ioThinx 4510 Series

Advanced modular remote I/O adapter with built-in serial ports

- Easy tool-free installation and removal
- Easy web configuration and reconfiguration
- Built-in Modbus RTU gateway function
- Supports Modbus/SNMP/RESTful API
- Supports up to 32 I/O modules
- Wide operating temperature models available for -40 to 75°C (-40 to 167°F) environments

Introduction

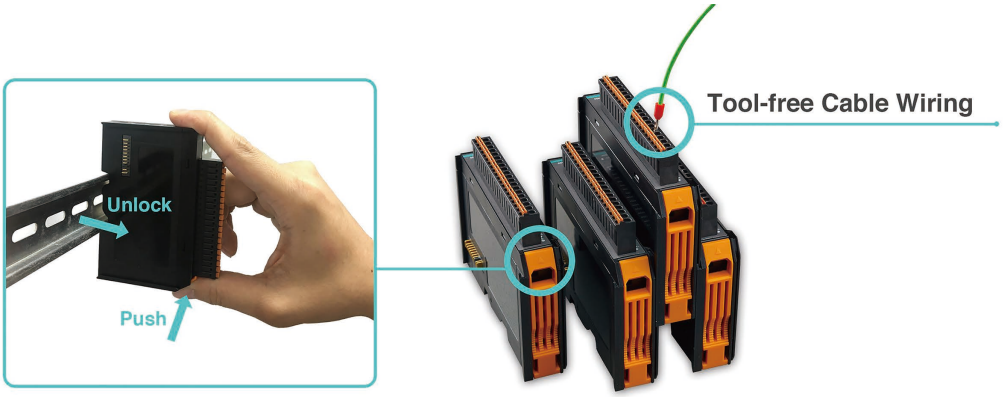
The ioThinx 4510 is an advanced modular remote I/O product with a unique hardware and software design, making it an ideal solution for a variety of industrial data acquisition applications.

The ioThinx 4510 has 2 Ethernet ports that support a daisy-chain topology to save cabling cost, as well as 1 RS-232/422 port or 2 RS-485 (2-wire) ports to enable Modbus RTU to Modbus TCP/SNMP/RESTful protocol conversion. In addition, the ioThinx 4510 supports up to 32 I/O modules to help users collect data from field sites.

The ioThinx 4510 supports tool free installation and removal. With its unique mechanical design, users can mount the module on the DIN-rail and later remove it, all tool free. In addition, the ioThinx 4510 has new web user interface. Using the new friendly web design, users can easily monitor the I/O status via the web dashboard and configure I/O modules.

Easy Tool-Free Installation and Removal

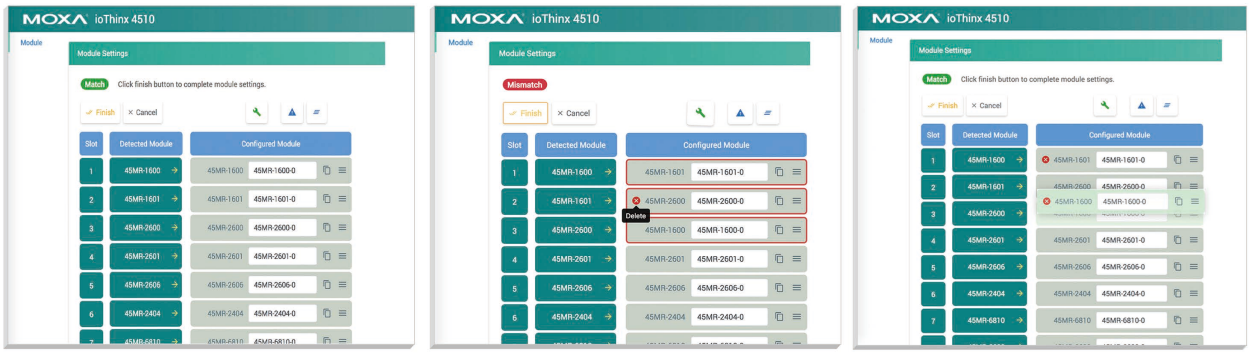
The ioThinx 4500 Series has a unique mechanical design that reduces the amount of time required for installation and removal. In fact, screw drivers and other tools are not required for any part of the hardware installation, including mounting the device on a DIN-rail, as well as connecting the wiring for both communication and I/O signal acquisition. Furthermore, no tools are required to remove the ioThinx from a DIN-rail. Removing all of the modules from a DIN-Rail is also easy using the latch and release tab.



Easy unmount single module
with Push & Unlock design

Easy Web Configuration/Reconfiguration

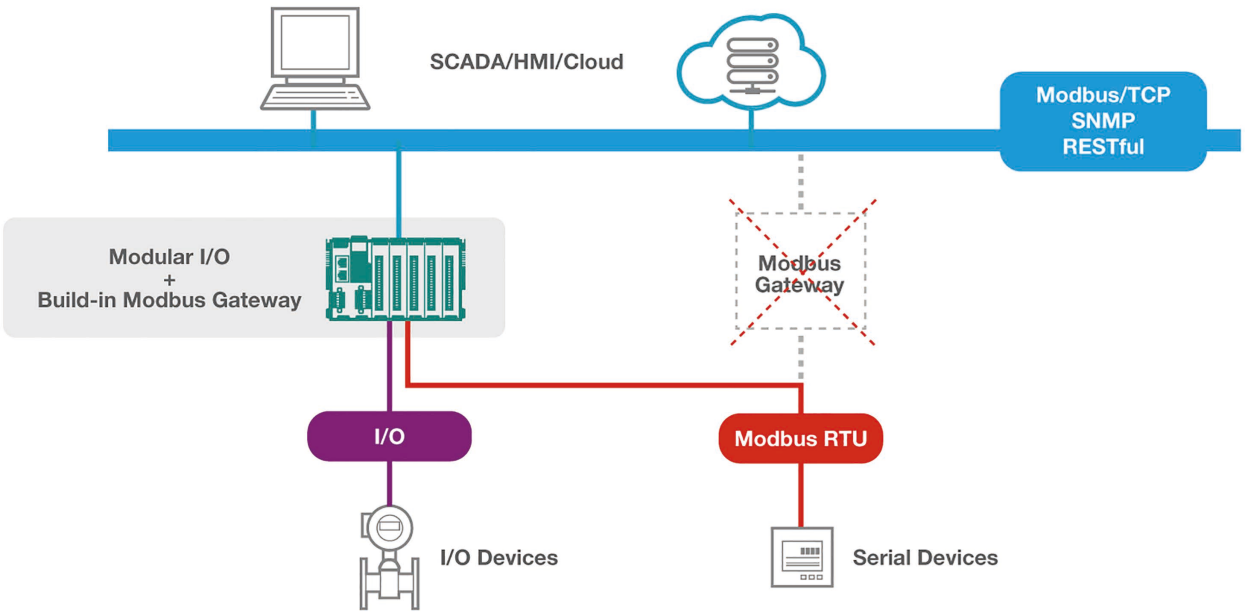
For modular remote I/O setups, one of the greatest difficulties is duplicating configuration settings to the current modules with different module combinations. After adding, moving, or deleting one of the modules, configuration of the unchanged modules, including the Modbus address and RESTful APIs to the upper software, need to be reconfigured. The ioThinx 4510's user-friendly web configuration tool was designed specifically to make configuration and reconfiguration easy; no reconfiguration efforts required for the unchanged modules. In addition, the ioThinx 4510's web interface supports module/channel unique names. This feature also applies to Modbus TCP and RESTful API, saving users a lot of time on development and deployment.



Built-In Modbus RTU Gateway Function

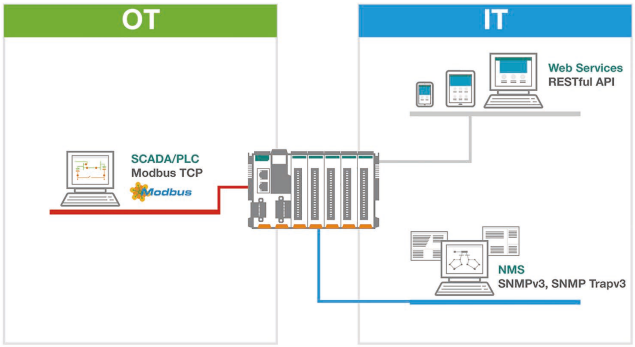
The ioThinx 4510 supports Modbus RTU Master for retrieving field site data from serial meters. After collecting the data, users can convert the serial data to a variety of protocols, including Modbus TCP, SNMP, and RESTful, allowing users to get field site data in their protocol of choice.

This two-in-one design reduces system complexity, the amount of space required in the network topology, as well as overall installation time. In addition, you can extend the useful life of legacy devices by connecting them to Ethernet and access the devices using a preferred protocol.



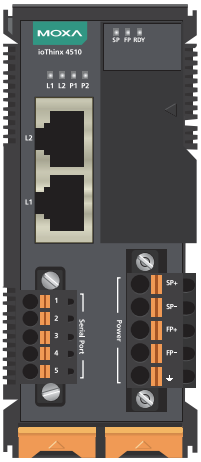
I/O to IT/OT Protocol Conversion

The ioThinx 4510 does just what you need by supporting the most often-used protocols for retrieving I/O data. Most IT engineers use SNMPv1/v2c/v3 or RESTful API protocols, but IA engineers are more familiar with Operational Technologies (OT), such as Modbus. The ioThinx 4510 makes it possible for both IT and OT engineers to conveniently retrieve data from the same I/O device. The ioThinx 4510 speaks several different protocols, including Modbus TCP for OT engineers, as well as SNMP and RESTful API for IT engineers. The ioThinx 4510 retrieves I/O data and converts the data to any of these protocols, allowing you to get your applications connected easily and effortlessly.



Specifications

ioThinx 4510: Advanced I/O, Ethernet network adapter, 3-in-1 serial port(s)



Input/Output Interface
Buttons: Reset button
Expansion Slots: Up to 32
Note: Compatible with 45MR Series only

Ethernet Interface
10/100BaseT(X) Ports (RJ45 connector): 2
Note: 1 MAC address
Protection: 1.5 kV magnetic isolation

Ethernet Software Features
Industrial Protocols: Modbus TCP Server (Slave), RESTful API, SNMPv1/v2c/v3

Serial Interface
Serial Standards: 1 x RS-232/422 or 2 x RS-485 (2-wire)
Connector: Spring-type Euroblock terminal
Wiring: 16 to 28 AWG
Strip Length: 9 to 10 mm

Serial Communication Parameters
Parity: None, Even, Odd
Data Bits: 8
Stop Bits: 1, 2
Flow Control: RTS/CTS
Baudrate: 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

Serial Software Features
Industrial Protocols: Modbus RTU Client (master)

System Power Parameters
Power Input: 12 to 48 VDC
Wiring: 12 to 26 AWG
Strip Length: 12 to 13 mm
Power Consumption (Max.): 800 mA @ 12 V
Output Current: Max. 1 A
Over-Voltage Protection: 55 VDC
Overload Protection: 1 A @ 25°C
Connection: Removable terminal block

Field Power Parameters
Power Input: 12/24 VDC
Wiring: 12 to 26 AWG
Strip Length: 12 to 13 mm
Output Current: Max. 2 A
Over-Voltage Protection: 33 VDC
Overload Protection: 2.5 A @ 25°C
Connection: Removable terminal block

Isolation
System Power to I/O Driver: 3k VDC or 2k Vrms
System Power to Field Power: 3k VDC or 2k Vrms

MTBF (mean time between failures)
Time: 1,451,040 hrs
Standards: Telcordia SR332

Physical Characteristics
Dimensions: 42.3 x 99 x 75 mm (1.67 x 3.9 x 2.95 in)
Weight: 173.5 g (0.382 lb)
Mounting: DIN-rail

Standards and Certifications
EMC: EN 55032, EN 55024, EN 61000-3-2/3-3
EMI: CISPR 32, FCC Part 15B Class A
EMS:
IEC 61000-4-2 ESD: Contact: 4 kV; Air: 8 kV
IEC 61000-4-3 RS: 80 MHz to 1 GHz: 3 V/m
IEC 61000-4-4 EFT: Power: 2 kV; Signal: 1 kV
IEC 61000-4-5 Surge: Power: 2 kV; Signal: 1 kV
IEC 61000-4-6 CS: 10 V
IEC 61000-4-8
Green Product: RoHS, CRoHS, WEEE

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)
Storage Temperature: -40 to 85°C (-40 to 185°F)
Ambient Relative Humidity: 5 to 95% (non-condensing)

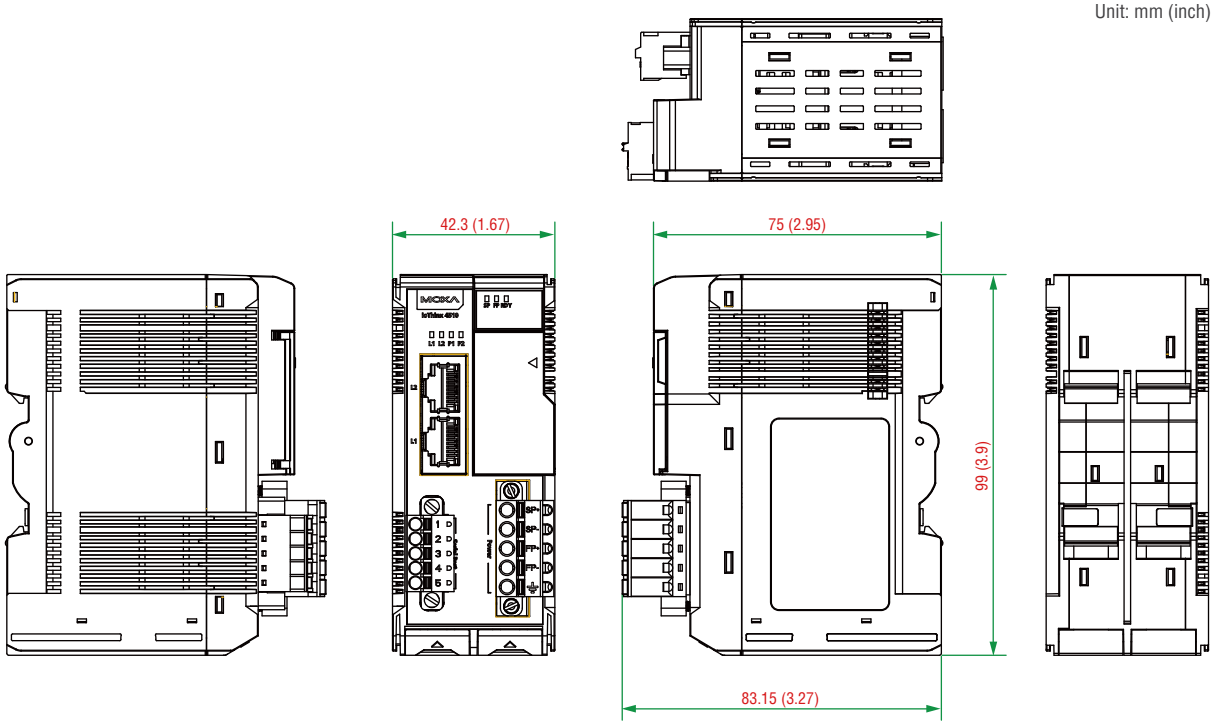
Shock: IEC 60068-2-27
Vibration: IEC 60068-2-6
Altitude: Up to 4000 m
Note: Please contact Moxa if you require products guaranteed to function properly at higher altitudes.

Warranty

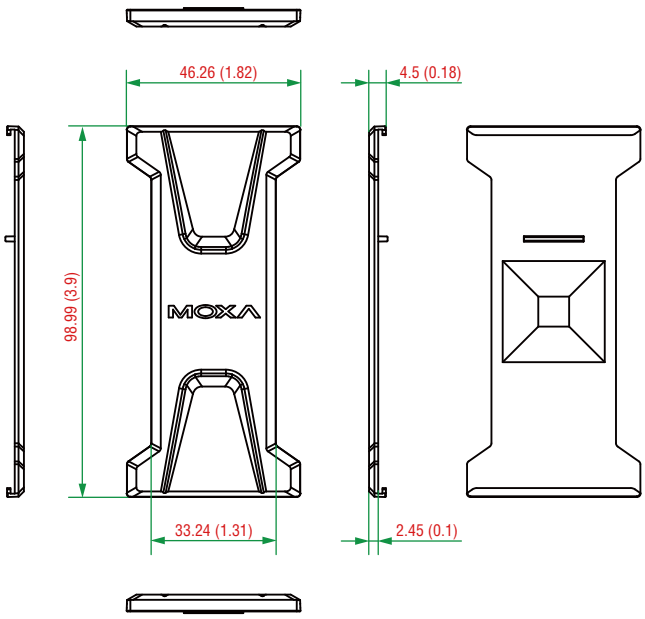
Warranty Period: 5 years

Dimensions

Unit: mm (inch)



Side Cover



Ordering Information

Adapter Modules

ioThinx 4510: Advanced I/O, Ethernet network adapter, 3-in-1 serial port(s), -20 to 60°C operating temperature
ioThinx 4510-T: Advanced I/O, Ethernet network adapter, 3-in-1 serial port(s), -40 to 75°C operating temperature

I/O Modules

45MR-1600: Module for ioThinx 4500 Series, 16 DIs, 24 VDC, PNP, -20 to 60°C operating temperature
45MR-1600-T: Module for ioThinx 4500 Series, 16 DIs, 24 VDC, PNP, -40 to 75°C operating temperature
45MR-1601: Module for ioThinx 4500 Series, 16 DIs, 24 VDC, NPN, -20 to 60°C operating temperature
45MR-1601-T: Module for ioThinx 4500 Series, 16 DIs, 24 VDC, NPN, -40 to 75°C operating temperature
45MR-2404: Module for ioThinx 4500 Series, 4 Relays, form A, -20 to 60°C operating temperature
45MR-2404-T: Module for ioThinx 4500 Series, 4 Relays, form A, -40 to 75°C operating temperature
45MR-2600: Module for ioThinx 4500 Series, 16 DOs, 24 VDC, sink , -20 to 60°C operating temperature
45MR-2600-T: Module for ioThinx 4500 Series, 16 DOs, 24 VDC, sink , -40 to 75°C operating temperature
45MR-2601: Module for ioThinx 4500 Series, 16 DOs, 24 VDC, source, -20 to 60°C operating temperature
45MR-2601-T: Module for ioThinx 4500 Series, 16 DOs, 24 VDC, source, -40 to 75°C operating temperature
45MR-2606: Module for ioThinx 4500 Series, 8 DIs, 24 VDC, PNP, 8 DOs, 24 VDC, source, -20 to 60°C operating temperature
45MR-2606-T: Module for ioThinx 4500 Series, 8 DIs, 24 VDC, PNP, 8 DOs, 24 VDC, source, -40 to 75°C operating temperature
45MR-3800: Module for ioThinx 4500 Series, 8 AIs, 0 to 20 mA/4 to 20 mA, -20 to 60°C operating temperature
45MR-3800-T: Module for ioThinx 4500 Series, 8 AIs, 0 to 20 mA/4 to 20 mA, -40 to 75°C operating temperature
45MR-3810: Module for ioThinx 4500 Series, 8 AIs, -10 to 10 V/0 to 10 V, -20 to 60°C operating temperature
45MR-3810-T: Module for ioThinx 4500 Series, 8 AIs, -10 to 10 V/0 to 10 V, -40 to 75°C operating temperature
45MR-6600: Module for ioThinx 4500 Series, 6 RTDs, -20 to 60°C operating temperature
45MR-6600-T: Module for ioThinx 4500 Series, 6 RTDs, -40 to 75°C operating temperature
45MR-6810: Module for ioThinx 4500 Series, 8 TCs, -20 to 60°C operating temperature
45MR-6810-T: Module for ioThinx 4500 Series, 8 TCs, -40 to 75°C operating temperature

Power modules

45MR-7820: Module for ioThinx 4500 Series, potential distributor module, -20 to 60°C operating temperature
45MR-7820-T: Module for ioThinx 4500 Series, potential distributor module, -40 to 75°C operating temperature

Package Checklist

ioThinx 4510

- 1 ioThinx 4510 product
- Quick installation guide (printed)
- 2 side cover plates

45MR Modules

- 1 45MR series product
- Quick installation guide (printed)

ioThinx 4500 Series (45MR) Modules

45MR-1600: Module for ioThinx 4500 Series, 16 DIs, 24 VDC, PNP

Inputs and Outputs
Digital Inputs: 16 channels
Isolation: 3k VDC or 2k Vrms

Digital Input
Sensor Type: PNP type
I/O Mode: DI or Counter (only supports the first 4 channels)
Dry Contact:
On: Short to FP+
Off: Open
Wet Contact (DI to FP-):
On: 10 to 30 VDC
Off: 0 to 3 VDC
Counter Frequency: 1 kHz
Digital Filtering Time Interval: Software configurable

Physical Characteristics
Weight: 77 g (0.17 lb)

Power Consumption (Max.)
System Power: 59.4 mA @ 3.3 VDC
Field Power: 19.305 mA @ 12 VDC, 25.3 mA @ 24 VDC

MTBF (mean time between failures)
Time: 661,247 hrs
Standard: Telcordia SR332

45MR-1601: Module for ioThinx 4500 Series, 16 DIs, 24 VDC, NPN

Inputs and Outputs
Digital Inputs: 16 channels
Isolation: 3k VDC or 2k Vrms

Digital Input
Sensor Type: NPN type
I/O Mode: DI or Counter (only supports the first 4 channels)
Dry Contact:
On: Short to FP-
Off: Open
Wet Contact (DI to FP+):
On: 10 to 30 VDC
Off: 0 to 3 VDC
Counter Frequency: 1 kHz
Digital Filtering Time Interval: Software configurable

Physical Characteristics
Weight: 77.6 g (0.171 lb)

Power Consumption (Max.)
System Power: 59.4 mA @ 3.3 VDC
Field Power: 19.305 mA @ 12 VDC, 25.3 mA @ 24 VDC

MTBF (mean time between failures)
Time: 661,247 hrs
Standard: Telcordia SR332

45MR-2404: Module for ioThinx 4500 Series, 4 Relays, form A

Inputs and Outputs
Relays: 4 channels
Isolation: 3k VDC or 2k Vrms

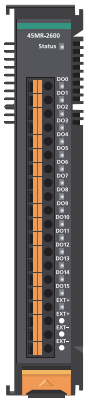
Relay
Type: From A (N.O.)
I/O Mode: DO
Contact Current Rating:
Resistive Load: 2 A @ 30 VDC, 250 VAC
Relay On/Off Time: 10 ms (max.)
Initial Insulation Resistance: 1000 mega-ohms (min.) @ 500 VDC
Mechanical Endurance: 5,000,000 operations
Electrical Endurance: 400,000 operations @ 2 A resistive load
Contact Resistance: 100 milli-ohms (max.)

Physical Characteristics
Weight: 88.4 g (0.195 lb)

Power Consumption (Max.)
System Power: 44 mA @ 3.3 VDC
Field Power: 31.2 mA @ 12 VDC, 24.7 mA @ 24 VDC
Note:
Ambient humidity must be non-condensing and remain between 5 and 95%. The relays of the 45M-2404 may malfunction when operating in high condensation environments below 0°C.

MTBF (mean time between failures)
Time: 1,955,805 hrs
Standard: Telcordia SR332

45MR-2600: Module for ioThinx 4500 Series, 16 DOs, 24 VDC, sink



Inputs and Outputs
Digital Outputs: 16 channels
Isolation: 3k VDC or 2k Vrms

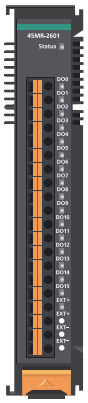
Digital Output
Type: Sink type
I/O Mode: DO or Pulse (only supports the first 4 channels)
External power: 12/24 VDC
Pulse Output Frequency: 1 kHz
Over-Voltage Protection: 45 VDC
Over-Temperature Shutdown: 175°C (typical), 150°C (min.)
Current Rating: 500 mA per channel

Physical Characteristics
Weight: 77.4 g (0.171 lb)

Power Consumption (Max.)
System Power: 57.2 mA @ 3.3 VDC
Field Power: 11 mA @ 12/24 VDC

MTBF (mean time between failures)
Time: 647,334 hrs
Standard: Telcordia SR332

45MR-2601: Module for ioThinx 4500 Series, 16 DOs, 24 VDC, source



Inputs and Outputs
Digital Outputs: 16 channels
Isolation: 3k VDC or 2k Vrms

Digital Output
Type: Source type
I/O Mode: DO or Pulse (only supports the first 4 channels)
External power: 12/24 VDC
Pulse Output Frequency: 1 kHz
Over-Temperature Shutdown: 175°C (typical), 150°C (min.)
Current Rating: 500 mA per channel

Physical Characteristics
Weight: 77 g (0.17 lb)

Power Consumption (Max.)
System Power: 63.8 mA @ 3.3 VDC
Field Power: 11 mA @ 12/24 VDC

MTBF (mean time between failures)
Time: 660,179 hrs
Standard: Telcordia SR332

45MR-2606: Module for ioThinx 4500 Series, 8 DIs, 24 VDC, PNP, 8 DOs, 24 VDC, source

Inputs and Outputs
Digital Inputs: 8 channels
Digital Outputs: 8 channels
Isolation: 3k VDC or 2k Vrms

Digital Input
Sensor Type: PNP type
I/O Mode: DI or Counter (only supports the first 2 channels)
Dry Contact:
On: Short to FP+
Off: Open
Wet Contact (DI to FP-):
On: 10 to 30 VDC
Off: 0 to 3 VDC
Counter Frequency: 1 kHz
Digital Filtering Time Interval: Software configurable

Digital Output
Type: Source type
I/O Mode: DO or Pulse (only supports the first 2 channels)
External power: 12/24 VDC
Pulse Output Frequency: 1 kHz
Over-Temperature Shutdown: 175°C (typical), 150°C (min.)
Current Rating: 500 mA per channel

Physical Characteristics
Weight: 77.4 g (0.171 lb)

Power Consumption (Max.)
System Power: 62.7 mA @ 3.3 VDC
Field Power: 15.4 mA @ 12 VDC, 18.7 mA @ 24 VDC

MTBF (mean time between failures)
Time: 638,652 hrs
Standard: Telcordia SR332

45MR-3800: Module for ioThinx 4500 Series, 8 AIs, 0 to 20 mA or 4 to 20 mA

Inputs and Outputs
Analog Inputs: 8 channels
Isolation: 3k VDC or 2k Vrms

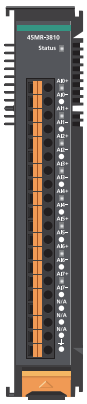
Analog Input
Type: Differential input
Resolution: 16 bits
I/O Mode: Current
Input Range: 0 to 20 mA, 4 to 20 mA, 4 to 20 mA (burnout detection)
Accuracy:
±0.1% FSR @ 25°C
±0.3% FSR @ -40 and 75°C
Sampling Rate:
• All channels: 100 samples/sec
• Per channel: 12.5 samples/sec
• Only one channel enabled: 100 samples/sec
Input Impedance: 120 ohms

Physical Characteristics
Weight: 79.8 g (0.176 lb)

Power Consumption (Max.)
System Power: 197.3 mA @ 3.3 VDC

MTBF (mean time between failures)
Time: 2,085,426 hrs
Standard: Telcordia SR332

45MR-3810: Module for ioThinx 4500 Series, 8 AIs, -10 to 10 V or 0 to 10 V



Inputs and Outputs
Analog Inputs: 8 channels
Isolation: 3k VDC or 2k Vrms

Analog Input
Type: Differential input
Resolution: 16 bits
I/O Mode: Voltage
Input Range: 0 to 10 VDC or -10 to 10 VDC
Over-Voltage Protection:
-35 to +35 VDC (power off)
-25 to +30 VDC (power on)
Accuracy:
±0.1% FSR @ 25°C
±0.3% FSR @ -40 and 75°C
Sampling Rate:
• All channels: 100 samples/sec
• Per channel: 12.5 samples/sec
• Only one channel enabled: 100 samples/sec
Input Impedance: 10 mega-ohms (min.)

Physical Characteristics
Weight: 79 g (0.175 lb)

Power Consumption (Max.)
System Power: 187 mA @ 3.3 VDC

MTBF (mean time between failures)
Time: 2,478,459 hrs
Standard: Telcordia SR332

45MR-6600: Module for ioThinx 4500 Series, 6 RTDs

Inputs and Outputs
RTDs: 6 channels
Isolation: 3k VDC or 2k Vrms

RTD
Sensor Type:
• PT50, PT100, PT200, PT500 (-200 to 850°C)
• PT1000 (-200 to 350°C)
• JPT100, JPT200, JPT500 (-200 to 640°C)
• JPT1000 (-200 to 350°C)
• NI100, NI200, NI500 (-60 to 250°C)
• NI1000 (-60 to 150°C)
• NI120 (-80 to 260°C)
Resistance Type: 310, 620, 1250, and 2200 Ohms
Input Connection: 2 or 3-wire
Sampling Rate:
• All channels: 12 samples/sec
• Per channel: 2 samples/sec
Resolution: 0.1°C or 0.1 ohm
Accuracy:
±0.1% FSR @ 25°C
±0.3% FSR @ -40 and 75°C
Input Impedance: 625 kilo-ohms

Physical Characteristics
Weight: 78.7 g (0.174 lb)

Power Consumption (Max.)
System Power: 131.7 mA @ 3.3 VDC

MTBF (mean time between failures)
Time: 2,291,755 hrs
Standard: Telcordia SR332

45MR-6810: Module for ioThinx 4500 Series, 8 TCs

Inputs and Outputs
Thermocouples: 8 channels
Isolation: 3k VDC or 2k Vrms

Thermocouple
Sensor Type: J (0 to 750°C), K (-200 to 1250°C), T (-200 to 350°C), E (-200 to 900°C), R (-50 to 1600°C), S (-50 to 1760°C), B (600 to 1700°C), N (-200 to 1300°C)
Millivolt Type:
Mode: ±78.126 mV, ±39.062 mV, ±19.532 mV
Resolution: 16 bits
Accuracy:
±0.1% FSR @ 25°C
±0.3% FSR @ -40 and 75°C
Sampling Rate:
• All channels: 12 samples/sec
• Per channel: 1.5 samples/sec

Input Impedance: 1 mega-ohms (min.)

Physical Characteristics
Weight: 78.4 g (0.173 lb)

Power Consumption (Max.)
System Power: 148.1 mA @ 3.3 VDC

MTBF (mean time between failures)
Time: 1,649,892 hrs
Standard: Telcordia SR332

45MR-7820: Module for ioThinx 4500 Series, potential distributor module

Power Parameters
Mode: 0 VDC, 12/24 VDC
Channels: 8

Physical Characteristics
Weight: 73.6 g (0.163 lb)

MTBF (mean time between failures)
Time: 256,886,914 hrs
Standard: Telcordia SR332

Common Specifications

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)
Storage Temperature: -40 to 85°C (-40 to 185°F)
Ambient Relative Humidity: 5 to 95% (non-condensing)
Shock: IEC 60068-2-27
Vibration: IEC 60068-2-6
Altitude: Up to 4000 m
Note: Please contact Moxa if you require products guaranteed to function properly at higher altitudes.

Standards and Certifications
EMC: EN 55032, EN 55024, EN 61000-3-2/3-3
EMI: CISPR 32, FCC Part 15B Class A

EMS:
IEC 61000-4-2 ESD: Contact: 4 kV; Air: 8 kV
IEC 61000-4-3 RS: 80 MHz to 1 GHz: 3 V/m
IEC 61000-4-4 EFT: Power: 2 kV; Signal: 1 kV
IEC 61000-4-5 Surge: Power: 2 kV; Signal: 1 kV
IEC 61000-4-6 CS: 10 V
IEC 61000-4-8
Green Product: RoHS, CRoHS, WEEE

Physical Characteristics
Wiring: 18 to 24 AWG
Strip Length: 9 to 10 mm
Dimensions: 19.5 x 99 x 60.5 mm (0.77 x 3.9 x 2.38 in)
Mounting: DIN-rail

Warranty
Warranty Period: 5 years (excluding the 45MR-2404)
Details: See www.moxa.com/warranty
Note: Because of the limited lifetime of power relays, products that use this component are covered by a 2-year warranty.

Dimensions

Unit: mm (inch)