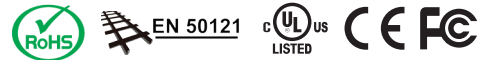# ioPAC 8020 Series

Rugged modular RTU controllers

> Compliant with EN 50121-3-2, EN 50121-4, and a portion of EN 50155 specifications
> Supports C/C++ programming languages
> 2-port Ethernet switch for daisy-chain topologies with bypass function
> Modular I/O for versatility, flexibility, and scalability
> Rugged and compact design for harsh environments
> Wide operating temperature: -40 to 75°C (-40 to 167°F)
> 3-in-1 RS-232/422/485 serial port
> Up to 32 GB SDHC data logging function

RoHS   EN 50121   c(UL)us LISTED   C€   FC

⠿ Overview

Sturdy and dependable, ioPAC 8020-C modular RTU controllers are an ideal solution for rolling stock and trackside applications. This series tolerates temperature extremes from -40 to 75°C, is enclosed in a sealed metal casing, and is compliant with EN 50121-3-2, EN 50121-4, and relevant sections of the EN 50155 anti-vibration standard. The ioPAC 8020-C further features a Linux/GNU platform adapted to data acquisition and condition monitoring. The main advantage of this open C platform is its user-friendly SDK, which helps economize on installation and configuration overhead by reducing your programming workload for key areas, including I/O control and condition monitoring, SCADA/DB interoperability, and improving smart communication controls.

The ioPAC-8020-C has a 2-port Ethernet switch that allows system integrators to easily build control networks with open Ethernet standards and daisy-chain topologies. Built-in dual power inputs ensure non-stop data transfer to the controller and uninterrupted communications management on the control network. For train-related applications, spring-type terminal blocks and optional M12 Ethernet connectors deliver reliable operations in high vibration environments. In addition, a rich selection of hot-swap I/O and communication modules is available for any combination of device applications.

Ethernet bypass feature for seamless data transmission

ioPAC RTU controllers also come with an integrated, independent, 2-port Ethernet switch for the convenient daisy-chaining of ioPAC RTU controllers. In distributed Ethernet data acquisition applications, panels, units, and cabinets are often located at remote sites where space is limited. The daisy-chain capability of ioPAC controllers allows ioPAC RTUs to connect in series either to each other or to other nearby Ethernet devices, drastically saving on both space and wiring costs. Because the Ethernet switch is independent of the main RTU and includes the power-off bypass mechanism, ioPAC RTU controllers are able to maintain continuous and seamless data transmissions even when a linked device fails.
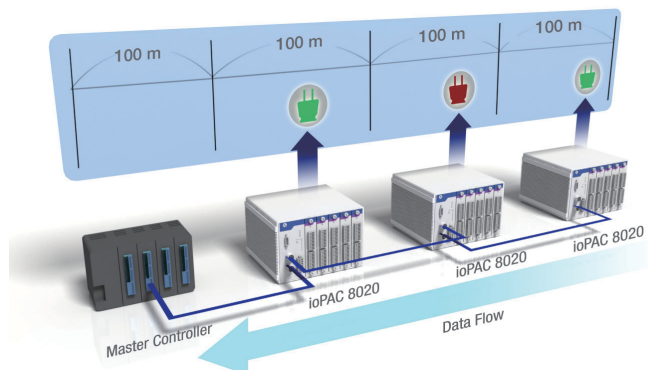
Hot-swappable modular I/O

ioPAC RTU controllers offer a modular design in a compact size to save space in installation cabinets. For modular ioPAC RTU controllers, the hot-swap capability allows users to unplug and then re-plug a module without shutting down the system, so that maintenance engineers can easily complete replacement tasks and reduce system downtime.

Hot-swap

: Specifications

Computer
CPU: 32-bit ARM9 160 MHz CPU
OS: Linux
Clock: Real-time clock with battery backup
SDRAM: 64 MB
Flash: 32 MB
SD™ Slot: Up to 32 GB (SD 2.0 compatible)
Note: For units operating in extreme temperatures, industrial-grade, wide-temperature SD cards are required.

Ethernet Interface
LAN: 2 x 10/100 Mbps, Ethernet bypass, RJ45 or M12
Protection: 1.5 kV magnetic isolation

Serial Interface
Serial Ports: RS-232/422/485 (DB9 male)
Serial Debug Port: RS-232 (4-pin connector)

Serial Ports
RS-232: TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND
RS-422: TxD+, TxD-, RxD+, RxD-, GND
RS-485-4w: TxD+, TxD-, RxD+, RxD-, GND
RS-485-2w: Data+, Data-, GND

Power Requirements
Input Voltage: 12 to 36 VDC
Input Current: 184 mA @ 24 VDC (without I/O modules)
Note: Compliant with EN 50155 at 24 VDC

Physical Characteristics
Housing: Aluminum
Dimensions:
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:
5-slot version: 2,000 g (4.41 lb)
9-slot version: 2,575 g (5.68 lb)
Mounting: DIN rail (standard), wall (optional)
I/O Module Slots: 5 or 9 slots (the 9th slot is reserved)

Environmental Limits
Operating Temperature: -40 to 75°C (-40 to 167°F)
Storage Temperature: -40 to 85°C (-40 to 185°F)
Ambient Relative Humidity: 5 to 95% (non-condensing)
Shock: IEC 60068-2-27
Vibration: IEC 60068-2-6
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
EMC: EN 55022/24
EMI: FCC Part 15 Subpart B Class A, CISPR 22
EMS:
IEC 61000-4-2 ESD: Contact: 4 kV; Air: 8 kV
IEC 61000-4-3 RS:
  80 MHz to 1000 MHz: 10 V/m
  1400 MHz to 2100 MHz: 3 V/m
  2100 MHz to 2700 MHz: 1 V/m
IEC 61000-4-4 EFT: Power: 2 kV; Signal: 1 kV
IEC 61000-4-5 Surge: Power: 2 kV (L-PE), 1 kV (L-L); Signal: 1 kV (9-slot version)
IEC 61000-4-6 CS: 10 V
IEC 61000-4-8 PFMF: 30 A/m
Rail Traffic: EN 50155*, EN 50121-3-2, EN 50121-4
*Complies with a portion of EN 50155 specifications.
Green Product: RoHS, CRoHS, WEEE
Note: Please check Moxa's website for the most up-to-date certification status.

MTBF (mean time between failures)
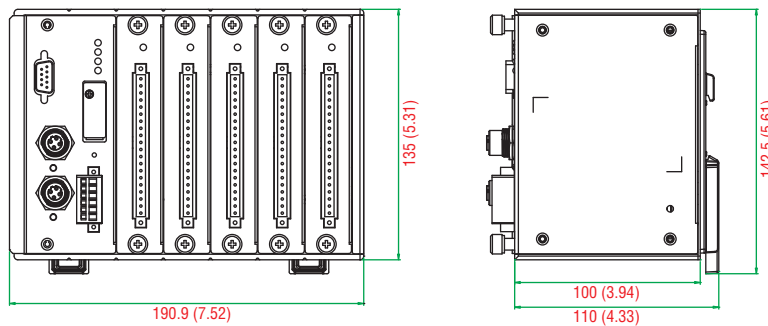**Time:** 690,214 hrs
Standard: Telcordia SR332

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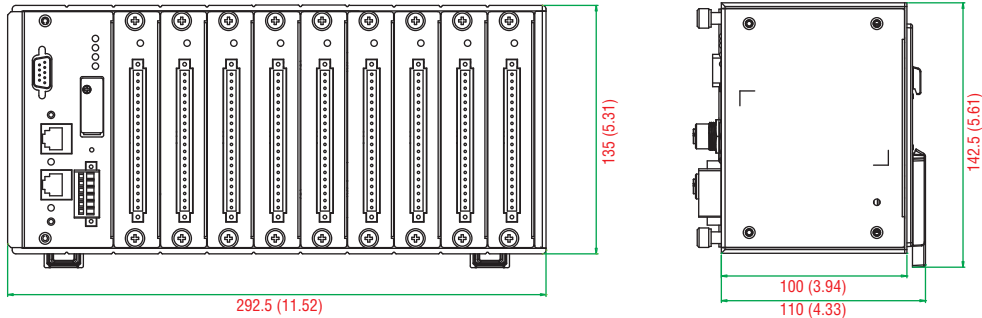**Details:** See www.moxa.com/warranty

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Dimensions

Unit: mm (inch)

ioPAC 8020-5

135 (5.31) 190.9 (7.52) 142.5 (5.61) 100 (3.94) 110 (4.33)

Dimensions

Unit: mm (inch)

ioPAC 8020-9

135 (5.31)
142.5 (5.61)
100 (3.94)
110 (4.33)
292.5 (11.52)

Mounting Kits

Wall-Mounting Kit
(optional)

DIN-Rail Kit

Wall-Mounting Kit
(optional)

DIN-Rail Kit
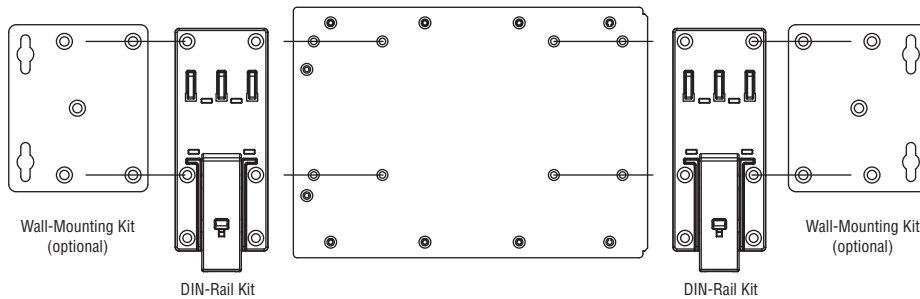
∶ Ordering Information

System Modules

ioPAC 8020-5-M12-C-T: Modular programmable controller with 5 slots, M12 Ethernet ports, -40 to 75°C operating temperature

ioPAC 8020-5-RJ45-C-T: Modular programmable controller with 5 slots, RJ45 Ethernet ports, -40 to 75°C operating temperature

ioPAC 8020-9-M12-C-T: Modular programmable controller with 9 slots, M12 Ethernet ports, -40 to 75°C operating temperature

ioPAC 8020-9-RJ45-C-T: Modular programmable controller with 9 slots, RJ45 Ethernet ports, -40 to 75°C operating temperature

I/O Modules (can be purchased separately)

RM-1050-T: 10 DIs, 110 VDC, ch-to-ch isolation, -40 to 75°C operating temperature
RM-1602-T: 16 DIs, sink/source, 24 VDC, -40 to 75°C operating temperature
RM-2600-T: 16 DOs, sink, 24 VDC, -40 to 75°C operating temperature
RM-3802-T: 8 AIs, 4 to 20 mA, 16 bits, -40 to 75°C operating temperature
RM-3810-T: 8 AIs, 0 to 10 V, 16 bits, -40 to 75°C operating temperature
KM-2430-T: 4-port unmanaged Ethernet switch, M12, -40 to 75°C operating temperature
Note: Conformal coating available on request

Optional Accessories (can be purchased separately)

DK-DC50131-01: DIN-rail mounting kit, 50 x 131 mm
WK-75: Wall-mounting kit, 2 plates with 8 screws
CBL-M12D(MM4P)/RJ45-100 IP67: 4-pin D-code M12-to-RJ45 CAT5E UTP Ethernet cable, 100 cm, IP67 waterproof
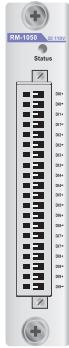**CBL-RJ458P-100:** 8-pin RJ45 CAT5 Ethernet cable, 100 cm
CBL-F9DPF1x4-BK-100: Serial console cable

Package Checklist

- ioPAC 8020-C
- Ethernet cable: CBL-M12D(MM4P)/RJ45-100 IP67
- Serial cable: CBL-F9DPF1x4-BK-100
- Documentation and software CD

ioPAC 8020 Series Modules

RM-1050-T: 10 channel-to-channel isolated DIs, 110 VDC, sink/source type

Digital Inputs: 10 channels, 110 VDC, channel-to-channel isolation
On: 50 to 175 VDC
Off: 0 to 15 VDC
Input Impedance: 120 kilo-ohms (typical)
Response Time: 10 ms
Isolation: 3k VDC or 2k Vrms
Channel-to-Channel Isolation: 2.5k VDC
Operating Temperature: -40 to 75°C (-40 to 176°F)
Input Current: 7 mA @ 24 VDC
Wiring: I/O cable, 14 AWG (max.)
**MTBF:** 3,993,435 hrs (Standard: Telcordia SR332)

RM-1602-T: 16 digital inputs, 24 VDC, sink/source type

Digital Inputs: 16 channels, 24 VDC, sink/source type
On: 10 to 30 VDC
Off: 0 to 3 VDC
Input Impedance: 3 kilo-ohms (typical)
Common Type: 8 points per 2 COMs
Response Time: 10 ms
Isolation: 3k VDC or 2k Vrms
Operating Temperature: -40 to 75°C (-40 to 176°F)
Input Current: 7 mA @ 24 VDC
Wiring: I/O cable, 14 AWG (max.)
MTBF: 4,132,863 hrs (Standard: Telcordia SR332)

RM-2600-T: 16 digital outputs, 24 VDC, sink-type
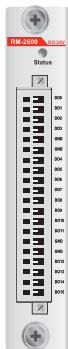
Digital Outputs: 16 channels, 24 VDC, sink-type
Output Impedance: 120 milli-ohms (typical)
Current Rating: 200 mA per channel
Off-state Resistance: 500 kilo-ohms (typical)
Response Time: 10 ms
Over Current Protection: 2.6 A (4 channels @ 650 mA)
Isolation: 3k VDC or 2k Vrms
Operating Temperature: -40 to 75°C (-40 to 176°F)
Input Current: 10 mA @ 24 VDC
Wiring: I/O cable, 14 AWG (max.)
MTBF: 4,440,241 hrs (Standard: Telcordia SR332)

RM-3802-T: 8 analog inputs, 4 to 20 mA

Analog Inputs: 8 channels, differential
Input Range: 4 to 20 mA
Input Impendence: 120 ohms
Resolution: 16 bits, 0.24 µA/bit
Accuracy:
±0.1%, FSR @ 25°C
±0.3%, FSR @ -40°C and 75°C
Sampling Rate:
• All channels: 12 samples/sec
• Per channel: 1.5 samples/sec
Isolation: 3k VDC or 2k Vrms
Operating Temperature: -40 to 75°C (-40 to 176°F)

Input Current: 78 mA @ 24 VDC
Wiring: I/O cable, 14 AWG (max.)
MTBF: 1,222,361 hrs (Standard: Telcordia SR332)

RM-3810-T: 8 analog inputs, 0 to 10 V

Analog Inputs: 8 channels, differential
Input Range: 0 to 10 VDC
Input Impendence: 10 mega-ohms (min.)
Resolution: 16 bits, 0.15 µA/bit
Data Format: 16-bit integer (2's complement)
Accuracy:
±0.1%, FSR @ 25°C
±0.3%, FSR @ -40°C, 75°C
Sampling Rate:
• All channels: 12 samples/sec
• Per channel: 1.5 samples/sec
Isolation: 3k VDC or 2k Vrms
Operating Temperature: -40 to 75°C (-40 to 176°F)

Input Current: 78 mA @ 24 VDC
Wiring: I/O cable, 14 AWG (max.)
MTBF: 1,225,957 hrs (Standard: Telcordia SR332)

KM-2430-T: 4-port unmanaged Ethernet switch module

Standards:
IEEE 802.3 for 10BaseT
IEEE 802.3u for 100BaseT(X)
IEEE 802.3x for Flow Control
Processing Type: Store and Forward
Interface: Front cabling, M12 connector, 10/100BaseT(X) auto negotiation speed
Operating Temperature: -40 to 75°C (-40 to 176°F)
Input Current: 20 mA @ 24 VDC
MTBF: 3,873,592 hrs (Standard: Telcordia SR332)