

# ioThinX 4500 Series (45MR) Modules

## Modules for ioThinX 4500 Series



### Feature and Benefits

- Easy tool-free installation and removal
- Built-in LED indicators for IO channels
- Wide operating temperature range: -40 to 75°C (-40 to 167°F)

### Certifications

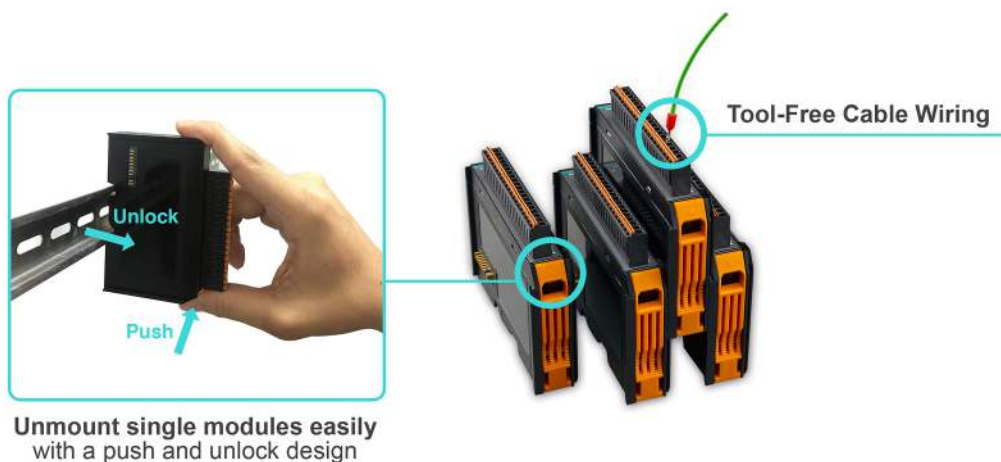


## Introduction

Moxa's ioThinX 4500 Series (45MR) Modules are available with DI/Os, AIs, relays, RTDs, and other I/O types, giving users a wide variety of options to choose from and allowing them to select the I/O combination that best fits their target application. With its unique mechanical design, hardware installation and removal can be done easily without tools, greatly reducing the amount of time required to set up and replace the 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, screwdrivers 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.



## Specifications

### Input/Output Interface

|                         |   |
|-------------------------|---|
| Digital Input Channels  | 45MR-1600 Series: 16<br>45MR-1601 Series: 16<br>45MR-2606 Series: 8 |
| Digital Output Channels | 45MR-2600 Series: 16<br>45MR-2601 Series: 16<br>45MR-2606 Series: 8 |
| Analog Input Channels   | 45MR-3800 Series: 8   |

|                       |                     |
|-----------------------|---------------------|
|                       | 45MR-3810 Series: 8 |
| Relay Channels        | 45MR-2404 Series: 4 |
| RTD Channels          | 45MR-6600 Series: 6 |
| Thermocouple Channels | 45MR-6810 Series: 8 |
| Isolation             | 3k VDC or 2k Vrms   |

#### Digital Inputs

|                                 |   |
|---------------------------------|---|
| Connector                       | Spring-type Euroblock terminal  |
| Sensor Type                     | Dry contact<br>Wet contact (NPN or PNP)   |
| I/O Mode                        | 45MR-1600/1601 Series: DI or event counter (only supports the first 4 channels)<br>45MR-2606 Series: DI or event counter (only supports the first 2 channels) |
| Dry Contact                     | On: short to FP+/FP-<br>Off: open   |
| Wet Contact (DI to FP-)         | On: 10 to 30 VDC<br>Off: 0 to 3 VDC   |
| Wet Contact (DI to FP+)         | On: 10 to 30 VDC<br>Off: 0 to 3 VDC   |
| Counter Frequency               | 1 kHz   |
| Digital Filtering Time Interval | Software configurable   |

#### Digital Outputs

|                           |   |
|---------------------------|---|
| Connector                 | Spring-type Euroblock terminal  |
| I/O Type                  | 45MR-2600 Series: Sink<br>45MR-2601/2606 Series: Source   |
| I/O Mode                  | 45MR-2600/2601 Series: DO or pulse output (only supports the first 4 channels)<br>45MR-2606 Series: DO or pulse output (only supports the first 2 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  |

#### Relays

|                               |   |
|-------------------------------|---|
| Connector                     | Spring-type Euroblock terminal                                |
| Type                          | Form A (N.O.) power relay                                     |
| I/O Mode                      | DO  |
| Contact Current Rating        | Resistive load: 2 A @ 30 VDC<br>Resistive load: 2 A @ 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.)   |
| <b>Analog Inputs</b>    |   |
| Connector               | Spring-type Euroblock terminal  |
| I/O Mode                | Voltage/Current   |
| I/O Type                | Differential  |
| Resolution              | 16 bits   |
| Input Range             | 45MR-3800 Series: 0 to 20 mA, 4 to 20 mA, 4 to 20 mA(burnout detection)<br>45MR-3810 Series: 0 to 10 VDC or -10 to 10 VDC |
| Over-Voltage Protection | -25 to +30 VDC (power on)<br>-35 to +35 VDC (power off)   |
| Accuracy                | ±0.1% FSR @ 25°C<br>±0.3% FSR @ -40 and 75°C  |
| Sampling Rate           | All channels: 100 samples/sec<br>Per channel: 12.5 samples/sec<br>Single channel: 100 samples/sec                         |
| Input Impedance         | 45MR-3800 Series: 120 ohms<br>45MR-3810 Series: 10 mega-ohms (min.)   |

#### RTDs

|                  |   |
|------------------|---|
| Connector        | Spring-type Euroblock terminal  |
| Sensor Type      | PT50, PT100, PT200, PT500 (-200 to 850°C)<br>PT1000 (-200 to 350°C)<br>JPT100, JPT200, JPT500 (-200 to 640°C)<br>JPT1000 (-200 to 350°C)<br>NI100, NI200, NI500 (-60 to 250°C)<br>NI1000 (-60 to 150°C)<br>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<br>Per channel: 2 samples/sec  |
| Resolution       | 0.1°C or 0.1 ohms   |
| Accuracy         | ±0.1% FSR @ 25°C<br>±0.3% FSR @ -40 and 75°C  |
| Input Impedance  | 625 kilo-ohms (min.)  |

#### Thermocouples

|                    |  |
|--------------------|--|
| Connector          | Spring-type Euroblock terminal               |
| Sensor Type        | J, K, T, E, R, S, B, N                       |
| Millivolt Type     | ±19.532 mV<br>±39.062 mV<br>±78.126 mV       |
| Resolution         | 16 bits                                      |
| Millivolt Accuracy | ±0.1% FSR @ 25°C<br>±0.3% FSR @ -40 and 75°C |

|  |   |
|--|---|
| Sampling Rate                          | All channels: 12 samples/sec<br>Per channel: 1.5 samples/sec  |
| Input Impedance                        | 1 mega-ohms (min.)  |
| <b>Power Parameters</b>                |   |
| Mode                                   | 45MR-7820 Series: 0, 12/24 VDC  |
| Channels                               | 45MR-7820 Series: 8   |
| <b>Power Consumption</b>               |   |
| System Power                           | 45MR-1600 Series: 59.4 mA @ 3.3 VDC<br>45MR-1601 Series: 59.4 mA @ 3.3 VDC<br>45MR-2404 Series: 44 mA @ 3.3 VDC<br>45MR-2600 Series: 57.2 mA @ 3.3 VDC<br>45MR-2601 Series: 63.8 mA @ 3.3 VDC<br>45MR-2606 Series: 62.7 mA @ 3.3 VDC<br>45MR-3800 Series: 197.3 mA @ 3.3 VDC<br>45MR-3810 Series: 187 mA @ 3.3 VDC<br>45MR-6600 Series: 131.7 mA @ 3.3 VDC<br>45MR-6810 Series: 148.1 mA @ 3.3 VDC                                |
| Field Power                            | 45MR-1600 Series: 19.3 mA @ 12 VDC<br>45MR-1601 Series: 19.3 mA @ 12 VDC<br>45MR-2404 Series: 31.2 mA @ 12 VDC<br>45MR-2606 Series: 15.4 mA @ 12 VDC<br>45MR-1600 Series: 25.3 mA @ 24 VDC<br>45MR-1601 Series: 25.3 mA @ 24 VDC<br>45MR-2404 Series: 24.7 mA @ 24 VDC<br>45MR-2606 Series: 18.7 mA @ 24 VDC  |
| <b>Physical Characteristics</b>        |   |
| Weight                                 | 45MR-1600 Series: 77 g (0.17 lb)<br>45MR-1601 Series: 77.6 g (0.171 lb)<br>45MR-2404 Series: 88.4 g (0.195 lb)<br>45MR-2600 Series: 77.4 g (0.171 lb)<br>45MR-2601 Series: 77 g (0.17 lb)<br>45MR-2606 Series: 77.4 g (0.171 lb)<br>45MR-3800 Series: 79.8 g (0.176 lb)<br>45MR-3810 Series: 79 g (0.175 lb)<br>45MR-6600 Series: 78.7 g (0.174 lb)<br>45MR-6810 Series: 78.4 g (0.173 lb)<br>45MR-7820 Series: 73.6 g (0.163 lb) |
| Dimensions                             | 19.5 x 99 x 60.5 mm (0.77 x 3.90 x 2.38 in)   |
| Housing                                | Plastic   |
| Installation                           | DIN-rail mounting   |
| Wiring                                 | I/O cable, 18 to 24 AWG   |
| Strip Length                           | I/O cable, 9 to 10 mm   |
| <b>Environmental Limits</b>            |   |
| Operating Temperature                  | Standard Models: -20 to 60°C (-4 to 140°F)<br>Wide Temp. Models: -40 to 75°C (-40 to 167°F)   |
| Storage Temperature (package included) | -40 to 85°C (-40 to 185°F)  |
| Ambient Relative Humidity              | 5 to 95% (non-condensing) <sup>1</sup>  |
| Altitude                               | Up to 4000 m <sup>2</sup>   |

1. The relays of the 45MR-2404 Series may malfunction when operating in high condensation environments below 0°C.
2. Please contact Moxa if you require products guaranteed to function properly at higher altitudes.

## Standards and Certifications

|           |   |
|-----------|---|
| EMC       | EN 55032/24   |
| EMI       | CISPR 32, FCC Part 15B Class A  |
| EMS       | IEC 61000-4-2 ESD: Contact: 4 kV; Air: 8 kV<br>IEC 61000-4-3 RS: 80 MHz to 1 GHz: 3 V/m<br>IEC 61000-4-4 EFT: Power: 2 kV; Signal: 1 kV<br>IEC 61000-4-5 Surge: Power: 2 kV; Signal: 1 kV<br>IEC 61000-4-6 CS: 10 V<br>IEC 61000-4-8 PFMF |
| Shock     | IEC 60068-2-27  |
| Vibration | IEC 60068-2-6   |

## Declaration

|               |                   |
|---------------|-------------------|
| Green Product | RoHS, CRoHS, WEEE |
|---------------|-------------------|

## MTBF

|           |   |
|-----------|---|
| Time      | 45MR-1600 Series: 661,247 hrs<br>45MR-1601 Series: 661,247 hrs<br>45MR-2404 Series: 1,955,805 hrs<br>45MR-2600 Series: 647,334 hrs<br>45MR-2601 Series: 660,179 hrs<br>45MR-2606 Series: 638,652 hrs<br>45MR-3800 Series: 2,085,426 hrs<br>45MR-3810 Series: 2,478,459 hrs<br>45MR-6600 Series: 2,291,755 hrs<br>45MR-6810 Series: 1,649,892 hrs<br>45MR-7820 Series: 256,886,914 hrs |
| Standards | Telcordia SR332   |

## Warranty

|                 |   |
|-----------------|---|
| Warranty Period | All models except 45MR-2404 Series: 5 years<br>45MR-2404 Series: 2 years <sup>3</sup> |
| Details         | See <a href="http://www.moxa.com/warranty">www.moxa.com/warranty</a>                  |

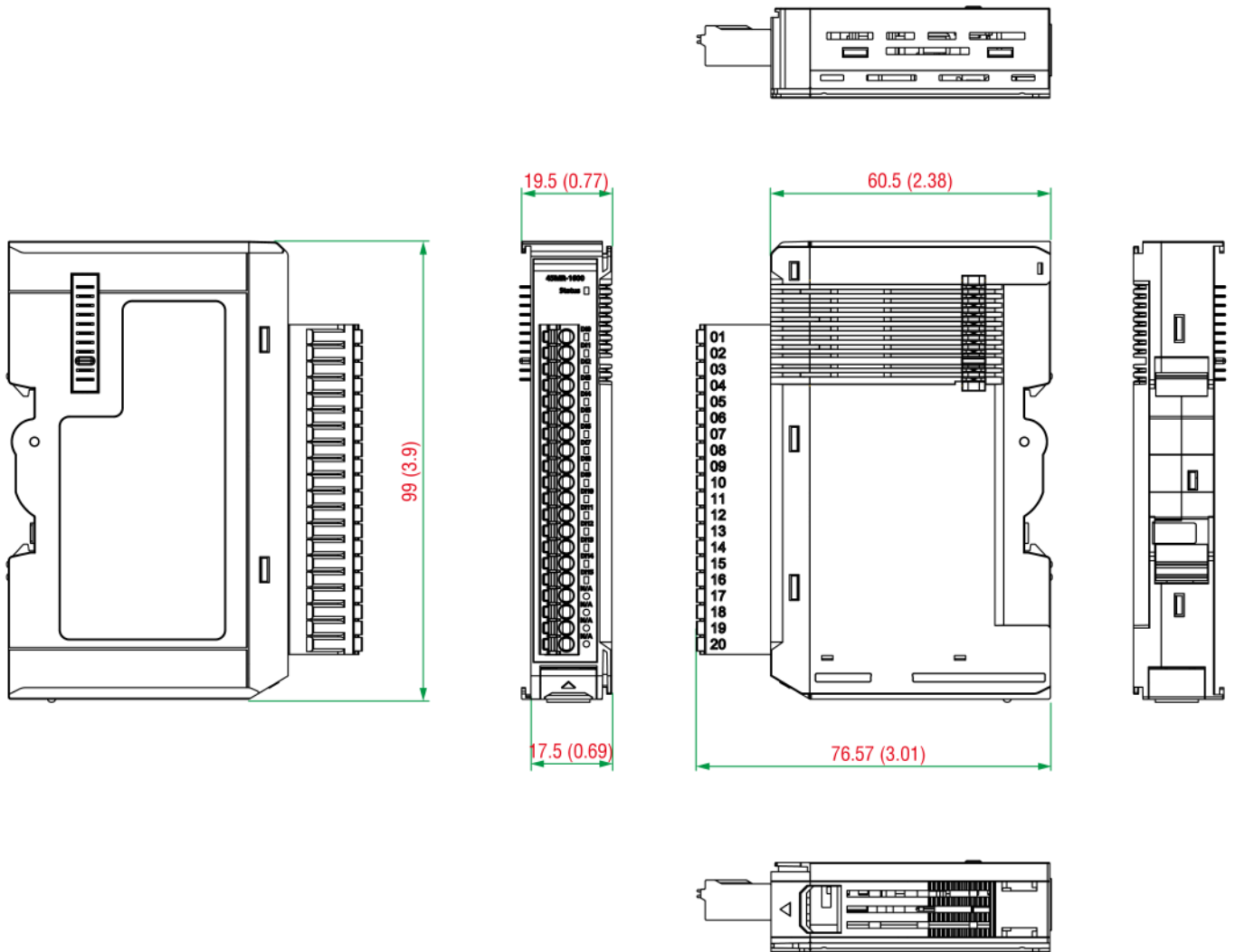
## Package Contents

|                  |   |
|------------------|---|
| Device           | 1 x 45MR Series product                           |
| Installation Kit | 1 x terminal block, 20-pin, 3.5 mm                |
| Documentation    | 1 x quick installation guide<br>1 x warranty card |

3. Because of the limited lifetime of power relays, products that use this component are covered by a 2-year warranty.

## Dimensions

Unit: mm (inch)



## Ordering Information

| Model Name  | Input/Output Interface | Digital Input    | Digital Output      | Relay                         | Analog Input Type | Potential Distributor Module | Operating Temp. |
|-------------|------------------------|------------------|---------------------|-------------------------------|-------------------|------------------------------|-----------------|
| 45MR-1600   | 16 x DI                | PNP<br>12/24VDC  | -                   | -                             | -                 | -                            | -20 to 60°C     |
| 45MR-1600-T | 16 x DI                | PNP<br>12/24VDC  | -                   | -                             | -                 | -                            | -40 to 75°C     |
| 45MR-1601   | 16 x DI                | NPN<br>12/24 VDC | -                   | -                             | -                 | -                            | -20 to 60°C     |
| 45MR-1601-T | 16 x DI                | NPN<br>12/24 VDC | -                   | -                             | -                 | -                            | -40 to 75°C     |
| 45MR-2404   | 4 x Relay              | -                | -                   | Form A<br>30 VDC/250 VAC, 2 A | -                 | -                            | -20 to 60°C     |
| 45MR-2404-T | 4 x Relay              | -                | -                   | Form A<br>30 VDC/250 VAC, 2 A | -                 | -                            | -40 to 75°C     |
| 45MR-2600   | 16 x DO                | -                | Sink<br>12/24 VDC   | -                             | -                 | -                            | -20 to 60°C     |
| 45MR-2600-T | 16 x DO                | -                | Sink<br>12/24 VDC   | -                             | -                 | -                            | -40 to 75°C     |
| 45MR-2601   | 16 x DO                | -                | Source<br>12/24 VDC | -                             | -                 | -                            | -20 to 60°C     |

| Model Name  | Input/Output Interface | Digital Input   | Digital Output      | Relay | Analog Input Type            | Potential Distributor Module   | Operating Temp. |
|-------------|------------------------|-----------------|---------------------|-------|------------------------------|--------------------------------|-----------------|
| 45MR-2601-T | 16 x DO                | -               | Source<br>12/24 VDC | -     | -                            | -                              | -40 to 75°C     |
| 45MR-2606   | 8 x DI, 8 x DO         | PNP<br>12/24VDC | Source<br>12/24 VDC | -     | -                            | -                              | -20 to 60°C     |
| 45MR-2606-T | 8 x DI, 8 x DO         | PNP<br>12/24VDC | Source<br>12/24 VDC | -     | -                            | -                              | -40 to 75°C     |
| 45MR-3800   | 8 x AI                 | -               | -                   | -     | 0 to 20 mA<br>4 to 20 mA     | -                              | -20 to 60°C     |
| 45MR-3800-T | 8 x AI                 | -               | -                   | -     | 0 to 20 mA<br>4 to 20 mA     | -                              | -40 to 75°C     |
| 45MR-3810   | 8 x AI                 | -               | -                   | -     | -10 to 10 VDC<br>0 to 10 VDC | -                              | -20 to 60°C     |
| 45MR-3810-T | 8 x AI                 | -               | -                   | -     | -10 to 10 VDC<br>0 to 10 VDC | -                              | -40 to 75°C     |
| 45MR-6600   | 6 x RTD                | -               | -                   | -     | RTD                          | -                              | -20 to 60°C     |
| 45MR-6600-T | 6 x RTD                | -               | -                   | -     | RTD                          | -                              | -40 to 75°C     |
| 45MR-6810   | 8 x TC                 | -               | -                   | -     | TC                           | -                              | -20 to 60°C     |
| 45MR-6810-T | 8 x TC                 | -               | -                   | -     | TC                           | -                              | -40 to 75°C     |
| 45MR-7820   | -                      | -               | -                   | -     | -                            | 8-ch, 0 VDC<br>8-ch, 12/24 VDC | -20 to 60°C     |
| 45MR-7820-T | -                      | -               | -                   | -     | -                            | 8-ch, 0 VDC<br>8-ch, 12/24 VDC | -40 to 75°C     |

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