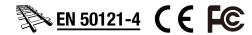# ioPAC 8500 Series

*Rugged modular controllers*

## Features and Benefits

- Dedicated Arm (RISC) CPUs for the main system and each I/O module
- Millisecond timestamp granularity for digital input and analog input
- Supports 5 kHz sampling rate for analog input
- Pre-recording for analog input data logging
- Supports C/C++ or IEC 61131-3 programming languages
- Complies with EN 50121-4 and a portion of EN 50155 specifications
- Robust and compact design for harsh environments
- Modular I/O for versatility, flexibility, and scalability

## Certifications

EN 50121-4  CE  FC

## Introduction

The ioPAC 8500 Series modular controllers use an Arm9 industrial-grade CPU for the system, and Arm Cortex™ M4 CPUs for the modules. The controllers have 2, 5, or 9 I/O slots for 85M Series modules and the dual CPU architecture supports a 5 kHz (per channel) analog input sampling rate, pre-recording of analog input data, and timestamping with millisecond granularity. Moreover, the ioPAC 8500 supports C/C++ or IEC 61131-3 programming, rail-level surge and ESD protection, a -40 to 75°C operating temperature range, vibration protection, hot-swappable modules, two 10/100 Mbps Ethernet ports with two MACs (with port trunking capability), and two 3-in-1 serial ports. Accompanied by Moxa's MX-AOPC UA Server and MX-AOPC UA Logger data integration software, the ioPAC 8500 Series provides a comprehensive solution for data acquisition and control applications in harsh environments.

### High Sampling Rate

Moxa's ioPAC 8500 controllers use an Arm9 industrial-grade CPU, and the dual CPU architecture supports up to a 5 kHz (per channel) analog input sampling rate, giving engineers the analog data precision they need to correctly analyze events after they have occurred.

### Analog Input Prerecord Feature

The prerecord feature allows the device to continuously record analog input data before an event is triggered. This is a major improvement over products that only start logging data after an event has occurred, because these conventional approaches can often lead to the loss of critical data due to network latency during the event.

### Millisecond Timestamp Granularity

Millisecond timestamp granularity is a powerful aid in post-event analysis and troubleshooting. For example, if an emergency triggers 10 separate I/O events within a 10-millisecond time interval, you will still be able to clearly identify the sequence in which the events occurred, even if the I/O events are recorded by different modules.

### Hot-Swappable Modular I/O

The controller lets you hot-swap I/O modules, allowing engineers to quickly and easily install and replace modules in the field, reducing maintenance costs and streamlining maintenance procedures.

## Specifications

### Computer

| | |
|---|---|
| CPU | 32-bit Arm9 192 MHz CPU |
| OS | Linux |
| Clock | Real-time clock with battery backup |

## Memory

| | |
|---|---|
| Flash | 32 MB (10 MB reserved for user) |
| microSD Slot | Up to 32 GB (SD 2.0 compatible) |
| SDRAM | 64 MB |

## Control Logic

| | |
|---|---|
| Language | C/C++<br>IEC 61131-3 |

## Ethernet Interface

| | |
|---|---|
| 10/100BaseT(X) Ports (M12 D-coded 4-pin female connector) | ioPAC 8500-X-M12 Series: 2, 2 MAC addresses |
| 10/100BaseT(X) Ports (RJ45 connector) | ioPAC 8500-X-RJ45 Series: 2, 2 MAC addresses |
| Magnetic Isolation Protection | 1.5 kV (built-in) |

## Ethernet Software Features

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

## Serial Interface

| | |
|---|---|
| Console Port | RS-232 (TxD, RxD, GND), 3-pin (115200, n, 8, 1) |
| Data Bits | 7, 8 |
| Flow Control | RTS/CTS<br>XON/XOFF |
| Parity | None<br>Even<br>Odd |
| Serial Standards | RS-232/422/485 |
| Stop Bits | 1, 2 |

## Modbus RTU/ASCII

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

## 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 | 1 |
| Input Voltage | 9 to 48 VDC |
| Power Consumption | 152 mA @ 24 VDC |

## Physical Characteristics

| | |
|---|---|
| Slots | ioPAC 8500-2 Series: 2<br>ioPAC 8500-5 Series: 5<br>ioPAC 8500-9 Series: 9 |
| Wiring | Power cable, 14 to 28 AWG |
| Housing | Metal |
| Dimensions | ioPAC 8500-2 Series: 114.7 x 135 x 100 mm (4.52 x 5.31 x 3.94 in)<br>ioPAC 8500-5 Series: 190.9 x 135 x 100 mm (7.52 x 5.31 x 3.94 in)<br>ioPAC 8500-9 Series: 292.5 x 135 x 100 mm (11.52 x 5.31 x 3.94 in) |
| Weight | ioPAC 8500-2 Series: 1,300 g (2.87 lb)<br>ioPAC 8500-5 Series: 2,000 g (4.41 lb)<br>ioPAC 8500-9 Series: 2,575 g (5.68 lb) |
| Installation | DIN-rail mounting<br>Wall mounting (with optional kit)<br>I/O cable, 14 to 28 AWG<br>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) |

## Standards and Certifications

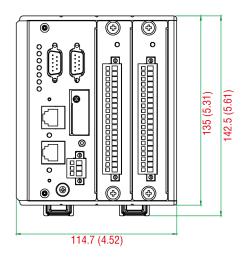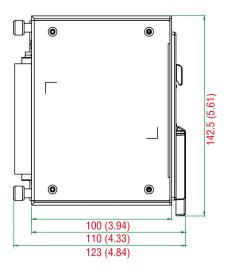| | |
|---|---|
| EMC | EN 55032/24<br>EN 61000-6-2/-6-4 |
| EMI | CISPR 32, FCC Part 15B Class A |
| EMS | IEC 61000-4-2 ESD: Contact: 6 kV; Air: 8 kV<br>IEC 61000-4-4 EFT: Power: 1 kV; Signal: 0.5 kV<br>IEC 61000-4-5 Surge: Power: 2 kV; Signal: 1 kV<br>IEC 61000-4-6 CS: 10 V<br>IEC 61000-4-8 PFMF |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

## MTBF

| | |
|---|---|
| Time | 859,979 hrs |
| Standards | Telcordia SR332 |

## Warranty

| | |
|---|---|
| Warranty Period | 5 years |
| Details | See www.moxa.com/warranty |

## Package Contents

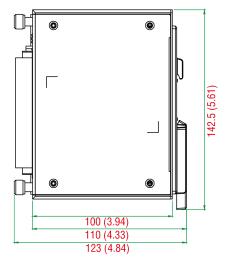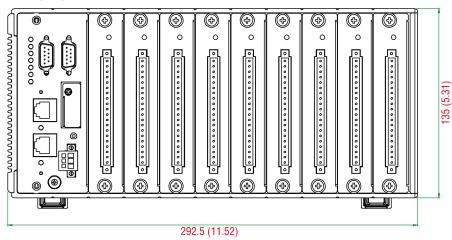| | |
|---|---|
| Device | 1 x ioPAC 8500 Series modular controller |
| Cable | C++ version: 1 x 4-pin header to DB9 console port |
| Documentation | 1 x software DVD<br>1 x warranty card |
| Note | This product requires additional modules (sold separately) to function. |

## Dimensions

**ioPAC 8500-2**

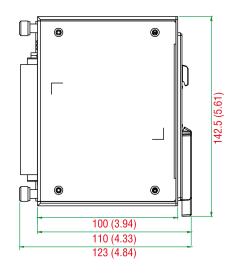Unit: mm (inch)

## ioPAC 8500-5

Unit: mm (inch)



135 (5.31)

190.9 (7.52)

142.5 (5.61)

100 (3.94)
110 (4.33)
123 (4.84)

## ioPAC 8500-9

Unit: mm (inch)



135 (5.31)

292.5 (11.52)

142.5 (5.61)

100 (3.94)
110 (4.33)
123 (4.84)

## Mounting Kits



Wall-Mounting Kit
(optional)

DIN-Rail Kit

DIN-Rail Kit

Wall-Mounting Kit
(optional)

# Ordering Information

| Model Name | LAN | Control Logic Languages | Slots |
|---|---|---|---|
| ioPAC 8500-2-RJ45-C-T | 2 x RJ45 | C/C++ | 2 |
| ioPAC 8500-2-RJ45-IEC-T | 2 x RJ45 | IEC 61131-3 | 2 |
| ioPAC 8500-2-M12-C-T | 2 x M12 | C/C++ | 2 |
| ioPAC 8500-2-M12-IEC-T | 2 x M12 | IEC 61131-3 | 2 |
| ioPAC 8500-5-RJ45-C-T | 2 x RJ45 | C/C++ | 5 |
| ioPAC 8500-5-RJ45-IEC-T | 2 x RJ45 | IEC 61131-3 | 5 |
| ioPAC 8500-5-M12-C-T | 2 x M12 | C/C++ | 5 |
| ioPAC 8500-5-M12-IEC-T | 2 x M12 | IEC 61131-3 | 5 |
| ioPAC 8500-9-RJ45-C-T | 2 x RJ45 | C/C++ | 9 |
| ioPAC 8500-9-RJ45-IEC-T | 2 x RJ45 | IEC 61131-3 | 9 |
| ioPAC 8500-9-M12-C-T | 2 x M12 | C/C++ | 9 |
| ioPAC 8500-9-M12-IEC-T | 2 x M12 | IEC 61131-3 | 9 |

# Accessories (sold separately)

### I/O Modules

| | |
|---|---|
| 85M-1602-T | For the ioPAC 8600/8500 Series, 16 DIs, 24 VDC, sink/source type |
| 85M-2600-T | For the ioPAC 8600/8500 Series, 16 DOs, 24 VDC, sink type |
| 85M-3800-T | For the ioPAC 8600/8500 Series, 8 AIs, 4 to 20 mA |
| 85M-3801-T | For the ioPAC 8600/8500 Series, 8 AIs, 0 to 10 V |
| 85M-3810-T | For the ioPAC 8600/8500 Series, 8 AIs, 4 to 20 mA, 40 kHz |
| 85M-3811-T | For the ioPAC 8600/8500 Series, 8 AIs, 0 to 10 V, 40 kHz |
| 85M-6600-T | For the ioPAC 8600/8500 Series, 6 RTDs |
| 85M-6810-T | For the ioPAC 8600/8500 Series, 8 TCs |
| 85M-5401-T | For the ioPAC 8600/8500 Series, 4-port serial, DB44 connectors |

### Software

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

### I/O Modules

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

### Cables

| | |
|---|---|
| CBL-M12D(MM4P)/RJ45-100 IP67 | M12-to-RJ45 cable, IP67-rated, 1 m<br><br>Applicable Models:<br>ioPAC 8500-2-M12-C-T<br>ioPAC 8500-2-M12-IEC-T<br>ioPAC 8500-5-M12-C-T<br>ioPAC 8500-5-M12-IEC-T<br>ioPAC 8500-9-M12-C-T<br>ioPAC 8500-9-M12-IEC-T |
| CBL-RJ458P-100 | 8-pin RJ45 CAT5 Ethernet cable, 1 m<br><br>Applicable Models:<br>ioPAC 8500-2-RJ45-C-T<br>ioPAC 8500-2-RJ45-IEC-T<br>ioPAC 8500-5-RJ45-C-T<br>ioPAC 8500-5-RJ45-IEC-T |

|  | ioPAC 8500-9-RJ45-C-T |
|  | ioPAC 8500-9-RJ45-IEC-T |

### Wall-Mounting Kits

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

www.moxa.com