Introduction to RTU Controllers
Moxa RTU Controller Solutions

- ioPAC 8000 modular RTUs incorporate powerful computing capability, modular flexibility, unbeatable reliability, and programmable control logics to meet the demands of large scale applications in harsh environments.

- ioLogik W5300 cellular RTUs are GPRS/3G HSDPA mobile modem, I/O controller, and data logger, all rolled into one, and are perfect for distributed wireless telemetry networks.

- ioLogik E2200 micro RTUs double as intelligent micro I/O controllers by offering an easy-to-use local control logic and Ethernet interface.

Interoperable and Versatile Remote Communications

Moxa RTU controllers provide a direct interface between field devices and the control center for data collection, remote site monitoring, and alarm distribution.

Moxa’s RTU products are specifically designed for remote data transmission between complex virtual networks that are widely dispersed. Moxa enhances automation communications with versatile protocols that support Modbus/TCP for easy SCADA/HMI communication, HTTP for Internet access, SNMP I/O communication for IT-friendly network management, 3G wireless interface for mobile communications, and patented Active OPC Server™ for faster data access for SCADA/HMI systems.

Moxa offers the innovative MXIO library, which supports both passive Modbus/TCP mode and Moxa’s patented active communication for non-OPC users using ioPAC and ioLogik RTU products. This type of event-based active communication can reduce the response time and bandwidth usage by a significant amount.

Redundant Networking for Maximum Reliability

Moxa RTUs offer network redundancy to ensure maximum uptime and availability. The ioLogik W5300 cellular RTU offers redundant network connectivity through the detachable 3G antenna and RJ45 port. Moxa’s industrial switches, Turbo Ring / Turbo Chain technology, and RTU products can be combined to create remote industrial automation solutions that provide high network availability and cost-effective redundancy.

Industry-proven Ruggedness

Remote automation applications are expected to perform just as well as their counterparts, even if they are deployed in harsh environments. Moxa’s RTU solutions combine both hardware and software innovations to take industrial-grade to new heights by overcoming environmental challenges such as extreme temperatures, limited bandwidth, severe vibrations, and unstable power/network connections. Users can count on Moxa’s remote automation solutions to provide stable and reliable operations; these solutions encompass industrial features such as, wide operating temperatures, vibration resistance, M12 Ethernet interface, IP30-rated metal housing, backup power solution, and “active” communications. The ioPAC 8000 series products are perfectly suited for rolling stock and tough industrial applications thanks to EN 50155 and EN 50121 compliance.

Through intuitive Click&Go™ control logic and a software utility, Moxa RTUs can remotely manage and configure devices, reboot devices, and upgrade firmware to save users a great deal of time and reduce overhead costs.
Modular RTUs for Mission-Critical Industrial Automation Applications

The ioPAC 8000 series products are rugged RTU controllers that are designed to perform in harsh environments. Consisting of a powerful CPU module and a variety of I/O module options, the ioPAC RTU presents an open, modular, programmable field-mount controller that supports data collection, processing, logging, and protocol conversion, to provide versatile communications for industrial automation applications.

Compliant with the EN 50155 standard, the ioPAC RTU can maintain stable operations under violent vibrations and extreme temperature conditions to protect your applications, regardless of whether they are deployed on a rolling vehicle, in a mine, in a wind turbine farm, or in outdoor cabinets.

Modular I/O for Versatility, Flexibility, and Scalability

ioPAC 8000 series RTU controllers come with either 5 or 9 I/O slots. The ioPAC offers a selection of I/O modules for future development and flexible configuration; both models are equipped with a fanless ARM9 CPU module, dual power inputs, dual M12/RJ45 Ethernet connectors, 1 serial port, and 1 SD card slot. The ioPAC controller can connect through the RS-232/422/485 serial interface to field devices such as PLCs, smart meters, controllers, and other serial devices. The SD card slot allows local storage of data logs and historical data analysis. In addition, the ioPAC also supports hot-swappable I/O slots for sensor signals, allowing you to choose from a variety of I/O modules for accessing sensor signals, and to keep services up and running.

Tailor-made for EN 50155 Rolling Stock Applications

The ioPAC RTU adheres to strict EN conformities, which encompass not only EMC requirements but also shock, vibration, extended temperature range, humidity, and power supply variations.

Full EN 50155 Compliance
**Anti-vibration Design**

The DIN-Rail mount of the ioPAC RTU is specifically designed to withstand severe vibrations; features include an IP30-rated aluminum chassis for vandal protection, spring-type terminal blocks for gas-tight and vibration resistant wire contacts, and optional M12 connectors to ensure a stable Ethernet connection. In the event of a power failure, the ioPAC controller will automatically activate its redundant power input to prevent interruptions to your applications.

![Anti-vibration Design Image](image1.png)

**Proficient Alarms and Communications**

Embedded with the simple yet powerful Click&Go™, the ioPAC RTU is able to execute local control logic and alarm alerts in response to user-configured settings. The menu-configured front-end intelligence allows the ioPAC RTU to identify unusual events and actively send triggered exception messages with real-time stamp though UDP, TCP, email, and SNMP trap. The independent operation of I/O control and handling is particularly critical for fast-moving railroad vehicles, unmanned track-side signaling, and control cabinet applications when there is a need to send out an alarm or when the network connection is interrupted.

![Proficient Alarms and Communications Image](image2.png)

**Programmable for the Ultimate in Versatility**

The ioPAC RTU is a programmable controller that supports a variety of logic programming languages, such as Click&Go™, C/C++, and 61131-3 programming to construct customized control systems. With the additional benefits of vibration resistance and built-in configurable logic, this modular RTU integrates easily with major subsystems such as passenger information systems, and trackside signaling and maintenance systems.
### Industrial Reliability to Keep Services Up and Running

The ioPAC is designed to provide continuous connectivity for mission-critical applications. The following features ensure the ioPAC’s reliability:

- A wide -40 to 75°C operating temperature range to ensure the ioPAC operates reliably under extreme temperature fluctuations.
- Dual-power inputs to ensure non-stop service during power failures.
- An SD card for backup and local data storage so that removal of the CPU module is not necessary, and system downtime for downloading data log files is drastically reduced (C and ISaGRAF models).
- Hot-swappable I/O modules allow you to replace I/O modules without interrupting network connectivity—services remain up and running.
- A metal chassis, which provides better protection than plastic, to help reduce the effect of electronic noise.

### Proficient Network Connectivity

The ioPAC provides two Ethernet switch ports to enable daisy-chaining of multiple devices with minimal hassle and cascade wiring. Together with the power-off bypass mechanism, the ioPAC RTU is able to maintain continuous data transmissions even when a linked device fails.

### Active Technology for Better Productivity (C and ISaGRAF Models)

The combination of Moxa’s patented active communication technology and easy-to-use automation software facilitates RTU application deployment and maximizes data transfer efficiency.

Moxa’s Active OPC Server and DA-Center software, which are available free of charge, provide extremely efficient data transfer from front-end devices to the central SCADA system or IT database. Active OPC Server delivers event-driven push-type communication that allows the ioPAC RTU to send I/O status reports using TCP or UDP messages. Compared with the traditional passive poll-type communication, this push-type communication allows Moxa’s ioPAC and ioLogik RTU to deliver an I/O response that’s 7 times faster. Moxa’s DA-Center forms a ready-to-run data gateway between RTU controllers and databases. Through the use of proficient database transformation and analysis, Moxa’s DA-center allows RTU solutions to increase system trend predictability and facilitate faster process improvement to enhance productivity.

Moxa’s RTU lines also support the push-type MXIO library, which benefits non-OPC users. The event-based MXIO library helps deploy active Modbus/TCP communication between non-OPC application platforms and Moxa’s RTU controllers, which reduces data response time and bandwidth usage by a significant amount.
Moxa’s ioLogik W5300 series introduces a next generation cellular RTU that combines the I/O controller, cellular modem, and data logger into a compact box design that reduces deployment time and cost, and simplifies operation and maintenance. The ioLogik W5300 series comes with a cellular interface that supports tri-band HSDPA/UMTS and quad-band GSM/GPRS/EDGE frequencies, offering a full spectrum of 3G mobile communication services. The cellular RTU is a rugged, wide-temperature remote terminal unit well suited for hard-to-wire remote monitoring and alarm applications, such as unmanned site monitoring, riverside monitoring, and pipeline monitoring.

### Smart Mobile Communication through Dynamic IP Connectivity

An ioLogik W5300 can be easily deployed and managed in a dynamic IP environment with full support for Moxa’s Active OPC Server, which performs as a cellular device gateway for mobile IP management. The remote ioLogik W5300 units will automatically establish communications with an Active OPC Server using a fixed IP. The Active OPC Server will receive and register the ioLogik W5300’s IP address, and receive and record tag updates accordingly.

### Seamless SCADA Connectivity

For uplink communication, Active OPC Server helps the ioLogik W5300 RTU build seamless connectivity with SCADA master systems. Compared with other 3rd party OPC servers, Active OPC Server offers event-driven push communications between Moxa’s RTU products and HMI/SCADA systems, with instant I/O status at a speed that is 7 times faster and saves 80% on bandwidth.

### Optimized Data Transmission Rate Saves on Communication Costs

The ioLogik W5300 series offers an extremely cost-effective solution for mobile remote monitoring applications in which cellular communications charges are determined by data packet size. With the ioLogik W5300 series, users can easily switch between Always-On and Wake-On-Demand mobile modes to achieve an optimum transmission rate for different application scenarios. Moxa’s “push-based” Active OPC Server conserves data transmission volume when communicating with SCADA systems, and the front-end data logging and report-by-exception functions minimize unnecessary data transmission.
Intuitive Menu-driven Front-end Intelligence

It is easy to unlock the full functionality of the ioLogik W5300 with a few mouse clicks thanks to patented Click&Go™ control logic, which makes local I/O control and alarm configuration extremely simple. With the built-in “IF-THEN-ELSE” Click&Go logic, the ioLogik W5300 RTU has front-end intelligence for event response and alarm messaging. When a pre-defined event is triggered, various alarms can be actively sent out by SMS, e-mail, TCP/UDP packets, or SNMP Trap with real-time stamps.

Intelligent Alarms with Mobile SMS Escalation and SMS Commands

By leveraging mobile SMS, the ioLogik W5300 RTU introduces alarm escalation technology to assure that alarm notifications and responses are simple and fast. The escalation process can be configured in the Click&Go interface. Moreover, an SMS command set allows users to monitor and control the I/O remotely via cellphones. Using the cellular ioLogic W5300 RTU's bidirectional SMS communications, recipients may acknowledge alarms by sending a simple SMS from their mobile phones to the ioLogik W5300 cellular RTU. The acknowledgment may terminate the alarm notification escalation process to ensure proper event management.

Network Redundancy

The ioLogik W5300 RTU offers network redundancy to keep services running over an IP network. The cellular RTU can go wireless with its 3G antenna, and also get an easily wired connection through the RJ45 port. Alternatively, the ioLogik W5300 can tightly collaborate with Moxa Ethernet switches to deliver Turbo-ring enabled network redundancy that assures fast fault recovery, flexible ring topology, and uninterrupted network communications.

WAN-to-LAN Extension with Port Forwarding

Using the 3G antenna and the RJ45 connector, the cellular W5300 RTU supports port forwarding technology that enables WAN-to-LAN communication with port redirection settings. Through port forwarding, the ioLogik W5300 allows external WAN hosts such as SCADA/HMI systems to connect to specific field devices within the LAN by linking with the ioLogik W5300.
Local Network Expansion to More Wired Devices

The ioLogik W5300 RTU can externally expand the local network to more wired clients through daisy-chained ioLogik E1200 I/O modules. The ioLogik E1200 supports daisy chained simple wiring and peer-to-peer cost free I/O extension. Through the RJ45 Ethernet port, the ioLogik W5300 RTU can support up to three connected ioLogik E1200 series I/O modules with 9 different model options to enforce a flexible and scalable network expansion that best fits customers’ needs.

Extensive Data Logging

In addition to remote data collection, the ioLogic WS300 RTU supports stand-alone data logging with one expandable SD card slot that can provide up to 2 GB of storage space. The wireless RTU harbors a built-in FTP client and e-mail attachments to support remote data log retrieval. Through the ioAdmin utility, the RTU unit supports log rate adjustment that allows more specific and precise configuration of logging intervals, providing flexibility and making it easy to adjust the log rate for any output set.

Friendly Serial Communications

The ioLogik W5300 RTU is equipped with one 3-in-1 serial port that supports RS-232/422/485, making it more convenient to connect field serial devices. The ioLogik W5300 comes with a transparent serial tunnel that brings legacy serial devices to 3G wireless networks, and works with customers’ existing applications.

In addition, the ioLogik W5300 supports Modbus RTU communications for establishing direct connectivity between field devices and central control systems. With ioAdmin, the ioLogik W5300 can create user-defined Modbus serial tags to drive and translate serial data from remote serial meters and flow sensors into OPC tags for use with a master SCADA system.
Moxa’s ioLogik E2200 series micro RTU offers proactive, event-driven reporting and logic control over remote I/O devices for PC-based data acquisition and control applications.

### PC-free Alarm and Control Intelligence

The ioLogik E2200 Micro RTU supports simple and powerful Click&Go™ technology to deliver event-driven reports and allow alarm messages to be sent by email, TCP/UDP, and SNMP Trap with real-time stamps. With built-in Click&Go™ intelligence, the ioLogik E2200 micro RTU can be used for simple output control when it is triggered by input status, without the need for a PC controller. The ioLogik E2200 micro RTU reports I/O status automatically based on user-specified conditions. This report by-exception approach requires far less bandwidth than the traditional polling approach.

### Use SNMP Protocol to Manage All Devices over Ethernet

In addition to Modbus/TCP, ioLogik E2200 RTUs support the widely used SNMP and CGI (Common Gateway Interface) protocols, giving IT engineers easy access to unfamiliar control and monitoring systems with their familiar SNMP protocols and knowledge. The ioLogik E2200 micro RTU can send out SNMP trap alarms and also accept SNMP as a means of reading or writing to I/Os. To protect network communications, the ioLogik E2200 micro RTU also supports SNMP v3 for message authentication and encryption. With Moxa’s SNMP-capable ioLogik RTU controllers, even IT customers can easily integrate any connected sensors and devices into an Ethernet backbone, and achieve proficient network management for many other applications, such as environmental monitoring, telecom, power, and transportation.

### Push Technology for Events and Alarms

The ioLogik E2200 micro RTU supports the free, push-based Active OPC Server utility to build seamless connections with any SCADA system. Using active communications, Moxa Active OPC Server is extremely efficient at “pushing” event-triggered data from the ioLogik RTU to the SCADA system or IT database. In a test of network performance, Active OPC Server and Moxa’s ioLogik RTUs demonstrated proven performance in delivering an I/O response that’s 7 times faster and 80% of the normal bandwidth usage, compared with a traditional OPC server polling architecture.