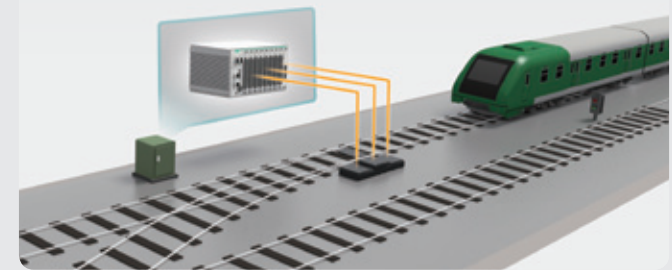


Railway Turnout Condition Monitoring Application

The continuous monitoring of key parameters for turnouts and switches is important for collecting and analyzing data to provide automated maintenance records for management, and for supporting maintenance engineers in the field. When used with turnout condition monitoring applications, Moxa's ioPAC 8500 RTU controllers can connect to an array of sensors, such as motor current sensors, force sensors, and open/close sensors, to record real-time measurements from the sensors.

Turnout Condition Monitoring

- Motor current sensor status
- Force sensor status
- Switch open/close position status



System Requirements

- Modular and compact design to fit in space-limited cabinets
- High-speed data capture
- Compliant with railway standards

Why Moxa?

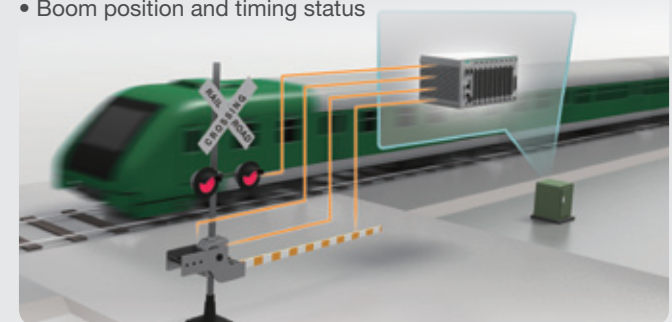
- Versatile module design: DI, DO, AI, RTD, TC, cellular, and serial modules available for greater flexibility
- Up to 5 kHz AI sampling rate for accurate data capture
- Rail-level surge and ESD protection for enhanced system reliability

Railroad Crossing Monitoring Application

Railroad crossings, which are extremely important for preventing collisions between trains and road traffic, require regular maintenance to ensure safety and reliability. Moxa's ioPAC 8500 RTU controller can be used to monitor the status of a variety of equipment associated with railroad crossings, including sirens, warning lights, the status of motors, boom gate positions, and timing. In addition, the ioPAC 8500 supports C/C++ or IEC 61131-3 programming, which can be used to automatically trigger IP cameras for video surveillance to provide an immediate response to system failures or vandalism.

Railroad Crossing Condition Monitoring

- Motor status
- Flashing light status
- Siren status
- Boom position and timing status



System Requirements

- Programming platform
- Modular and compact design to fit in space-limited cabinets
- Compliant with railway standards

Why Moxa?

- Supports C/C++ or IEC 61131-3 programming
- Versatile module design: DI, DO, AI, RTD, TC, cellular, and serial modules available for greater flexibility
- Rail-level surge and ESD protection for enhanced system reliability

MOXA[®]

Reliable Networks ▲ Sincere Service

Moxa's Railway Preventive Maintenance Solutions

ioPAC 8500 Series RTU Controllers



- ARM-based main and I/O dual CPU architecture
- Supports prerecording analog input and millisecond timestamp
- Supports C/C++ or IEC 61131-3 programming
- Modular I/O for versatility, flexibility, and scalability

Model Name	Description
ioPAC 8500-2/5/9-RJ45/M12-C-T	2/5/9 slots, RJ45/M12 Ethernet ports, C/C++ programming
ioPAC 8500-2/5/9-RJ45/M12-IEC-T	2/5/9 slots, RJ45/M12 Ethernet ports, IEC 61131-3 programming
85M-1602-T	16 Dis, Sink/Source
85M-2600-T	16 DOs, Sink
85M-3800-T	8 Als, 4-20 mA
85M-3810-T	8 Als, 0-10 V
85M-3801-T	8 Als, 4-20 mA, 40 kHz
85M-3811-T	8 Als, 0-10 V, 40 kHz
85M-6600-T	6 RTDs
85M-6810-T	8 TCs
85M-5142-T	HSPA, 3G antenna included
85M-5401-T	4 serial ports, DB44-to-DB9 cable included

* Note: C/C++ programming version available in 2013/Q2, IEC 61131-3 programming version available in 2013/Q4

ioPAC 5500 Series RTU Controllers



- ARM-based main and dual I/O CPU architecture
- Supports C/C++ or IEC 61131-3 programming
- Dual Ethernet MACs with port trucking support
- HSPA 5.76 Mbps upload and 14.4 Mbps download speeds (ioPAC 5542-HSPA only)

Model Name	Description
ioPAC 5542-HSPA-C/IEC-T	Cellular, C/C++ or IEC 61131-3 programming, 8 Als, 8 Dis, 8 DIOs
ioPAC 5542-C/IEC-T	Ethernet, C/C++ or IEC 61131-3 programming, 8 Als, 8 Dis, 8 DIOs

* Note: C/C++ programming version available in 2013/Q3, IEC 61131-3 programming version available in 2013/Q4

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RTUs Tailored for Railway Preventive Maintenance Applications



Moxa's RTU Controller Solutions

Moxa's ioPAC 8500 and 5500 series RTU controllers are tailored to make condition-based preventive maintenance easy.



ioPAC 8500
Modular RTU
Controller



ioPAC 5542-HSPA
Cellular RTU
Controller



ioPAC 5542
Ethernet RTU
Controller

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RTUs Tailored for Railway Preventive Maintenance Applications



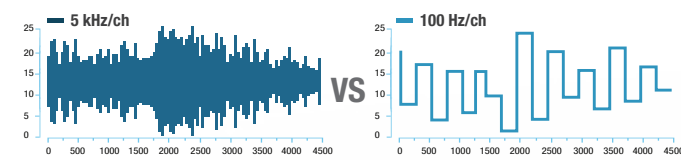
In addition to using schedule-based maintenance, railways are also turning to condition-based maintenance, in which operators keep an eye on critical indicators that provide warnings about possible equipment failures. Moxa's ioPAC 8500 RTU controllers are tailor-made for condition-based preventive maintenance applications. The RTUs provide extremely accurate data, giving engineers the information they need to identify anomalous conditions—before failures occur. The ioPAC 8500 RTUs are also designed to work reliably in harsh environments, and modules can be easily replaced to shorten system downtime. The controllers support C/C++ or IEC 61131-3 programming and are compliant with important railway standards. When used together with Moxa's Active OPC Server and DA-Center, the controllers provide a comprehensive solution for condition-based preventive maintenance applications.

Control Room

More accurate data allows you to respond quickly and correctly

kHz-level analog input sampling rate for accurate event analysis

Moxa's ioPAC 8500 RTUs use an ARM9-based industrial-grade CPU, and the dual CPU architecture supports a kHz-level analog input sampling rate, giving engineers the analog data precision they need to correctly analyze events, and then formulate the best response.



Prerecorded analog input prevents missing data

The ioPAC 8500 RTU's prerecording function allows the RTU controller to continuously record analog input data before an event trigger point. The prerecording function is a major improvement over products that only start data logging after an event has occurred, which can lead to the loss of critical data due to the latency between the event and when the data logging actually begins.

Millisecond-level timestamp for more accurate data analysis

The I/O CPU for Moxa's ioPAC 8500 adds a millisecond-level timestamp to each I/O event that is triggered. This level of accuracy gives engineers a powerful ally. 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.

Easy data integration with included software package

Push-based Active OPC Server and DA-Center data historian

Moxa's ioPAC 8500 RTU controllers come with Moxa's patented Active OPC Server and DA-Center software. Active OPC server adds a non-polling architecture to the standard OPC protocol, giving users the advantage of active, push-based communication—from Moxa's controllers to the SCADA system. DA-Center provides a standard OPC interface that interacts with Moxa Active OPC Server for real-time data collection. The interface acts as bridge between field data and IT databases or spreadsheets, and a trend chart tool is provided to perform historical analysis. The combination of Active OPC Server and DA-Center ensures data completeness, and easy database integration.

Sustainable system reliability, even in harsh environments

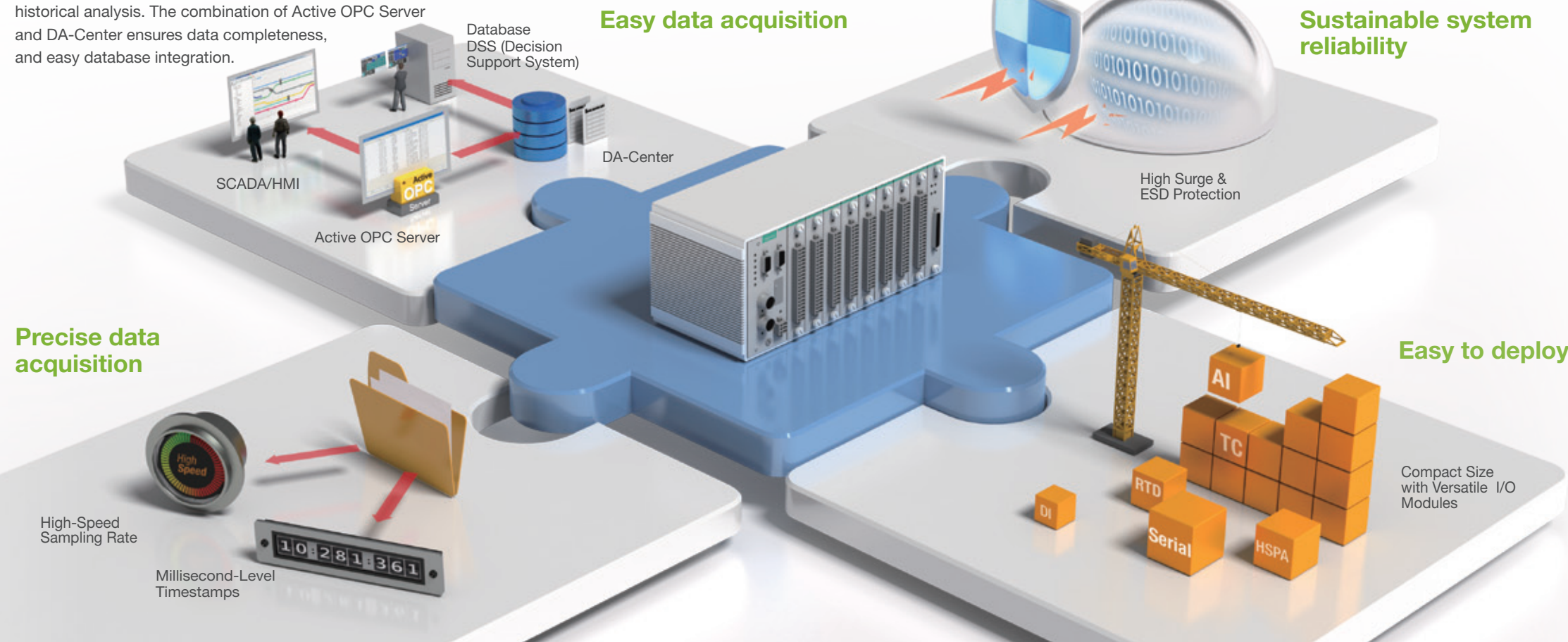
Compliant with important railway standards

The ioPAC 8500 RTU controllers are compliant with EN 50155, EN 50121-3-2, and EN 50121-4 railway standards, which require that products can withstand high levels of vibration, and support surge and ESD protection for power and communication ports. The ioPAC 8500's metal chassis not only extends product lifetime, it also provides an efficient heat transfer mechanism. In addition to being compliant with EN 50155 Rail TX class ambient temperature standards, the ioPAC 8500 series has an actual operating temperature range of -40 to 75°C (-40 to 167°F).

Easy deployment for distributed monitoring applications

Compact size and versatile selection of modules

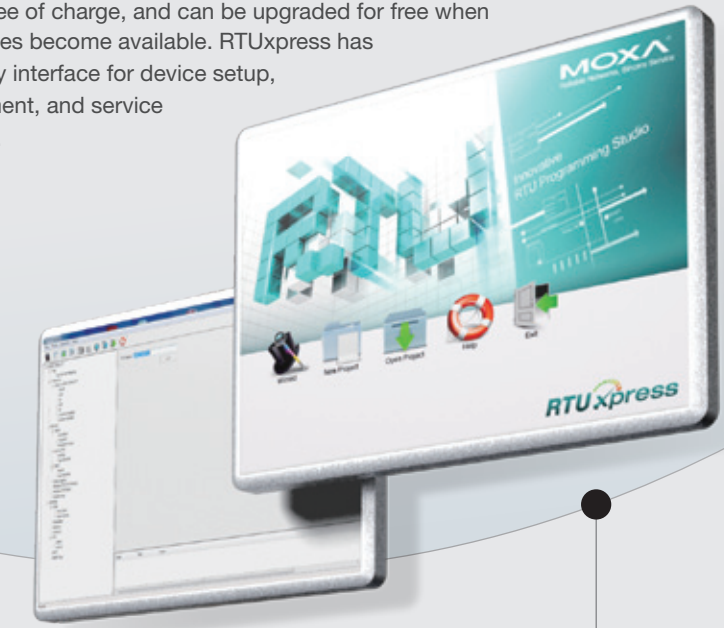
Moxa's ioPAC 8500 modular RTU controllers support a versatile collection of I/O modules, including DI, DO, AI, RTD, TC, HSPA, and serial modules. The compact size and modular design make this ioPAC 8500 ideal for cabinets with limited space, and all of the I/O modules are hot-swappable. The hot-swappable function 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.



Easy system configuration and maintenance

RTUxpress makes device configuration easy

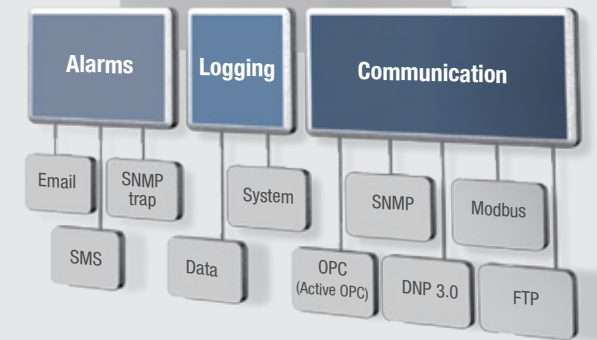
Moxa RTUxpress is a user-friendly and intuitive offline configuration tool for configuring Moxa's ioPAC 8500 RTU controllers. RTUxpress is provided free of charge, and can be upgraded for free when future upgrades become available. RTUxpress has a user-friendly interface for device setup, tag management, and service configuration.



Easily link I/O and services with TagEasy

Moxa's innovative TagEasy implements tag-centric programming through RTUxpress, in which a "tag" links resources (DI, DO, AI, etc.) together with ready-to-run services (alarms, logging, active tags, etc.). For example, users can read a pre-defined DI tag to get the channel status, or change the value of a pre-defined internal variable to trigger a logging service. From the point of view of the engineer responsible for programming, the focus has changed from incorporating lots of APIs to instead configuring simple tags. This change of focus greatly reduces the programming effort required.

Ready-to-Run Service Packages



Configure ready-to-run services without APIs

Moxa's ioPAC 8500 RTU controllers provide ready-to-run services, including alarms, data logging, and communication, to help programmers reduce the time and effort needed for program design. With Moxa's RTUxpress utility, programmers only need to configure the appropriate services, and then upload the configuration file to the ioPAC 8500. Once configured, all of the services will be ready to run.