



Series 4 Manual

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1 WHAT'S INCLUDED

The JNIOR is shipped with the following items:

- **JNIOR – one of the following models with the main difference being the I/O mix**
 - JNIOR Model 410 Catalog No. JNR-100-004B 8 inputs 8 outputs
 - JNIOR Model 412 Catalog No. JNR-200-004B 4 inputs 12 outputs
 - JNIOR Model 414 Catalog No. JNR-300-004B 12 inputs 4 outputs
 - JNIOR Model 412DMX Catalog No. JNR-200-004D 4 inputs 12 outputs, DMX Port

- **Connector Kit – 5-Piece**

<u>Connection</u>	<u>Type</u>	<u>Quantity</u>
○ Power	4 Pin terminal connector	1
○ Digital Inputs	8 Pin terminal connector	2
○ Relay Outputs	8 Pin terminal connector	2

- **Power Adapter (optional) – includes 4 pin terminal connector already attached**
- **JNIOR Support Documentation**

Available on our website at <http://www.integpg.com/support/>

- **JNIOR Support Tool** – PC Software for configuring your JNIOR IP settings and updates
- **Documentation** – User Manuals, Technical Manuals and Drawings
- **JNIOR Software Development Kit (SDK)** and Sample Software
- **Miscellaneous Tools**

2 INTRODUCTION TO THE JNIOR

JNIOR, a Network I/O Resource utilizing the JAVA™ platform, is a cost effective automation controller that communicates over a network using TCP/IP via an Ethernet Port or via its serial port. The JNIOR is a general-purpose automation controller and I/O device that is easily configurable for control and monitoring of your equipment or process via the built-in web pages, by enabling the built-in software applications, interaction with an application running on another computer, or by adding your own applications.

The TCP/IP connectivity allows the JNIOR to be easily connected with other computers over an Ethernet network or the Internet using the JNIOR protocol, web sockets, TCP, Modbus, SNMP, MQTT, and others. Custom protocols can also be added.

The JNIOR Series 4 contains a modern web server to host its own dynamic web pages using web sockets and HTML5 code or custom web pages developed by INTEG or the end user.

The JNIOR contains File Transfer Protocol (FTP) and Telnet servers, for transferring data files, loading software, system configuration, and maintenance.

The JNIOR is also an e-mail client capable of sending e-mails, with attachments, based on alarms or system events.

The JNIOR Series 4 can make 'secure' web and other connections.

The JNIOR contains a mix of digital inputs and relay outputs, and can be expanded with plug and play analog expansion modules (4 – 20 mA, +/- 10 VDC), 4 Relay Output expansion modules (for high voltages), LED Dimmer module, User Control Panel and/or digital temperature and humidity sensors.

For custom applications, a Java Virtual Machine (JVM) is also available on the JNIOR for implementing application programs written in Java. Please contact INTEG Process Group for more details.

Uses for the JNIOR include:

- Cinema automation
- Lighting and presentation control
- Remote monitoring and control of equipment
- Utility usage monitoring and reporting
- Data acquisition and logging
- Serial-to-Ethernet interface
- Interface with legacy systems
- Linking I/O to existing operator interfaces
- E-mail alert

3 POWERING YOUR JNIOR

The JNIOR uses a 2-piece terminal connector system for all power and I/O wiring connections allowing for easy installation and/or removal of the JNIOR. The connection details are described in section 6 of this manual. Additional installation information and drawings are provided on our website.

The JNIOR can be powered with 12 to 24 volts AC or DC. An optional, wall transformer (AC power converter) for North American outlets is available from INTEG that can be used for converting 120/240 VAC to 12 VDC @ 1 amp. An international model is also available with the Euro plug. Other plug types are also available.

The Power Connector is located along the upper left edge of the JNIOR. Note that this is a 4-pin connector. If numbered from one (1) through four (4) from left to right **power is always connected to positions 2 and 3** (middle two connectors). The polarity is irrelevant although it is recommended that the positive (+) lead be connected to position 2.



JNIOR Model

The left two positions (1 & 2) are internally connected together, as are the right two positions (3 & 4). This is to facilitate the interconnection of the supplied power to other devices and circuits such as input or output devices. If you power the I/O circuits with your JNIOR power supply, please make sure the power supply is sized appropriately.

WARNING

Do not connect the transformer leads both to Positions 1 & 2 or both to positions 3 & 4. This will short the transformer and possibly damage it and/or the JNIOR. Always use a fused/protected power source.

When a proper power source is connected and turned on the leftmost LED adjacent to the power connector will glow BLUE continuously. The LED to the right may glow ORANGE for several seconds. This orange STATUS LED remains on through most of the JNIOR boot sequence. Later it will flash whenever an external connection is made to the JNIOR via the Ethernet port.

4 COMMUNICATIONS SET-UP

The JNIOR supports and is shipped with DHCP enabled for dynamic setting of the JNIOR IP address by a network server.

If the above address will not work on your network, then there are two ways to configure your JNIOR IP settings:

- By using the JNIOR **Support Tool** (Beacon tab) provided on our website at the following link:
<http://www.integpg.com/support/jnior/>
- Via the RS232 Serial Port and a command line window available via the JNIOR Support Tool

4.1 Configuration Using the JNIOR Support Tool

The easiest way to configure your JNIOR is via the JNIOR Support Tool and the JNIOR Beacon functionality. Beacon is built into every JNIOR Series 4. The JNIOR Support Tool is available on our website. The JNIOR Support Tool Manual is installed on your PC under Start – Programs – INTEG – Support Tool.

Simply install the JNIOR Support Tool and then connect an Ethernet cable to your JNIOR and power-up the JNIOR. The JNIOR Support Tool will automatically detect the JNIOR (as long as the JNIOR is on the same local Ethernet network) when the JNIOR completes its boot. Or you can right click in the Beacon Tab and select Query New or Query All. The Manage IP List feature allows you to manually enter JNIOR IP addresses so they can be found across a VPN, routers, etc. Please see the JNIOR Support Tool Manual for additional details on how to use the other features of the JNIOR Support Tool. You may need to adjust your Firewall settings for Beacon to work.

JNIOR Support Tool - 7.5

File View Tools Options **Beacon** Help

Beacon Devices Macro Update Registry Editor Logs Snapshot

Serial Number	Hostname	> Address	Subnet Mask	MAC Address	OS Version	Boot Time	Last Announced
816080060	bruce_dev2	10.0.0.55	255.255.255.0	9C:8D:1A:02:09:AF	v1.6.5	5/22/2018 8:15:55 AM	5/25/2018 9:38:29 AM
615080240	kev-bt-tagconverter	10.0.0.76	255.255.255.0	9C:8D:1A:01:03:77	v1.6.5	5/22/2018 8:16:02 AM	5/25/2018 9:38:29 AM
816080015	kev-h2-lightning	10.0.0.79	255.255.255.0	9C:8D:1A:02:09:98	v1.6.5	5/25/2018 12:00:12 AM	5/25/2018 9:38:30 AM
614070021	kev-telephone	10.0.0.83	255.255.255.0	9C:8D:1A:00:00:8D	v1.6.5	5/22/2018 8:16:16 AM	5/25/2018 9:38:30 AM
	Query	10.0.0.84	255.255.255.0	9C:8D:1A:00:00:7E	v1.6.5	5/22/2018 8:16:04 AM	5/25/2018 9:38:29 AM
	Configure		255.255.255.0	9C:8D:1A:02:09:B3	v1.6.5	5/22/2018 8:16:13 AM	5/25/2018 9:38:30 AM
	Identify		255.255.255.0	9C:8D:1A:01:15:92	v1.6.5	5/23/2018 11:44:39 AM	5/25/2018 9:38:30 AM
	Tools		255.255.255.0	9C:8D:1A:00:00:8C	v1.6.5	5/22/2018 8:15:59 AM	5/25/2018 9:38:30 AM
	IP Configuration		255.255.255.0	9C:8D:1A:00:06:65	v1.6.5	5/22/2018 8:16:19 AM	5/25/2018 9:38:30 AM
	JNIOR List		255.255.254.0	9C:8D:1A:02:18:75	v1.6.2	5/23/2018 10:31:55 AM	5/25/2018 9:38:30 AM
	Set Hostname		255.255.255.0	00:60:35:11:3b:3c	4.8.614.2124	5/21/2018 12:04:42 PM	5/25/2018 9:38:30 AM
	Edit Registry		255.255.255.0	9C:8D:1A:01:15:7D	v1.6.5	5/24/2018 3:59:37 PM	5/25/2018 9:38:30 AM
	Reset Attention Flag		255.255.255.0	9C:8D:1A:02:02:41	v1.6.5	5/25/2018 1:04:18 PM	5/25/2018 1:04:28 PM
217070299	Rick_Kristian-AVC-	10.0.0.228	255.255.255.0	9C:8D:1A:02:14:42	v1.6.5	5/22/2018 8:16:39 AM	5/25/2018 9:38:30 AM
617120228	Rick_Misc_Testing_TASKER	10.0.0.230	255.255.255.0	9C:8D:1A:00:02:8C	v1.6.5	5/25/2018 3:33:15 PM	5/25/2018 3:33:29 PM
715070178	CinemaCon_UI	10.0.0.231	255.255.255.0	9C:8D:1A:00:00:68	v1.6.5	5/22/2018 8:16:16 AM	5/25/2018 9:38:30 AM
717070299	Rick_LED_Cinema_XChange	10.0.0.237	255.255.255.0	9C:8D:1A:01:00:01	v1.6.5	5/22/2018 8:16:23 AM	5/25/2018 9:38:30 AM
614070322	4MB_INTEG_VMOEE_Demo	10.0.0.239	255.255.255.0	9C:8D:1A:01:16:92	v1.6.5	5/23/2018 12:17:30 PM	5/25/2018 9:38:30 AM
613090074	Rick_Graphr_Chtrs_INTEG_email	10.0.0.242	255.255.255.0	00:60:35:11:2e:eb	4.8.614.2124	5/21/2018 3:17:30 AM	5/25/2018 9:38:30 AM
814490001	CinemaCon_DMx	10.0.0.243	255.255.255.0	9C:8D:1A:01:0E:19	v1.6.5	5/22/2018 8:17:06 AM	5/25/2018 9:38:30 AM
918020009	Rick_Test_310	10.0.0.245	255.255.254.0	9C:8D:1A:01:00:07	v1.6.5	5/22/2018 8:16:53 AM	5/25/2018 9:38:30 AM
211027425	Rick_Environ_Nick_NONjnior2	10.0.0.246	255.255.255.0	9C:8D:1A:02:15:B1	v1.6.5	5/22/2018 8:17:12 AM	5/25/2018 9:38:30 AM
717030837	ProCellution-LineSidePrinting414	10.0.0.250	255.255.255.0	9C:8D:1A:00:07:F2	v1.6.5	5/22/2018 4:02:16 PM	5/25/2018 9:38:30 AM
814490008	CinemaCon_LED	10.0.0.253	255.255.255.0				
617110129	Rick_Environ_Sensors_Cinema1						
716190001							

By “right clicking” on your JNIOR listed in the window, you can display the Configuration pop-up as shown below. At a minimum, you need to type in your desired JNIOR IP Address and click OK. You should then be able to interact with your JNIOR via your Ethernet network.

JNIOR Information

Serial Number **715070178** Enable Beacon

MAC Address **9C:8D:1A:02:02:41** "Responds to "Query New"

Auto Announce

Use DHCP

Use the following IP Config

IP Addressing

IP Address

Subnet Mask

Default Gateway

DNS

Primary DNS

Secondary DNS

DNS Timeout ms

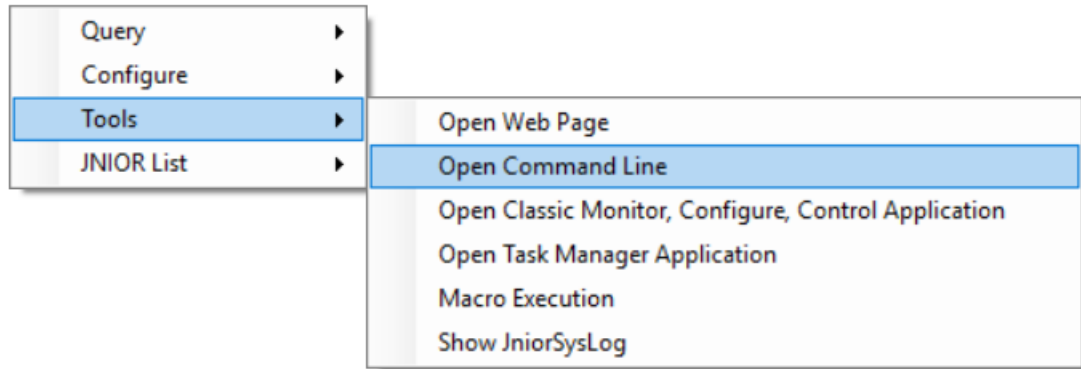
Domain Name
for example "integpg.com"

Time Zone

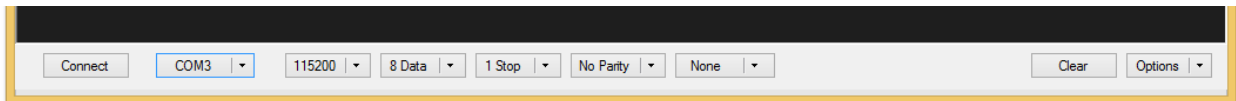
4.2 Configuration Using a Serial Connection from Your PC

The alternate way to configure your JNIOR is via the **RS-232 port located along the bottom edge of the JNIOR**. The lower RS232 port is the JNIOR command console port and is a DB-9 connector that utilizes a standard, straight-through, serial cable. You will need to use a USB to DB-9 serial cable to work with your computer.

You will need to communicate with the JNIOR using a Command Line window that is available from the JNIOR Support Tool. “Right-click” in the white area on the Beacon tab and select Tools – Open Command Line as shown below.

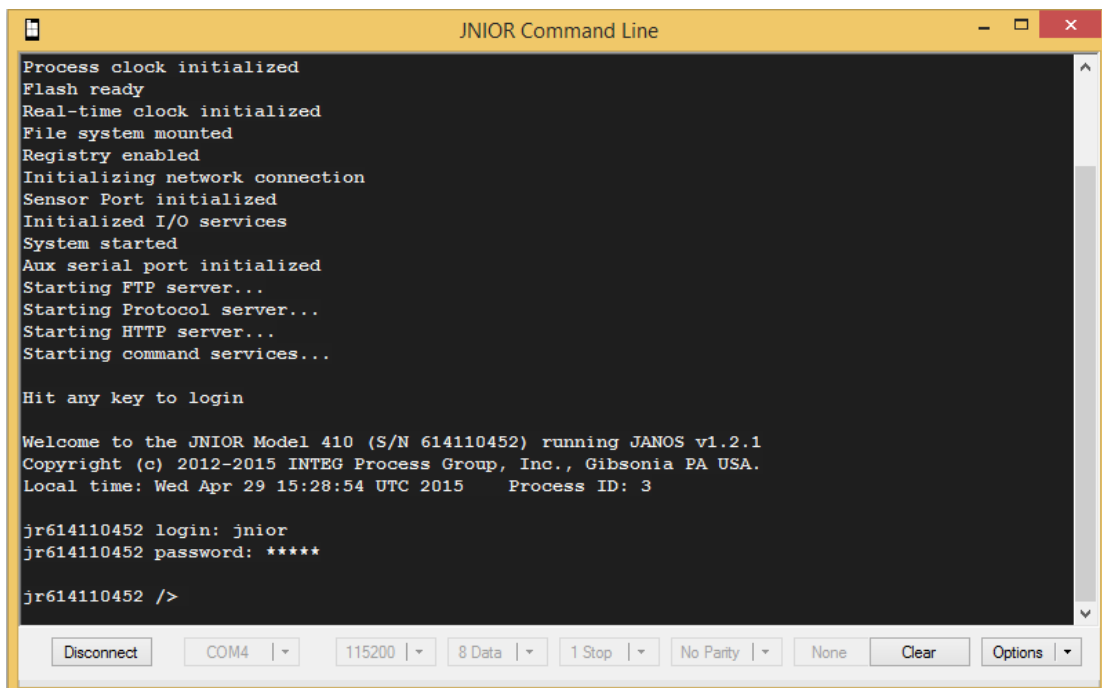


Your COM properties should be set for 115200 baud, 8 bits, no parity, 1 stop bit, and no handshaking (flow control) and appear as shown below (these are the default settings for the RS-232 port):

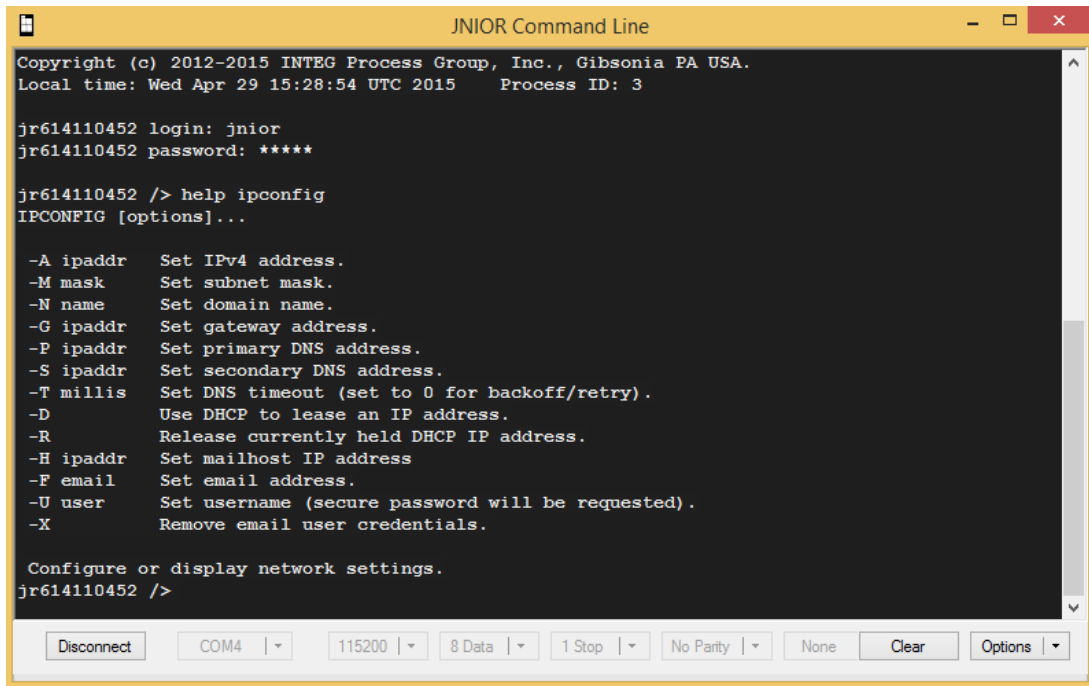


If you power-up your JNIOR **after** you have connected your serial cable to the JNIOR and opened a command line session, you will see the boot dialog. If you powered-up your JNIOR **before** you have opened a command line session, you will not see the Boot dialog. In either case, the JNIOR is ready to accept a login. You may need to hit the ENTER key to obtain the login prompt.

Enter a username for the JNIOR (default is "jnior") and enter a password for the JNIOR (default is "jnior"). If you are successful, your screen should look similar to the following:



You will use the `ipconfig` command to configure the JNIOR Ethernet port for your required static (fixed) IP Address. The `ipconfig` command has several options associated with it and they can be viewed by typing, `help ipconfig` at the command line prompt. The options are shown below:



```

JNIOR Command Line
Copyright (c) 2012-2015 INTEG Process Group, Inc., Gibsonia PA USA.
Local time: Wed Apr 29 15:28:54 UTC 2015   Process ID: 3

jr614110452 login: jnior
jr614110452 password: *****

jr614110452 /> help ipconfig
IPCONFIG [options]...

-A ipaddr   Set IPv4 address.
-M mask     Set subnet mask.
-N name     Set domain name.
-G ipaddr   Set gateway address.
-P ipaddr   Set primary DNS address.
-S ipaddr   Set secondary DNS address.
-T millis   Set DNS timeout (set to 0 for backoff/retry).
-D          Use DHCP to lease an IP address.
-R          Release currently held DHCP IP address.
-H ipaddr   Set mailhost IP address
-F email    Set email address.
-U user     Set username (secure password will be requested).
-X          Remove email user credentials.

Configure or display network settings.
jr614110452 />
  
```

In order to properly configure your JNIOR network settings using `ipconfig`, use the command shown below. You must enter, at a minimum, your IP address and a mask:

```
ipconfig -a IP -m MASK
```

where:

IP	= desired IP address
MASK	= IP mask

On a private network, the IP address may be something like 192.168.1.10. A common mask would be 255.255.255.0. The command would then look as follows:

```
ipconfig -a 192.168.1.10 -m 255.255.255.0
```

Other settings, such as a gateway, primary and secondary domain name servers, and a mail host, may or may not be needed.

- The gateway often, although not always, is the .1 of the IP address. In the above example it would be 192.168.1.1. It allows the JNIOR to get to another segment of the Ethernet network.
- The primary and secondary domain name servers (DNS) provide resolution for the aliases that are used for the IP addresses of other devices on the network and for e-mail addresses. If other devices are referred to by their IP address only and not by name or the JNIOR e-mail feature is not being used, then neither DNS server has to be setup.

- The JNIOR Series 4 email system requires a Mail Host. Please see the Email Application Note for additional details on how to configure the JNIOR Series 4 to send email.

Typing in the above command will result in the following. Your IP settings can be checked by simply typing the `ipconfig` command at the command line and pressing <enter>:

```

JNIOR Command Line
-R      Release currently held DHCP IP address.
-H ipaddr  Set mailhost IP address
-F email   Set email address.
-U user    Set username (secure password will be requested).
-X        Remove email user credentials.

Configure or display network settings.
jr614110452 /> ipconfig -a 192.168.1.10 -m 255.255.255.0 ← Set IPCONFIG

jr614110452 /> ipconfig ← Verify
Current IPv4 addr.: 192.168.1.10/24 (255.255.255.0) (active)
Current IPv6 addr.: 0000:0:0:0:0000:0000:0000/00 (unsupported)
Default IPv4 GW   : 10.0.0.1
Ethernet Address  : 9c:8d:1a:00:07:59
Primary DNS       : 10.0.0.4
Secondary DNS     : 0.0.0.0
DNS Timeout       : 5000 (ms)
DHCP Server       : 0.0.0.0
DHCP Enabled      : false
Domain            :
Mailhost          :
Email Address     :
Email Username    :

jr614110452 /> |
  
```

The screenshot shows a terminal window titled "JNIOR Command Line". It displays a list of commands and their descriptions, followed by the execution of the `ipconfig -a 192.168.1.10 -m 255.255.255.0` command. A red arrow points from the text "Set IPCONFIG" to this command. Below that, the `ipconfig` command is executed, and its output is shown. A red arrow points from the text "Verify" to the `ipconfig` command. The output shows the current IPv4 address as 192.168.1.10/24 (255.255.255.0) (active), and other network settings like DNS, DHCP, and Ethernet address. At the bottom of the window, there are control buttons for "Disconnect", "COM4", "115200", "8 Data", "1 Stop", "No Parity", "None", "Clear", and "Options".

While you are logged into the JNIOR, you can also set your date and time. The JNIOR date and time are set during the factory build to GMT (also now referred to as MIT). The JNIOR has a real time clock that is battery backed so you may just have to set your time zone. The GMT time should be approximately correct.

If the JNIOR is connected to the Ethernet, the time can automatically be synced via the JNIOR Network Time Protocol (NTP). The default website the JNIOR checks is `clock.isc.org`. However, for this NTP server to work, you will need to set a DNS and possibly a gateway address.

You can change the NTP Server registry key to the IP address of any server/computer on the network that will respond to an NTP request or you can use any domain name that will provide the NTP functionality.

You can set your JNIOR date and time using the `date` command. Typing `help date` will provide you with the command format.

When finished with your Command Line session, type `logout` or `bye` on the command line to end your session and then close the Command Line window.

For more information concerning additional commands available to the user through a command line or a Telnet session, please see the **Command Line Communications Manual** on our website.

4.3 JNIOR Web Page

The JNIOR Series 4 contains the Dynamic Configuration Page (DCP) which is a web page used for a variety of functions including monitoring and manually controlling the I/O, changing various configuration items, opening a Telnet/Console session and several other functions. The DCP web page works with Microsoft Internet Explorer, Google Chrome, Fire Fox and other browsers.

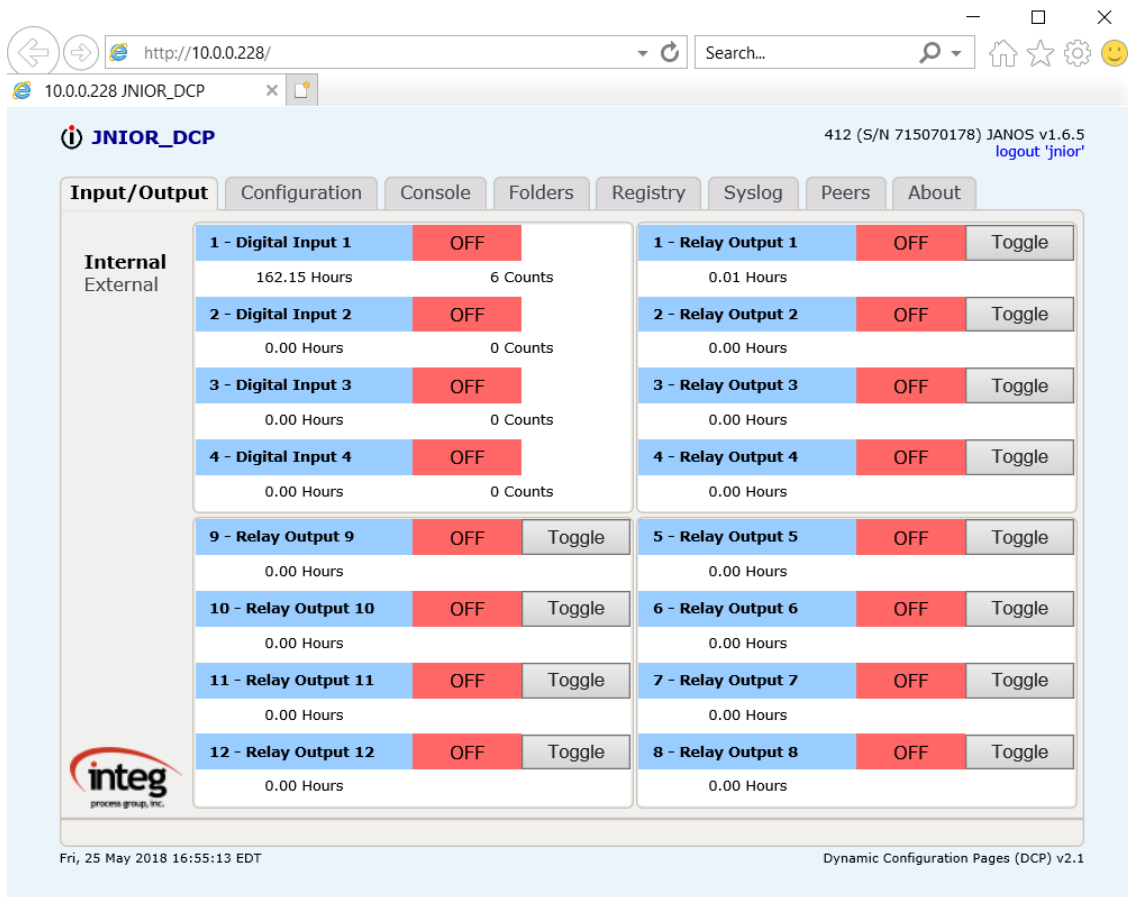
PLEASE NOTE: The dynamic web page requires a ‘modern web browser’ which is defined as Internet Explorer 10 or greater, Google Chrome or Firefox.

You can launch the JNIOR DCP Web page from the Beacon tab in the JNIOR Support Tool by right-clicking on your JNIOR and going to Tools – Open Web page or by manually entering the JNIOR IP address in your browser address line. To manually launch the JNIOR web page, open your browser and in the address line of the browser type your JNIOR IP address, for example:

<http://10.0.0.228>

After the JNIOR web page is loaded, the user is asked to login with a valid username and password. You can use the default username (jnior) and default password (jnior).

The JNIOR DCP web page will be launched in your browser as shown below.



5 HARDWARE SPECIFICATIONS

5.1 JNIOR Series 4

The **JNIOR Series 4** contains a 32-bit microprocessor, 32 MB FLASH memory, 32 MB dynamic RAM, 2 MB battery-backed static RAM memory, and the JNIOR operating system (JANOS) with an integral Java Virtual Machine (JVM).

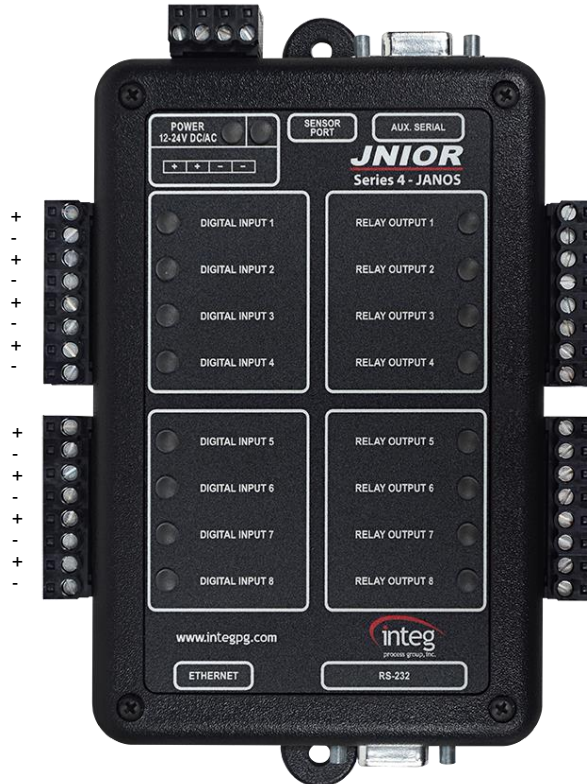
JNIOR's circuit board resides in a protective case with an integral low voltage power supply and a variety of general-purpose I/O points. External communications are handled via the Ethernet port, Auxiliary Serial Port and RS232 Serial Port.

The **JNIOR Series 4** specifications are provided in the following table:

Power Input	
Input Voltage	12 to 24 Volts DC or AC, < 400 mA typical
Digital Inputs	
Range	0 to 30 Volts AC/DC
Logic Low input	0 to 1 Volt
Logic High input	2 to 30 Volts
Input Resistance	1.2 K ohm nominal
Response time	1 millisecond
Counter capability	2000 Hz Max (each input)
Isolation	Optically Isolated
Functions	Latching capability – as fast as 1 millisecond
Relay Outputs	
Type	SPST, Form A – 1 Normally Open Contact (Two relays are Form C and configurable as Normally Open or Normally Closed to the terminals)
Contact Ratings	1 Amp @ 24 Volts AC/DC
Pulse Resolution	1 millisecond pulse increments
RS232 Serial Port (1)	
Communication	DB-9 female with 9 pin DTE pinout
Default Settings	Configurable based on application 115,200 BPS, 8 Data bits, No parity, 1 stop bit, No Flow Control
Aux Serial Port (1)	
Communication	Auxiliary Serial Port – RS232, RS422, RS485
Default Settings	Configurable based on application 9600 BPS, 8 Data bits, No parity, 1 stop bit, No Flow Control
Connector	DB-9 Female
Ethernet (1)	
Connection	RJ-45 Connection
Speed	10/100 Mb Auto-Negotiated, Full Duplex
Sensor Port (1)	
	RJ-12 Connection for Expansion Modules
Certification	
	TUV Safety Mark (60950), CE, FCC Class A

5.1.1 Wiring Diagram

The following diagram provides the user with the pin-outs of the digital inputs and digital outputs for the **JNIOR Model 410**. Please contact INTEG Process Group for additional assistance.



The Digital Inputs are polarity sensitive and require a voltage of 2 volts or greater to go ON

The inputs are optically isolated so they can use various voltage

The Relay Outputs are dry contacts and do not output any voltage.

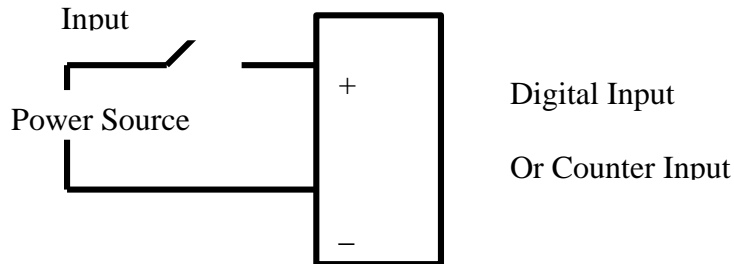
Two terminals per relay output.

Relay contacts for relays 1 and 2 can be changed from normally open to normally closed by removing the lid and changing a jumper

5.1.2 Digital Inputs

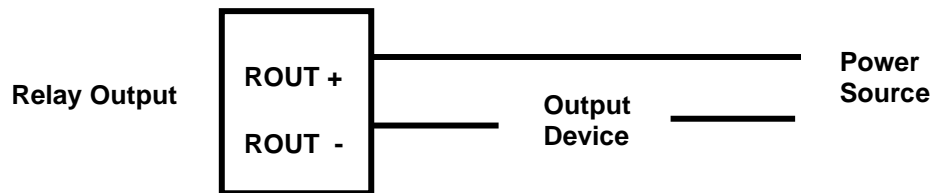
The JNIOR is equipped with optically isolated digital inputs. Each digital input can accept AC or DC voltage sources in the 0 – 30 V range. An LED associated with each digital input displays the current electrical status of the input (off or on). Isolation of each digital input allows you to connect input signals to different voltage sources without the addition of isolation devices. The input voltage must be greater than 2 VDC for the input to register as “on” and then less than 1 VDC to register as “off”.

A typical connection would be as follows:



5.1.3 Relay Outputs

The JNIOR is equipped with Relay Outputs with most of them being a Form A SPST relay (1 Normally Open Contact) and two of them being a Form C SPST relay (1 Normally Open Contact and 1 Normally Closed Contact – jumper selectable as to which one is available on the JNIOR terminals by removing the lid and changing the jumper setting. Normally Open is the default.) Each relay output is independent and isolated from the other relay output. Each relay contact rating is 1A @ 24VDC and the voltage source must be in the range of 5 – 30V AC or DC. A typical connection would be configured as follows:



Summary

Thank you for purchasing the **JNIOR**. Hopefully this manual made the getting-to-know process of your new **JNIOR** very quick and easy. The **JNIOR** has many more wonderful tools and features available, and are explained in detail in the supplied documents.

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Please do not hesitate to contact our **JNIOR** team at **INTEG Process Group, Inc.** We can be reached via phone, fax or e-mail as follows:

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