Safety instructions

Overview

This chapter states the general safety instructions that must be followed when installing and operating the AIMA-01 I/O Module Adapter.

The material in this chapter must be studied before attempting any work on the unit.

In addition to the safety instructions given below, read the complete safety instructions of the specific drive you are working on.

General safety instructions

**WARNING!** All electrical installation and maintenance work on the drive should be carried out by qualified electricians.

The drive and adjoining equipment must be properly earthed.

Do not attempt any work on a powered drive. After switching off the mains, always allow the intermediate circuit capacitors 5 minutes to discharge before working on the frequency converter, the motor or the motor cable. It is good practice to check (with a voltage indicating instrument) that the drive is in fact discharged before beginning work.

The motor cable terminals of the drive are at a dangerously high voltage when mains power is applied, regardless of motor operation.

There can be dangerous voltages inside the drive from external control circuits even when the drive mains power is shut off. Exercise appropriate care when working on the unit. Neglecting these instructions can cause physical injury or death.
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AIMA-01 I/O Module Adapter

Overview

The AIMA-01 I/O Module Adapter is an extension unit for the mounting of I/O extension modules, such as RDIO-01, RAIO-01 and RTAC-01, outside the drive unit. The AIMA-01 is connected to the drive via a DDCS-protocol fibre optic link. Up to three I/O extension modules can be mounted on one AIMA-01 adapter. Several AIMA-01 adapters can be connected in a ring topology using fibre optic cable.

Optical component types

ABB drive products in general utilise 5 and 10 MBd (megabaud) optical components from Agilent Technologies’ (Hewlett-Packard) Versatile Link range. Please note that the optical component type is not directly related to the actual communication speed. The AIMA-01 has both a 5 MBd and a 10 MBd component channel. Only one channel can be used at a time.

Note: The optical components (transmitter and receiver) on a fibre optic link must be of the same type.

Plastic optical fibre (POF) cables can be used with both 5 MBd and 10 MBd optical components. 10 MBd components also enable the use of Hard Clad Silica (HCS®) cables, which allow longer connection distances thanks to their lower attenuation. HCS® cables cannot be used with 5 MBd optical components. HCS® is a registered trademark of SpecTran Corporation.

The optical component types used in ABB drive equipment are presented in sub-section Settings and connections.

Cable length and optical power setting

Because of the narrow optical dynamic operating area of 5 MBd components, the optical power (light intensity) of the transmitters must be set in accordance to the cable attenuation, which in turn depends on cable type and length. Incorrect optical power can either underdrive or overdrive the receiver, resulting in a disturbed signal. It should also be noted that if the optical power is set too low or high, an initially working link may cause problems later, e.g. when the ambient temperature changes and the optical components age.

The wider dynamic range of 10 MBd components allows the use of maximum optical power regardless of cable length. However, this is not recommended since high transmitter current shortens its lifetime, and the additional heat generation in the driver components may lead to reduced reliability.

Each optical channel on the AIMA-01 has an individual rotary selection switch for the transmitter power setting. The position should be set depending on the cable type and length as explained under sub-section Settings and connections below.
Settings and connections

Layout

The following figure shows the layout and dimensions of the AIMA-01, indicating three slot positions and front components such as the diagnostic LED, fibre optic transmitter/receiver, power supply connector, fuse and selector switches.
Optical power (S1/S2)

Each fibre optic channel has a rotary selection switch on the circuit board of the AIMA-01 to select the optical power level and to disable the transceiver (TXD). The selector should be set according to the length (or attenuation) of the cable as shown below.

**Note:** Set the selector to the Disabled position on the disconnected channel to reduce heat generation.

---

<table>
<thead>
<tr>
<th>Optical component type</th>
<th>Transmission speed</th>
<th>Cable type</th>
<th>Cable length [m]</th>
<th>Optical power setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 MBd</td>
<td>1 MBit/s</td>
<td>POF</td>
<td>0.1 ... 5</td>
<td>Short</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(2) 5 ... 10</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(5) 10 ... 15</td>
<td>Long</td>
</tr>
<tr>
<td>2 or 4 MBit/s</td>
<td></td>
<td>POF</td>
<td>0.1 ... 4</td>
<td>Short</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(2) 4 ... 7</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(5) 7 ... 10</td>
<td>Long</td>
</tr>
<tr>
<td>10 MBd</td>
<td>–</td>
<td>POF</td>
<td>0.1 ... 5</td>
<td>Short</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.1) 5 ... 20</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.1) 5 ... 30</td>
<td>Long</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HCS®</td>
<td>0.1 ... 50</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.1) 50 ... 200</td>
<td>Long</td>
</tr>
</tbody>
</table>

Power supply (X1)

The AIMA-01 requires a supply voltage of 24 V DC ±10%. The connection is protected by means of fuse F1 and is galvanically isolated from earth and the logic circuitry.
Diagnostic LED
The diagnostic LED V1 on the circuit board of the AIMA-01 unit can be viewed on the front of the metal housing.

The +5V OK LED indicates that the logic circuitry of the AIMA-01 is receiving its supply voltages of 5 V and 24 V. This LED should be illuminated when the AIMA-01 is powered.

Fibre optic link connection
Connect the TXD connector of CH 1A or CH 1B to the RXD connector of the I/O Extension channel (see the drive documentation) of the drive. Connect the RXD connector of CH 1A or CH 1B to the TXD connector of the I/O Extension channel (see the drive documentation) of the drive.

Multiple AIMA-01 I/O Module Adapters are connected together in a ring topology as shown below.

Mechanical installation
The housing of the AIMA-01 unit has two spring-loaded fasteners for vertical or horizontal 35 × 7.5 mm DIN rail mounting. The mounting rail must be earthed to a noiseless earth. If the rail is not mounted on a properly earthed base, a separate earthing conductor must be used. The conductor must be as short as possible and its cross-sectional area must be 6 mm² at least. Note: No solid copper conductor may be used (stranded wire allowed only).

The unit should be mounted so that air can freely pass through the ventilation holes in the housing. Mounting directly above heat-generating equipment should be avoided.
The mounting of the I/O extension modules is shown in the figure below. Refer to the corresponding User’s Manuals.

**Technical data, AIMA-01**

**Housing:** Zinc-plated sheet steel  
**Dimensions:**  
Housing: 78 × 325 × 28 mm  
Circuit board: 70 × 220 mm  
**Mounting:** Onto 35 × 7.5 mm DIN rail  
**Power supply connection:**  
Voltage: 24 V DC ±10%  
Current consumption: Refer to I/O extension module’s User’s Manual.  
Fuse: TR5, T1 A (anti-surge)  
**Connectors:**  
CH 1A: Agilent Technologies (Hewlett-Packard) Versatile Link Series (5 MBd)  
CH 1B: Agilent Technologies (Hewlett-Packard) Versatile Link Series (10 MBd)  
Power supply: Detachable screw terminal block (Phoenix Contact MSTBA 2.5/2-G-5.08)  
**LED:**  
+5V OK (logic voltage OK)
Ambient conditions:

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

<table>
<thead>
<tr>
<th></th>
<th>Operation installed for stationary use</th>
<th>Storage in the protective package</th>
<th>Transportation in the protective package</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation site altitude</td>
<td>0 to 4000 m (13123 ft) above sea level</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Air temperature</td>
<td>0 to +50 °C (32 to 122 °F)</td>
<td>-20 to +70 °C (-4 to +158 °F)</td>
<td>-20 to +70 °C (-4 to +158 °F)</td>
</tr>
<tr>
<td>Relative humidity</td>
<td>5 to 95%</td>
<td>Max. 95%</td>
<td>Max. 95%</td>
</tr>
</tbody>
</table>

No condensation allowed. Maximum allowed relative humidity is 95% in the presence of corrosive gases.

Contamination levels (IEC 60721-3-3)

- **Boards without coating:**
  - Chemical gases: Class 3C1
  - Solid particles: Class 3S2

- **Boards with coating:**
  - Chemical gases: Class 3C2
  - Solid particles: Class 3S2

Atmospheric pressure

<table>
<thead>
<tr>
<th></th>
<th>0 to 106 kPa</th>
<th>0.7 to 1.05 atmospheres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vibration (IEC 60068-2)</td>
<td>Max. 1 mm (0.04 in.) (5 to 13.2 Hz), max. 7 m/s² (23 ft/s²) (13.2 to 100 Hz) sinusoidal</td>
<td>Max. 1 mm (0.04 in.) (5 to 13.2 Hz), max. 7 m/s² (23 ft/s²) (13.2 to 100 Hz) sinusoidal</td>
</tr>
<tr>
<td>Shock (IEC 60068-2-29)</td>
<td>Not allowed</td>
<td>Max. 100 m/s² (330 ft/s²), 11 ms</td>
</tr>
<tr>
<td>Free fall</td>
<td>Not allowed</td>
<td>250 mm (10 in.) for weight under 100 kg (220 lb) 100 mm (4 in.) for weight over 100 kg (220 lb)</td>
</tr>
</tbody>
</table>

**Degree of protection:** IP20

**EMC:** Complies with EMC standards EN 50081-2 and EN 50082-2.
Warranty and liability information

The manufacturer warrants the equipment supplied against defects in design, materials and workmanship for a period of twelve (12) months after installation or twenty-four (24) months from date of manufacturing, whichever first occurs. The local ABB office or distributor may grant a warranty period different to the above and refer to local terms of liability as defined in the supply contract.

The manufacturer is not responsible for

- any costs resulting from a failure if the installation, commissioning, repair, alternation, or ambient conditions of the drive do not fulfil the requirements specified in the documentation delivered with the unit and other relevant documentation
- units subjected to misuse, negligence or accident
- units comprised of materials provided or designs stipulated by the purchaser.

In no event shall the manufacturer, its suppliers or subcontractors be liable for special, indirect, incidental or consequential damages, losses or penalties.

If you have any questions concerning your ABB drive, please contact the local distributor or ABB office. The technical data, information and specifications are valid at the time of printing. The manufacturer reserves the right to modifications without prior notice.