Installation manual
ACW600 Multidrive to ACS880LC Retrofit

ACS880R-107LCS6 Liquid Cooled Multidrive Retrofit
# List of related manuals and documents

## Multidrive module
- ACS880 liquid-cooled multidrive cabinets and modules safety instructions
  - Code (English): 3AXD50000048633
- ACS880-107LC inverter units hardware manual
  - Code (English): 3AXD50000196111
- ACS880-104LC inverter modules Hardware manual
  - Code (English): 3AXD50000045610
- ACS-AP-x assistant control panels user’s manual
  - Code (English): 3AUA0000085685

## Drive firmware manuals and guides
- ACS880 primary control program firmware manual
  - Code (English): 3AUA0000085967
- Quick start-up guide for ACS880 drives with primary control program
  - Code (English): 3AUA0000098062
- Drive composer start-up and maintenance PC tool user’s manual
  - Code (English): 3AUA0000094606
# Table of Contents

List of related manuals and documents ........................................................................................................................................................................................................................................................................2

1 Safety ..............................................................................................................................................................................................................................................................................................................5

1.1 General safety for installation, start-up and maintenance ...........................................................................................................................................5
  1.1.1 Work on the liquid cooling system ..............................................................................................................................................................................................6

1.2 Electrical safety in installation, start up and maintenance ...........................................................................................................................................7
  1.2.1 Additional instructions and notes .............................................................................................................................................................................................8
  1.3 Printed circuit boards .................................................................................................................................................................................................9

2 General Information ............................................................................................................................................................................................................10

3 Design and preparation work ....................................................................................................................................................................................................................11

3.1 Confirm Retrofit technical appendix information ..............................................................................................................................................11

3.2 Obtain documents and forms ...........................................................................................................................................................................................11

3.3 Obtain basic and special tools ..........................................................................................................................................................................................12

4 Material and parameter backup inspection on-site .........................................................................................................................................................13

4.1 Parameter backup ........................................................................................................................................................................................13

4.2 Inspect materials .................................................................................................................................................................................................13

5 Mechanical installation ......................................................................................................................................................................................................14

5.1 Remove the old hardware ........................................................................................................................................................................................................14

5.2 Install the new hardware ..................................................................................................................................................................................................16

5.3 Cabinet pressure testing after new hardware is installed ...........................................................................................................................................16
  5.3.1 Performing the pressure test ............................................................................................................................................................................................17

5.4 Installation Hints ........................................................................................................................................................................................................17

5.4.1 Axilock installation and tightening ..............................................................................................................................................................................18

5.4.2 Module cooling pipes installation ...........................................................................................................................................................................19

5.4.3 Module cooling pipes heating ...............................................................................................................................................................................20

6 Electrical installation ......................................................................................................................................................................................................21

6.1 Wirings routes .............................................................................................................................................................................................................21

6.2 Wires’ installation specific for the 5xR8i and 6xR8i ...................................................................................................................................................................................23

6.3 Wirings specific for DC-switch variant (+F286) .................................................................................................................................................................23

6.4 Heater (+G300) ........................................................................................................................................................................................................26

6.5 Lighting (+G301) ........................................................................................................................................................................................................26

7 Commissioning ...........................................................................................................................................................................................................27

8 Documentation .................................................................................................................................................................................................................28

8.1 Documents for the customer ..................................................................................................................................................................................................28

8.2 Documents for ABB ....................................................................................................................................................................................................28

8.3 New type labels and stickers ..................................................................................................................................................................................................28

8.4 Registering the new installation to ABB Drives Installed Base (DIB) .......................................................................................................................................29
  8.4.1 Accessing to DIB .....................................................................................................................................................................................................29
1 Safety

This section follows ABB Safety instructions for ACS880 multi drive cabinets and modules.

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.

![Diagram of a cabinet tipping over]

- Do not stand or walk on the cabinet roof. Make sure that nothing presses against the roof, side or back plates or door. Do not store anything on the roof while the drive is in operation.
- 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.
1. 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.

2. Make sure that debris from borings and grindings does not enter the drive during the installation. Electrically conductive debris inside the drive may cause damage or malfunction.

3. Make sure that there is sufficient cooling. See the technical data.

4. 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).

5. Before you adjust the drive operation limits, make sure that the motor and all driven equipment can operate throughout the set operation limits.

6. 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".

7. The maximum drive power cycles is once every 2 minutes. Power cycling the drive too often can damage the charging circuit of the DC capacitors.

8. Validate any safety circuits (for example, Safe torque off or emergency stop) in start-up. See separate instructions for the safety circuits.

### 1.1.1 Work on the liquid cooling system

These instructions are intended for all personnel that do installation, commissioning and maintenance work on the liquid cooling system.

**WARNING!**

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

- Use the required personal protective equipment. See the Safety data sheet for Antifrogen®L coolant by Clariant (www.clariant.com) for the instructions on the respiratory, hand and eye protection when handling the coolant.
• Beware of hot, high-pressure coolant (6 bar, max. 50 °C) that is present in the internal cooling circuit when it is in operation. Before you disconnect a pipe, release the pressure. Close the appropriate stop valve(s). If necessary, stop the cooling circuit pumps.

• Avoid skin contact with coolant. If coolant splashes onto the skin or in the eyes, rinse immediately with plenty of water. Do not syphon it by mouth. If you swallow or get it into the eyes, seek medical advice.

• Before the drive power up, make sure that the internal cooling circuit is filled up with coolant, and the cooling is in operation (coolant circulates). Safety instructions 13

• Make sure that coolant meets the ABB specification. See the appropriate hardware manual of the drive/unit.

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

• Do not drain coolant into the sewer system.

• If you need to store the drive in temperature below -15 °C (5 °F), drain the cooling circuit, or make sure that it is filled with the coolant specified by ABB.

• Drives with the cooling unit: Do not open the cooling unit pump inlet or outlet valves before filling up the coolant circuit. The pumps are filled with a mixture at the factory to prevent corrosion and the valves are closed at the factory.

• Drives with the cooling unit: Do not run the cooling unit pump dry.

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 and equipment

3. Disconnect all possible voltage sources. Lock out and tag out.
   - Open the main disconnecting device of the drive.
   - Open the charging switch if present.
   - Open the disconnector of the supply transformer. (The main disconnecting device in the drive cabinet does not disconnect the voltage from the AC input power busbars of the drive cabinet.)
   - Close the grounding switch or switches ([Q9], option +F259) if present. Do not use excessive force as the switch has electromagnetic interlocking.
● If the drive is equipped with a DC/DC converter unit (optional): Open the DC switch/disconnector ([Q11], option +F286) of the DC/DC converter. Open the disconnecting device of the energy storage connected to the DC/DC converter unit (outside the drive cabinet).

● Open the auxiliary voltage switch-disconnector (if present). Also open all other possible disconnecting devices that isolate the drive from dangerous voltage sources.

● In the liquid cooling unit (if present), open the motor protective circuit breaker(s) of the cooling pumps.

● If you have a permanent magnet motor connected to the drive, disconnect the motor from the drive with a safety switch or by other means.

● Make sure that re-connection is not possible. Lock out and tag out.

● Disconnect any dangerous external voltages from the control circuits.

● After you disconnect power from the drive, always wait 5 minutes to let the intermediate circuit capacitors discharge before you continue. Protect any other energized parts in the work location against contact.

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 (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.
   ● If you have a permanent magnet motor connected to the drive, make sure that the voltage between the drive output terminals (T1/U, T2/V, T3/W) and the grounding (PE) busbar is close to 0 V.

---

**WARNING!**
The busbars inside the cabinet are partially coated. Measurements made through the coating are potentially unreliable, so only measure at uncoated portions. Note that the coating does not constitute a safe or touch-proof insulation.

---

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.

1.2.1 Additional instructions and notes

---

**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.
- Make sure that the electrical power network, motor/generator, and environmental conditions agree with the drive data. Verify that the network voltage matches with the input voltage on the drive type designation label.

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

**Note:**

- The motor cable terminals of the drive are at a dangerous voltage when the input power is on, regardless of whether the motor is running or not.

- When the input power is on, the drive DC bus is at a dangerous voltage.

- External wiring can supply dangerous voltages to the relay outputs of the control units of the drive.

- The Safe torque off function does not remove the voltage from the main and auxiliary circuits. The function is not effective against deliberate sabotage or misuse.

### 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-107LCS6 is a multidrive solution that is used for retrofitting the old ACW610 products. The product consists of several pre-assemblies; however some loose parts are delivered. The example of cabinet layout after retrofit presented in figure 2.1.

This manual is applicable to the ACS880R-107LCS6 multidrive units. 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 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.

Figure 2.1. Cabinet layout after Retrofit (2-4xRI2i with DC-switch)
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 if applicable

3.1 Confirm Retrofit technical appendix information

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

- Type code of multi drive cabinet and type code of each inverter unit
- Verify the cabling variant (top or bottom, applies for auxiliary and motor cables)
- What is the auxiliary supply voltage?
- How is the communication to the upper level?
- What is the fieldbus type?
- What is the emergency stop and type?
- Where terminal block X25 is located? (Cabinet where located and corner of the cabinet where located (left/ right)
- 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 ACW600 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(s) (15-100 Nm)
- Power drill
- Adjustable pliers
- Socket set with drive 7-13 mm, sockets 8-21 mm
- Extension bars for torque wrench (500mm length needed in total)
- Torx T10, T20, T25, T30
- Screwdriver bit extension 150 mm
- Hex key 6mm (suitable for 15Nm torque wrench)
- Fork spanners 10-19 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
- Ratcheting PVC Cutters (tube sizes Ø8, Ø17 and Ø22)

**Special tools**

- Pressure tester (42000383 or equal)
- Lifter for lifting modules and other heavy equipment (3AXD50000047447 or equal)
  - W1000 conversion kit 3AXD50000699384 needed for 1xR12i 1000mm cabinet if lifter 3AXD50000047447 used
- Module service level (68847711)
  - W800 conversion kit 3AXD50000823307 needed if 1-4xR12i cabinet
4 Material and parameter backup inspection on-site

4.1 Parameter backup

Make sure that the latest backup of ACW600 is available for later commissioning use. If the ACW600 backup is not available at the office prior to decommissioning and installation, first complete the parameter backup and conversion, before you begin the installation.

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-107LCS6 Liquid Cooled Multidrive Retrofit, the following packages are delivered to the customer site:

- ACS880-104LC-0850A-7 modules (amount depends on drive type, see appendix 1)
- Packages with all mechanical and electrical parts and the pre-assemblies.
  - Including options, accessories and screws
  - 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 Remove the old hardware

Refer to old assembly drawings and remove the old hardware.

WARNING! Follow the safety instructions in chapter 1

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

1. Re-confirm that there is no live voltage (AC/DC).
2. Remove the door.
3. If there are customer wires, mark their connector ID for reconnecting them, then disconnect the customer wires from cabinet. You can also disassemble the cables. If possible, leave the connector terminals connected to ensure their correct reconnection.
4. Remove the other existing old hardware parts from the cabinet. Refer to “dismantled state of the cabinet” in step 1 of the relevant assembly drawing for the cabinet. See table 1.

5.1.1 Removing old DC-busbars cover plate

In old DC-busbar cover plate, there is one screw behind the plate. Screw can be removed with small wrench/screwdriver after the busbars, coming through the plate, are removed. See figures 5.1 and 5.2. screw is marked with red circle.

Figure 5.1: DC-busbars cover plate
Figure 5.2: DC-busbars
5.2 Install the new hardware

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.

Table 1 Main assembly drawings of ACS880R-107LCS6 Liquid Cooled Multidrive Retrofit

<table>
<thead>
<tr>
<th>SAP Code</th>
<th>DMS Code</th>
<th>Description</th>
<th>Type Designation</th>
<th>Cabinet width (mm)</th>
<th>Size/Rating/Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>3AXD50000799756</td>
<td>3AXD10001413097</td>
<td>LAYOUT DRAWING MAIN ASSEMBLY</td>
<td>2xR8iLC UNIT TOP</td>
<td>2000</td>
<td>1156A 2196A 3260A 4300A</td>
</tr>
<tr>
<td>3AXD50000803019</td>
<td>3AXD10001416494</td>
<td>LAYOUT DRAWING MAIN ASSEMBLY</td>
<td>2xR8iLC UNIT BOTTOM</td>
<td>3000</td>
<td>X</td>
</tr>
<tr>
<td>3AXD50000802968</td>
<td>3AXD10001416783</td>
<td>LAYOUT DRAWING MAIN ASSEMBLY</td>
<td>3xR8iLC UNIT</td>
<td>3800</td>
<td>x</td>
</tr>
<tr>
<td>3AXD50000756391</td>
<td>3AXD10001464198</td>
<td>ASSEMBLY DRAWING 2xR8iLC UNIT TOP</td>
<td>2xR8iLC UNIT</td>
<td>1000</td>
<td>X</td>
</tr>
<tr>
<td>3AXD50000755400</td>
<td>3AXD10001464098</td>
<td>ASSEMBLY DRAWING 3xR8iLC UNIT</td>
<td>3xR8iLC UNIT</td>
<td>800</td>
<td>x x x</td>
</tr>
<tr>
<td>3axd50000766611</td>
<td>3AXD10001464930</td>
<td>ASSEMBLY DRAWING 2xR8iLC UNIT</td>
<td>2xR8iLC UNIT</td>
<td>800</td>
<td>X</td>
</tr>
<tr>
<td>3AXD50000701391</td>
<td>3AXD10001464954</td>
<td>ASSEMBLY DRAWING EMPTY CABINET</td>
<td>600 MM CABLING SECTION</td>
<td>800</td>
<td>X X X</td>
</tr>
<tr>
<td>3AXD50000728565</td>
<td>3AXD10001311305</td>
<td>ASSEMBLY DRAWING 400 MM CABLING SECTION</td>
<td>400 MM CABLING SECTION</td>
<td>400</td>
<td>X</td>
</tr>
<tr>
<td>3AXD50000739370</td>
<td>3AXD10001335332</td>
<td>ASSEMBLY DRAWING 600 MM CABLING SECTION</td>
<td>600 MM CABLING SECTION</td>
<td>600</td>
<td>X X</td>
</tr>
</tbody>
</table>

5.3 Cabinet pressure testing after new hardware is installed

The purpose of the pressure test is to verify the sufficient tightness of the piping, joints, and other components of the cooling circuit. Test shall be always done with Antifrogen L 25/50% mixture and with proper pressure pump (42000383 or equal).

WARNING! Never perform pressure test with compressed air or other gasses due safety reasons!
5.3.1 Performing the pressure test
Fill up the internal circuit with Antifrogen L 25/50%-coolant. Bleed the circuit. Bleed the pumps separately through their bleed nipples. Raise the pressure to test specification 10 bar – note: at 6 bar, close expansion vessel valve V0003 in LCU unit ACS880R-1007LCS6 if it exists. After the test duration (15 minutes), check that the pressure remains at 10 bar. Check the circuit visually for leaks.

Table 2 Specifications for the pressure test

<table>
<thead>
<tr>
<th>Test description</th>
<th>Internal circuit: 10 bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test pressure</td>
<td>Internal circuit: 10 bar</td>
</tr>
<tr>
<td>Pressure tolerance</td>
<td>± 0.3 bar</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>20-25°C</td>
</tr>
<tr>
<td>Duration</td>
<td>Internal circuit: 15 min</td>
</tr>
<tr>
<td>Pass criteria</td>
<td>No visible leaks.</td>
</tr>
<tr>
<td></td>
<td>The pressure drops no more than 0.2 bar from initial test pressure.</td>
</tr>
</tbody>
</table>

5.4 Installation Hints

Be careful while installing sub-assemblies and parts which weigh more than 25kg. Use suitable lifting device. All parts and sub-assemblies weighting more than 25 kg are listed below. Heavy parts are also marked in the assembly drawings.

Table 3 Heavy parts of ACS880R-107LCS6 Liquid Cooled Multidrive Retrofit

<table>
<thead>
<tr>
<th>Item Code</th>
<th>Description</th>
<th>Type Designation</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3AXD50000715732</td>
<td>SUB-ASSEMBLY</td>
<td>OT SWITCH PRE-ASSEMBLY, 2xR8iLC</td>
<td>33.6</td>
</tr>
<tr>
<td>3AXD50000709663</td>
<td>SUB-ASSEMBLY</td>
<td>OT SWITCH PRE-ASSEMBLY, 3xR8iLC</td>
<td>47.7</td>
</tr>
<tr>
<td>3AXD50000751495</td>
<td>ELECTRICAL PART</td>
<td>INVERTER UNIT MODULE R8iLC</td>
<td>63</td>
</tr>
</tbody>
</table>
5.4.1 Axilock installation and tightening

In the design, TEEKAY, AXILOCK-S TYPE160.3 EPDM (68410509) -connector has been used in the steel pipe connections (main cooling pipes and LCU piping).

Axilock installation steps:

1. Clean the surface of the pipe in the joint area and remove any excess dirt.
2. Check that there are no deformations or depressions in the pipe in the connection area.
3. Center the pipe ends against each other and leave the recommended spacing between the pipe ends (0-5 mm)
4. Insert the connector into the second pipe
5. Align the pipes to be connected and pull the connector on the other pipe as well
6. Tighten both bolts alternately until the seal bites against the pipe. After this, do not turn the connector again to another position on the pipe.
7. Tighten both bolts alternately with a torque wrench until the torque indicated on the type plate is achieved (15 NM).

Figure 5.3: Example picture of Axilock
5.4.2 Module cooling pipes installation

Due manufacturing tolerances, module cooling pipes (see figure 5.4) are sometimes too long. When installing the module cooling pipes, verify that pipe length is appropriate, and pipes doesn’t interfere with door closing etc. In case of too long pipe, make pipe shorter by cutting it with appropriate pipe cutters.

**Note:** Cutting pipes with knife etc. sharp tool is not allowed since cutting surface will be uneven/crooked which can later cause liquid leakages. Pipes are only allowed to be cut with appropriate pipe cutters which are meant for plastic pipes (Ratcheting PVC Cutters).

*Figure 5.4: Module liquid cooling pipes*
5.4.3 Module cooling pipes heating

Plastic cooling pipes between main cooling pipes and cooling manifold (see figure 5.5.) can be challenging to install due high wall thickness in the pipes which makes them stiff. Therefore, one can carefully heat the plastic pipe ends with a heat gun, or other suitable device, to ease the pipe installation.

**Note:** Be careful that you don’t overheat the plastic pipe and cause any deformation to the pipe.

*Figure 5.5: Liquid cooling pipes between cooling manifold and main cooling pipes*
6 Electrical installation

NOTE: Electrical installation should be done in conjunction with mechanical installation.

6.1 Wirings routes

Installation of the wires needs to be made according to the circuit diagrams. Following instructions helps with installation routes of the wire and standard location of the components. Component location and wirings can vary in different deliveries.

In figure 6.1.1’s left side is shown the location of the main cable ducts, modules’ connectors, swing frame, fans’ connector and IO-plate. Right side shows the wiring routes inside the INU-cabinet.

![Image of wiring routes]

Figure 6.1.1: General look of the inverter unit’s cabinet and wiring routes inside the cabinet.

The swing frame is installed inside the cabinet at step 9 in the assembly drawings. Installation can be continued until step 14 where the upper shroud is installed. This shroud needs to be installed after the wire installations.

Inverter modules needs 230 V-power supply from terminals X16.x and fiber optic cables and safe torque off STO cables from control unit A41. The wiring routes are shown in the figure 6.1.2.
Figure 6.1.2: Wiring routes for the inverter modules.
The 230 V and 230 V UPS -circuits are distributed through the ACW600 cabinets in terminal blocks X25. In most cases every INU has its own X25 terminal. Connect the F13.x and F32.x to the X25 as in the electrical drawings. Wiring routes for these are shown in the figure 6.1.3.

Figure 6.1.3: Wiring routes for the auxiliary power supply of the inverter unit.
Cabinet fans’ power supply is wired from X14.x and control from K116.x as shown in figure 6.1.4.

Figure 6.1.4: Wiring routes for the module fans.
Wires to IO-plate in from of module fans are routed same way as wires to fans.
6.2 Wires’ installation specific for the 5xR8i and 6xR8i

In 3xR12i and 4xR12i ACW600 INU’s the retrofit is installed to 2 cabinets with modules. Following instructions includes the wires which are needed between these module cabinets.

Fan and heating control between:
+11.1-X22.1:122 – +11.2-X22.1:112
+11.1-X22.1:123 – +11.2-X22.1:120

Fan supply monitoring:
F14.2 – XDI.1:6

Safe torque off cable:
-T11.3-X51 – -T11.4-X52

24V Power supply:
+11.1-X22.1 – +11.2-X22.2

6.3 Wirings specific for DC-switch variant (+F286)

In the DC-switch variant +F286 there is main switch Q11.x in the DC circuit. Make sure the auxiliary contacts have been connected to the switch before installing the assembly to the cabinet. In the figure 6.3.1 is an example of the switch assembly from the 3D model.

The charging circuit is installed in its own assembly plate. Make sure the wires are connected to the components before installing the assembly plate inside the cabinet.
After installation of the charging circuit plate, connect the wires from the charging switch Q10.x to the DC busbars. The connection points are shown in the figures with yellow circles.

Figure 6.3.3: The connection points of the charging circuit to the DC busbars. Figure is from 2x-4xR12i’s model.

The shaft of the DC-switch’s handle is installed through the interlock K11.x. Move the cover of the shaft mechanism and locking screw from the DC-switch to the interlock. Make sure the rotation position of the interlock is in the same position as the switch’s position.
Figure 6.3.4: The interlock of the DC switch.

Charging controller is pre-installed to the swing frame. One controller is installed to each cabinet which have DC-switch option.

When the swing frame is installed in the cabinet, connect the wires from Q11.x, Q10.x and K11.x to terminal block X13.x. Also wire the charging status lamp P11.x to the door. All modules needs to be connected to the charging controller A11.x with fiber optic cables. Change the dip switch S1-3 on the charging control board according to the electrical drawings.

Figure 6.3.5: Wiring routes for the charging circuit.
6.4 Heater (+G300)

With the heater option +G300 install the heater assembly kit behind the module fans, to the left side of the cabinet. Location of the heater is presented in the figure 6.4.1

The heater is wired to the terminal block X15.x on the swing frame.

![Figure 6.4.1: Location of the heater kit in the 2-4xR12i INUs’ cabinets.](image)

6.5 Lighting (+G301)

With the lighting option +G301 install the door switch S130.x below the top beam of the cabinet. The switch is wired to the swing frame. The light H130.x itself is installed on top of the swing frame.

![Figure 6.5.1: The locations of the light and door switch in the 2-4xR12i INUs’ cabinets.](image)
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 3AUA0000085967
- Quick start-up guide for ACS880 drives with primary control program 3AUA0000098062
- ACS-AP-x Assistant control panels user's manual 3AUA0000085685
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 each drive/supply section, see example in Figure 1
- Apply type labels and warning stickers according to the document

Figure 1, 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 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 2.

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

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

![Report Missing Drives](https://businessapps.abb.com/sites/DrivesIB4/Pages/Default.aspx)

**Figure 2**

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.
Figure 5, a drive module of single drive

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 6, 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 7.

Figure 7

<table>
<thead>
<tr>
<th>Component code</th>
<th>Description</th>
<th>Serial number</th>
</tr>
</thead>
<tbody>
<tr>
<td>69611431</td>
<td>AC550MOMDREIVE</td>
<td>1654100097</td>
</tr>
<tr>
<td>69611466</td>
<td>TRANSPORT LENGTH 2</td>
<td>1654100090</td>
</tr>
<tr>
<td>69611467</td>
<td>TRANSPORT LENGTH 3</td>
<td>1654100091</td>
</tr>
<tr>
<td>69611440</td>
<td>TRANSPORT LENGTH 4</td>
<td>1654100098</td>
</tr>
<tr>
<td>69611441</td>
<td>TRANSPORT LENGTH 5</td>
<td>1654100093</td>
</tr>
<tr>
<td>69611491</td>
<td>TRANSPORT LENGTH 6</td>
<td>1654100097</td>
</tr>
<tr>
<td>3AD90000432073</td>
<td>ACS880R-107F6.178A-3</td>
<td>192003417</td>
</tr>
<tr>
<td>3AD9000048241</td>
<td>INVERTER MODULE</td>
<td>191274031</td>
</tr>
<tr>
<td>69620295</td>
<td>COMMUNICATION BOARD</td>
<td>A32004975</td>
</tr>
<tr>
<td>9427677</td>
<td>AUX. CONTACT FOR SWITCHES</td>
<td>9.7.2019</td>
</tr>
<tr>
<td>3AD90000011661</td>
<td>CHARGING CONTROL BOARD</td>
<td>G01056656</td>
</tr>
<tr>
<td>3AU00000008531</td>
<td>CONTROL PANEL KIT</td>
<td>93020715B</td>
</tr>
<tr>
<td>3AU00000010870</td>
<td>CONTROL PANEL KIT</td>
<td>93039224V</td>
</tr>
<tr>
<td>3AU27677</td>
<td>AUX. CONTACT FOR SWITCHES</td>
<td>9.7.2019</td>
</tr>
<tr>
<td>3AD90000027565</td>
<td>ASSEMBLY KIT</td>
<td>9.7.2019</td>
</tr>
<tr>
<td>3AD90000009422</td>
<td>FUSE SWITCH</td>
<td>9.7.2019</td>
</tr>
<tr>
<td>696135372</td>
<td>DRIVE UNIT 18kVA 17A 60kW</td>
<td>1654100013</td>
</tr>
<tr>
<td>69613394</td>
<td>DRIVE UNIT 18kVA 17A 60kW</td>
<td>1654100011</td>
</tr>
</tbody>
</table>

**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 do not appear automatically.
Fill the commissioning report, upload it to DIB and prepare a copy for customer documentation.
# Appendix 1: Product scope table

Table 4 Available types and ratings of standard ACS880-107LCS6 Retrofit for ACW610

<table>
<thead>
<tr>
<th>Old Drive type</th>
<th>Old Frame</th>
<th>ACW600 In</th>
<th>New module type</th>
<th>New frame</th>
<th>Retrofit type</th>
<th>ACS880R In</th>
</tr>
</thead>
<tbody>
<tr>
<td>690 V</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACW610-1050-6</td>
<td>1xR12i</td>
<td>874</td>
<td>ACS880-104LC-0850A-7</td>
<td>2xR8iLC</td>
<td>ACS880R-107LCS6-1156A-7</td>
<td>1156</td>
</tr>
<tr>
<td>ACW610-1390-6</td>
<td>1xR12i</td>
<td>1156</td>
<td>ACS880-104LC-0850A-7</td>
<td>2xR8iLC</td>
<td>ACS880R-107LCS6-1156A-7</td>
<td>1156</td>
</tr>
<tr>
<td>ACW610-1985-6</td>
<td>2xR12i</td>
<td>1661</td>
<td>ACS880-104LC-0850A-7</td>
<td>3xR8iLC</td>
<td>ACS880R-107LCS6-2196A-7</td>
<td>2196</td>
</tr>
<tr>
<td>ACW610-2625-6</td>
<td>2xR12i</td>
<td>2196</td>
<td>ACS880-104LC-0850A-7</td>
<td>3xR8iLC</td>
<td>ACS880R-107LCS6-2196A-7</td>
<td>2196</td>
</tr>
<tr>
<td>ACW610-2945-6</td>
<td>3xR12i</td>
<td>2465</td>
<td>ACS880-104LC-0850A-7</td>
<td>5xR8iLC</td>
<td>ACS880R-107LCS6-3260A-7</td>
<td>3260</td>
</tr>
<tr>
<td>ACW610-3900-6</td>
<td>3xR12i</td>
<td>3260</td>
<td>ACS880-104LC-0850A-7</td>
<td>5xR8iLC</td>
<td>ACS880R-107LCS6-3260A-7</td>
<td>3260</td>
</tr>
<tr>
<td>ACW610-5145-6</td>
<td>4xR12i</td>
<td>4300</td>
<td>ACS880-104LC-0850A-7</td>
<td>6xR8iLC</td>
<td>ACS880R-107LCS6-4300A-7</td>
<td>4300</td>
</tr>
</tbody>
</table>
# Appendix 2: Tightening torques

<table>
<thead>
<tr>
<th>Common use</th>
<th>Electrical Connection</th>
<th>Mechanical. Connection</th>
<th>Note!</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combine screw/ Hexagon bolt/ Carriage bolt</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>Insulation supports for the frame and the bus bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper / Lower thread</td>
<td>MRP-code</td>
</tr>
<tr>
<td>M6</td>
<td>64610121</td>
</tr>
<tr>
<td>M8 / M8</td>
<td>09707301</td>
</tr>
<tr>
<td>M8 / M8</td>
<td>64575945</td>
</tr>
<tr>
<td>M10 / M10</td>
<td>09707255</td>
</tr>
<tr>
<td>M10 / M10</td>
<td>09707409</td>
</tr>
<tr>
<td>M10 / M10</td>
<td>09707263</td>
</tr>
<tr>
<td>M12 / M12</td>
<td>09707271</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2. Set screw for fuses</th>
<th>Set Screw to fuse</th>
<th>Hex nut on the set screw</th>
<th>Note!</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Bussman</td>
<td>Ferraz S.</td>
</tr>
<tr>
<td>M8</td>
<td>Max. 5</td>
<td>20</td>
<td>13.5</td>
</tr>
<tr>
<td>M10</td>
<td>Max. 5</td>
<td>40</td>
<td>26</td>
</tr>
<tr>
<td>M12</td>
<td>Max. 5</td>
<td>50</td>
<td>46</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3. Cable lug</th>
<th>Electrical Connection</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>
## Appendix 3: 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>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Busbar and cabling connections</th>
<th>Ok</th>
<th>Not Ok</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>All hidden busbar, cable and PE connections have been inspected and marked with white marker. After inspection connections have been marked</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General condition of materials. Quality errors and other.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right tightening torques has been used for all busbar and cable connections.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mechanical inspection</th>
<th>Ok</th>
<th>Not Ok</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>All mechanical assembly parts and support structures have been properly attached. In case of frame retrofit, frame is properly attached to the cabinet.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Busbar bends, insulation supports, lead-throughs and connection point cleanliness has been inspected.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input, output and PE busbars have the necessary safety stickers attached according to instructions.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Installed parts match the retrofit bill of material (BOM).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modules and subassemblies have been properly installed.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clearance and creepage requirements are fulfilled. (minimum distances 12,7 mm)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General appearance: All screws, cable conduits, etc. have been installed.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final inspection</td>
<td>OK</td>
<td>Not Ok</td>
<td>N/A</td>
</tr>
<tr>
<td>------------------------------------------------------</td>
<td>----</td>
<td>--------</td>
<td>-----</td>
</tr>
<tr>
<td>Cable marking are in place.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuses are correct and match the bill of materials.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input, output and PE busbars have the necessary safety stickers attached according to instructions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Warning and serial number stickers have been placed according to instructions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cabinet door attachments have been properly installed and necessary PE connections are in place. Control panel, switches, etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cable connections have been tested by pulling.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Optical cables are properly installed and routed. Proper bending radiuses have been followed.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Door functionality. Door cannot open when main switch is closed. OT switch shaft is correctly installed.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relays have been correctly installed and are functional.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Final electrical inspection</th>
<th>OK</th>
<th>Not Ok</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wiring done according to the electrical drawings.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transformer connections have been checked.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time relay settings are done according to circuit drawings.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Insulation resistance test for motor cables is done.

Fan functionality test. Fans are tested using paper slit to check air flow.

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

Additional comments
Contact us

www.abb.com/drives

3AXD10001562793 Rev A (EN) 2021-10-21