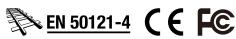# ioPAC 8500 Series

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

MOXA
Reliable Networks ▲ Sincere Service

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++, 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), Modbus TCP Server (Slave), Moxa AOPC (Active Tag), SNMPv1/v2c Trap, SNMPv1/v2c/v3
Management	BOOTP, DHCP Client, IPv4, SMTP, UDP, TCP/IP
Security	IPsec, 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, XON/XOFF
Parity	None, Even, 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

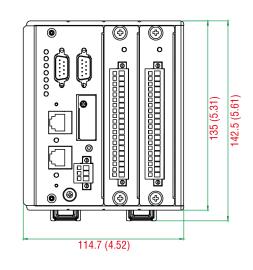|	
Power Connector	Spring-type Euroblock terminal
No. of Power Inputs	1
Input Voltage	9 to 48 VDC
Power Consumption	152 mA @ 24 VDC

Physical Characteristics

Slots	ioPAC 8500-2 Series: 2 ioPAC 8500-5 Series: 5 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) ioPAC 8500-5 Series: 190.9 x 135 x 100 mm (7.52 x 5.31 x 3.94 in) 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) ioPAC 8500-5 Series: 2,000 g (4.41 lb) ioPAC 8500-9 Series: 2,575 g (5.68 lb)
Installation	DIN-rail mounting, Wall mounting (with optional kit), I/O cable, 14 to 28 AWG, 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, 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 61000-4-4 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	859,979 hrs
Standards	Telcordia SR332

Warranty

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

Package Contents

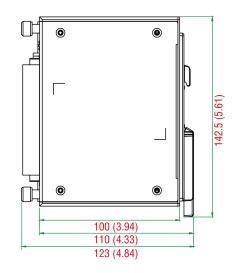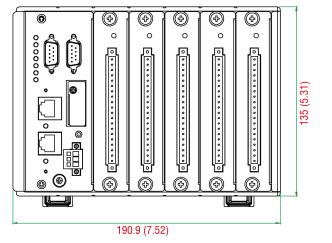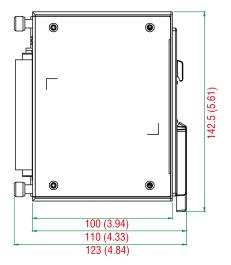|	
Device	1 x ioPAC 8500 Series modular controller
Cable	C++ version: 1 x 4-pin header to DB9 console port
Documentation	1 x software DVD 1 x warranty card
Note	This product requires additional modules (sold separately) to function.

Dimensions
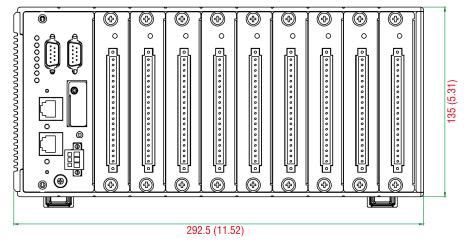
ioPAC 8500-2

Unit: mm (inch)

ioPAC 8500-5

Unit: mm (inch)

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	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-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
85M-5401-T	Module for the ioPAC 8500/8600 Series, 4-port serial, DB44 connectors, -40 to 75°C operating temperature

Brackets

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

Software

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

Cables

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