



# *JNIOR Series 3*

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A Network I/O Resource  
Utilizing the JAVA™ Platform

Analog Expansion Modules  
(4-20 mA, +/-10 VDC, RTD, Temp Sensor)  
Release 3.0

NOTE: JNIOR OS 3.1 or greater required

INTEG Process Group, Inc.  
2919 East Hardies Rd, First Floor  
Gibsonia, PA 15044

PH (724) 933-9350  
FAX (724) 443-3553

[www.integpg.com](http://www.integpg.com)

[JNIORsales@integpg.com](mailto:JNIORsales@integpg.com)

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## TABLE OF CONTENTS

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1	Overview.....	1
2	Viewing, Configuring and Controlling.....	2
2.1	Viewing.....	2
2.2	Configuring.....	5
2.3	Controlling.....	7
3	Specifications and Wiring.....	8

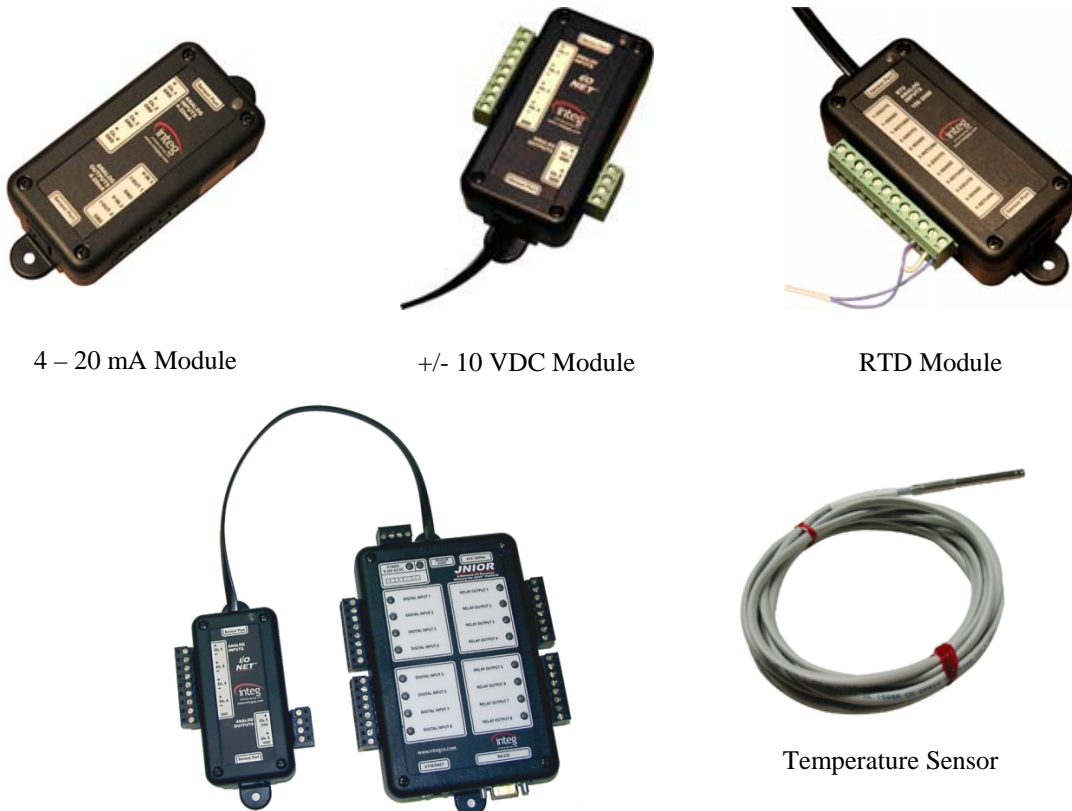
# 1 Overview

The JNIOR Analog Expansion Modules provide an easy way to add multiple analog signals for integration with the JNIOR Model 310. There are currently four types of Analog Expansion Modules or Sensors available:

1. **4 – 20 mA** (4 analog inputs, 2 analog outputs)
2. **+/- 10 VDC** (4 analog inputs, 2 analog outputs)
3. **RTD** (4 RTD inputs for PT100 sensors)
4. **Temperature Sensor** (1 digital temperature sensor)

The modules are connected to the JNIOR via the supplied cable that is connected to the Sensor Port on each device. The temperature sensor plugs directly into any Sensor Port. Up to two expansion modules per JNIOR can be daisy-chained together. The modules should be connected to the JNIOR while the power is off so that on boot-up, the JNIOR can properly recognize and address each module. The analog expansion modules are automatically integrated into the various JNIOR communication methods (Web page, Modbus, OPC Server, and JNIOR Protocol).

All three analog modules work the same way concerning their interaction with the JNIOR. The main difference is in the wiring of the devices. Please see Section 3 of this manual for the various wiring details.



4 – 20 mA Module

+/- 10 VDC Module

RTD Module

Temperature Sensor

## 2 Viewing, Configuring and Controlling

### 2.1 Viewing

#### Analog Expansion Modules

The Analog Expansion Modules are viewed via the main JNIOR web page. The JNIOR web page allows the user to monitor, control and configure the JNIOR internal and external I/O. The Analog Expansion Modules are viewed, controlled and configured under the I/O Control/External devices tab.

The screenshot displays the JNIOR web interface. At the top, the title "JNIOR" is centered. Below it are navigation tabs: "I/O Control", "Configuration", "Registry Editor", "Command Line", "Applications", and "About". Under "I/O Control", there are sub-tabs for "Internal" and "External", with "External" selected. The main content area shows two modules:

**RTD Module** (ID: A511FFFFFFFFFC)

INPUTS	
Room Temp	71.24 F
Channel 2	32.00 F
Channel 3	32.00 F
Channel 4	32.00 F

Temperature units are set to  Fahrenheit.

**4-20ma Analog Module** (ID: 5C110000246C80FE)

INPUTS		OUTPUTS	
Channel 1	0.00 %	Channel 1	0.00 % Set
Channel 2	0.00 %	Channel 2	0.00 % Set
Channel 3	0.00 %		
Channel 4	0.00 %		

A "Search Again" link is located in the bottom right corner of the External devices tab.

The first time you click on the External tab, the web page will poll the JNIOR for a list of all external devices available. If new external devices are added while the External devices tab is being displayed, you can click on the text "Search Again" in the lower right corner of the External devices tab and the web page will poll the JNIOR again for a list of the current external devices.

4-20ma Analog Module			5C110000246C80FE		
INPUTS		OUTPUTS			
Channel 1	0.00 %	Channel 1	0.00 %	Set	
Channel 2	0.00 %				
Channel 3	0.00 %	Channel 2	0.00 %	Set	
Channel 4	0.00 %				

The above screen shot shows the web page display for the 4-20 mA Analog Expansion Module. It is comprised of four analog inputs and two analog outputs. In the upper right hand corner is a long alphanumeric number. This unique number is how the JNIOR identifies each individual module. It may be important for you to know this number for use with your external application and/or for some of the standard INTEG applications (like logging via Task Manager). It is also important to know this address if you want to find the registry entries for each device or access the external devices via the JNIOR OPC Server or JNIOR Protocol (see the JNIOR Protocol documentation) for a custom application. The unique ID number is also located on a label attached to the side of each module.

If the Analog Expansion Modules are connected to the JNIOR during boot-up (reboot or first power on), the JNIOR will assign an I/O “number” to each input and output on the modules. For the first analog module, it will use inputs 1 through 4 and outputs 1 and 2, and for the second analog module of the same type, it will use inputs 5 through 8 and outputs 3 and 4. Below is a screen shot with two 4 – 20 mA Analog Expansion Modules.

The screenshot shows the JNIOR web interface with two 4-20ma Analog Modules. The first module (ID 3810000002385FE) has inputs 5 - Channel 1, 6 - Channel 2, 7 - Channel 3, and 8 - Channel 4. Its outputs are 3 - Channel 1 and 4 - Channel 2. The second module (ID 5810000002387FE) has inputs 1 - Channel 1, 2 - Channel 2, 3 - Channel 3, and 4 - Channel 4. Its outputs are 1 - Channel 1 and 2 - Channel 2. A callout bubble labeled "Input/Output numbering scheme" points to the channel numbers in both modules.

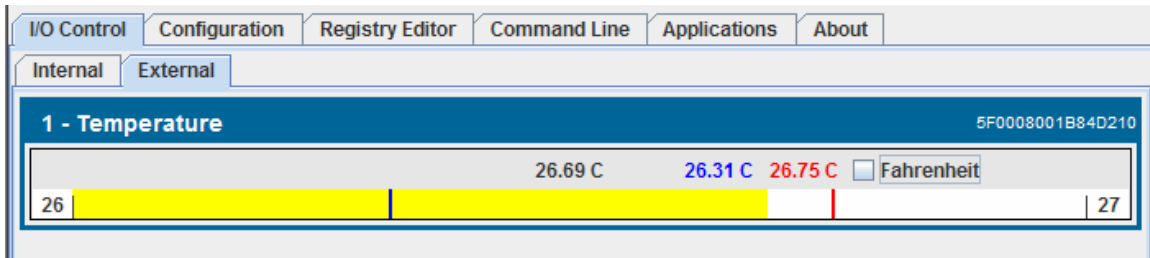
**NOTE:** If you unplug one of the expansion modules from the JNIOR, the JNIOR will retain the numbering sequence for the other module whether that is 1 – 4 or 5 – 8. This allows you to replace one of the modules without having to modify your application use of the channel numbers.

## Temperature Sensors

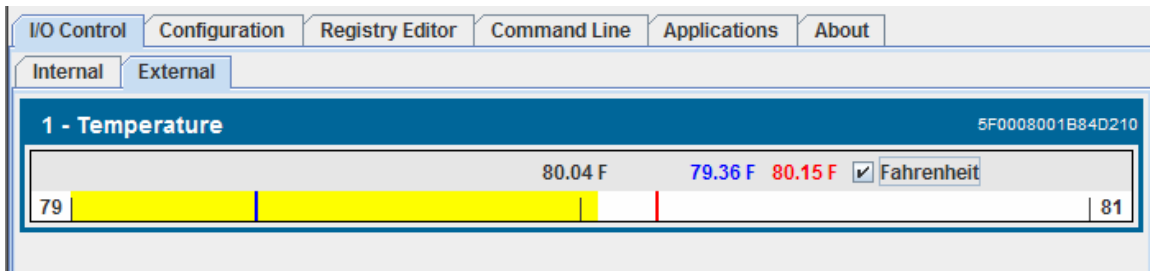
The Temperature Sensors are also viewed via the main JNIOR web page under the I/O Control/External devices tab.

The Temperature Sensor value can be viewed as Degrees Celsius or Fahrenheit by having the Fahrenheit box “unchecked” (shows Celsius) or “checked” (shows Fahrenheit).

### Celsius View



### Fahrenheit View



The blue, black and red text and indicator bars represent:

**Blue Text** – lowest reading

**Black Text** – current reading

**Red Text** – highest reading

## 2.2 Configuring

### Analog Expansion Modules

The Analog Expansion Modules are configured via the main JNIOR web page.

The overall description for the Analog Expansion module is configured by right clicking on the module block and then clicking Edit Description.

The screenshot displays the configuration page for a '4-20ma Analog Module' (ID: 5C110000246C80FE). It features two main sections: 'INPUTS' and 'OUTPUTS'. The 'INPUTS' section lists Channel 1 through Channel 4. The 'OUTPUTS' section shows Channel 1 and Channel 2, each with a '0.00 %' value and a 'Set' button. A context menu is overlaid on the 'INPUTS' section, providing options to edit the module description, individual input channels, and individual output channels. A callout bubble highlights the 'Edit Description' option, indicating that right-clicking here allows for editing the module's overall configuration parameters.

Each analog input channel can be configured separately by selecting the Edit Input Channel. You can configure the description, minimum and maximum scale, display units and precision (number of decimal places) for each input. The default scale is 0 – 100%.

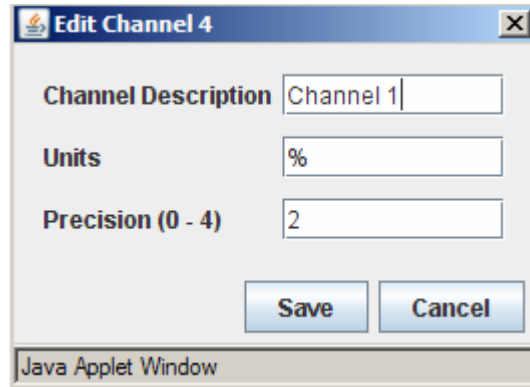
The 'Edit Channel 0' dialog box is shown, allowing for the configuration of a specific input channel. The fields are as follows:

Channel Description	Channel 1
Minimum	0.0
Maximum	100.0
Units	%
Precision (0 - 4)	2

Buttons: Save, Cancel

Java Applet Window

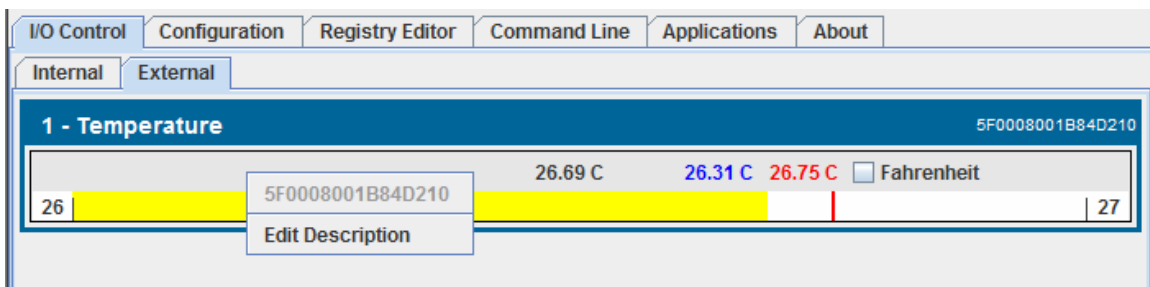
Each analog output channel is configured separately by selecting the Edit Output Channel. You can configure the description, display units and precision. The range is always 0 – 100.



### **Temperature Sensors**

The Temperature Sensor is also configured via the main JNIOR web page under the I/O Control/External devices tab.

The Temperature Sensor description is modified by right clicking on the sensor box and then clicking Edit Description.



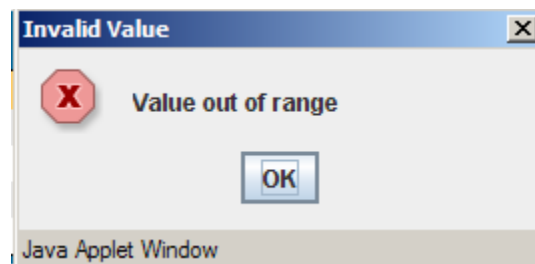


## 2.3 Controlling

Values for the analog output signals can be controlled from the JNIOR web page. The number to the left of the Set button is the current output value in percentage terms (i.e. percent of milliamps between 4 and 20 or percent of voltage between 0 and +10). You can change the output value by clicking on the Set button and then entering a new value in the pop-up box and pressing the OK button or by pressing the enter key. The number that displays in bold may be slightly different than the value you just typed in due to scaling of a digital value.

The screenshot shows the '4-20ma Analog Module' control interface. The top bar displays the module name and a unique identifier '5C110000246C80FE'. Below this are two tables: 'INPUTS' and 'OUTPUTS'. The 'INPUTS' table lists Channel 1 through Channel 4, all showing 0.00%. The 'OUTPUTS' table lists Channel 1 and Channel 2, both showing 0.00% and a 'Set' button next to each. A 'New Value' dialog box is open in the foreground, prompting the user to 'Enter a new value (0 - 100) %' with an input field and 'OK' and 'Cancel' buttons. The dialog box also features a green question mark icon and is identified as a 'Java Applet Window'.

If a value is entered outside of the current scale, then a warning window pops up to alert you that this is not a valid entry.



### 3 Specifications and Wiring

Please see the appropriate data sheet for each Analog Expansion Module for each module's specifications. Some general information is as follows:

#### General

- No power required – draws power from the JNIO
- Dimensions: 4 x 2 x 1.2 in (102 x 51 x 31 mm)
- Weight: 4 ounces (115 grams)

#### Analog Inputs

- Quantity: 4
- Range: -10 to + 10 volts DC or 4 – 20 mA or RTD
- A/D resolution: 16 bits (12 bits effective)
- Full Scale Accuracy: better than 1% full-scale

#### Analog Outputs

- Quantity: 2
- Range: 0 – 10 volts DC or 4 – 20 mA
- D/A resolution: 8 bits
- Full Scale Accuracy: better than 1% full-scale



#### Sensor Port

- Up to 2 expansion modules can be daisy-chained
- Each module comes with a cable for connecting to the Sensor Port. However, the Expansion Modules can be located up to 50 ft. from the JNIO. A wiring diagram for the connector cable follows in this manual.

#### Temperature Sensor

- Either standard temperature sensor or rugged temperature sensor
- Stainless steel probe
- Standard sensor temperature range is – 20 °C to 75 °C
- Rugged sensor temperature range is – 55 °C to 125 °C

#### Wiring

Care should be used when wiring analog signals to the Analog Expansion Module. Industry standard power and grounding methods should be followed.

Connection diagrams are provided for each module in the following pages.

## Sensor Port Cable

The Expansion Modules can be located up to 50 feet from the JNIOR. In these instances, the user must make a custom cable to connect the expansion module with the JNIOR. The pin out for the cable that connects the Sensor Port on the JNIOR with the Expansion Module is the same on both ends. The connector is a standard RJ-12 connector on both ends.

**Note:**

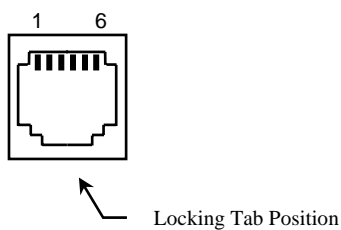
An RJ12 connector is the same size as an RJ11 connector except all 6 pins have copper pads to connect all 6 wires to the port.

Please make sure that you orient the pins properly for each side of the cable. **The cable will be twisted (or the one RJ12 connector will be upside down from the other) so that when you hold both ends of the cable side by side, the pin numbers will match.** Please contact INTEG Process Group with any questions.

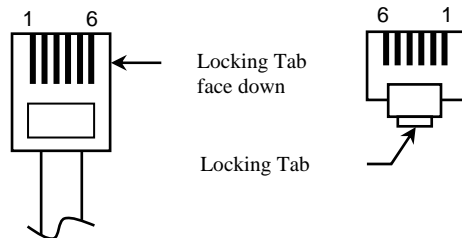
Sensor Port Pin-Outs – Use a 6 conductor wire and connect each colored wire to the same pin number on each connector.

Pin	Description
1	Voltage (5V Vcc)
2	GND
3	1-WIO (1-Wire Data)
4	GND (1-Wire Return)
5	NC (No Connection internally to the Expansion Module)
6	Unregulated DC

Reference the following diagrams to determine the proper pin numbers of the connectors:



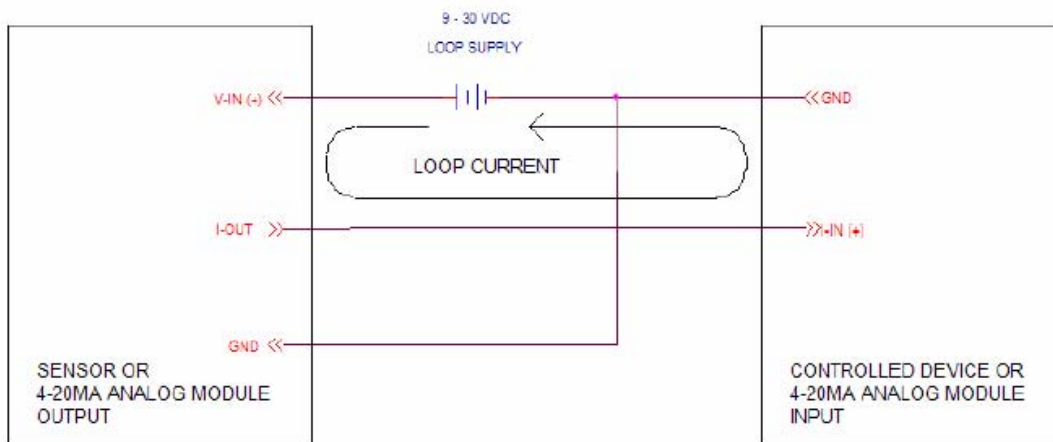
RJ12 Modular



RJ12 Modular

## JNIOR 4 – 20 mA Expansion Module

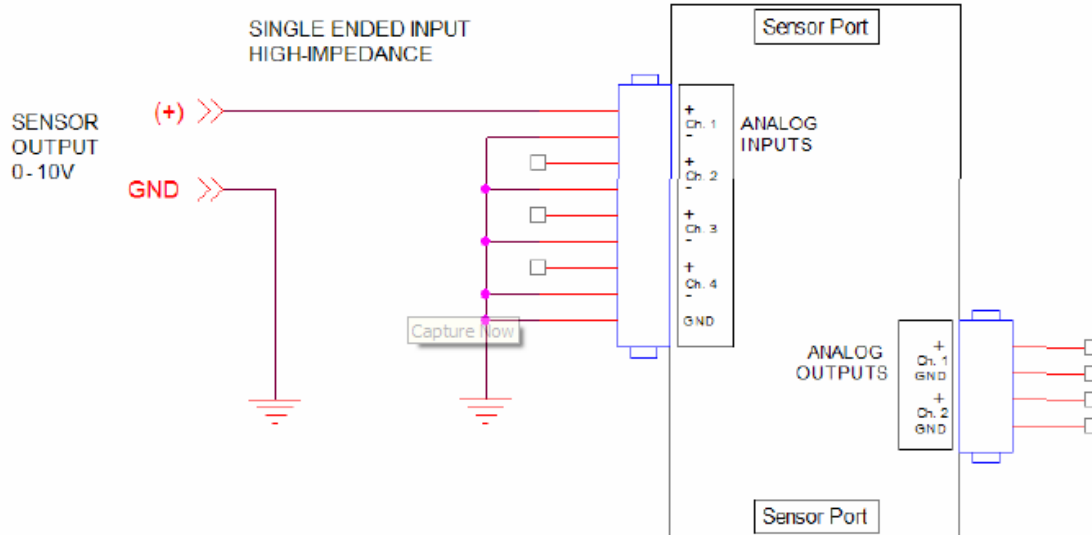
### Wiring Diagram



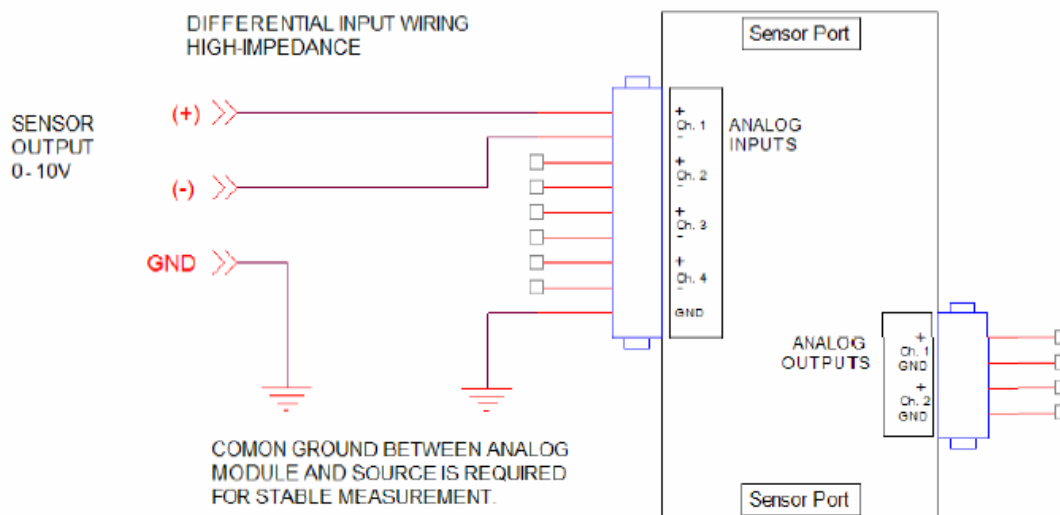
# JNIOR +/- 10 VDC Expansion Module

## Wiring Diagram

### Single ended wiring (each 0-10V input referenced directly to GND)



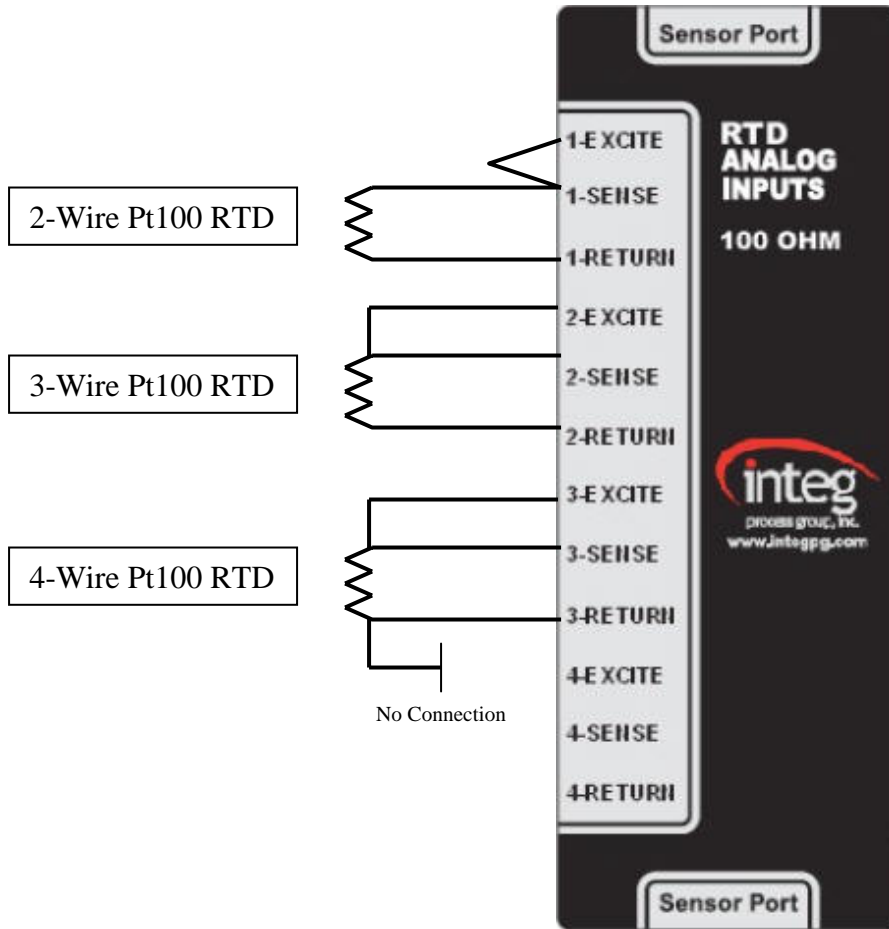
### Differential input wiring (measured voltage difference)



BOTH THE POSITIVE (+) AND NEGATIVE (-) INPUTS MUST REMAIN WITHIN +/- 12 VOLTS RELATIVE TO GND.

# JNIOR RTD Expansion Module

## Wiring Diagram



## 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:

INTEG Process Group, Inc.  
2919 E. Hardies Road  
1<sup>st</sup> Floor  
Gibsonia, PA 15044

[www.integpg.com](http://www.integpg.com)

[JNIORsales@integpg.com](mailto:JNIORsales@integpg.com)

PH (724) 933-9350 extension 20  
FAX (724) 443-3553