

# ioPAC 5500 Hardware User's Manual

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Edition 2.0, June 2017

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# ioPAC 5500 Hardware User's Manual

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# Introduction

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The following topics are covered in this chapter:

- ❑ **Overview**
- ❑ **Package Checklist**
- ❑ **Appearance and Dimensions**
  - Appearance
  - Dimensions
- ❑ **Hardware Block Diagrams**
  - ioPAC 5500 RTU Controller Block Diagram
- ❑ **Product Hardware Specifications**
  - Product Selection Guide
  - Product Specifications

# Overview

The ioPAC 5500 standalone controllers use an ARM9 based industrial-grade CPU for the main system, with ARM Cortex™ M4 based CPUs for the I/O channels. The USB bus between the controller CPU and module CPUs transmits data at up to 200 Mbps, and the dual CPU architecture supports a 2 kHz analog input sampling rate and millisecond timestamps. The ioPAC 5500 supports C/C++ and IEC 61131-3 programming, rail-level surge and ESD protection, a -40 to 75°C (-30 to 75°C for HSPA models) operating temperature range, UL/cUL Class 1 Division 2 certification, two 10/100 Mbps Ethernet ports with two MACs (Port Trunking ready), and two 3-in-1 serial ports. With Moxa's Active OPC Server and DA-Center, the ioPAC 5500 series provides a comprehensive solution for data acquisition and control applications in harsh environments.

## Package Checklist

### **ioPAC 5500**

The ioPAC 5500 ships with the following items:

- ioPAC 5500 controller
- Serial console cable (C/C++ models only)
- Documentation and software CD

### **Optional Accessories (can be purchased separately)**

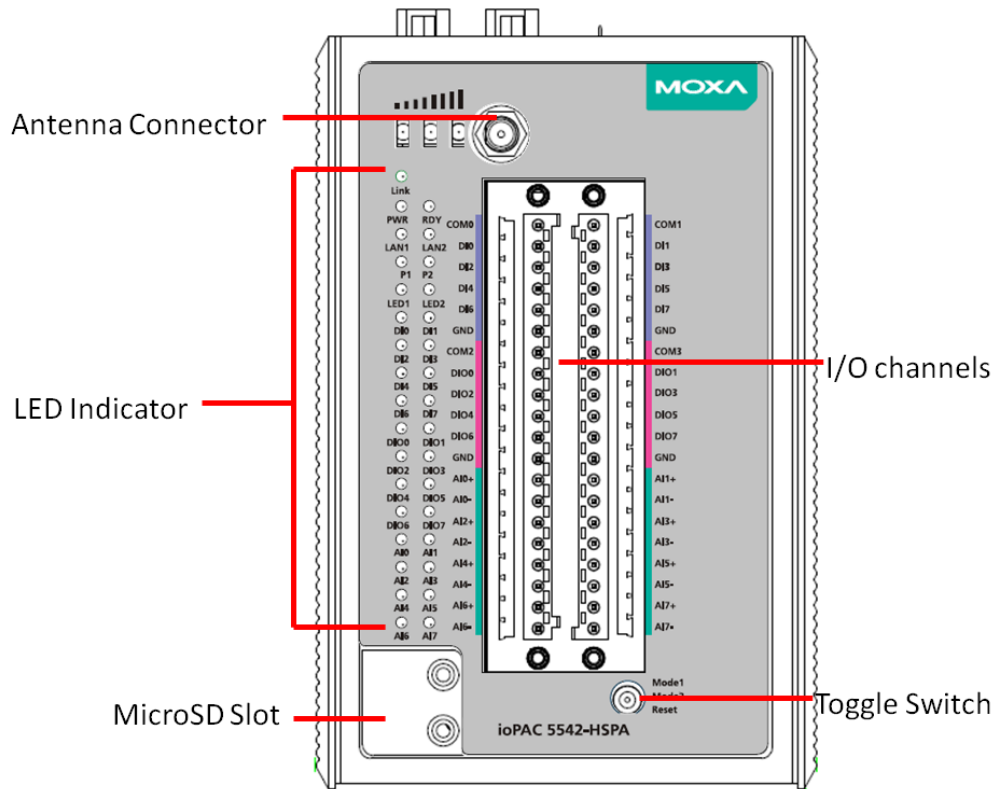
- DK-DC50131: DIN-rail mounting kit, 50 x 131 mm
- CBL-RJ458P-100: 8-pin RJ45 CAT5 Ethernet cable, 100 cm
- CBL-F9DPF1x4-BK-100: Serial console cable
- WK-51-01: Wall-mounting kit, 2 plates with 6 screws
- ANT-WCDMA-AHSM-04-2.5m Black: 3G cellular antenna

# Appearance and Dimensions

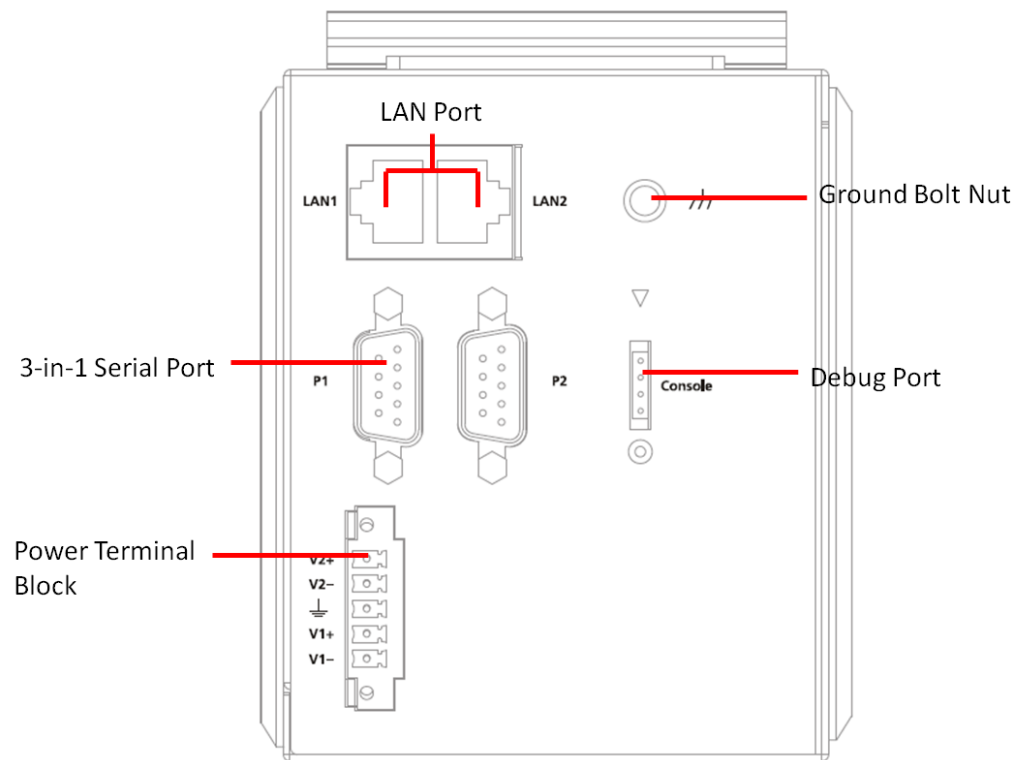
## Appearance

The following figures depict ioPAC 5500 RTU controller.

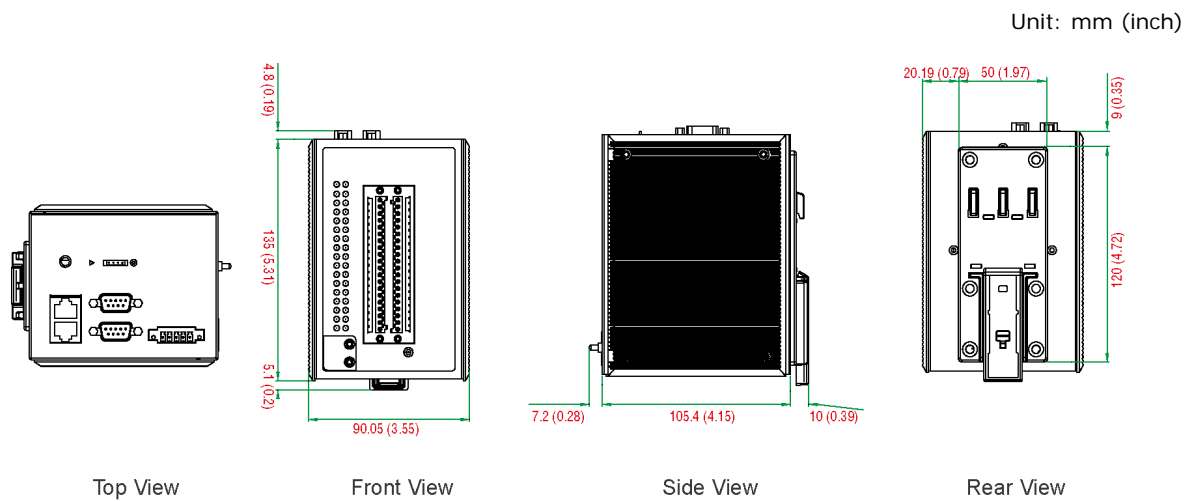
### Front View



### Top View



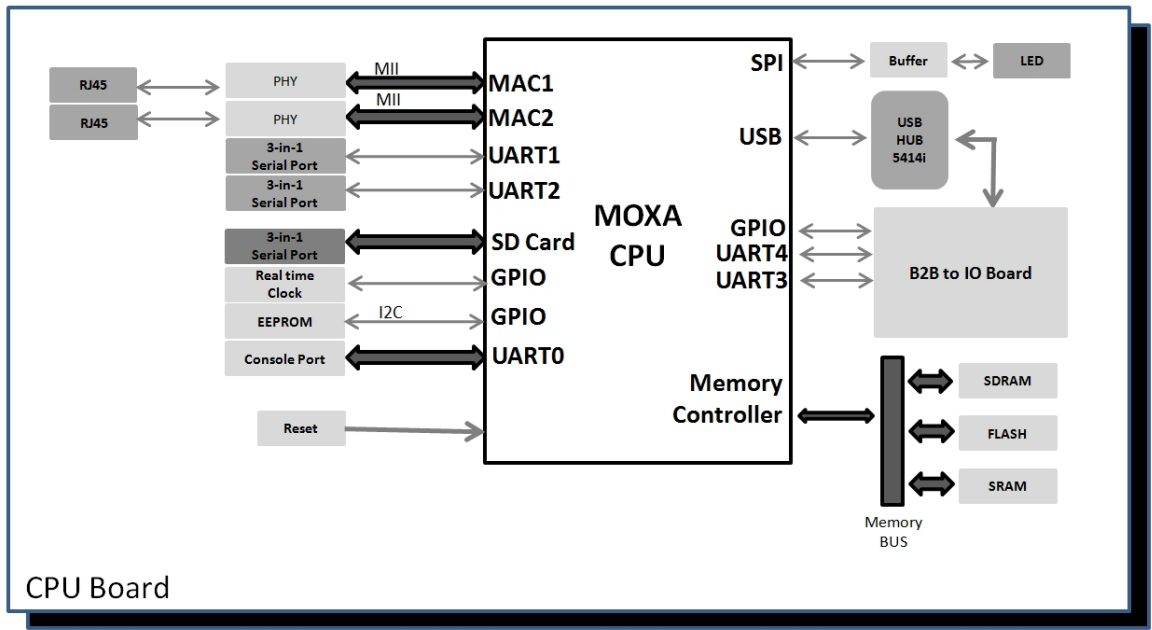
# Dimensions



# Hardware Block Diagrams

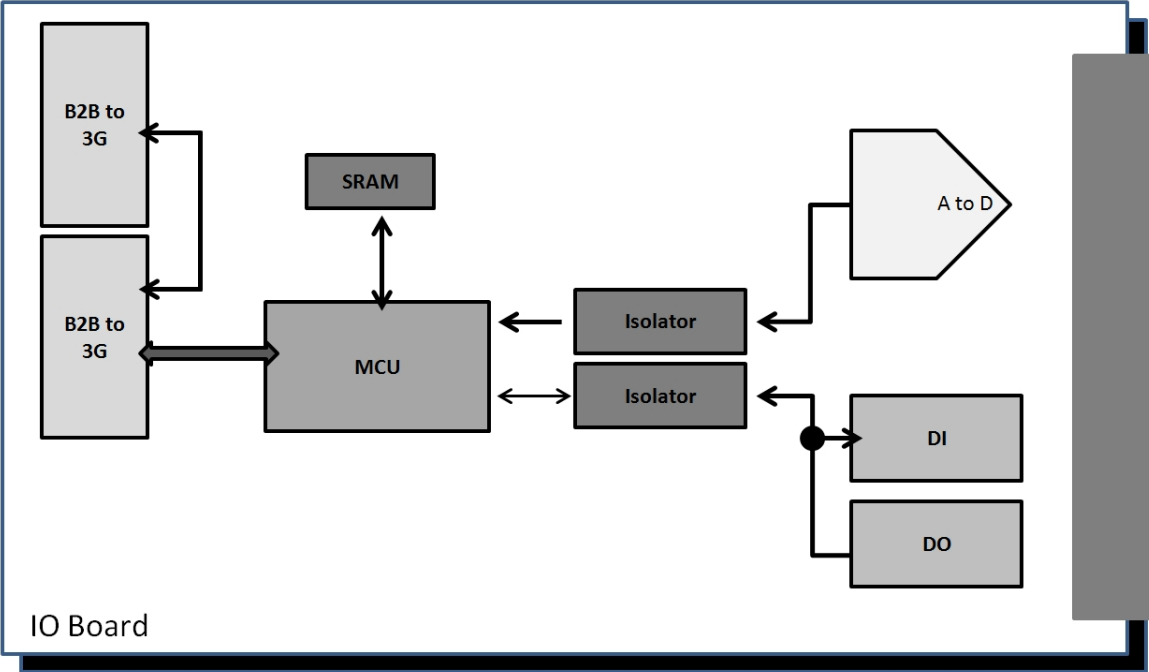
## ioPAC 5500 RTU Controller Block Diagram

### CPU Board

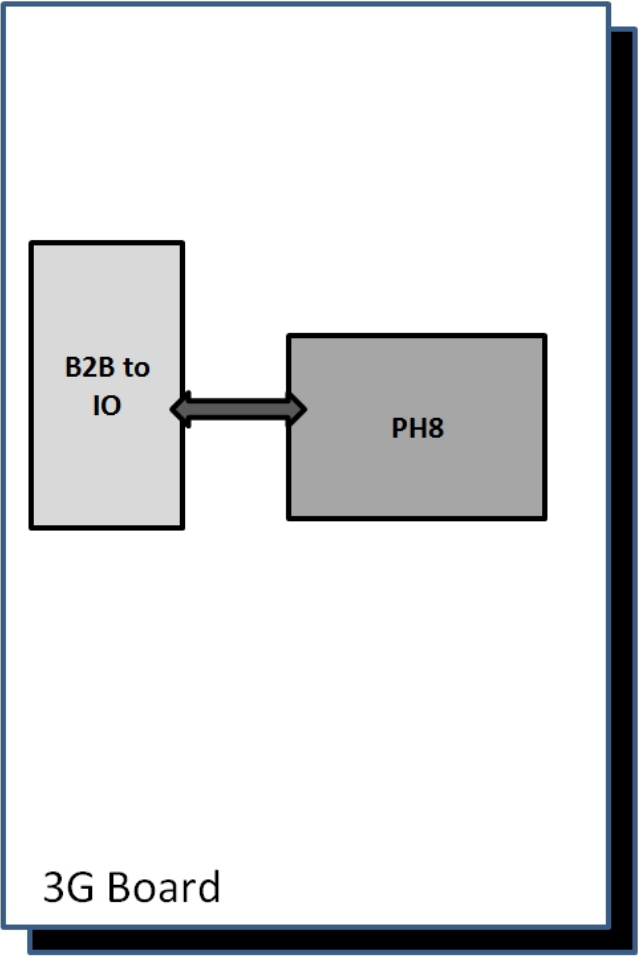




I/O Board



3G Board



# Product Hardware Specifications

## Product Selection Guide

Model Name	Description
ioPAC 5542-C-T	RTU controller, 8AIs, 8 DIs, 8DIOs, C/C++, -40 to 75°C operating temperature
ioPAC 5542-HSPA-C-T	RTU controller with HSPA module, 8AIs, 8 DIs, 8DIOs, C/C++, -30 to 75°C operating temperature
ioPAC 5542-IEC-T	RTU controller, 8AIs, 8 DIs, 8DIOs, IEC 61131-3, -40 to 75°C operating temperature
ioPAC 5542-HSPA-IEC-T	RTU controller with HSPA module, 8AIs, 8 DIs, 8DIOs, IEC 61131-3, -30 to 75°C operating temperature

**NOTE** Conformal coating available on request.

## Product Specifications

### Computer

**Main CPU:** 32-bit ARM9 192 MHz CPU

**I/O CPU:** 32-bit ARM Cortex M4 80 MHz CPU

**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.

### Cellular (for the ioPAC 5542-HSPA Series)

**Network:**

- Quad-band GSM/GPRS/EDGE 850/900/1800/1900 MHz
- Five-band UMTS/HSPA+ 800/850/AWS/1900/2100 MHz

**Internet:**

HSPA:

- Up to 5.76 Mbps upload speed
- Up to 14.4 Mbps download speed

UMTS: Up to 384 kbps upload/download speed

EDGE Class 12: Up to 237 kbps upload/download speed

GPRS Class 12: Up to 85.6 kbps upload/download speed

**SMS:** Point-to-Point Text/PDU mode

**SIM Control Voltage:** 3/1.8 V

### Ethernet Interface

**LAN:** 2 x 10/100 Mbps, 2 MACs (IPs), RJ45

**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:** 15 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, RI

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

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

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

### Inputs and Outputs

**Analog Inputs:** 8 channels

**Digital Inputs:** 8 channels

**Configurable DIOs:** 8 channels

**Isolation:** 3k VDC or 2k Vrms

### Analog Input

**Type:** Differential Input

**Resolution:** 16 bits

**I/O Mode:** Voltage / Current

**Input Range:** 0 to 10 VDC, -10 to 10 VDC, 0 to 20 mA, 4 to 20 mA (wire off)

**Historical Data Buffering:** 60KB per channel, 120 second data buffer at 250 Hz

**Accuracy:**

±0.1% FSR @ 25°C

±0.3% FSR @ -40 and 75°C

**Sampling Rate:**

- All channels: 2000 samples/sec
- Per channel: 250 samples/sec

**Input Impedance:** 2M ohms (min.)

**Built-in Resistor for Current Input:** 120 ohms (min.)

### Digital Input

**Sensor Type:** Wet Contact (NPN or PNP), Dry Contact

**I/O Mode:** DI, Counter or Frequency

**Dry Contact:**

- On: short to GND
- Off: open

**Wet Contact:**

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:** 4 points per COM

**Counter Frequency:** 1 kHz

**Digital Filtering Time Interval:** Software selectable (by 0.5 ms)

### Digital Output

**Type:** Sink

**I/O Mode:** DO or PWM

**Pulse Output Frequency:** 1 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

## Software Characteristics

**Automation Languages:** C/C++, IEC 61131-3

**Protocols:** Modbus TCP/RTU (master/slave), SNMP TCP/IP, UDP, DHCP, BOOTP, SNTP, SMTP

## Power Requirements

**Power Input:**

- ioPAC 5542-HSPA series: 305 mA @ 24 VDC
- ioPAC 5542 series: 264 mA @ 24 VDC

## Physical Characteristics

**Housing:** Aluminum

**Dimensions:** 90.05 x 135 x 105.4 mm (3.55 x 5.32 x 4.15 in)

**Weight:**

- ioPAC 5542-HSPA Series: 1100 g (2.43 lb)
- ioPAC 5542 Series: 1000 g (2.20 lb)

**Mounting:** DIN-Rail mounting (standard), wall mounting (optional)

**Connector:** Spring-type terminal block

## Environmental Limits

**Operating Temperature:**

- ioPAC 5542 Series: -40 to 75°C (-40 to 176°F)
- ioPAC 5542-HSPA Series: -30 to 75°C (-22 to 176°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: 3 V/m

IEC 61000-4-4 EFT: Power: 1 kV; Signal: 0.5 kV

IEC 61000-4-5 Surge: Power: 2 kV (L-PE), 1 kV (L-L); Signal: 1 kV

IEC 61000-4-6 CS: 3 V

IEC 61000-4-8 PFMF: 1 A/m

**Radio:** NCC

**Rail Traffic:** EN 50121-4

**Hazardous Location:** Class 1 Division 2

**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](http://www.moxa.com/warranty)

This chapter includes instructions on how to install the ioPAC 5500.

The following topics are covered in this chapter:

**❑ Basic Installation**

- DIN Rail Installation Procedure

**❑ Configuring the Power**

- Powering on the ioPAC Controller
- Grounding the ioPAC

**❑ Installing a microSD Card**

**❑ ioPAC 5500 LED Indicators**

- System LEDs
- Communication LEDs
- Cellular
- User-Defined LEDs: LED1 and LED2
- IEC-61131-3 Compliant LEDs: R/S and ERR
- I/O LEDs

**❑ The Toggle Switch**

- In IEC-61131-3 Models
- In C/C++ Models

**❑ Toggle Switch: Factory Reset Process**

**❑ Pin assignment and I/O wiring guide**

- Pin Assignment
- Digital Input
- Digital Output
- Analog Input (Voltage)
- Analog Input (Current)

**❑ Installing a SIM card**

**❑ Connecting to the Network**

- Ethernet Communication

**❑ Serial Connectivity**

- Connecting to a Serial Device
- Serial Console (Debug Port)

**❑ Battery**

# Basic Installation

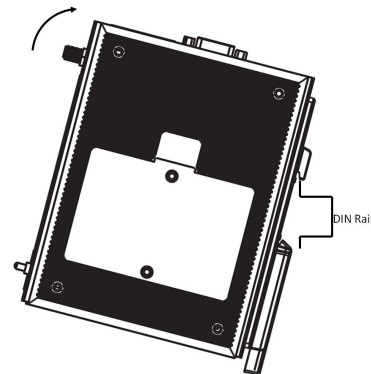
## DIN Rail Installation Procedure

### Installing the ioPAC 5500 on a DIN Rail

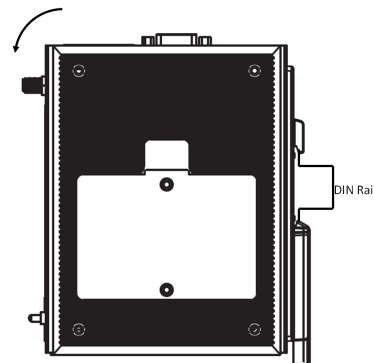
The DIN rail attachment plate should already be fixed to the back panel of the ioPAC 5500 when you take it out of the box. To install the ioPAC 5500 on a DIN Rail, follow below steps.

**NOTE** A wall mount kit can be purchased separately.

**STEP 1:** Insert the top of the DIN rail into the slot just below the stiff metal spring.



**STEP 2:** The DIN-rail attachment unit will snap into place as shown to the right.



### Removing the ioPAC 5500 from a DIN Rail

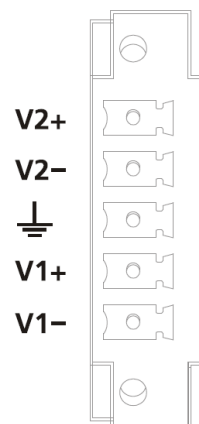
To remove the ioLogik unit from the DIN-rail, simply reverse Steps 1 and 2 above.

# Configuring the Power

## Powering on the ioPAC Controller

The ioPAC controller can receive power from a 9 to 48 VDC power. Input power is applied to the positive (V1+, V2+) and negative (V1-, V2-) terminals on the connector.

- When the input voltage is below the minimum recommended voltage the ioPAC will turn off.
- The ioPAC has reverse protection and power input over-voltage protection, allowing it to resist a maximum voltage of 60 V, and the ioPAC's power input over-current fuse protection specification is 5 A at 25°C.



After connecting the Moxa ioPAC controller to the power supply, it will take 30 to 60 seconds for the operating system to boot up. The green Ready LED will not turn on until the operating system is ready.

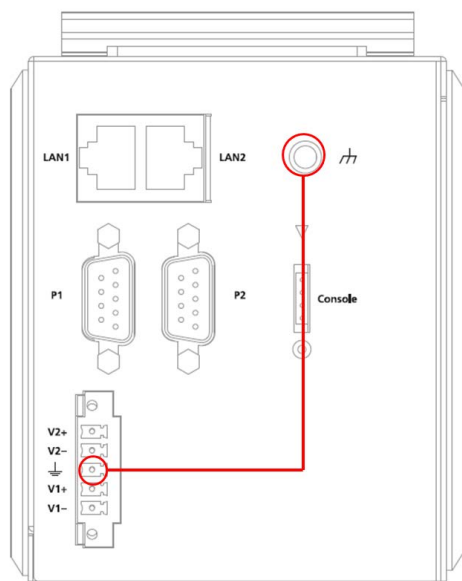


### ATTENTION

This product is intended to be supplied by a Listed Power Unit with output marked "LPS" and rated for 9-48 VDC (minimum requirements). For railway rolling stock applications, these devices must be supplied by a galvanic isolated power supply with design based on the EN 50155 standard.

## Grounding the ioPAC

For most applications, it is desirable to ground the system by connecting the system's power supply common wire to the chassis or panel ground. The negative (-V) side of the DC power input terminal as well as all I/O point terminals labeled GND are connected to chassis ground.



### NOTE

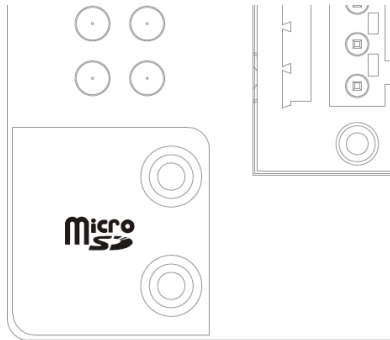
1. Use 18 AWG wire for the power ground.
2. We highly recommend connecting the ground screw to the power terminal block's ground.

# Installing a microSD Card

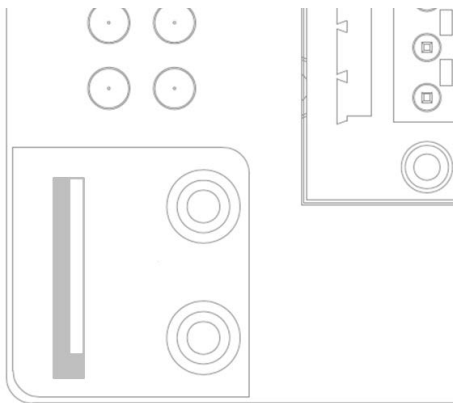
The ioPAC is equipped with one slot for a microSD card. The card reader slot is located inside the ioPAC device, so you will need to unscrew and remove the card cover to install your microSD card. When inserting a microSD card, remember to keep the front edge of the card facing down.

Follow these steps to remove or install a microSD card:

1. Remove the screw holding the card cover in place.



2. (a) Insert a microSD card into the microSD card slot, or  
(b) Remove the microSD card from the microSD card slot.

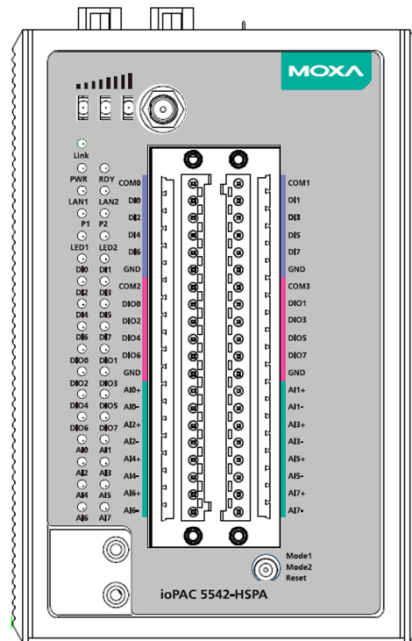



3. Fasten back the screw holding the card cover in place.



# ioPAC 5500 LED Indicators

There are 9 LEDs on the ioPAC controller.



Category	Label	Usage	
System	PWR	System Power	<b>On:</b> Power On <b>Off:</b> Power Off
	RDY	System (Kernel) Ready	<b>Green:</b> System Ready <b>Blinking Green:</b> System is booting up <b>Red:</b> System error, firmware upgrade, or reset procedure underway <b>Blinking Red:</b> Factory reset triggered
C/C++ Version	LED1, LED2	User-Defined	User-Defined
IEC Version	R/S	Run/Stop Mode	<b>Green:</b> The CPU is executing PRDK. <b>OFF:</b> The CPU has stopped / is not executing PRDK.
	ERR	Error	<b>Red:</b> System / I/O / services error <b>OFF:</b> No error (auto update if error fixes)
Communication	LAN1, LAN2	Ethernet Connection	<b>Green:</b> 100Mb <b>Amber:</b> 10Mb <b>Blinking:</b> data transmitting <b>Off:</b> disconnected
	P1, P2	Serial Connection	<b>Green:</b> Transmitting data (Tx) <b>Amber:</b> Receiving data (Rx) <b>Off:</b> disconnected
	Link	Cellular Connection	<b>Green:</b> ISP/IP retrieved <b>Off:</b> ISP disconnected
		Cellular Signal	<b>1 &amp; 2 &amp; 3:</b> ON (RSSI >= 24) <b>1 &amp; 2:</b> ON (18 <= RSSI < 24) <b>1:</b> ON Only (12 <= RSSI < 18) <b>Off:</b> No Signal (RSSI < 12)
I/O	DIn, DIOn	Digital Input / Output Indicator	<b>Green:</b> Channel ON or counter signal in/pulse signal output (scan rate: 1 second) <b>Off:</b> Channel OFF or No Counter/Pulse Signal
	AIn	Analog Input Indicator	<b>Green:</b> Channel Enabled <b>Red:</b> Burn out & wire off when 4-20 mA current mode

## System LEDs

### PWR (Power LED)

The Power (PWR) LED indicates the status of the system power. When the system is on, this LED will turn green, and when the system power is off this LED will be off.

### RDY (Ready LED)

The Ready (RDY) LED indicates the status of the system's kernel. When the LED is green the system kernel is ready. When the LED is green and blinking, the system's kernel is booting-up. When the Ready (RDY) LED is red, there is either a system error or the system is being reset to factory defaults. When the Ready LED is red and blinking, the device's factory default mode has been triggered.

## Communication LEDs

### P1 and P2

The ioPAC controller comes with two serial connections. P1 and P2 represent the status of each serial connection. When the LED is green, the ioPAC is transmitting data (Tx). When the LED is amber, the ioPAC is receiving data (Rx). When the LED is blinking randomly, data is either being transmitted or received. For example, if P1 is blinking and is green, the ioPAC is transmitting data.

When the LED is off, the serial connection is disconnected.

### LAN1 and LAN2

The ioPAC controller comes with two Ethernet ports, with the LAN1 and LAN2 LEDs used to represent the status of the two connections. When the LED is green, data is transmitting at 100 Mbps. When the LED is amber, data is transmitting at 10 Mbps. When the LED is blinking, data is being transmitted. When the LED is off, there is no Ethernet connection, or the Ethernet connection has been disconnected.

## Cellular

The ioPAC 5542-HSPA RTU controller supports a cellular (HSPA) communications. The **Link LED** can detect the communication status and the cellular signal can detect the signal strength of the cellular connection.

## User-Defined LEDs: LED1 and LED2

The ioPAC controller allows the user to custom configure these two LEDs (through the software interface). Refer to the **C/C++ Sample Code Programming Guide for ioPAC RTU Controllers** for details.

## IEC-61131-3 Compliant LEDs: R/S and ERR

The ioPAC controller supports IEC-61131-3-compliant Run/Stop and Error (ERR) LEDs for ISaGRAF-specific notifications. These LEDs are not user configurable.

## I/O LEDs

The ioPAC 5542 RTU controller has I/O LED indicators that directly display the status of I/Os on the front panel of the ioPAC 5542 RTU controller.

# The Toggle Switch

The toggle switch functions differently depending on the programming language set your ioPAC model is configured for.

## In IEC-61131-3 Models

For IEC-61131-3 models, the toggle switch is a simple run/stop switch for IEC programs. Users can enable or disable it through RTUxpress. The default setting is disabled.



## In C/C++ Models

On models that use the C language set, the toggle switch is programmable, giving integrators and end-users a switch that can trigger one of two operation modes (refer to the **C/C++ Sample Code Programming Guide for ioPAC RTU Controllers** for details).



# Toggle Switch: Factory Reset Process

Use the following procedure to reset the ioPAC to the factory defaults. Note that when you reset the ioPAC, all of your tag definitions, software programs, and files will be deleted, and the service and runtime engine will be restarted.

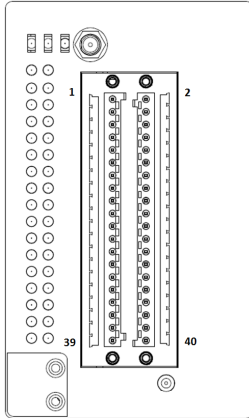
1. When the system is booting up and the RDY LED is blinking GREEN, hold the toggle switch in the "reset" position.
2. Continue to hold toggle switch until the "RDY" LED turns a solid RED, and then release the toggle switch. It will take around 90 seconds to complete the factory reset process.
3. When the "RDY" LED starts blinking GREEN (indicating that the kernel is rebooting), the factory mode is completed.

<b>NOTE</b>	Do NOT power off, operate, or connect any devices when the "RDY" LED is a solid RED. The factory reset function is only activated when the system is booting up.
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# Pin assignment and I/O wiring guide

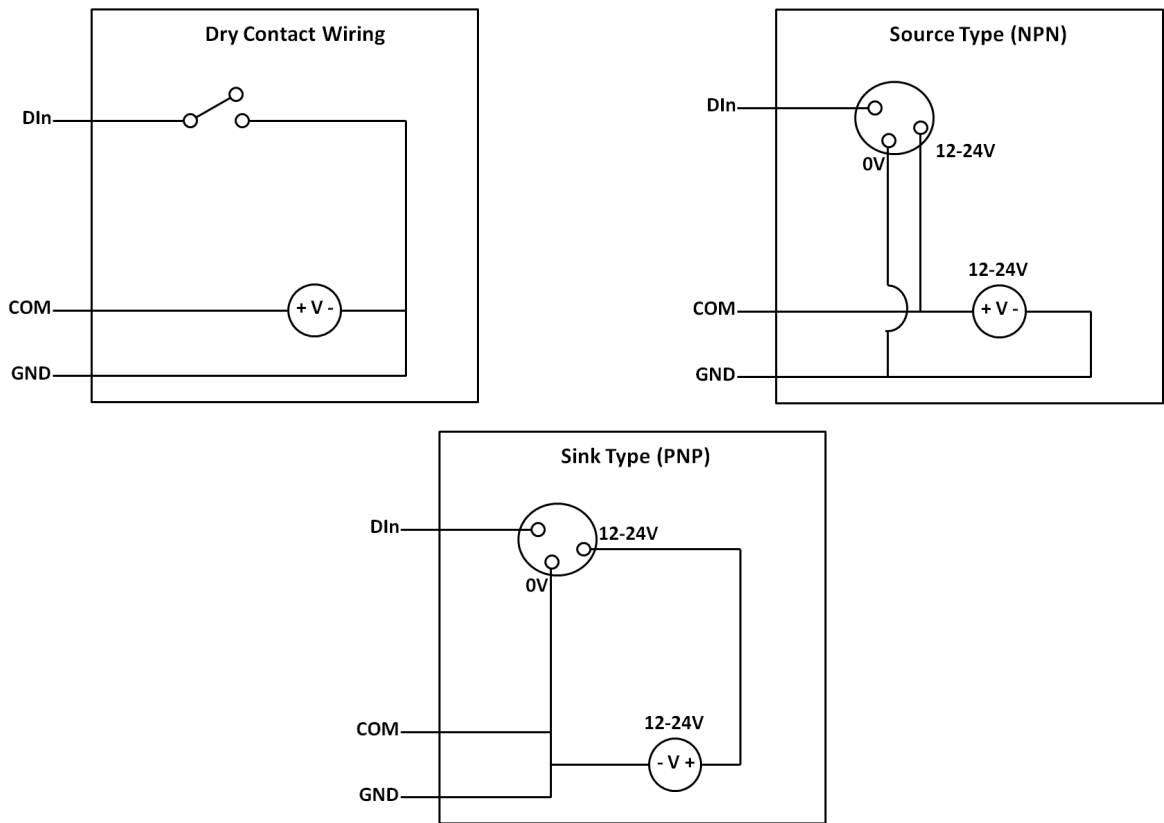
The following is the ioPAC 5542 RTU controller's pin assignment and I/O wiring guide.

## Pin Assignment

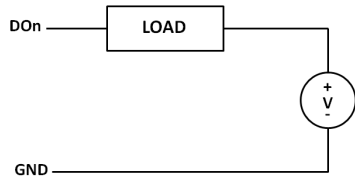


Pin	Name	Description	Pin	Name	Description
1	COM0	COM of DI0, DI2, DI4, and DI6	2	COM1	COM of DI1, DI3, DI5, and DI7
3	DI0	Digital Input Channel 0	4	DI1	Digital Input Channel 1
5	DI2	Digital Input Channel 2	6	DI3	Digital Input Channel 3
7	DI4	Digital Input Channel 4	8	DI5	Digital Input Channel 5
9	DI6	Digital Input Channel 6	10	DI7	Digital Input Channel 7
11	GND	Ground	12	GND	Ground
13	COM2	COM of DIO0, DIO2, DIO4, and DIO6	14	COM3	COM of DIO1, DIO3, DIO5, and DIO7
15	DIO0	Digital Input/Output Channel 0	16	DIO1	Digital Input/Output Channel 1
17	DIO2	Digital Input/Output Channel 2	18	DIO3	Digital Input/Output Channel 3
19	DIO4	Digital Input/Output Channel 4	20	DIO5	Digital Input/Output Channel 5
21	DIO6	Digital Input/Output Channel 6	22	DIO7	Digital Input/Output Channel 7
23	GND	Ground	24	GND	Ground
25	AI0+	Analog Input Channel 0 +	26	AI1+	Analog Input Channel 1 +
27	AI0-	Analog Input Channel 0 -	28	AI1-	Analog Input Channel 1 -
29	AI2+	Analog Input Channel 2 +	30	AI3+	Analog Input Channel 3 +
31	AI2-	Analog Input Channel 2 -	32	AI3-	Analog Input Channel 3 -
33	AI4+	Analog Input Channel 4 +	34	AI5+	Analog Input Channel 5 +
35	AI4-	Analog Input Channel 4 -	36	AI5-	Analog Input Channel 5 -
37	AI6+	Analog Input Channel 6 +	38	AI7+	Analog Input Channel 7 +
39	AI6-	Analog Input Channel 6 -	40	AI7-	Analog Input Channel 7 -

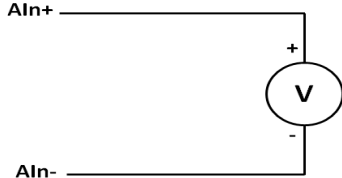
# Digital Input



# Digital Output



# Analog Input (Voltage)



# Analog Input (Current)

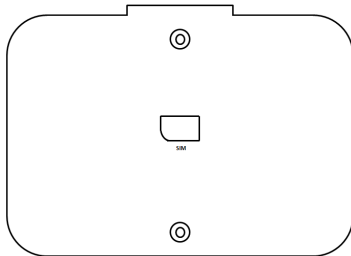


# Installing a SIM card

ioPAC 5542-HSPA controller supports cellular network function. user can unscrew and remove the SIM card cover to insert the SIM card.

Follow these steps to remove or install a SIM card:

1. Remove the screw holding the card cover in place.



2. (a) Insert the SIM card into the slot, or  
(b) Remove the SIM card from the slot.

## Connecting to the Network

### Ethernet Communication

Connections to the LAN port are made through an RJ45 connector on the module. The wiring and pin connections for these connectors are described in separate sections below.

- **TCP/IP Settings:** Dual Speed Functionality: The ioPAC 5500's Ethernet ports auto negotiate with the connected devices and then use the fastest data transmission rate supported by both devices. The following table shows the TCP/IP parameters supported by the LAN port. Default values are set when a Factory Reset is performed on the controller.

Lan Port 1		Lan Port 2	
Parameter	Supported Values	Parameter	Supported Values
IP Address	Default: 192.168.127.254	IP Address	Default: 192.168.126.254
Subnet Mask	Default: 255.255.255.0	Subnet Mask	Default: 255.255.255.0
Gateway	Default: 0.0.0.0	Gateway	Default: 0.0.0.0

**IP Address** is the IP address of the controller.

**Subnet Mask** determines the subnet on which the controller is located.

**Gateway** determines how your controller communicates with devices outside its subnet. Enter the IP address of the gateway.

The IP address, subnet mask, and gateway are static; contact your network administrator to obtain these addresses for the controller.

### RJ45 Ethernet Connector

The ideal maximum cable length of a 10/100BaseT connection is 100 m (350 feet), but the actual limit could be longer or shorter depending on the amount of electrical noise in the environment. To minimize the amount of noise, Ethernet cables should not run parallel to power cables or other types of cables that generate electrical noise.

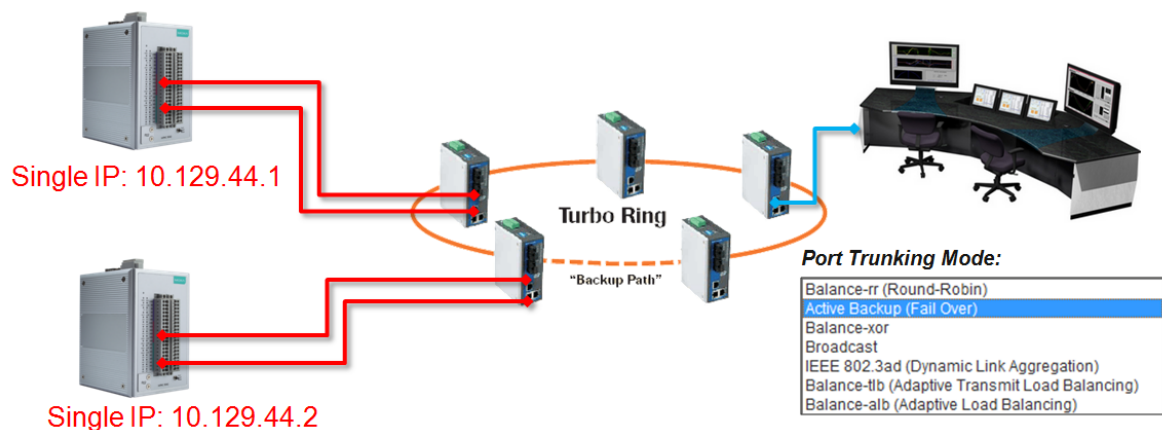
The following diagram and table shows the pin connections for the RJ45 Ethernet connector.

## RJ45 Connector Pin Assignment

Contact	Media Direct Interface Signal
1	Tx + (transmit)
2	Tx - (transmit)
3	Rx + (receive)
4	Not used
5	Not used
6	Rx - (receive)
7	Not used
8	Not used

## Port Trunking

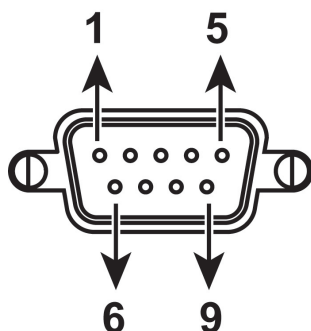
The ioPAC 5500 RTU controller has a **Port Trunking** function (active backup mode) that can convert two LAN-port IP addresses into one virtual IP address for easy SCADA integration and Ethernet redundancy. In the following diagram, both LAN ports on each ioPAC RTU controller are connected to a managed switch on an Ethernet network running SCADA software. For more details regarding configuration setup, refer to the **ioPAC RTU Software User's Manual**.



## Serial Connectivity

### Connecting to a Serial Device

The ioPAC RTU is equipped with two 3-in-1 serial ports that support RS-232/422/485, making it more convenient to connect field serial devices.



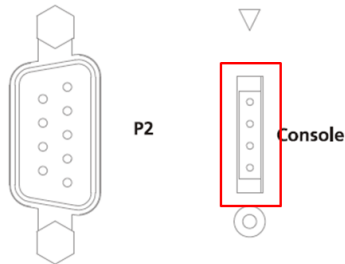
Pin	RS-232	RS-422 and 4-wire RS-485	2-wire RS-485
1	DCD	TxD- (A)	—
2	RXD	TxD+ (B)	—
3	TXD	RxD+ (B)	Data+ (B)
4	DTR	RxD- (A)	Data- (A)
5	GND	GND	GND
6	DSR	—	—
7	RTS	—	—
8	CTS	—	—
9	RI	—	—

## Serial Console (Debug Port)

The serial console gives users a convenient way of connecting to the RTU controllers. This method is particularly useful when using the computer for the first time. The serial console is also effective for connecting the Moxa RTU controllers when you do not know target network settings and IP addresses.

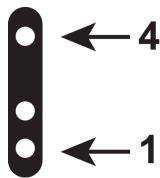
**Step 1:** To use the serial console, remove the cover from the front/top panel first.

### Console Port for the ioPAC Series



**Step 2:** Attach the 4-pin serial console cable to the console port. The following diagram shows the 4-pin serial connector and pin connections.

### Pin Assignment for the Serial Console Port



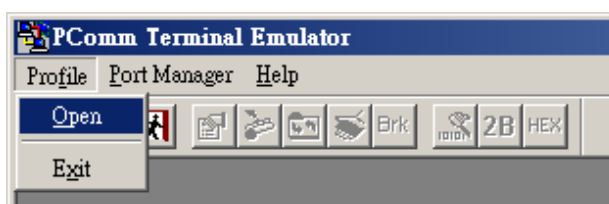
Pin	Definition
1	TxD
2	RxD
3	NC
4	GND

## Serial Console Default Settings

Parameter	Value
Baudrate	115200 bps
Parity	None
Data bits	8
Stop bits	1
Flow Control	None
Terminal	VT100

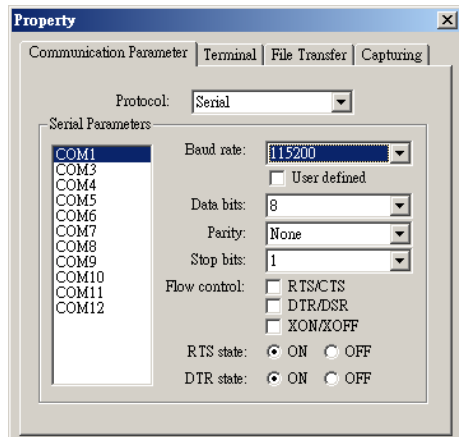
We recommend using Moxa PComm Terminal Emulator to connect to the serial console. The following steps describe how to connect the console.

1. Download Moxa PComm Lite from the Moxa website ([www.moxa.com](http://www.moxa.com)) or copy it from the following folder on the Documentation and Software CD: Software\utility\PComm\.
2. Install Moxa PComm Lite to the host Windows PC.
3. Run PComm Lite Terminal Emulator from **Start → Programs → PComm Lite Ver 1.x → Terminal Emulator**.
4. Click **Profile → Open**.

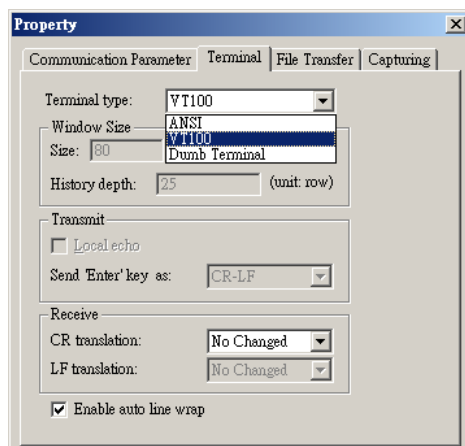




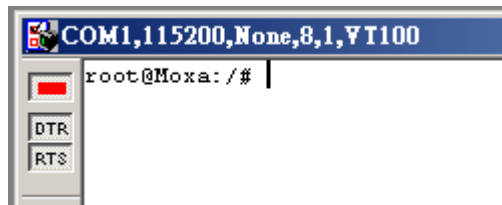
- Specify which COM port is connecting to the Moxa RTU, and use the following configuration settings:  
115200, 8, none, 1.



- Click on the Terminal tab and configure the Terminal Type to VT100. Click **OK** to proceed.



- The serial console will be displayed on the terminal screen.



## Battery

The ioPAC RTU controller is equipped with one built-in, rechargeable VL2020 3V battery for the SRAM and one 3V rechargeable battery (model number VL-1220) for the Real Time Clock (RTC).

- Rechargeable battery (VL2020) for SRAM
  - Sustains at least 1 week without power supply
  - Capacity: 20 mAh
  - Typical consumption (@ 25°C): 4 µA
  - 5-year warranty
- Rechargeable battery (VL-1220) for RTC
  - Sustains power for at least 1 week without power supply
  - Capacity: 7 mAh
  - Typical consumption (@ 25°C): 2 µA
  - 5-year warranty

**Caution**

Do NOT attempt to replace the battery. Contact your local dealer for replacement assistance.

## The RTUxpress Utility

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In this chapter, we introduce Moxa's RTUxpress Utility. The ioPAC Series can be managed and configured over an Ethernet using RTUxpress, which provides easy access to all status information and ready-to-run service settings.

The following topics are covered in this chapter:

### ▣ RTUxpress Introduction

- Quick Start
- User Interface

### ▣ Device and Service Configuration

- Settings Page
- Log Message Window

# RTUxpress Introduction

Moxa RTUxpress is a user-friendly and intuitive offline configuration tool for configuring Moxa's ioPAC Programmable 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.

The TagEasy feature implements tag-centric programming through RTUxpress, in which a "tag" links resources (DI, DO, AI, etc.) 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 just configuring simple tags instead.

This change of focus greatly reduces the programming effort.



Moxa's ioPAC programmable 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 programmable controllers. Once ioPAC is configured, all of the services will be ready to run.

## Ready-to-Run Services

**Alarms**

**OT Protocol**

**IT  
Protocol**

**Log**

E-mail

SMS

SNMP  
Trap

Modbus  
Master

Modbus  
Slave

Active  
OPC

SNMP

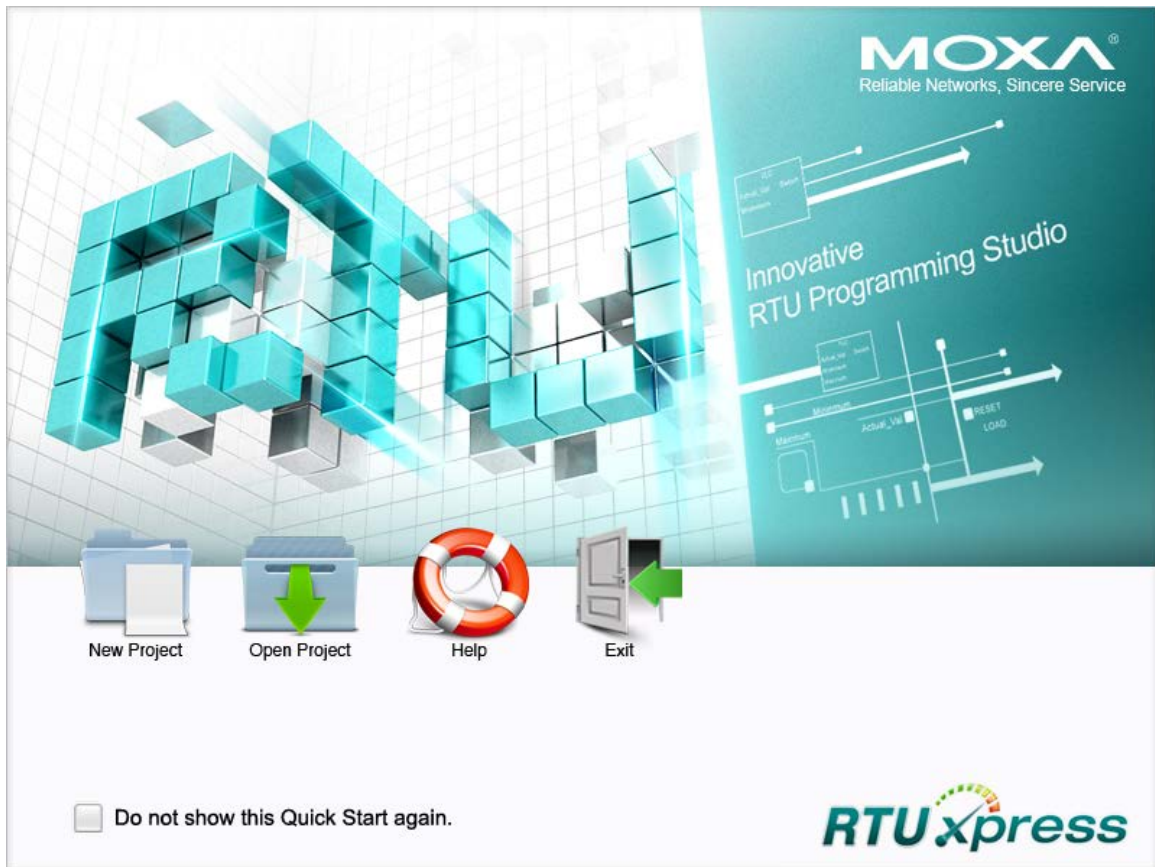
RESTful  
API

Data  
Logging

FTP

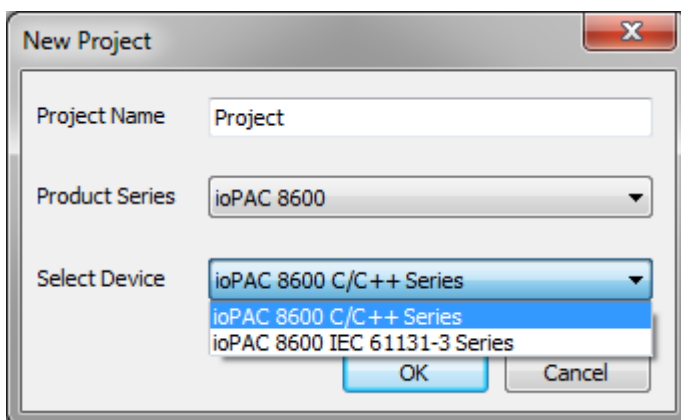
## Quick Start

When you start RTUxpress, click on **New Project**, **Open Project**, or **Help**, located at the bottom of RTU Quick Start window. If do not want the Quick Start window to appear the next time you log in, select the **Do not show this Quick Start again** checkbox before proceeding.



## New Project

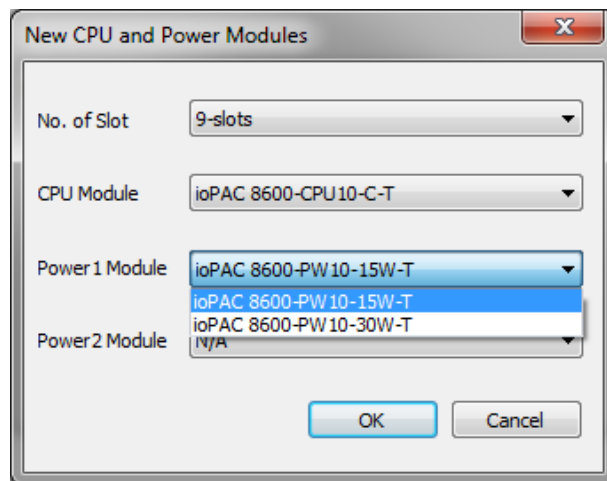
When you create a new ioPAC 8600 project for ioPAC 8600 device configuration, you can specify the **Project Name**, set the **Product Series** to ioPAC 8600, and choose the C/C++ or IEC 61131-3 programming language from the **Select Device** dropdown box. Click **OK** to proceed.



The **New CPU and Power Modules** dialog allows you to specify the characteristics of the backplane module you are using.

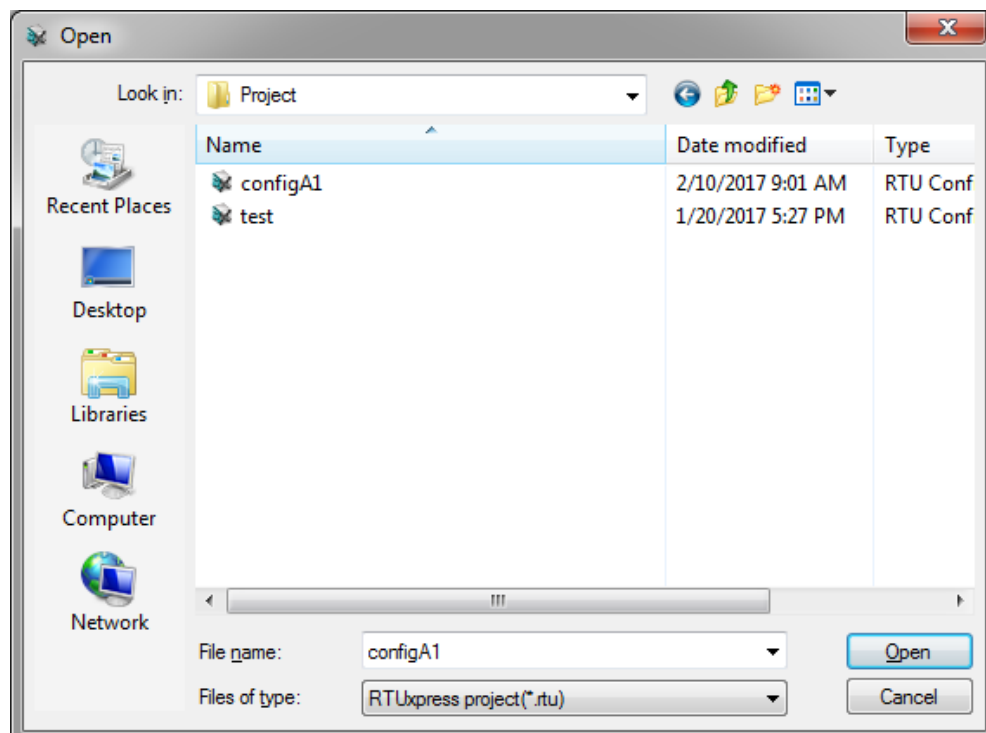
- Select the number of slots from the **No. of Slots** dropdown box.  
Three models are supported: 5 slots, 9 slots, 12 slots.
- Select the CPU model you are using from the **CPU module** dropdown box.
- Select the model of power module you are using from the **Power 1 Module** dropdown box.
- ioPAC 8600 9-slot and 12-slot backplane modules support redundant power modules. If you are using either a 9-slot or 12-slot module, you can select an additional power module from the **Power 2 Module** dropdown box.

**NOTE** You must specify the same power module models in the Power 1 Module and Power 2 Module dropdown boxes.



## Open Project

When you click on the **Open Project** icon from the Quick Start interface, use the **Open** dialog to select which project you would like to open.



## Help

Click the Help button to open the RTUxpress help utility, and then select a help topic from the left menu.



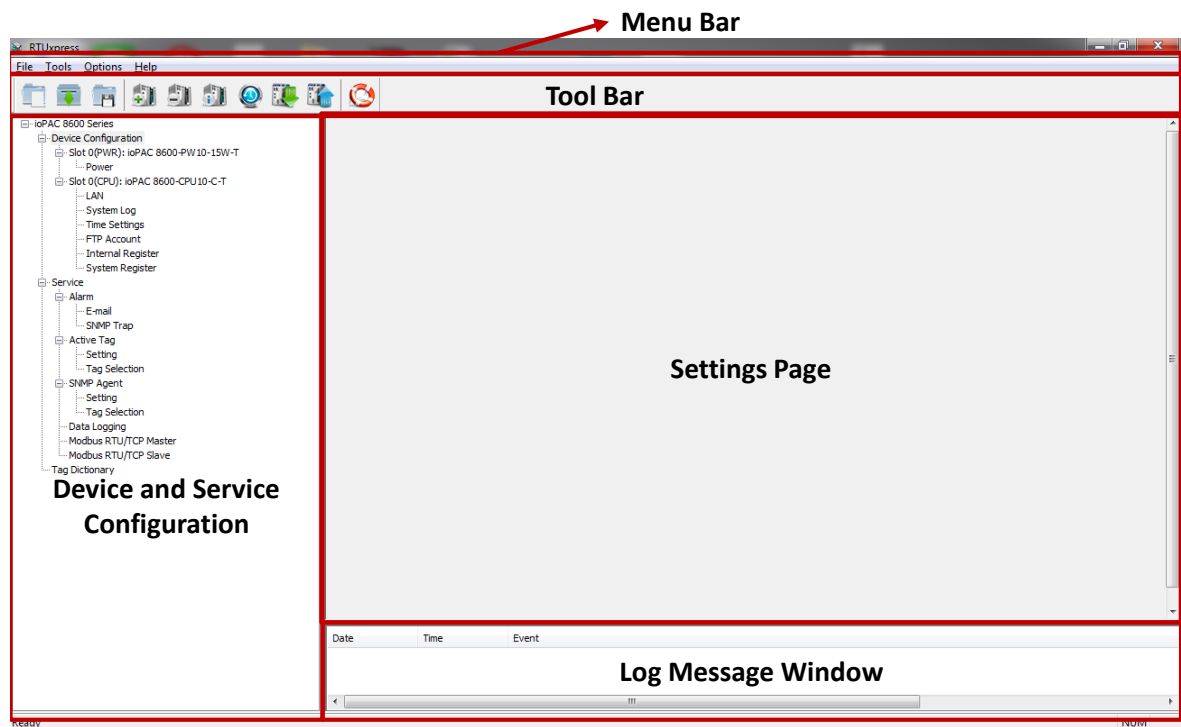
## Exit

Click the **Exit** icon to close the RTUxpress utility.

## User Interface

The RTUxpress interface is divided into six main areas:

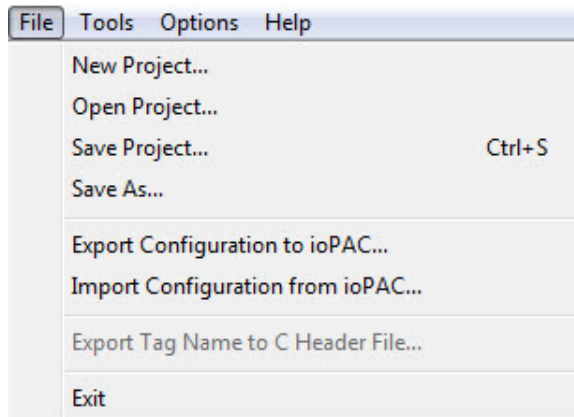
- Menu bar
- Tool bar
- Device configuration options
- Service configuration options
- Settings panel
- Log message panel





## Menu Bar

### File:



The following options are available under the **File** menu item:

- New Project: Create a new RTUxpress project
- Open Project: Open an existing RTUxpress project
- Save Project: Save the RTUxpress project that is currently opened
- Save As: Save the currently opened project as a new project
- Export Configuration to ioPAC: Export the configuration file to an ioPAC Programmable Controller
- Import Configuration from ioPAC: Import the configuration file from an ioPAC Programmable Controller
- Export Tag Name to C Header File: Export the tag name to a C header file for use in a C/C++ program
- Exit: Close the RTUxpress utility

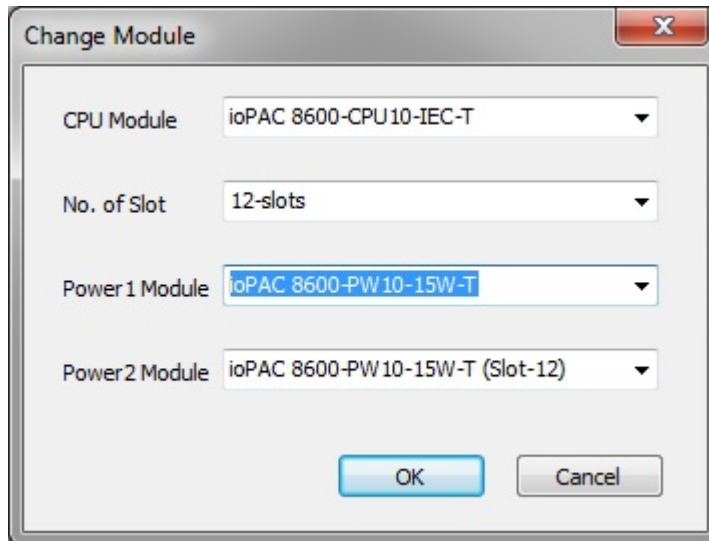
### Tools:



The following options are available under the **Tools** menu item:

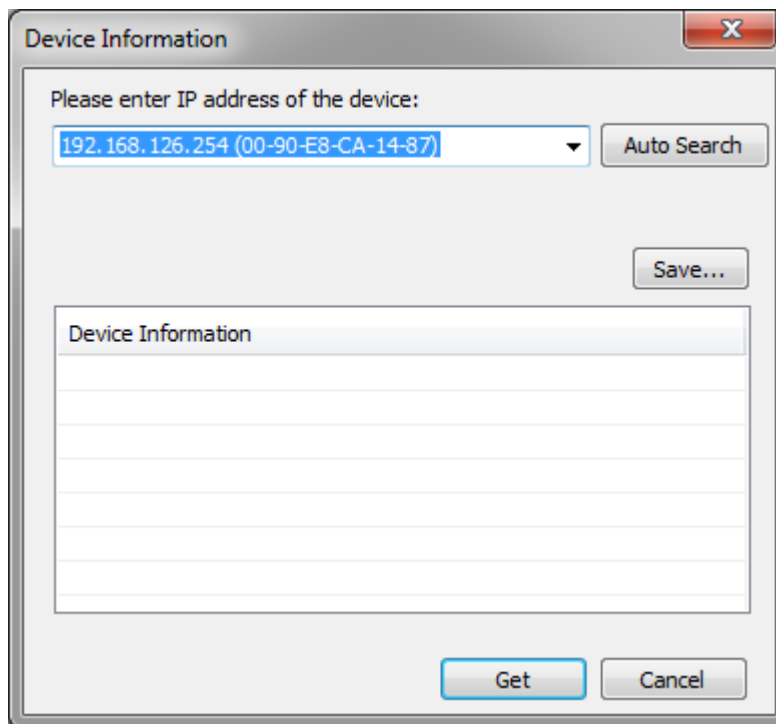
- Add Module: Add an ioPAC I/O module to the RTUxpress project
- Delete Module: Delete an ioPAC I/O module from the RTUxpress project

- Change CPU/Power Module: Change the CPU, Power, backplane settings for the RTUxpress project



The 'Change Module' dialog box contains four dropdown menus. The first is 'CPU Module' with the value 'ioPAC 8600-CPU10-IEC-T'. The second is 'No. of Slot' with the value '12-slots'. The third is 'Power1 Module' with the value 'ioPAC 8600-PW10-15W-T'. The fourth is 'Power2 Module' with the value 'ioPAC 8600-PW10-15W-T (Slot-12)'. At the bottom are 'OK' and 'Cancel' buttons.

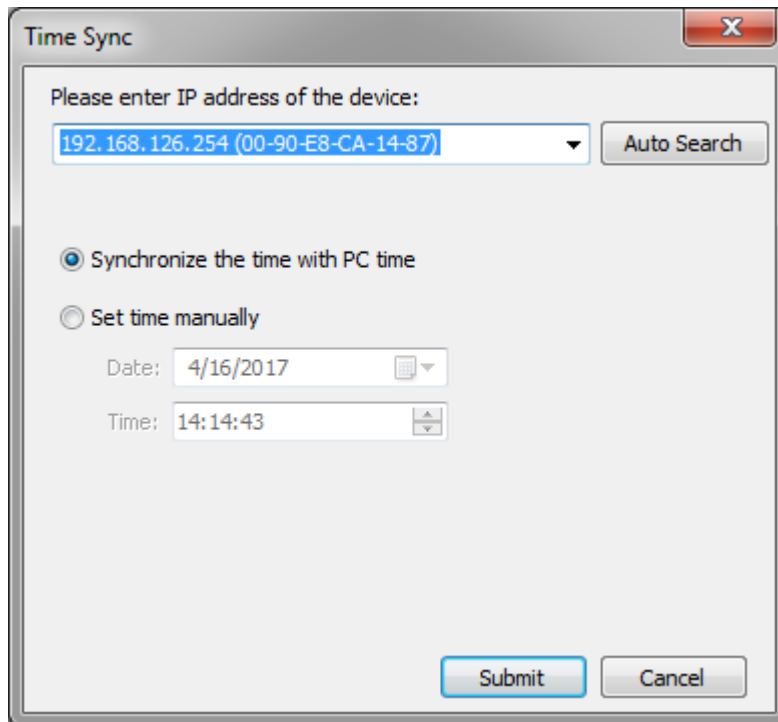
- Device Information: Get the device information for a particular device



The 'Device Information' dialog box has a text input field for the IP address, currently showing '192.168.126.254 (00-90-E8-CA-14-87)'. To the right of the input field is an 'Auto Search' button. Below the input field is a 'Save...' button. At the bottom are 'Get' and 'Cancel' buttons. A large empty text area labeled 'Device Information' is located between the 'Save...' button and the 'Get' button.

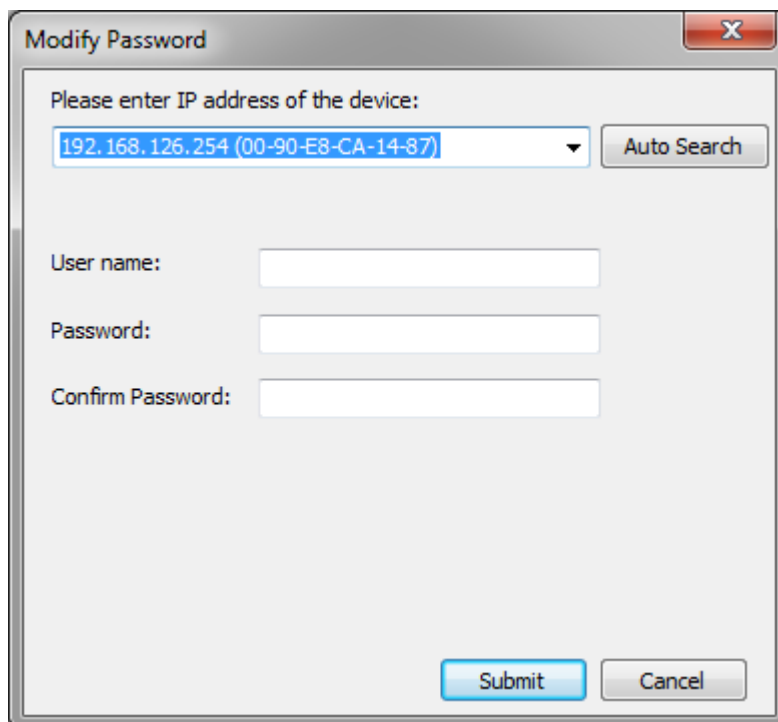
**NOTE** A username and password are required to retrieve device information. the default Username/Password is moxa/moxa for the ioPAC 8600-CPU30 series and root/root for other ioPAC series products.

- Time Sync: Synchronize the device time with the PC's time, or set the time manually



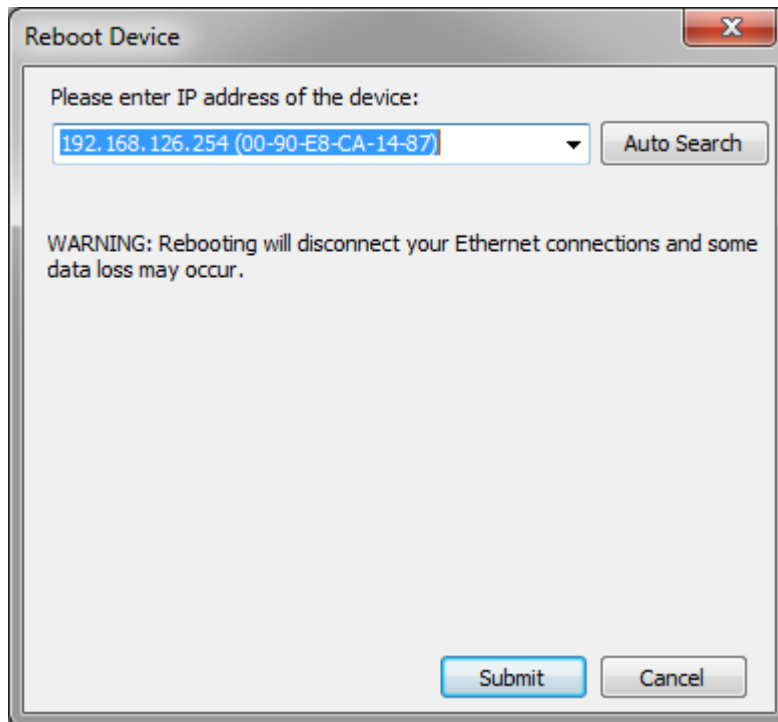
The Time Sync dialog box has a title bar with a close button (X). The main content area contains the text "Please enter IP address of the device:" followed by a dropdown menu showing "192.168.126.254 (00-90-E8-CA-14-87)" and an "Auto Search" button. Below this are two radio buttons: "Synchronize the time with PC time" (selected) and "Set time manually". Under "Set time manually" are fields for "Date:" (4/16/2017) and "Time:" (14:14:43). At the bottom are "Submit" and "Cancel" buttons.

- Modify Password: Modify the administrator password



The Modify Password dialog box has a title bar with a close button (X). The main content area contains the text "Please enter IP address of the device:" followed by a dropdown menu showing "192.168.126.254 (00-90-E8-CA-14-87)" and an "Auto Search" button. Below this are three text input fields labeled "User name:", "Password:", and "Confirm Password:". At the bottom are "Submit" and "Cancel" buttons.

- Reboot Device: Reboot the ioPAC Programmable Controller



The image shows a 'Reboot Device' dialog box with a title bar containing a close button (X). Inside the dialog, there is a text prompt 'Please enter IP address of the device:' followed by a text input field containing '192.168.126.254 (00-90-E8-CA-14-87)' and a dropdown arrow. To the right of the input field is an 'Auto Search' button. Below this, a warning message reads: 'WARNING: Rebooting will disconnect your Ethernet connections and some data loss may occur.' At the bottom of the dialog are two buttons: 'Submit' and 'Cancel'.

Reboot Device

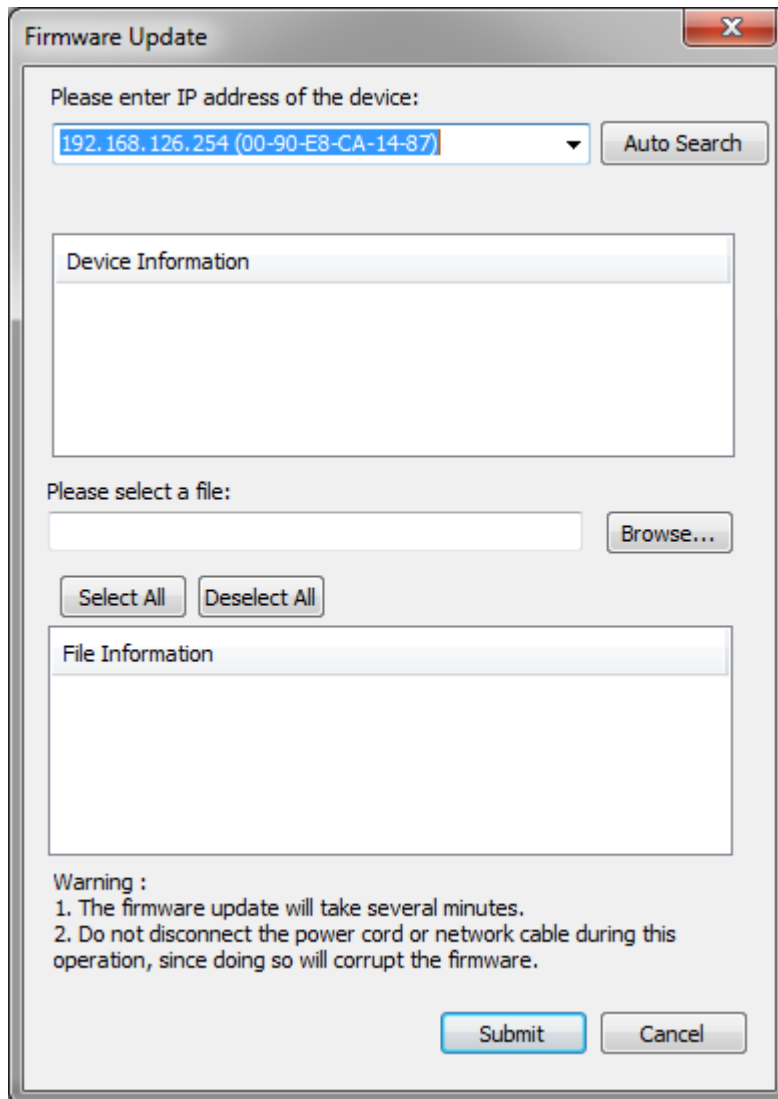
Please enter IP address of the device:

192.168.126.254 (00-90-E8-CA-14-87) Auto Search

WARNING: Rebooting will disconnect your Ethernet connections and some data loss may occur.

Submit Cancel

- Firmware Update: Upgrade the ioPAC Programmable Controller's firmware



**Firmware Update**

Please enter IP address of the device:

192.168.126.254 (00-90-E8-CA-14-87) Auto Search

Device Information

Please select a file:

Browse...

Select All Deselect All

File Information

Warning :

1. The firmware update will take several minutes.
2. Do not disconnect the power cord or network cable during this operation, since doing so will corrupt the firmware.

Submit Cancel

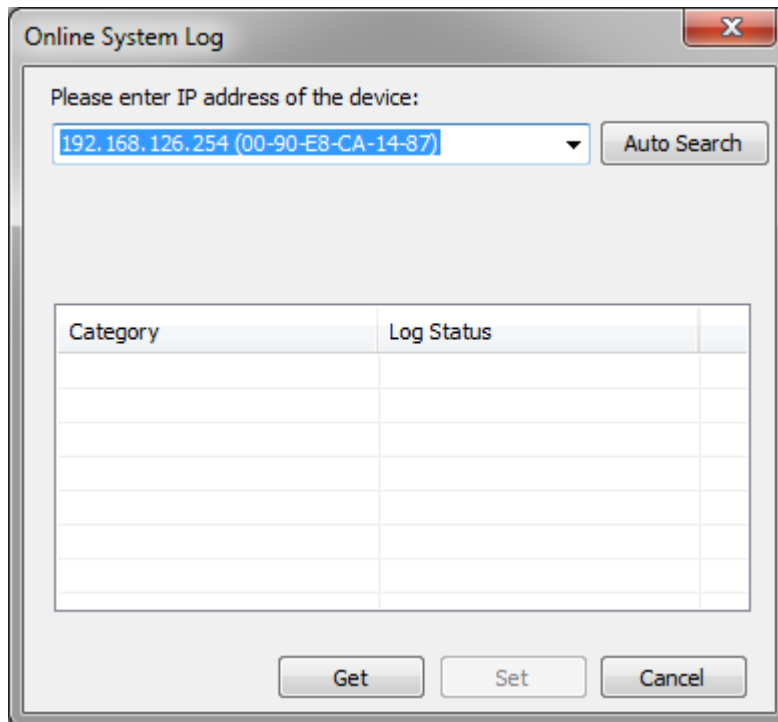
- Factory Reset: Reset all settings and configurations to default settings

IEC 61131-3 Setting:

IEC 61131-3 Setting	Resource information
Online System Log Setting	ISaGRAF Run Time Engine Reset to Default

- Resource information: Indicates how many resources are supported by the ioPAC and whether or not the resources are running.
- ISaGRAF Runtime Engine Reset to Default: Deletes all resources and programs in the ioPAC and restarts the ISaGRAF runtime engine.

- Online System Log: Users can change the system log settings online.



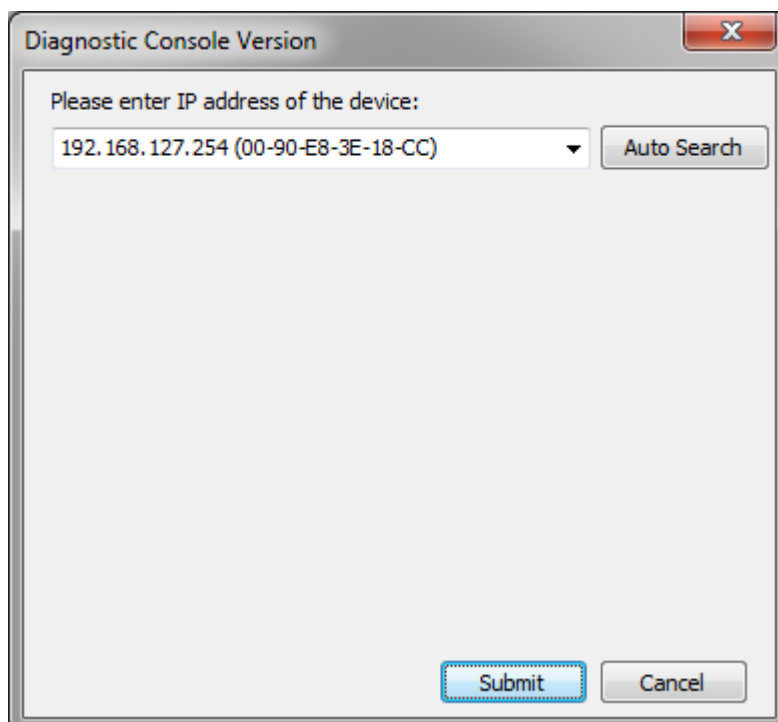
The 'Online System Log' dialog box has a title bar with a close button. Inside, it says 'Please enter IP address of the device:' followed by a text field containing '192.168.126.254 (00-90-E8-CA-14-87)' and a dropdown arrow. To the right is an 'Auto Search' button. Below this is a table with two columns: 'Category' and 'Log Status'. The table has 7 rows. At the bottom are three buttons: 'Get', 'Set', and 'Cancel'.

Category	Log Status

**NOTE** Enabling the log will affect device performance. However, we recommend enabling it so that runtime details will be logged when the ioPAC experiences unexpected errors.

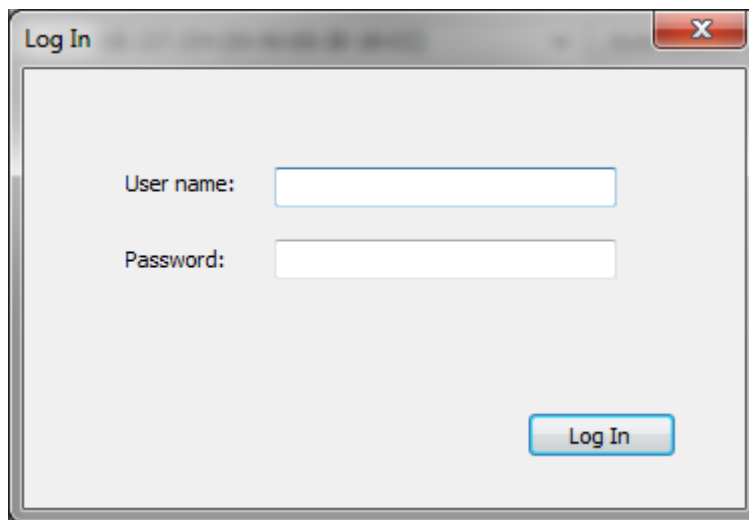
- Diagnostic & Testing Tool: The tool can be used to pre-test or monitor the IO status of the device. Take the following steps to use the tool:

Step 1: Start the tool, key in an IP address or auto search for a device, and then then click submit.

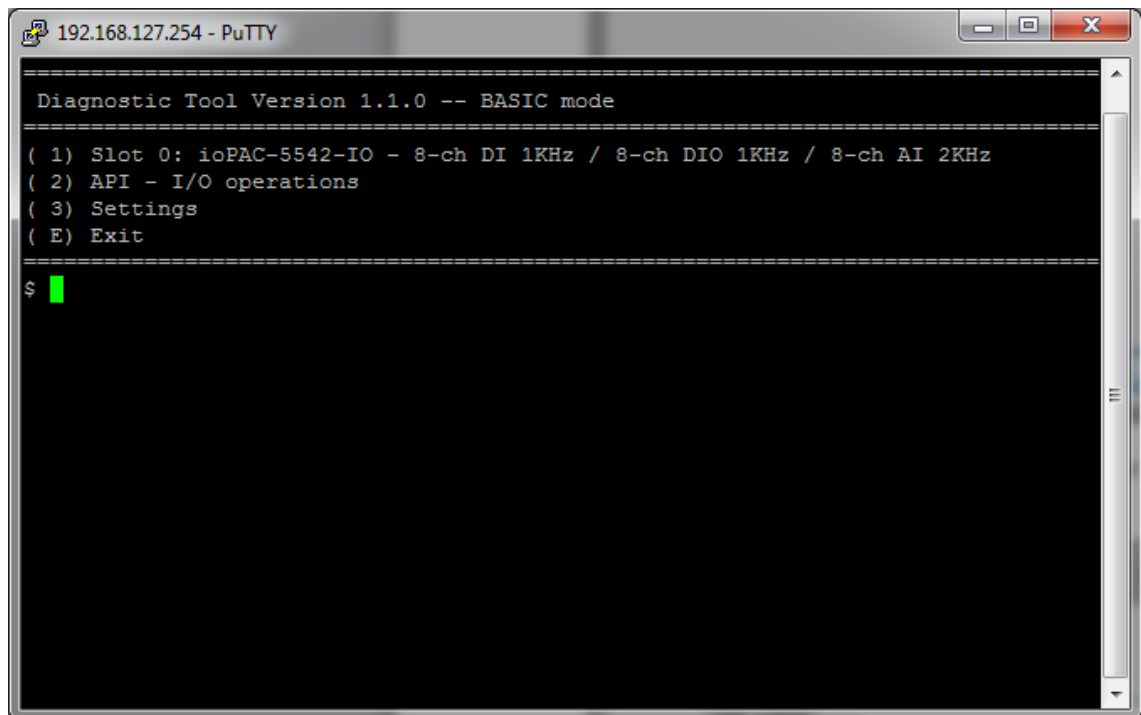


The 'Diagnostic Console Version' dialog box has a title bar with a close button. Inside, it says 'Please enter IP address of the device:' followed by a text field containing '192.168.127.254 (00-90-E8-3E-18-CC)' and a dropdown arrow. To the right is an 'Auto Search' button. At the bottom are two buttons: 'Submit' and 'Cancel'.

Step 2: When the Log in window appears, enter the user name and password to log in. RTUxpress will open PuTTY to establish an SSH connection between the ioPAC and the PC.

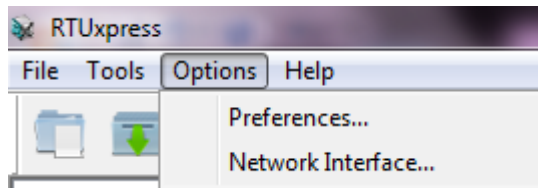


Step 3: When a connection has been established, the slot and API information will be displayed in the PuTTY window. Use the commands listed on the screen to monitor the device.

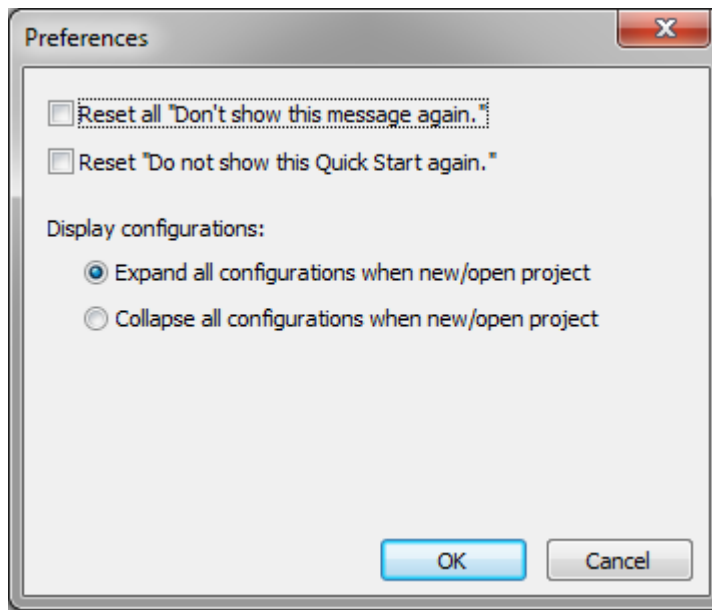


**NOTE** The tool may affect the operation of the ioPAC. If you want to use the tool when the ioPAC is operating, we strongly suggest that you to stop the ioPAC first to avoid unexpected results.

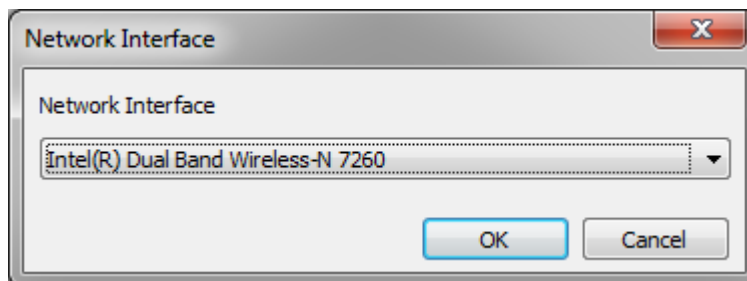
## Options:



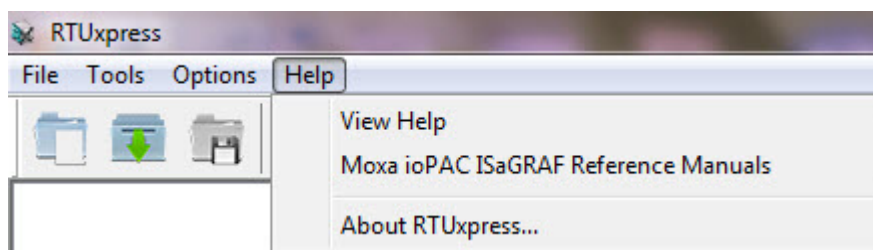
- Preferences: Allows you to configure the preferences shown below



- Network Interface: Allows you to select the network interface



## Help:



- View Help: Opens the **RTUxpress.chm** help utility
- Moxa ioPAC ISaGRAF Reference Manuals: Opens the **Moxa\_ioPAC\_ISaGRAF.chm** utility
- About RTUxpress: it will show the RTUxpress utility version



## Tool Bar



New Project: Create a new RTUxpress project



Open Project: Open an existing RTUxpress project



Save Project: Save a currently opened RTUxpress project



Add Module: Add an ioPAC I/O module



Delete Module: Delete an ioPAC I/O module



Device Information: Get device information



Time Sync: Device time synchronization



Export Configuration to ioPAC: Export a configuration file to the ioPAC Programmable controller



Import Configuration from ioPAC: Imports the configuration file from ioPAC Programmable Controller

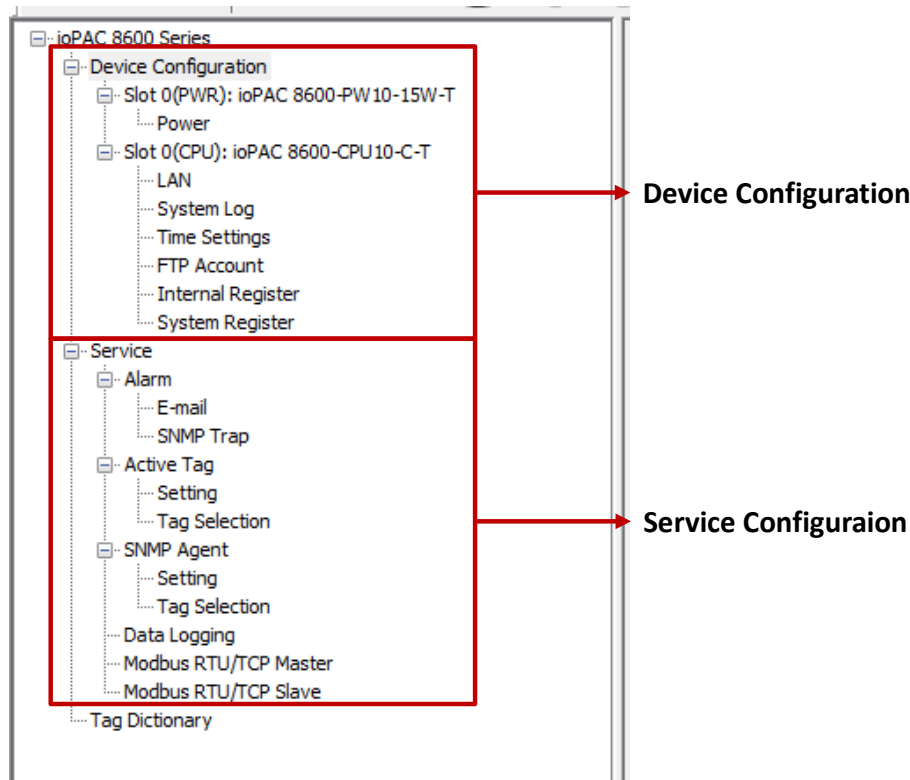


Help: Opens the **RTUxpress.chm** help utility

# Device and Service Configuration

Device Configuration is to configure ioPAC Programmable Controller settings and resources. You can configure the LAN, IO, an serial settings in the device's configuration section. Since the product has a modular design, a module's function settings will appear once the module has been added to the device.

ioPAC also provides services (Modbus, SNMP, Data Logging, etc.) to reduce the developer's effort. Configure the function in the service configuration page, and then upload the configuration to the device. The service will start working automatically.



## Settings Page

Detailed device and configuration settings will be displayed in this window. Check in RTUxpress's help file for the definition of each setting.

## Log Message Window

Operation and message logs will be displayed in this window for reference.