ABB industrial drives

Hardware manual
ACS880-607 3-phase brake units
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<tr>
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</thead>
<tbody>
<tr>
<td>Safety instructions for ACS880 multidevice cabinets and modules</td>
<td>3AUA0000102301</td>
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<tr>
<td>Mechanical installation instructions for ACS880 multidevice</td>
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<td>cabinets</td>
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<td>ACS-AP-x Assistant control panels user’s manual</td>
<td>3AUA0000085685</td>
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<tr>
<th>Supply unit manuals</th>
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<tr>
<td>ACS880-207 IGBT supply units hardware manual</td>
<td>3AUA0000130644</td>
</tr>
<tr>
<td>ACS880-307 (+A003) diode supply units hardware manual</td>
<td>3AUA0000102452</td>
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<tr>
<td>ACS880-307 +A018 diode supply units hardware manual</td>
<td>3AXD50000011408</td>
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<td>ACS880 diode supply control program firmware manual</td>
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<thead>
<tr>
<th>Inverter unit manuals and guides</th>
<th>Code (English)</th>
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<tr>
<td>ACS880-107 inverter units hardware manual</td>
<td>3AUA0000102519</td>
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<tr>
<td>ACS880 primary control program firmware manual</td>
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<td>ACS880 primary control program quick start-up guide</td>
<td>3AUA0000098062</td>
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<th>Brake unit manuals</th>
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<tr>
<td>ACS880-607 1-phase brake units hardware manual</td>
<td>3AUA0000102559</td>
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<td>ACS880-607 3-phase brake units hardware manual</td>
<td>3AXD50000022034</td>
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<tr>
<td>ACS880 brake control program firmware manual</td>
<td>3AXD50000020967</td>
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</table>

<table>
<thead>
<tr>
<th>Option manuals and guides</th>
<th>Code (English)</th>
</tr>
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<tbody>
<tr>
<td>Drive composer start-up and maintenance PC tool user’s manual</td>
<td>3AUA0000094606</td>
</tr>
<tr>
<td>Category 0 emergency stop (+Q951) for ACS880 multidevice</td>
<td>3AUA0000119885</td>
</tr>
<tr>
<td>categories user’s manual</td>
<td></td>
</tr>
<tr>
<td>Category 1 emergency stop (+Q952) for ACS880 multidevice</td>
<td>3AUA0000119886</td>
</tr>
<tr>
<td>category user’s manual</td>
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</tr>
<tr>
<td>Category 0 emergency stop (+Q963) for ACS880 multidevice</td>
<td>3AUA0000119891</td>
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<tr>
<td>Category 1 emergency stop (+Q964) for ACS880 multidevice</td>
<td>3AUA0000119893</td>
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<td>category user’s manual</td>
<td></td>
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<tr>
<td>FDPI-02 diagnostics and panel interface user’s manual</td>
<td>3AUA0000113618</td>
</tr>
<tr>
<td>FSO-12 safety functions module user’s manual</td>
<td>3AXD50000015612</td>
</tr>
<tr>
<td>Prevention of unexpected start-up (+Q957) for ACS880</td>
<td></td>
</tr>
<tr>
<td>multidevice user’s manual</td>
<td></td>
</tr>
<tr>
<td>Manuals and quick guides for I/O extension modules,</td>
<td></td>
</tr>
<tr>
<td>fieldbus adapters, etc.</td>
<td></td>
</tr>
</tbody>
</table>

You can find manuals and other product documents in PDF format on the Internet. See section Document library on the Internet on the inside of the back cover. For manuals not available in the Document library, contact your local ABB representative.
Hardware manual

ACS880-607 3-phase brake units

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5. Electrical installation

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Introduction to the manual

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

Applicability
The manual is applicable to ACS880-607 3-phase brake units that form a part of an ACS880 multidrive system.

Safety instructions
Obey all safety instructions delivered with the drive.

• Read the complete safety instructions before you install, commission, use or service the drive. The complete safety instructions are given in ACS880 multidrive and multidrive modules safety instructions (3AUA0000102301 [English]).

• Read the software function-specific warnings and notes before changing the default settings of the 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 install, start-up, use and service the brake units. Read the manual before working on the drive. You are expected to know the fundamentals of electricity, wiring, electrical components and electrical schematic symbols.
Contents of the manual

- **Introduction to the manual** gives an introduction to this manual.
- **Operation principle and hardware description** describes the brake unit and its role in the drive system.
- **Mechanical installation** describes the mechanical installation of the brake units.
- **Guidelines for planning the electrical installation** contains instructions on selecting, placing and protecting the brake circuit components and cables.
- **Electrical installation** contains the cabling and wiring instructions.
- **The brake control unit** describes the connections of the drive control unit, the main interface for the control connections of the brake unit.
- **Installation checklist** contains a list of items to check before start-up.
- **Start-up** describes the start-up sequence of the brake unit.
- **Fault tracing** describes the fault tracing possibilities of the brake unit.
- **Maintenance** provides maintenance instructions.
- **Technical data** contains the technical specifications of the brake unit, for example ratings, sizes and technical requirements, and provisions for fulfilling the requirements for CE and other markings.

Related documents

The multidrive user documentation consists of technical drawings and a set of manuals. The technical drawings are tailor-made for each drive. The composition of the manual set depends on the composition of the drive, eg. which supply unit type, options and inverter control program has been ordered by the customer. The manuals have been listed on the inside of the front cover.

Categorization by frame size and option code

Some descriptions, instructions, technical data and dimensional drawings which concern only certain brake units are marked with the symbol of the frame size such as 4×R8i. The marking derives from the quantity and basic construction of the brake chopper modules that form the brake unit. For example, frame size 2×R8i indicates that the brake unit consists of two frame size R8i brake chopper modules connected in parallel.

The frame size is marked on the type designation labels. The frame size of each brake chopper module is also shown in the rating tables, page 65.

The instructions and technical data which concern only certain optional selections are marked with option codes (such as +E210). The options included in the drive can be identified from the option codes visible on the type designation label. The option selections are listed in section **Brake unit type designation key**, page 26.

Use of component designations

Some device names in the manual include the component designations in brackets, for example (Q1) to make it possible to identify the components in the circuit diagrams of the drive.
# Terms and abbreviations

<table>
<thead>
<tr>
<th>Term/Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCU-x2</td>
<td>Type of the control unit used for the brake unit control</td>
</tr>
<tr>
<td>Brake chopper</td>
<td>Conducts the surplus energy from the intermediate circuit of the drive to the brake resistors when necessary. The chopper operates when the DC link voltage exceeds a certain maximum limit. The voltage rise is typically caused by deceleration (braking) of a high inertia motor.</td>
</tr>
<tr>
<td>Brake chopper module</td>
<td>Brake chopper enclosed inside a metal frame or enclosure. Intended for cabinet installation. See section <em>Operation principle</em> on page 13.</td>
</tr>
<tr>
<td>Brake resistor</td>
<td>Dissipates the drive surplus braking energy conducted by the brake chopper to heat. Essential part of the brake circuit. See <em>Operation principle</em> on page 13.</td>
</tr>
<tr>
<td>Brake unit</td>
<td>Brake chopper modules under control of one control board and related accessories. The control board is considered part of the unit.</td>
</tr>
<tr>
<td>Control board</td>
<td>Circuit board in which the control program runs.</td>
</tr>
<tr>
<td>Control unit</td>
<td>Control board built in a rail-mountable housing</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>DI</td>
<td>Digital input</td>
</tr>
<tr>
<td>Drive</td>
<td>Frequency converter for controlling AC motors</td>
</tr>
<tr>
<td>FCAN</td>
<td>Optional CANopen adapter module</td>
</tr>
<tr>
<td>FCNA</td>
<td>Optional ControlNet™ adapter module</td>
</tr>
<tr>
<td>FDNA</td>
<td>Optional DeviceNet™ adapter module</td>
</tr>
<tr>
<td>FDPI</td>
<td>Optional diagnostics and panel interface</td>
</tr>
<tr>
<td>FECA</td>
<td>Optional EtherCAT adapter module</td>
</tr>
<tr>
<td>FEN-01</td>
<td>Optional TTL encoder interface module</td>
</tr>
<tr>
<td>FEN-11</td>
<td>Optional absolute encoder interface module</td>
</tr>
<tr>
<td>FEN-21</td>
<td>Optional resolver interface module</td>
</tr>
<tr>
<td>FEN-31</td>
<td>Optional HTL encoder interface module</td>
</tr>
<tr>
<td>FENA</td>
<td>Optional high-performance Ethernet/IP™, Modbus/TCP and PROFINET adapter module</td>
</tr>
<tr>
<td>FEPL</td>
<td>Optional Ethernet POWERLINK adapter module</td>
</tr>
<tr>
<td>FIO-01</td>
<td>Optional digital I/O extension module</td>
</tr>
<tr>
<td>FIO-11</td>
<td>Optional analog I/O extension module</td>
</tr>
<tr>
<td>FLON-01</td>
<td>Optional LonWorks® adapter module</td>
</tr>
<tr>
<td>FPBA-01</td>
<td>Optional FPBA-01 PROFIBUS DP adapter module</td>
</tr>
<tr>
<td>FSCA-01</td>
<td>Optional Modbus/RTU adapter module</td>
</tr>
<tr>
<td>FSO-11, FSO-21</td>
<td>Optional safety function module</td>
</tr>
<tr>
<td>Frame (size)</td>
<td>Relates to the construction of brake chopper modules.</td>
</tr>
<tr>
<td>Intermediate circuit</td>
<td><strong>DC link</strong></td>
</tr>
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</table>
12 Introduction to the manual

<table>
<thead>
<tr>
<th>Term/Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inverter</td>
<td>Converts direct current and voltage to alternating current and voltage.</td>
</tr>
<tr>
<td>Inverter module</td>
<td>Inverter bridge, related components and drive DC link capacitors enclosed inside a metal frame or enclosure. Intended for cabinet installation.</td>
</tr>
<tr>
<td>Inverter unit</td>
<td>Inverter module(s) under control of one control board, and related components. One inverter unit typically controls one motor.</td>
</tr>
<tr>
<td>I/O</td>
<td>Input/Output</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>
<tr>
<td>Parameter</td>
<td>In the control program, user-adjustable operation instruction to the drive, or signal measured or calculated by the drive</td>
</tr>
<tr>
<td>PLC</td>
<td>Programmable logic controller</td>
</tr>
<tr>
<td>STO</td>
<td>Safe torque off</td>
</tr>
<tr>
<td>Supply unit</td>
<td>Part of the drive system that rectifies the AC supply voltage and outputs a DC voltage.</td>
</tr>
</tbody>
</table>
Operation principle and hardware description

Contents of this chapter
This chapter describes the operation principle and construction of the brake unit.

Product overview
ACS880-607 is an air-cooled cabinet-installed brake unit, which forms a part of an ACS880 multidrive system. As standard, it includes brake chopper(s). Brake resistors are external.

Operation principle
The brake chopper handles the energy generated by a decelerating motor. The chopper connects the brake resistor to the intermediate DC circuit whenever the voltage in the circuit exceeds the limit defined by the control program. Energy consumption by the resistor losses lowers the voltage until the resistor can be disconnected.

Typically, a drive system is equipped with a brake chopper(s) if:
• high capacity braking is needed and the drive cannot be equipped with a regenerative supply unit
• a backup for the regenerative supply unit is needed.
Simplified main circuit diagram of the drive system

This diagram shows a typical common DC bus drive system.

1. AC supply
2. Input (AC) fuses
3. Supply unit
4. DC bus
5. Inverter DC fuses (with or without a DC switch/disconnector)
6. Inverter units (in this example, one of the two units consists of two inverter modules connected in parallel)
7. Brake chopper DC fuses
8. Brake unit
9. Brake resistors
10. Brake resistor fuses
11. Motor(s)
12. DC switch/disconnector (option +F286)
13. Charging circuit switch with fuses with option +F286
14. Charging resistors with option +F286
The supply unit connects to the AC supply network (and to charging circuit with DC switch-disconnector option +F286). The supply unit converts the AC voltage into DC. The DC voltage is distributed through the DC bus to all inverter and brake units. The inverter unit, consisting of one or more ACS880-104 inverter modules, converts the DC back to AC that rotates the motor. The brake unit, consisting of one or more ACS880-104 brake chopper modules, converts the DC back to AC for the brake resistors.
Layout drawings

The figure below shows the components of the brake chopper cubicle with bottom entry and exit of cables and shrouds removed.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Control panel (option +J400)</td>
</tr>
<tr>
<td>2</td>
<td>Drive monitoring display (option +J401)</td>
</tr>
<tr>
<td>3</td>
<td>DC fuses</td>
</tr>
<tr>
<td>4</td>
<td>Brake chopper module</td>
</tr>
<tr>
<td>5</td>
<td>Brake chopper cooling fan</td>
</tr>
<tr>
<td>6</td>
<td>Lead-throughs for brake resistor and control cables</td>
</tr>
<tr>
<td>7</td>
<td>Terminals for brake resistor cable connection</td>
</tr>
<tr>
<td>8</td>
<td>Resistor fuses</td>
</tr>
<tr>
<td>9</td>
<td>BCU-x2 control unit</td>
</tr>
<tr>
<td>10</td>
<td>Cabinet heater (option +G300)</td>
</tr>
</tbody>
</table>
The figure below shows the components of the brake chopper cubicle with bottom entry and exit of cables and shrouds removed – option +F286 included.

1. Control panel (option +J400)
2. DC switch/disconnector (option +F286) handle
3. Charging circuit switch fuse handle with option +F286
4. Drive monitoring display (option +J401)
5. Charging circuit fuses
6. Brake chopper module
7. Brake chopper cooling fan
8. Lead-throughs for brake resistor and control cables
9. BCU-x2 control unit
10. Terminals for brake resistor cable connection
11. DC fuses
12. Resistor fuses behind the circuit plate
13. Cabinet heater (option +G300)
The figure below shows the components of the brake chopper cubicles with top entry and exit of cables and shrouds removed.

<table>
<thead>
<tr>
<th></th>
<th>Component Description</th>
<th></th>
<th>Component Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Control panel (option +J400)</td>
<td>7</td>
<td>Terminals for brake resistor cable connection</td>
</tr>
<tr>
<td>2</td>
<td>Drive monitoring display (option +J401)</td>
<td>8</td>
<td>Resistor fuses</td>
</tr>
<tr>
<td>3</td>
<td>DC fuses</td>
<td>9</td>
<td>Cabinet fans</td>
</tr>
<tr>
<td>4</td>
<td>Brake chopper module</td>
<td>10</td>
<td>BCU-x2 control unit</td>
</tr>
<tr>
<td>5</td>
<td>Brake chopper cooling fan</td>
<td>11</td>
<td>Cabinet heater (option G300)</td>
</tr>
<tr>
<td>6</td>
<td>Lead-throughs for brake resistor and control cables</td>
<td></td>
<td>-</td>
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</tbody>
</table>

18 Operation principle and hardware description
**Brake chopper module**

The components of the brake chopper module are shown below.

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DC input busbars</td>
</tr>
<tr>
<td>2</td>
<td>Handle</td>
</tr>
<tr>
<td>3</td>
<td>LEDs (see section <em>LEDs</em> on page 58). Fiber optic connectors (see section <em>Fiber optic connectors</em> on page 20)</td>
</tr>
<tr>
<td>4</td>
<td>Cooling fans</td>
</tr>
<tr>
<td>5</td>
<td>Quick connector (AC output) (the counterpart fastened to the cabinet behind the module)</td>
</tr>
<tr>
<td>6</td>
<td>Wheels</td>
</tr>
<tr>
<td>7</td>
<td>Type designation label</td>
</tr>
<tr>
<td>8</td>
<td>Terminal block X50 (power supply for internal boards and brake module direct-on-line fan (option +C188). See section <em>Connectors X50…X53</em> on page 20.</td>
</tr>
<tr>
<td>9</td>
<td>STO and power to BCU connectors (24 V DC) X51, X52, X53. See section <em>Connectors X50…X53</em> on page 20.</td>
</tr>
<tr>
<td>10</td>
<td>Unpainted fastening hole. The grounding point (PE) between module frame and cabinet frame.</td>
</tr>
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</table>
Connectors X50…X53

**Connector X50**

<table>
<thead>
<tr>
<th>#</th>
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</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Not in use.</td>
</tr>
<tr>
<td>7</td>
<td>L</td>
</tr>
<tr>
<td>6</td>
<td>Not in use.</td>
</tr>
<tr>
<td>5</td>
<td>N 115/230 V AC input for internal power supply (BDPS)</td>
</tr>
<tr>
<td>4</td>
<td>L</td>
</tr>
<tr>
<td>3</td>
<td>W</td>
</tr>
<tr>
<td>2</td>
<td>V Direct-on-line fan supply (option +C188)</td>
</tr>
<tr>
<td>1</td>
<td>U</td>
</tr>
</tbody>
</table>

**Connectors X51, X52, X53**

<table>
<thead>
<tr>
<th>#</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>X51</td>
<td>STO OUT</td>
<td>Not in use</td>
</tr>
<tr>
<td>X52</td>
<td>STO IN</td>
<td>STO connectors of the module. Must be connected to 24 V DC for the brake chopper module to start.</td>
</tr>
<tr>
<td>X53</td>
<td>24V OUT</td>
<td>24 V DC for BCU and for STO IN to enable brake chopper module operation.</td>
</tr>
</tbody>
</table>

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

**Fiber optic connectors**

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSFC</td>
<td>Charging controller connection with option +F286.</td>
</tr>
<tr>
<td>BFPS</td>
<td>Fan control connection (to fan control box).</td>
</tr>
<tr>
<td>BCU</td>
<td>Control unit connection.</td>
</tr>
</tbody>
</table>

**Cooling fans**

The cooling fan unit at the base of the brake chopper module contains two DC fans. The fans are PWM-controlled according to an internal temperature measurement. Direct-on-line fan is optionally available, to be powered from the auxiliary voltage supply. The fan carriage can be easily removed for fan replacement, or to allow access to the output cable connections at the back of the cubicle.
The brake chopper module also has a small fan ventilating the circuit board compartment inside the module. The fan can be serviced without removing the brake chopper module from the cabinet.

**Overview of power and control connections**

The diagram below shows the power and control connections of the brake unit.

**Brake unit control devices**

Brake units employ a separate control unit (BCU) that contains the BCON board with basic I/Os and slots for optional I/O modules. A fiber optic link connects the BCU to each brake chopper module. The diagram below shows the control connections and interfaces of the brake unit.
<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>No.</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>
<td>7</td>
<td>Control panel or PC</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>8</td>
<td>Fiber optic links to brake chopper modules</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>9</td>
<td>Ethernet interface</td>
</tr>
<tr>
<td>4</td>
<td>Memory unit</td>
<td>5</td>
<td>Slot 4 for RDCO-0x DDCS communication option</td>
</tr>
<tr>
<td>5</td>
<td>Terminal blocks. See the chapter <em>The brake control unit</em> on page 39.</td>
<td>6</td>
<td>Safety option interface (for FSO-xx safety functions module). Not in use for the brake unit.</td>
</tr>
</tbody>
</table>
The ACS-AP-I control panel

The ACS-AP-I is the user interface of the brake unit, providing the essential controls such as Reset, and the parameter settings for the control program. The control panel is mounted on a platform on the brake cubicle door.

For details on the control panel, see ACS-AP-x Assistant control panels user’s manual (3AUA0000085685 [English]).

Control by PC tools

There is a USB connector on the front of the panel that can be used to connect a PC to the drive. For details, see page 41.

Fieldbus control

The brake unit can be controlled through a fieldbus interface if the unit is equipped with an optional fieldbus adapter, and when the control program has been configured for fieldbus control by parameters. For information on the parameters, see the brake control program firmware manual.

Other control devices

DC switch/disconnector (option +F286)

The brake unit can optionally be equipped with DC switch/disconnectors which allow the isolation of the brake modules from the DC bus. When a brake module is reconnected to the DC bus, its DC capacitors are automatically charged through a charging circuit.

The status of the DC switch/disconnector is connected to the DIIL input on the brake control unit. By default, the run enable signal is removed when the DC switch/disconnector is open.

WARNING! Do not open the DC switch/disconnector under load.

Charging switch

The brake modules equipped with a DC switch/disconnector have a DC link precharging circuit including an xSFC-02 charging control unit and a charging switch on the cubicle door. Before closing the DC switch/disconnector, the user closes the charging switch handle (Q10). After the precharging completes, a green light on the cabinet door illuminates, and the DC switch/disconnector (Q11) can now be closed, and the charging switch opened.

Note: The charging switch must be opened before the brake unit can be started.

Type designation labels

Each brake unit and brake chopper module is equipped with type designation labels.
## Brake unit type designation label

An example label of the brake unit is shown below.

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Type designation, see section <em>Brake unit type designation key</em> on page 23.</td>
</tr>
<tr>
<td>2</td>
<td>Manufacturer's address</td>
</tr>
<tr>
<td>3</td>
<td>Frame size</td>
</tr>
<tr>
<td>4</td>
<td>Cooling method</td>
</tr>
<tr>
<td>5</td>
<td>Degree of protection</td>
</tr>
<tr>
<td>6</td>
<td>Maximum input voltage (UL/CSA), see section <em>Input and output voltages</em> on page 68.</td>
</tr>
<tr>
<td>7</td>
<td>Ratings, see section <em>Ratings</em> on page 65 and section <em>Input and output voltages</em> on page 68.</td>
</tr>
<tr>
<td>8</td>
<td>Valid markings</td>
</tr>
<tr>
<td>9</td>
<td>Serial number</td>
</tr>
</tbody>
</table>

- 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 or modules with the same number.
### Brake chopper module type designation labels

Example labels are shown below.

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Type designation, see section <a href="#">Brake unit type designation key</a> on page 23.</td>
</tr>
<tr>
<td>2</td>
<td>Manufacturer’s address</td>
</tr>
<tr>
<td>3</td>
<td>Frame size</td>
</tr>
<tr>
<td>4</td>
<td>Cooling method</td>
</tr>
<tr>
<td>5</td>
<td>Degree of protection and enclosure type</td>
</tr>
<tr>
<td>6</td>
<td>Maximum input voltage (UL/CSA), see section <a href="#">Input and output voltages</a> on page 68.</td>
</tr>
<tr>
<td>7</td>
<td>Ratings, see section <a href="#">Ratings</a> on page 65 and section <a href="#">Input and output voltages</a> on page 68.</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>
<tr>
<td>9</td>
<td>Valid markings. See <a href="#">Electrical planning instructions for ACS880 multidrive cabinets and modules</a> (3AUA0000102324 [English]).</td>
</tr>
</tbody>
</table>
Brake unit type designation key

The main selections are described below for reference.

<table>
<thead>
<tr>
<th>CODE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Basic codes</strong></td>
<td></td>
</tr>
<tr>
<td>ACS880</td>
<td>Product series</td>
</tr>
<tr>
<td>607</td>
<td>Brake unit: Supply frequency 50 Hz, control (auxiliary) voltage 230 V AC, IEC industrial cabinet construction, degree of protection IP22 (UL Type 1), cabling through bottom of cabinet, speed-controlled module cooling fans, European-style motor cable entries, aluminum DC busbars (up to 3200 A), tin-plated copper DC busbars (from 3200 A up), DC fuses, ACS880 brake control program, coated circuit boards, USB memory stick containing complete documentation in English.</td>
</tr>
<tr>
<td><strong>Size</strong></td>
<td></td>
</tr>
<tr>
<td>xxxx</td>
<td>Refer to the rating tables, page 65.</td>
</tr>
<tr>
<td><strong>Voltage range</strong></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>513…566 V DC. This is indicated in the type designation label as typical input voltage level 566 V DC.</td>
</tr>
<tr>
<td>5</td>
<td>513…707 V DC. This is indicated in the type designation label as typical input voltage levels 566 / 679 / 707 V DC.</td>
</tr>
<tr>
<td>7</td>
<td>709…976 V DC. This is indicated in the type designation label as typical input voltage levels 742 / 849 / 976 (849 UL, CSA) V DC.</td>
</tr>
<tr>
<td><strong>Option codes (plus codes)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Supply frequency</strong></td>
<td></td>
</tr>
<tr>
<td>A013</td>
<td>60 Hz</td>
</tr>
<tr>
<td><strong>Degree of protection</strong></td>
<td></td>
</tr>
<tr>
<td>B054</td>
<td>IP42 (UL Type 1)</td>
</tr>
<tr>
<td>B055</td>
<td>IP54 (UL Type 12)</td>
</tr>
<tr>
<td><strong>Construction</strong></td>
<td></td>
</tr>
<tr>
<td>C121</td>
<td>Marine construction</td>
</tr>
<tr>
<td>C128</td>
<td>Cooling air through bottom</td>
</tr>
<tr>
<td>C129</td>
<td>UL approved</td>
</tr>
<tr>
<td>C130</td>
<td>Channeled air outlet</td>
</tr>
<tr>
<td>C134</td>
<td>CSA approved</td>
</tr>
<tr>
<td>C164</td>
<td>Plinth height 100 mm</td>
</tr>
<tr>
<td>C179</td>
<td>Plinth height 200 mm</td>
</tr>
<tr>
<td>C180</td>
<td>Seismic design</td>
</tr>
<tr>
<td>C188</td>
<td>Direct-on-line cooling fan</td>
</tr>
<tr>
<td><strong>Resistor braking</strong></td>
<td></td>
</tr>
<tr>
<td>D150</td>
<td>Brake choppers</td>
</tr>
<tr>
<td><strong>Filters</strong></td>
<td></td>
</tr>
<tr>
<td>E210</td>
<td>EMC filter for second environment TN and IT (grounded and ungrounded) systems, category C3.</td>
</tr>
<tr>
<td><strong>Switchgear</strong></td>
<td></td>
</tr>
<tr>
<td>F286</td>
<td>DC switch/disconnector</td>
</tr>
<tr>
<td><strong>Heaters lights and auxiliary control voltage</strong></td>
<td></td>
</tr>
<tr>
<td>G300</td>
<td>Cabinet heater (external supply)</td>
</tr>
<tr>
<td>G301</td>
<td>Cabinet lighting</td>
</tr>
<tr>
<td>G304</td>
<td>115 V control voltage for relays</td>
</tr>
<tr>
<td><strong>Materials</strong></td>
<td></td>
</tr>
<tr>
<td>G315</td>
<td>DC bus material tin plated copper</td>
</tr>
<tr>
<td>G330</td>
<td>Halogen-free wiring and materials.</td>
</tr>
<tr>
<td><strong>Cabling</strong></td>
<td></td>
</tr>
<tr>
<td>H353</td>
<td>Brake resistor cables through the roof of the cabinet</td>
</tr>
<tr>
<td>H358</td>
<td>Blind 3 mm steel cable gland plates</td>
</tr>
<tr>
<td>H364</td>
<td>Blind 3 mm aluminum cable gland plates</td>
</tr>
<tr>
<td>H365</td>
<td>Blind 6 mm brass cable gland plates</td>
</tr>
</tbody>
</table>
### Control panel and PC options
- **H368** Control cables through the roof of the cabinet
- **J400** Control panel ACS-AP-I (max. 4 per door)
- **J401** Drive monitoring display
- **J410** Control panel mounting platform (max. 4 per door)
- **J412** Common control panel

### I/O extension and feedback interface modules
- **L500** FIO-11 analog I/O extension module
- **L501** FIO-01 digital I/O extension module
- **L509** RDCO-04 DDCS communication module
- **L525** FAIO-01 analog I/O extension module
- **L526** FDIO-01 digital I/O extension module
- **Z2016** Ring topology for fiber optic link without NDCU-95 DDCS branching unit

### Fieldbus adapter modules
- **K450** Panel bus selected
- **K451** FDNA-01 DeviceNet™ adapter module
- **K452** FLON-01 LonWorks® adapter module
- **K454** FPBA-01 PROFIBUS DP adapter module
- **K457** FCAN-01 CANopen adapter module
- **K458** FSCA-01 Modbus/RTU adapter module
- **K462** FCNA-01 ControlNet™ adapter module
- **K469** FECA-01 EtherCAT adapter module
- **K470** FEPL-01 Ethernet POWERLINK adapter module
- **K473** FENA-11 Ethernet/IP™, Modbus/TCP and PROFINET adapter module
- **K475** FENA-21 high performance Ethernet/IP™, Modbus/TCP and PROFINET adapter module
- **K480** Ethernet switch with optical link for PC tool and control network

### Documentation
**Note:** English-language manuals may be included if a translation in the specified language is not available.
- **R701** German
- **R702** Italian
- **R705** Swedish
- **R706** Finnish
- **R707** French
- **R708** Spanish
- **R711** Russian
- **R716** Hard copies of documentation

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**CODE** | **DESCRIPTION**
---|---
H368 | Control cables through the roof of the cabinet
J400 | Control panel ACS-AP-I (max. 4 per door)
J401 | Drive monitoring display
J410 | Control panel mounting platform (max. 4 per door)
J412 | Common control panel
L500 | FIO-11 analog I/O extension module
L501 | FIO-01 digital I/O extension module
L509 | RDCO-04 DDCS communication module
L525 | FAIO-01 analog I/O extension module
L526 | FDIO-01 digital I/O extension module
Z2016 | Ring topology for fiber optic link without NDCU-95 DDCS branching unit
K450 | Panel bus selected
K451 | FDNA-01 DeviceNet™ adapter module
K452 | FLON-01 LonWorks® adapter module
K454 | FPBA-01 PROFIBUS DP adapter module
K457 | FCAN-01 CANopen adapter module
K458 | FSCA-01 Modbus/RTU adapter module
K462 | FCNA-01 ControlNet™ adapter module
K469 | FECA-01 EtherCAT adapter module
K470 | FEPL-01 Ethernet POWERLINK adapter module
K473 | FENA-11 Ethernet/IP™, Modbus/TCP and PROFINET adapter module
K475 | FENA-21 high performance Ethernet/IP™, Modbus/TCP and PROFINET adapter module
K480 | Ethernet switch with optical link for PC tool and control network
R701 | German
R702 | Italian
R705 | Swedish
R706 | Finnish
R707 | French
R708 | Spanish
R711 | Russian
R716 | Hard copies of documentation

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**Note:** English-language manuals may be included if a translation in the specified language is not available.
Operation principle and hardware description
Mechanical installation

Contents of this chapter
This chapter the mechanical installation of the brake units.

Brake units
The ACS880 multidrive - the brake unit as one part of the complete drive - is transported in shipping splits. For the mechanical installation of the shipping splits, see Mechanical installation instructions for ACS880 multidrive cabinets (3AUA0000101764 [English]).

Brake resistors
Obey the brake resistor manufacturer’s instructions.
30 Mechanical installation
Guidelines for planning the electrical installation

Contents of this chapter
This chapter contains instructions on selecting, placing and protecting the brake circuit components and cables.

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.

Generic guidelines
See Electrical planning instructions for ACS880 multidrive cabinets and modules (3AUA0000102324 [English]) for the generic guidelines for planning the electrical installation (selecting cables, routing cables, etc.) of the air-cooled multidrive cabinets.
Selecting the brake resistors

The brake unit must be equipped with a brake resistor by the user.

**WARNING!** ABB is not responsible for customer resistor selection or protection of the resistor.

Select the resistor according to the resistor specification given in chapter *Technical data*. In addition, consider the following:

- Each chopper must feed a resistor or resistor assembly of its own.
- The resistance \( R \) of the brake resistor assembly must be equal to or above the value specified. Never use resistance values below the specified value.
- The resistor must withstand the specified brake cycles.
- The ventilation of the space/room in which the resistors are located must meet the air flow amounts specified.
- The resistor assembly must be equipped with a thermal switch. See also section *Protecting the system against thermal overload* on page 34.

**WARNING!** Before you connect the resistor thermal switch to the chopper control unit, make sure that the isolation level and protection of the switch are sufficient. The switch is at the intermediate circuit potential. This voltage is extremely dangerous. The normally closed switch/contact should always be properly isolated (test voltage over 2.5 kV) and shrouded against contact. The same requirements are valid for the connection cable.

### Selecting and routing the brake resistor cables

#### Typical resistor cable sizes

This table gives copper cable types. Cable sizing is based on max. 9 cables laid on a cable ladder side by side, three ladder type trays one on top of the other, ambient temperature 30 °C, PVC insulation, surface temperature 70 °C and 90 °C (EN 60204-1 and IEC 60364-5-2/2001). For other conditions, size the cables according to local safety regulations, appropriate input voltage and the load current of the drive. \( I_{\text{rms dim}} \) is the dimensioning current.

<table>
<thead>
<tr>
<th>Brake unit type</th>
<th>Frame size</th>
<th>( I_{\text{rms dim}} )</th>
<th>Cable data</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Cable, T=70 °C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A</td>
<td>mm²</td>
</tr>
<tr>
<td>( U_N = 400 \text{ V} )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACS880-607-0500-3</td>
<td>R8i</td>
<td>372</td>
<td>3×(2×(3×120+70))</td>
</tr>
<tr>
<td>ACS880-607-0750-3</td>
<td>R8i</td>
<td>559</td>
<td>3×(2×(3×240+120))</td>
</tr>
<tr>
<td>ACS880-607-1000-3</td>
<td>2×R8i</td>
<td>745</td>
<td>2×(3×(2×(3×120+70)))</td>
</tr>
<tr>
<td>ACS880-607-1510-3</td>
<td>2×R8i</td>
<td>1117</td>
<td>2×(3×(2×(3×240+120)))</td>
</tr>
<tr>
<td>ACS880-607-2260-3</td>
<td>3×R8i</td>
<td>1676</td>
<td>3×(3×(2×(3×240+120)))</td>
</tr>
<tr>
<td>ACS880-607-3010-3</td>
<td>4×R8i</td>
<td>2234</td>
<td>4×(3×(2×(3×240+120)))</td>
</tr>
<tr>
<td>ACS880-607-3770-3</td>
<td>5×R8i</td>
<td>2793</td>
<td>5×(3×(2×(3×240+120)))</td>
</tr>
<tr>
<td>( U_N = 500 \text{ V} )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACS880-607-0630-5</td>
<td>R8i</td>
<td>372</td>
<td>3×(2×(3×120+70))</td>
</tr>
<tr>
<td>ACS880-607-0940-5</td>
<td>R8i</td>
<td>559</td>
<td>3×(2×(3×240+120))</td>
</tr>
<tr>
<td>ACS880-607-1260-5</td>
<td>2×R8i</td>
<td>745</td>
<td>2×(3×(2×(3×120+70)))</td>
</tr>
</tbody>
</table>
Minimizing electromagnetic interference

Obey these rules in order to minimize the electromagnetic interference caused by rapid current changes in the resistor cables:

- Shield the braking power line completely, either by using shielded cable or a metallic enclosure. Unshielded single-core cable can only be used if it is routed inside a cabinet that efficiently suppresses radiated emissions.
- Install the cables away from other cable routes.
- Avoid long parallel runs with other cables. The minimum parallel cabling separation distance should be 0.3 meters.
- Cross the other cables at right angles.  
- Keep the cable as short as possible in order to minimize the radiated emissions and stress on chopper IGBTs. The longer the cable, the higher the radiated emissions, inductive load and voltage peaks over the IGBT semiconductors of the brake chopper.

Maximum cable length

The maximum cable length of the resistor cable(s) is 300 m (984 ft). However, keep the cable as short as possible in order to minimize the EMC emissions and stress on chopper IGBTs. The longer the cable, the higher the EMC emissions. The longer the cable the higher the inductive load and voltage peaks over the IGBT semiconductors of the brake chopper.

EMC compliance of the complete installation

Note: ABB has not verified that the EMC requirements are fulfilled with external user-defined brake resistors and cabling. The EMC compliance of the complete installation must be considered by the customer.

Placing the brake resistors

Install the resistors outside the drive in a place where they will cool.

Arrange the cooling of the resistor in a way that:
- no danger of overheating is caused to the resistor or nearby materials
- the temperature of the room the resistor is located in does not exceed the allowed maximum.
Supply the resistor with cooling air/water according to the resistor manufacturer’s instructions.

**WARNING!** The materials near the brake resistor must be non-flammable. The surface temperature of the resistor is high. Air flowing from the resistor is of hundreds of degrees Celsius. If the exhaust vents are connected to a ventilation system, make sure that the material withstands high temperatures. Protect the resistor against contact.

---

### Selecting the chopper input cable from thermal switch

Make sure that the cable connecting the resistor thermal switch to chopper control unit meets the following requirements:

- shielded cable
- rated operating voltage $0.6 \text{kV} / 1 \text{kV} (U_0/U)$
- insulation test voltage > 2.5 kV
- jacket material for at least 90 °C (194 °F). Take into account further requirements due to resistor construction and temperature.

---

### Protecting the system against thermal overload

The brake control program includes a resistor and resistor cable thermal protection function, which can be tuned by the user. The brake chopper protects itself and the resistor cables against thermal overload. Make sure that the following conditions are met:

- the resistor assembly is equipped with a thermal switch, which is connected to chopper control unit input (see page 38)
- the cables are dimensioned according to the nominal current of the drive.

#### Operation principle

If the resistor overheats, the thermal switch opens and interrupts the chopper control unit input signal. Upon a fault, the control unit relay output either opens the drive main circuit breaker or gives a fault indication to the overriding control system, which takes care of the protection.

For more information on the thermal protection function, see the appropriate firmware manual.

---

### Protecting the resistor cable against short-circuits

The brake unit is equipped with DC fuses as standard. The fuses protect the chopper and the brake circuit cables in a cable short-circuit situation.
Electrical installation

Contents of this chapter
This chapter contains instructions on wiring the brake units.
For more information on cable selection, protections, etc., see Electrical planning instructions for ACS880 multidrive cabinets and modules (3AUA0000102324 [English]).

WARNING! Only qualified electricians are allowed to carry out the work described in this chapter. Read the safety instructions given in Safety instructions for ACS880 multidrive cabinets and modules (3AUA0000102301 [English]) before you install, commission, use or service the drive.

The tightening torques for the electrical connections are listed in chapter Tightening torques on page 74.
Electrical safety precautions

WARNING! Obey these instructions. If you ignore them, injury or death, or damage to the equipment can occur. If you are not a qualified electrician, 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.
2. Disconnect all possible voltage sources.
   - Open the main switch-disconnector or rack out the main breaker (Q1) of the drive (whichever is present). Note that some drives have two switch-disconnectors (Q1.1 and Q1.2).
   - Open the disconnector of the supply transformer as the main switch-disconnecting device of the drive does not remove the voltage from the input busbars of the drive or from the voltmeter (option +G334).
   - 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 (L1, L2, L3) and the grounding (PE) busbar is close to 0 V.
   - Make sure that the voltage between the drive DC busbars (+ and -) and the grounding (PE) busbar is close to 0 V.
6. Install temporary grounding as required by the local regulations. Close the grounding switch (option +F259, Q9), if present.
7. Ask for a permit to work from the person in control of the electrical installation work.

General notes

Static electricity

WARNING! Circuit boards contain components sensitive to electrostatic discharge (ESD). Wear a grounding wrist band when handling the boards. Do not touch the boards unnecessarily.
Optical components

Handle fiber optic cables with care. When unplugging optic cables, always grab the connector, not the cable itself. Do not touch the ends of the fibers with bare hands as the fiber is extremely sensitive to dirt. The specifications of the optic cable are as follows:

- Storage temperature: -55 ... +85 °C
- Installation temperature: -20 ... +70 °C
- Maximum short-term tensile force: 50 N
- Minimum short-term bend radius: 25 mm
- Minimum long-term bend radius: 35 mm
- Maximum long-term tensile load: 1 N
- Flexing: Max. 1000 cycles

ABB drive products in general utilize 5 and 10 MBd (megabaud) optical components from Avago Technologies’ Versatile Link range. Please 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 respectively.

*HCS® is a trademark of SpecTran Corporation.*

Checking the insulation of the resistor circuit

Do not make any voltage tolerance or insulation resistance tests on the brake chopper modules. Every brake chopper module has been tested for insulation between the main circuit and the chassis at the factory.

Check the insulation of the brake resistor assembly as follows:

1. Stop the drive and do the steps in section *Electrical safety precautions* on page 36 before you start the work.

2. Check that the resistor cable is connected to the resistor, and disconnected from the chopper output terminals R+ and R-.

3. At the brake unit end, connect the R+ and R- conductors of the resistor cable together. Measure the insulation resistance between the combined conductors and the PE conductor by using a measuring voltage of 1 kV DC. The insulation resistance must be higher than 1 Mohm.

![Diagram of resistor connection](image)
Connecting the resistor cables and thermal switch

Connection diagram

This diagram shows resistor cable connections and an example connection of the thermal switches.
Connection procedure of the resistor cables

**WARNING!** Repeat the steps described in section *Electrical safety precautions* on page 36. The complete safety instructions are given in *Safety instructions for ACS880 multidrive cabinets and modules* (3AUA0000102301 [English]). If you ignore them injury or death, or damage to the equipment can occur.

1. Open the door of the brake unit cubicle and remove the shrouding.
2. Lead the cables into the cubicle. Make the 360° earthing arrangement at the cable entry as shown.

![Diagram](image)

Grommet (IP54 units only)

3. Cut the cables to suitable length. Strip the cables and conductors.
4. Twist the cable shields into bundles and connect the bundles to the PE busbar in the cubicle.
5. Connect the resistor cables. Note the connection of the third conductor and the cable shield. See also the circuit diagrams delivered with the unit.
   **Note:** If you use parallel-connected resistors, connect them as shown below. The cable between the chopper and the first resistor must be able to carry the entire braking power.

![Diagram](image)

6. Go to section *Connection procedure of the thermal switch cable* on page 40.
Connection procedure of the thermal switch cable

1. Slacken the locking screws of the entry and open it wide. Thread the cables through the grommets below the cable entry, then into the cubicle between the cushions.

2. Run the cables to their eventual connection points using existing trunking wherever possible. Protect the cables against any sharp edges or hot surfaces.

3. Remove the outer jacket at the entry so that the cushions can press on the bare shield.

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

4. Push the cushions firmly together so that they press on the exposed cable shields. Tighten the locking screws.

5. Strip the ends of the conductors. Try to keep the unshielded portion of the conductors as short as possible. Use tape or shrink tubing to contain any stray strands. Connect the conductors to the appropriate terminals (see the connection diagram on page 38 and the circuit diagrams delivered with the drive system). Twist the shields
into a bundle, crimp a ring terminal onto it and connect it to the nearest chassis grounding point.

6. Refit any shrouds removed earlier.

7. At the other end of the cables, leave the shields unconnected or ground them via a capacitor (eg. 3.3 nF / 630 V).

**WARNING!** As the inputs brake control unit are not insulated according to IEC 60664, the connection of the temperature sensor requires double or reinforced insulation between resistor live parts and the sensor. If the assembly does not fulfill the requirement, the I/O board terminals must be protected against contact and must not be connected to other equipment or the temperature sensor must be isolated from the I/O terminals.

### Connecting a PC to the brake unit

A PC (with eg. the Drive composer PC tool) can be connected to the brake unit as follows:

1. Connect an ACS-AP-I control panel to the brake control unit either by using an Ethernet (eg. CAT5E) networking cable, or by inserting the panel into the panel holder (if present).

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

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 displays an indication whenever the connection is active.

**Note 1:** When a PC is connected to the control panel, the control panel keypad is disabled. In this case, the control panel acts as a USB-RS485 adapter.
The brake control unit

Contents of this chapter

This chapter

• describes the connections of the brake control unit used in ACS880 multidrives
• contains the specifications of the inputs and outputs of the brake control unit.

General

The drive utilizes BCU control units. The control unit consists of a BCON control board (and a BIOC-01 I/O connector board and power supply board) built in a metal housing.

The supply, inverter and brake units are each controlled by a dedicated BCU control unit. See the layout drawings in section Layout drawings on page 16 for the location of the brake control unit.

In this manual, the name “BCU-x2” represents the control unit types BCU-02 and BCU-12 and BCU-22. These have a different number of power module connections but are otherwise similar.
Control unit layout and connections

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>I/O I/O terminals (see following diagram)</td>
</tr>
<tr>
<td>SLOT 1 I/O extension or fieldbus adapter module connection. (This is the sole location for an FDP-02 diagnostics and panel interface.)</td>
</tr>
<tr>
<td>SLOT 2 I/O extension or fieldbus adapter module connection</td>
</tr>
<tr>
<td>SLOT 3 I/O extension or fieldbus adapter 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 (CR 2032)</td>
</tr>
<tr>
<td>A11 Mode selector for analog input A11 (I = current, U = voltage)</td>
</tr>
<tr>
<td>A12 Mode selector for analog input A12 (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).</td>
</tr>
</tbody>
</table>

7-segment display
Multicharacter indications are displayed as repeated sequences of characters

- ("U" is indicated briefly before "o".) Control program startup in progress
- (Flashing) Firmware cannot be started. Memory unit missing or corrupted
- Firmware download from PC to control unit in progress
- At power-up, the display may show short indications of eg. "1", "2", "b" or "U". These are normal indications immediately after power-up. If the display ends up showing any other value than those described, it indicates a hardware failure.
<table>
<thead>
<tr>
<th>Description</th>
<th></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>Not in use</td>
</tr>
<tr>
<td>XD24</td>
<td>+24 V output (for digital inputs)</td>
</tr>
<tr>
<td>XETH</td>
<td>Ethernet port (eg. for PC communication)</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>Not in use</td>
</tr>
<tr>
<td>XSTO OUT</td>
<td>Not in use</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 brake modules 1 and 2 (VxT = transmitter, VxR = receiver)</td>
</tr>
<tr>
<td>V3T/V3R, V4T/V4R</td>
<td>Fiber optic connection to brake modules 3…7 (BCU-12/22 only) (VxT = transmitter, VxR = receiver)</td>
</tr>
<tr>
<td>V7T/V7R, V8T/V8R</td>
<td>Fiber optic connection to brake modules 8…12 (BCU-22 only) (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 brake 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 connection diagram**

<table>
<thead>
<tr>
<th>XD2D</th>
<th>Drive-to-drive link</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>B</td>
</tr>
<tr>
<td>2</td>
<td>A</td>
</tr>
<tr>
<td>3</td>
<td>BOND</td>
</tr>
<tr>
<td>4</td>
<td>Shield</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>X485</th>
<th>RS485 connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>B</td>
</tr>
<tr>
<td>6</td>
<td>A</td>
</tr>
<tr>
<td>7</td>
<td>BOND</td>
</tr>
<tr>
<td>8</td>
<td>Shield</td>
</tr>
</tbody>
</table>

**XRO1...XRO3 Relay outputs**

| 11 | NC | XRO1: Running \(^\d\) (energized = running) |
| 12 | COM| 250 V AC / 30 V DC / 2 A                     |
| 21 | NC | XRO2: Fault (-) \(^\d\) (energized = no fault) |
| 22 | COM| 250 V AC / 30 V DC / 2 A                     |
| 31 | NC | XRO3: Running \(^\d\) (energized = running)   |
| 32 | COM| 250 V AC / 30 V DC / 2 A                     |

**XSTO XSTO connector**

| 1   | OUT | XSTO connector. Both circuits (power module, control unit) must be closed for the brake unit to start. (IN1 and IN2 must be connected to OUT.) \(^\d\) |
| 2   | SGND|                                              |
| 3   | IN1 |
| 4   | IN2 |
| 5   | IN1 |
| 6   | SGND|

**XDI Digital inputs**

| 1   | DI1 | Temp fault \(^\d\) (0 = overtemperature) |
| 2   | DI2 | Not in use by default                     |
| 3   | DI3 | Not in use by default                     |
| 4   | DI4 | Not in use by default                     |
| 5   | DI5 | Not in use by default                     |
| 6   | DI6 | Reset \(^\d\) (0 \(\rightarrow\) 1 = fault reset) |
| 7   | DIIL| Not in use by default                     |

**XDO Digital input/output**

| 1   | DIO1| Not in use by default                     |
| 2   | DIO2| Not in use by default                     |
| 3   | DIOGND| Digital input/output ground              |
| 4   | DIOGND| Digital input/output ground              |

**XD24 Auxiliary voltage output**

| 5   | +24VD| +24 V DC 200 mA \(^\d\)                     |
| 6   | DICOM| Digital input ground                     |
| 7   | +24VD| +24 V DC 200 mA \(^\d\)                     |
| 8   | DIOGND| Digital input/output ground              |

**DICOM=DIOGND Ground selection switch \(^\d\)**

**XAI Analog inputs, reference voltage output**

| 1   | +VREF| 10 V DC, \(R\_L \geq 10\) kohm             |
| 2   | -VREF| -10 V DC, \(R\_L \geq 10\) kohm            |
| 4   | AGND | Ground                                     |
| 5   | AI1+ | Not in use by default.                     |
| 6   | AI1- | 0(4)…20 mA, \(R\_L = 100\) ohm \(^\d\)     |
| 7   | AI2+ | Not in use by default.                     |
| 8   | AI2- | 0(2)…10 V, \(R\_L > 200\) kohm \(^\d\)     |

**XAO Analog outputs**

| 1   | AO1 | Zero \(^\d\) 0…20 mA, \(R\_L < 500\) ohm   |
| 2   | AGND|                                             |
| 3   | AO2 | Zero \(^\d\) 0…20 mA, \(R\_L < 500\) ohm   |
| 4   | AGND|                                             |

**XPOW External power input**

| 1   | +24VI| 24 V DC, 2.05 A                             |
| 2   | GND  |                                             |
| 3   | +24VI|                                             |

**X12 Safety functions module connection**

**X13 Control panel connection**

**X205 Memory unit connection**
Wire sizes and tightening torques: 0.5 … 2.5 mm² (24…12 AWG) and 0.5 N·m (5 lbf·in) for both stranded and solid wiring.

There are additional fiber optics connections from the BCU control unit to R8i modules.

Notes:
1) Default use of the signal in the control program. The use can be changed by a parameter. For the delivery-specific use, see the delivery-specific circuit diagrams.
2) Current [0(4)…20 mA, \( R_{in} = 100 \text{ ohm} \)] or voltage [0(2)…10 V, \( R_{in} > 200 \text{ kohm} \)] input selected by switch AI1. Change of setting requires reboot of control unit.
3) Current [0(4)…20 mA, \( R_{in} = 100 \text{ ohm} \)] or voltage [0(2)…10 V, \( R_{in} > 200 \text{ kohm} \)] input selected by switch AI2. Change of setting requires reboot of control unit.
4) Total load capacity of these outputs is 4.8 W (200 mA at 24 V) minus the power taken by DIO1 and DIO2.
5) Determines whether DICOM is separated from DIOGND (ie. common reference for digital inputs floats). DICOM = DIOGND. ON: DICOM connected to DIOGND. OFF: DICOM and DIOGND separate.
6) This input only acts as a true Safe torque off input in control units controlling a motor. 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.

Control unit connector data

<table>
<thead>
<tr>
<th>Power supply (XPOW)</th>
<th>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.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relay outputs RO1…RO3 (XRO1…XRO3)</td>
<td>Connector pitch 5 mm, wire size 2.5 mm² 250 V AC / 30 V DC, 2 A Protected by varistors</td>
</tr>
<tr>
<td>+24 V output (XD24:2 and XD24:4)</td>
<td>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.</td>
</tr>
<tr>
<td>Digital inputs DI1…DI6 (XDI:1…XDI:6)</td>
<td>Connector pitch 5 mm, wire size 2.5 mm² 24 V logic levels: &quot;0&quot; &lt; 5 V, &quot;1&quot; &gt; 15 V ( R_{in} = 2.0 \text{ kohm} ) Input type: NPN/PNP (DI1…DI5), NPN (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. &quot;0&quot; &gt; 4 kohm, &quot;1&quot; &lt; 1.5 kohm ( I_{max} = 15 \text{ mA} ) (DI1…DI5), 5 mA (DI6)</td>
</tr>
<tr>
<td>Start interlock input DIIL (XDI:7)</td>
<td>Connector pitch 5 mm, wire size 2.5 mm² 24 V logic levels: &quot;0&quot; &lt; 5 V, &quot;1&quot; &gt; 15 V ( R_{in} = 2.0 \text{ kohm} ) Input type: NPN/PNP Hardware filtering: 0.04 ms, digital filtering up to 8 ms</td>
</tr>
</tbody>
</table>
Digital inputs/outputs DIO1 and DIO2 (XDIO:1 and XDIO:2)
Input/output mode selection by parameters. See the firmware manual, parameter group 111.

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

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
Inaccuracy: 1% of full scale range

Analog outputs AO1 and AO2 (XAO)

Connector pitch 5 mm, wire size 2.5 mm²

0...20 mA, $R_{load}$ < 500 ohm
Frequency range: 0...500 Hz
Resolution: 11 bit + sign bit
Inaccuracy: 2% of full scale range

Drive-to-drive link (XD2D)

Connector pitch 5 mm, wire size 2.5 mm²
Physical layer: RS-485
Termination by switch

RS-485 connection (X485)

Connector pitch 5 mm, wire size 2.5 mm²
Physical layer: RS-485

Safe torque off connection (XSTO)

Connector pitch 5 mm, wire size 2.5 mm²
Input voltage range: -3...30 V DC
Logic levels: “0” < 5 V, “1” > 17 V
For the unit to start, both connections must be “1”
Current consumption: 55 mA (continuous)
EMC (immunity) according to IEC 61326-3-1

Safe torque off output (XSTO OUT)

Not in use

Control panel connection (X13)

Connector: RJ-45
Cable length < 3 m

Ethernet connection (XETH)

Connector: RJ-45

SDHC memory card slot (SD CARD)

Memory card type: SDHC
Maximum memory size: 4 GB

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

*Ground selector (DICOM=DIOGND) settings

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

Contents of this chapter
This chapter contains a list for checking the mechanical and electrical installation of the brake units.

Warnings

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

Checklist
Go through the checklist together with another person..

<table>
<thead>
<tr>
<th>Check that …</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>The ambient operating conditions meet the specifications given</td>
<td>✔</td>
</tr>
<tr>
<td>in the drive hardware manual.</td>
<td></td>
</tr>
<tr>
<td>The brake unit cabinet has been attached to floor, and if</td>
<td></td>
</tr>
<tr>
<td>necessary due to vibration etc, also from top to the wall or</td>
<td></td>
</tr>
<tr>
<td>roof.</td>
<td></td>
</tr>
<tr>
<td>The cooling air will flow freely in and out of the brake unit</td>
<td></td>
</tr>
<tr>
<td>cabinet, and air recirculation inside the cabinet will not be</td>
<td></td>
</tr>
<tr>
<td>possible (air baffle plates are in place).</td>
<td></td>
</tr>
<tr>
<td>The resistor cable has been connected to the correct terminals,</td>
<td></td>
</tr>
<tr>
<td>and the terminals have been tightened. (Pull the conductors to</td>
<td></td>
</tr>
<tr>
<td>check.)</td>
<td></td>
</tr>
<tr>
<td>The brake resistor cable has been routed away from other cables.</td>
<td></td>
</tr>
<tr>
<td>Check that …</td>
<td></td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
<td>---</td>
</tr>
<tr>
<td>The control cables have been connected to the correct terminals, and the terminals have been tightened. (Pull the conductors to check.)</td>
<td>☑</td>
</tr>
<tr>
<td>There are no tools, foreign objects or dust from drilling inside the brake unit cabinet.</td>
<td>☐</td>
</tr>
<tr>
<td>All shrouds and the front panel of the brake chopper module are in place. Cabinet doors have been closed.</td>
<td>☐</td>
</tr>
</tbody>
</table>
Start-up

Contents of this chapter

This chapter contains the start-up procedure of the brake unit. The symbols in brackets, for example (Q1), refer to the item designations used in the circuit diagrams. If a task is valid only for a certain option device or feature, the option code is given in brackets, for example, (option +F286). These instructions do not cover all start-up tasks of all possible variants of the brake unit. Always refer to the delivery-specific circuit diagrams when proceeding with the start-up.

Start-up procedure

<table>
<thead>
<tr>
<th>Tasks</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety</td>
<td>✓</td>
</tr>
</tbody>
</table>

⚠ Only qualified electricians are allowed to carry out the work described in this chapter. Obey the safety instructions during the start-up procedure. See Safety instructions for ACS880 multidrive cabinets and modules (3AUA0000102301 [English]). If you ignore the safety instructions, injury or death, or damage to the equipment can occur.

Note: Some brake resistors are coated with oil film for protection. The protective oil will burn off when the brake resistor is used for the first time. Make sure that the airflow is sufficient.

<table>
<thead>
<tr>
<th>Installation checklist</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Check that the supply and inverter units have been installed according to the instructions given in their hardware manuals.</td>
<td>✓</td>
</tr>
<tr>
<td>Check that the mechanical and electrical installation of the brake unit has been inspected and is OK. See chapter Installation checklist.</td>
<td>✓</td>
</tr>
<tr>
<td>Check that the insulation of the resistor circuit has been measured and is OK. See section Checking the insulation of the resistor circuit on page 37.</td>
<td>✓</td>
</tr>
</tbody>
</table>
Supply and inverter units start-up

- Make sure that the supply unit of the drive system has been started up according to the instructions in its hardware manual.
- Make sure that the inverter units of the drive system have been started up according to the instructions in their hardware manual.
- Make sure that the supply unit is stopped, and the drive system has been isolated from the supply network.

Powering up the DC bus

- Make sure that all cabinet doors are closed.

**WARNING!** Before you close the main contactor / air circuit breaker (Q1), make sure that sufficient inverter power is connected to the intermediate DC bus. 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 can overshoot the overvoltage limit causing immediate start of the brake unit and continuous supply for it by the supply unit. Constant braking will overload brake choppers and resistors and cause overheating.

- Close the disconnector of the supply transformer.
- Close the auxiliary voltage switch (Q21) to power up the control unit of the unit.
- Start the supply unit. See the supply unit hardware manual for the start procedure. When started, the supply unit charges the capacitors of all inverters and brake units connected to the DC bus.

Brake units with DC switch/disconnector (option +F286): Connecting the brake unit to the DC bus

- To charge the brake unit capacitors, close the charging switch (Q10).
- When the green light on the cabinet door illuminates, close the DC switch/disconnector (Q11) of the brake unit.
- Open the charging switch (Q10).
Start-up 55

Setting up the brake unit parameters

Check the brake control program parameter settings. See chapter Start-up in ACS880 brake control program firmware manual (3AXD50000020967 [English]).

If your brake unit consists of more than one module, parameter 195.12 Parallel connection rating id needs to be set. Set parameter 195.12 according to the table below. For setting this parameter, you need a service level pass code. To obtain the pass code, contact your local ABB representative.

<table>
<thead>
<tr>
<th>ACS880-604</th>
<th>Frame</th>
<th>Parameter 195.12 selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACS880-604-0500-3</td>
<td>R8i</td>
<td>ACS880-60x-0500-3 (707)</td>
</tr>
<tr>
<td>ACS880-604-0750-3</td>
<td>R8i</td>
<td>ACS880-60x-0750-3 (710)</td>
</tr>
<tr>
<td>ACS880-604-1000-3</td>
<td>2×R8i</td>
<td>ACS880-60x-1000-3 (7072)</td>
</tr>
<tr>
<td>ACS880-604-1510-3</td>
<td>2×R8i</td>
<td>ACS880-60x-1510-3 (7102)</td>
</tr>
<tr>
<td>ACS880-604-2260-3</td>
<td>3×R8i</td>
<td>ACS880-60x-2260-3 (7103)</td>
</tr>
<tr>
<td>ACS880-604-3010-3</td>
<td>4×R8i</td>
<td>ACS880-60x-3010-3 (7104)</td>
</tr>
<tr>
<td>ACS880-604-3770-3</td>
<td>5×R8i</td>
<td>ACS880-60x-3770-3 (7105)</td>
</tr>
<tr>
<td>ACS880-604-0630-5</td>
<td>R8i</td>
<td>ACS880-60x-0630-5 (717)</td>
</tr>
<tr>
<td>ACS880-604-0940-5</td>
<td>R8i</td>
<td>ACS880-60x-0940-5 (720)</td>
</tr>
<tr>
<td>ACS880-604-1260-5</td>
<td>2×R8i</td>
<td>ACS880-60x-1260-5 (7172)</td>
</tr>
<tr>
<td>ACS880-604-1880-5</td>
<td>2×R8i</td>
<td>ACS880-60x-1880-5 (7202)</td>
</tr>
<tr>
<td>ACS880-604-2830-5</td>
<td>3×R8i</td>
<td>ACS880-60x-2830-5 (7203)</td>
</tr>
<tr>
<td>ACS880-604-3770-5</td>
<td>4×R8i</td>
<td>ACS880-60x-3770-5 (7204)</td>
</tr>
<tr>
<td>ACS880-604-4710-5</td>
<td>5×R8i</td>
<td>ACS880-60x-4710-5 (7205)</td>
</tr>
<tr>
<td>ACS880-604-0870-7</td>
<td>R8i</td>
<td>ACS880-60x-0870-7 (727)</td>
</tr>
<tr>
<td>ACS880-604-1300-7</td>
<td>R8i</td>
<td>ACS880-60x-1300-7 (730)</td>
</tr>
<tr>
<td>ACS880-604-1730-7</td>
<td>2×R8i</td>
<td>ACS880-60x-1730-7 (7272)</td>
</tr>
<tr>
<td>ACS880-604-2600-7</td>
<td>2×R8i</td>
<td>ACS880-60x-2600-7 (7302)</td>
</tr>
<tr>
<td>ACS880-604-3900-7</td>
<td>3×R8i</td>
<td>ACS880-60x-3900-7 (7303)</td>
</tr>
<tr>
<td>ACS880-604-5200-7</td>
<td>4×R8i</td>
<td>ACS880-60x-5200-7 (7304)</td>
</tr>
<tr>
<td>ACS880-604-6500-7</td>
<td>5×R8i</td>
<td>ACS880-60x-6500-7 (7305)</td>
</tr>
</tbody>
</table>

Operational tests

Test the operation of the braking. See chapter Start-up in ACS880 brake control program firmware manual (3AXD50000020967 [English]).
Start-up
Fault tracing

Contents of this chapter

This chapter describes the fault tracing possibilities and maintenance instructions of the brake units.

Fault indications

A fault in the resistor brake circuit prevents fast motor deceleration, and may cause the drive to trip on a fault.

If a fault is detected by the chopper control board, the brake chopper disconnects the brake resistor from the intermediate circuit, and the chopper fault indication relay output is de-energized.

Depending on the application, the relay output either opens the drive main circuit breaker or gives a fault indication to the overriding control system. See the circuit diagrams delivered with the unit.

<table>
<thead>
<tr>
<th>Fault indication/Fault</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fault indication relay output switches off the main power or gives a fault indication to an overriding control system.</td>
<td>Chopper or resistor overheated.</td>
<td>Check connections. Let equipment cool.</td>
</tr>
<tr>
<td></td>
<td>No enable input received by chopper control board.</td>
<td>Check that enable input is on.</td>
</tr>
<tr>
<td></td>
<td>Short circuit in resistor or power cables.</td>
<td>Check power cables and resistor.</td>
</tr>
<tr>
<td></td>
<td>Chopper control board failure. Chopper damaged; it is not able to disconnect resistor from intermediate circuit.</td>
<td>Contact local ABB representative.</td>
</tr>
</tbody>
</table>
### Fault tracing

<table>
<thead>
<tr>
<th>Fault indication/Fault</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chopper does not function.</td>
<td>Chopper voltage setting too high. Inverter overvoltage control is on.</td>
<td>Check voltage setting. Check parameters of all inverters. Check that enable input is on.</td>
</tr>
<tr>
<td>Chopper starts to function at too low a DC voltage.</td>
<td>Chopper voltage setting too low.</td>
<td>Check voltage setting.</td>
</tr>
<tr>
<td>Inverter trips on fault 3210 DC link overvoltage.</td>
<td>Chopper voltage setting is too high.</td>
<td>Check voltage setting. Check parameters of all inverters.</td>
</tr>
<tr>
<td>Brake resistor or chopper overheats.</td>
<td>The maximum brake cycle exceeded or resistor cooling insufficient.</td>
<td>Check duty cycle and resistor cooling.</td>
</tr>
<tr>
<td></td>
<td>Chopper voltage setting incorrect or jumper missing.</td>
<td>Make sure that voltage setting is correct and jumper is properly in place.</td>
</tr>
</tbody>
</table>

### LEDs

<table>
<thead>
<tr>
<th>Location</th>
<th>LED</th>
<th>Indication</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACS-AP-I control panel (status LED)</td>
<td>Continuous green</td>
<td>The brake unit is functioning normally.</td>
</tr>
<tr>
<td></td>
<td>Flickering green</td>
<td>Data is transferred between the PC tool and brake 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 brake unit.</td>
</tr>
<tr>
<td></td>
<td>Continuous red</td>
<td>There is an active fault in the brake unit.</td>
</tr>
<tr>
<td>Control panel mounting platform (with the control panel removed)</td>
<td>Red</td>
<td>There is an active fault in the brake unit.</td>
</tr>
<tr>
<td></td>
<td>Green</td>
<td>Power supply for the control board of the brake unit is ok.</td>
</tr>
<tr>
<td>Brake chopper module</td>
<td>FAULT (continuous red)</td>
<td>There is an active fault in the brake chopper module.</td>
</tr>
<tr>
<td></td>
<td>ENABLE / STO (continuous green)</td>
<td>The brake chopper module is ready for use.</td>
</tr>
<tr>
<td></td>
<td>ENABLE / STO (continuous yellow)</td>
<td>Safe torque off connectors are de-energized.</td>
</tr>
<tr>
<td></td>
<td>POWER OK (continuous green)</td>
<td>Supply voltage on the board is OK (&gt; 21 V).</td>
</tr>
<tr>
<td>Brake control unit (BCU)</td>
<td>BATT OK</td>
<td>When lit, the battery voltage of the real time clock is OK (higher than 2.8 V). When off, • battery voltage is below 2.8 V, • battery is missing, or • control unit is not powered.</td>
</tr>
<tr>
<td></td>
<td>PWR OK</td>
<td>When lit, internal voltage is OK.</td>
</tr>
<tr>
<td></td>
<td>FAULT W</td>
<td>When lit, the control program indicates that the equipment is faulty. See the appropriate firmware manual.</td>
</tr>
<tr>
<td></td>
<td>WRITE</td>
<td>When lit, writing to the SD card is in progress.</td>
</tr>
</tbody>
</table>
The 7-segment display of the brake control unit (BCU)

The following table describes the indications of the 7-segment display on the brake control unit. Multicharacter indications are displayed as repeated sequences of characters.

<table>
<thead>
<tr>
<th>Character</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>“U”</td>
<td>“U” is indicated shortly before “o”. The control program has been launched and is running.</td>
</tr>
<tr>
<td>U</td>
<td>Flashing character. The firmware cannot be started: The ZMU memory unit is missing or corrupted.</td>
</tr>
<tr>
<td>L</td>
<td>The firmware download from a PC to the control unit is in progress.</td>
</tr>
<tr>
<td>1</td>
<td>At the drive power-up, the 7-segment display can show short indications of, for example, “1”, “2”, “b” or “U”. These are normal indications immediately after powering up the drive.</td>
</tr>
<tr>
<td>2</td>
<td>If the 7-segment display ends up showing other values than described above after the power-up, it indicates a hardware failure.</td>
</tr>
</tbody>
</table>

Warning and fault messages

See the firmware manual for the descriptions, causes and remedies of the brake control program warning and fault messages.
Maintenance

Contents of this chapter
This chapter refers to maintenance instructions of the brake unit.

Reference to maintenance instructions
See the inverter unit hardware manual for:
• preventing maintenance intervals of cooling fans and converter modules
• instructions on how to replace the cooling fans and converter modules.
Replacing DC and resistor fuses – bottom exit

WARNING! Obey the safety instructions. The complete safety instructions are given in Safety instructions for ACS880 multidrive cabinets and modules (3AU0000102301 [English]). If you ignore the instructions, injury or death, or damage to the equipment can occur.

1. Stop the drive and do the steps in section Electrical safety precautions on page 36 before you start the work.

WARNING! Do not open the DC switch/disconnector under load.

2. Brake units without option +F286: Replace the fuses as shown below.
   Brake units with DC switch/disconnector (option +F286):
   • Open the DC switch.
   • Unplug the wires of the mounting plate in front of the fuses.
   • Undo the mounting screws of the charging circuit mounting plate and remove the plate.
   • Replace the fuses as shown below.
   • Install the mounting plate in reverse order.
Replacing DC and resistor fuses – top exit

**WARNING!** Obey the safety instructions. The complete safety instructions are given in *Safety instructions for ACS880 multidrive cabinets and modules* (3UA0000102301 [English]). If you ignore the instructions, injury or death, or damage to the equipment can occur.

1. Stop the drive and do the steps in section *Electrical safety precautions* on page 36 before you start the work.

**WARNING!** Do not open the DC switch/disconnector under load.

2. **Brake units without option +F286:** Replace the fuses as shown below.
   **Brake units with DC switch/disconnector (option +F286):**
   - Open the DC switch.
   - Unplug the wires of the mounting plate in front of the fuses.
   - Undo the mounting screws of charging circuit mounting plate and remove the plate.
   - Replace the fuses as shown below.
   - Install the mounting plate in reverse order.
## Technical data

### Contents of this chapter

This chapter contains the technical data for the brake units.

### Ratings

The nominal ratings for the brake units are given below.

<table>
<thead>
<tr>
<th>Unit type</th>
<th>Frame size</th>
<th>Resistor values</th>
<th>Ratings with $R_{\min}$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Rmin $R_{\max}$</td>
<td>No overload use</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ohm Ohm</td>
<td>$I_1$ $I_2$ $P_{\text{contmax}}$ ($S_n$)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A DC A DC</td>
<td>kW (kVA) A DC A DC A DC kW</td>
</tr>
<tr>
<td>$U_N = 400$ V</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACS880-607-0500-3 R8i</td>
<td>1.7 2.1</td>
<td>781 310</td>
<td>500 370 999 351 640</td>
</tr>
<tr>
<td>ACS880-607-0750-3 R8i</td>
<td>1.2 1.4</td>
<td>1171 465</td>
<td>750 555 1499 527 960</td>
</tr>
<tr>
<td>ACS880-607-1000-3 2×R8i</td>
<td>1.7 2.1</td>
<td>1562 621</td>
<td>1000 740 1998 702 1290</td>
</tr>
<tr>
<td>ACS880-607-1510-3 2×R8i</td>
<td>1.2 1.4</td>
<td>2342 931</td>
<td>1510 1110 2998 702 1610</td>
</tr>
<tr>
<td>ACS880-607-2260-3 3×R8i</td>
<td>1.2 1.4</td>
<td>3514 1396</td>
<td>2260 1665 4496 1580 2890</td>
</tr>
<tr>
<td>ACS880-607-3010-3 4×R8i</td>
<td>1.2 1.4</td>
<td>4685 1862</td>
<td>3010 2220 5994 2106 3860</td>
</tr>
<tr>
<td>ACS880-607-3770-3 5×R8i</td>
<td>1.2 1.4</td>
<td>5856 2327</td>
<td>3770 2775 7493 2633 4820</td>
</tr>
<tr>
<td>$U_N = 500$ V</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACS880-607-0630-5 R8i</td>
<td>2.2 2.6</td>
<td>781 310</td>
<td>630 370 999 351 800</td>
</tr>
<tr>
<td>ACS880-607-0940-5 R8i</td>
<td>1.4 1.7</td>
<td>1171 465</td>
<td>940 555 1499 527 1210</td>
</tr>
<tr>
<td>ACS880-607-1260-5 2×R8i</td>
<td>2.2 2.6</td>
<td>1562 621</td>
<td>1260 740 1998 702 1610</td>
</tr>
</tbody>
</table>
## Technical data

<table>
<thead>
<tr>
<th>Model</th>
<th>R8i</th>
<th>R8i</th>
<th>1.4</th>
<th>1.7</th>
<th>2342</th>
<th>931</th>
<th>1880</th>
<th>1110</th>
<th>2997</th>
<th>1053</th>
<th>2410</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACS880-607-0870-7</td>
<td>1.4</td>
<td>1.7</td>
<td>781</td>
<td>310</td>
<td>870</td>
<td>370</td>
<td>999</td>
<td>351</td>
<td>1110</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACS880-607-1300-7</td>
<td>2.0</td>
<td>2.4</td>
<td>1171</td>
<td>465</td>
<td>1300</td>
<td>555</td>
<td>1499</td>
<td>527</td>
<td>1660</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACS880-607-1730-7</td>
<td>2.0</td>
<td>2.4</td>
<td>1562</td>
<td>621</td>
<td>1730</td>
<td>740</td>
<td>1998</td>
<td>702</td>
<td>2220</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACS880-607-2600-7</td>
<td>2.0</td>
<td>2.4</td>
<td>2342</td>
<td>931</td>
<td>2600</td>
<td>1110</td>
<td>2997</td>
<td>1053</td>
<td>3330</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACS880-607-3900-7</td>
<td>2.0</td>
<td>2.4</td>
<td>3514</td>
<td>1396</td>
<td>3900</td>
<td>1665</td>
<td>4496</td>
<td>1580</td>
<td>4990</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACS880-607-5200-7</td>
<td>2.0</td>
<td>2.4</td>
<td>4685</td>
<td>1862</td>
<td>5200</td>
<td>2220</td>
<td>5994</td>
<td>2106</td>
<td>6650</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACS880-607-6500-7</td>
<td>2.0</td>
<td>2.4</td>
<td>5856</td>
<td>2327</td>
<td>6500</td>
<td>2775</td>
<td>7493</td>
<td>2633</td>
<td>8320</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Rating with \( R_{\text{max}} \)

<table>
<thead>
<tr>
<th>No overload use</th>
<th>Cyclic load (1 min / 5 min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>( R_{\text{min}} )</td>
<td>( R_{\text{max}} )</td>
</tr>
<tr>
<td>Ohm</td>
<td>Ohm</td>
</tr>
</tbody>
</table>

### Unit type

<table>
<thead>
<tr>
<th>Frame size</th>
<th>Resistor values</th>
<th>Ratings with ( R_{\text{max}} )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( U_N = 690 ) V</td>
<td></td>
</tr>
<tr>
<td></td>
<td>( U_N = 400 ) V</td>
<td></td>
</tr>
<tr>
<td></td>
<td>( U_N = 500 ) V</td>
<td></td>
</tr>
<tr>
<td></td>
<td>( U_N = 690 ) V</td>
<td></td>
</tr>
</tbody>
</table>

### Unit type

<table>
<thead>
<tr>
<th>Frame size</th>
<th>Resistor values</th>
<th>Ratings with ( R_{\text{max}} )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( U_N = 690 ) V</td>
<td></td>
</tr>
<tr>
<td></td>
<td>( U_N = 400 ) V</td>
<td></td>
</tr>
<tr>
<td></td>
<td>( U_N = 500 ) V</td>
<td></td>
</tr>
<tr>
<td></td>
<td>( U_N = 690 ) V</td>
<td></td>
</tr>
</tbody>
</table>

### Unit type

<table>
<thead>
<tr>
<th>Frame size</th>
<th>Resistor values</th>
<th>Ratings with ( R_{\text{max}} )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( U_N = 690 ) V</td>
<td></td>
</tr>
</tbody>
</table>
### Definitions

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>U_N</td>
<td>Nominal voltage</td>
</tr>
<tr>
<td>R_{min}</td>
<td>Minimum allowed resistance value of the brake resistor per one phase of the brake module</td>
</tr>
<tr>
<td>R_{max}</td>
<td>Maximum resistance value of the brake resistor per one phase of the brake module</td>
</tr>
</tbody>
</table>

**Note:** Connect one resistor per brake module phase. For example, a brake unit of frame size 2xR8i includes two brake modules -> 2 × 3 resistors are needed.

### No-overload use

- **I_1** Input current. Input current with R_{min} is given in the type designation label.
- **I_2** Output current. This is indicated the type designation label as 3x the value with R_{min} given in this table.

### Cyclic load (1 min / 5 min)

- **I_{max}** Peak brake current (DC) per chopper module phase
- **I_{dc}** Input current
- **I_{rms}** Total rms DC current per brake unit phase during a period of 1 minute with braking power P_{br}
- **P_{br}** Short term braking power per brake unit allowed for one minute every 5 minutes

#### Example: Brake unit with two parallel brake modules

\[
I_1 = I_{1(1)} + I_{1(2)}
\]
\[
I_2 = I_{2(1)} + I_{2(2)}
\]
# Technical data

## Derating

### Temperature derating

In the temperature range +40…50 °C (+104…122 °F), the rated output current is derated by 1% 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 ($k$):

![Temperature derating graph](image)

### Altitude derating

At altitudes from 1000 to 2000 m (3300 to 6561 ft) above sea level, the continuous output currents given above must be derated 1% for every 100 m (328 ft). For a more accurate derating, use the DriveSize PC tool.

## Input and output voltages

Typical input and output voltages are listed below:

<table>
<thead>
<tr>
<th>$U_N$ (V AC)</th>
<th>Input voltage $U_1$ (DC)</th>
<th>Output voltage $U_2$ (0…$U_1$, 3-phase symmetrical), i.e., resistor (AC) connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>400</td>
<td>513…566 V DC.</td>
<td>3 × 0…566 V DC. This is indicated in the type designation label as typical output voltage level 566 V DC.</td>
</tr>
<tr>
<td></td>
<td>This is indicated in the type designation label as typical input voltage level 566 V DC.</td>
<td></td>
</tr>
<tr>
<td>500</td>
<td>513…707 V DC.</td>
<td>3 × 0…707 V DC. This is indicated in the type designation label as typical output voltage levels 566 / 679 / 707 V DC.</td>
</tr>
<tr>
<td></td>
<td>This is indicated in the type designation label as typical input voltage levels 566 / 679 / 707 V DC.</td>
<td></td>
</tr>
<tr>
<td>690</td>
<td>709…976 V DC. (UL, CSA: 848 V DC).</td>
<td>3 × 0…976 V DC. (UL, CSA: 848 V DC) This is indicated in the type designation label as typical output voltage levels 742 / 849 / 976 (849 UL, CSA) V DC.</td>
</tr>
<tr>
<td></td>
<td>This is indicated in the type designation label as typical input voltage levels 742 / 849 / 976 (849 UL, CSA) V DC.</td>
<td></td>
</tr>
</tbody>
</table>
## Type equivalence table

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## Fuses

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Dimensions, weights and free space requirements

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Height 1: Height of IP22 and IP42 units
Height 2: Height of IP54 units
Width 1: Standard width with bottom exit of cables
Width 2: Standard width with top exit of cables
Depth 1: Depth of standard units
Depth 2: Depth of units with air inlet through bottom
Weight 1: Weight of units with bottom exit of cables
Weight 2: Weight of units with top exit of cables
Losses, cooling data and noise

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<th>Losses</th>
<th>Cooling air flow</th>
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<td>m³/h</td>
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Terminal and lead-through data for the resistor cables
Screw size for connecting external resistors: M12 or ½". Tightening torque: 70 N•m (52 lbf•ft). See chapter Dimension drawings.

Control connections
See chapter The brake control unit (page 43).

Protection classes
Degree of protection (IEC/EN 60529)  
IP22, IP42, IP54, IP20 with doors open.

Enclosure type (UL 508A)
UL Type 1, UL Type 12. UL Open Type with doors open.

Overvoltage category (IEC 60664-1)  
III
## Ambient conditions

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

<table>
<thead>
<tr>
<th>Installation site altitude</th>
<th>Operation installed for stationary use</th>
<th>Storage in the protective package</th>
<th>Transportation in the protective package</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 to 2000 m (6561 ft) above sea level. For altitudes over 2000 m, contact ABB. Output derated above 1000 m (3281 ft). See section Altitude derating (page 68).</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>- 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>
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<tr>
<th>Air temperature</th>
<th>Operation</th>
<th>Storage</th>
<th>Transportation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 ... +40 °C (+32 ... +104 °F). No condensation allowed. Output derated in the range +40 ... +50 °C (+104 ... +122 °F). See section Temperature derating (page 68).</td>
<td>-40 to +70 °C (-40 to +158 °F)</td>
<td>-40 to +70 °C (-40 to +158 °F)</td>
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</table>

<table>
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<th>Operation</th>
<th>Storage</th>
<th>Transportation</th>
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<td>Max. 95%</td>
<td>Max. 95%</td>
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<tr>
<td>No condensation allowed. Maximum allowed relative humidity is 60% in the presence of corrosive gases.</td>
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<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</td>
<td>IEC 60721-3-2</td>
<td>-</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 3S2 (3S1 with IP20). No conductive dust allowed.</td>
<td>Class 1S3 (packing must support this, otherwise 1S2)</td>
<td>Class 2S2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pollution degree</th>
<th>Operation</th>
<th>Storage</th>
<th>Transportation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vibration</th>
<th>Operation</th>
<th>Storage</th>
<th>Transportation</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEC 60068-2-6:2007, EN 60068-2-6:2008 Environmental testing Part 2-6: Tests - Test Fc: Vibration sinusoidal</td>
<td>10...58 Hz, max. 0.075 mm displacement amplitude 58...150 Hz 10 m/s²</td>
<td>For modules and cabinets in packages: IEC/EN 60721-3-1:1997 Classification of environmental conditions - Part 3: Classification of groups of environmental parameters and their severities - Section 1: Storage</td>
<td>For cabinet package: IEC/EN 60721-3-1:1997 Classification of environmental conditions - Part 3: Classification of groups of environmental parameters and their severities - Section 2: Transportation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Shock</th>
<th>Operation</th>
<th>Storage</th>
<th>Transportation</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEC 60068-2-27:2008, EN 60068-2-27:2009 Environmental testing - Part 2-27: Tests - Test Ea and guidance: 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>
</tbody>
</table>
Materials

Cabinet
Hot-dip zinc coated steel sheet, thickness of coating 20 micrometers. Doors, panels 1.5 mm, frame beams 2 mm, panels inside the cabinet 1…3 mm.
Polyester thermosetting powder coating (thickness approximately 80 micrometers) on visible surfaces, color RAL 7035 and RAL 9017.
PC/ABS 3 mm, color NCS 1502-Y (RAL 9002 / PMS 1C Cool Gray).

Brake modules
PC/ABS 3 mm, color NCS 1502-Y (RAL 9002 / PMS 1C Cool Gray) and RAL 9017
PC+10%GF 3.0mm, color RAL 9017
Hot-dip zinc-coated steel sheet 1.5 to 3.0 mm, thickness of coating 20 micrometers, color NCS 1502-Y

Busbars
Aluminum or copper

Package
Standard package:
• timber, polyethylene sheet (thickness 0.2 mm), stretch film (thickness (0.023 mm), PP tape, PET strap, sheet metal (steel)
• for land and air transport when planned storage time is < 2 months or when storage can be arranged in clean and dry conditions < 6 months
• can be used when products will not be exposed to corrosive atmosphere during transport or storage

Container package:
• timber, VCI sheet film (PE, thickness 0.15 mm), VCI stretch film (PE, thickness (0.04 mm), VCI emitter bags, PP tape, PET strap, sheet metal (steel)
• for sea transport in containers
• recommended for land and air transport when storage time prior to installation exceeds 6 months or storage is arranged in partially weather-protected conditions

Seaworthy package:
• timber, plywood, VCI sheet film (PE, thickness 0.15 mm), VCI stretch film (PE, thickness (0.04 mm), VCI emitter bags, PP tape, PET strap, sheet metal (steel)
• for sea transport with or without containerization
• for long storage periods in environments where roofed and humidity-controlled storage cannot be arranged

Cabinets are fastened to the pallet by screws and braced from the top end to the package walls to prevent swaying inside the package.
Package elements are attached together by screws.
For handling the packages, see Mechanical installation instructions for ACS880 multidrive cabinets [3AUA0000101764 (English)].

Disposal
The drive contains raw materials that should be recycled to preserve energy and natural resources. The package materials are environmentally compatible and recyclable.
All metal parts can be recycled. The plastic parts can either be recycled or burned under controlled circumstances, according to local regulations. Most recyclable parts are marked with recycling marks.
If recycling is not feasible, all parts excluding electrolytic capacitors and printed circuit boards can be landfilled. Electrolytic capacitors and printed circuit boards are classified as hazardous waste within the EU. They must be removed and handled according to local regulations.
For further information on environmental aspects and more detailed recycling instructions, please contact your local ABB distributor.

Standards
See Electrical planning instructions for ACS880 multidrive cabinets and modules (3AUA0000102324 [English]).
Technical data

Markings

See Electrical planning instructions for ACS880 multidrive cabinets and modules (3AU00000102324 [English]).

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 N·m</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>M3</td>
<td>0.5</td>
<td>Strength class 4.6...8.8</td>
</tr>
<tr>
<td>M4</td>
<td>1</td>
<td>Strength class 4.6...8.8</td>
</tr>
<tr>
<td>M5</td>
<td>4</td>
<td>Strength class 8.8</td>
</tr>
<tr>
<td>M6</td>
<td>9</td>
<td>Strength class 8.8</td>
</tr>
<tr>
<td>M8</td>
<td>22</td>
<td>Strength class 8.8</td>
</tr>
<tr>
<td>M10</td>
<td>42</td>
<td>Strength class 8.8</td>
</tr>
<tr>
<td>M12</td>
<td>70</td>
<td>Strength class 8.8</td>
</tr>
<tr>
<td>M16</td>
<td>120</td>
<td>Strength class 8.8</td>
</tr>
</tbody>
</table>

- **Mechanical connections**

<table>
<thead>
<tr>
<th>Size</th>
<th>Max. torque N·m</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>M5</td>
<td>6</td>
<td>Strength class 8.8</td>
</tr>
<tr>
<td>M6</td>
<td>10</td>
<td>Strength class 8.8</td>
</tr>
<tr>
<td>M8</td>
<td>24</td>
<td>Strength class 8.8</td>
</tr>
</tbody>
</table>

- **Insulation supports**

<table>
<thead>
<tr>
<th>Size</th>
<th>Max. torque N·m</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>M6</td>
<td>5</td>
<td>Strength class 8.8</td>
</tr>
<tr>
<td>M8</td>
<td>9</td>
<td>Strength class 8.8</td>
</tr>
<tr>
<td>M10</td>
<td>18</td>
<td>Strength class 8.8</td>
</tr>
<tr>
<td>M12</td>
<td>31</td>
<td>Strength class 8.8</td>
</tr>
</tbody>
</table>

- **Cable lugs**

<table>
<thead>
<tr>
<th>Size</th>
<th>Max. torque N·m</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>M8</td>
<td>15</td>
<td>Strength class 8.8</td>
</tr>
<tr>
<td>M10</td>
<td>32</td>
<td>Strength class 8.8</td>
</tr>
<tr>
<td>M12</td>
<td>50</td>
<td>Strength class 8.8</td>
</tr>
</tbody>
</table>
Disclaimer

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

Cyber security disclaimer

This product is designed to be connected to and to communicate information and data via a network interface. It is Customer's sole responsibility to provide and continuously ensure a secure connection between the product and Customer network or any other network (as the case may be). Customer shall establish and maintain any appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of anti-virus programs, etc) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information. ABB and its affiliates are not liable for damages and/or losses related to such security breaches, any unauthorized access, interference, intrusion, leakage and/or theft of data or information.
Dimension drawings

Contents of this chapter
This chapter contains example dimension drawings for the brake units.
Dimension drawing – bottom exit

A – A

B – B

C – C
Dimension drawing – top exit
Dimension drawings
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 www.abb.com/drives and select Training courses.

Providing feedback on ABB Drives manuals
Your comments on our manuals are welcome. Go to www.abb.com/drives and select Document Library – Manuals feedback form (LV AC drives).

Document library on the Internet
You can find manuals and other product documents in PDF format on the Internet. Go to www.abb.com/drives and select Document Library. You can browse the library or enter selection criteria, for example a document code, in the search field.
Contact us

www.abb.com/drives
www.abb.com/drivespartners

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