

# ioLogik E1500 Series

Ethernet remote I/O for railway applications



## Features and Benefits

- User-definable Modbus TCP Slave addressing
- Active communication with MX-AOPC UA Server
- Easy mass deployment and configuration with ioSearch utility
- Friendly configuration via web browser
- Simplifies I/O management with MXIO library for Windows or Linux
- Compliant with EN 50121-3-2, EN 50121-4, and a portion of EN 50155 specifications
- Wide operating temperature range: -40 to 85°C (-40 to 185°F)

## Certifications



## Introduction

The ioLogik E1500 Series Ethernet Remote I/O devices have a ruggedized aluminum housing, and are compliant with EN 50121-3-2, EN 50121-4, and essential sections of EN 50155 standard, which are essential for electronic equipment used in rolling stock applications. This rugged platform also features a wide operating temperature range of -40 to 85°C to deliver consistent performance even in harsh environments.

## Ruggedly Designed for Monitoring Rolling Stock

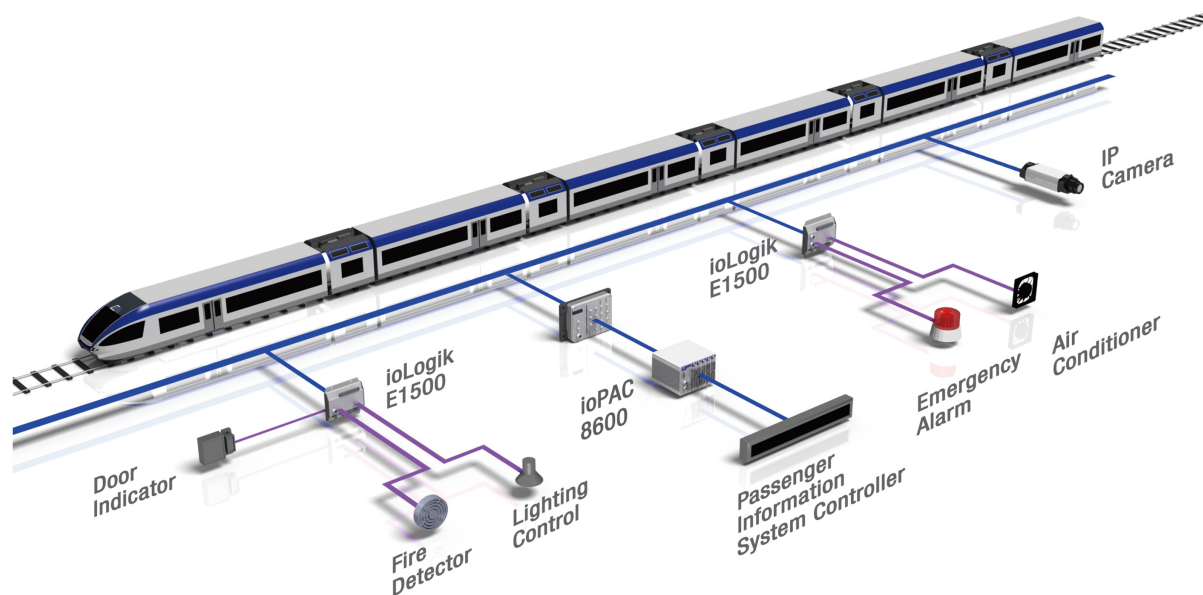
The ioLogik E1500 Series Ethernet remote I/O devices have a durable aluminum housing and are compliant with EN 50121-4 and a portion of EN 50155 specifications required for electronic equipment used in railway applications. The ioLogik E1500 design strictly conforms to EN standards, including not only EMC requirements but also with regards to shock, vibration, extended temperature range, humidity, and power supply variations.

## Channel-to-Channel Isolation

With this topology, I/O channels on the ioLogik E1500 are individually isolated from one another to ensure that data communication is highly stable. For example, a lightning strike that affects one channel will not affect devices connected to other channels on the same ioLogik E1500.

## Application: Enhanced Efficiency for Remote Monitoring on Rolling Stock

The railway I/O module is an EN 50155/50121 remote Ethernet I/O device for use on rolling stock. It features an anti-vibration design, channel isolation, and operates reliably in temperatures ranging from -40 to 85°C, making it the ideal solution for data acquisition on rolling stock. Capable of both monitoring system status and triggering I/O events, this railway I/O is a great choice for simultaneously enhancing system reliability and maintaining efficiency in rolling stock environments.



## Specifications

### Input/Output Interface

Digital Input Channels	ioLogik E1510-M12-T: 12 ioLogik E1512-M12-T: 4
Configurable DIO Channels (by software)	ioLogik E1512-M12-T: 4
Isolation	3k VDC or 2k Vrms
Buttons	Reset button

### Digital Inputs

Connector	Spring-type Euroblock terminal
Counter Frequency	250 Hz
Digital Filtering Time Interval	Software configurable
Dry Contact	On: short to GND Off: open
I/O Mode	DI or event counter
Points per COM	ioLogik E1512-M12-T: 2 channels
Sensor Type	Dry contact Wet Contact (NPN or PNP)
Wet Contact (DI to GND)	On: 10 to 30 VDC Off: 0 to 3 VDC

### Digital Outputs

Connector	Spring-type Euroblock terminal
Current Rating	200 mA per channel
I/O Mode	DO or pulse output
I/O Type	Sink
Over-Current Protection	0.65 A per channel @ 25°C
Over-Temperature Shutdown	175°C (typical), 150°C (min.)

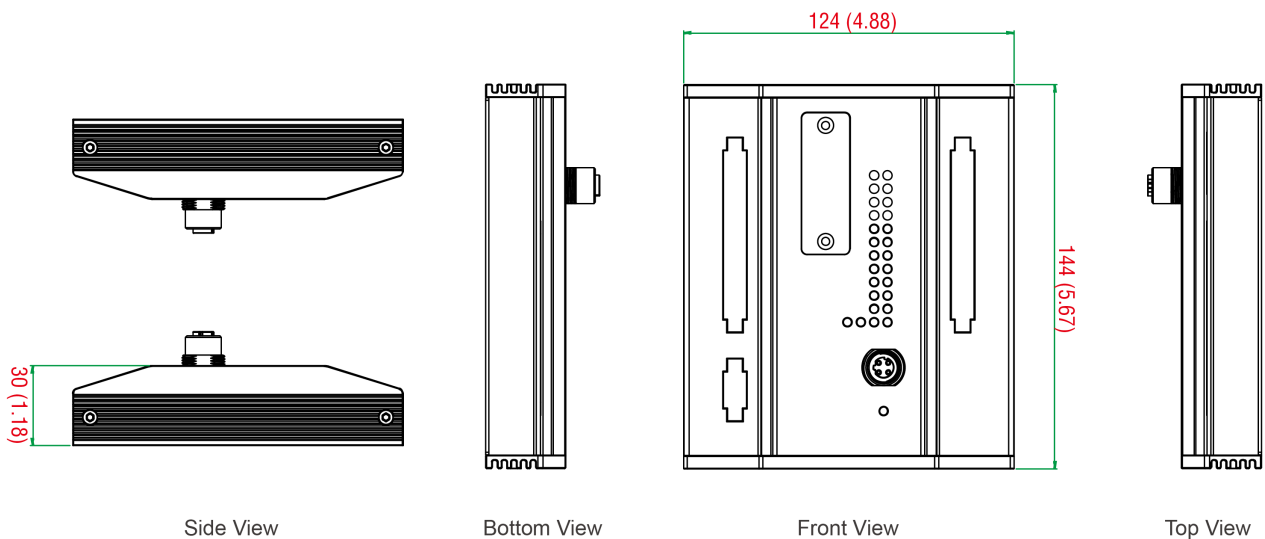
Over-Voltage Protection	35 VDC
Pulse Output Frequency	500 Hz
<b>Ethernet Interface</b>	
10/100BaseT(X) Ports (M12 D-coded 4-pin female connector)	1
Magnetic Isolation Protection	1.5 kV (built-in)
<b>Ethernet Software Features</b>	
Configuration Options	Web Console (HTTP), Windows Utility (ioSearch)
Industrial Protocols	Modbus TCP Server (Slave), Moxa AOPC (Active Tag), MXIO Library
Management	BOOTP, DHCP Client, HTTP, IPv4, TCP/IP, UDP
<b>LED Interface</b>	
LED Indicators	ioLogik E1510-M12-T: PWR, RDY, EXP, LAN, DI Channels ioLogik E1512-M12-T: PWR, RDY, EXP, LAN, DI Channels, DO Channels
<b>Modbus TCP</b>	
Functions Supported	1, 2, 3, 4, 5, 6, 15, 16, 23
Mode	Client
<b>Power Parameters</b>	
Power Connector	Spring-type Euroblock terminal
No. of Power Inputs	1
Input Voltage	12 to 48 VDC
Power Consumption	150 mA @ 24 VDC
<b>Physical Characteristics</b>	
Housing	Aluminum
Dimensions	144 x 124 x 30 mm (5.67 x 4.88 x 1.18 in)
Weight	825 g (1.82 lb)
Installation	DIN-rail mounting, Wall mounting (with optional kit)
Wiring	I/O cable, 16 to 26 AWG Power cable, 16 to 26 AWG
<b>Environmental Limits</b>	
Operating Temperature	-40 to 85°C (-40 to 185°F)
Ambient Relative Humidity	5 to 95% (non-condensing)
Altitude	2000 m <sup>1</sup>
<b>Standards and Certifications</b>	
EMC	EN 61000-6-2/-6-4
EMI	CISPR 32, FCC Part 15B Class A
EMS	IEC 61000-4-2 ESD: Contact: 8 kV; Air: 15 kV

1. Please contact Moxa if you require products guaranteed to function properly at higher altitudes.

	IEC 61000-4-3 RS: 80 MHz to 1 GHz: 10 V/m IEC 61000-4-4 EFT: Power: 2 kV; Signal: 2 kV IEC 61000-4-5 Surge: Power: 2 kV; Signal: 2 kV IEC 61000-4-6 CS: 10 V IEC 61000-4-8 PFMF
Railway	EN 50121-4, EN 50155
Safety	UL 508
Shock	IEC 60068-2-27
Vibration	IEC 60068-2-6
<b>Declaration</b>	
Green Product	RoHS, CRoHS, WEEE
<b>MTBF</b>	
Time	ioLogik E1510-M12-T: 507,064 hrs ioLogik E1512-M12-T: 554,122 hrs
Standards	Telcordia SR332
<b>Warranty</b>	
Warranty Period	5 years
Details	See <a href="http://www.moxa.com/warranty">www.moxa.com/warranty</a>
<b>Package Contents</b>	
Device	1 x ioLogik E1500 Series remote I/O
Installation Kit	1 x terminal block, 16-pin, 3.81 mm 1 x terminal block, 3-pin, 3.81 mm
Documentation	1 x quick installation guide 1 x warranty card

## Dimensions

Unit: mm (inch)



## Ordering Information

Model Name	Input/Output Interface	Conformal Coating
ioLogik E1510-M12-CT-T	12 x DI	✓
ioLogik E1510-M12-T	12 x DI	–
ioLogik E1512-M12-CT-T	4 x DI, 4 x DIO	✓
ioLogik E1512-M12-T	4 x DI, 4 x DIO	–

## Accessories (sold separately)

### Software

MX-AOPC UA Server	OPC UA Server software for converting fieldbus to the OPC UA standard
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### Wall-Mounting Kits

WK-90-01	Wall-mounting kit, 2 plates, 6 screws, 90 x 62 x 2.5 mm
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# ioPAC 8500 Series (85M) Modules

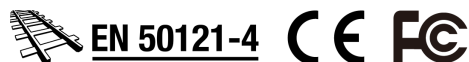
Rugged modules for the ioPAC 8500 Series



## Features and Benefits

- Compliant with EN 50121-3-2, EN 50121-4, and a portion of EN 50155 specifications
- Rugged and compact design for harsh environments
- Expand the I/O and communication capabilities of your ioPAC 8600 or 8500 Series device
- Wide operating temperature range: -40 to 75°C (-40 to 167°F)
- Millisecond timestamp granularity for digital input and analog input
- Supports sampling rates up to 40 kHz for analog input
- Pre-recording for analog input data logging
- Up to 4 3-in-1 RS-232/422/485 serial ports

## Certifications



## Introduction

Moxa's ioPAC 8500 Series 85M Modules can be installed in both ioPAC 8500 and ioPAC 8600 Series devices. Modules are available with DI/Os, AIs, Fast AIs, and serial interfaces, 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. All 85M modules are designed for railway industry applications, and as such, are compliant with EN 50121-3-2, EN 50121-4, and a portion of the EN 50155 specifications. In addition, these modules all support a wide operating temperature range of -40 to 75°C for reliable operation even in harsh environments.

## Specifications

### Input/Output Interface

Analog Input Channels	85M-3800-T/3801-T/3810-T/3811-T: 8
Digital Input Channels	85M-1602-T: 16
Digital Output Channels	85M-2600-T: 16
Isolation	3k VDC or 2k Vrms
RTD Channels	85M-6600-T: 6
Thermocouple Channels	85M-6810-T: 8
Serial Ports	85M-5401-T: 4

### Digital Inputs

Voltage	24 VDC
Connector	Spring-type Euroblock terminal
Counter Frequency	5 kHz
Dry Contact	On: short to GND Off: open
I/O Mode	DI, event counter, or frequency

Points per COM	8 channels
Sensor Type	Dry contact Wet Contact (NPN or PNP)
Wet Contact (DI to COM)	On: 10 to 30 VDC Off: 0 to 3 VDC

#### Digital Outputs

Voltage	24 VDC
Connector	Spring-type Euroblock terminal
Current Rating	200 mA per channel
I/O Mode	DO or PWM
I/O Type	Sink
Over-Current Protection	0.65 A per channel @ 25°C
Over-Temperature Shutdown	175°C (typical), 150°C (min.)
Over-Voltage Protection	35 VDC
Pulse Output Frequency	5 kHz

#### Analog Inputs

Accuracy	±0.1% FSR @ 25°C ±0.3% FSR @ -40 to 75°C
Built-in Resistor for Current Input	85M-3800-T/3801-T: 125 ohms
Connector	Spring-type Euroblock terminal
Historical Data Buffering	85M-3801-T/3811-T: 60 KB per channel, 6-second data buffer at 5 kHz
I/O Type	Differential
Input Impedance	85M-3800-T/3801-T: 125 ohms (min.) 85M-3810-T: 200 kilo-ohms (min.) 85M-3811-T: 20 mega-ohms (min.)
Input Range	85M-3800-T/3801-T: 4 to 20 mA (with burn-out detection) 85M-3810-T/3811-T: 0 to 10 VDC
Resolution	16 bits
Sampling Rate	85M-3800-T/3810-T: All channels: 100 samples/sec Per channel: 12.5 samples/sec  85M-3801-T/3811-T: All channels: 40k samples/sec Per channel: 5k samples/sec

#### RTDs

Accuracy	±0.1% FSR @ 25°C ±0.3% FSR @ -40 to 75°C
Connector	Spring-type Euroblock terminal
Input Connection	2- or 3-wire
Input Impedance	625 kilo-ohms (min.)

Sensor Type	JPT100, JPT200, JPT500 (-200 to 640°C) JPT1000 (-200 to 350°C) NI100, NI50, NI500 (-60 to 250°C) NI1000 (-60 to 150°C) NI120 (-80 to 260°C) PT1000 (-200 to 350°C) PT50, PT100, PT200, PT500 (-200 to 850°C) Resistance of 310, 620, 1250, and 2200 ohms
Resolution	0.1°C or 0.1 ohms
Sampling Rate	All channels: 12 samples/sec Per channel: 2 samples/sec

#### Thermocouples

Millivolt Accuracy	±0.1% FSR @ 25°C ±0.3% FSR @ -40 to 75°C
Connector	Spring-type Euroblock terminal
Input Impedance	1 mega-ohms (min.)
Millivolt Type	±19.532 mV ±39.062 mV ±78.126 mV Fault and over-voltage protection: -35 to +35 VDC (power off); -25 to +30 VDC (power on)
Resolution	16 bits
Sampling Rate	All channels: 12 samples/sec Per channel: 1.5 samples/sec
Sensor Type	J, K, T, E, R, S, B, N

#### Serial Interface

Baudrate	300 bps to 921.6 kbps
Data Bits	7, 8
Flow Control	RTS/CTS, XON/XOFF
Parity	Even, None, Odd
Serial Standards	RS-232/422/485
Stop Bits	1, 2

#### Serial Signals

RS-232	TxD, RxD, RTS, CTS, DTR, DSR, DCD, GND
RS-422	Tx+, Tx-, Rx+, Rx-, GND
RS-485-2w	Data+, Data-, GND
RS-485-4w	Tx+, Tx-, Rx+, Rx-, GND



## Power Parameters

Power Consumption	85M-1602-T: 50.0 mA @ 24 VDC 85M-2600-T: 35.4 mA @ 24 VDC 85M-3800-T: 43.8 mA @ 24 VDC 85M-3801-T: 43.8 mA @ 24 VDC 85M-3810-T: 43.3 mA @ 24 VDC 85M-3811-T: 521 mA @ 24 VDC 85M-5401-T: 51.7 mA @ 24 VDC 85M-6600-T: 27.7 mA @ 24 VDC 85M-6810-T: 24.1 mA @ 24 VDC
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## Physical Characteristics

Dimensions	25 x 128.2 x 85.5 mm (0.98 x 5.05 x 3.37 in)
Weight	Under 80 g
Wiring	I/O cable, 14 to 28 AWG

## Environmental Limits

Operating Temperature	-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)
Altitude	2000 m <sup>1</sup>

## Standards and Certifications

EMC	EN 55032/24, EN 61000-6-2/-6-4
EMI	CISPR 32, FCC Part 15B Class A
EMS	IEC 61000-4-2 ESD: Contact: 6 kV; Air: 8 kV IEC 61000-4-3 RS: 5100 MHz to 6000 MHz: 3 V/m IEC 61000-4-4 EFT: Power: 1 kV; Signal: 0.5 kV IEC 61000-4-5 Surge: Power: 2 kV; Signal: 1 kV IEC 61000-4-6 CS: 10 V IEC 61000-4-8 PFMF
Railway	EN 50121-4, EN 50155
Safety	UL 508
Shock	IEC 60068-2-27
Vibration	IEC 60068-2-6

## MTBF

Time	85M-1602-T: 1,132,561 hrs 85M-2600-T: 792,571 hrs 85M-3800-T: 1,512,906 hrs 85M-3801-T: 1,426,112 hrs 85M-3810-T: 1,530,690 hrs 85M-3811-T: 1,426,112 hrs 85M-5401-T: 596,611 hrs 85M-6600-T: 571,446 hrs 85M-6810-T: 2,324,891 hrs
Standards	Telcordia SR332
Warranty	
Warranty Period	5 years
Details	See <a href="http://www.moxa.com/warranty">www.moxa.com/warranty</a>

1. Please contact Moxa if you require products guaranteed to function properly at higher altitudes.

## Package Contents

Device	1 x ioPAC 8500 Series (85M) module
Documentation	1 x warranty card

## Ordering Information

Model Name	Input/Output Interface	Analog Input Type	Analog Input Sampling Rate	Serial Standards
85M-1602-T	16 x DI	–	–	–
85M-2600-T	16 x DO	–	–	–
85M-3800-T	8 x AI	4-20 mA	Per channel: 12.5 samples/sec	–
85M-3801-T	8 x AI	4-20 mA	Per channel: 5k samples/sec	–
85M-3810-T	8 x AI	0-10 V	Per channel: 12.5 samples/sec	–
85M-3811-T	8 x AI	0-10 V	Per channel: 5k samples/sec	–
85M-5401-T	4 x Serial port	–	–	RS-232/422/485
85M-6600-T	6 x RTD	–	–	–
85M-6810-T	8 x TC	–	–	–

## Accessories (sold separately)

### Cables

CBL-M44M9x4-50	4-port DB44 male to DB9 male cable, 50 cm Applicable Models: 85M-5401-T
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# ioPAC 8600 Series (86M) Modules

Rugged modules for the ioPAC 8600 Series



## Features and Benefits

- Complies with all EN 50155 mandatory test items<sup>1</sup>
- Complies with EN 50121-4
- Rugged and compact design for harsh environments
- Expand the I/O and communication capabilities of your ioPAC 8600 Series device
- Wide operating temperature range: -40 to 75°C (-40 to 167°F)
- Channel-to-channel isolated digital input and output
- 24 to 110 V DI/O module and universal power input range module
- Supports CAN bus for CAN 2.0 A/B communication

## Certifications



EN 50155



EN 50121-4



## Introduction

Moxa's ioPAC 8600 Series 86M Modules include channel-to-channel isolated DIs, channel-to-channel isolated DOs, relays, and AOs to provide even more I/O options for ioPAC 8600 Series devices. Combined with the 85M modules, users have a wide variety of options to choose from, allowing them to select the I/O combination that best fits their target application. All 86M modules are designed for railway industry applications, and as such, are compliant with EN 50121-3-2, EN 50121-4, and all EN 50155 mandatory test items. In addition, these modules all support a wide operating temperature range of -40 to 75°C for reliable operation even in harsh environments.

## Specifications

### Input/Output Interface

Digital Input Channels	86M-1620D-T: 16 86M-1832D-T: 8
Digital Output Channels	86M-2821D-T: 8 86M-2830D-T: 8
Relay Channels	86M-2604D-T: 6
Analog Output Channels	86M-4420-T: 4
2-Wire Ethernet Ports	86M-5212U-T: 2
CAN Ports	86M-5250-T: 2
Isolation	3k VDC or 2k Vrms

### Digital Inputs

Connector	Spring-type Euroblock terminal
Voltage	86M-1620D-T: 24 to 110 VDC 86M-1832D-T: 24 VDC
Channel-to-Channel Isolation	86M-1832D-T: 1k VDC

1. This product is suitable for rolling stock railway applications, as defined by the EN 50155 standard. For a more detailed statement, click here: [www.moxa.com/doc/specs/EN\\_50155\\_Compliance.pdf](http://www.moxa.com/doc/specs/EN_50155_Compliance.pdf)

Counter Frequency	86M-1832D-T: 5k Hz
Debouncing Function	86M-1620D-T: Software enable/disable
Debouncing Time	86M-1620D-T: 1 to 15 ms (software-selectable)
Digital Filtering Time Interval	86M-1832D-T: Software configurable
I/O Mode	86M-1620D-T: DI 86M-1832D-T: DI, event counter, or frequency
Points per COM	86M-1620D-T: 8 channels
Scan on Time	86M-1620D-T: 0.5 ms
Scan Period	86M-1620D-T: 8 ms (typical)
Sensor Type	86M-1620D-T: PNP 86M-1832D-T: Wet Contact (NPN or PNP)
Wet Contact (DI to COM)	86M-1832D-T: On: 10 to 30 VDC 86M-1832D-T: Off: 0 to 3 VDC 86M-1620D-T: On: > 0.3 times external power voltage 86M-1620D-T: Off: < 0.15 times external power voltage

### Digital Outputs

Connector	Spring-type Euroblock terminal
Voltage	86M-2830D-T: 24 VDC 86M-2821D-T: 24 to 110 VDC
Current Rating	86M-2821D-T: 1500 mA per channel 86M-2830D-T: 200 mA per channel
I/O Mode	DO or PWM
I/O Type	86M-2821D-T: Source 86M-2830D-T: Sink
Over-Voltage Protection	86M-2821D-T: 160 VDC 86M-2830D-T: 41 VDC
Short-Circuit Protection	86M-2821D-T: 2800 mA @ 25°C 86M-2830D-T: 750 mA @ 25°C
Pulse Output Frequency	86M-2821D-T: 100 Hz 86M-2830D-T: 1 kHz

### Relays

Connector	Spring-type Euroblock terminal
I/O Mode	Relay or PWM
Contact Current Rating	Resistive load: 5 A @ 30 VDC, 250 VAC
Contact Resistance	100 milli-ohms (max.)
Electrical Endurance	60,000 operations @ 5 A resistive load
Initial Insulation Resistance	1,000 mega-ohms (min.) @ 500 VDC
Mechanical Endurance	5,000,000 operations
Pulse Output Frequency	0.33 Hz at rated load
Type	Form A (N.O.) power relay

## Analog Outputs

Connector	Spring-type Euroblock terminal
I/O Mode	Static or waveform mode
Accuracy	±0.1% FSR @ 25°C ±0.3% FSR @ -40 to 75°C
Current Load Resistance	External 24 VDC power: 1000 ohms Internal power: 400 ohms
Output Range	0 to 10 VDC 0 to 20 mA -10 to 10 V 4 to 20 mA
Resolution	12-bit
Voltage Output	10 mA (max.)
Waveform Frequency	125 Hz
Waveform Type	Sine, Square, Triangle

## Ethernet Interface

Connector	M12 D-coded 2-pin female connector
No. of Ports	2
Standards	BroadR-Reach® for 10 Mbps and 100 Mbps IEEE 802.3 for 10BaseT IEEE 802.3u for 100BaseT(X) and 100BaseFX

## CAN Interface

Industrial Protocols	CAN 2.0A, CAN 2.0B, CANopen DS301, V4.02
Baudrate	10/20/50/125/250/500/800/1000 kbps, user-defined
Connector	DB9 male
Isolation	3k VDC or 2k Vrms
No. of Ports	2
Terminator	N/A, 120 ohms (by DIP)

## Power Parameters

Power Consumption	86M-1620D-T: 12.6 mA @ 24 VDC 86M-1832D-T: 12.6 mA @ 24 VDC 86M-2604D-T: 127 mA @ 24 VDC 86M-2830D-T: 76.7 mA @ 24 VDC 86M-2821D-T: 85.2 mA @ 24 VDC 86M-4420-T: 143.8 mA @ 24 VDC 86M-5212U-T: 79.2 mA @ 24 VDC 86M-5250-T: 60.0 mA @ 24 VDC
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## Physical Characteristics

Dimensions	25 x 128.2 x 85.5 mm (0.98 x 5.05 x 3.37 in)
Weight	Under 80 g
Wiring	I/O cable, 16 to 28 AWG

## Environmental Limits

Operating Temperature	-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)
Altitude	2000 m <sup>2</sup>

## Standards and Certifications

EMC	EN 55032/24, EN 61000-6-2/-6-4
EMI	CISPR 32, FCC Part 15B Class A
EMS	IEC 61000-4-2 ESD: Contact: 6 kV; Air: 8 kV IEC 61000-4-3 RS: 5100 MHz to 6000 MHz: 3 V/m IEC 61000-4-4 EFT: Power: 1 kV; Signal: 0.5 kV IEC 61000-4-5 Surge: Power: 2 kV; Signal: 1 kV IEC 61000-4-6 CS: 10 V IEC 61000-4-8 PFMF
Railway	EN 50121-4, EN 50155
Safety	UL 508
Shock	IEC 60068-2-27
Vibration	IEC 60068-2-6

## MTBF

Time	86M-1620D-T: 1,115,244 hrs 86M-1832D-T: 1,149,108 hrs 86M-2604D-T: 4,173,843 hrs 86M-2821D-T: 696,245 hrs 86M-2830D-T: 1,766,037 hrs 86M-4420-T: 2,409,345 hrs 86M-5212U-T: 2,498,942 hrs 86M-5250-T: 3,306,609 hrs
Standards	Telcordia SR332

## Warranty

Warranty Period	5 years
Details	See <a href="http://www.moxa.com/warranty">www.moxa.com/warranty</a>

## Package Contents

Device	1 x ioPAC 8600 Series (86M) module
Documentation	1 x warranty card

## Ordering Information

Model Name	Input/Output Interface	Input/Output Mode	Type	Channel LED
86M-1620D-T	16 x DI	24-110 VDC	Sink	✓
86M-1832D-T	8 x DI	24 VDC ch-to-ch isolation	Sink/source	✓
86M-2604D-T	6 x Relay	Form A (N.O.)	-	✓
86M-2821D-T	8 x DO	24-110 VDC	Source	✓
86M-2830D-T	8 x DO	24 VDC ch-to-ch isolation	Sink	✓

2. Please contact Moxa if you require products guaranteed to function properly at higher altitudes.

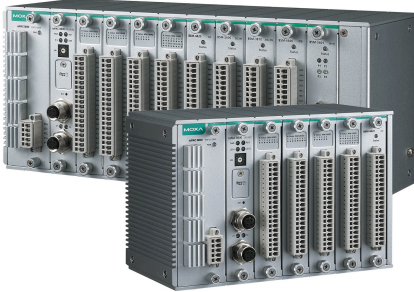
Model Name	Input/Output Interface	Input/Output Mode	Type	Channel LED
86M-4420-T	4 x AO	±10 V 0-10 V 0-20 mA 4-20 mA	-	-
86M-5212U-T	2 x 2-wire Ethernet	100BASE-TX IEEE 802.3u 10BASE-T IEEE 802.3 100 Mbps BroadR-Reach 10 Mbps BroadR-Reach	-	✓
86M-5250-T	2 x CAN	CAN 2.0A CAN 2.0B CANopen DS301, V4.02	-	✓

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# ioPAC 8600 Series

## Rugged modular programmable controllers



### Features and Benefits

- Modular CPU/power/backplane design that supports 85M/86M modules
- Tag-centric design with ready-to-run services
- Supports C/C++ and IEC 61131-3 programming languages
- Compact, lightweight design
- Supports a redundant power module with dual power inputs
- 24 to 110 V DI/O module and universal power input range module
- Complies with EN 50121-4
- Complies with all EN 50155 mandatory test items<sup>1</sup>

### Certifications



## Introduction

The ioPAC 8600 Series modular programmable controllers are 100% modular, giving you the freedom to choose the power, backplane, communication, and I/O modules you need for your application. In addition, the ioPAC 8600 enhances the hardware system architecture and key features of the ioPAC 8020 and ioPAC 8500 combined, and has an Ethernet bus on the backplane to support Ethernet switch modules.

The ioPAC 8600 supports the C/C++ and IEC 61131-3 programming languages and ready-to-run services, including Modbus TCP/RTU, SNMP, data logging, and email alarms to fulfill different customer requirements. With active tag and MX-AOPC UA Suite data integration software, the ioPAC 8600 Series provides a comprehensive solution for data acquisition and control applications in harsh environments.

### All New High-Performance CPU30 Module

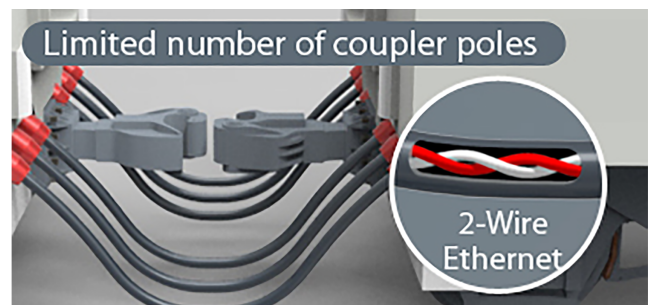
Moxa's ioPAC 8600-CPU30 module is equipped with a new 1 GHz high-performance Cortex™ A8 CPU, which shortens the cycle time significantly, and allows users to run more programs simultaneously. With the CPU30 module's 4 GB eMMC, the ioPAC 8600 can support more communication protocols for a wider range of scenarios, including a RESTful API for railway IIoT applications and DNP3 outstations<sup>2</sup> for oil and gas applications. The CPU30 also reserves up to 1.7 GB of internal storage that gives users the freedom to develop more complex programs for specific ioPAC applications. As an added bonus, users can develop programs directly on the ioPAC.<sup>2</sup>

### Tag-Centric Design and Ready-to-Run Service

Moxa's ioPAC 8600 programmable controllers use a tag-centric design with ready-to-run services. The tag-centric design helps streamline the connection between the ioPAC 8600 controller and remote I/Os, and allows you to easily manage I/O status by implementing get/set routines to read-from/write-to tag values, even if you are not particularly familiar with PLC FBDs and APIs. The ready-to-run service allows programmers to rapidly configure services (SNMP, Modbus RTU/TCP, email alarms, etc.) without writing a single line of code, reducing the development of complicated communication applications to a few mouse clicks. The ioPAC 8600's tag-centric design and ready-to-run service greatly increase an engineer's productivity.

### 2-Wire Ethernet Technology

Moxa's 2-wire Ethernet technology offers system integrators an attractive option for upgrading a train's IP network to a 10/100 Mbps<sup>3</sup> Ethernet backbone with existing 2-wire cable. This innovative technology greatly reduces cable usage by providing 100 Mbps Ethernet transmission over only two wires, thereby reducing the train's weight and improving energy efficiency. The 2-wire Ethernet switch module supports Ethernet bypass functionality, ensuring that the Ethernet backbone will continue to operate even if one ioPAC unit is without power. As an added bonus, by installing two 2-wire Ethernet modules in one ioPAC unit, the network can transmit at 200 Mbps and provide a redundant architecture.



1. This product is suitable for rolling stock railway applications, as defined by the EN 50155 standard. For a more detailed statement, click here: [www.moxa.com/doc/specs/EN\\_50155\\_Compliance.pdf](http://www.moxa.com/doc/specs/EN_50155_Compliance.pdf)  
2. Additional customization is required.  
3. When using 2-wire technology, network performance is dependent on cable quality.



## Compact, Lightweight Integrated Solution

The compact ioPAC 8600 programmable controller is well-suited for smaller sized installation spaces, and its lightweight design reduces energy consumption and allows the product to withstand the wear and tear of railway applications. However, the ioPAC's small size does not limit its capabilities. The ioPAC 8600 is equipped with universal dual power inputs that support all railway power voltages. With support for both 85M and 86M modules, the ioPAC 8600 programmable controller can implement the wide variety of IO scenarios required by train applications. The ioPAC 8600 also supports a variety of communication interfaces, including Ethernet, serial, CAN, and HART.<sup>4</sup> System integrators can control or monitor subsystems with the ioPAC 8600, which saves space and provides powerful functions that both fit within the system integrator's budget and overcome installation difficulties.

## Specifications

### Computer

CPU	32-bit Cortex-A8 1 GHz CPU
OS	Real-time Linux (PREEMPT_RT)
Clock	Real-time clock with capacitor backup

### Memory

eMMC	4 GB (1.7 GB reserved for the user)
SDRAM	512 MB DDR3(L)
SPI-NVRAM	128 KB
microSD Slot	Up to 32 GB (SD 2.0 compatible) <sup>5</sup>

### Control Logic

Language	C/C++, IEC 61131-3
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### Ethernet Interface

10/100BaseT(X) Ports (M12 D-coded 4-pin female connector)	M12 version: 2, 1 MAC address (Ethernet bypass) or 2 MAC addresses, jumper selectable
10/100BaseT(X) Ports (RJ45 connector)	RJ45 version: 2, 1 MAC address (Ethernet bypass) or 2 MAC addresses, jumper selectable
Magnetic Isolation Protection	1.5 kV (built-in)

### Ethernet Software Features

Configuration Options	Windows Utility (RTUxpress)
Industrial Protocols	Modbus TCP Client (Master), Modbus TCP Server (Slave), Moxa AOPC (Active Tag), SNMPv1/v2c Trap, SNMPv1/v2c/v3
Management	BOOTP, IPv4, SMTP, UDP, TCP/IP
Security	SSH
Time Management	SNTP

### Serial Interface

Console Port	RS-232 (TxD, RxD, GND), 3-pin (115200, n, 8, 1)
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### Modbus RTU/ASCII

Functions Supported	1, 2, 3, 4, 5, 6, 15, 16
Mode	Master, Slave

4. HART only available on a project basis.

5. For units operating in extreme temperatures, industrial-grade, wide-temperature microSD cards are required.

## Modbus TCP

Functions Supported	1, 2, 3, 4, 5, 6, 15, 16
Mode	Master, Slave

## Power Parameters

Power Connector	Spring-type Euroblock terminal
No. of Power Inputs	2
Input Voltage	24 to 110 VDC
Power Consumption	223 mA @ 24 VDC
Galvanic Isolation	3k VDC

## Physical Characteristics

Slots	ioPAC 8600-BM005: 5 ioPAC 8600-BM009: 9 ioPAC 8600-BM012: 12
Housing	Metal
Dimensions	ioPAC 8600-BM005: 205.65 x 133.35 x 100 mm (8.1 x 5.25 x 3.94 in) ioPAC 8600-BM009: 324.8 x 133.35 x 100 mm (12.79 x 5.25 x 3.94 in) ioPAC 8600-BM012: 436.8 x 132.2 x 100 mm (17.19 x 5.2 x 3.94 in)
Weight	ioPAC 8600-BM005: 2,560 g (5.64 lb) ioPAC 8600-BM009: 3,690 g (8.14 lb) ioPAC 8600-BM012: 4,550 g (10.03 lb)
Installation	Wall mounting (with optional kit)
Wiring	Power cable, 14 to 28 AWG

## Environmental Limits

Operating Temperature	-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)
Altitude	2000 m <sup>6</sup>

## Standards and Certifications

EMC	EN 55032/24, EN 61000-6-2/-6-4
EMI	CISPR 32, FCC Part 15B Class A
EMS	IEC 61000-4-2 ESD: Contact: 6 kV; Air: 8 kV IEC 61000-4-3 RS: 5100 MHz to 6000 MHz: 3 V/m IEC 61000-4-4 EFT: Power: 1 kV; Signal: 0.5 kV IEC 61000-4-5 Surge: Power: 2 kV; Signal: 1 kV IEC 61000-4-6 CS: 10 V IEC 61000-4-8 PFMF
Railway	EN 50121-4, EN 50155
Safety	UL 508
Shock	IEC 60068-2-27
Vibration	IEC 60068-2-6

6. Please contact Moxa if you require products guaranteed to function properly at higher altitudes.

## MTBF

Time	ioPAC 8600-CPU30 Series: 1,358,656 hrs ioPAC 8600-PW10-15W-T: 1,752,960 hrs ioPAC 8600-PW10-30W-T: 1,341,777 hrs
Standards	Telcordia SR332

## Warranty

Warranty Period	5 years
Details	See <a href="http://www.moxa.com/warranty">www.moxa.com/warranty</a>

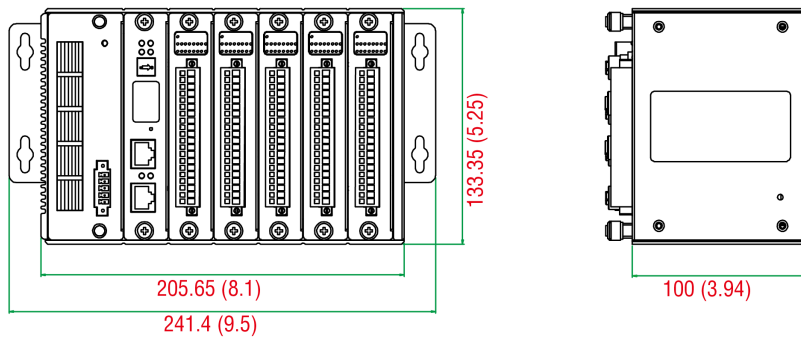
## Package Contents

Device	1 x ioPAC 8600 Series modular controller
Cable	C++ version: 1 x 4-pin header to DB9 console port
Documentation	1 x warranty card 1 x software DVD
Note	This product requires additional modules (sold separately) to function.

## Dimensions

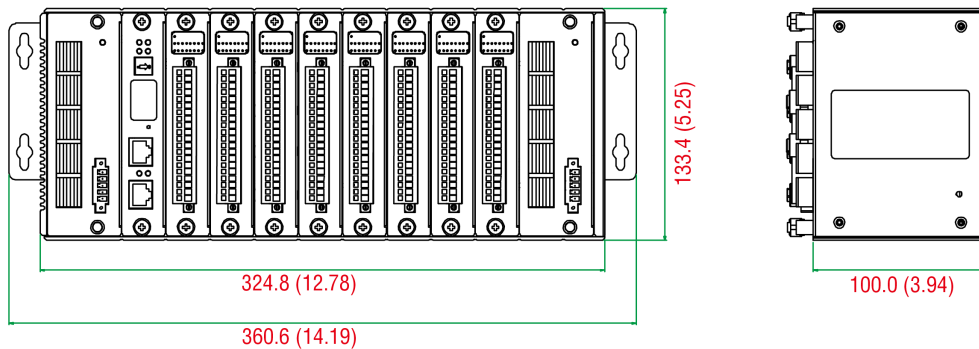
### 5-Slot ioPAC 8600

Unit: mm (inch)



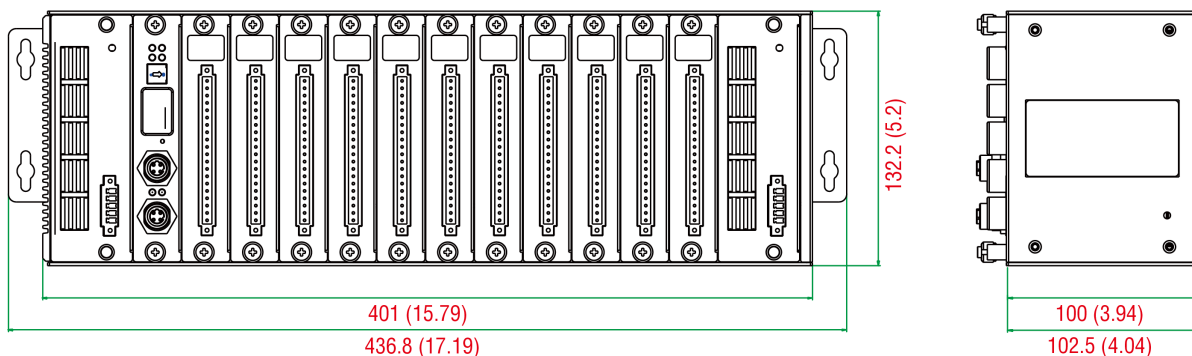
### 9-Slot ioPAC 8600

Unit: mm (inch)



## 12-Slot ioPAC 8600

Unit: mm (inch)



## Ordering Information

Model Name	CPU	OS	LAN	Control Logic Languages	Dual-Power Input	Slots
ioPAC 8600-CPU30-M12-C-T	32-bit Cortex-A8 1 GHz	Real-time Linux (PREEMPT_RT)	2 x M12	C/C++	-	-
ioPAC 8600-CPU30-RJ45-C-T	32-bit Cortex-A8 1 GHz	Real-time Linux (PREEMPT_RT)	2 x RJ45	C/C++	-	-
ioPAC 8600-CPU30-M12-IEC-T	32-bit Cortex-A8 1 GHz	Real-time Linux (PREEMPT_RT)	2 x M12	IEC 61131-3	-	-
ioPAC 8600-CPU30-RJ45-IEC-T	32-bit Cortex-A8 1 GHz	Real-time Linux (PREEMPT_RT)	2 x RJ45	IEC 61131-3	-	-
ioPAC 8600-PW10-15W-T	-	-	-	-	24-110 VDC, 15 W	-
ioPAC 8600-PW10-30W-T	-	-	-	-	24-110 VDC, 30 W	-
ioPAC 8600-BM005-T	-	-	-	-	-	5
ioPAC 8600-BM009-T	-	-	-	-	-	9
ioPAC 8600-BM012-T	-	-	-	-	-	12

## Accessories (sold separately)

### I/O Modules

85M-1602-T	Module for the ioPAC 8500/8600 Series, 16 DIs, 24 VDC sink/source, -40 to 75°C operating temperature
85M-2600-T	Module for the ioPAC 8500/8600 Series, 16 DOs, 24 VDC sink, -40 to 75°C operating temperature
85M-3800-T	Module for the ioPAC 8500/8600 Series, 8 AIs, 4 to 20 mA, -40 to 75°C operating temperature
85M-3801-T	Module for the ioPAC 8500/8600 Series, 8 AIs, 0 to 10 V, -40 to 75°C operating temperature
85M-3810-T	Module for the ioPAC 8500/8600 Series, 8 AIs, 4 to 20 mA, 40 kHz, -40 to 75°C operating temperature
85M-3811-T	Module for the ioPAC 8500/8600 Series, 8 AIs, 0 to 10 V, 40 kHz, -40 to 75°C operating temperature
85M-5401-T	Module for the ioPAC 8500/8600 Series, 4-port serial, DB44 connectors, -40 to 75°C operating temperature
85M-6600-T	Module for the ioPAC 8500/8600 Series, 6 RTDs, -40 to 75°C operating temperature
85M-6810-T	Module for the ioPAC 8500/8600 Series, 8 TCs, -40 to 75°C operating temperature
86M-1620D-T	Module for the ioPAC 8600 Series, 16 DIs, 24 to 110 VDC, sink, channel LED, -40 to 75°C operating temperature
86M-1832D-T	Module for the ioPAC 8600 Series, 8 DIs, 24 VDC, sink/source, ch-to-ch isolation, channel LED, -40 to 75°C operating temperature

86M-2604D-T	Module for the ioPAC 8600 Series, 6 Relays, form A (N.O.), channel LED, -40 to 75°C operating temperature
86M-2821D-T	Module for the ioPAC 8600 Series, 8 DOs, 24 to 110 VDC, source, channel LED, -40 to 75°C operating temperature
86M-2830D-T	Module for the ioPAC 8600 Series, 8 DOs, 24 VDC, sink, ch-to-ch isolation, channel LED, -40 to 75°C operating temperature
86M-4420-T	Module for the ioPAC 8600 Series, 4 AOs, 0 to 10 V, -10 to 10 V, 0 to 20 mA, or 4 to 20 mA, -40 to 75°C operating temperature
86M-5212U-T	Module for the ioPAC 8600 Series, 2-port 2-wire Ethernet switch, -40 to 75°C operating temperature
86M-5250-T	Module for the ioPAC 8600 Series, 2 CAN ports, -40 to 75°C operating temperature

#### Software

MX-AOPC UA Server	OPC UA Server software for converting fieldbus to the OPC UA standard
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#### Brackets

85M-BKTES	Empty slot cover (3 pieces per package)
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#### Cables

CBL-M12D(MM4P)/RJ45-100 IP67	M12-to-RJ45 cable, IP67-rated, 1 m  Applicable Models: ioPAC 8600-CPU30-M12-C-T ioPAC 8600-CPU30-M12-IEC-T
CBL-RJ458P-100	8-pin RJ45 CAT5 Ethernet cable, 1 m  Applicable Models: ioPAC 8600-CPU30-RJ45-C-T ioPAC 8600-CPU30-RJ45-IEC-T

#### Wall-Mounting Kits

WK-75	Wall-mounting kit, 2 plates, 8 screws, 75 x 90 x 2.5 mm
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