### Safety instructions

**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 caps, safety glasses, protective gloves and long sleeves, etc.
- When the drive or connected equipment is energized, do not do any work on the drive, motor, motor cables or control circuits.
- Do not do any work on the drive when a rotating permanent magnet is connected. When a rotating permanent magnet energizes the drive, including its input and output power terminals.

**Electrical safety precautions**

1. Clearly identify the work location and equipment.
2. Discard all possible voltage sources. Make sure that re-connection is not possible. Lock out and tag out.
3. Open the main disconnecting device of the drive.
4. If you have a permanent magnet motor connected to the drive, disconnect the motor from the drive.
5. Disconnect any external power supplies from the drive circuit.
6. After you disconnect power from the drive, always wait 5 minutes to let the intermediate circuit capacitors discharge before you continue.
7. Protect any other energized parts in the work location against contact.
8. Take special precautions when close to bare conductors.
9. Measure that the installation is de-energized.
10. Use a multimeter with a minimum impedance of 1 Mohm.
11. Make sure that the voltage between the drive input power terminals (L1, L2, L3) and the ground (PE) is close to 0 V.
12. Make sure that the voltage between the drive output terminals (T1/U, T2/V, T3/W) and the ground (PE) is close to 0 V.
13. Make sure that the voltage between the drive DC terminals (R+/UDC+, UDC-) and the ground (PE) is close to 0 V.
14. If you have a permanent magnet motor connected to the drive, disconnect the motor from the drive.
15. Use a double-shielded twisted-pair cable for the analog signals.
16. Use a shielded cable for the power cables.
17. For more information, see the drive hardware manual.

### 3. Measure the insulation resistance

**Measuring the insulation resistance**

Measuring the insulation resistance is typically not required in North America.

**Drive:**
- Do not do voltage tolerance or insulation resistance tests on the drive, because this can cause damage to the drive.

**Input power cable:**
- Before you connect the input power cable, measure the insulation of the input power cable. Obey the local regulations.

**Motor and motor cable:**
- Make sure that the motor is connected to the motor and disconnected from the drive output terminals T1/U, T2/V and T3/W.
- Make sure that the voltage between the drive DC terminals (R+/UDC+, UDC-) and the ground (PE) is close to 0 V.
- Use a voltage of 1000 V DC to measure the insulation resistance between each phase conductor and the protective earth conductor. The insulation resistance of an ABB motor must be more than 100 Mohm (at 25°C/77°F). For the insulation resistance of other motors, refer to the manufacturer’s documentation. Minimize in the motor decreases the insulation resistance. If you think that there is moisture in the motor, dry the motor and do the measurement again.

### 4. Select the cables

**Input power cable:**
- Use symmetrical shielded cable (VFD cable) for the best EMC performance.

**Motor cables:**
- Use a double-shielded twisted-pair cable for the signals. Use a double-shielded twisted-pair cable for the motor cable. Do not do signal wiring for the motor cable.

**Control cables:**
- Use a double-shielded twisted-pair cable for the control cables. The shield is not sufficient for the protective grounding.

For more information, see the drive hardware manual.

### 5. Connect the power cables

**For instructions about wiring in conduits, see the drive hardware manual.**

### 6. Connect the communication module

**To install the communication module (I/O module or fieldbus module):**

1. Loosen the locking screws of the front cover. Then flip the front cover up.
2. Pull out the locking tab of the communication module.
3. Align the communication module with the contacts on the drive. Carefully push the module into position.
4. Push in the locking tab of the communication module.
5. Tighten the locking tab to fully attach and electrically ground the communication module.

### 7. Connect the control cables

**Connection procedure**

Keep the signal wire pairs twisted as near to the terminals as possible to prevent inductive coupling.

1. Strip a part of the shield of the control cable for grounding.
2. Use a cable tie to ground the outer shield to the grounding tab.
3. Strip the control cable conductors.
4. Connect the conductors to the correct control terminals.
5. Tighten the screws to 0.5 … 0.6 N·m (4.4 … 5.3 lb·in).
6. Connect the shields of the twisted pair and grounding conductors to the SCR terminal. Tightening torque: 0.5 ... 0.6 N·m (4.4 ... 5.3 lb·in).
7. Mechanically attach the control cables on the outside of the drive.
8. Close the front cover and tighten the locking screws.

### Default I/O connections (HVC default)

**Default I/O connections (HVAC default)**

<table>
<thead>
<tr>
<th>Port description</th>
<th>Port number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital input common for all digital inputs</td>
<td>IN2</td>
<td>Input 2</td>
</tr>
<tr>
<td>Analog input circuit common</td>
<td>IN1</td>
<td>Input 1</td>
</tr>
<tr>
<td>Analog output circuit common</td>
<td>OUT1</td>
<td>Output 1</td>
</tr>
<tr>
<td>Signal cable shield (screen)</td>
<td>SCR</td>
<td>Signal cable shield</td>
</tr>
<tr>
<td>SCR terminal</td>
<td>SCR</td>
<td>SCR terminal</td>
</tr>
<tr>
<td>SGND</td>
<td>SGND</td>
<td>SGND</td>
</tr>
<tr>
<td>Safe torque off. Factory connection. Both terminals are in the base unit</td>
<td>Safe torque off</td>
<td>Safe torque off</td>
</tr>
<tr>
<td>Auxiliary voltage output. The alternative to the auxiliary voltage output</td>
<td>AUX</td>
<td>Auxiliary voltage output</td>
</tr>
<tr>
<td>Embedded fieldbus (EIA-485)</td>
<td>Embedded fieldbus</td>
<td>Embedded fieldbus</td>
</tr>
<tr>
<td>Embedded fieldbus (optional)</td>
<td>Embedded fieldbus (optional)</td>
<td>Embedded fieldbus (optional)</td>
</tr>
<tr>
<td>1000 VDC, &gt; 100 Mohm</td>
<td>1000 VDC</td>
<td>1000 VDC</td>
</tr>
<tr>
<td>2A</td>
<td>2A</td>
<td>2A</td>
</tr>
<tr>
<td>250 WAC/300 VDC</td>
<td>250 WAC/300 VDC</td>
<td>250 WAC/300 VDC</td>
</tr>
<tr>
<td>2A</td>
<td>2A</td>
<td>2A</td>
</tr>
<tr>
<td>1000 VDC</td>
<td>1000 VDC</td>
<td>1000 VDC</td>
</tr>
<tr>
<td>2A</td>
<td>2A</td>
<td>2A</td>
</tr>
<tr>
<td>250 WAC/300 VDC</td>
<td>250 WAC/300 VDC</td>
<td>250 WAC/300 VDC</td>
</tr>
</tbody>
</table>

**For more information, see the drive hardware manual.**

### Frame size Tightening torques for the terminal connections

<table>
<thead>
<tr>
<th>Screw size</th>
<th>Tightening torque (N·m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M3</td>
<td>0.3 ... 0.35</td>
</tr>
<tr>
<td>M4</td>
<td>0.5 ... 0.6</td>
</tr>
<tr>
<td>M5</td>
<td>1.2 ... 1.5</td>
</tr>
<tr>
<td>M6</td>
<td>2.5 ... 3.7</td>
</tr>
<tr>
<td>M8</td>
<td>5.0 ... 6.3</td>
</tr>
<tr>
<td>M10</td>
<td>8.0 ... 10.0</td>
</tr>
<tr>
<td>M12</td>
<td>12.0 ... 15.0</td>
</tr>
<tr>
<td>M16</td>
<td>16.0 ... 20.0</td>
</tr>
<tr>
<td>M20</td>
<td>20.0 ... 25.0</td>
</tr>
<tr>
<td>M24</td>
<td>25.0 ... 30.0</td>
</tr>
</tbody>
</table>

**Drive terminal connections**

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1, L2, L3</td>
<td>Input power terminals</td>
</tr>
<tr>
<td>T1/U, T2/V, T3/W</td>
<td>Output power terminals</td>
</tr>
<tr>
<td>PE</td>
<td>Ground terminal</td>
</tr>
</tbody>
</table>

**Input power cable**

- For more information, see the drive hardware manual.

### Quick installation and start-up guide

**Quick installation and start-up guide**

1. **1. Move the locking part to the left.** If necessary, use a flat-head screwdriver.
2. **2. Move the locking part to the right.** Make sure that the drive is correctly installed.
3. **3. Release the locking button.** Move the locking part to the right.
4. **4. Put the drive onto the mounting surface.** Leave a clearance of 1 ... 3 mm (0.04 ... 0.12 in) between the drive and the installation surface.
5. **5. Tighten the mounting screws.**
Connecting EIA-485 embedded fieldbus to the drive

Connect the fieldbus to the EIA-485 embedded fieldbus terminal on the RIIO-01 module. The connection diagram is shown below.

Wiring diagram:
- Fieldbus controller
- Termination ON
- Fieldbus
- Termination OFF
- Fieldbus
- Termination OFF
- Fieldbus
- Termination ON

© 2020 ABB. All rights reserved.

For more information, refer to the online manuals applicable to this product:
- FPNO-21 PROFINET adapter module quick guide 3AXD50000158577
- FMBT-21 Modbus/TCP adapter module quick guide 3AXD50000158560
- FBIP-21 BACnet/IP adapter module quick guide 3AXD50000158171
- ACH480 quick installation and start-up guide 3AXD50000247141
- ACH480 HVAC control program firmware manual 3AXD50000247134

Warnings and faults

- **Fault A180**: Warning. Current calculation is done at the next start. Fault indicator set.
- **Fault A200**: Overcurrent. The output current is more than the internal limit. This can be caused by an earth fault or phase fault.
- **Fault A230**: Earth leakage. A load unbalance that is typically caused by an earth fault in the motor or the cable.
- **Fault A320**: Short-circuit. There is a short-circuit in the motor or the motor cable.
- **Fault A330**: Overload. The motor current is more than the internal limit. This can be caused by an earth fault or phase fault.

For information on the user interface, refer to the Main menu to configure the unit.

4. Configure fieldbus communication from the parameter list.

1. Connect the fieldbus cable and the required I/O signals. Refer to Default I/O and N2 protocols.

You can connect the drive to a serial communication link with a fieldbus adapter if required. Refer to the firmware manual.

- **Termination**: ON
- **A1**...**A4**: The device at both ends on the fieldbus must have termination set to ON.

9. Start up the drive

For information on the start-up and drive parameters, refer to the drive firmware manual.

**WARNING** Before you start up the drive, make sure that the installation is complete. Make sure that the cover of the drive is in place. Make sure also that the motor does not cause danger when it starts. Disconnect the motor from other machinery, if there is a risk of damage or injury.

For information on the user interface, refer to the ACx-AP-a assistant control panel user’s manual 3AXD50000085656 (English).

The control panel has softkeys below the display to access the corresponding commands and arrow keys to navigate the menu and change parameter values. Push the "?” button to open the help function.

First start-up:

Make sure that you have the motor data (from the name plate) available.

1. Set the main power on.

2. Select the user interface language with the arrow keys and set it with the right softkey (Next).

3. Select Commission the drive and push the right softkey (Next).

4. Select the location and push the right softkey (Next).

5. To complete the start-up procedure, enter the settings and values you are prompted by the set-up assistant.

You can also use primary settings in the Main menu to configure the unit.

Fieldbus communication

You can connect the drive to a serial communication link with a fieldbus adapter module or the embedded fieldbus interface. The embedded fieldbus system is isolated in the Drive and has a bus isolation of 1000 V DC between the input and output signals.

To configure BACnet MS/TP communication with the embedded fieldbus:

1. Connect the fieldbus cable and the required I/O signals. Refer to Default I/O connections (H/W default) and Connecting EIA-485 embedded fieldbus to the drive.

2. If the drive is at the end of the fieldbus, set the termination switch to ON.

3. Power up the drive.

4. Configure fieldbus communication from the parameter list.

Related documents

- ACH480 drives hardware manual 3AXD50000249349
- ACH480 HVAC control program firmware manual 3AXD50000247124
- ACH480 quick installation and start-up guide 3AXD50000247141
- ACx-AP-a assistant control panel user’s manual 3AXD50000085656
- FSB-32 BACnet/IP adapter module quick guide 3AXD50000158571
- FDNA-05 Devicenet adapter module quick guide 3AXD50000158515
- FENA-01/-11/-21 Ethernet adapter module user’s manual 3AXD50000093568
- FMBT-21 Modbus/TCP adapter module quick guide 3AXD50000158560
- FPBA-01 PROFIBUS DP adapter module user’s manual 3AXD50000158721
- FPND-21 PROFINET adapter module quick guide 3AXD50000158577

Free space requirements

- Frame size Above Below Sides
- H2...H4 2...3 2...3 2...3
- W2...W4 2...3 2...3 2...3
- D2...D4 2...3 2...3 2...3

Dimensions and weights

- Frame size H2 H2 W2 W2 D2 D2 M1 M1 M1 M1 M1 M1 M1 M1 M1 M1 Weight
- H2...H4 2...3 2...3 2...3 2...3 2...3 2...3
- W2...W4 2...3 2...3 2...3 2...3 2...3 2...3
- D2...D4 2...3 2...3 2...3 2...3 2...3 2...3

Declaration of conformity

ABB Declaration of Conformity (March 2020) 3AXD50000249349

List of ACH480 manuals