key</td>
<td>1SDA073807R1</td>
</tr>
<tr>
<td>TRIPLE CERTIFIC: UL/IEC/CCC *</td>
<td>1SDA083022R1 (E2.2S), 1SDA083025R1 (E4.2S), 1SDA083028R1 (E6.2V)</td>
</tr>
</tbody>
</table>

* = Certificate not included in E4.2S 3200.

For adapting E2.2S-A, E4.2S-A and E6.2V-A air circuit breakers to IEC bus bars, use bus bar shim kit. See [IEC busbar shim kits (page 170)](#).
### IGBT supply unit

<table>
<thead>
<tr>
<th>Type</th>
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### Wagons (IEC)

- **$U_N = 690$ V**
- **ACS880-204LC-0360A-7**
- **ACS880-204LC-0400A-7**
- **ACS880-204LC-0450A-7**
- **ACS880-204LC-0480A-7**
- **ACS880-204LC-0560A-7**
- **ACS880-204LC-0620A-7**
- **ACS880-204LC-0700A-7**
- **ACS880-204LC-0770A-7**
- **ACS880-204LC-0930A-7**
- **ACS880-204LC-1090A-7**
- **ACS880-204LC-1180A-7**
- **ACS880-204LC-1360A-7**
- **ACS880-204LC-1500A-7**
- **ACS880-204LC-1800A-7**
- **ACS880-204LC-2020A-7**
- **ACS880-204LC-2220A-7**
- **ACS880-204LC-2670A-7**
- **ACS880-204LC-2930A-7**

**Ordering information 165**

#### Content of the 230 V wagons:

- **W FP lu=2000 3p HR HR UL**
- **W FP lu=2500 3p HR HR UL**
- **WAGON W FP lu=5000 HR HR UL**
- **AUP 5 contacts 400V E2.2...E6.2 - left set**

- 1SDA079698R1 (E2.2-A W FP 2000)
- 1SDA079700R1 (E4.2-A W FP 2500)
- 1SDA079706R1 (E6.2-A W FP 5000)
- 1SDA080373R1
The exception is E4.2_W_FP_3200_HR-HR_IEC:

- W FP lu=3200 HR, IEC
- AUP 5 contacts 400V E2.2...E6.2, IEC

For adapting E2.2S-A, E4.2S-A and E6.2V-A air circuit breakers to IEC bus bars, use bus bar shim kit. See IEC busbar kits (page 170).

<table>
<thead>
<tr>
<th>IGBT supply unit</th>
<th>Main circuit breakers (115 V, IEC)</th>
<th>Ordering code</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>$U_N = 690$ V</td>
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</table>
168 Ordering information

Content of the 115 V air circuit breakers:

- Ekip Dip LI 3p WMP
  - 1SDA077648R1 (E2.2S-A 1200)
  - 1SDA077658R1 (E2.2S-A 1600)
  - 1SDA077668R1 (E2.2S-A 2000)
  - 1SDA078458R1 (E4.2S-A 2500)
  - 1SDA072501R1 (E4.2S 3200)
  - 1SDA079138R1 (E6.2V-A 5000)

- YO E1.2..E6.2 110-120 Vac/dc
  - 1SDA073672R1

- YC E1.2..E6.2 110-120 Vac/dc
  - 1SDA073685R1

- YU E1.2..E6.2 110-120 Vac/dc
  - 1SDA073698R1

- M E2.2..E6.2 100-130 Vac/dc
  - 1SDA073724R1

- MOC E2.2..E6.2
  - 1SDA073781R1

- AUX 6Q 400V E2.2..E6.2
  - 1SDA073756R1

- KLC-S Key lock open N.20005 E2.2..E6.2
  - 1SDA073792R1

- KLP-S Key lock racked in/out N.20005 E2.2..E6.2 1st key
  - 1SDA073807R1

- TRIPLE CERTIFIC: UL/IEC/CCC *
  - 1SDA083022R1 (E2.2s),
  - 1SDA083025R1 (E4.2s),
  - 1SDA083028R1 (E6.2v)

* = Certificate not included in E4.2S 3200.

For adapting E2.2S-A, E4.2S-A and E6.2V-A air circuit breakers to IEC bus bars, use bus bar shim kit. See IEC busbar shim kits (page 170).

Content of the 115 V wagons:

- W FP lu=2000 3p HR HR UL /
  - 1SDA079698R1 (E2.2-A W FP 2000)

- W FP lu=2500 3p HR HR UL /
  - 1SDA079700R1 (E4.2-A W FP 2500)

- WAGON W FP lu=5000 HR HR UL
  - 1SDA079706R1 (E6.2-A W FP 5000)

- AUP 5 contacts 400V E2.2...E6.2 - left set
  - 1SDA080373R1

The exception is E4.2_W_FP_3200_HR-HR_IEC:

- W FP lu=3200 HR HR, IEC
  - 1SDA073913R1 (E4.2 W FP 3200)

- AUP 5 contacts 400V E2.2...E6.2, IEC
  - 1SDA073764R1

For adapting E2.2S-A, E4.2S-A and E6.2V-A air circuit breakers to IEC bus bars, use bus bar shim kit. See IEC busbar shim kits (page 170).
<table>
<thead>
<tr>
<th>IGBT supply unit</th>
<th>Wagons (UL/CSA)</th>
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<tr>
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<td>Type</td>
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<td>A.UX CONT</td>
</tr>
<tr>
<td>ACS880-204LC-0360A-7</td>
<td>E2.2-A_W_FP_2000HR-UL, IEC, CCC AUXCONT</td>
</tr>
<tr>
<td>ACS880-204LC-0400A-7</td>
<td>E2.2-A_W_FP_2000HR-UL, IEC, CCC AUXCONT</td>
</tr>
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<td>ACS880-204LC-0450A-7</td>
<td>E2.2-A_W_FP_2000HR-UL, IEC, CCC AUXCONT</td>
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<td>ACS880-204LC-0480A-7</td>
<td>E2.2-A_W_FP_2000HR-UL, IEC, CCC AUXCONT</td>
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<tr>
<td>ACS880-204LC-0560A-7</td>
<td>E2.2-A_W_FP_2000HR-UL, IEC, CCC AUXCONT</td>
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<td>ACS880-204LC-0620A-7</td>
<td>E2.2-A_W_FP_2000HR-UL, IEC, CCC AUXCONT</td>
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<td>ACS880-204LC-0700A-7</td>
<td>E2.2-A_W_FP_2000HR-UL, IEC, CCC AUXCONT</td>
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<td>ACS880-204LC-0770A-7</td>
<td>E2.2-A_W_FP_2000HR-UL, IEC, CCC AUXCONT</td>
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<td>ACS880-204LC-0930A-7</td>
<td>E2.2-A_W_FP_2000HR-UL, IEC, CCC AUXCONT</td>
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<td>E2.2-A_W_FP_2000HR-UL, IEC, CCC AUXCONT</td>
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<td>ACS880-204LC-1180A-7</td>
<td>E2.2-A_W_FP_2000HR-UL, IEC, CCC AUXCONT</td>
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<td>E2.2-A_W_FP_2000HR-UL, IEC, CCC AUXCONT</td>
</tr>
<tr>
<td>ACS880-204LC-1500A-7</td>
<td>E2.2-A_W_FP_2000HR-UL, IEC, CCC AUXCONT</td>
</tr>
<tr>
<td>ACS880-204LC-1800A-7</td>
<td>E4.2-A_W_FP_2500HR-UL AUXCONT</td>
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<td>ACS880-204LC-2020A-7</td>
<td>E4.2-A_W_FP_2500HR-UL AUXCONT</td>
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<td>ACS880-204LC-2220A-7</td>
<td>E4.2-A_W_FP_2500HR-UL AUXCONT</td>
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<td>ACS880-204LC-2670A-7</td>
<td>E2.2-A_W_FP_2000HR-UL, IEC, CCC AUXCONT</td>
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<td>ACS880-204LC-2930A-7</td>
<td>E2.2-A_W_FP_2000HR-UL, IEC, CCC AUXCONT</td>
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</table>
### IEC busbar shim kits

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

<table>
<thead>
<tr>
<th>Type</th>
<th>Data</th>
<th>Ordering code</th>
<th>Illustration</th>
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<tbody>
<tr>
<td>E2.2S-A</td>
<td>EMAX2 E2.2 busbar shim kit</td>
<td>3AXD50000286324</td>
<td><img src="image" alt="Instruction code: 3AXD50000286072" /></td>
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<tr>
<td>E4.2S-A</td>
<td>EMAX2 E4.2 busbar shim kit</td>
<td>3AXD50000286782</td>
<td><img src="image" alt="Instruction code: 3AXD50000286973" /></td>
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</table>

### Main circuit breaker and wagon cover

One cover is needed for each main circuit breaker/wagon pair. See *ACS880 multidrive modules cabinet design and construction instructions* (3AUA0000107668 [English]) for further details regarding arc protection.

IEC: IP54 flange, key N.20005 E2.2…E6.2, 1SDA073869R1, ordering code: 3AXD50000049760

UL: Hinged Window, APWK2016H, ordering code 3AUA0000222786
AC fuses

The AC fuses protect the input cables and the module against short circuits.

<table>
<thead>
<tr>
<th>IGBT supply unit</th>
<th>AC fuses</th>
<th>Type</th>
<th>A</th>
<th>V</th>
<th>Ordering code</th>
<th>Qty</th>
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<td></td>
<td>2500</td>
<td>690</td>
<td>68752591</td>
<td>6</td>
</tr>
</tbody>
</table>
AC-DC charging kits for line-up charging

The capacitor bank of the IGBT supply module needs to be charged during the start-up before connecting the module to a three-phase power line. The charging kit contains the main parts of the charging circuit.

Note: The charging components are dimensioned for DC link capacitances equal to 3 × IGBT supply unit DC capacitance (1×ISU + 2×INU), 5 × IGBT supply unit DC capacitance (1×ISU + 4×INU) and 7 × IGBT supply unit DC capacitance (1×ISU + 6×INU). If the total DC link capacitance (including IGBT supply and inverter module DC capacitances) exceeds these limits, the components must be redimensioned. Contact ABB representative for more information. The capacitances of the IGBT supply module types and the inverter module types are specified in their technical data tables. The maximum allowed number of charging cycles of the DC capacitors (i.e., power-ups by applying power) is five in ten minutes.

The following table shows the charging kits available for each module type.

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<thead>
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<th>Ordering code (IEC)</th>
<th>Max. capacitance (mF)</th>
<th>Ordering code (IEC)</th>
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<td>Ordering code (UL/CSA)</td>
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<td>1800A-7</td>
<td>3AXD500000686612</td>
<td>81</td>
<td>3AXD500000686629</td>
</tr>
<tr>
<td>2020A-7</td>
<td>3AXD500000686612</td>
<td>81</td>
<td>3AXD500000686629</td>
</tr>
<tr>
<td>2220A-7</td>
<td>3AXD500000686612</td>
<td>81</td>
<td>3AXD500000686629</td>
</tr>
<tr>
<td>2670A-7</td>
<td>3AXD500000686629</td>
<td>108</td>
<td>3AXD500000686636</td>
</tr>
<tr>
<td>2930A-7</td>
<td>3AXD500000686629</td>
<td>108</td>
<td>3AXD500000686636</td>
</tr>
</tbody>
</table>

For charging kit contents, see the technical data.

**Varistor board kit for UL/CSA installations**

The CVAR varistor board is used to protect the supply/rectifier module against excessive voltage peaks. The board shunts the current created by high voltage.

The CVAR board must be:

- installed into the cabinet,
- connected to the main circuit after the main contactor or breaker, and
- connected to the PE.

For the best results, use the shortest possible wiring when connecting the CVAR board. For the detailed connection, see the example circuit diagrams.

<table>
<thead>
<tr>
<th>Unit frame size</th>
<th>Type</th>
<th>Qty</th>
<th>Ordering code</th>
<th>Illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1×R8i 2×R8i 3×R8i</td>
<td>Varistor board kit</td>
<td>2</td>
<td>3AXD50000005122</td>
<td></td>
</tr>
<tr>
<td>4×R8i</td>
<td>Varistor board kit</td>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The second CVAR board is connected after charging contactor [Q4] in line-up charging circuit. It protects DC link against excessive voltage peaks. For connection details, see the circuit diagrams.

The varistor kit contains:

- CVAR varistor board with fastening items (stand-offs and fastening screws).

For the dimensions of the CVAR board, see the dimension drawings.

**AC busbars for LCL filters**

<table>
<thead>
<tr>
<th>Used with …</th>
<th>Qty</th>
<th>Ordering code</th>
<th>Kit code</th>
<th>Illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>BLCL-15LC-7 (600 mm Rittal VX25 enclosure)</td>
<td>1</td>
<td>3AXD50000237470</td>
<td>L-6-8-108</td>
<td><img src="image1" alt="Illustration" /></td>
</tr>
<tr>
<td>BLCL-24LC-7 (600 mm Rittal VX25 enclosure)</td>
<td>1</td>
<td>3AXD50000237487</td>
<td>L-6-8-109</td>
<td><img src="image2" alt="Illustration" /></td>
</tr>
<tr>
<td>BLCL-25LC-7 (600 mm Rittal VX25 enclosure)</td>
<td>1</td>
<td>3AXD50000237494</td>
<td>L-6-8-110</td>
<td><img src="image3" alt="Illustration" /></td>
</tr>
<tr>
<td>BLCL-15LC-7, BLCL-24LC-7 and BLCL-25LC-7 (600 mm Rittal VX25 enclosure)</td>
<td>1</td>
<td>3AXD50000237371</td>
<td>L-6-X-012</td>
<td><img src="image4" alt="Illustration" /></td>
</tr>
</tbody>
</table>
### LCL fuse busbars

<table>
<thead>
<tr>
<th>Used with …</th>
<th>Qty</th>
<th>Ordering code</th>
<th>Kit code</th>
<th>Illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>BLCL-15LC-7 (600 mm Rittal VX25 or generic enclosure)</td>
<td>1</td>
<td>3AXD50000426669</td>
<td>L-6-8-103-VX</td>
<td><img src="image1" alt="" /> Instruction code: 3AXD50000431601</td>
</tr>
<tr>
<td>BLCL-24LC-7 (600 mm Rittal VX25 or generic enclosure)</td>
<td>1</td>
<td>3AXD50000426676</td>
<td>L-6-8-104-VX</td>
<td><img src="image2" alt="" /> Instruction code: 3AXD50000431403</td>
</tr>
<tr>
<td>BLCL-25LC-7 (600 mm Rittal VX25 or generic enclosure)</td>
<td>1</td>
<td>3AXD50000426683</td>
<td>L-6-8-105-VX</td>
<td><img src="image3" alt="" /> Instruction code: 3AXD50000431724</td>
</tr>
</tbody>
</table>

### LCL choke installation kits

<table>
<thead>
<tr>
<th>Used with …</th>
<th>Qty</th>
<th>Ordering code</th>
<th>Kit code</th>
<th>Illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>BLCL-15LC-7 and BLCL-24LC-7 (600 mm Rittal VX25 or generic enclosure)</td>
<td>1</td>
<td>3AXD50000237418</td>
<td>L-6-8-106</td>
<td><img src="image4" alt="" /> Instruction code: 3AXD50000247097</td>
</tr>
</tbody>
</table>
### Ordering information

<table>
<thead>
<tr>
<th>Used with …</th>
<th>Qty</th>
<th>Ordering code</th>
<th>Kit code</th>
<th>Illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>BLCL-25LC-7 (600 mm Rittal VX25 or generic enclosure)</td>
<td>1</td>
<td>3AXD50000237425</td>
<td>L-6-8-107</td>
<td><img src="image1.png" alt="Illustration" /></td>
</tr>
<tr>
<td>BLCL-15LC-7 and BLCL-24LC-7 (600 mm Rittal VX25 or generic enclosure)</td>
<td>1</td>
<td>3AXD50000426195</td>
<td>L-6-8-306-VX</td>
<td><img src="image2.png" alt="Illustration" /></td>
</tr>
<tr>
<td>BLCL-25LC-7 (600 mm Rittal VX25 or generic enclosure)</td>
<td>1</td>
<td>3AXD50000426201</td>
<td>L-6-8-307-VX</td>
<td><img src="image3.png" alt="Illustration" /></td>
</tr>
</tbody>
</table>
### LCL capacitor installation kits

<table>
<thead>
<tr>
<th>Used with …</th>
<th>Qty</th>
<th>Ordering code</th>
<th>Kit code</th>
<th>Illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>BLCL-15LC-7 and BLCL-24LC-7 (600 mm Rittal VX25 or generic enclosure)</td>
<td>1</td>
<td>3AXD50000237319</td>
<td>L-6-8-308</td>
<td><img src="image1" alt="Illustration" /> Instruction code: 3AXD50000244065</td>
</tr>
<tr>
<td>BLCL-24LC-7 (600 mm Rittal VX25 or generic enclosure)</td>
<td>1</td>
<td>3AXD50000237333</td>
<td>L-6-8-309</td>
<td><img src="image2" alt="Illustration" /> Instruction code: 3AXD50000244065</td>
</tr>
</tbody>
</table>
### Used with ... | Qty | Ordering code | Kit code | Illustration
---|---|---|---|---
BLCL-25LC-7 (600 mm Rittal VX25 or generic enclosure) | 1 | 3AXD50000237340 | L-6-8-310 | ![Illustration](image1.png)
BLCL-15LC-7 and BLCL-24LC-7 (600 mm Rittal VX25 enclosure) | 1 | 3AXD50000426690 | L-6-8-101-VX | ![Illustration](image2.png)
BLCL-25LC-7 (600 mm Rittal VX25 enclosure) | 1 | 3AXD50000426706 | L-6-8-102-VX | ![Illustration](image3.png)
BLCL-15LC-7, BLCL-24LC-7 and BLCL-25LC-7 (600 mm Rittal VX25 enclosure) | 1 | 3AXD50000371013 | L-6-X-012-VX | ![Illustration](image4.png)

**LCL ISU connection kits**
AC busbars

The power input of the supply module is connected to the module through a quick connector.

<table>
<thead>
<tr>
<th>Used with</th>
<th>Qty</th>
<th>Ordering code</th>
<th>Kit code</th>
<th>Illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>400/600/800 mm Rittal VX25 enclosure</td>
<td>1 module</td>
<td>3AXD50000371037</td>
<td>L-468-8-121-VX</td>
<td><img src="image1" alt="Illustration" /></td>
</tr>
</tbody>
</table>

Quick connector

The power input is connected to the module through a quick connector.

<table>
<thead>
<tr>
<th>Used with</th>
<th>Qty</th>
<th>Ordering code</th>
<th>Kit code</th>
<th>Illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>All enclosure types</td>
<td>1 per module</td>
<td>3AUA0000119227</td>
<td>A-468-8-100</td>
<td><img src="image2" alt="Illustration" /></td>
</tr>
</tbody>
</table>
**DC-side components**

**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.

**Note:** The designs presented in this manual for Rittal VX25 enclosures employ the Rittal Flat-PLS busbar system. Make sure that the current carrying capability of the busbars is not exceeded at any point of the drive system.

<table>
<thead>
<tr>
<th>Used with …</th>
<th>Qty</th>
<th>Ordering code</th>
<th>Kit code</th>
<th>Illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>400/600/800 mm Rittal VX25 enclosure</td>
<td>1 kit per cubicle</td>
<td>3AXD50000333387</td>
<td>A-468-X-001-VX</td>
<td><img src="https://via.placeholder.com/150" alt="Illustration" /></td>
</tr>
</tbody>
</table>

Instruction code: 3AXD50000333639
DC connection parts 1 of 2 (for Rittal VX25 enclosures)

These parts connect the Flat-PLS busbars to the DC fuses.

<table>
<thead>
<tr>
<th>Used with…</th>
<th>Qty</th>
<th>Ordering code</th>
<th>Kit code</th>
<th>Illustration</th>
</tr>
</thead>
</table>
| 400 mm Rittal VX25 enclosure | 1   | 3AXD50000360604  | L-4-8-201-VX | ![Instruction code: 3AXD50000332861](image1)
|                      |     |                  |           | ![Instruction code: 3AXD50000332885](image2)
|                      | 1   | 3AXD50000361021  | L-4-8-251-VX | ![Instruction code: 3AXD50000332229](image3)
| 600 mm Rittal VX25 enclosure | 1   | 3AXD50000361106  | L-6-8-202-VX | ![Instruction code: 3AXD50000332229](image4)
|                      |     |                  |           | ![Instruction code: 3AXD50000332106](image5)
|                      | 1   | 3AXD50000361229  | L-6-8-252-VX |
### DC connection parts 1 of 2 (for generic enclosures)

These parts provide the DC connection between the DC output (busbars or otherwise) and the DC fuses.

<table>
<thead>
<tr>
<th>Used with…</th>
<th>Qty</th>
<th>Ordering code</th>
<th>Kit code</th>
<th>Illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>800 mm Rittal VX25 enclosure</td>
<td>1</td>
<td>3AXD50000361281</td>
<td>L-8-8-203-VX</td>
<td><img src="image1.png" alt="Illustration" /></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Instruction code: 3AXD50000331567</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>3AXD50000361298</td>
<td>L-8-8-253-VX</td>
<td><img src="image2.png" alt="Illustration" /></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Instruction code: 3AXD50000331765</td>
</tr>
<tr>
<td>Used with…</td>
<td>Qty</td>
<td>Ordering code</td>
<td>Kit code</td>
<td>Illustration</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-----</td>
<td>------------------------</td>
<td>----------</td>
<td>--------------</td>
</tr>
<tr>
<td>400 mm generic enclosure</td>
<td>1</td>
<td>3AXD50000540150</td>
<td>L-3-8-259</td>
<td></td>
</tr>
<tr>
<td>without DC switch</td>
<td></td>
<td></td>
<td></td>
<td>Instruction code: 3AXD50000540655</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>400 mm generic enclosure</td>
<td>1</td>
<td>3AXD50000361038</td>
<td>L-4-8-254-VX</td>
<td></td>
</tr>
<tr>
<td>with DC switch</td>
<td></td>
<td></td>
<td></td>
<td>Instruction code: 3AXD50000342600</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>600 mm generic enclosure</td>
<td>1</td>
<td>3AXD50000540167</td>
<td>L-5-8-260</td>
<td></td>
</tr>
<tr>
<td>without DC switch</td>
<td></td>
<td></td>
<td></td>
<td>Instruction code: 3AXD50000540723</td>
</tr>
</tbody>
</table>
### Ordering information

<table>
<thead>
<tr>
<th>Used with…</th>
<th>Qty</th>
<th>Ordering code</th>
<th>Kit code</th>
<th>Illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>600 mm generic enclosure with DC switch</td>
<td>1</td>
<td>3AXD50000361243</td>
<td>L-6-8-255-VX</td>
<td><img src="attachment" alt="Image" /></td>
</tr>
<tr>
<td>Instruction code: 3AXD50000338740</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>800 mm generic enclosure without DC switch</td>
<td>1</td>
<td>3AXD50000540174</td>
<td>L-7-8-261</td>
<td><img src="attachment" alt="Image" /></td>
</tr>
<tr>
<td>Instruction code: 3AXD50000540693</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>800 mm generic enclosure with DC switch</td>
<td>1</td>
<td>3AXD50000361304</td>
<td>L-8-8-256-VX</td>
<td><img src="attachment" alt="Image" /></td>
</tr>
<tr>
<td><strong>Note:</strong> 3×R8i design with DC switches is not suitable for UL installations.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instruction code: 3AXD50000336999</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**DC fuses**

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

<table>
<thead>
<tr>
<th>IGBT supply unit</th>
<th>DC fuses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
<td><strong>Type</strong></td>
</tr>
<tr>
<td><strong>$U_N = 690 , V$</strong></td>
<td></td>
</tr>
<tr>
<td>ACS880-204LC-0360A-7</td>
<td>170M6546</td>
</tr>
<tr>
<td>ACS880-204LC-0400A-7</td>
<td>170M6546</td>
</tr>
<tr>
<td>ACS880-204LC-0450A-7</td>
<td>170M6547</td>
</tr>
<tr>
<td>ACS880-204LC-0480A-7</td>
<td>170M6548</td>
</tr>
<tr>
<td>ACS880-204LC-0560A-7</td>
<td>170M6549</td>
</tr>
<tr>
<td>ACS880-204LC-0620A-7</td>
<td>170M6500</td>
</tr>
<tr>
<td>ACS880-204LC-0700A-7</td>
<td>170M6501</td>
</tr>
<tr>
<td>ACS880-204LC-0770A-7</td>
<td>170M6501</td>
</tr>
<tr>
<td>ACS880-204LC-0930A-7</td>
<td>170M6548</td>
</tr>
<tr>
<td>ACS880-204LC-1090A-7</td>
<td>170M6549</td>
</tr>
<tr>
<td>ACS880-204LC-1180A-7</td>
<td>170M6500</td>
</tr>
<tr>
<td>ACS880-204LC-1360A-7</td>
<td>170M6501</td>
</tr>
<tr>
<td>ACS880-204LC-1500A-7</td>
<td>170M6501</td>
</tr>
<tr>
<td>ACS880-204LC-1800A-7</td>
<td>170M6500</td>
</tr>
<tr>
<td>ACS880-204LC-2020A-7</td>
<td>170M6501</td>
</tr>
<tr>
<td>ACS880-204LC-2220A-7</td>
<td>170M6501</td>
</tr>
<tr>
<td>ACS880-204LC-2670A-7</td>
<td>170M6501</td>
</tr>
<tr>
<td>ACS880-204LC-2930A-7</td>
<td>170M6501</td>
</tr>
</tbody>
</table>
DC switch-disconnector kits for unit charging

### DC switch-disconnector kits for unit charging (IEC)

<table>
<thead>
<tr>
<th>Used with...</th>
<th>DC switch type</th>
<th>Handle type</th>
<th>Qty</th>
<th>Ordering code</th>
<th>Instruction code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frame R8i with DC switch-disconnector</td>
<td>OT1600E11 OHB150J12P</td>
<td>1</td>
<td>3AXD50000227037</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frame 2×R8i with DC switch-disconnector</td>
<td>OT1600E22 OHB274J12</td>
<td>1</td>
<td>3AXD50000227044</td>
<td>3AXD50000330720</td>
<td></td>
</tr>
<tr>
<td>Frame 3×R8i with DC switch-disconnector</td>
<td>OT2500E22 OHB274J12</td>
<td>1</td>
<td>3AXD50000227051</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The kit contains the following components:
- DC switch (type indicated in table)
- Operating handle (type indicated in table)
- OXP12X395 operating shaft
- OA1G10 and OA3G01 auxiliary contacts
- OTZT4A and PDAL2/24DC interlocks
- OHZX10 alignment ring.

### DC switch-disconnector kits for unit charging (UL/CSA)

<table>
<thead>
<tr>
<th>Used with...</th>
<th>DC switch type</th>
<th>Handle type</th>
<th>Qty</th>
<th>Ordering code</th>
<th>Instruction code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frame R8i with DC switch-disconnector</td>
<td>OT1200U11 OHB150J12P</td>
<td>1</td>
<td>3AXD50000227068</td>
<td>3AXD50000330720</td>
<td></td>
</tr>
<tr>
<td>Frame 2×R8i with DC switch-disconnector</td>
<td>OT1200U22 OHB274J12</td>
<td>1</td>
<td>3AXD50000227075</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
DC charging kits for unit charging (for units with DC switch-disconnector)

<table>
<thead>
<tr>
<th>Used with...</th>
<th>DC charging kits for unit charging (IEC)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Switch type</td>
</tr>
<tr>
<td>Frames R8i and 2×R8i with DC switch-disconnector</td>
<td>OS160GD04F</td>
</tr>
<tr>
<td>Frame 3×R8i with DC switch-disconnector</td>
<td>OS200DZ22F</td>
</tr>
</tbody>
</table>

The kit contains the following components:

- Charging switch (type indicated in table) with terminal shrouds
- OHB65J6 operating handle
- OXP6X290 operating shaft
- 2 pcs of OA3G01 auxiliary contacts
- BSFC-12C charging controller
- 170M2676 fuses
- OHZX10 alignment ring.

DC charging kits for unit charging (UL/CSA)

<table>
<thead>
<tr>
<th>Used with...</th>
<th>DC charging kits for unit charging (UL/CSA)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Switch type</td>
</tr>
<tr>
<td>Frames R8i and 2×R8i with DC switch-disconnector</td>
<td>OS100GJ04F</td>
</tr>
</tbody>
</table>

The kit contains the following components:

- Charging switch (type indicated in table) with terminal shrouds and support
- OXP6X290 operating shaft
- OHB65J6 operating handle
- Combi screws M4×8
- 2 pcs of OA3G01 auxiliary contacts
- BSFC-12C charging controller
- FWJ 30A fuses and fuse clips
- OHZX10 alignment ring.

**Note:** Charging resistors are not included in the kit and must be ordered separately.
Charging resistors for unit charging (for units with DC switch-disconnector)

<table>
<thead>
<tr>
<th>Used with…</th>
<th>Qty (IEC)</th>
<th>Qty (UL)</th>
<th>Ordering code (IEC/UL/CSA)</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frame R8i with DC switch-disconnector</td>
<td>4</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frame 2xR8i with DC switch-disconnector</td>
<td>6</td>
<td>6</td>
<td>10028531</td>
<td>33 ohm</td>
</tr>
<tr>
<td>Frame 3xR8i with DC switch-disconnector</td>
<td>8</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frame 4xR8i with DC switch-disconnector</td>
<td>12</td>
<td>12</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DC switch-disconnector for line-up charging

Load break switch is needed when the delivery contains both line-up charging and unit charging.

<table>
<thead>
<tr>
<th>Used with…</th>
<th>DC switch-disconnector for line-up charging (IEC)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Type</td>
</tr>
<tr>
<td>Frame R8i</td>
<td>OT630E11 kit</td>
</tr>
<tr>
<td>Frame 2xR8i</td>
<td>OT630U11</td>
</tr>
<tr>
<td>Frame 3xR8i</td>
<td></td>
</tr>
<tr>
<td>Frame 4xR8i</td>
<td></td>
</tr>
</tbody>
</table>

The kits above contain the following components:

- OXP12X250 operating shaft
- OHB150J12P operating handle
- OA1G10 auxiliary contact
- OHZX10 alignment ring.
**DC connection parts 2 of 2**

These parts connect the DC fuses to the module.

<table>
<thead>
<tr>
<th>Used with</th>
<th>Qty</th>
<th>Ordering code</th>
<th>Kit code</th>
<th>Illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>All enclosure types</td>
<td>1 / module</td>
<td>3AXD50000041264</td>
<td>L-468-8-230</td>
<td><img src="image1.png" alt="Illustration" /></td>
</tr>
</tbody>
</table>

*Instruction code: 3AXD50000041311*

*Note: Filters to be ordered separately.*

**Flat-PLS busbars (common DC) for LCL filters**

<table>
<thead>
<tr>
<th>Used with</th>
<th>Qty</th>
<th>Ordering code</th>
<th>Kit code</th>
<th>Illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>BLCL-15LC-7, BLCL-24LC-7 and BLCL-25LC-7 (600 mm Rittal VX25 enclosure)</td>
<td>1</td>
<td>3AXD5000033387</td>
<td>A-468-X-001-VX</td>
<td><img src="image2.png" alt="Illustration" /></td>
</tr>
</tbody>
</table>

*Instruction code: 3AXD50000333639*
### Charging mechanics

<table>
<thead>
<tr>
<th>Used with ...</th>
<th>Qty</th>
<th>Ordering code</th>
<th>Kit code</th>
<th>Illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>400 mm Rittal VX25 enclosure</td>
<td>1</td>
<td>3AXD50000361038</td>
<td>L-4-8-254-VX</td>
<td><img src="" alt="Image" /></td>
</tr>
<tr>
<td>600 mm Rittal VX25 enclosure</td>
<td>1</td>
<td>3AXD50000361243</td>
<td>L-6-8-255-VX</td>
<td><img src="" alt="Image" /></td>
</tr>
<tr>
<td>800 mm Rittal VX25 enclosure</td>
<td>1</td>
<td>3AXD50000361304</td>
<td>L-8-8-256-VX</td>
<td><img src="" alt="Image" /></td>
</tr>
</tbody>
</table>

### DC connection charging mechanics

<table>
<thead>
<tr>
<th>Used with ...</th>
<th>Qty</th>
<th>Ordering code</th>
<th>Kit code</th>
<th>Illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>400 mm and 600 mm Rittal VX25 enclosures</td>
<td>1 / module</td>
<td>3AXD50000360567</td>
<td>L-46-8-207-VX</td>
<td><img src="" alt="Image" /></td>
</tr>
<tr>
<td>800 mm Rittal VX25 enclosure</td>
<td>1</td>
<td>3AXD50000360574</td>
<td>L-8-8-208-VX</td>
<td><img src="" alt="Image" /></td>
</tr>
</tbody>
</table>
### Common mode filter busbars

<table>
<thead>
<tr>
<th>Used with …</th>
<th>Qty</th>
<th>Ordering code</th>
<th>Kit code</th>
<th>Illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>400 mm and 600 mm Rittal VX25 and generic enclosures</td>
<td>1 / module</td>
<td>3AXD50000200368</td>
<td>L-46-8-233</td>
<td>Instruction code: 3AXD50000205042</td>
</tr>
<tr>
<td>800 mm Rittal VX25 and generic enclosures</td>
<td>1 / module</td>
<td>3AXD50000200337</td>
<td>L-8-8-234</td>
<td>Instruction code: 3AXD50000205226</td>
</tr>
</tbody>
</table>

**Note:** Filters to be ordered separately.

### Common mode filters

Common mode filtering reduces bearing currents and is required for electromagnetic compatibility (EMC). The filtering is implemented by installing two toroidal cores onto the DC busbars.

<table>
<thead>
<tr>
<th>Used with …</th>
<th>Qty</th>
<th>Ordering code</th>
<th>Kit code</th>
<th>Illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>All enclosure types</td>
<td>2 per module</td>
<td>3AXD50000566785</td>
<td>-</td>
<td>Instruction code: 3AXD5000005734</td>
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</tbody>
</table>

### Cooling system parts

#### Coolant distribution manifold kits

<table>
<thead>
<tr>
<th>Enclosure</th>
<th>Qty</th>
<th>Ordering code</th>
<th>Kit code</th>
<th>Illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>400/600/800 mm VX25 and generic enclosure (1 module)</td>
<td>1</td>
<td>3AXD5000044084</td>
<td>L-468-8-441</td>
<td>Instruction code: 3AXD5000048217</td>
</tr>
</tbody>
</table>
192 Ordering information

<table>
<thead>
<tr>
<th>Enclosure</th>
<th>Qty</th>
<th>Ordering code</th>
<th>Kit code</th>
<th>Illustration</th>
<th>Instruction code</th>
</tr>
</thead>
<tbody>
<tr>
<td>400/600/800 mm VX25 and generic enclosure (2 modules)</td>
<td>1</td>
<td>3AXD50000044182</td>
<td>L-468-8-442</td>
<td></td>
<td>3AXD50000048258</td>
</tr>
<tr>
<td>400/600/800 mm VX25 and generic enclosure (3 modules)</td>
<td>1</td>
<td>3AXD50000048136</td>
<td>L-468-8-443</td>
<td></td>
<td>3AXD50000048283</td>
</tr>
</tbody>
</table>

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 – not used with the ACS880-204LC.

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.

<table>
<thead>
<tr>
<th>Component</th>
<th>Data</th>
<th>Ordering code</th>
</tr>
</thead>
<tbody>
<tr>
<td>PA pipe</td>
<td>50 m, PA12P40, 16/13 mm</td>
<td>3AXD50000047488</td>
</tr>
<tr>
<td>PA pipe</td>
<td>50 m, PA11P40, 8/6 mm, L50m</td>
<td>3AXD50000419302</td>
</tr>
</tbody>
</table>

**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**

<table>
<thead>
<tr>
<th>Used with …</th>
<th>Qty</th>
<th>Ordering code</th>
<th>Kit code</th>
<th>Illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>All enclosure types</td>
<td>1 per module</td>
<td>3AXD50000041265</td>
<td>L-468-8-440</td>
<td></td>
</tr>
</tbody>
</table>
# Cooling system parts for LCL filters

<table>
<thead>
<tr>
<th>Used with …</th>
<th>Qty</th>
<th>Ordering code</th>
<th>Kit code</th>
<th>Illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>BLCL-15LC-7, BLCL-24LC-7 and BLCL-25LC-7 (600 mm Rittal VX25 or generic enclosure)</td>
<td>1</td>
<td>3AXD50000344970</td>
<td>L-6-8-405</td>
<td><img src="image1.png" alt="Illustration" /></td>
</tr>
<tr>
<td><strong>Note:</strong> Fan to be ordered separately.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BLCL-15LC-7, BLCL-24LC-7 and BLCL-25LC-7 (600 mm Rittal VX25 enclosure)</td>
<td>1</td>
<td>3AXD50000426814</td>
<td>L-6-8-028-VX</td>
<td><img src="image2.png" alt="Illustration" /></td>
</tr>
<tr>
<td>Instruction code: 3AXD5000431397</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BLCL-15LC-7, BLCL-24LC-7 and BLCL-25LC-7 (600 mm Rittal VX25 or generic enclosure)</td>
<td>1</td>
<td>3AXD50000426821</td>
<td>L-6-8-029-VX</td>
<td><img src="image3.png" alt="Illustration" /></td>
</tr>
<tr>
<td>Instruction code: 3AXD5000431588</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BLCL-15LC-7, BLCL-24LC-7 and BLCL-25LC-7 (600 mm Rittal VX25 or generic enclosure)</td>
<td>1</td>
<td>3AXD50000479795</td>
<td>L-468-8-446</td>
<td><img src="image4.png" alt="Illustration" /></td>
</tr>
<tr>
<td>Instruction code: 3AXD5000431588</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Cooling fans for LCL filters

The fan blows air through the heat exchanger, circulating the air inside the cabinet. The fan is selected according to the auxiliary voltage.

<table>
<thead>
<tr>
<th>Auxiliary voltage</th>
<th>Qty</th>
<th>Ordering code</th>
</tr>
</thead>
<tbody>
<tr>
<td>230 V AC (50/60 Hz)</td>
<td>1</td>
<td>3AXD50000050763</td>
</tr>
<tr>
<td>115 V AC (50/60 Hz)</td>
<td>1</td>
<td>3AXD50000050767</td>
</tr>
</tbody>
</table>
Cooling fans for IGBT supply modules

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

The fan is selected according to the auxiliary voltage.

<table>
<thead>
<tr>
<th>Auxiliary voltage</th>
<th>Qty</th>
<th>Ordering code</th>
<th>Illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>230 V AC (50/60 Hz)</td>
<td>1 / module</td>
<td>3AXD50000043886</td>
<td></td>
</tr>
<tr>
<td>115 V AC (50/60 Hz)</td>
<td>1 / module</td>
<td>3AXD50000045414</td>
<td></td>
</tr>
</tbody>
</table>
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.
Supply modules. The drawing shows the configuration of a diode supply unit with two modules, i.e., there is a common air-to-liquid exchanger in the cubicle. With an IGBT supply unit, each module has a dedicated air-to-liquid exchanger as shown for item 2.

| 1 | Supply modules. The drawing shows the configuration of a diode supply unit with two modules, i.e., there is a common air-to-liquid exchanger in the cubicle. With an IGBT supply unit, each module has a dedicated air-to-liquid exchanger as shown for item 2. |
| 2 | Inverter modules |
| 3 | To/From cooling unit |
| A/L | Air-to-liquid heat exchanger |
| HS | Heat sink |
| a | Inlet valve |
| b | Inlet-side drain valve |
| c | Outlet valve |
| d | Outlet-side drain valve |

The coolant used with ACS880 liquid-cooled drive systems is Antifrogen® L 25% or 50% mixture. See Coolant specification (page 202).
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 202)*. 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 204)*.

  **Coolant temperature control**

  The temperature of the coolant in the internal cooling circuit must be kept within the limits specified in *Technical data (page 202)*. 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**

Follow 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 202).*
   **Note:** 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 202).
   - drain the cooling circuit again.

Maintenance intervals

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

Technical data

- **Coolant specification**

  **Coolant type**
  Antifrogen® L (by Clariant International Ltd, www.clariant.com) 25% or 50% mixture, available from Clariant distributors and ABB Service representatives.
  **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 allowed regardless of the freezing point of the coolant.

  **WARNING!**
The warranty does not cover damage occurring from use of improper coolant.

- **Temperature limits**

  **Ambient temperature:** See the technical data of the drive/unit.
**Freeze protection:** The freezing point of the coolant is determined by the concentration of heat transfer fluid in the mixture.

The higher the concentration of heat transfer fluid, the higher the viscosity of the coolant. This results in a higher pressure loss in the system. See *Pressure limits (page 204).*

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.

![Diagram showing derating factor \((k)\) in relation to Antifrogen® L concentration](image)

**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.

![Diagram showing derating factor \((k)\) in relation to coolant temperature](image)

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

![Diagram showing minimum coolant temperature](image)
### 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. These are also the only materials that can be used in the external cooling circuit.

- 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 connecting external piping to the internal cooling circuit, use only materials that are specified above. Copper, brass or bronze must not be used under any circumstances. Even minor dissolution of copper can cause copper precipitation on aluminum and subsequent galvanic corrosion. The liquid cooling system must not contain any zinc (eg. galvanized pipes).

---

If the plant incorporates normal iron pipes or cast iron accessories (eg. motor housings), a cooling unit with a heat exchanger (such as the ACS880-1007LC) must be used to separate the systems.
Technical data

Contents of this chapter
This chapter contains the technical data for ACS880-204LC IGBT supply modules.
## Ratings

The nominal ratings for are given below. The definitions are described below the table.

<table>
<thead>
<tr>
<th>ACS880-204LC-</th>
<th>Basic module type ACS880-104LC-</th>
<th>Frame size</th>
<th>No-overload use</th>
<th>Light-overload use</th>
<th>Heavy-duty use</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>$I_1$</td>
<td>$I_N$</td>
<td>$I_{max}$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(A (AC))</td>
<td>(A (DC))</td>
<td>(A (AC))</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>$I_{max}$</td>
<td>$P_N$</td>
<td>$S_N$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(A (DC))</td>
<td>kW (DC)</td>
<td>(A (DC))</td>
</tr>
<tr>
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<td>kW (DC)</td>
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<td></td>
<td>A (DC)</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>kW (DC)</td>
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<tr>
<td>$U_N = 690$ V</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>0360A-7</td>
<td>0390A-7</td>
<td>1×R8i</td>
<td>360</td>
<td>436</td>
<td>540</td>
</tr>
<tr>
<td>0400A-7</td>
<td>0430A-7</td>
<td>1×R8i</td>
<td>400</td>
<td>485</td>
<td>600</td>
</tr>
<tr>
<td>0450A-7</td>
<td>0480A-7</td>
<td>1×R8i</td>
<td>450</td>
<td>546</td>
<td>680</td>
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### Definitions

- $U_N$: Supply voltage range
- $I_1$: Nominal rms current
- $I_N$: Nominal current (available continuously with no over-loading)
- $I_{max}$: Maximum current. Available for 10 seconds at start, then as long as allowed by drive temperature.
- $P_N$: Typical power in no-overload use
- $S_N$: Nominal apparent power
- $I_{Ld}$: Continuous rms current allowing 10% overload for 1 minute every 5 minutes
- $P_{Ld}$: Typical power in light-overload use
- $I_{Hd}$: Continuous rms current allowing 50% overload for 1 minute every 5 minutes
- $P_{Hd}$: Typical power in heavy-duty use

**Note 1:** The ratings apply at an ambient air temperature of 45 °C (113 °F) and a coolant temperature of 40 °C (104 °F).

**Note 2:** To achieve the rated power given in the table, the rated current must be higher than or equal to the rated current. For dimensioning, use DriveSize dimensioning tool available from ABB.
Derating

Surrounding air temperature derating
In the temperature range +45…55 °C (+113…131 °F), the rated output current is derated by 0.5 percentage points for every added 1 °C (1.8 °F). The output current can be calculated by multiplying the current given in the rating table by the derating factor (k):

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

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

Type equivalence table

<table>
<thead>
<tr>
<th>ACS880-204LC-…</th>
<th>Modules used</th>
<th>LCL filter</th>
<th>Qty</th>
</tr>
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<tbody>
<tr>
<td>ACS880-104LC-…</td>
<td>DC capacitance (mF)</td>
<td>Qty</td>
<td>LCL filter type</td>
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<tr>
<td>Uₙ = 690 V</td>
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<td></td>
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<td>0390A-7</td>
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<td>1</td>
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<td>1</td>
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<td>0480A-7</td>
<td>6</td>
<td>1</td>
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<td>0670A-7</td>
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<td>0750A-7</td>
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<td>2930A-7</td>
<td>0850A-7</td>
<td>36</td>
<td>4</td>
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Fuses

Fuses are given in chapter Ordering information.

Note: The recommended fuses are for branch circuit protection per NEC as required for the UL/CSA approval.

LCL filters

- Kit contents

<table>
<thead>
<tr>
<th>LCL filter type</th>
<th>Ordering code</th>
<th>Resistor</th>
<th>Film capacitor</th>
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<td>Data</td>
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<tr>
<td>BLCL-24LC-7</td>
<td>3AXD50000234431</td>
<td>3×120 W, 3×50 kohm</td>
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<tr>
<td>BLCL-25LC-7</td>
<td>3AXD50000234448</td>
<td>3×120 W, 3×50 kohm</td>
<td>1</td>
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</tbody>
</table>

- Technical data

The technical data and the weights of the LCL filter components are shown below. For the dimensions, see chapter Dimension drawings.

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<th></th>
<th></th>
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<tbody>
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<td>0.106</td>
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<td>0.053</td>
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<td>3×200</td>
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Charging kit contents

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<th>Charging resistors</th>
<th>OS switch fuse rating</th>
<th>AC fuse rating</th>
<th>DC fuse rating</th>
<th>Contactor rating</th>
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</thead>
<tbody>
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<td>$I_n$ [A]</td>
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<table>
<thead>
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<th>AC fuse rating</th>
<th>DC fuse rating</th>
<th>Contactor rating</th>
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Dimensions and weights

The weights of the supply modules are shown below. For the dimensions, see chapter Dimension drawings.

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<th>Module type</th>
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<td>ACS880-104LC-0600A-7 ...-0850A-7</td>
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</table>

Free space requirements

Frame R8i module:

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

Allowable mounting orientations

IGBT supply module (frame R8i): Upright position and on left-hand side (viewed from the front).

LCL filter components: Upright position.
Losses, cooling data and noise

<table>
<thead>
<tr>
<th>ACS880-204LC-</th>
<th>$P_{\text{loss}}$ (ISU)</th>
<th>$P_{\text{loss}}$ (LCL)</th>
<th>$P_{\text{loss}}$ (LCL cabinet)</th>
<th>Power loss, total</th>
<th>Power loss, total</th>
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<tbody>
<tr>
<td></td>
<td>kW</td>
<td>kW</td>
<td>kW</td>
<td>kW</td>
<td>kW</td>
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<td>7.3</td>
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### Coolant volume and flow rates

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<th>Pressure loss</th>
<th>Noise level$^1)$</th>
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<td>module(s) LCL filter</td>
<td>kPa</td>
<td>dB(A)</td>
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<td>16 (4.2) 20 (5.3)</td>
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<td>66</td>
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<td>Pressure loss</td>
<td>Noise level&lt;sup&gt;1)&lt;/sup&gt;</td>
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<td>-------------------</td>
</tr>
<tr>
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<td>module(s) I/min (US gal/min)</td>
<td>LCL filter I/min (US gal/min)</td>
</tr>
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<td>4.8 (5.1)</td>
<td>8.2 (8.7)</td>
<td>48 (12.5)</td>
<td>80 (21.1)</td>
</tr>
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<td>2020A-7</td>
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<td>8.2 (8.7)</td>
<td>48 (12.5)</td>
<td>80 (21.1)</td>
</tr>
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<td>8.2 (8.7)</td>
<td>48 (12.5)</td>
<td>80 (21.1)</td>
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<tr>
<td>2670A-7</td>
<td>6.4 (6.8)</td>
<td>9.2 (9.7)</td>
<td>64 (17)</td>
<td>80 (21.1)</td>
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<td>6.4 (6.8)</td>
<td>9.2 (9.7)</td>
<td>64 (17)</td>
<td>80 (21.1)</td>
</tr>
</tbody>
</table>

<sup>1)</sup> Measured in a hemi-anechoic room in accordance with ISO 9614-2 standard.

**Note:** These losses are not calculated according to IEC 61800-9-2.
Tightening torques

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

### Electrical connections

<table>
<thead>
<tr>
<th>Size</th>
<th>Torque</th>
<th>Strength class</th>
</tr>
</thead>
<tbody>
<tr>
<td>M3</td>
<td>0.5 N·m (4.4 lbf·in)</td>
<td>4.6...8.8</td>
</tr>
<tr>
<td>M4</td>
<td>1 N·m (9 lbf·in)</td>
<td>4.6...8.8</td>
</tr>
<tr>
<td>M5</td>
<td>4 N·m (35 lbf·in)</td>
<td>8.8</td>
</tr>
<tr>
<td>M6</td>
<td>9 N·m (6.6 lbf·ft)</td>
<td>8.8</td>
</tr>
<tr>
<td>M8</td>
<td>22 N·m (16 lbf·ft)</td>
<td>8.8</td>
</tr>
<tr>
<td>M10</td>
<td>42 N·m (31 lbf·ft)</td>
<td>8.8</td>
</tr>
<tr>
<td>M12</td>
<td>70 N·m (52 lbf·ft)</td>
<td>8.8</td>
</tr>
<tr>
<td>M16</td>
<td>120 N·m (90 lbf·ft)</td>
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### Mechanical connections

<table>
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<tr>
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<th>Max. torque</th>
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</tr>
</thead>
<tbody>
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<td>8.8</td>
</tr>
<tr>
<td>M6</td>
<td>10 N·m (7.4 lbf·ft)</td>
<td>8.8</td>
</tr>
<tr>
<td>M8</td>
<td>24 N·m (17.7 lbf·ft)</td>
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### Insulation supports

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</tr>
<tr>
<td>M8</td>
<td>9 N·m (6.6 lbf·ft)</td>
<td>8.8</td>
</tr>
<tr>
<td>M10</td>
<td>18 N·m (13.3 lbf·ft)</td>
<td>8.8</td>
</tr>
<tr>
<td>M12</td>
<td>31 N·m (23 lbf·ft)</td>
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</tr>
</tbody>
</table>

### Cable lugs

<table>
<thead>
<tr>
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<th>Max. torque</th>
<th>Strength class</th>
</tr>
</thead>
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<td>M8</td>
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<td>8.8</td>
</tr>
<tr>
<td>M10</td>
<td>32 N·m (23.5 lbf·ft)</td>
<td>8.8</td>
</tr>
<tr>
<td>M12</td>
<td>50 N·m (37 lbf·ft)</td>
<td>8.8</td>
</tr>
</tbody>
</table>
## Typical power cable sizes

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

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

<table>
<thead>
<tr>
<th>Aluminum cable</th>
<th>Conductor temperature 70 °C</th>
<th>XLPE insulation</th>
<th>Conductor temperature 90 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Size</strong></td>
<td>$\varnothing$ [mm]</td>
<td>$I_{\text{Lmax}}$ [A]</td>
<td>Time const. [s]</td>
</tr>
<tr>
<td>3 × 35 + 10 Cu</td>
<td>26</td>
<td>67</td>
<td>736</td>
</tr>
<tr>
<td>3 × 50 + 15 Cu</td>
<td>29</td>
<td>82</td>
<td>959</td>
</tr>
<tr>
<td>3 × 70 + 21 Cu</td>
<td>32</td>
<td>105</td>
<td>1182</td>
</tr>
<tr>
<td>3 × 95 + 29 Cu</td>
<td>38</td>
<td>128</td>
<td>1492</td>
</tr>
<tr>
<td>3 × 120 + 41 Cu</td>
<td>41</td>
<td>148</td>
<td>1776</td>
</tr>
<tr>
<td>3 × 150 + 41 Cu</td>
<td>44</td>
<td>171</td>
<td>2042</td>
</tr>
<tr>
<td>3 × 185 + 57 Cu</td>
<td>49</td>
<td>196</td>
<td>2422</td>
</tr>
<tr>
<td>3 × 240 + 72 Cu</td>
<td>54</td>
<td>231</td>
<td>2967</td>
</tr>
<tr>
<td>3 × 300 + 88 Cu</td>
<td>58</td>
<td>267</td>
<td>3478</td>
</tr>
<tr>
<td>2 × (3 × 70 + 21 Cu)</td>
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<td>210</td>
<td>1182</td>
</tr>
<tr>
<td>2 × (3 × 95 + 29 Cu)</td>
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<td>1492</td>
</tr>
<tr>
<td>2 × (3 × 120 + 41 Cu)</td>
<td>2 × 41</td>
<td>297</td>
<td>1776</td>
</tr>
<tr>
<td>2 × (3 × 150 + 41 Cu)</td>
<td>2 × 44</td>
<td>343</td>
<td>2042</td>
</tr>
<tr>
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<td>392</td>
<td>2422</td>
</tr>
<tr>
<td>2 × (3 × 240 + 72 Cu)</td>
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<td>462</td>
<td>2967</td>
</tr>
<tr>
<td>2 × (3 × 300 + 88 Cu)</td>
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</tr>
<tr>
<td>3 × (3 × 70 + 21 Cu)</td>
<td>3 × 44</td>
<td>514</td>
<td>2042</td>
</tr>
<tr>
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<td>2422</td>
</tr>
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</tr>
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</tr>
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</tr>
<tr>
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<td>3478</td>
</tr>
<tr>
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</tr>
<tr>
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</tr>
<tr>
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<td>1333</td>
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</tr>
<tr>
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<tr>
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</tr>
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</tr>
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## Copper cable

<table>
<thead>
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<th>Size</th>
<th>( \varphi ) [mm]</th>
<th>( I_{\text{max}} ) [A]</th>
<th>Time const. [s]</th>
<th>( I_{\text{max}} ) [A]</th>
<th>Time const. [s]</th>
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<tr>
<td>3 × 1.5 + 1.5</td>
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<td>13</td>
<td>85</td>
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<td>121</td>
<td>23</td>
<td>88</td>
</tr>
<tr>
<td>(3 × 4 + 4)</td>
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<td>133</td>
</tr>
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<td>251</td>
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</tr>
<tr>
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<td>53</td>
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<td>791</td>
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<td>1000</td>
<td>110</td>
<td>760</td>
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<td>41</td>
<td>193</td>
<td>2441</td>
<td>241</td>
<td>1859</td>
</tr>
<tr>
<td>3 × 150 + 70</td>
<td>44</td>
<td>223</td>
<td>2820</td>
<td>279</td>
<td>2139</td>
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<tr>
<td>3 × 185 + 95</td>
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<td>255</td>
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<td>2525</td>
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<td>1020</td>
<td>3329</td>
<td>1276</td>
<td>2525</td>
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<tr>
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<td>4073</td>
<td>1504</td>
<td>3099</td>
</tr>
<tr>
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<td>4779</td>
<td>1304</td>
<td>3636</td>
</tr>
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<td>1275</td>
<td>3329</td>
<td>1595</td>
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</tr>
<tr>
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<td>1880</td>
<td>3099</td>
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<td>4779</td>
<td>2173</td>
<td>3636</td>
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<tr>
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<td>1530</td>
<td>3329</td>
<td>1914</td>
<td>2525</td>
</tr>
<tr>
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<td>1806</td>
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<td>7 × 58</td>
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<td>4779</td>
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<td>8 × 58</td>
<td>2783</td>
<td>4779</td>
<td>3477</td>
<td>3636</td>
</tr>
</tbody>
</table>
Electrical power network specification

<table>
<thead>
<tr>
<th>Voltage ((U_1))</th>
<th>690 V units: 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).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network type</td>
<td>TN (grounded) and IT (ungrounded) systems</td>
</tr>
<tr>
<td>Frequency</td>
<td>50/60 Hz, variation (\pm 5%) of nominal frequency</td>
</tr>
<tr>
<td>Imbalance</td>
<td>Max. (\pm 3%) of nominal phase-to-phase input voltage</td>
</tr>
<tr>
<td>Short-circuit withstand strength (IEC/EN 61439-1)</td>
<td>Supply units with R8i module(s): Supply units with ABB-defined main breaker and fuses: Rated peak withstand current ((I_{pk})): 143 kA Rated short-time withstand current ((I_{cm})): 65 kA/1 s</td>
</tr>
<tr>
<td>Short-circuit current protection (UL 508A, CSA C22.2 No. 14-13)</td>
<td>The drive is suitable for use on a circuit capable of delivering not more than 100,000 rms symmetrical amperes at 600 V maximum when the input cable is protected with class T fuses.</td>
</tr>
<tr>
<td>Fundamental power factor ((\cos \phi_1))</td>
<td>0.99</td>
</tr>
</tbody>
</table>

Harmonic distortion

| Harmonics are below the limits defined in IEEE519. |
|---|---|---|
| \(R_{sc}\) | THD Voltage [\%] | THD Current [\%] |
| 20 | 3 | 2.5 \(^1\) |
| 100 | 0.8 | 2.5 (4.0 with types -0390A…-0520A-7) \(^1\) |

\[ THD = \sqrt{\sum_{n=2}^{50} \left( \frac{I_n}{I_N} \right)^2} \]

\(^1\) Other loads may influence the THD value. THD = Total Harmonic Distortion (THD). The voltage THD depends on the short-circuit ratio \((R_{sc})\). The spectrum of the distortion also contains interharmonics. 
\[ R_{sc} = \frac{l_{sc}}{I_N} \]
\[ l_{sc} = \text{short-circuit current at point of common coupling (PCC)} \]
\[ I_N = \text{IGBT supply unit nominal current} \]

Control unit connection data
See chapter *The control unit.*

Coolant connections

16 mm, for polyamide (PA) pipe
Efficiency

98.2…98.8% at nominal power level

*Note:* The efficiency is not calculated according to IEC 61800-9-2.

Energy efficiency data (ecodesign)

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

Protection classes for module

<table>
<thead>
<tr>
<th>Degrees of protection (IEC/EN 60529)</th>
<th>IP00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enclosure types (UL 61800-5-1)</td>
<td>UL Type Open</td>
</tr>
<tr>
<td>Overvoltage category (IEC/EN 60664-1)</td>
<td>III</td>
</tr>
<tr>
<td>Protective class (IEC/EN 61800-5-1)</td>
<td>I</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Operation installed for stationary use</th>
<th>Storage in protective package</th>
<th>Transportation in protective package</th>
</tr>
</thead>
<tbody>
<tr>
<td>Altitude above sea level</td>
<td>0…4000 m (13123 ft)*</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>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.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Air temperature</td>
<td>0…+45 °C (+32…+113 °F), no condensation allowed. Output derated in the range +45…+55 °C (+113…+131 °F).</td>
<td>-40 … +70 °C (+-40 … +158 °F)</td>
<td>-40 … +70 °C (+-40 … +158 °F)</td>
</tr>
<tr>
<td>Relative humidity</td>
<td>Maximum 95%, no condensation allowed</td>
<td>Maximum 95%, no condensation allowed</td>
<td>Maximum 95%, no condensation allowed</td>
</tr>
<tr>
<td></td>
<td>No condensation allowed. Maximum allowed relative humidity is 60% in the presence of corrosive gases.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contamination</td>
<td>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</td>
<td>IEC 60721-3-1:1997</td>
<td>IEC 60721-3-2:1997</td>
</tr>
<tr>
<td>Chemical gases</td>
<td>Class 3C2</td>
<td>Class 1C2</td>
<td>Class 2C2</td>
</tr>
<tr>
<td>Solid particles</td>
<td>Class 3S1</td>
<td>Class 1S3 (packing must support this, otherwise 1S2)</td>
<td>Class 2S2</td>
</tr>
<tr>
<td>Vibration</td>
<td>IEC 61800-5-1</td>
<td>IEC/EN 60721-3-1:1997</td>
<td>IEC/EN 60721-3-1:1997</td>
</tr>
<tr>
<td></td>
<td>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</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shock</td>
<td>Not allowed</td>
<td>With packing max. 100 m/s² (330 ft./s²) 11 ms</td>
<td>With packing max. 100 m/s² (330 ft./s²) 11 ms</td>
</tr>
<tr>
<td>-------</td>
<td>-------------</td>
<td>-----------------------------------------</td>
<td>-----------------------------------------</td>
</tr>
</tbody>
</table>

**Cooling**

Cooling method: Liquid cooling

**Materials**

- **Module housing**
  Zinc coated steel sheet. Front plate covered with Lexan 8B35 polycarbonate film.

- **Internal cooling circuit**
  See chapter *Internal cooling circuit (page 197).*

**Color**

PMS 1C Cool Gray and PMS Process Black.

**Package**

Plywood base, corrugated cardboard, PET straps. Product wrapping: polyethylene sheet or VCI protection bag.

**Disposal**

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

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

Contact your local ABB distributor for further information on environmental aspects and recycling instructions for professional recyclers. End of life treatment must follow international and local regulations.
Auxiliary circuit current consumption

PDAL2 switch/disconnector interlock coil: 24 V DC (+10%/-30%), 9 VA
Charging controller BSFC-12C: 24 V DC ±10%, current consumption 150 mA

- Control equipment

<table>
<thead>
<tr>
<th>Device</th>
<th>$U_N$</th>
<th>$f$ Hz</th>
<th>$I_{cont}$ A</th>
<th>$I_{start}$ A</th>
<th>$P_{cont}$ W</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCU control unit</td>
<td>24 V DC (±10%)</td>
<td>-</td>
<td>2.0</td>
<td>-</td>
<td>48</td>
</tr>
<tr>
<td>R8i module: internal electronics</td>
<td>230 V AC (+15%/-20%)</td>
<td>50</td>
<td>0.45</td>
<td>-</td>
<td>105</td>
</tr>
<tr>
<td></td>
<td>115 V AC (+15%/-20%)</td>
<td>60</td>
<td>0.9</td>
<td>-</td>
<td>105</td>
</tr>
<tr>
<td>C1O-01</td>
<td>24 V (-15%/+20%)</td>
<td>-</td>
<td>0.1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>BAMU-12C</td>
<td>24 V (±10%)</td>
<td>-</td>
<td>0.25</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

- Cooling fans

<table>
<thead>
<tr>
<th>Frame size</th>
<th>$U_N$ V AC</th>
<th>$f$ Hz</th>
<th>$I_{cont}$ A</th>
</tr>
</thead>
<tbody>
<tr>
<td>R8i</td>
<td>200…240</td>
<td>50/60</td>
<td>1.4</td>
</tr>
<tr>
<td></td>
<td>100…130</td>
<td>50/60</td>
<td>2.4</td>
</tr>
</tbody>
</table>

- Definitions

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$f$</td>
<td>Supply frequency</td>
</tr>
<tr>
<td>$I_{cont}$</td>
<td>Continuous current consumption</td>
</tr>
<tr>
<td>$I_{start}$</td>
<td>Calculated load current at start</td>
</tr>
<tr>
<td>$P_{cont}$</td>
<td>Continuous input power</td>
</tr>
<tr>
<td>$U_N$</td>
<td>Voltage requirement</td>
</tr>
</tbody>
</table>

- Standards and markings

See ACS880 liquid-cooled multidrives and multidrive modules planning the electrical installation (3AXD50000048634 [English]).
Disclaimers

- **Generic disclaimer**

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

- **Cybersecurity disclaimer**

This product can be connected to and to 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 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.
The control unit

Contents of this chapter
This chapter
• describes the connections of the control unit
• contains the specifications of the inputs and outputs of the control unit.

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

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

## BCU-x2 layout

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>I/O terminals (see following diagram)</td>
</tr>
<tr>
<td>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.)</td>
</tr>
<tr>
<td>SLOT 2 I/O extension, encoder interface or fieldbus adapter module connection</td>
</tr>
<tr>
<td>SLOT 3 I/O extension, encoder interface, fieldbus adapter or FSO-xx safety functions module connection</td>
</tr>
<tr>
<td>SLOT 4 RDCO-0x DDCS communication option module connection</td>
</tr>
<tr>
<td>X205 Memory unit connection</td>
</tr>
<tr>
<td>BATTERY Holder for real-time clock battery (BR2032)</td>
</tr>
<tr>
<td>AI1 Mode selector for analog input AI1 (I = current, U = voltage)</td>
</tr>
<tr>
<td>AI2 Mode selector for analog input AI2 (I = current, U = voltage)</td>
</tr>
<tr>
<td>D2D TERM Termination switch for drive-to-drive link (D2D)</td>
</tr>
<tr>
<td>DICOM= DIOGND Ground selection. Determines whether DICOM is separated from DIOGND (i.e. the common reference for the digital inputs floats). See the ground isolation diagram.</td>
</tr>
</tbody>
</table>

### 7-segment display

Multicharacter indications are displayed as repeated sequences of characters

- "U" ("U" is indicated briefly before "o".)
  - Control program running
- "o"
  - Control program startup in progress
- (Flashing) Firmware cannot be started. Memory unit missing or corrupted
- "d"
  - Firmware download from PC to control unit in progress
- 1
  - 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.
<table>
<thead>
<tr>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>XAI</td>
<td>Analog inputs</td>
</tr>
<tr>
<td>XAO</td>
<td>Analog outputs</td>
</tr>
<tr>
<td>XDI</td>
<td>Digital inputs, Digital input interlock (DIIL)</td>
</tr>
<tr>
<td>XDIO</td>
<td>Digital input/outputs</td>
</tr>
<tr>
<td>XD2D</td>
<td>Drive-to-drive link</td>
</tr>
<tr>
<td>XD24</td>
<td>+24 V output (for digital inputs)</td>
</tr>
<tr>
<td>XETH</td>
<td>Ethernet port – Not in use</td>
</tr>
<tr>
<td>XPOW</td>
<td>External power input</td>
</tr>
<tr>
<td>XRO1</td>
<td>Relay output RO1</td>
</tr>
<tr>
<td>XRO2</td>
<td>Relay output RO2</td>
</tr>
<tr>
<td>XRO3</td>
<td>Relay output RO3</td>
</tr>
<tr>
<td>XSTO</td>
<td>Safe torque off connection (input signals)</td>
</tr>
<tr>
<td>XSTO OUT</td>
<td>Safe torque off connection (to inverter modules)</td>
</tr>
<tr>
<td>X12</td>
<td>(On the opposite side) Connection for FSO-xx safety functions module (optional)</td>
</tr>
<tr>
<td>X13</td>
<td>Control panel / PC connection</td>
</tr>
<tr>
<td>X485</td>
<td>Not in use</td>
</tr>
<tr>
<td>V1T/V1R, V2T/V2R</td>
<td>Fiber optic connection to modules 1 and 2</td>
</tr>
<tr>
<td></td>
<td>(VxT = transmitter, VxR = receiver)</td>
</tr>
<tr>
<td>V3T/V3R, V7T/V7R</td>
<td>Fiber optic connection to modules 3…7 (BCU-12/22 only)</td>
</tr>
<tr>
<td></td>
<td>(VxT = transmitter, VxR = receiver)</td>
</tr>
<tr>
<td>V8T/V8R, V12T/V12R</td>
<td>Fiber optic connection to modules 8…12 (BCU-22 only)</td>
</tr>
<tr>
<td></td>
<td>(VxT = transmitter, VxR = receiver)</td>
</tr>
<tr>
<td>SD CARD</td>
<td>Data logger memory card for inverter module communication</td>
</tr>
<tr>
<td>BATT OK</td>
<td>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.</td>
</tr>
<tr>
<td>FAULT</td>
<td>The control program has generated a fault. See the firmware manual of the supply/inverter unit.</td>
</tr>
<tr>
<td>PWR OK</td>
<td>Internal voltage supply is OK</td>
</tr>
<tr>
<td>WRITE</td>
<td>Writing to memory card in progress. Do not remove the memory card.</td>
</tr>
</tbody>
</table>
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 mm² (24…12 AWG). The torque is 0.5 N·m (5 lbf·in).

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>XD2D</td>
<td>Drive-to-drive link</td>
</tr>
<tr>
<td>1</td>
<td>B</td>
</tr>
<tr>
<td>2</td>
<td>A</td>
</tr>
<tr>
<td>3</td>
<td>BGND</td>
</tr>
<tr>
<td>4</td>
<td>Shield</td>
</tr>
<tr>
<td></td>
<td>D2D.TERM Drive-to-drive link termination switch¹</td>
</tr>
<tr>
<td>X485</td>
<td>RS485 connection</td>
</tr>
<tr>
<td>5</td>
<td>B</td>
</tr>
<tr>
<td>6</td>
<td>A</td>
</tr>
<tr>
<td>7</td>
<td>BGND</td>
</tr>
<tr>
<td>8</td>
<td>Shield</td>
</tr>
<tr>
<td>XRO1, XRO2, XRO3</td>
<td>Relay outputs</td>
</tr>
<tr>
<td>11</td>
<td>NC Norm. closed</td>
</tr>
<tr>
<td>12</td>
<td>COM Common</td>
</tr>
<tr>
<td>13</td>
<td>NO Norm. open</td>
</tr>
<tr>
<td>21</td>
<td>NC Norm. closed</td>
</tr>
<tr>
<td>22</td>
<td>COM Common</td>
</tr>
<tr>
<td>23</td>
<td>NO Norm. open</td>
</tr>
<tr>
<td>31</td>
<td>NC Norm. closed</td>
</tr>
<tr>
<td>32</td>
<td>COM Common</td>
</tr>
<tr>
<td>33</td>
<td>NO Norm. open</td>
</tr>
<tr>
<td>XSTO, XSTO OUT</td>
<td>Safe torque off⁴</td>
</tr>
<tr>
<td>1</td>
<td>OUT</td>
</tr>
<tr>
<td>2</td>
<td>SGND</td>
</tr>
<tr>
<td>3</td>
<td>IN1</td>
</tr>
<tr>
<td>4</td>
<td>IN2</td>
</tr>
<tr>
<td>5</td>
<td>IN1</td>
</tr>
<tr>
<td>6</td>
<td>SGND</td>
</tr>
<tr>
<td>7</td>
<td>IN2</td>
</tr>
<tr>
<td>8</td>
<td>SGND</td>
</tr>
</tbody>
</table>

¹ XSTO: Factory connection. Both circuits (power module, control unit) must be closed for the supply unit to start (IN1 and IN2 must be connected to OUT).

² XSTO OUT: Not in use.
<table>
<thead>
<tr>
<th>Terminal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DI1</td>
</tr>
<tr>
<td>2</td>
<td>DI2</td>
</tr>
<tr>
<td>3</td>
<td>DI3</td>
</tr>
<tr>
<td>4</td>
<td>DI4</td>
</tr>
<tr>
<td>5</td>
<td>DI5</td>
</tr>
<tr>
<td>6</td>
<td>DI6</td>
</tr>
<tr>
<td>7</td>
<td>DIIL</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>XDIO</th>
<th>Digital input/outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DIO1</td>
</tr>
<tr>
<td>2</td>
<td>DIO2</td>
</tr>
<tr>
<td>3</td>
<td>DIOGND</td>
</tr>
<tr>
<td>4</td>
<td>DIOGND</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>XD24</th>
<th>Auxiliary voltage output</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>+24VD</td>
</tr>
<tr>
<td>6</td>
<td>DICOM</td>
</tr>
<tr>
<td>7</td>
<td>+24VD</td>
</tr>
<tr>
<td>8</td>
<td>DIOGND</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DICOM = DIOGND</th>
<th>Ground selection switch[^6]</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>XAI</th>
<th>Analog inputs, reference voltage output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+VREF</td>
</tr>
<tr>
<td>2</td>
<td>-VREF</td>
</tr>
<tr>
<td>3</td>
<td>AGND</td>
</tr>
<tr>
<td>4</td>
<td>AI1+</td>
</tr>
<tr>
<td>5</td>
<td>AI1-</td>
</tr>
<tr>
<td>6</td>
<td>AI2+</td>
</tr>
<tr>
<td>7</td>
<td>AI2-</td>
</tr>
</tbody>
</table>

| AI1      | AI1 current/voltage selection switch |
| AI2      | AI2 current/voltage selection switch |

<table>
<thead>
<tr>
<th>XAO</th>
<th>Analog outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AO1</td>
</tr>
<tr>
<td>2</td>
<td>AGND</td>
</tr>
<tr>
<td>3</td>
<td>AO2</td>
</tr>
<tr>
<td>4</td>
<td>AGND</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>XPOW</th>
<th>External power input</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+24VI</td>
</tr>
<tr>
<td>2</td>
<td>GND</td>
</tr>
<tr>
<td>3</td>
<td>+24VI</td>
</tr>
<tr>
<td>4</td>
<td>GND</td>
</tr>
</tbody>
</table>

| X12      | Safety functions module connection (not in use in supply units) |
| X13      | Control panel connection |

[^2]: MCB feedback
[^3]: Temp fault
[^4]: Run / enable
[^5]: Auxiliary voltage output
[^6]: Ground selection switch
[^7]: AI1 current/voltage selection switch
[^8]: AI2 current/voltage selection switch
[^9]: Analog inputs, reference voltage output
[^10]: Analog outputs
[^11]: External power input
1) Must be set to ON when the supply unit is the first or last unit on the drive-to-drive (D2D) link. On intermediate units, set termination to OFF.

2) Use of the signal in the control program. When parameter 120.30 External charge enable has value Yes (default setting), the control program reserves this I/O terminal for external charging circuit control and monitoring, and parameters 110.24 RO1 source and 110.30 RO2 source are write-protected. If the value is No, you can use the I/O terminal for other purposes.

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

4) This input only acts as a true Safe torque off input in inverter 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 (i.e., common reference for digital inputs floats). ON: DICOM connected to DIOGND. OFF: DICOM and DIOGND separate.

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

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

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

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

Using an external supply is recommended if

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

### 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-xx safety functions module connection (X12)

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

SDHC memory card slot

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

| Power supply (XPOW) | Connector pitch 5 mm, wire size 2.5 mm²  
| 24 V (±10%) DC, 2 A  
| External power input.  
| Two supplies can be connected for redundancy. |
| Relay outputs RO1…RO3 (XRO1…XRO3) | Connector pitch 5 mm, wire size 2.5 mm²  
| 250 V AC / 30 V DC, 2 A  
| Protected by varistors |
| +24 V output (XD24:2 and XD24:4) | Connector pitch 5 mm, wire size 2.5 mm²  
| Total load capacity of these outputs is 4.8 W (200 mA / 24 V) minus the power taken by DIO1 and DIO2. |
| Digital inputs DI1…DI6 (XDI:1…XDI:6) | Connector pitch 5 mm, wire size 2.5 mm²  
| 24 V logic levels: "0" < 5 V, "1" > 15 V  
| $R_{in}$: 2.0 kohm  
| Input type: NPN/PNP (DI1…DI5), PNP (DI6)  
| Hardware filtering: 0.04 ms, digital filtering up to 8 ms  
| DI6 (XDI:6) can alternatively be used as an input for a PTC sensor.  
| $"0"$ > 4 kohm, "$1"$ < 1.5 kohm.  
| $I_{max}$: 15 mA (DI1…DI5), 5 mA (DI6) |
| Start interlock input DIIL (XDI:7) | Connector pitch 5 mm, wire size 2.5 mm²  
| 24 V logic levels: "0" < 5 V, "1" > 15 V  
| $R_{in}$: 2.0 kohm  
| Input type: NPN/PNP  
| Hardware filtering: 0.04 ms, digital filtering up to 8 ms |
| Digital inputs/outputs DIO1 and DIO2 (XDIO:1 and XDIO:2) | Connector pitch 5 mm, wire size 2.5 mm²  
| As inputs: 24 V logic levels: "0" < 5 V, "1" > 15 V.  
| $R_{in}$: 2.0 kohm.  
| Filtering: 1 ms.  
| As outputs: Total output current from +24VD is limited to 200 mA  
| +24VD |
| Reference voltage for analog inputs +VREF and -VREF (XAI:1 and XAI:2) | Connector pitch 5 mm, wire size 2.5 mm²  
| 10 V ±1% and −10 V ±1%, $R_{load}$ 1…10 kohm  
| Maximum output current: 10 mA |
| Analog inputs AI1 and AI2 (XAI:4 ... XAI:7).  
| Current/voltage input mode selection by switches | Connector pitch 5 mm, wire size 2.5 mm²  
| Current input: −20…20 mA, $R_{in} = 100$ ohm  
| Voltage input: −10…10 V, $R_{in} > 200$ kohm  
| Differential inputs, common mode range ±30 V  
| Sampling interval per channel: 0.25 ms  
| Hardware filtering: 0.25 ms, adjustable digital filtering up to 8 ms  
| Resolution: 11 bit + sign bit  
<p>| Inaccuracy: 1% of full scale range |</p>
<table>
<thead>
<tr>
<th>Connector Pitch</th>
<th>Connector Pitch</th>
<th>Connector Pitch</th>
<th>Connector Pitch</th>
<th>Connector Pitch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pitch 5 mm, Wire Size 2.5 mm²</td>
<td>Pitch 5 mm, Wire Size 2.5 mm²</td>
<td>Pitch 5 mm, Wire Size 2.5 mm²</td>
<td>Pitch 5 mm, Wire Size 2.5 mm²</td>
<td>Pitch 5 mm, Wire Size 2.5 mm²</td>
</tr>
<tr>
<td>Analogue Outputs AO1 and AO2 (XAO)</td>
<td>Analog Outputs AO1 and AO2 (XAO)</td>
<td>Analog Outputs AO1 and AO2 (XAO)</td>
<td>Analog Outputs AO1 and AO2 (XAO)</td>
<td>Analog Outputs AO1 and AO2 (XAO)</td>
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<tr>
<td>Connector Pitch 5 mm, Wire Size 2.5 mm²</td>
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<td>Connector Pitch 5 mm, Wire Size 2.5 mm²</td>
<td>Connector Pitch 5 mm, Wire Size 2.5 mm²</td>
</tr>
<tr>
<td>0…20 mA, ( R_{\text{load}} \leq 500 \text{ ohm} )</td>
<td>0…20 mA, ( R_{\text{load}} \leq 500 \text{ ohm} )</td>
<td>0…20 mA, ( R_{\text{load}} \leq 500 \text{ ohm} )</td>
<td>0…20 mA, ( R_{\text{load}} \leq 500 \text{ ohm} )</td>
<td>0…20 mA, ( R_{\text{load}} \leq 500 \text{ ohm} )</td>
</tr>
<tr>
<td>Frequency range: 0…500 Hz</td>
<td>Frequency range: 0…500 Hz</td>
<td>Frequency range: 0…500 Hz</td>
<td>Frequency range: 0…500 Hz</td>
<td>Frequency range: 0…500 Hz</td>
</tr>
<tr>
<td>Inaccuracy: 2% of full scale range</td>
<td>Inaccuracy: 2% of full scale range</td>
<td>Inaccuracy: 2% of full scale range</td>
<td>Inaccuracy: 2% of full scale range</td>
<td>Inaccuracy: 2% of full scale range</td>
</tr>
<tr>
<td>XD2D Connector</td>
<td>XD2D Connector</td>
<td>XD2D Connector</td>
<td>XD2D Connector</td>
<td>XD2D Connector</td>
</tr>
<tr>
<td>Connector Pitch 5 mm, Wire Size 2.5 mm²</td>
<td>Connector Pitch 5 mm, Wire Size 2.5 mm²</td>
<td>Connector Pitch 5 mm, Wire Size 2.5 mm²</td>
<td>Connector Pitch 5 mm, Wire Size 2.5 mm²</td>
<td>Connector Pitch 5 mm, Wire Size 2.5 mm²</td>
</tr>
<tr>
<td>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)</td>
<td>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)</td>
<td>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)</td>
<td>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)</td>
<td>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)</td>
</tr>
<tr>
<td>Maximum length of link: 50 m (164 ft)</td>
<td>Maximum length of link: 50 m (164 ft)</td>
<td>Maximum length of link: 50 m (164 ft)</td>
<td>Maximum length of link: 50 m (164 ft)</td>
<td>Maximum length of link: 50 m (164 ft)</td>
</tr>
<tr>
<td>Termination by switch</td>
<td>Termination by switch</td>
<td>Termination by switch</td>
<td>Termination by switch</td>
<td>Termination by switch</td>
</tr>
<tr>
<td>RS-485 Connection (X485)</td>
<td>RS-485 Connection (X485)</td>
<td>RS-485 Connection (X485)</td>
<td>RS-485 Connection (X485)</td>
<td>RS-485 Connection (X485)</td>
</tr>
<tr>
<td>Connector Pitch 5 mm, Wire Size 2.5 mm²</td>
<td>Connector Pitch 5 mm, Wire Size 2.5 mm²</td>
<td>Connector Pitch 5 mm, Wire Size 2.5 mm²</td>
<td>Connector Pitch 5 mm, Wire Size 2.5 mm²</td>
<td>Connector Pitch 5 mm, Wire Size 2.5 mm²</td>
</tr>
<tr>
<td>Safe Torque Off Connection (XSTO)</td>
<td>Safe Torque Off Connection (XSTO)</td>
<td>Safe Torque Off Connection (XSTO)</td>
<td>Safe Torque Off Connection (XSTO)</td>
<td>Safe Torque Off Connection (XSTO)</td>
</tr>
<tr>
<td>Connector Pitch 5 mm, Wire Size 2.5 mm²</td>
<td>Connector Pitch 5 mm, Wire Size 2.5 mm²</td>
<td>Connector Pitch 5 mm, Wire Size 2.5 mm²</td>
<td>Connector Pitch 5 mm, Wire Size 2.5 mm²</td>
<td>Connector Pitch 5 mm, Wire Size 2.5 mm²</td>
</tr>
<tr>
<td>Input voltage range: -3…30 V DC</td>
<td>Input voltage range: -3…30 V DC</td>
<td>Input voltage range: -3…30 V DC</td>
<td>Input voltage range: -3…30 V DC</td>
<td>Input voltage range: -3…30 V DC</td>
</tr>
<tr>
<td>Logic levels: &quot;0&quot; (&lt; 5 \text{ V}, &quot;1&quot; &gt; 17 \text{ V})</td>
<td>Logic levels: &quot;0&quot; (&lt; 5 \text{ V}, &quot;1&quot; &gt; 17 \text{ V})</td>
<td>Logic levels: &quot;0&quot; (&lt; 5 \text{ V}, &quot;1&quot; &gt; 17 \text{ V})</td>
<td>Logic levels: &quot;0&quot; (&lt; 5 \text{ V}, &quot;1&quot; &gt; 17 \text{ V})</td>
<td>Logic levels: &quot;0&quot; (&lt; 5 \text{ V}, &quot;1&quot; &gt; 17 \text{ V})</td>
</tr>
<tr>
<td>Note: For the unit to start, both connections must be &quot;1&quot;. 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.</td>
<td>Note: For the unit to start, both connections must be &quot;1&quot;. 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.</td>
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</tr>
<tr>
<td>Safe Torque Off Output (XSTO OUT)</td>
<td>Safe Torque Off Output (XSTO OUT)</td>
<td>Safe Torque Off Output (XSTO OUT)</td>
<td>Safe Torque Off Output (XSTO OUT)</td>
<td>Safe Torque Off Output (XSTO OUT)</td>
</tr>
<tr>
<td>Connector Pitch 5 mm, Wire Size 2.5 mm²</td>
<td>Connector Pitch 5 mm, Wire Size 2.5 mm²</td>
<td>Connector Pitch 5 mm, Wire Size 2.5 mm²</td>
<td>Connector Pitch 5 mm, Wire Size 2.5 mm²</td>
<td>Connector Pitch 5 mm, Wire Size 2.5 mm²</td>
</tr>
<tr>
<td>To STO connector of inverter module.</td>
<td>To STO connector of inverter module.</td>
<td>To STO connector of inverter module.</td>
<td>To STO connector of inverter module.</td>
<td>To STO connector of inverter module.</td>
</tr>
<tr>
<td>Control Panel Connection (X13)</td>
<td>Control Panel Connection (X13)</td>
<td>Control Panel Connection (X13)</td>
<td>Control Panel Connection (X13)</td>
<td>Control Panel Connection (X13)</td>
</tr>
<tr>
<td>Cable length (&lt; 3 \text{ m})</td>
<td>Cable length (&lt; 3 \text{ m})</td>
<td>Cable length (&lt; 3 \text{ m})</td>
<td>Cable length (&lt; 3 \text{ m})</td>
<td>Cable length (&lt; 3 \text{ m})</td>
</tr>
<tr>
<td>Ethernet Connection (XETH)</td>
<td>Ethernet Connection (XETH)</td>
<td>Ethernet Connection (XETH)</td>
<td>Ethernet Connection (XETH)</td>
<td>Ethernet Connection (XETH)</td>
</tr>
<tr>
<td>This connection is not supported by the firmware.</td>
<td>This connection is not supported by the firmware.</td>
<td>This connection is not supported by the firmware.</td>
<td>This connection is not supported by the firmware.</td>
<td>This connection is not supported by the firmware.</td>
</tr>
<tr>
<td>SDHC Memory Card Slot (SD CARD)</td>
<td>SDHC Memory Card Slot (SD CARD)</td>
<td>SDHC Memory Card Slot (SD CARD)</td>
<td>SDHC Memory Card Slot (SD CARD)</td>
<td>SDHC Memory Card Slot (SD CARD)</td>
</tr>
<tr>
<td>Memory Card Type: SDHC</td>
<td>Memory Card Type: SDHC</td>
<td>Memory Card Type: SDHC</td>
<td>Memory Card Type: SDHC</td>
<td>Memory Card Type: SDHC</td>
</tr>
<tr>
<td>Maximum Memory Size: 4 GB</td>
<td>Maximum Memory Size: 4 GB</td>
<td>Maximum Memory Size: 4 GB</td>
<td>Maximum Memory Size: 4 GB</td>
<td>Maximum Memory Size: 4 GB</td>
</tr>
</tbody>
</table>

The terminals of the control unit fulfill the Protective Extra Low Voltage (PELV) requirements. The PELV requirements of a relay output are not fulfilled if a voltage higher than 48 V is connected to the relay output.
*Ground selector (DICOM=DI0GND) settings*

<table>
<thead>
<tr>
<th>DICOM=DI0GND: ON</th>
<th>DICOM=DI0GND: OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>All digital inputs share a common ground (DICOM connected to DI0GND). This is the default setting.</td>
<td>Ground of digital inputs DI1...DI5 and DIIL (DICOM) is isolated from DIO signal ground (DI0GND). Isolation voltage 50 V.</td>
</tr>
</tbody>
</table>

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

Contents of this chapter

This chapter contains dimension drawings of the ACS880-204LC IGBT supply modules and accessories. Dimensional drawings of most installation accessories are available from ABB on request.
Frame R8i module
Quick connector
LCL filter components

- Grid-side choke (BLCL-15LC-7 and BLCL-24LC-7)
Grid-side choke (BLCL-25LC-7)
- Converter-side choke (BLCL-15LC-7 and BLCL-24LC-7)
- Converter-side choke (BLCL-25LC-7)
 Capacitor

After safety device operation
Max. expansion 12.7mm

marking

Tightening torque = 12N.m max.
Toothed lock washer Din 6797
Hexagonal Nut Din 934

M6 screw
Tightening torque 3.5N.m

www.tdk-electronics.tdk.com
Control electronics

For dimension drawings of optional modules and devices, refer to their documentation.

- BCU control unit
- DPMP-01 door mounting kit
- CVAR board
Main circuit breaker

- E2.2S-A (IEC/UL/CSA)

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Horizontal terminals 1600 A - 2000 A</td>
</tr>
<tr>
<td>2</td>
<td>Vertical terminals 1600 A - 2000 A</td>
</tr>
<tr>
<td>3</td>
<td>Tightening torque 8.6 N·m (76 lbf·in)</td>
</tr>
<tr>
<td>4</td>
<td>Door position</td>
</tr>
<tr>
<td>5</td>
<td>Grounding</td>
</tr>
<tr>
<td>6</td>
<td>Mounting fixed part screws</td>
</tr>
<tr>
<td>7</td>
<td>Moving part</td>
</tr>
<tr>
<td>8</td>
<td>Fixed part</td>
</tr>
<tr>
<td>9</td>
<td>Segregation</td>
</tr>
<tr>
<td>10</td>
<td>Connected, test, disconnected distances</td>
</tr>
<tr>
<td>11</td>
<td>Roof insulation or insulated material</td>
</tr>
</tbody>
</table>

Dimension drawings
- E4.2S-A (IEC/UL/CSA)

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Horizontal terminals 2500 A</td>
</tr>
<tr>
<td>2</td>
<td>Vertical terminals 2500 A</td>
</tr>
<tr>
<td>3</td>
<td>Tightening torque 20 N·m (177 lbf·in)</td>
</tr>
<tr>
<td>4</td>
<td>Door position</td>
</tr>
<tr>
<td>5</td>
<td>Grounding</td>
</tr>
<tr>
<td>6</td>
<td>Mounting fixed part screws</td>
</tr>
<tr>
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<tr>
<td>8</td>
<td>Fixed part</td>
</tr>
<tr>
<td>9</td>
<td>Segregation</td>
</tr>
<tr>
<td>10</td>
<td>Connected, test, disconnected distances</td>
</tr>
<tr>
<td>11</td>
<td>Roof insulation or insulated material</td>
</tr>
</tbody>
</table>
AC fuses

- **Fuses of type 170M64xx**

![Dimension drawings for fuse type 170M64xx]

<table>
<thead>
<tr>
<th>Size</th>
<th>A (mm)</th>
<th>B (mm)</th>
<th>D (mm)</th>
<th>E (mm)</th>
<th>F</th>
<th>G (mm)</th>
<th>H (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>51 (2.01)</td>
<td>53 (2.09)</td>
<td>92 (3.62)</td>
<td>76 (2.99)</td>
<td>M12</td>
<td>10 (0.39)</td>
<td>30 (1.18)</td>
</tr>
</tbody>
</table>

- **Fuses of type 170M70xx**

![Dimension drawings for fuse type 170M70xx]

<table>
<thead>
<tr>
<th>Size</th>
<th>F</th>
<th>G (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4B</td>
<td>M10</td>
<td>33 (1.30)</td>
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</tbody>
</table>
DC fuses

1000…1250 V fuses (as used with 690 V units)

<table>
<thead>
<tr>
<th>Size</th>
<th>A (mm)</th>
<th>B (mm)</th>
<th>D (mm)</th>
<th>E (mm)</th>
<th>F</th>
<th>G (mm)</th>
<th>H (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>81 (3.19)</td>
<td>83 (3.27)</td>
<td>92 (3.62)</td>
<td>76 (2.99)</td>
<td>M12</td>
<td>10 (0.39)</td>
<td>30 (1.18)</td>
</tr>
<tr>
<td>3*</td>
<td>81 (3.19)</td>
<td>91 (3.58)</td>
<td>92 (3.62)</td>
<td>76 (2.99)</td>
<td>M12</td>
<td>10 (0.39)</td>
<td>30 (1.18)</td>
</tr>
</tbody>
</table>
Example circuit diagrams

Contents of this chapter
This chapter contains example circuit diagrams of an IGBT 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 an IGBT supply unit, and
- learning how to wire an (ACS880-204LC) IGBT supply module when installed in a user-defined cabinet.

Contents of example circuit diagrams
- ACS880-204LC IGBT supply unit 2×R8i (3AXD10000695767)
  - IGBT supply module
  - LCL filter
  - main circuit breaker
  - main charging circuit
  - DC switch
  - DC charging circuit
  - internal auxiliary voltage supply
  - BCU-02 control unit
  - cabinet cooling fans
  - control panel, panel mounting kit.
ACS880-204LC IGBT supply unit 4×R8i (3AXD10000695768)

- IGBT supply module
- LCL filter
- main circuit breaker
- main charging circuit
- DC switch
- DC charging circuit
- internal auxiliary voltage supply
- BCU-12 control unit
- cabinet cooling fans
- control panel, panel mounting kit
- CIO-01 module for distributed I/O bus control.

250 Example circuit diagrams
<table>
<thead>
<tr>
<th>Page</th>
<th>Page description</th>
<th>Revision</th>
</tr>
</thead>
<tbody>
<tr>
<td>000A</td>
<td>Title page / cover sheet</td>
<td>F</td>
</tr>
<tr>
<td>000C</td>
<td>Structured identifier overview</td>
<td>F</td>
</tr>
<tr>
<td>001D</td>
<td>Summarized parts list</td>
<td>F</td>
</tr>
<tr>
<td>002E</td>
<td>Summarized parts list</td>
<td>F</td>
</tr>
<tr>
<td>003F</td>
<td>Summarized parts list</td>
<td>F</td>
</tr>
<tr>
<td>005A</td>
<td>Symbol Overview</td>
<td>F</td>
</tr>
</tbody>
</table>

**01**
- 001a Main supply, Aux. supply switch
- 001b Line-up charging circuit
- 002a LC filter
- 003a Drive main circuit
- 004a BIFC
- 005a Drive main circuit
- 020a Auxiliary transformer
- 020b External fan supply
- 021a Auxiliary circuit
- 022a 24V Distribution
- 023a AC/UCU fan control
- 024a U/L fan control
- 025a SU fan control
- 026a Aux circuit breaker
- 027a SU Control Board
- 028a SU Control Board
- 029a SU Control Board
- 030a Safety circuit & Supply STO

---

**Example Circuit Diagrams**

**ACS880-204LC**

- 2×R8i

**Anna Maria Zhiglova**

11/15/2020
Example circuit diagrams 255
Example circuit diagrams
Example Circuit Diagrams

EXTERNAL FAN VOLTAGE SUPPLY
PROVIDED BY USER
MAX FUSE 40 A 600 V

AUXILIARY CONTROL CUBICLE (EXTERNAL)
AUXILIARY CONTROL CUBICLE (EXTERNAL)

NOTE! WITH UNINSULATED FERRULE

Alarm -T22
24 V DC, 5 A
PE
N
L
DC+
+(2)
DC+
+(1)
DC-
-(1)
DC-
-(2)
13
14
-F29
6A
1
2
12
11
14

POWER 24V
13
12
11
1
2
3
4
5
15
-X22
-X21

Example Circuit Diagrams

264 Example circuit diagrams
Example Circuit Diagrams 265
Example circuit diagrams
Example circuit diagrams 267
268 Example circuit diagrams
Control and status signals

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Pin</th>
</tr>
</thead>
<tbody>
<tr>
<td>-XDI 1</td>
<td>RS</td>
</tr>
<tr>
<td>-XDI 2</td>
<td>RS</td>
</tr>
<tr>
<td>-XDI 3</td>
<td>RS</td>
</tr>
<tr>
<td>-XDI 4</td>
<td>RS</td>
</tr>
<tr>
<td>-XDI 5</td>
<td>RS</td>
</tr>
<tr>
<td>-XDI 6</td>
<td>RS</td>
</tr>
<tr>
<td>-XDI 7</td>
<td>RS</td>
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Fan supply supervision

<table>
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<tr>
<td>-XSTO.OUT</td>
<td>RS</td>
</tr>
<tr>
<td>-DI1</td>
<td>RS</td>
</tr>
<tr>
<td>-DI2</td>
<td>RS</td>
</tr>
<tr>
<td>-DI3</td>
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<tr>
<td>-DI4</td>
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</tr>
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<td>-DI6</td>
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<td>-DI7</td>
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AUXILIARY CONTROL CUBICLE (EXTERNAL)

Example circuit diagrams
### Control and status signals

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<tbody>
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<td>-AI1</td>
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<td>-AI2</td>
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<tr>
<td>-AO1</td>
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</tr>
<tr>
<td>-AO2</td>
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<tr>
<td>-XDIO1</td>
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<td>-XDIO2</td>
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**Note**: All AI not specified by default not in use, 0(4)...20mA

### AUXILIARY CONTROL CUBICLE (EXTERNAL)

Example circuit diagrams 271
Example circuit diagrams 273
Frame 4×R8i

<table>
<thead>
<tr>
<th>Project type</th>
<th>Converter type</th>
<th>Frame Size</th>
<th>Type Code</th>
<th>Revision</th>
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<td>Example Circuit Diagrams</td>
<td>ACS880-204LC</td>
<td>4×R8i</td>
<td>ACS880-204LC-2930A-7</td>
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Type Code: 2.9.4

Used EPLAN version: P8.14734
Example Circuit Diagrams

ACS880-204LC

11/15/2020

Example Circuit Diagrams

ACS880-204LC

11/15/2020
### Table of Contents

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<thead>
<tr>
<th>Higher-level function</th>
<th>Page</th>
<th>Page description</th>
<th>Revision</th>
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<td>050d</td>
<td>ISU Control Board</td>
<td>F</td>
</tr>
<tr>
<td>066d</td>
<td>Safety circuit &amp; Supply STD</td>
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#### Example Circuit Diagrams

- ACS880-204LC
  - 4xRB

---

Example Circuit Diagrams

![Example Circuit Diagrams](image-url)
### Function designations

<table>
<thead>
<tr>
<th>Designation</th>
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<tr>
<td>+01</td>
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<tr>
<td>+02</td>
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<td>+03</td>
<td>+01.2 IGBT Supply Unit</td>
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<td>+04</td>
<td>+01.3 IGBT Supply Unit</td>
</tr>
<tr>
<td>+05</td>
<td>+01.4 IGBT Supply Unit</td>
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<td>+06</td>
<td>+01.5 IGBT Supply Unit</td>
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<tr>
<td>+07</td>
<td>+01.6 IGBT Supply Unit</td>
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### Location designations

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<th>Structure description</th>
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<td>+01.1 AUX Control Cubicle (External)</td>
</tr>
<tr>
<td>+01.2</td>
<td>+01.2 IGBT Supply Unit</td>
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<tr>
<td>+01.3</td>
<td>+01.3 IGBT Supply Unit</td>
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<td>+01.5 IGBT Supply Unit</td>
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### Electrical option designations

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<td>CM Filter</td>
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<td>Charging Kit</td>
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<td>Control Panel</td>
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<td>Fieldbus Adaptor</td>
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<td>Supply Module</td>
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<tr>
<td>Supply Module</td>
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---

Example Circuit Diagrams

ACS880-204LC-0850A-7

Mika Asikainen
11/15/2020

Anna Mariia Zhiglova
11/11/2020

Example Circuit Diagrams

ACS880-204LC-0850A-7

Example circuit diagrams 281
Example circuit diagrams
Example circuit diagrams
Example circuit diagrams 287
SECOND IGBT SUPPLY CUBICLE

Example circuit diagrams
290 Example circuit diagrams
Example circuit diagrams
FIRST LCL FILTER CUBICLE

Example Circuit Diagrams

ACS880-204LC-2930A-7

DMS doc. nr. 3AXD10000695768

IGBT Supply Unit

026c

No. of Sheets

Rev. 01

= SAP Doc. No.

EPLAN Doc. No.

ABB Ref. No.

Resp. Dept.

Item Des.

Sheet

Title

Prep.

App.

Project

Cust. Doc. No.

Cust. Ref. No.

Customer

Example Circuit Diagrams

294
Table of Control and Status Signals:

<table>
<thead>
<tr>
<th>Control and status signals</th>
<th>Terminal</th>
<th>Pin</th>
</tr>
</thead>
<tbody>
<tr>
<td>A51 CHANGING CONTACTOR CONTROL</td>
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<tr>
<td>A51 LCU ON/OFF</td>
<td>-XRO2</td>
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<td>A51 MAIN BREAKER CONTROL</td>
<td>-XRO3</td>
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Example Circuit Diagrams:

AUXILIARY CONTROL CUBICLE (EXTERNAL)
Example circuit diagrams 299
### Auxiliary Control Cubicle (External)

#### Control and Status Signals

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Pin</th>
</tr>
</thead>
<tbody>
<tr>
<td>-AI 1</td>
<td>6</td>
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<tr>
<td>-AI 2</td>
<td>6</td>
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<td>-AO 1</td>
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<tr>
<td>-AO 2</td>
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<tr>
<td>-XAO 1</td>
<td>2</td>
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<tr>
<td>-XDIO 1</td>
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</tr>
<tr>
<td>-XDIO 2</td>
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</table>

#### Connections

- **-AI 1**: NOT SPECIFIED BY DEFAULT NOT IN USE, 0(2...10V)
- **-AI 2**: NOT SPECIFIED BY DEFAULT NOT IN USE, 0(4...20mA)
- **-AO 1**: ZERO 0...20mA, R<500 Ohm
- **-AO 2**: ZERO 0...20mA, R<500 Ohm
- **-XAI 1**: NOT SPECIFIED BY DEFAULT NOT IN USE, 0(2...10V)
- **-XAO 1**: NOT SPECIFIED BY DEFAULT NOT IN USE, 0(2...10V)
- **-XDIO 1**: NOT SPECIFIED BY DEFAULT NOT IN USE, 0(4...20mA)
- **-XDIO 2**: NOT SPECIFIED BY DEFAULT NOT IN USE, 0(4...20mA)

### Example Circuit Diagrams

- **ACS880-204LC-2930A-7**
- **IGBT Supply Unit**
- **No. of Sheets**: 8
- **Rev.**: 01
- **SAP Doc. No.**: 32400505
- **EPLAN Doc. No.**: 32400505
- **ABB Ref. No.**: 32400505
- **Resp. Dept.**: 32400505
- **Item Des.**: 32400505
- **Sheet Title**: 32400505
- **Prep.**: 32400505
- **App.**: 32400505
- **Project**: 32400505
- **Cust. Doc. No.**: 32400505
- **Cust. Ref. No.**: 32400505
- **Customer**: EFS2
- **Example Circuit Diagrams**: 4×R8i

### AUXILIARY CONTROL CUBICLE (EXTERNAL)

The **AUXILIARY CONTROL CUBICLE (EXTERNAL)** is designed to support the control and status signals for the **SHI Control Board**. It includes connections for terminals and pins that facilitate the necessary control and status signals for the system. The diagram illustrates the connections for various terminals and pins, ensuring seamless integration with the control unit. The document includes detailed specifications and diagrams for effective implementation.

---

**Example Circuit Diagrams**

- **ACS880-204LC-2930A-7**
- **IGBT Supply Unit**
- **No. of Sheets**: 8
- **Rev.**: 01
- **SAP Doc. No.**: 32400505
- **EPLAN Doc. No.**: 32400505
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- **Prep.**: 32400505
- **App.**: 32400505
- **Project**: 32400505
- **Cust. Doc. No.**: 32400505
- **Cust. Ref. No.**: 32400505
- **Customer**: EFS2
- **Example Circuit Diagrams**: 4×R8i
Example Circuit Diagrams
Further information

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

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

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

Document library on the Internet
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