Installation manual
ACS600 Multidrive to ACS880 Standard Retrofit

ACS880R-107S6 R8i INVERTER UNITS
List of related manuals and documents

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1 Safety

This section follows ABB Safety instructions for ACS880 Multidrive cabinets and modules (3UA0000102301).

1.1 General safety for installation, start-up, and maintenance

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

---

WARNING!

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

---

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

Be careful when handling a tall module. The module overturns easily because it is heavy and has a high center of gravity. Whenever possible, secure the module with chains. Do not leave an unsupported module unattended, especially on a sloping floor.

- Do not use the module installation ramp with plinth heights that exceed 50 mm [1.97 in].
Secure the module extraction/installation ramp carefully.

Push the module into the cabinet and carefully pull it from the cabinet, preferably with help from another person. Keep a constant pressure with one foot on the base of the module to prevent the module from falling on its back. Keep your fingers away from the edges of the front flange of the module.

- Beware of hot surfaces. Some parts, such as heatsinks of power semiconductors and brake resistors, remain hot for a while after disconnection of the electrical supply.
- Vacuum clean the area around the drive before the start-up to prevent the drive cooling fan from drawing pulling the dust inside the drive.
- Make sure that there is sufficient cooling. See the technical data.
- Keep the cabinet doors closed when the drive is powered. With the doors open, a risk of a potentially fatal electric shock, arc flash or high-energy arc blast exists. If you cannot avoid working on a powered drive, obey the local laws and regulations on live working (including – but not limited to – electric shock and arc protection).
- Before you adjust the drive operation limits, make sure that the motor and all driven equipment can operate throughout the set operation limits.
- Before you activate the automatic fault reset or automatic restart functions of the drive control program, make sure that no dangerous situations can occur. These functions reset the drive automatically and continue operation after a fault or supply break. If these functions are activated, the installation must be clearly marked as defined in IEC/EN 61800-5-1, subclause 6.5.3, for example, “THIS MACHINE STARTS AUTOMATICALLY”.
- The maximum number of drive power-ups is five in ten minutes. Too many frequent power-ups can damage the charging circuit of the DC capacitors.
- Validate any safety circuits (for example, Safe torque off or emergency stop) in start-up. See separate instructions for the safety circuits.
- Beware of hot air exiting from the air outlets.
- Do not cover the air inlet or outlet when the drive is running.

1.2 Electrical safety in installation, start up and maintenance

These instructions are for all personnel who work on the drive, motor cable and motor.

**WARNING!**

Obey these instructions. If you ignore them, injury or death, or damage to the equipment can occur. If you are not a qualified electrician, do not do installation or maintenance work. Go through these steps before you begin any installation or maintenance work.

1. Keep the cabinet doors closed when the drive is powered. With the doors open, a risk of a potentially fatal electric shock, arc flash or high-energy arc blast exists.
2. Clearly identify the work location.
3. Disconnect all possible voltage sources.
   - Open the main disconnecting device of the drive.
- Open the charging switch if present.
- If the main disconnecting device does not disconnect the voltage from the AC input power busbars of the drive, open the disconnector of the supply transformer. (The main disconnecting device in the drive cabinet does not disconnect the voltage from the AC input power busbars.)
- Close the grounding switch or switches (option +F259, Q9) if present. Do not use excessive force as the switch has electromagnetic interlocking.
- Open the auxiliary voltage switch-disconnector (if present). Also open all other possible disconnecting devices that isolate the drive from dangerous voltage sources.
- If you have a permanent magnet motor connected to the drive, disconnect the motor from the drive with a safety switch or by other means.
- Make sure that re-connection 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 work on the control cables.
- After you disconnect the drive, always wait 5 minutes to let the intermediate circuit capacitors discharge before you continue.

4. Protect any other energized parts in the work location against contact.
5. Take special precautions when close to bare conductors.
6. Measure that the installation is de-energized. If the measurement requires removal or disassembly of shrouding or other cabinet structures, obey the local laws and regulations applicable to live working (including – but not limited to- electric shock and arc protection).
   - Use a multimeter with an impedance of at least 1 MOhm.
   - Make sure that the voltage between the drive input power terminals and the grounding (PE) busbar is close to 0V.
   - Make sure that the voltage between the drive DC busbars (+ and -) and the grounding (PE) busbar is close to 0 V.
7. Install temporary grounding as required by the local regulations.
8. Ask the person in control of the electrical installation work for a permit to work.

1.3 Printed circuit boards

**WARNING!**
*Use a grounding wrist band when you handle printed circuit boards. Do not touch the boards unnecessarily. The boards contain components sensitive to electrostatic discharge.*
2 General Information

ACS880R-107S6 is an inverter solution that can be used for retrofitting of the old ACA610 product. The product consist of a kit of pre-assembled electrical components, mechanical parts and the new ACS880 module which are installed into existing ACS600 cabinet.

This manual is applicable to the cabinet-installed ACS880R-107S6 inverter units (INU). It is intended for engineers who plan the installation, install or do the service work in retrofit projects. The engineers are expected to know the fundamentals of electricity, wiring electrical components and electrical schematic symbols. If other required repair or maintenance tasks occur before or during the installation and commissioning which have not been detailed in this instruction, the service personnel should be familiar with the working methods needed to safely do the required actions without harm any potential danger or risk to personnel or equipment safety.

Before starting the installation work, the whole work must be carefully planned so that the required actions can be performed safely and effectively.

Lighting and heating options are not included in the product. The retrofit module is defined based on the output current directly in the type of the module.

For more information about Product Scope see, Appendix 2:

**NOTE!** Retrofit/Upgrade kits have been designed and tested for modernizing the previous generation of drives and to fulfill the same requirements as the original installation.

This means that the Retrofit/Upgrade solution has not been designed to upgrade the power of the system. Do not exceed values in the original rating plate of the drive/system even though new drive/supply modules could deliver that.

Due to the above, the current limits must be set to the original rating values during the commissioning of the drive/supply modules.

In case the power extension is needed the whole system needs to be verified and assessed. Please contact our engineering center (EC Finland) in such cases.
3 Design and preparation work

Before you retrofit a drive, complete the following preparatory tasks.

- Confirm Retrofit technical appendix information
- Obtain documents and forms
- Obtain basic and special tools
- Parameter backup and conversion

3.1 Confirm Retrofit technical appendix information

The scope of this instruction is for ACS600 Multidrive section ACA610 R8i – R10i to ACS880R-107S6 R8i retrofit installation. See the scope of this manual from the Error! Reference source not found. Error! Reference source not found..

Verify the following information in the existing installation. This information is located in the ABB Salesforce case ID.

- Type code of drive cabinet and type code of each drive module
- DC switch (OT) / fuse application
- What are the auxiliary supply voltages?
  - Is an uninterruptible power supply (UPS) used?
- Is there prevention of start up? Is it with POUS or POS?
- Are analog inputs of NDCU in use on-site?
- What is the field bus type?
- What is the emergency stop and type?
- What are the other installed options in the old ACS600 installation that need to be replaced?

Note! If the target site equipment is to be retrofitted for the first time, visit the installation site once before you start the installation. Get pictures and layout drawings and other relevant information. Make sure that all necessary parts and kits have been delivered.

3.2 Obtain documents and forms

Before you start the installation, get the following documents:

- Project specific electrical circuit diagrams (if available).
- Valid print copies of Electrical Circuit diagrams from the old ACS600 installation. These may have been modified at the customer site during the products lifetime.

3.3 Obtain basic and special tools

Use the following recommended tools for the installation:

Basic tools

- Multimeter (1000 V)
- Isolation test meter (500 VDC)
- Cordless screwdriver
● Torque wrench (100 Nm)
● Power drill
● Socket set with drive 7-13 mm, sockets 8-21 mm
● Torx T10, T20, T25, T30
● Fork spanner 10, 13, 17 and 19 mm
● Tape measure
● High quality drills Ø5.3, Ø4.5, Ø3.6 and Ø10 mm
● Contact cleaner
● Contact grease (for Cu-Al)
● Scouring pad or equivalent polishing material, e.g. Scotch Brite.

**Special tools**

- No special tools are required for the installation of ACS880R-107F6 1xR5-7i.
- To install ACS880R-107S6 R8i, take the following special tools with you:
  - Electrical saw
    To cut the PE bus bar or bottom plate, use an electrical jig saw or reciprocating saw as shown in Figure 1 and/or Figure 2. Additionally, use a special saw blade for copper.
  - If you need to cut the middle beam, use the reciprocating saw.

![Figure 1 Electrical jig saw](image1)

![Figure 2 Electrical reciprocating saw](image2)

### 3.4 Parameter backup and conversion

Download the latest backup file from the old ACS600 installation before you begin retrofitting the drive. In order to fulfill original technical requirements, compile the setup of the target application parameters to the ACS880 parameter range.

**Before you decommission and dismantle the old drive:**

- Save a copy of the current ACS600 parameters (Drive Window, Drive Composer).

**To install and commission a new drive, do the following:**

1. Manually prepare ACS880 parameters for ID run.
2. Convert application parameters manually.
3. The commissioning engineer must complete the final inspection on-site.
4 Material and parameter backup inspection on-site

4.1 Parameter backup

Before you begin the installation, make sure that the latest backup of ACS600 is available for later commissioning use. If necessary, make the parameter backup from ACS600 again. If the ACS600 backup is not available at the office prior to decommissioning and installation, first complete the tasks in 3.4 Parameter backup and conversion.

4.2 Inspect materials

Before you begin the mechanical on-site work, make sure that all materials to be installed are available.

- Check if all materials' type and quantity are consistent with the packing list
- Check if all materials' appearance is intact.

In ACS880R-107S6 R8i standard retrofit kit, following are delivered to the customer site:

- ACS880-104 R8i Inverter module, type depends on the selected kit type, see appendix Scope table.
- Packages with all mechanical and electrical parts and the pre-assemblies.
  - Including options, accessories and screws
  - Wire sets
- Documentation for installation, including
  - Circuit diagrams (standard or project specific)
  - Mechanical assembly drawings for site installation
  - Bill of materials
- New doors for the cabinets which contains new inverter units.
5 Mechanical installation

5.1 ACA610 R8i/ R9i to ACS880R 1xR8i retrofit

5.1.1 Remove the old hardware
Refer to old assembly drawings and remove the old hardware.

WARNING! Make sure that there is no live voltage (AC/DC).

1. Re-confirm that there is no live voltage (AC/DC).
2. Remove door
3. Disconnect the bus bars connection for the fuse-switch, and remove the fuse-switch (or fuse base) with all accessories. See Figure 3

Figure 3

In some cases it is necessary to remove the roof of the cabinet for accessing the bolts.

Figure 4

To remove bus bar connection remove
Reference source not found. Lose these bolts from top side of the cabinet.
4. If switch option, remove the charging components, including charging fuses, resistors and control board.
5. Remove the front cover of module first, and then disconnect the module output bus bars, remove the module.
6. Remove the assembly plate, DC input bus bar and the plate1. See Figure 5

Figure 5

7. Remove the cooling fan, Relay K12 (cooling fan monitor relay) and all connected wires on it. Disconnect the wires on option cards, and then remove the cards away.
8. Remove the module output bus bars, related support plates and air baffles. See Figure 6

Figure 6

9. Disconnect the wires of NDCU or RDCU and then remove it. See Figure 7
10. If Du/Dt option, remove Du/Dt filter and related parts and remain the motor cables there.

Note! After this step, pull out the cables from bottom of the cabinet. If there is a firewall (fire break) underneath the cabinet, re-positioning of cables is needed due to that the lead through location is different in the new installation. After new lead through installed, pull the cables back. Refer to the assembly drawings for details.

11. Remove the assembly plate and related lead through plate. See Figure 8.

12. Leave other parts inside the old cabinet, including auxiliary components, bottom plate, DC-common bus bars, PE bus bar and AC common bus bar when top exit. See Figure 9, Figure 9. Refer to Assembly drawings.
5.1.2 Install the ACS880R-10756 R8i kit for ACS610 R8i/ R9i

NOTE! Follow the assembly procedure and the main mechanical assembly work from the mechanical assembly drawings. Assembly drawings are delivered with the retrofit product or can be found on SAP or DMS with the provided document codes.

Note! Mechanical assemble is done in conjunction with electrical installation. Make sure to read chapter 6 Electrical installation before starting the retrofit installation.

<table>
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<th>Main assembly drawings</th>
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<tbody>
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</tr>
<tr>
<td>DMS:</td>
</tr>
<tr>
<td>3AXD50000018449</td>
</tr>
<tr>
<td>SAP:</td>
</tr>
<tr>
<td>3AXD50000018449</td>
</tr>
<tr>
<td>Door assembly</td>
</tr>
<tr>
<td>3AXD10000348158</td>
</tr>
<tr>
<td>3AXD50000018465</td>
</tr>
<tr>
<td>Slide I/ O plate assembly</td>
</tr>
<tr>
<td>3AXD10000819777</td>
</tr>
<tr>
<td>3AXD500000352050</td>
</tr>
</tbody>
</table>
1. Cabinet heater location must be changed from the bottom plate to the side plate, see Figure 11.

2. Cut the old PE bus bar according to Figure 12.

3. If top exit option, it is also needed to cut the AC common bus bar according to Figure 13.
NOTE! When all cutting work done, clean the cabinet with vacuum cleaner!

4. Install two lead-through pre-assemblies, PE and support pre-assembly, see Figure 14. At the same time, pull the motor- and cables through lead-through.

5. Use the PE bar, support pre-assembly and two lead through pre-assemblies on the bottom plate as a drilling template and drill 10pcs Ø5.3 holes as in below Figure 15, then fix them with tapping screws.

Note: The temporary support part 3AXD50000027665 must be removed when installation done.
NOTE! When all cutting and drilling work done, clean the cabinet with vacuum cleaner!

6. Install the support parts, see Figure 16. For details refer to assembly drawings.

7. If switch option is selected, refer to the following steps.
   a) Install the connection bus bar to DC common bus bar, support pre-assembly Figure 17, and other related parts, see Figure 19.
   b) Install OT switch (-Q11) pre-assembly Figure 18 and other related parts, see Figure 20.
Figure 17. Support pre-assembly

Figure 18. Switch pre-assembly

Clean the contact areas of common bus bar with scouring pad or equivalent material!

Figure 19

Note! Before installing the connection bus bars, clean the contact area of the common bus bar with scoring pad or equivalent material!
c) Pull charging wire harness out the insulation cover in front of bus bar down switch, -Q11. Colligate them. Wiring route is shown in Figure 21. Bundle the control wire harness from OT aux. contactor on the top of assembly plate.

d) Install fuse plate pre-assembly, CMF pre-assembly, socket pre-assembly and other related parts. See Figure 22, Figure 23 and Figure 24. Refer to the Assembly drawings for details.

e) If NRCB option is in use, install the fuse base for it. See Figure 25.
f) Remove temporarily the two L-shape connection bus bars from CMF pre-assembly, install them back after the module installation, see Figure 25.

g) Route and fix wire harnesses of busbars to the front of fuse assembly plate, see Figure 21 and Figure 36.
8. **If fuse option**, install the bus bar support pre-assembly Figure 26, DC bus bar pre-assembly Figure 27 and the CMF pre-assembly Figure 25.

9. Install fuses and other related components. See Figure 28, refer to the Assembly drawing for details.

**Note!** Before installing the connection bus bars, clean the contact area of the common bus bar with scoring pad or equivalent material!
Note: Remove the two connection bus bars from CMF pre-assembly, install them back after module installation.

10. Install module supports, air baffles, etc. See Figure 34. Refer to assembly drawing for details.
11. If OT switch option, install charging resistor pre-assembly. See Figure 33, charging resistor pre-assembly.
12. If NRCB option in use, install NRCB and other related parts. See Figure 34. Refer to assembly drawing for details.
13. **If switch option**, route and attach wire harnesses.

a) Connect charging wire harness to -X12 socket. Connect -X11 plug and socket, and connect -X14 plug and socket if NRCB-01 option.

b) For -X14 socket assembly, please refer to Figure 35.

c) Bundle and route charging wire harness and control wire harness from OT switch. If NRCB-01 option assembled, bundle the supply wire harness. See Figure 36.
d) Bundle and route control wire harness into the duct in the top-front of cabinet. The wire harness route is shown in Figure 37.

Note: If DC fuse option only, bundle and route the wire harness from X50 according to Figure 37. Control wire harness from OT switch includes -X13 plug, check that the length is adequate before bundling and routing.

14. For bottom exit, install the quick connector pre-assembly and output terminal pre-assembly, see Figure 38 and Figure 39. Install protective covers and other parts, Figure 40. See Assembly drawing for details.
**Figure 38**, fast connector pre-assembly

**Figure 39**, output terminal pre-assembly.

**Figure 40**

**15. For top exit**, install module fast connector pre-assembly and connection bus bars for AC common bus bar. See Figure 41 and Assembly drawings for details.
16. Install the ramp plate, then push drive module into the cabinet, finally reinstall the bus bars removed from CMF pre-assembly, see Figure 42 and Assembly drawing.
17. **If switch option**, install the charging circuit pre-assembly, see Figure 43, Figure 44 and Assembly drawing for details.

---

**Note:** After module installation, store the ramp for service use!
5.1.3 Door installation

Note! In first ACS600 cabinet designs (called as MNS cabinet) the door hinges and locking hooks are different than in the latest ACS600 common cabinet design. In that case the old hinges and hooks must be replaced. Use template for drilling and self-tapping screws for hooks and hinges. See details in the door’s assembly drawing.

![Figure 45, door assembly for 600mm wide cabinet.](image)

5.1.4 Inlet filter installation

See chapter 5.2.4 Inlet filter installation.
5.2 ACA610 R10i to ACS880R 1xR8i retrofit

5.2.1 Remove the old hardware
Refer to old assembly drawings and remove the old hardware.

WARNING!
Follow the safety instructions in Electrical safety in installation, start up and maintenance on page 5.

WARNING! Make sure that there is no live voltage (AC/DC).

1. Re-confirm that there is no live voltage (AC/DC).
2. Remove door
3. Remove the protection shrouds.
4. Disconnect the communication cable of the old panel, then remove the old door with all accessories.
5. Disconnect the fuse-switch bus bar, remove the fuse-switch (or fuse base) with all accessories and bus bar from DC common bus bar to switch or fuse. Remove the related assembly plates.
6. Open the front cover of old module, disconnect the module input and output bus bars, remove the module, see Figure 46.
7. Remove the cooling fan, air baffle and supports, Relay K12, K13 (cooling fan monitor relay) and the wires.

8. Remove the module output bus bars and terminal bus bars. Remove the DU/DT option if exists and related bus bar, support parts. Keep the motor cable there. See Figure 47.

9. Mark and disconnect the cables of NDCU or RDCU, Figure 47.

Note! After this step, pull out the cables from bottom of the cabinet. If there is a firewall (fire break) underneath the cabinet, re-positioning of cables is needed due to that the lead through location is different in the new installation. After new lead through installed, pull the cables back. Refer to the assembly drawings for details.

10. Remove the assembly plate and related lead through plates. See Figure 48.

11. Leave other parts inside the old cabinet, including auxiliary components, bottom plate, DC-common bus bars, AC common bus bars if top exit and PE bus bar. See Figure 49, bottom exit. Refer to assembly drawings for details.
Figure 49, bottom exit

Figure 50, top exit
5.2.2 Install the ACS880R-10756 R8i kit for ACS610 R10i

NOTE! Follow the assembly procedure and the main mechanical assembly work from the mechanical assembly drawings. Assembly drawings are delivered with the retrofit product or can be found on SAP or DMS with the provided document codes.

**Note!** Mechanical assembly is done in conjunction with electrical installation. Make sure to read Chapter 6 *Electrical installation* before starting the retrofit installation.

### Main assembly drawings

<table>
<thead>
<tr>
<th>ACS880R-10756 R8i for ACA610 R10i w1000</th>
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</thead>
<tbody>
<tr>
<td><strong>SAP:</strong> 3AXD50000018449 3AXD10000348103</td>
</tr>
<tr>
<td><strong>DMS:</strong></td>
</tr>
<tr>
<td><strong>Door assembly</strong> 3AXD10000347352 3AXD50000018374</td>
</tr>
<tr>
<td><strong>Slide I/O plate assembly</strong> 3AXD10000819777 3AXD50000352050</td>
</tr>
</tbody>
</table>

1. Cabinet heater location must be changed from the bottom of the cabinet to the side plate. Use the heater as a drilling template. See Figure 51.

![Figure 51](image)

Figure 51

2. Cut the old PE bus bar according to the Figure 52.

3. If top exit option, it is also needed to cut the AC common bus bar according to Figure 53, see assembly drawings for details.
4. Use the plate 3AXD50000018714 as a template and drill 11pcs of Ø5.3 holes to the bottom plate. See Figure 54 and refer to assembly drawings for details.

NOTE! When all cutting and drilling work done, clean the cabinet with vacuum cleaner!

5. Install the beams, supports and other related parts as shown in below Figure 55. Install door hooks also in this step. See Figure 56 and Figure 57. Refer to the assembly drawings for more details.
6. Install pre-assembled lead-through plates for motor- and control cables. Install PE and support assembly, Figure 58, Figure 59, Figure 60, and Figure 61. Refer to assembly drawings for details. Pull the cables for motor and controls at the same time when installing lead-througs.

Figure 58, for control wires

Figure 59, for motor cables

Figure 60, PE and support pre-assembly

Figure 61

Temporary support part. Remove after assembly.
Note! The temporary part 3AXD50000027665 must be removed after installing PE and support pre-assembly.

7. Use the PE and support pre-assembly and two lead through pre-assemblies as a drilling template and drill 10pcs Ø5.3 holes as below pic shows, then fix them with tapping screws. See Figure 62.

8. **If fuse option**, install the bus bar support pre-assembly Figure 63, DC bus bar pre-assembly Figure 65, and CMF pre-assembly Figure 64. Install fuses and other related components, see Figure 66. Refer to assembly drawing for details.

   **Note! Before installing the connection bus bars, clean the contact areas of the common bus bars with scoring pad or equivalent material!**
Note: Remove the two connection bus bar from CMF pre-assembly, and install them back after the module installation.

9. **If OT switch option**, Install the connection bus bar to the DC common bus bar and install the bus bar support pre-assembly Figure 68, Figure 69 and other related parts. See Figure 70 and refer to assembly drawing.

**Note! Before installing the connection bus bars, clean the contact areas of the common bus bars with scoring pad or equivalent material!**
10. Install the OT switch (Q11.1) pre-assembly and insulating cover, see Figure 71 and refer to assembly drawing.

11. Pull charging wire harness out from the insulation cover in front of bus bar, below the switch -Q11 and bundle and fix them to anchor points. Follow the routing in Figure 72.

Polish the contact area on the old DC common bus bar with abrasive paper
Install the fuse plate pre-assembly, bus bars, fuses, socket pre-assembly and CMF pre-assembly. See Figure 73, Figure 74, Figure 75 and Figure 76. Refer to assembly drawing for details.

**Note:** Remove the two connection bus bars from CMF pre-assembly and install them back after the module installation.

When NRCB option selected, install the fuse base. See Figure 76, refer to assembly drawing.
14. Install the module supports, socket pre-assembly and other related parts. See Figure 77, Figure 78 and Figure 79. Refer to assembly drawings for details.

15. **If OT switch option,** install charging resistor pre-assembly, see Figure 80.

16. **If NRCB option,** install NRCB and other related parts. See Figure 81 and refer to assembly drawing for details.
17. **If OT switch option**, bundle and attach wire harness.

18. Connect charging wire harness to -X12 socket according to wire markings. Connect -X11 plug and socket, connect -X14 plug and socket, if NRCB-01 option in use.

19. Bundle the charging wire harness, control wire harness from OT switch and -NRCB if used, Figure 83.
20. Bundle control wire harness into the duct in the top-front of cabinet. The wire harness path is shown in Figure 84.

21. Bundle charging wire harness and control wire harness from OT switch, see Figure 84.

22. **If fuse option**, bundle the wire harness from -X50 terminal, Figure 84. Because control wire harness from OT switch includes -X13 plug, retain enough length before final anchoring.
23. **For bottom exit**, install the quick connector pre-assembly Figure 85, output terminal pre-assembly Figure 86, air guides and other related parts, Figure 87. Refer to assembly drawing for details.
24. **For top exit**, install quick connector pre-assembly, connection bus bars for AC common bus bar and other related parts. See Figure 88 and assembly drawing.

25. For BCU control board and components assembly, see Chapter 6.1.1 Control board BCU and components installation. Refer to assembly drawing and circuit diagrams.

26. Install the service ramp plate, then push R8i module into the cabinet, Figure 89. Install the DC bus bars to CMF assembly. Refer to assembly drawing.
Note! After module installation, store the ramp for service use!

27. **If switch option**, install the charging circuit pre-assembly and insulating cover, Figure 90, refer to assembly drawing.
28. **If bottom exit**, install shrouds, Figure 91. Refer to assembly drawing for details.

![Figure 91](image)

**5.2.3 Door installation w1000mm**

<table>
<thead>
<tr>
<th>Shroud 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brackets 12pcs</td>
</tr>
<tr>
<td>Shroud 2</td>
</tr>
</tbody>
</table>

**Note!** In first ACS600 cabinet designs (called as MNS cabinet) the door hinges and locking hooks are different than in the latest ACS600 common cabinet design. In that case the old hinges and hooks must be replaced. Use template for drilling and self-tapping screws for hooks and hinges. See details in the door’s assembly drawing.

1. Install the hooks and hinges. Use part 3AXD50000020180 as a drilling template (if MNS cabinet)
2. Install the new doors. The 1000mm kit includes two doors; 600mm and 400mm width. 600mm wide door has 4 different variants of cut outs depending on the selected options: OT switch and control panel. The 400mm door has one blank version. Refer to door’s assembly drawings for details.
3. Install new panel or blind block and switch handle (if OT option) to the door.
5.2.4 Inlet filter installation
Install the IP22-42 inlet filter with brackets to the door see Figure 93.

Note! It might be necessary to adjust slightly the the position of the side hooks with pliers if those does not fit properly to the slots.

Figure 92, 600+400mm door assembly with variants.

Figure 93
6 Electrical installation

Circuit drawings of for each configuration is provided with retrofit kit in paper copies and also in electrical format from Engineering Center. Drawing numbers may vary depending on the type and quantity of drive modules, selected options etc. Common page numbering of the electrical drawings as in the Table 1.

<table>
<thead>
<tr>
<th>Page</th>
<th>Description</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>001</td>
<td>Main circuit diagram</td>
<td>DC connection for INU and control board, OT/ Fuse, nxRxi</td>
</tr>
<tr>
<td>002</td>
<td>Main circuit diagram</td>
<td>E-Stop (Cat 1) +BCU I/O, nxRxi</td>
</tr>
<tr>
<td>017</td>
<td>Safety circuit</td>
<td>POUS (Old circuit +M/F link)</td>
</tr>
<tr>
<td>020</td>
<td>Control circuit</td>
<td>Aux power nxRx1, no UPS / UPS / with POUS</td>
</tr>
<tr>
<td>040</td>
<td>Inverter control unit</td>
<td>Main circuit / OT switch +BCU</td>
</tr>
<tr>
<td>043</td>
<td>Option circuit</td>
<td>FEN-31option</td>
</tr>
<tr>
<td>044</td>
<td>Option circuit</td>
<td>Fieldbus Fxxx-xx</td>
</tr>
<tr>
<td>046</td>
<td>Option circuit</td>
<td>Analog extension FIO-xx</td>
</tr>
<tr>
<td>061</td>
<td>POUS circuit diagram</td>
<td>No POUS option / Master drive / Follower drive</td>
</tr>
</tbody>
</table>

6.1 Installation

To do the electrical installation,

1. Connect the following:
   - motor cable
   - auxiliary supply wires
   - E-stop function
   - control wires
   - customer signals
   - connect PE
2. Measure the isolation resistance for the motor cable to PE.

6.1.1 Control board BCU and components installation

1. Ensure that old control board and other auxiliary control parts are removed on the DIN rail.
2. Drill 4pcs Ø4.5 holes, Figure 94 and Figure 95. Refer to assembly drawings for details.
3. Install the DIN rail and BCU components and other reused auxiliary control parts and move auxiliary power supply to new position, Figure 94.
4. Connections and options according to the circuit diagrams and ordered options.
6.1.2 Customer I/ O
To connect the customer I/ O wires, use the project specific circuit diagrams or the connection table provided by the Engineering Center.

6.1.3 Auxiliary voltage supply
Connect to the auxiliary power wires. Use the information in Table 2 and Table 3 to connect the auxiliary power supply.
Table 2: Auxiliary power connection with UPS.

<table>
<thead>
<tr>
<th>Retrofit Design number</th>
<th>Cabinet Design number</th>
</tr>
</thead>
</table>

Table 3: Auxiliary power connection without UPS.

<table>
<thead>
<tr>
<th>Retrofit Design number</th>
<th>Cabinet Design number</th>
</tr>
</thead>
<tbody>
<tr>
<td>-X21.1:211</td>
<td>-X25:211</td>
</tr>
<tr>
<td>-X21.1:201</td>
<td>-X25:201</td>
</tr>
</tbody>
</table>

6.1.4 Emergency stop connections

Use the information in Table 4 and Table 5 to connect E-stop function wires.

**Note!**
1. Before you begin the installation, clarify system options.
2. If the system uses E-stop cat0, +Q951, there is no need to connect them.
3. To avoid any accident, remove wires connected to -X25.x.

Table 4 E-stop function wires connections.

<table>
<thead>
<tr>
<th>Retrofit Design number</th>
<th>Cabinet Design number</th>
</tr>
</thead>
</table>

Table 5 E-stop feedback wires connections.

<table>
<thead>
<tr>
<th>Retrofit Design number</th>
<th>Cabinet Design number</th>
</tr>
</thead>
<tbody>
<tr>
<td>-X21.1:229</td>
<td>-X25:229</td>
</tr>
<tr>
<td>-X21.1:227</td>
<td>-X25:227</td>
</tr>
</tbody>
</table>
### 6.1.1 Operation shaft for switch disconnector

For the door and handle, it might be needed to cut the shaft(s) of the switch(es) to a suitable length. To cut and install the shaft properly, obey the instructions of the switch and handle manufacturer provided with the delivery package. Make sure that the shaft end meets the inner position of the handle properly. When installing the shaft, draw out the shaft a little to keep the red line roughly visible on shaft holder of switch side, then lock the position.

![Figure 96, OT shaft installation mark](image1)

![Figure 97, OS shaft installation mark](image2)
6.2 Precautions in case of TSU supply

A rule of thumb for ACS600 TSU: The sum capacitance of the inverters connected must be at least 30% of the sum capacitance of all inverters. If there is no enough capacitive load at start, the DC voltage will overshoot the controller voltage limit, causing an immediate change to regeneration.

Based on the ACS880 R8i charging method, the DC switch of ACS880 R8i could not be switched on without DC Power supply on DC link, so the ACS880 R8i module could not be connected to DC link prior starting the TSU supply. However, the TSU supply unit needs enough capacitance in the DC link for starting. To avoid above mentioned looping issue, an attenuator (NRCB-01) can be installed to DC link to play as capacitive load.

It is also needed to force the forward bridge to avoid activating reverse bridge of TSU during starting up.

To force the forward bridge, change the parameter 16.11 to FORWARD FORCE, or by a switch connected to DI8 of TSU control circuit, see below.

After having started TSU and R8i modules connected to DC bus bar, return TSU to normal mode.
7 Commissioning

Only certified engineers must adjust the drive parameters to meet the precise demands of the application. Make sure you consider safety issues related to the application.

Manuals mentioned below can be used for the commissioning:

- ACS880 primary control program firmware manual
- Quick start-up guide for ACS880 drives with primary control program
- ACS-AP-x Assistant control panels user's manual
8 Documentation

To install the product, obey the manufacturer's instructions, safety regulations and agreed functional requirements that are included in the following documentation.

8.1 Documents for the customer

- Electrical drawing of the module
- Electrical drawing of power supply connections
- Commissioning report
- Backup package of commissioning parameter setting

8.2 Documents for ABB

- Service report/Installation verification
- Commissioning report
- Parameter package

8.3 New type labels and stickers

Apply new type label and modernization stickers to the cabinet door. Follow the instruction document 3AXD10000962402 provided in the documentation package. Make sure the warning stickers are applied also as mentioned in the documentation.

- Apply "Modernized by ABB sticker" to the top left corner of the each drive/supply section, see example in Figure 99
- Apply type labels and warning stickers according to the document

Figure 99, position of modernization sticker
8.4 Registering the new installation to ABB Drives Installed Base (DIB)

It is important to register the new retrofit installation to ABB Drives Installed Base in order to keep the database- and customer fleet information up-to-date. Additionally by registering the new installation is possible to see the dedicated spare parts, preventive maintenance packages and other service products for the new serial number.

**NOTE! If registration not done, spare parts or PM packages for new installation are not visible.**

Note. Examples given in this document are from DIB test environment, thus might not represent the real installation.

### 8.4.1 Accessing to DIB

ABB Drives Installed Base is for ABB- or ABB partner employees use.

Go to the web site:


If no access, fill the access request form.

**NOTE!** It is recommended to submit access request form before the installation, e.g. in project planning phase, due to some delays might occur.

Additionally, it is recommended to find in advance the serial numbers from the database for which the retrofit installation is planned for. In the case old serial numbers are not found it is possible to report missing drives, see Figure 100.

**NOTE!** Some ACS600 drives might not be found from DIB.

Enter the needed info and wait for reply from DIB technical support team.

![Figure 100](image)

Use the Support menu if you need help in DIB features.

### 8.4.2 Registering the new installation

Find the original ACS600 multidrive by entering the serial number or by sales order. If the original multidrive is not registered do the registration first for it.
When drive found, double click to see details.

When the drive found, the **single drive module** or **multidrive unit or supply unit** can be replaced with new retrofit type code and serial number. Be aware of multiple levels of the component structure, drive units are below transport lengths.
Do not edit main ‘Single drive’ or ‘Multidrive’ or ‘Transport length’ level serial numbers!

NOTE! Double check that the old serial number and type code match the installation in question, do not proceed if unsure!

Figure 104, a drive unit of a multidrive

Enter new serial number from the new type label delivered with the retrofit kit and wait the new ‘Description’ and ‘Component code’ appears.

NOTE! Before clicking ‘Confirm’, double-check the serial number and the new type is correct, there is no “UN-DO” button if wrong serial number is entered!

When all clear, click confirm.

Check that the new retrofit type code and serial number appears to product structure, see example in below Figure 105.

Figure 105
Note! Do the registration also for the new installed ACS880R/U type!

This is important to do since the new installation is not automatically registered along with the main level serial number.

### 8.4.1 Services for the new installation

It is possible to see spare parts and PM packages by double clicking the serial number of the new retrofit type.

Go to the ‘Services’ tab and click ‘Refresh’ if items does not appear automatically.

![Equipment Details](image1)

Fill the commissioning report, upload it to DIB and prepare a copy for customer documentation.

![Service Reports](image2)
### Appendix 1: Basic I/O Re-connection Table

<table>
<thead>
<tr>
<th>Function</th>
<th>BCON</th>
<th>NIOC-01(RMIO)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>+VREF</td>
<td>1</td>
<td>1</td>
<td>+VREF, Reference Voltage +10V DC.</td>
</tr>
<tr>
<td>-VREF</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SH</td>
<td>3</td>
<td>2</td>
<td>AGND</td>
</tr>
<tr>
<td>Al1+</td>
<td>4</td>
<td>3</td>
<td>Al1+</td>
</tr>
<tr>
<td>Al1-</td>
<td>5</td>
<td>4</td>
<td>Al1-</td>
</tr>
<tr>
<td>Al2+</td>
<td>6</td>
<td>5</td>
<td>Al2+</td>
</tr>
<tr>
<td>Al2-</td>
<td>7</td>
<td>6</td>
<td>Al2-</td>
</tr>
<tr>
<td>Al3+</td>
<td>7</td>
<td></td>
<td>FIO-11 must be installed if Al3 was in use.</td>
</tr>
<tr>
<td>Al3-</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AO1+</td>
<td>1</td>
<td>9</td>
<td>AO1+</td>
</tr>
<tr>
<td>AO1-</td>
<td>2</td>
<td>10</td>
<td>AO1-</td>
</tr>
<tr>
<td>AO2+</td>
<td>3</td>
<td>11</td>
<td>AO2+</td>
</tr>
<tr>
<td>AO2-</td>
<td>4</td>
<td>12</td>
<td>AO2-</td>
</tr>
<tr>
<td>DI1</td>
<td>1</td>
<td>1</td>
<td>DI1, No Emergency Stop</td>
</tr>
<tr>
<td>DI2</td>
<td>2</td>
<td>2</td>
<td>DI2, Run Enable/If OT</td>
</tr>
<tr>
<td>DI3</td>
<td>3</td>
<td>3</td>
<td>DI3, Start Inhibit/If -A40</td>
</tr>
<tr>
<td>DI4</td>
<td>4</td>
<td>4</td>
<td>DI4, Start/Stop/Direction</td>
</tr>
<tr>
<td>DI5</td>
<td>5</td>
<td>5</td>
<td>DI5, Reset</td>
</tr>
<tr>
<td>DI6</td>
<td>6</td>
<td>6</td>
<td>DI6, Start/Stop/Direction</td>
</tr>
<tr>
<td>DIIL</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DIO1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DIO2</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DIOGND</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DIOGND</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>+24VD</td>
<td>5</td>
<td>7</td>
<td>24VD, When NOIC is used, if different power supply was used in DI5 and DI6, we have to relocate the DI5 and DI6 to DIO1 and DIO2 to avoid the power conflict.</td>
</tr>
<tr>
<td>DICOM</td>
<td>6</td>
<td>9</td>
<td>DGND(1), (DGND2), (DIIL), (Start Interlock)</td>
</tr>
<tr>
<td>+24VD</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DIGND</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>+24VI</td>
<td>1</td>
<td>1</td>
<td>24V</td>
</tr>
<tr>
<td>GND</td>
<td>2</td>
<td>2</td>
<td>GND(0V)</td>
</tr>
<tr>
<td>+24VI</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>GND</td>
<td>4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:** The content in “( )” presents the terminal definition of RMIO.
### Product scope table

<table>
<thead>
<tr>
<th>ACS600 drive section</th>
<th>Size</th>
<th>New module type</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACA 610-0265-3</td>
<td>R8i</td>
<td>ACS880-104-0470A-3</td>
<td>R8i</td>
</tr>
<tr>
<td>ACA 610-0335-3</td>
<td>R9i</td>
<td>ACS880-104-0640A-3</td>
<td>R8i</td>
</tr>
<tr>
<td>ACA 610-0405-3</td>
<td>R9i</td>
<td>ACS880-104-0640A-3</td>
<td>R8i</td>
</tr>
<tr>
<td>ACA 610-0500-3</td>
<td>R10i</td>
<td>ACS880-104-0760A-3</td>
<td>R8i</td>
</tr>
<tr>
<td>ACA 610-0325-5</td>
<td>R8i</td>
<td>ACS880-104-0440A-5</td>
<td>R8i</td>
</tr>
<tr>
<td>ACA 610-0395-5</td>
<td>R9i</td>
<td>ACS880-104-0590A-5</td>
<td>R8i</td>
</tr>
<tr>
<td>ACA 610-0495-5</td>
<td>R9i</td>
<td>ACS880-104-0590A-5</td>
<td>R8i</td>
</tr>
<tr>
<td>ACA 610-0610-5</td>
<td>R10i</td>
<td>ACS880-104-0740A-5</td>
<td>R8i</td>
</tr>
<tr>
<td>ACA 610-0375-6</td>
<td>R8i</td>
<td>ACS880-104-0340A-7</td>
<td>R8i</td>
</tr>
<tr>
<td>ACA 610-0485-6</td>
<td>R9i</td>
<td>ACS880-104-0530A-7</td>
<td>R8i</td>
</tr>
<tr>
<td>ACA 610-0600-6</td>
<td>R10i</td>
<td>ACS880-104-0530A-7</td>
<td>R8i</td>
</tr>
</tbody>
</table>
# Appendix 3: Tightening torques

Table 6. Tightening torques for ACS600 to ACS880 Retrofit

<table>
<thead>
<tr>
<th>Common use</th>
<th>Electrical Connection</th>
<th>Mechanical. Connection</th>
<th>Note!</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Combine screw/Hexagon bolt/Carriage bolt</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M3</td>
<td>0.5</td>
<td></td>
<td>Strength class 4.6...8.8</td>
</tr>
<tr>
<td>M4</td>
<td>1</td>
<td></td>
<td>Strength class 4.6...8.8</td>
</tr>
<tr>
<td>M4 (including torx tapping crew, self-clinching stud, draw hole)</td>
<td></td>
<td>2</td>
<td>Strength class 8.8</td>
</tr>
<tr>
<td>M5</td>
<td>4</td>
<td></td>
<td>Strength class 8.8</td>
</tr>
<tr>
<td>M5 (including torx tapping crew, self-clinching stud, draw hole)</td>
<td></td>
<td>3</td>
<td>Strength class 8.8</td>
</tr>
<tr>
<td>M6</td>
<td>9</td>
<td></td>
<td>Strength class 8.8</td>
</tr>
<tr>
<td>M6 (Torx tapping screw)</td>
<td>5 (Frame earthing)</td>
<td>5</td>
<td>Strength class 8.8</td>
</tr>
<tr>
<td>M6 (including draw hole)</td>
<td></td>
<td>5</td>
<td>Strength class 8.8</td>
</tr>
<tr>
<td>M8</td>
<td>22</td>
<td></td>
<td>Strength class 8.8</td>
</tr>
<tr>
<td>M10</td>
<td>42</td>
<td></td>
<td>Strength class 8.8</td>
</tr>
<tr>
<td>M12</td>
<td>70</td>
<td></td>
<td>Strength class 8.8</td>
</tr>
<tr>
<td>M16</td>
<td>120</td>
<td></td>
<td>Strength class 8.8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Special use</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Insulation supports for the frame and the bus bar</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Upper / Lower thread</th>
<th>MRP-code</th>
<th>Type</th>
<th>Nm</th>
</tr>
</thead>
<tbody>
<tr>
<td>M6</td>
<td>64610121</td>
<td></td>
<td>5/5</td>
</tr>
<tr>
<td>M8 / M8</td>
<td>09707301</td>
<td>NTGD 1N1</td>
<td>9/ 9</td>
</tr>
<tr>
<td>M8 / M8</td>
<td>64575945</td>
<td>D30 H30 M</td>
<td>9/ 9</td>
</tr>
<tr>
<td>M10 / M10</td>
<td>09707255</td>
<td>NTGB 1A4</td>
<td>18/18</td>
</tr>
<tr>
<td>M10 / M10</td>
<td>09707409</td>
<td>NTGM 1N1</td>
<td>18/18</td>
</tr>
<tr>
<td>M10 / M10</td>
<td>09707263</td>
<td>NTGB 1A8</td>
<td>18/18</td>
</tr>
<tr>
<td>M12 / M12</td>
<td>09707271</td>
<td>NTGB 1A15</td>
<td>31/31</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5. Set screw for fuses</th>
<th>Set Screw to fuse</th>
<th>Hex nut on the set screw</th>
<th>Bussman</th>
<th>Ferraz S.</th>
<th>Note!</th>
</tr>
</thead>
<tbody>
<tr>
<td>M8</td>
<td>Max. 5</td>
<td>20</td>
<td>13.5</td>
<td>Strength class 8.8</td>
<td></td>
</tr>
<tr>
<td>M10</td>
<td>Max. 5</td>
<td>40</td>
<td>26</td>
<td>Strength class 8.8</td>
<td></td>
</tr>
<tr>
<td>M12</td>
<td>Max. 5</td>
<td>50</td>
<td>46</td>
<td>Strength class 8.8</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>6. Cable lug</th>
<th>Electrical Connection</th>
<th>Note!</th>
</tr>
</thead>
<tbody>
<tr>
<td>M8</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>M10</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>M12</td>
<td>50</td>
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</tr>
</tbody>
</table>
# Appendix 4: Installation inspection template

## Sales order and position: 

## Serial number: 

## Date: 

<table>
<thead>
<tr>
<th>Missing parts</th>
<th>Reported</th>
<th>Delivered</th>
<th>Installed</th>
</tr>
</thead>
<tbody>
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</table>

## Busbar and cabling connections

All hidden busbar, cable and PE connections have been inspected and marked with white marker. After inspection connections have been marked with black marker.

General condition of materials. Quality errors and other.

Right tightening torques has been used for all busbar and cable connections.

## Mechanical inspection

All mechanical assembly parts and support structures have been properly attached. In case of frame retrofit, frame is properly attached to the cabinet.

Busbar bends, insulation supports, lead-throughs and connection point cleanliness has been inspected.

Input, output and PE busbars have the necessary safety stickers attached according to instructions.

Installed parts match the retrofit bill of material (BOM).

Modules and subassemblies have been properly installed.

Clearance and creepage requirements are fulfilled. (minimum distances 12.7 mm)

General appearance: All screws, cable conduits, etc. have been installed.

## Final inspection

<table>
<thead>
<tr>
<th>OK</th>
<th>Not Ok</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>
Cable marking are in place.

<table>
<thead>
<tr>
<th>Fuses are correct and match the bill of materials.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input, output and PE busbars have the necessary safety stickers attached according to instructions</td>
</tr>
<tr>
<td>Warning and serial number stickers have been placed according to instructions.</td>
</tr>
<tr>
<td>Cabinet door attachments have been properly installed and necessary PE connections are in place. Control panel, switches, etc.</td>
</tr>
<tr>
<td>Cable connections have been tested by pulling.</td>
</tr>
<tr>
<td>Optical cables are properly installed and routed. Proper bending radiuses have been followed.</td>
</tr>
<tr>
<td>Door functionality. Door cannot open when main switch is closed. OT switch shaft is correctly installed.</td>
</tr>
<tr>
<td>Relays have been correctly installed and are functional.</td>
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</tbody>
</table>

**Final inspection**

<table>
<thead>
<tr>
<th>OK</th>
<th>Not Ok</th>
<th>N/A</th>
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</table>

- Wiring done according to the electrical drawings.
- Transformer connections have been checked.
- Time relay settings are done according to circuit drawings.
- Insulation resistance test for motor cables is done.
- Fan functionality test. Fans are tested using paper slit to check air flow.
### Commissioning

<table>
<thead>
<tr>
<th></th>
<th>OK</th>
<th>Not Ok</th>
<th>N/A</th>
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<tbody>
<tr>
<td>Set inverter maximum output current limitation accordingly to original drive, cabinet and cabling dimensioning and motor power.</td>
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</tbody>
</table>

### Additional comments
Contact us

www.abb.com/drives

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