ioThinx 4500 (45ML) Module Series User's Manual

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Technical Support Contact Information

www.moxa.com/support

Moxa Americas
Toll-free: 1-888-669-2872
Tel: +1-714-528-6777
Fax: +1-714-528-6778

Moxa China (Shanghai office)
Toll-free: 800-820-5036
Tel: +86-21-5258-9955
Fax: +86-21-5258-5505

Moxa Europe
Tel: +49-89-3 70 03 99-0
Fax: +49-89-3 70 03 99-99

Moxa Asia-Pacific
Tel: +886-2-8919-1230
Fax: +886-2-8919-1231

Moxa India
Tel: +91-80-4172-9088
Fax: +91-80-4132-1045

Safety Symbols

DANGER

Indicates a high-risk, imminently hazardous situation, which could result in death or serious injury.

WARNING

Indicates a moderate-risk, potentially hazardous situation, which may result in moderate to serious injury.

CAUTION

Indicates a low-risk, potentially hazardous situation, which may result in minor or moderate injury.

NOTE Indicates a potential malfunction, which will not result in damage to property.

INFORMATION This information is important for preventing errors.

Table of Contents

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Preface

In this chapter, we explain the scope of and how to use this document.

The following topics are covered in this chapter:

- **Revision History**
- **Relevant Models**
- **Package Contents**
- **How to Use This Device**
- **Safety Precautions**
- **Additional Resources**

Revision History

Version	Change	Date
v1.0	First release.	2020-07-06

Relevant Models

This document applies to the following 45ML modules:

Model Name	Features	Operating Temp.
45ML-5401	4 serial ports (RS-232/422/485 3-in-1)	-20 to 60°C
45ML-5401-T	4 serial ports (RS-232/422/485 3-in-1)	-40 to 75°C

Package Contents

The following items are included in the product package.

- 1 x 45ML module
- 1 x quick installation guide (printed)
- 1 x warranty card

How to Use This Device

45ML modules cannot be used as standalone devices. The modules must be used with an ioThinx 4500 Series head/CPU module. Refer to the appropriate ioThinx 4500 Series User's Manual for details.

NOTE Be sure to connect both the system and field power on the ioThinx 4530 series to the power supply; otherwise, the 45ML module may not work properly.

Safety Precautions

Observe the following safety precautions when installing or using the devices discussed in this document:

DANGER

Never work on the device while the power source is switched on! Disconnect all power sources to the device before performing any installation, repair, or maintenance work.

DANGER

To avoid causing electrical arcs, make sure that all power sources have been disconnected before removing or replacing components. Electrical arcs can cause explosions in areas that contain flammable substances. This warning applies when:

- Connecting or disconnecting the removable terminal block.
- Connecting or disconnecting the device from a field-site power source.

WARNING

Devices discussed in this document are sensitive to electrostatic discharge, which can cause internal damage to and/or affect normal operation of the devices. Observe the following precautions when handling a device:

- Before touching the device, touch a grounded object with your finger to discharge static electricity.
- Wear an approved grounding wristband.
- Do not touch connectors or pins on component boards.
- Do not touch circuit components inside the equipment.
- Use a static-safe workstation, if available.
- Store the device in appropriate static-safe packaging when not in use.

WARNING

Check the voltage supplied by the power source. Make sure the voltage provided by the power source matches the voltage required by the device.

WARNING

Check the voltage or current of the sensors or loads. Make sure the voltage and/or current indicated on the sensors or loads corresponds to the specifications of your 45ML module before you connect the device.

WARNING

Connect your device to an earthed ground.

CAUTION

Do not use the device if the device itself is already damaged. Replace defective or damaged devices to ensure that your devices function properly.

CAUTION

Do not attempt to repair the device yourself. If your device needs to be repaired, return the device to Moxa's customer service department. Attempting to repair the device yourself could invalidate the device's warranty.

Additional Resources

Refer to following documents for additional information.

- Datasheets for the following products:
  - ioThinx 4530 Series
  - ioThinx 4500 Series (45ML) Modules
- User's Manuals:
  - ioThinx 4530 Series Hardware User's Manual
  - ioThinx 4530 Series Linux User's Manual
- Programming Guide:
  - ioThinx 4530 Series Programming Guide

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Product Overview

In this chapter, we give an overview of each of the 45ML modules.

The following topics are covered in this chapter:

- **Technical Data**
  - Common Specifications
  - 45ML-5401 Specifications
- **Appearance**
  - Front View
  - Dimensions
- **LED Indicators**

Technical Data

Common Specifications

Physical Characteristics

Connector: Removable terminal block
Wiring: 18 to 24 AWG
Dimensions: 26.4 x 99 x 65.5 mm (1.04 x 3.90 x 2.58 in)
Installation: DIN-rail mounting

Environmental Limits

Operating Temperature:
Standard Models: -20 to 60°C (-4 to 140°F)
Wide Temp. Models: -40 to 75°C (-40 to 167°F)

45ML-5401 Specifications

Serial Communication

Interface: 4 RS-232/422/485 ports, software selectable
Isolation: 3k VDC or 2k Vrms

Serial Communication Parameters

Parity: None, Even, Odd
Data Bits: 7, 8
Stop Bits: 1, 2
Flow Control: RTS/CTS (RS-232 only), XON/XOFF
Pull High/Low Resistor for RS-485: 10 kilo-ohm
Baudrate: 300, 600, 1200, 1800, 2400, 4800, 9600, 19200, 38400, 57600, 115200 bps

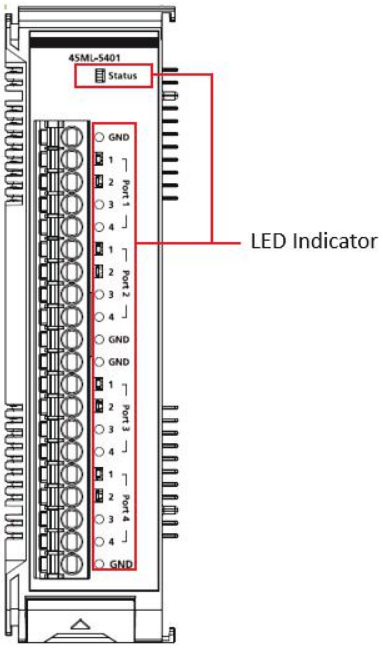
Serial Signals

RS-232: TxD, RxD, RTS, CTS, GND
RS-422: Tx+, Tx-, Rx+, Rx-, GND
RS-485-2w: Data+, Data-, GND

Note: Up to 5 45ML-5401 modules can be used at the same time.

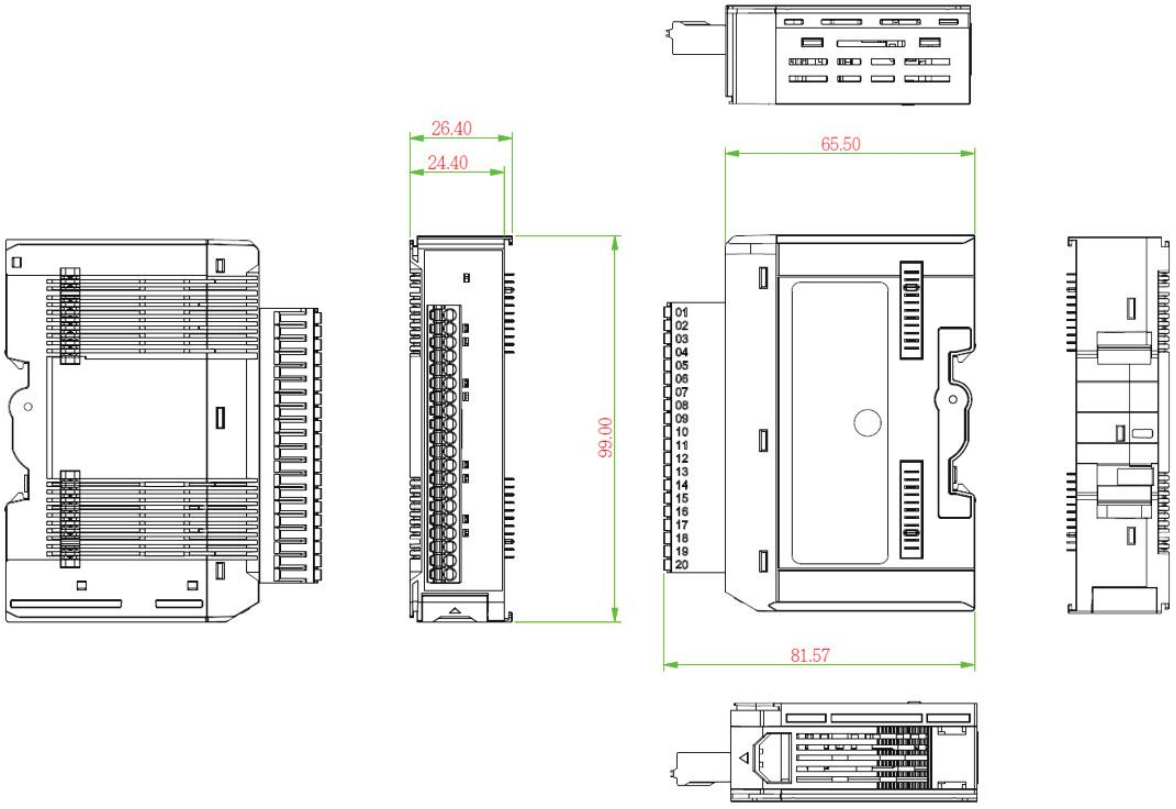
Appearance

Front View

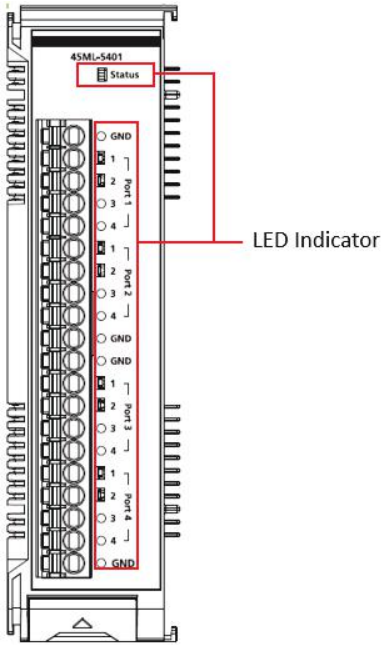


Dimensions

Unit: mm (inch)



LED Indicators



Label	Usage	No. of LEDs	LED Color	Description
Status	Status	1	Green	Steady on: Module ready Slow Blinking: Booting up
			Red	Steady on: Module error Slow Blinking: Upgrading firmware
			Off	Power off
Port 1, Port 2, Port 3, Port 4	Serial connection	2 of each	Green	Transmitting data(Tx)
			Amber	Receiving data(Rx)
			off	Disconnected or data is not being transmitted

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Hardware Installation

In this chapter, we describe how to install the 45ML modules.

The following topics are covered in this chapter:

- **Module Specifications**
  - Terminal Blocks
  - 45ML-5401
- **Mounting the Module**
  - Installing the Module on the DIN Rail
  - Unmounting the I/O Module from the DIN Rail

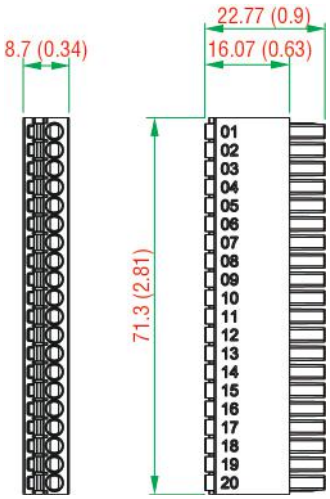
Module Specifications

Terminal Blocks

Wire range: 18 to 24 AWG

Wire strip length: 9 to 10 mm

Unit: mm (in.)



45ML-5401

Pin Assignment

The following tables shows the 45ML-5401 pin assignments.

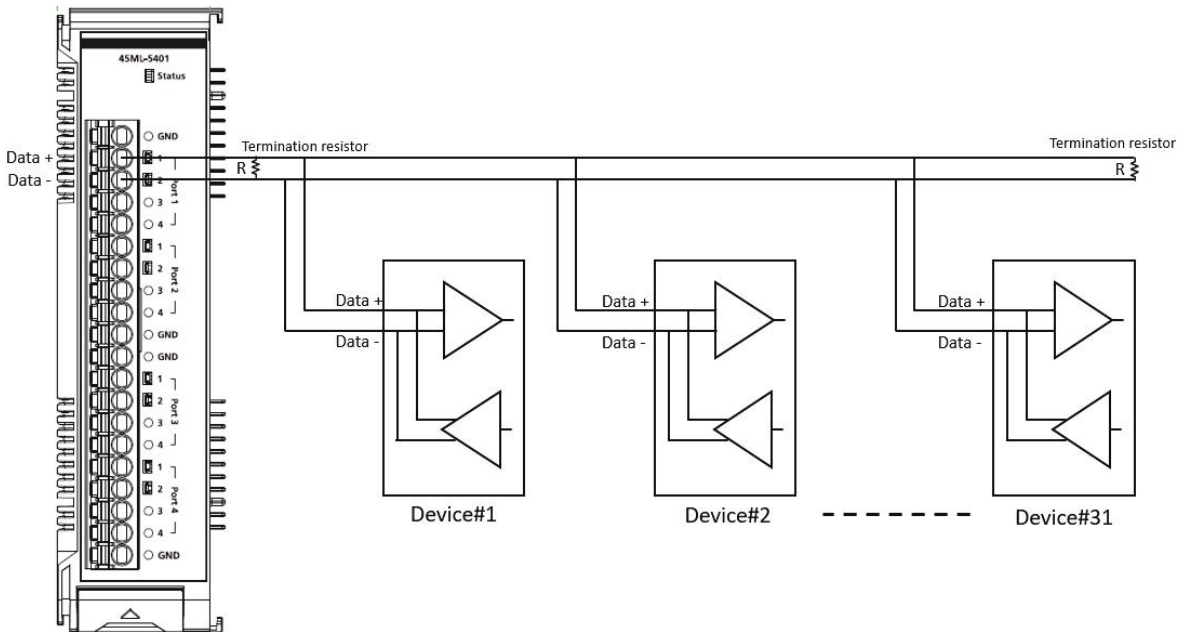
	Pin	RS-232	RS-422	RS-485		Pin	RS-232	RS-422	RS-485
	1	GND	GND	GND		11	GND	GND	GND
Port 1	2	TxD1	TxD1+	Data1+	Port 3	12	TxD3	TxD3+	Data3+
	3	RxD1	TxD1-	Data1-		13	RxD3	TxD3-	Data3-
	4	RTS1	RxD1+	–		14	RTS3	RxD3+	–
	5	CTS1	RxD1-	–		15	CTS3	RxD3-	–
Port 2	6	TxD2	TxD2+	Data2+	Port 4	16	TxD4	TxD4+	Data4+
	7	RxD2	TxD2-	Data2-		17	RxD4	TxD4-	Data4-
	8	RTS2	RxD2+	–		18	RTS4	RxD4+	–
	9	CTS2	RxD2-	–		19	CTS4	RxD4-	–
	10	GND	GND	GND		20	GND	GND	GND

Setting Up Termination Resistors

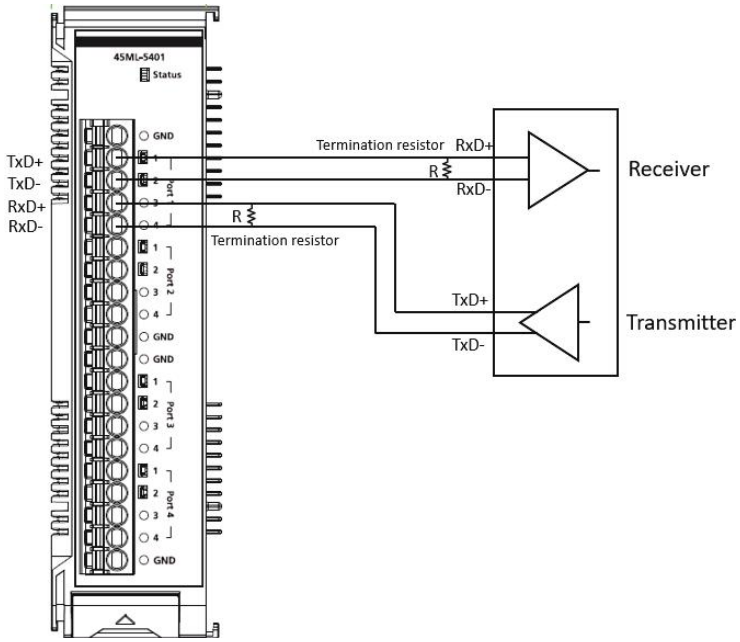
When setting up your RS-485 and RS-422 networks for long-distance communication, you should use termination resistors to prevent signal reflections. The following figures illustrate how to properly configure termination for a 2-wire RS-485 network, and an RS-422 network.

The 45ML-5401 Series comes with 10 kilo-ohm pull-high/low resistors built in. You will usually only need to install termination resistors (typically 120 Ω) on the first and last devices on your network.

Setting Up Terminators for a 2-wire RS-485 Network



Setting Up Terminators for an RS-422 Network



Mounting the Module

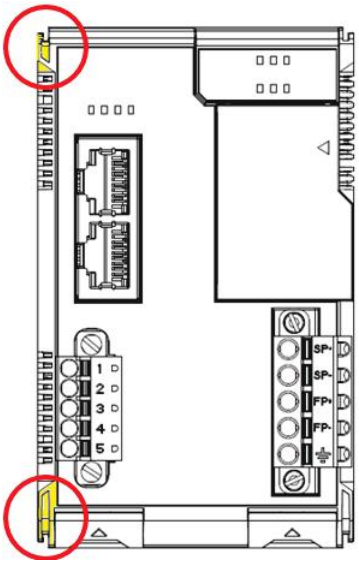
Take the following steps to mount the device on or unmount the device from a DIN rail.

DANGER

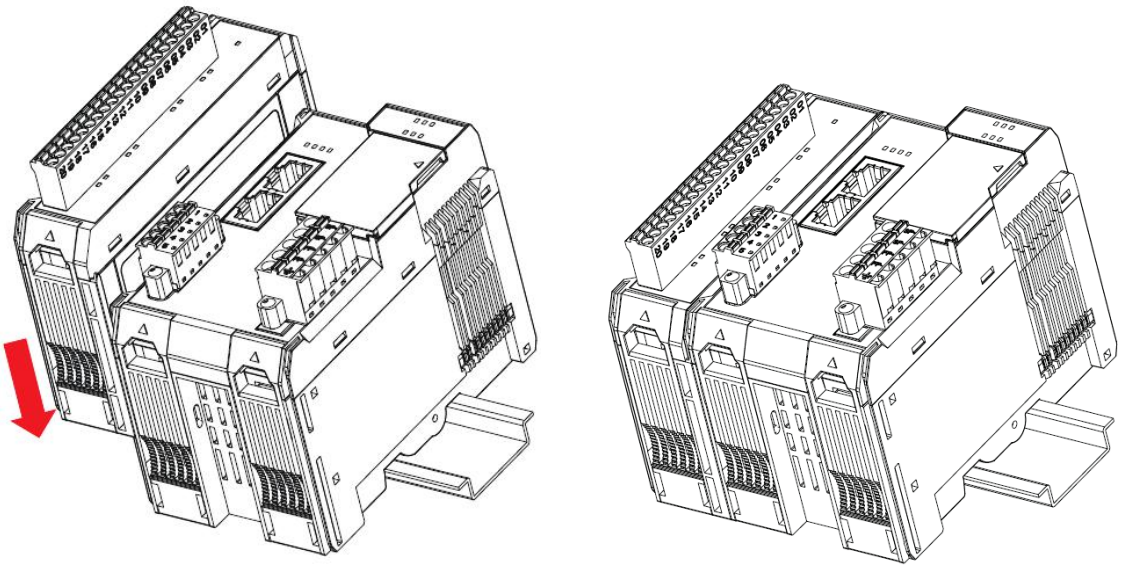
Never install the device when the power source is switched on!

Installing the Module on the DIN Rail

Step 1: Align the I/O module side by side with the head/CPU module, making sure that the upper and lower rails are hooked together.



Step 2: After aligning the I/O module side by side with the network module, push the I/O module until it touches the DIN rail. Next, apply more force until the module clips to the DIN rail.

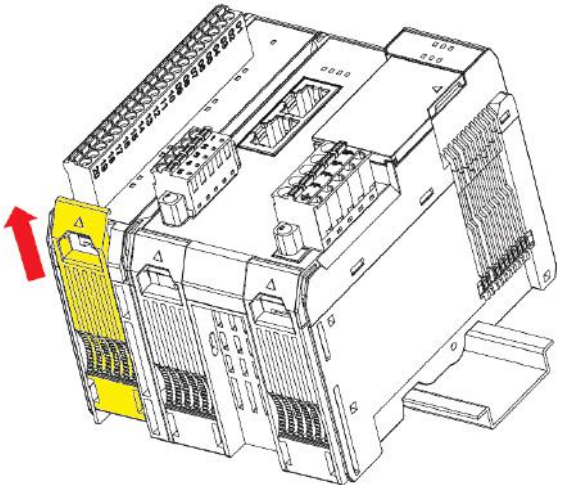


NOTE After the module is firmly attached to the DIN rail, the module connections to the internal bus will be established.

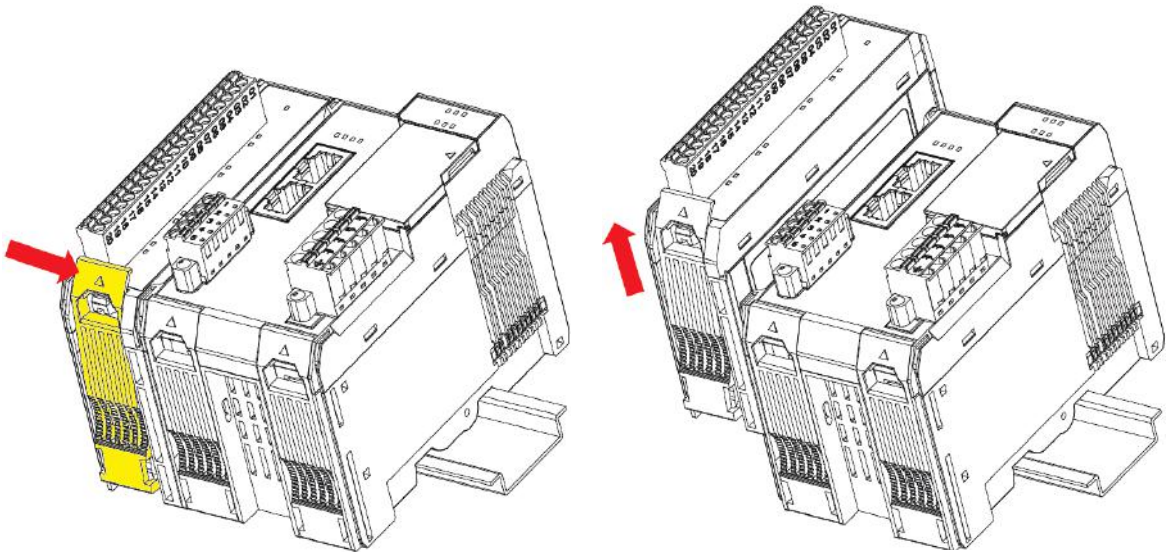
INFORMATION With the I/O module inserted in place, the internal bus will establish a connection through the adjacent module(s).

Unmounting the I/O Module from the DIN Rail

Step 1: Use your finger to lift the release tab on the lower part of the module.



Step 2: Push the top of the release tab to latch it, and then pull the module out.



NOTE Electrical connections for the internal bus will be disconnected when the module is removed.

NOTE The 45MR module can be installed on the right side of every ioThinx 4500 Series head/CPU module, whereas 45ML modules only can only be used with ioThinx 4500 series devices that have a communication bus on the left side of the head/CPU module. For example, ioThinx 4510 Series does not support the 45ML module.