List of related manuals

<table>
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<tr>
<th>General drive manuals</th>
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<td>Safety instructions for ACS880 air-cooled multidrive cabinets and modules</td>
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<td>Safety instructions for ACS880 liquid-cooled multidrive cabinets and modules</td>
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<tr>
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<tr>
<td>ACS880-304 diode supply modules (+A018) hardware manual</td>
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<td>ACS880-304LC +A019 diode supply modules hardware manual</td>
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<td>ACS880-904 regenerative rectifier modules hardware manual</td>
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<td>ACS880-104 inverter modules hardware manual</td>
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<td>ACS880-104LC inverter modules hardware manual</td>
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<td>ACS880-604 3-phase brake chopper modules hardware manual</td>
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<td>ACS880-1604 DC/DC converter modules hardware manual</td>
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<th>Option manuals and guides</th>
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<tbody>
<tr>
<td>Manuals and quick guides for I/O extension modules, fieldbus adapters, etc.</td>
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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.
Cabinet design and construction instructions

ACS880 air-cooled and liquid-cooled multidrive modules
# Table of contents

## Introduction to this manual
- Contents of this document ................................................. 7
- ACS880 multidrive modules documentation .......................... 7

## General cabinet planning instructions
- Contents of this chapter .................................................. 9
- Cabinet construction ...................................................... 9
  - Allowable mounting orientations .................................... 9
  - Disposition of the devices .......................................... 9
  - Grounding of mounting structures ................................. 10
  - Busbar material and joints ........................................ 10
  - Shrouding .................................................................... 10
  - Tightening torques .................................................... 11
- Cooling and degrees of protection .................................... 12
  - Air-cooled drive systems ............................................. 12
    - Air inlets and outlets ............................................ 12
    - Air flow inside the cabinet ..................................... 13
    - Air flow outside the cabinet ................................... 13
  - Liquid-cooled drive systems ....................................... 14
    - Air flow inside the cabinet ..................................... 14
- EMC requirements ........................................................... 15
- Cabling ........................................................................... 15
- Cubicle heaters .............................................................. 16

## Cabinet system specific instructions
- Contents of this chapter .................................................. 17
- Rittal TS 8 ....................................................................... 18
  - ACS880 modules and Rittal TS 8 enclosures .................... 18
- Order of construction ...................................................... 18
- Baying ............................................................................ 19
- Dividing (partitioning) enclosures .................................. 19
- PE busbar installation ..................................................... 19
- AC/DC busbars .............................................................. 19
- Component installation ................................................... 19
- Vibration damping .......................................................... 20

## Further information
- Product and service inquiries .......................................... 21
- Product training ............................................................... 21
- Providing feedback on ABB manuals ................................ 21
- Document library on the Internet ...................................... 21
Introduction to this manual

Contents of this document

This document guides in planning the installation of ACS880 power modules (ie. converter or supply modules as well as auxiliary components such as filters) into a user-defined cabinet. The issues discussed are essential for the safe and trouble-free use of the drive system.

**Note:** The modules must be installed into an electrical enclosure or similar assembly which will provide access protection. 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.

The information is divided into the following chapters:
- **General cabinet planning instructions** (page 9), which contains generic instructions applicable to any cabinet system.
- **Cabinet system specific instructions** (page 17), which contains instructions for specific cabinet systems (such as the Rittal TS 8).

ACS880 multidrive modules documentation

All documentation is available on the Engineering Support site ([https://sites-apps.abb.com/sites/lvacdrivesengineeringsupport/content](https://sites-apps.abb.com/sites/lvacdrivesengineeringsupport/content)). Contact your local ABB representative for access.

Please note that the kit-specific installation instructions are not included in the hardware manuals of the individual ACS880 multidrive modules products.
General cabinet planning instructions

Contents of this chapter
This chapter contains generic instructions applicable to any cabinet system.

Cabinet construction
The cabinet frame must be sturdy enough to carry the weight of the components, control circuitry and other equipment installed in it.

The cabinet must protect the power modules against contact and meet the requirements for dust and humidity (see the Technical data chapter in the respective module hardware manuals).

The frame and doors of the cabinet must be strong enough to withstand the result of an arc flash created inside the cabinet.

- Allowable mounting orientations
The modules must be mounted upright unless other orientations are expressly allowed in the Technical data section in the respective hardware manual.

- Disposition of the devices
For easy installation and maintenance, a spacious layout is recommended. Sufficient cooling air flow, obligatory clearances, cables, cable support structures all require space.

The control electronics must not be installed near a main circuit or hot parts.

Refer to the respective module hardware manual for layout examples.
Grounding of mounting structures

Make sure any cross-members or shelves on which components are mounted are properly grounded and the connecting surfaces left unpainted.

Note: Ensure that the modules are properly grounded through their fastening points to the installation base.

Busbar material and joints

Tin-plated copper is recommended but aluminum can also be used.

Before joining aluminum busbars, remove the oxide layer and apply suitable anti-oxidant joint compound.

Shrouding

The installation of shrouding (touch protection) to fulfill applicable safety regulations is the responsibility of the drive system builder. Ready-made shrouding parts are available from ABB for some (especially Rittal TS 8) cabinet designs. See the Ordering information section in the module hardware manuals.
### Tightening torques

**WARNING!** When installing components, always refer to the manufacturer’s instructions for tightening torques. The torques listed here are suggestions only to be used whenever no specific information is available from the component manufacturer or from other installation instructions.

#### Electrical connections

<table>
<thead>
<tr>
<th>Screw size</th>
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<th>Torque</th>
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<tr>
<td>M3</td>
<td>4.6 ... 8.8</td>
<td>0.5 N·m (4.5 lbf·in)</td>
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<td>4.6 ... 8.8</td>
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<td>M5</td>
<td>8.8</td>
<td>4 N·m (35 lbf·in)</td>
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<tr>
<td>M6</td>
<td>8.8</td>
<td>9 N·m (6.5 lbf·ft)</td>
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<tr>
<td>M8</td>
<td>8.8</td>
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<td>8.8</td>
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#### Mechanical connections

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<tr>
<td>M8</td>
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#### Cable lugs

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<td>M12</td>
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#### Insulation supports

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<td>M8</td>
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<td>M10</td>
<td>8.8</td>
<td>18 N·m (13.5 lbf·ft)</td>
</tr>
<tr>
<td>M12</td>
<td>8.8</td>
<td>31 N·m (23 lbf·ft)</td>
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</table>
Cooling and degrees of protection

The cabinet must have enough free space for the components to ensure sufficient cooling. Observe the minimum clearances given for each component.

- **Air-cooled drive systems**

  **Air inlets and outlets**

  The air inlets and outlets must be equipped with gratings that
  - guide the air flow
  - protect against contact
  - prevent water splashes from entering the cabinet
  - ensure adequate protection against flames or pressure blast originating from inside the cabinet in case of arc flash or similar failure.

  The drawing below shows two typical cabinet cooling solutions. The air inlet is at the bottom of the cabinet. The outlet is on the roof, or on the upper part of the door if room height is limited.

  ![Diagram of cabinet cooling solutions](image)

  Arrange the cooling air flow through the components so that the requirements stated in the Technical data section of the appropriate power module manual are met:
  - cooling air flow
    
    **Note:** The values stated for each component in their respective manuals (Technical data) apply to continuous nominal load. If the load is cyclic or less than nominal, less cooling air is required.
  - allowed ambient temperature and temperature rise inside the cabinet
  - allowed pressure drop over the cabinet that the cooling fan can overcome
  - air inlet and outlet sizes required for cooling and recommended filter material (if used).

  In addition to the above, the heat dissipated by cables and other additional equipment must also be ventilated.

  The internal cooling fans of the converter modules and filters are usually sufficient to keep the component temperatures low enough in IP20 and IP42 cabinets. Additional fans are present in the example designs as needed. If additional heat-generating components are to be installed in the cabinet, the cooling system must be upgraded accordingly.
In IP54 cabinets, thick filter mats are used to prevent water splashes from entering the cabinet. This entails the installation of additional cooling equipment, such as a hot air exhauster.

The installation site must be sufficiently ventilated.

**Air flow inside the cabinet**

Prevent hot air circulation inside the cabinet with leak-proof air baffles at the positions shown in the respective power module manuals. Seal the baffles to the inside wall using neoprene gasketing (included with ABB kits) or equivalent.

**Air flow outside the cabinet**

Prevent hot air circulation outside the cabinet by leading the outcoming hot air away from the inlet area. Some possible solutions include:

- gratings that guide air flow at the air inlet and outlet
- arranging the air inlet and outlet at different sides of the cabinet
- placing the cool air inlet in the lower part of the front door, and adding an exhauster on the roof of the cabinet.

The drawing below shows the air flow inside and outside the cabinet.
Liquid-cooled drive systems

The cabinet can be totally sealed from the ambient air. The air inside the cabinet must be able to circulate freely. The power module in the cabinet can have a dedicated fan to push air through an air-to-liquid heat exchanger and the module. The returning air flow from the upper part of the cubicle must not be obstructed. A cabinet with diverse components can have a common fan/heat exchanger combination.

Air flow inside the cabinet

The drawing below shows the air flow inside the cabinet.
EMC requirements

Generally, the fewer and smaller the holes in the cabinet, the better the interference attenuation. The maximum diameter of a hole in galvanic metal contact in the covering cabinet structure is 100 mm. Special attention must be paid to the cooling air inlet and outlet gratings.

The best galvanic connection between the steel panels is achieved by welding them together as no holes are necessary. If welding is not possible, the seams between the panels must be left unpainted and equipped with special conductive EMC strips to provide adequate galvanic connection. Usually, reliable strips are made of flexible silicon mass covered with a metal mesh. The non-tightened touch-contact of the metal surfaces is not sufficient, so a conductive gasket between the surfaces is required. The maximum distance between assembly screws is 100 mm.

Sufficient high-frequency grounding network must be constructed in the cabinet to avoid voltage differences and forming of high-impedance radiator structures. A good high-frequency grounding is made with short flat copper braids for low inductance. One-point high-frequency grounding cannot be used due to the long distances inside the cabinet.

On the other hand, a sturdy low-frequency earthing structure is required for electrical safety of the parts. Conductive EMC shielding gasket tapes are not sufficient for protective grounding. Please follow the local regulations when designing protective grounding.

- Cabling

EMC compliance of a drive requires 360° high frequency grounding of the motor and control cable shields at their entries. (360° grounding of the supply cables is recommended.) For the power cables, the grounding can be implemented by a knitted wire mesh screening as shown below.
Signal cables can be grounded by means of conductive shielding cushions pressed against the cable shield from both directions.

**Cubicle heaters**

Use a cubicle heater if there is a risk of condensation in the cabinet. Although the primary function of the heater is to keep the air dry, it may also be required for heating at low temperatures. When placing the heater, follow the instructions provided by its manufacturer.
Cabinet system specific instructions

Contents of this chapter
This chapter contains cabinet system specific instructions.

Note: The installation must always be designed and made according to applicable local laws and regulations. ABB does not assume any liability whatsoever for any installation which breaches the local laws and/or other regulations. Furthermore, if the recommendations given by ABB are not followed, the drive may experience problems that the warranty does not cover.
Rittal TS 8

ACS880 modules and Rittal TS 8 enclosures

ACS880 series drive installations into Rittal TS 8 enclosures are designed as complete mechanical solutions. The complete documentation including parts lists, installation instructions and videos is available at https://sites-apps.abb.com/sites/lvacdrivesengineeringsupport/content. However, instructions for cabling are not included because of different customer-specific demands.

In general, the designs follow those of cabinet-built ACS880 multidrives and take module-specific requirements into account. Note that even though the same TS 8 frames and the same design principles are used for both air-cooled and liquid-cooled modules, the designs still differ in many ways. See the module hardware manuals for details.

Order of construction

In general, the cabinet line-up should be built in the following order:

1. Baying of enclosures
2. Dividing (partitioning) of enclosures
3. PE busbar installation
4. Common AC and DC bus installation
5. Enclosure-specific installation.

The drawing shows an example of an air-cooled drive design in a TS 8 enclosure. The instructions referred to contain listings of parts available through ABB and Rittal.
- **Baying**

All cabinet designs use the same baying principle; see drawing 3AUA0000114535. Other baying parts can be used, but ensure that these parts do not interfere with the subsequent installation of other components.

---

**WARNING!** When lifting line-ups consisting of multiple cubicles, spreader-type lifting bars must be used. Refer to instructions from Rittal.

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- **Dividing (partitioning) enclosures**

It is recommended to use divider panels to partition the cabinet line-up. This is because various drive equipment have different cooling characteristics, and to avoid counterflow or other airflow-related problems. See section *Cooling and degrees of protection* (page 12).

Drawing 3AUA0000115695 details divider panel installation. It also illustrates the modifications required to the standard panels when the Rittal Flat-PLS power distribution system is used.

Instead of standard Rittal divider panels, liquid-cooled designs use ABB-designed adapter panels available as kits.

- **PE busbar installation**

The PE busbar can be placed at the bottom rear edge of the line-up. This design employs Rittal busbar supports and a 2 × 10 × 30 mm busbar. The cross-sectional area of the PE busbar should be at least 50 mm². For details, see drawing 3AUA0000114475.

In liquid-cooled designs, the PE busbar is placed at the front part of the cabinet, behind the main coolant pipe. Typically, 50 × 10 mm busbar is used.

- **AC/DC busbars**

AC and DC power distribution is handled by Rittal Flat-PLS busbars. Each phase (or pole) can consist of 1 to 4 10 × 60 mm busbars, with the cross-sectional area thus ranging from 600 to 2400 mm².

**Note:** Make sure that the current carrying capability of the busbars is not exceeded at any point of the drive system.

The ACS880 modules offering contains kits 3AUA0000115905 and 3AUA0000115906 with attachment brackets/plates for optimum AC/DC bus positioning in the TS 8 line-up.

Refer to the instructions provided by Rittal when designing and building the busbar system.

- **Component installation**

Detailed stage-by-stage installation instructions can be found at the Engineering Support site ([https://sites-apps.abb.com/sites/lvacdrivesengineeringsupport/content](https://sites-apps.abb.com/sites/lvacdrivesengineeringsupport/content)). An overview is presented in the module-specific manuals. Please note that some designs require that the kits are installed in the correct order. Some kits, such as air inlets and outlets, may require modification of Rittal parts.
Vibration damping

Drive installations using ABB kits for TS 8 enclosures are designed to withstand industrial level vibrations. The use of vibration isolators is recommended in marine installations, as well as other environments with strong vibrations. The isolators can be placed, for example, under the enclosure and at the top back as shown in the drawing below.

In a cabinet line-up, it is recommended to attach the isolators to a shared common plinth. The plinth should be rigid enough to minimize twisting around the longest dimension of the line-up under uneven mechanical loads.

Several types of vibration isolators exist on the market. The cabinet weight, weight distribution, and the type (shock, sinusoidal) and frequency of the expected vibrations are the most important parameters when choosing a vibration isolator.

Vibration isolators allow the cabinet to move related to its surroundings. The cabling and other connections to the cabinet should be made flexible enough to allow for cabinet movement.
Further information

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

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

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

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