

ioPAC 8500 Series

Rugged modular RTU controllers



- > Dedicated ARM-based CPUs for the main system and each I/O module
- > Supports millisecond timestamps for digital input and analog input
- > Supports 40 kHz sampling and pre-recording for analog input
- > Supports C/C++ programming languages
- > Compliant with EN 50121-3-2, EN 50121-4, and EN 50155
- > Robust and compact design for harsh environments
- > Modular I/O for versatility, flexibility, and scalability



Introduction

The ioPAC 8500 modular RTU controllers use an ARM9 based industrial grade CPU for the system, and ARM Cortex™ M4 based CPUs for the modules. The controllers have 2, 5, or 9 I/O slots for 85M series modules. The USB bus between the controller CPU and module CPUs transmits data at up to 200 Mbps, and the dual CPU architecture supports a 40 kHz analog input sampling rate, pre-recording of analog input data, and millisecond timestamping. Moreover, the ioPAC 8500 supports C/C++ programming capability, 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 (Port Trunking ready), and two 3-in-1 serial ports. Accompanied by Moxa's Active OPC Server and DA-Center data integration software, the ioPAC 8500 series provides a comprehensive solution for data acquisition and control applications in harsh environments.

Specifications

Computer

Main CPU: ARM9 based CPU, 32-bit/192 MHz
I/O CPU: ARM Cortex M4 based CPU, 32-bit/80MHz
OS: Linux
Clock: Real-time clock with battery backup

Memory:

- SDRAM: 64 MB
- Flash: 32 MB
- SRAM: 256 KB (battery backup lasts for 1 week)
- microSD™ Slot: Up to 32 GB (SD 2.0 compatible)

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

Backplane Bus Speed: Up to 200 Mbps for all slots

Ethernet Interface

LAN: 2 x 10/100 Mbps, 2 MACs (IPs), RJ45 or M12
Protection: 1.5 kV magnetic isolation

Serial Communication

Interface:

- 2 RS-232/422/485 ports, software selectable (DB9 male)
- 1 RS-232 debug port (4-pin connector)

Serial Line Protection: 8 kV ESD for all signals

Serial Communication Parameters

Parity: None, Even, Odd

Data Bits: 7, 8

Stop Bits: 1, 2

Flow Control: RTS/CTS, XON/XOFF

Baudrate: 300 bps to 921.6 Kbps

Serial Signals

RS-232: TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND

RS-422: Tx+, Tx-, Rx+, Rx-, GND

RS-485-4w: Tx+, Tx-, Rx+, Rx-, GND

RS-485-2w: Data+, Data-, GND

Software Characteristics

Automation Languages: C/C++

Protocols: Modbus/TCP, Modbus/RTU Master, Modbus/RTU Slave

Power Requirements

Power Input: 24 VDC nominal, 9 to 48 VDC

Note: Compliant with EN 50155 at 24 VDC

Current for I/O Modules: 5 A @ 3.3 VDC (max.)

Power Consumption: 3.65 W @ 24 VDC

Physical Characteristics

Housing: Aluminum

Dimensions:

- 2-slot version: 114.7 x 135 x 100 mm (4.52 x 5.31 x 3.94 in)
- 5-slot version: 190.9 x 135 x 100 mm (7.52 x 5.31 x 3.94 in)
- 9-slot version: 292.5 x 135 x 100 mm (11.52 x 5.31 x 3.94 in)

Weight:

- 2-slot version: 1300 g
- 5-slot version: 2000 g
- 9-slot version: 2575 g

Mounting: DIN rail mounting (standard), wall mounting (optional)

Connector: Spring-type terminal block

Environmental Limits

Operating Temperature: -40 to 75°C (-40 to 176°F)

Storage Temperature: -40 to 85°C (-40 to 185°F)

Ambient Relative Humidity: 5 to 95% (non-condensing)

Altitude: Up to 2000 m

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

Standards and Certifications

Safety: UL 508 (Pending)

EMI: EN 55022, EN 61000-3-2; EN 61000-3-3; FCC Part 15 Subpart B Class A

EMS: EN 55024, EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-4-8, EN 61000-4-11

Shock: IEC 60068-2-27

Freefall: IEC 60068-2-32

Vibration: IEC 60068-2-6

Rail Traffic: EN 50155, EN 50121-3-2, EN 50121-4

Note: Please check Moxa's website for the most up-to-date certification status.

MTBF (mean time between failure)

Time: 859,979 hrs

Database: Telcordia (Bellcore)

Warranty

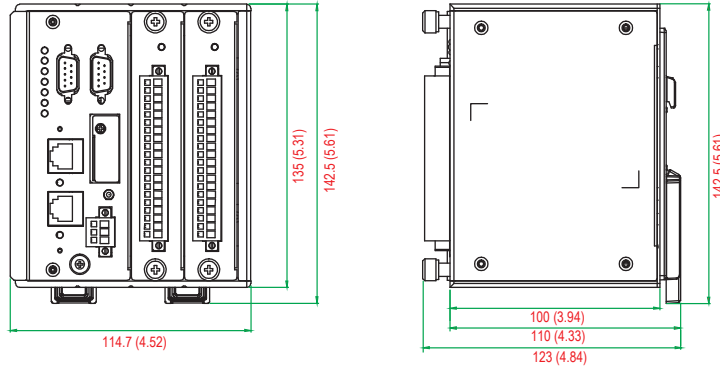
Warranty Period: 5 years

Details: See www.moxa.com/warranty

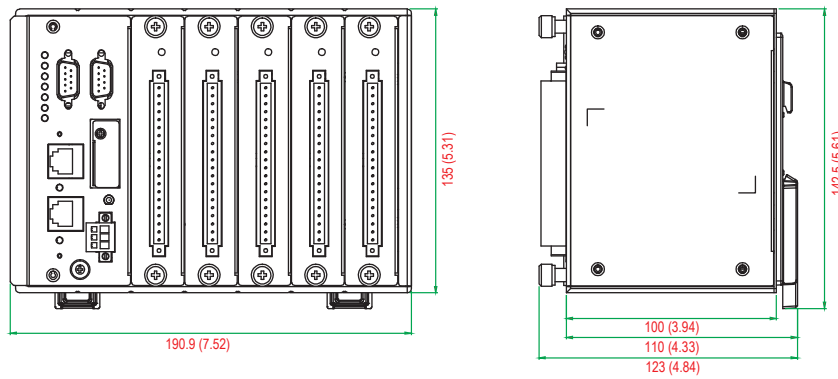
Dimensions

Unit: mm (inch)

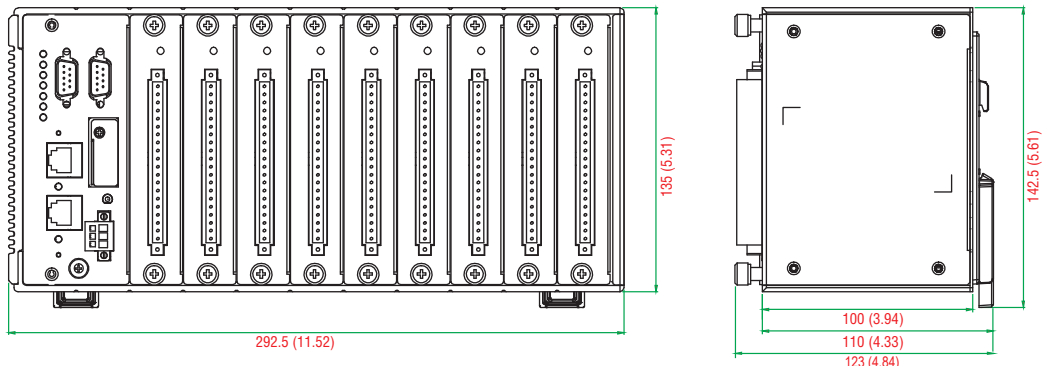
ioPAC 8500-2



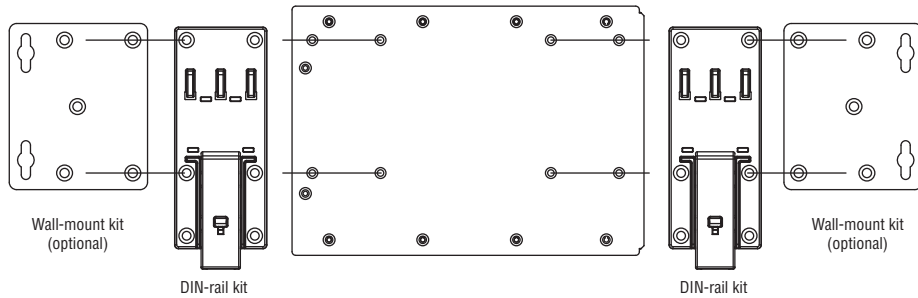
ioPAC 8500-5



ioPAC 8500-9



Mounting Kits



Ordering Information

Available Models

ioPAC 8500-2-RJ45-C-T : Modular RTU controller with RJ45 connectors, 2 I/O slots, C/C++, -40 to 75°C operating temperature

ioPAC 8500-2-M12-C-T : Modular RTU controller with M12 connectors, 2 I/O slots, C/C++, -40 to 75°C operating temperature

ioPAC 8500-5-RJ45-C-T: Modular RTU controller with RJ45 connectors, 5 I/O slots, C/C++, -40 to 75°C operating temperature

ioPAC 8500-5-M12-C-T: Modular RTU controller with M12 connectors, 5 I/O slots, C/C++, -40 to 75°C operating temperature

ioPAC 8500-9-RJ45-C-T: Modular RTU controller with RJ45 connectors, 9 I/O slots, C/C++, -40 to 75°C operating temperature

ioPAC 8500-9-M12-C-T: Modular RTU controller with M12 connectors, 9 I/O slots, C/C++, -40 to 75°C operating temperature

Optional Accessories (can be purchased separately)

WK-75: Wallmount kit

CBL-M12D(MM4P)/RJ45-100 IP67: M12 to RJ45 cable

85M-BKTES: Empty slot cover for ioPAC 85xx modules (3 pcs per package)

I/O Modules (can be purchased separately)

85M-1602-T: ioPAC 85xx I/O module with 16 DIs, 24 VDC sink/source type, -40 to 75°C operating temperature

85M-2600-T: ioPAC 85xx I/O module with 16 DOs, 24 VDC sink type, -40 to 75°C operating temperature

85M-3800-T: ioPAC 85xx I/O module with 8 AIs, 4 to 20 mA, -40 to 75°C operating temperature

85M-3810-T: ioPAC 85xx I/O module with 8 AIs, 0 to 10 V, -40 to 75°C operating temperature

85M-3801-T: ioPAC 85xx I/O module with 8 AIs, 4 to 20 mA, 40 kHz, -40 to 75°C operating temperature

85M-3811-T: ioPAC 85xx I/O module with 8 AIs, 0 to 10 V, 40 kHz, -40 to 75°C operating temperature

85M-5401-T: ioPAC 85xx communication module with 4-port Serial, DB44 connectors, -40 to 75°C operating temperature

Note: Conformal coating available on request

Package Checklist (ioPAC 8500)

- ioPAC 8500 controller
- Serial console cable
- Documentation and software CD

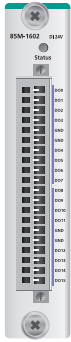
Package Checklist (85M modules)

- 85M module
- DB44 to 4-port DB9 cable included in 85M-5401-T package



I/O Modules for the ioPAC 8500 Series

16 digital inputs, 24 VDC, sink/source, dry contact type



85M-1602-T: 16 digital inputs, 24 VDC, sink/source, dry contact type

Inputs and Outputs

Digital Inputs: 16 channels
Isolation: 3K VDC or 2K Vrms

Digital Inputs

Sensor Type: Wet contact (NPN or PNP), dry contact

I/O Mode: DI or event counter

Dry Contact:

- On: short to GND
- Off: open

Wet Contact (DI to GND):

- NPN (DI to GND):
- On: 0 to 3 VDC
 - Off: 10 to 30 VDC
- PNP (DI to GND):
- Off: 0 to 3 VDC
 - On: 10 to 30 VDC

Common Type: 8 points per COM

Counter Frequency: 5 kHz

Digital Filtering Time Interval: Software selectable (by 0.1 ms)

Physical Characteristics

Wiring: I/O cable, max. 16 AWG

Connector: Spring type terminal block

Environmental Limits

Operating Temperature: -40 to 75°C

Power Requirements

Power Consumption: 1.2 W @ 3.3 VDC

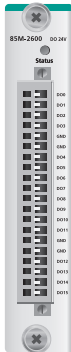
MTBF (mean time between failure)

Time: 1,132,561 hrs

Database: Telcordia (Bellcore)



16 digital outputs, 24 VDC, sink type



85M-2600-T: 16 digital outputs, 24 VDC, sink type

Inputs and Outputs

Digital Outputs: 16 channels
Isolation: 3K VDC or 2K Vrms

Digital Outputs

Type: Sink

I/O Mode: DO or pulse output

Pulse Output Frequency: 5 kHz

Over-voltage Protection: 45 VDC

Over-current Protection: 2.6 A (4 channels @ 650 mA)

Over-temperature Shutdown: 175°C (typical), 150°C (min.)

Current Rating: 200 mA per channel

Physical Characteristics

Wiring: I/O cable, max. 16 AWG

Connector: Spring type terminal block

Environmental Limits

Operating Temperature: -40 to 75°C

Power Requirements

Power Consumption: 0.85 W @ 3.3 VDC

MTBF (mean time between failure)

Time: 792,571 hrs

Database: Telcordia (Bellcore)



8 analog inputs, 4 to 20 mA



85M-3800-T: 8 analog inputs, 4 to 20 mA

Inputs and Outputs

Analog Inputs: 8 channels

Isolation: 3K VDC or 2K Vrms

Analog Inputs

Type: Differential

Resolution: 16 bits

I/O Mode: 4 to 20 mA (wire off)

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

Input Impedance: 125 ohms (min.)

Physical Characteristics

Wiring: I/O cable, max. 16 AWG

Connector: Spring type terminal block

Environmental Limits

Operating Temperature: -40 to 75°C

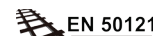
Power Requirements

Power Consumption: 1.05 W @ 3.3 VDC

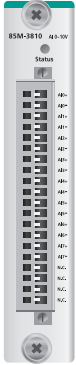
MTBF (mean time between failure)

Time: 1,512,906 hrs

Database: Telcordia (Bellcore)



8 analog inputs, 0 to 10 VDC



85M-3810-T: 8 analog inputs, 0 to 10 VDC

Inputs and Outputs

Analog Inputs: 8 channels
Isolation: 3K VDC or 2K Vrms

Analog Inputs

Type: Differential
Resolution: 16 bits
I/O Mode: 0 to 10 VDC

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

Input Impedance: 200 k-ohms (min.)

Physical Characteristics

Wiring: I/O cable, max. 16 AWG
Connector: Spring type terminal block

Environmental Limits

Operating Temperature: -40 to 75°C

Power Requirements

Power Consumption: 1.04 W @ 3.3 VDC

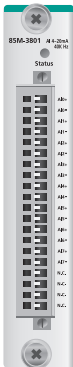
MTBF (mean time between failure)

Time: 1,530,690 hrs

Database: Telcordia (Bellcore)



8 analog inputs, 4 to 20 mA, 40 kHz



85M-3801-T: 8 analog inputs, 4 to 20 mA, 40 kHz

Inputs and Outputs

Analog Inputs: 8 channels
Isolation: 3K VDC or 2K Vrms

Analog Inputs

Type: Differential
Resolution: 16 bits
I/O Mode: 4 to 20 mA (wire off)

Historical Data Buffering: Up to 6 sec per channel

Accuracy:
 ±0.1% FSR @ 25°C
 ±0.3% FSR @ -40 and 75°C

Sampling Rate:

- All channels: 40k samples/sec
- Per channel: 5k samples/sec

Input Impedance: 125 ohms (min.)

Physical Characteristics

Wiring: I/O cable, max. 16 AWG
Connector: Spring type terminal block

Environmental Limits

Operating Temperature: -40 to 75°C

Power Requirements

Power Consumption: 1.25 W @ 3.3 VDC

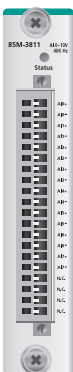
MTBF (mean time between failure)

Time: 1,410,655 hrs

Database: Telcordia (Bellcore)



8 analog inputs, 0 to 10 VDC, 40 kHz



85M-3811-T: 8 analog inputs, 0 to 10 VDC, 40 kHz

Inputs and Outputs

Analog Inputs: 8 channels
Isolation: 3K VDC or 2K Vrms

Analog Inputs

Type: Differential
Resolution: 16 bits
I/O Mode: 0 to 10 VDC

Historical Data Buffering: Up to 6 sec per channel

Accuracy:
 ±0.1% FSR @ 25°C
 ±0.3% FSR @ -40 and 75°C

Sampling Rate:

- All channels: 40k samples/sec
- Per channel: 5k samples/sec

Input Impedance: 20 M-ohms (min.)

Physical Characteristics

Wiring: I/O cable, max. 16 AWG
Connector: Spring type terminal block

Environmental Limits

Operating Temperature: -40 to 75°C

Power Requirements

Power Consumption: 1.25 W @ 3.3 VDC

MTBF (mean time between failure)

Time: 1,426,112 hrs

Database: Telcordia (Bellcore)



4 serial ports



85M-5401-T: 4 serial ports

Serial Communication

Interface: 4 RS-232/422/485 ports, software selectable (DB44 male)

Port to Port Isolation: 3K VDC or 2K VAC

Note: DB44 to 4-port DB9 cable included in the package.

Serial Communication Parameters

Parity: None, Even, Odd

Data Bits: 7, 8

Stop Bits: 1, 2

Flow Control: RTS/CTS, XON/XOFF

Baudrate: 300 bps to 921.6 Kbps

Serial Signals

RS-232: TxD, RxD, RTS, CTS, DTR, DSR, DCD, GND

RS-422: Tx+, Tx-, Rx+, Rx-, GND

RS-485-4w: Tx+, Tx-, Rx+, Rx-, GND

RS-485-2w: Data+, Data-, GND

Physical Characteristics

Connector: DB44 male

Environmental Limits

Operating Temperature: -40 to 75°C

Power Requirements

Power Consumption: 1.24 W @ 3.3 VDC

MTBF (mean time between failure)

Time: 596,611 hrs

Database: Telcordia (Bellcore)



Common Specifications

Environmental Limits

Storage Temperature: -40 to 85°C (-40 to 185°F)

Ambient Relative Humidity: 5 to 95% (non-condensing)

Standards and Certifications

Safety: UL 508 (Pending)

EMI: EN 55022, EN 61000-3-2, EN 61000-3-3,

FCC Part 15 Subpart B Class A

EMS: EN 55024, EN 61000-4-2, EN 61000-4-3,

EN 61000-4-4, EN 61000-4-5, EN 61000-4-6,

EN 61000-4-8, EN 61000-4-11

Shock: IEC 60068-2-27

Freefall: IEC 60068-2-32

Vibration: IEC 60068-2-6

Rail Traffic: EN 50155, EN 50121-3-2, EN 50121-4

Note: Please check Moxa's website for the most up-to-date certification status.

Warranty

Warranty Period: 5 years

Details: See www.moxa.com/warranty