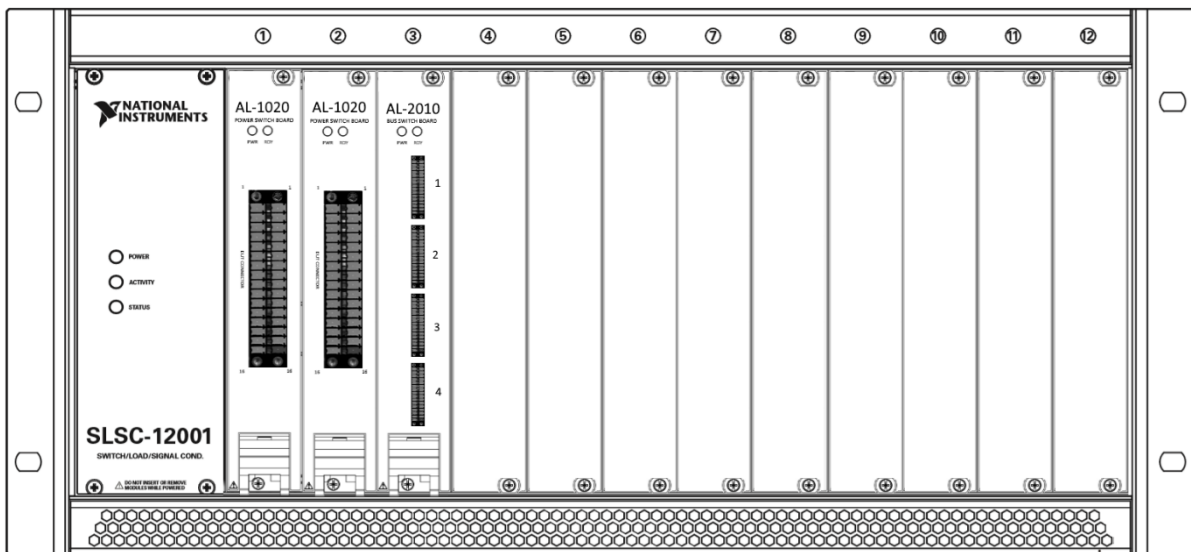


Power Switching Chassis

AL-1020U for SLSC

This document describes the ALIARO Powering Switching Chassis (AL-1020U) based on National Instruments SLSC-12001 Chassis.



Overview

The ALIARO Powering Switching Chassis (AL-1020U) provides the power and bus network switching used in a vehicle while also providing the ability to individually enable or bypass bus signals to each ECU.

The AL-1020U is made to fit National Instruments (NI) Switch Load Signal Conditioning (SLSC) system together with corresponding computer interface boards. Software control is achieved through a Python library, pre-delivered by Aliaro.

The main purpose of the unit is to supply a test system running multiple simultaneous test objects and to, by software, enable and disable the connected test objects.

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Description

The ALIARO Powering Switching Chassis (AL-1020U) provides switching on both power I/O and bus network channels by using the following SLSC modules:

- AL-1020, 12 channels Power Switch Board for SLSC
- AL-2010, 16 channels Bus Switch Board for SLSC

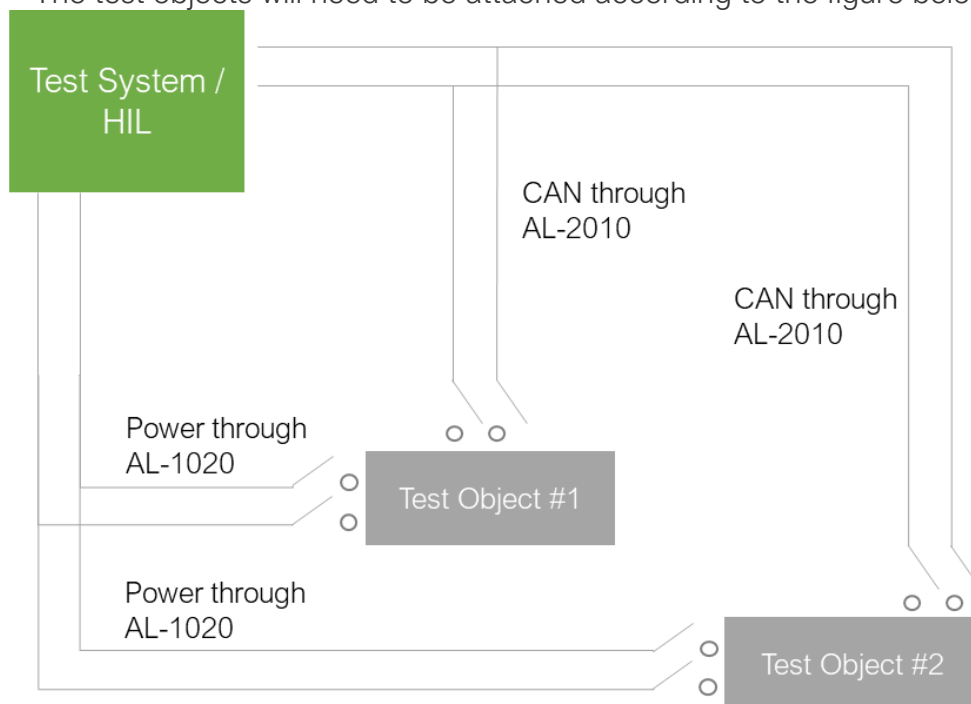
Depending on the amount of required test objects to be managed, the unit must be configured with the appropriate number of modules.

Detailed description

For additional information about the AL-1020 Power Switch Board and AL-2010 Bus Switch Board, visit Aliaro.com :

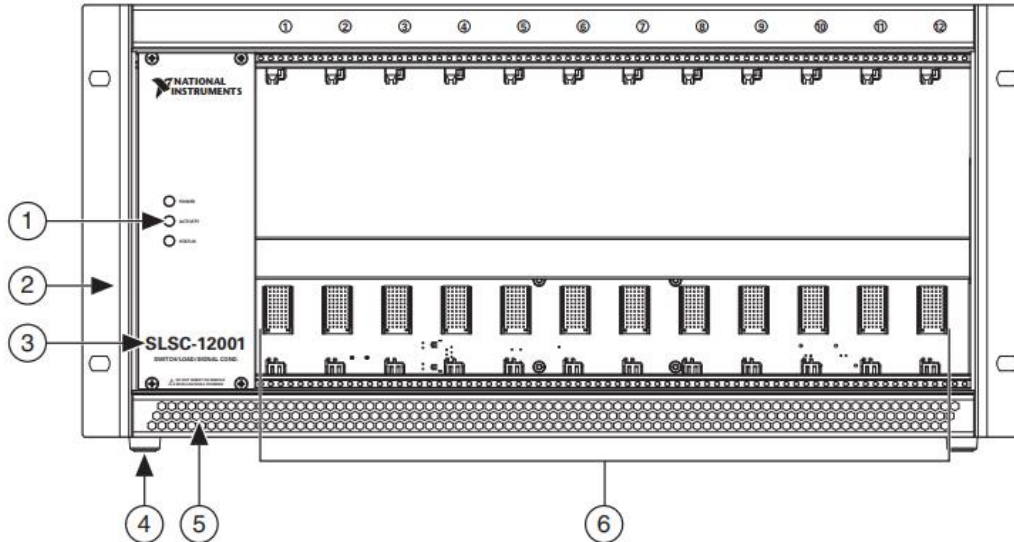
- [ALIARO AL-1020](#)
- [ALIARO AL-2010](#)

The test objects will need to be attached according to the figure below.



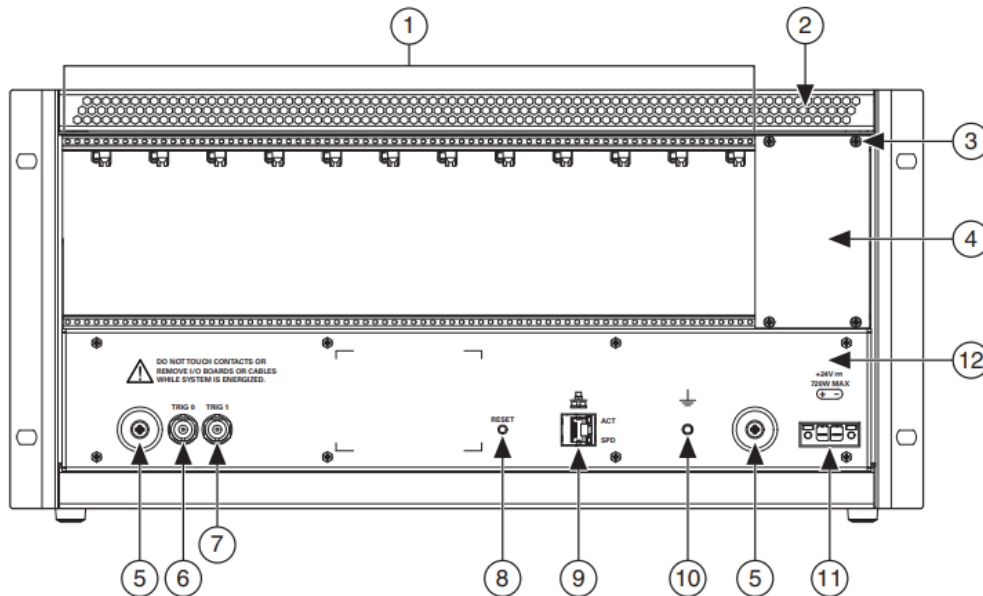
Chassis overview

Chassis Front View



- | | |
|------------------------------------|------------------------------|
| 1 POWER, STATUS, and ACTIVITY LEDs | 4 Chassis Feet (4) |
| 2 Mounting Bracket (2) | 5 Front Air Intake |
| 3 Chassis Model Name | 6 SLSC Peripheral Slots (12) |

Chassis Rear View



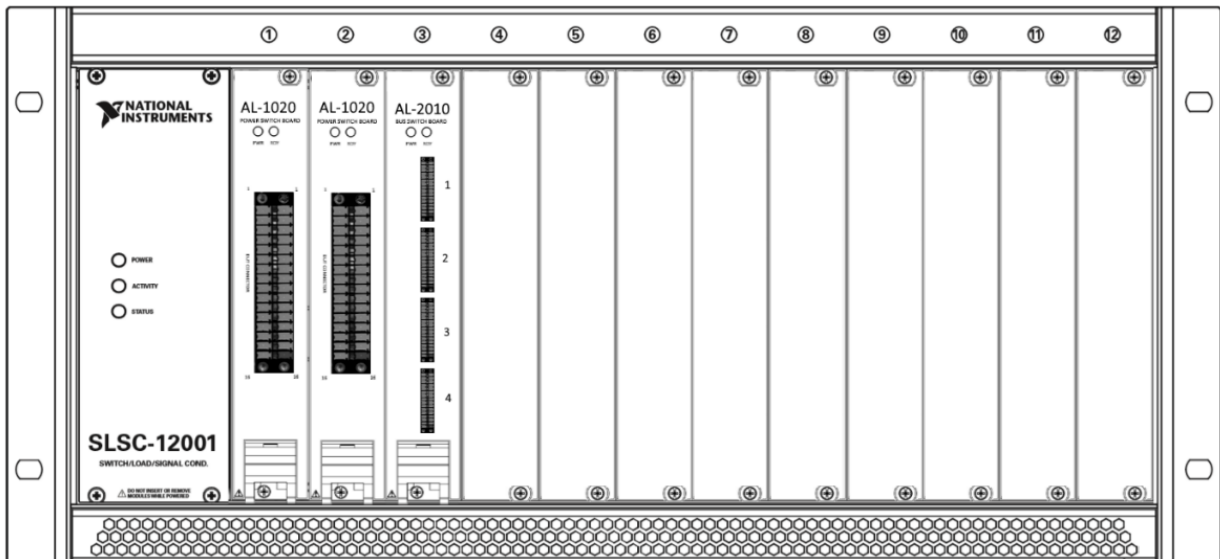
- | | |
|---------------------------------|-------------------------|
| 1 SLSC Peripheral Rear I/O Area | 7 Trigger 1 |
| 2 Rear Air Exhaust | 8 Button |
| 3 Upper Rear Panel Screws (4) | 9 Ethernet Port |
| 4 Upper Rear Panel | 10 Chassis Ground Screw |
| 5 Bumpers (2) | 11 DC Voltage Input |
| 6 Trigger 0 | 12 Backplane Panel |

Note - 11 requires connection with an external 24V power source

Aliaro reserve the right to vary from the description given in this data sheet and shall not be liable for any errors.

Customized chassis overview

- Slot 1: AL-1020 Power Switch Board
- Slot 2: AL-1020 Power Switch Board
- Slot 3: AL-2010 Bus Switch Board



Installation requirements

The following knowledge is required to install and run the Power Switch Unit:

- Basic electrical knowledge
- Average skills using the Python programming language

Chassis installation

Electromagnetic Compatibility

This product is intended for use in industrial locations. However, harmful interference may occur in some installations, when the product is connected to a peripheral device or test object, or if the product is used in residential or commercial areas. To minimize interference with radio and television reception and prevent unacceptable performance degradation, install and use this product in strict accordance with the instructions in the product documentation.

Furthermore, any modifications to the product not expressly approved by Aliaro could void your authority to operate it under your local regulatory rules.

Unpacking the module

- Carefully inspect the shipping container and the module for damage. Check for visible damage to the exterior and interior of the chassis. If damage appears to have been caused during shipment file a claim with the carrier. Retain the packing material for possible inspection and/or reshipment. If the chassis is damaged, promptly contact Aliaro and do not install it.

What You Need to Get Started

To set up and use the module you need the following items:

Hardware

- SLSC-12001 chassis
- SLSC module(s)
- Power cable
- Power input connector
- External 24V power source

Documentation

- Power Switch Unit Specification



Caution: Do not touch the contacts or remove the I/O boards or cables while the system is energized.

The SLSC chassis and the SLSC module do not support hot plug-in. The entire chassis must be powered off when a module is inserted or removed.

Installing additional modules

1. Caution Do not touch the contacts or remove the I/O boards or cables while the system is energized.
2. Power off the main DC power source or disconnect the power source from the chassis before installing any modules or RTIs.
3. Ensure that the chassis is powered off. The POWER LED should be off. If the POWER LED is not off, do not proceed until it is off.



Notice The AL-1020U chassis and the SLSC modules do not support hot plug-in. The entire chassis must be powered off when a module is inserted or removed.

4. Loosen the screws on the upper rear panel of the chassis.
5. Position the RTI backplane (if needed) at the desired slot and insert the securing screws, but do not fully tighten them.
6. Insert the SLSC module into the same slot as its corresponding RTI while firmly holding the RTI in place until the RTI is firmly connected to the module.
7. Repeat steps 4 and 5 for all required RTIs.
8. Fully tighten the screws for all RTIs and the upper rear panel of the chassis. Note Waiting until all RTIs and modules are installed to fully tighten the screws ensures proper alignment for future connections between modules and RTIs.
9. Fully tighten the two module mounting screws on each newly installed module.
10. Power on the AL-1020U chassis

Calibration

Recommended warm-up time	10 min
Calibration interval	Not required

Software installation

AL-1020U Chassis Configuration

The AL-1020U chassis can be configured through a web-interface. The web-interface can be used to configure settings such as:

- Network settings (IP-address, Subnet, Gateway, DNS)
- Device name

Since the chassis is based on the National Instruments SLSC-12001 Chassis, the interface is reached by entering its IP-address (default: 192.168.1.149) into a Microsoft Silverlight compliant web-browser. Please note that this currently excludes third party browsers such as Google Chrome, Mozilla Firefox, Safari etc.

Recommended browser is Internet Explorer.

Python Library

Contents

The chassis communicate over ethernet utilizing the supplied ALIARO Python driver library API. The library contains the following components:

- `pws_chassi.py` - Driver for the AL-1020U

Driver Installation

When the chassis is to be used, Aliaro drivers must be installed. The Power Switch Chassis Python library is available at Aliaro.se/download.

- Download, move and unzip the drivers to your current Python program directory (or use other absolute path import methods)
- Import the drivers to the application by using the import command in Python:
`import pws_chassi`

Methods definition / API

The Python driver is called by a user application that uses instances of respective module to call methods and manipulate the connected channels E.g. :

- Switching channels on the Power Switch Board on/off
- Connect/disconnect ECUs from the CAN-bus on the Bus Switch Board.



Each module is instantiated with the correct IP-Address (“url”) and module name (“devices”) parameters. The defaults for these are:

- “url” - **192.168.1.149**
- “devices” - **AL-1020U-XXX-ModY**
where X is the device serial number printed on the chassis and Y the slot number of the card (1-3).

The following API is available for each driver:

```
class PowerSwitchBoard(__builtin__.object)
```

Methods defined here:

```
__init__(self, url=None, devices=None)
```

Method for instantiating the PowerSwitchBoard class

```
get_digital_state(self, channel)
```

Method for reading the digital state of a channel

:param channel: 0..11

:return:

```
get_source(self, channel)
```

:param channel: (int32) 0..11

:return:

```
set_source(self, channel, source)
```

:param channel: (int32) 0..11

:param source: (int32) 0(Disabled)

1(Power_1)

2(Power_2)

:return:

Class BusSwitchBoard(__builtin__.object)

Methods defined here:

`__init__(self, url=None, devices=None)`

Method for instantiating the bsb class

`get_bus_configuration(self, bus)`

Gets the configuration of the bus

:param bus: (int32) 1..4

:return:

`get_bus_operation(self, bus, con)`

Gets the state of the bus.

:param bus: (int32) 1..4

:param con: (int32) 1..4

:return:

`set_bus_configuration(self, state, bus)`

Sets the configuration of the bus

NOTE! This configuration is only for balanced bus topology (CAN), NOT for serial such as K-line.

:param state: (int32) 0(Open),

1(Termination),

2(Daisychain),

3(NextBus)

:param bus: (int32) 1..4

:return:

`set_bus_operation(self, state, bus, con)`

Sets the state of the bus.

Aliaro reserve the right to vary from the description given in this data sheet and shall not be liable for any errors.

Executes command on one or more devices or physical channels.

:param command:

:param timeout:

:return:

get_property(self, prop)

Gets properties for devices.

:param prop:

:return:

get_property_physical_channels(self, prop, physical_channels)

Gets properties for physical channels.

:param prop:

:param physical_channels:

:return:

initialize_session(self)

Initializes an SLSC session.

:return:

reset_device(self)

Resets devices to default state. This method sends the specified modules a software reset signal, reinitialize module registers to their initial value, and rereads the module's non-volatile memory

:return:

set_host_devices(self, url, devices)

Method for updating the object-memory with communication settings

:param url:

:param devices:

:return:

Aliaro reserve the right to vary from the description given in this data sheet and shall not be liable for any errors.

`set_property(self, prop, value)`

Sets properties for devices or physical channels. You must commit dynamic properties for the changes

to take effect. You do not have to commit static properties. You can set only one property for one or multiple

devices or physical channels.

:param prop:

:param value:

:return:

`set_property_physical_channels(self, prop, physical_channels, value)`

Sets properties for devices or physical channels. You must commit dynamic properties for the changes

to take effect. You do not have to commit static properties. You can set only one property for one or multiple

devices or physical channels.

:param prop:

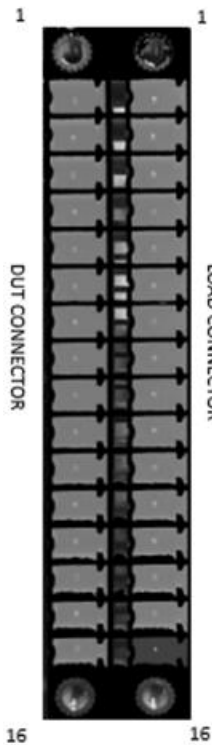
:param physical_channels:

:param value:

:return:

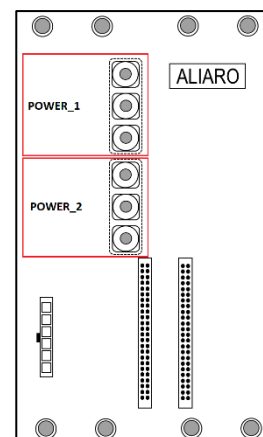
Connections

- Power Switch board:
The Power Switch board has connections for the 12 channels and the channel ground. For detailed descriptions see the [AL-1020 specification](#).



PORT	LEFT	RIGHT
1	CH 1	NC
2	CH 2	NC
3	CH 3	NC
4	CH 4	NC
5	CH 5	NC
6	CH 6	NC
7	CH 7	NC
8	CH 8	NC
9	CH 9	NC
10	CH 10	NC
11	CH 11	NC
12	CH 12	NC
13	CHANNEL_GND	NC
14	NC	NC
15	NC	NC
16	NC	NC

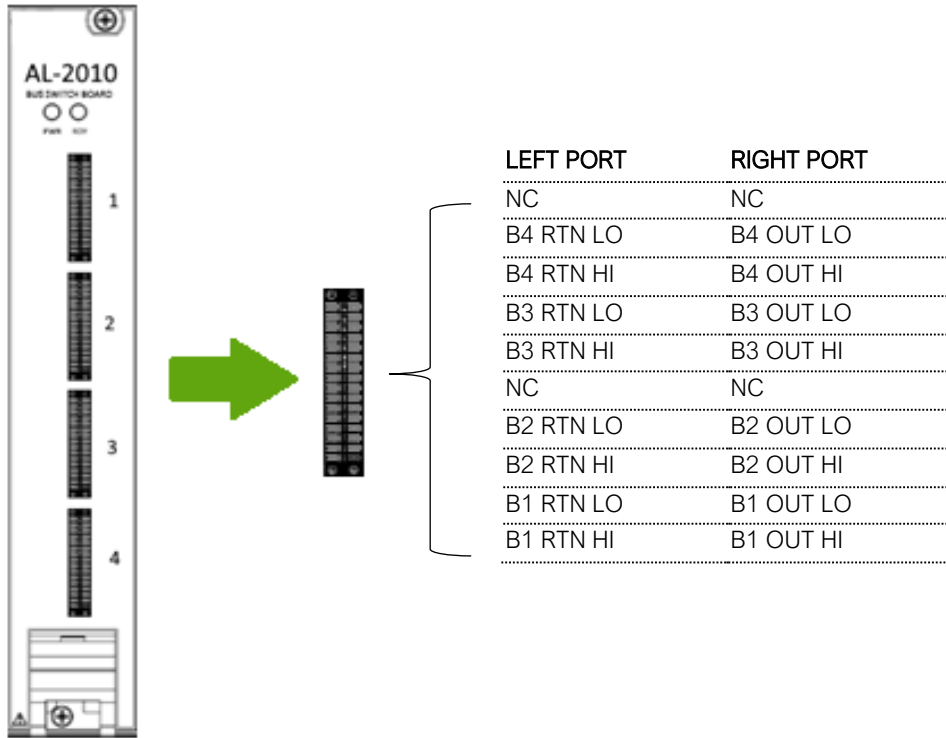
- Backplane POWER connections:
The backplane of the Power Switch boards has connections for POWER_1 and POWER_2. These come pre-fitted with copper plates and crimp connectors.



- Bus Switch board:
The board has connections for 16 CAN-buses distributed over 4 groups/connectors. Each CAN-bus requires a return connection to be formed to each ECU on respective "RTN" port pair.

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NOTE! The configuration of the AL-2010 in the Power Switching Chassis is a limited version of the complete AL-2010 Bus Switch Board for SLSC. For detailed descriptions of the full board see the [AL-2010 specification](#).



To address a specific CAN-bus, the Python driver references “con” and “bus”.

- Con – Which connection (1-4) on the board.
- Bus – Which bus pair (B1 – B4) on the connection. Note that both RTN and OUT must be connected to achieve proper functionality.

Specification

Definition and conditions

Warranted specifications describe the performance of a model under stated operating conditions and are covered by the model warranty.

The following characteristic specifications describe values that are relevant to the use of the model under stated operating conditions but are not covered by the model warranty.

- Typical specifications describe the performance met by a majority of models.
- Nominal specifications describe an attribute that is based on design, conformance testing, or supplemental testing.

Specifications are *Typical* unless otherwise noted.

Specifications are valid under the following conditions unless otherwise noted.

Aliaro reserve the right to vary from the description given in this data sheet and shall not be liable for any errors.

The SLSC modules is mounted in an AL-1020U chassis with the recommended cooling clearances and using a power supply that meets the specifications provided in the chassis user guide. For the entire temperature range of the chassis.



Note These specifications only apply to the product as provided by Aliaro. Modifications to the module may invalidate these. Be certain to verify the performance of modified modules.



Caution Observe all instructions and cautions in the user documentation. Using the model in a manner not specified can damage the model and compromise the built-in safety protection. Return damaged models to Aliaro for repair.

Environmental Characteristics

Temperature and Humidity

Operating temperature	0 °C to 40 °C
Storage temperature range	-40 °C to 85 °C
Operating relative humidity range	10% to 90%, noncondensing
Storage relative humidity range	5% to 95%, noncondensing

Safety Guidelines



Caution Ensure that hazardous voltage wiring is performed only by qualified personnel adhering to local electrical standards.



Caution Do not mix hazardous voltage circuits and human-accessible circuits on the same module



Caution When device terminals are hazardous voltage LIVE, you must ensure that devices and circuits connected to the device are properly insulated from human contact.



Caution All wiring must be insulated for the highest voltage used.

Product Certifications and Declarations

Refer to the product Declaration of Conformity (DoC) for additional regulatory compliance information. To obtain product certifications and the DoC for Aliaro products, visit ni.com/

Environmental Guidelines



Notice This model is intended for use in indoor applications only