EH-RIO

Technical Data

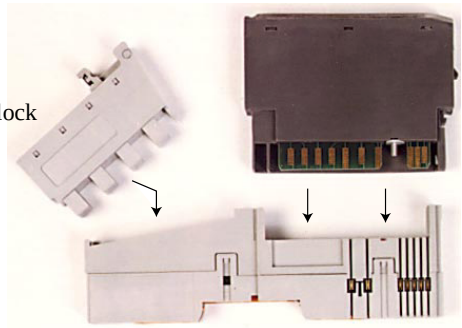
About EH-RIO

EH-RIO is a family of modular input/output modules. This solution allows you to precisely specify the right amount of I/O for your application needs, thus increasing your flexibility and reducing installation costs.

The EH-RIO system is ideal for industries where flexibility and low cost-of-ownership are key to successful control system design and operation.

How the EH-RIO System Works

The EH-RIO modules and Removable Terminal Blocks (RTBs) operate independently allowing for simplified installation and commissioning. The latching device on the Removable Terminal Blocks (RTBs) keeps the I/O assembly into place as indicated by the audible "click" sound.



For a detailed description of each of these components, refer to the table on page 3.

EH-RIO Features and Benefits

- Just-what-you-need granularity reduces system size and cost.
- Network options provide a variety of control system solutions.
- Bidirectional bus interconnect system improves reliable power and communication pass-through.
- DIN-rail disconnect system allows you to vertically remove components without interrupting adjacent components.
- Mechanical keying for field-side protection allows you to prevent incorrect module insertion into a preconfigured terminal base.
- Electronic module ID allows for system-side protection.
- Remove cartridge and terminations independently without interrupting communications on the network.
- Light-gray terminals facilitate visual inspection and verification.
- You can pre-assemble the system and then mount it as a unit on the DIN-rail.
- Removable termination facilitates system installation, commissioning, and maintenance.
- You can mount the system vertically or horizontally, allowing for "real-world" installation.

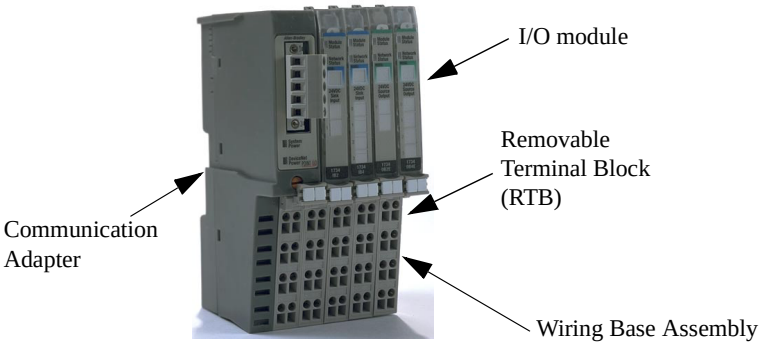
What this Technical Guide Contains

Use the following table to find product information in this document.

For Information On	Module Name	Description	See Page
EH-RIO System	EH-RIO Series	Overview of the EH-RIO System	4
Adapters	RIO-DNP	DeviceNet Interface	12
	RIO-DNA	DeviceNet Adapter	14
	RIO-PBA	PROFIBUS Adapter	16
Wiring Base Assemblies	RIO-BSC, -BSC3	Wiring Base Assembly with a Screw-Clamp Removable Terminal Block	19
	RIO-BSP, -BSP3	Wiring Base Assembly with a Spring-Clamp Removable Terminal Block	19
	RIO-BSCT	Cold Junction Compension Wiring Base Assembly with Screw-Clamp RIO-SCT Removable Terminal Block	19
Digital ac/dc Input Modules	RIO-XDP2	24V dc 2 Input Sink Module	22
	RIO-XDP4	24V dc 4 Input Sink Module	23
	RIO-XD2	24V dc 2 Input Source Module	24
	RIO-XD4	24V dc 4 Input Source Module	25
	RIO-XAH2	220V ac 2 Input Module	26
Digital ac/dc Output Modules	RIO-YTP2	24V dc Electronically Protected 2 Output Module	28
	RIO-YTP4	24V dc Electronically Protected 4 Output Module	29
	RIO-YR2	24V dc, 120V ac, and 240V ac 2 Relay Sink/Source Output Module	30
	RIO-YS2	120/220V ac 2 Output Module	32
Analog Input Modules	RIO-AX2I	24V dc Analog 2 Current Input Module	34
	RIO-AX2V	24V dc Analog 2 Voltage Input Module	36
	RIO-PT2	2 RTD Input Module	38
	RIO-TC2	2 Thermocouple Input Module	39
Analog Output Modules	RIO-AY2I	24V dc Analog 2 Current Output Module	42
	RIO-AY2V	24V dc Analog 2 Voltage Output Module	43
Speciality Modules	RIO-CU24	24V dc Very High Speed Counter Module	45
	RIO-CU5	5V dc Very High Speed Counter Module	47
	RIO-CU24L	24V dc Encoder Counter Module	48
	RIO-CU5L	5V dc Encoder Counter Module	49
Power Supplies	RIO-PS	Field Power Supply	51
	RIO-PSD	Expansion Power Supply (DC)	53
Related Publications	EH-RIO Series	Related Publications List and Mounting Dimensions	55
Mounting Dimensions	EH-RIO Series	Mounting Dimensions	56

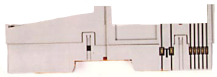
Understanding the System Design

The EH-RIO system consists of four main components.

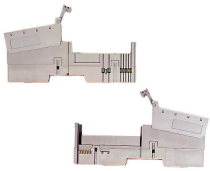


42003

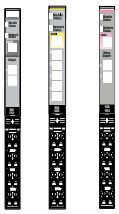
42087



42005

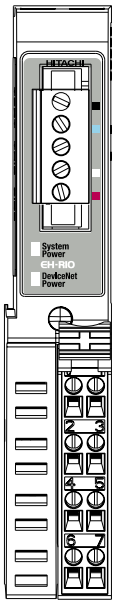


42006



The EH-RIO system also has an optional component.

42012



42087

Communication Interfaces

EH-RIO communication interfaces provide the interface between a fieldbus network and the EH-RIO backplane bus. For this purpose EH-RIO provides a low-cost communication interface (RIO-DNP).

EH-RIO modules attach to the DeviceNet network using round media. Each adapter interfaces the EH-RIO backplane with the DeviceNet network and supplies 5V logic power to the I/O modules.

Refer to the section on the RIO-PS Power Supply (AC) for more information on how it separates the backplane to support different field-power voltages. Refer to the sections on the RIO-PSD expansion power unit and RIO-PS field power supply for more information on how they expand the backplane to support up to 63 modules.

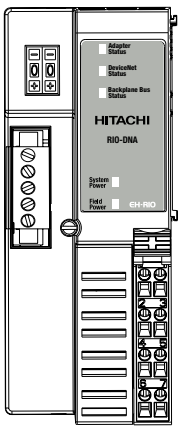
- RIO-DNP

  This low-cost DeviceNet interface is not seen as a node on the DeviceNet network, yet each module attached to this adapter is viewed as a separate node. The backplane power is derived from the DeviceNet network and is not isolated.

  You can connect up to 17 modules to each RIO-DNP. The number of modules can vary, depending on the current requirement of each. Refer to the specifications for a listing of the requirements for each module. Do not exceed the RIO-DNP limit of 1.3A. Refer to the RIO-PS section on page 51 for logical and partitioning examples.

TIP

You will need to address I/O modules used with the RIO-DNP interface as individual nodes on the DeviceNet network. You can do this by using Sequential Auto Addressing (SAA) or node commissioning. For a brief description, see page 11. For more detailed information, refer to the EH-RIO User Manual, publication UM-RIO-e.

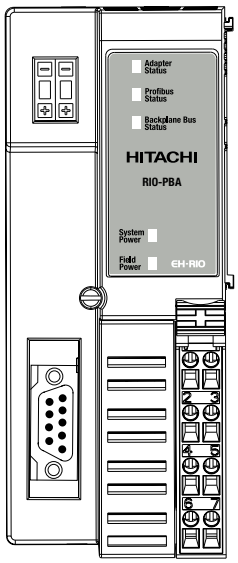


- DeviceNet adapter (RIO-DNA)

  The RIO-DNA DeviceNet adapter collects I/O data from up to 64 modules via the I/O backplane. This data is presented to the scanner module located on the DeviceNet network allowing the I/O modules to appear on DeviceNet as one node, requiring only one DeviceNet node address. The DNA provides an isolated dc/dc converter between field 24V dc and the backplane bus 5V.

You can connect up to 13 modules to each RIO-DNA. The number of modules can vary, depending on the current requirement of each. Refer to the specifications for a listing of the requirements for each module. Do not exceed the RIO-DNA limit of 1.0A. You can expand up to 63 modules using the integrated, isolated 24V dc power supply (refer to the RIO-PSD section on page 52) to provide expansion power to both digital and analog modules.

- PROFIBUS Adapter (RIO-PBA)



The RIO-PBA is a PROFIBUS adapter that interacts with the EH-RIO backplane and any PROFIBUS DP master/scanner controller on a PROFIBUS DP network.

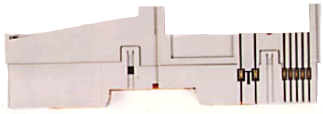
The RIO-PBA module is a slave device to the DP master/scanner, and is a master controller of the EH-RIO system where it is installed.

The I/O data exchange occurs as follows: Output data is sent from the DP master/scanner controller across the PROFIBUS DP network to the RIO-PBA adapter. The adapter then automatically transfers the data across the backplane bus to the output modules.

Inputs from the input modules are collected by the PROFIBUS adapter via the backplane and sent across the PROFIBUS DP network to the DP master/scanner controller.

You can connect up to 13 modules to each RIO-PBA. The number of modules can vary, depending on the current requirement of each. Refer to the specifications for a listing of the requirements for each module. Do not exceed the RIO-PBA limit of 1.0A. You can expand up to 63 modules using the integrated, isolated 24V dc power supply (refer to the RIO-PSD section on page 52) to provide expansion power to both digital and analog modules.

Mounting Base



42005

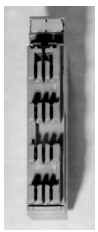
The EH-RIO system follows a "No Tools" design approach. The mounting base (RIO-MB), I/O module, and Removable Terminal Block (RIO-SC or -SP) may be assembled as a system without tools. The EH-RIO mounting base, following this "No Tools" model, mounts directly on the DIN-rail either vertically or horizontally.

The mounting base provides the mounting locations for the I/O modules and the Removable Terminal Blocks (RTBs). The mounting base also forms the interconnect for the I/O backplane communication and field power distribution.

Additional features of the mounting base include:

- 30m-in gold-plated, card-edge contacts for long-term reliability
- DIN-rail mount/lock/unlock - color-coded on the top and bottom
- bidirectional bus interface creates a reliable connection
- field power and chassis ground (via DIN rail) interconnect
- mechanical keying prevents incorrect module placement
- color-coded mechanical features for visual inspection

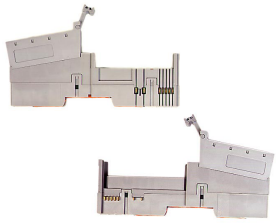
Removable Terminal Blocks (RTB)



42053

The Removable Terminal Blocks (RTBs) provide 8 separate terminal locations (RIO-BSC, RIO-BSP) or 12 separate terminal locations (RIO-BSC3, RIO-BSP3) for you to connect field wiring. The RIO-BSCT terminal base unit provides internal cold junction compensation for thermocouple inputs. RTBs also provide you with vertical access to wire and screw terminations. Each terminal is numbered and a separate terminal point is provided for each wire, including a shield ground terminal point for 2-point analog modules.
The RTB also follows the "No Tools" design approach. Once the RTB is wired properly, you never need to touch the screws. These RTBs separate independently of the base and I/O module to facilitate rapid installation and commissioning of the system, whether it's one loop or one sub-system at a time. You can pivot the RTB into place or insert it vertically.

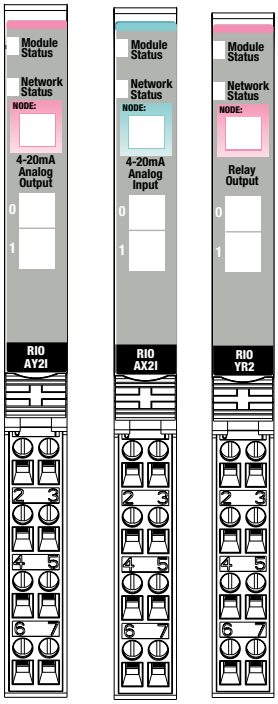
Each terminal is numbered on the bottom of the RTB to simplify troubleshooting during commissioning or maintenance cycles.



42006

TIP

The mounting base (RIO-MB) and Removable Terminal Blocks (RIO-SC or -SP) are sold together under the catalog number RIO-BSC (screw clamp terminations) and RIO-BSP (spring clamp terminations). The mounting base (RIO-MB) and Removable Terminal Blocks (RIO-SC3 or -SP3) are sold together under the catalog number RIO-BSC3 (screw clamp terminations) and RIO-BSP3 (spring clamp terminations).



I/O Modules

EH-RIO modules convert field device signals into control status indicators. To facilitate installation, commissioning, and maintenance, you can Remove and Insert Under Power (RIUP).

ATTENTION

Remove field-side power before removing or inserting modules. Modules are designed so you can remove and insert them under backplane power. When you remove or insert a module while field-side power is applied, you may cause an electrical arc. An electrical arc can cause personal injury or property damage because it may:

- send an erroneous signal to your system's field devices causing unintended machine motion
- cause an explosion in a hazardous environment

Repeated electrical arcing causes excessive wear to the contacts on both the module and its mating connector. Worn contacts may create electrical resistance.

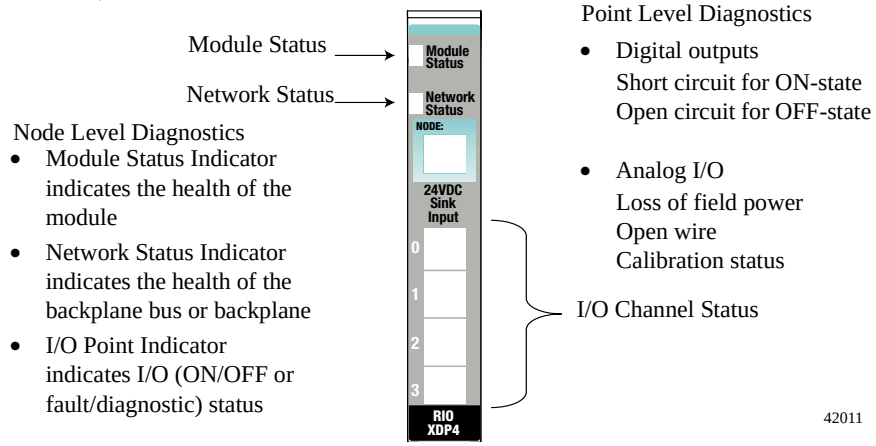
EH-RIO modules provide a variety of LED indicators:

- module status
- network status
- power indication
- calibration status
- I/O point status (ON/OFF/fault or diagnostic)

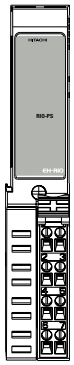
Refer to each module's product page later in this document for detailed information.

About the EH-RIO Modules' Diagnostics

All status and diagnostic information (strobed, polled, cyclic, or change-of-state) is reported back over the network communication adapter. A single point of failure is detected and reported at the module and to the control system.



Field Power Supply



42012

The RIO-PS Field Power Supply allows you to convert your field power so that you may have a broad range of voltage inputs in your module system. This range of voltage inputs includes 5V dc to 250V dc and/or 24V ac to 240V ac applications and I/O modules.

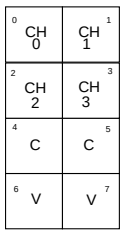
The power supply passes through all EH-RIO backplane signals, but does not provide additional backplane power. The power supply gives you the ability to change the field power distribution source for I/O modules to the right of the RIO-PS Field Power Supply. This facilitates logical or functional partitioning of low-channel count, high I/O-mix applications using the RIO-DNP communication interface.

Wiring EH-RIO Modules to the Terminal Base Unit

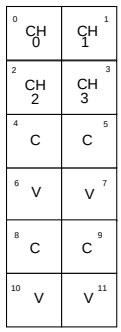
The RIO-BSC and -BSP terminal base units provide one location for every wire you need to connect to a two-point module. The RIO-BSC3 and -BSP3 provide a location for every wire you need to connect a 3-point module. The RIO-BSCT terminal base unit provides internal cold junction compensation for thermocouple inputs.

Refer to the tables below for terminal connections for each removable terminal block.

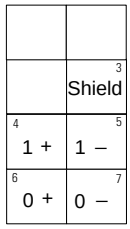
RI0-BSC and -BSP



RI0-BSC3 and -BSP3



RI0-BSCT



.

Terminal Number	Module Termination Function								
	RIO-XDP2	RIO-XDP4	RIO-XD2	RIO-XD4	RIO-YTP2	RIO-YTP4	RIO-AX2I	RIO-AY2I	RIO-YR2[1]
0	In 0	In 0	In 0	In 0	Out 0	Out 0	In 0	Out 0	Out 0 A
1	In 1	In 1	In 1	In 1	Out 1	Out 1	In 1	Out 1	Out 1 A
2	NC	In 2	NC	In 2	Out 0	Out 2	Chassis Gnd	Chassis Gnd	Out 0 B
3	NC	In 3	NC	In 3	Out 1	Out 3	Chassis Gnd	Chassis Gnd	Out 1 B
4	C	C	C	C	C	C	C	C	C or L2/N
5	C	C	C	C	C	C	C	C	C or L2/N
6	V	V	V	V	V	C	V	V	V or L1
7	V	V	V	V	V	C	V	V	V or L1

1 Relay contacts are not connected to the field power bus.

V = 24V dc = Supply C = Common = DC Return NC = No Connection Chass Gnd=Chassis Ground L1=AC Power L2/N=AC Return/Neutral

Table continued on next page.

Terminal Number	Module Termination Function								
	RIO-XAH2	RIO-YS2	RIO-CU5, -CU24 Module 1	RIO-CU5, -CU24 Module 2	RIO-CU5L, -CU24L	RIO-AX2V	RIO-AY2V	RIO-TC2[1]	RIO-PT2
0	In 0	Out 0	A	Chassis Gnd	A	In 0	Out 0		In 0A
1	In 1	Out 1	Aret	Chassis Gnd	Aret	In 1	Out 1		In 1A
2	NC	NC	B	RET	B	Chassis Gnd	Chassis Gnd		In 0B
3	NC	NC	Bret	RET	Bret	Chassis Gnd	Chassis Gnd	Shield	In 1B
4	L2/N	L2/N	Z	-Vaux	Z	C	C	Ch 0+	Return 0
5	L2/N	L2/N	Zret	-Vaux	Zret	C	C	Ch 0-	Return 1
6	L1	L1	Out 0	+Vaux	Out 0	V	V	Ch 1+	Shield
7	L1	L1	Out 1	+Vaux	Out 1	V	V	Ch1-	Shield

1 Requires RIO-BCST remote termination block.

V = 24V dc = Supply C = Common = DC Return NC = No Connection Chass Gnd=Chassis Ground L1=AC Power L2/N=AC Return/Neutral

Configuring EH-RIO Modules

Configuring EH-RIO modules is as easy as point and click. RSNetWorx™ allows you to simply ID the network and configure the I/O modules with easy-to-use Electronic Data Sheet (EDS) files - just point to the field and click on your selection.

To obtain EDS files for use in configuration, go to:
http://www.hitachi-ds.com/manuals.

.

Understanding Sequential Auto Addressing (SAA) and Node Commissioning

When using I/O modules with the RIO-DNP interface, you will need to address the modules as individual nodes on the DeviceNet network. You can do this by using:

- Node Commissioning

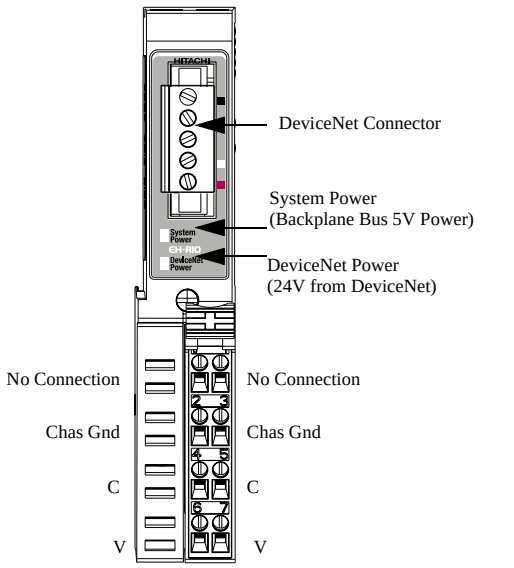
  Node commissioning allows you to assign the node address for individual devices. This is done one device at a time.

- Sequential Auto Addressing (SAA)

  Sequential Auto Addressing allows you to commission multiple nodes at one time. Used in conjunction with EDS files, you assign the first node with a node address and the SAA function will automatically assign node addresses to the remaining nodes.

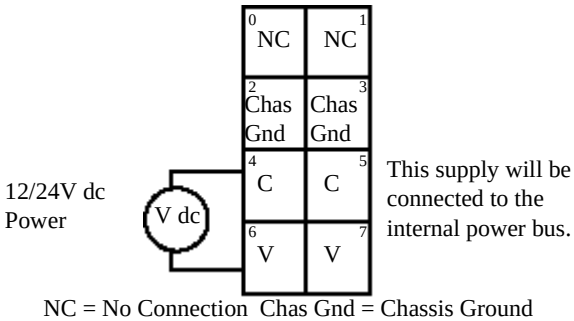
  For more information, refer to the EH-RIO User Manual, publication UM-RIO-e.

RIO-DNP Interface

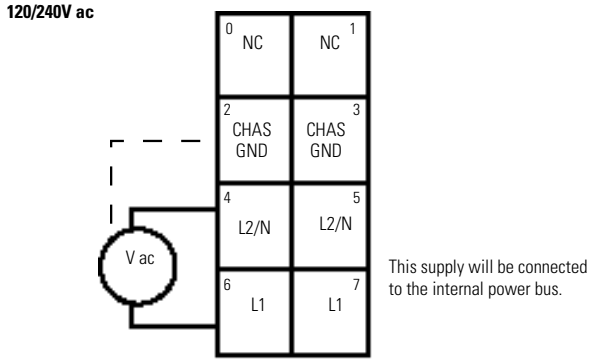


NC = No Connection Chas Gnd = Chassis Ground
C = Common V = Supply 42087

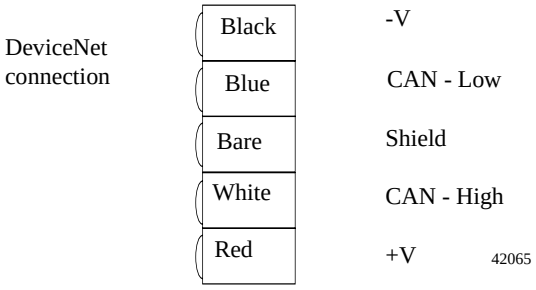
Wiring



NC = No Connection Chas Gnd = Chassis Ground
C = Common V = Supply 42064



L2/N = Neutral, L1 = 120/240V ac
CHAS GND = Chassis ground



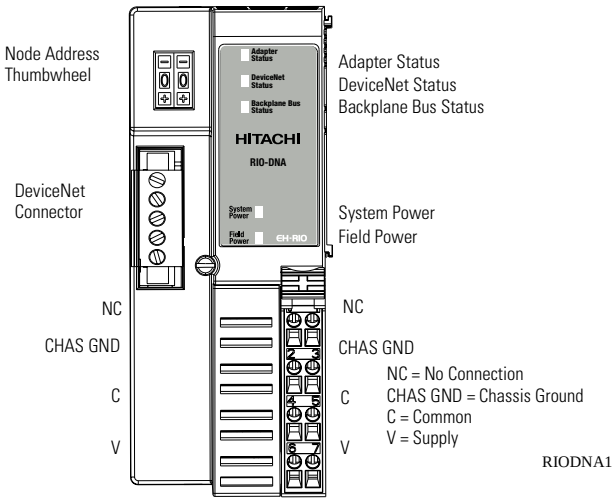
Specifications - RIO-DNP Communication Interface	
Communication Interface Specifications	
Expansion I/O Capacity	Up to 17 modules, dependent on backplane bus current draw (17 times 75mA = 1.275A, just under the limit of 1.3A). The actual number of modules can vary. Add up the current requirements of the modules you want to use to make sure they do not exceed the amperage limit of the RIO-DNP. **Cat. No. Backplane Bus Current** RIO-XDP2 75mA RIO-XDP4 75mA RIO-XD2 75mA RIO-XD4 75mA RIO-YTP2 75mA RIO-YTP4 75mA RIO-YR2 80mA RIO-AX2I 75mA RIO-AY2I 75mA RIO-AX2V 75mA RIO-AY2V 75mA RIO-XAH2 75mA RIO-YS2 75mA RIO-CU5L 160mA RIO-CU24L 160mA RIO-PT2 220mA RIO-TC2 175mA RIO-CU5 180mA RIO-CU24 180mA
Communication Rate	125K bit/s (500m maximum) 250K bit/s (250m maximum) 500K bit/s (100m maximum)
DeviceNet Power Requirements	24V dc (+4% = 25V dc max) @ 400mA maximum
Module Location	Starter module - left side of EH-RIO system
DeviceNet Power Specifications	
Power Supply	Class 2 Supply - **Note:** In order to comply with CE Low Voltage Directives (LVD), you must use either a NEC Class 2, a Safety Extra Low Voltage (SELV) or a Protected Extra Low Voltage (PELV) power supply to power this adapter.A SELV supply cannot exceed 30V rms, 42.4V peak or 60V dc under normal conditions and under single fault conditions. A PELV supply has the same rating and is connected to protected earth.
Input Voltage Rating	24V dc nominal
Input Voltage Range	11-25V dc DeviceNet specification

Specifications continued on next page.

Input Overvoltage Protection	Reverse polarity protected
Inrush Current	6A for 5ms
Indicators	2 green power supply status indicators: System Power (Backplane Bus 5V power) DeviceNet Power (24V from DeviceNet)
General Specifications	
Output Current to Backplane Bus	1.3A maximum @ 5V dc ±5% (4.75-5.25)
Power Consumption	8.0W maximum @ 25V dc
Power Dissipation	1.2W maximum @ 25V
Thermal Dissipation	4.1 BTU/hr maximum @ 25V dc
Isolation Voltage	Tested to withstand 2600V dc for 60s
Field Power Bus Supply Voltage Supply Current	 10-28.8V dc range, 120V ac, or 240V ac 10A maximum
Dimensions Inches (Millimeters)	3.0H x 1.0W x 5.25L (76.2H x 25.4W x 133.4L)
Environmental Conditions	
Operational Temperature	IEC 60068-2-1 (Test Ad, Operating Cold), IEC 60068-2-2 (Test Bd, Operating Dry Heat), IEC 60068-2-14 (Test Nb, Operating Thermal Shock): -20 to 55°C (-4 to 131°F)
Storage Temperature	IEC 60068-2-1 (Test Ab, Unpackaged Nonoperating Cold), IEC 60068-2-2 (Test Bb, Unpackaged Nonoperating Dry Heat), IEC 60068-2-14 (Test Na, Unpackaged Nonoperating Thermal Shock): -40 to 85°C (-40 to 185°F)
Relative Humidity	IEC 60068-2-30 (Test Db, Unpackaged Nonoperating Damp Heat): 5 to 95% noncondensing
Shock Operating Non-operating	IEC 60068-2-27 (Test Ea, Unpackaged Shock) 30g peak acceleration 50g peak acceleration
Vibration	IEC 60068-2-6, (Test Fc, Operating) Tested 5g @ 10-500Hz
ESD Immunity	IEC 61000-4-2: 6kV contact discharges 8kV air discharges
Radiated RF Immunity	IEC 61000-4-3: 10V/m with 1kHz sine-wave 80%AM from 80MHz to 1000MHz 10V/m with 200Hz 50% Pulse 100%AM at 900Mhz
EFT/B Immunity	IEC 61000-4-4: ±2kV at 5kHz on signal ports
Surge Transient Immunity	IEC 61000-4-5: ±1kV line-line(DM) and ±2kV line-earth(CM) on signal ports
Conducted RF Immunity	IEC 61000-4-6: 10Vrms with 1kHz sine-wave 80%AM from 150kHz to 80MHz
Emissions	CISPR 11 Group 1, Class A
Enclosure Type Rating	None (open-style)

	14 AWG (2.5mm^2) - 22 AWG (0.25mm^2) solid or stranded wire rated @ 75°C or higher 3/64 inch (1.2mm) insulation maximum
	7 pound-inches (0.6Nm)
	1 - Black Wire -V 2 - Blue Wire CAN Low 3 - Bare Wire Shield 4 - White Wire CAN High 5 - Red Wire +V 0 - No Connection 1 - No Connection 2 - Chassis Ground 3 - Chassis Ground 4 - Common 5 - Common 6 - Supply 7 - Supply
	4.56 oz/129.3grams
	C-UL-US - UL Listed Industrial Control Equipment, certified for US and Canada **C-UL-US** - UL Listed for Class I, Division 2, Groups A, B, C and D Hazardous locations, certified for US and Canada **CE** - European Union 73/23/EEC LVD Directive, compliant with: EN 61131-2: Programmable Controllers **CE** - European Union 89/336/EEC EMC Directive, compliant with: EN 50081-2; Industrial Emissions EN 50082-2; Industrial Immunity EN 61326; Meas./Control/Lab., Industrial Requirements EN 61000-6-2; Industrial Immunity **C-Tick** - Australian Radiocommunications Act compliant with AS/NZS 2064, Industrial Emissions **ODVA** - ODVA conformance tested to ODVA DeviceNet specifications

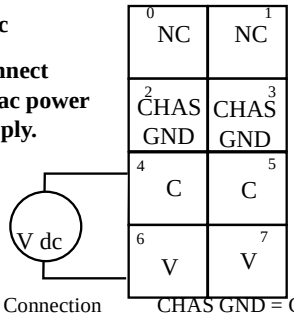
RIO-DNA DeviceNet Adapter



Wiring

12/24V dc

Do not connect 120/240V ac power to this supply.



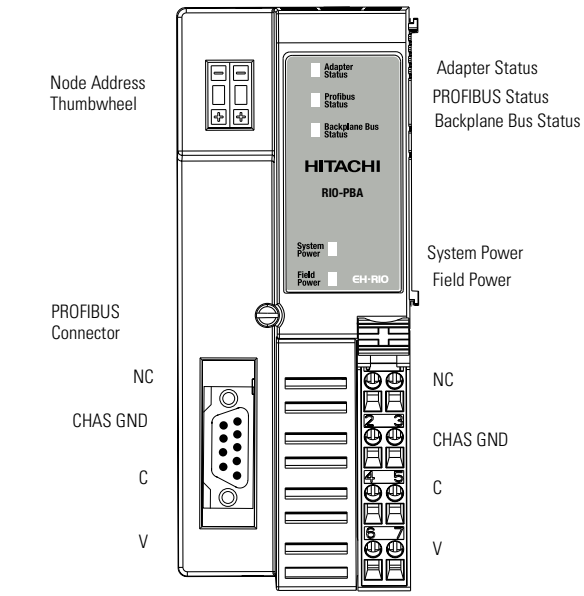
This dc supply will be connected to the internal power bus.

NC = No Connection
C = Common
CHAS GND = Chassis Ground
V = Supply

Specifications - RIO-DNA DeviceNet Adapter Module	
Communication Interface Specifications	
Expansion I/O Capacity (continued in next column)	Up to 13 modules, dependent on backplane bus current draw (13 times 75mA = 0.975, just under the limit of 1.0A). The actual number of modules can vary. Add up the current requirements of the modules you want to use to make sure they do not exceed the amperage limit of the RIO-DNA. (Note: Total expansion up to 63 modules - 13 modules maximum with RIO-DNA - add RIO-PSD modules for an additional 17 modules (or less based on current requirements), up to 63 module maximum) **Cat. No. — Backplane Bus Current** RIO-XDP2 — 75mA RIO-XDP4 — 75mA RIO-XD2 — 75mA RIO-XD4 — 75mA RIO-YTP2 — 75mA RIO-YTP4 — 75mA RIO-YR2 — 80mA RIO-AX2I — 75mA RIO-AY2I — 75mA RIO-AX2V — 75mA RIO-AY2V — 75mA RIO-XAH2 — 75mA RIO-YS2 — 75mA
Expansion I/O Capacity (Continued)	RIO-CU5L — 160mA RIO-CU24L — 160mA RIO-PT2 — 220mA RIO-TC2 — 175mA RIO-CU5 — 180mA RIO-CU24 — 180mA
DeviceNet Communication Rate	125K bit/s (500m maximum) 250K bit/s (250m maximum) 500K bit/s (100m maximum)
Module Location	Starter module - left side of EH-RIO system
DeviceNet Power Specifications	
Power Supply	**Note:** In order to comply with CE Low Voltage Directives (LVD), you must use either a NEC Class 2, a Safety Extra Low Voltage (SELV) or a Protected Extra Low Voltage (PELV) power supply to power this adapter.A SELV supply cannot exceed 30V rms, 42.4V peak or 60V dc under normal conditions and under single fault conditions. A PELV supply has the same rating and is connected to protected earth.
Input Voltage Rating	24V dc nominal
DeviceNet Input Voltage Range	11-25V dc DeviceNet specification
Input Overvoltage Protection	Reverse polarity protected
DeviceNet Power Requirements	24V dc (+4% = 25V dc max) @ 30mA maximum
Power Supply Specifications	
Power Supply	**Note:** In order to comply with CE Low Voltage Directives (LVD), you must use either a NEC Class 2, a Safety Extra Low Voltage (SELV) or a Protected Extra Low Voltage (PELV) power supply to power this adapter.A SELV supply cannot exceed 30V rms, 42.4V peak or 60V dc under normal conditions and under single fault conditions. A PELV supply has the same rating and is connected to protected earth.
Input Voltage Rating	24V dc nominal 10-28.8V dc range
Field Side Power Requirements	24V dc (+20% = 28.8V dc maximum) @ 400mA maximum
Inrush Current	6A maximum for 10ms
Backpl. Bus Output Current	1A maximum @ 5V dc ±5% (4.75 - 5.25)
Input Overvoltage Protection	Reverse polarity protected
Interruption	Output voltage will stay within specifications when input drops out for 10ms at 10V with maximum load.
General Specifications	
Indicators	3 red/green status indicators Adapter status DeviceNet status Backplane Bus status 2 green power supply status indicators: System Power (Backplane Bus 5V power) Field Power (24V from field supply)
Power Consumption	8.1W maximum @ 28.8V dc

Power Dissipation	2.8W maximum @ 28.8V
Thermal Dissipation	9.5 BTU/hr maximum @ 28.8V dc
Isolation Voltage	1250V rms/V ac
Field Power Bus Nominal Voltage Supply Voltage Range Supply Current	 24V dc 10-28.8V dc range, 10A maximum
Dimensions Inches (Millimeters)	3.0H x 2.16W x 5.25L (76.2H x 54.9W x 133.4L)
Environmental Conditions Operational Temperature Storage Temperature Relative Humidity Shock Operating Non-operating Vibration	 -20 to 55°C (-4 to 131°F) -40 to 85°C (-40 to 185°F) 5 to 95% noncondensing 30g peak acceleration, 11(±1)ms pulse width 50g peak acceleration, 11(±1)ms pulse width Tested 5g @ 10-500Hz per IEC 68-2-6
Conductors Wire Size	14 AWG (2.5mm^2) - 22 AWG (0.25mm^2) solid or stranded wire rated @ 75°C or higher 3/64 inch (1.2mm) insulation maximum
Terminal Base Screw Torque	7 pound-inches (0.6Nm)
Field Wiring Terminations DeviceNet Power Supply	 1 - Black Wire -V 2 - Blue Wire CAN Low 3 - Bare Wire Shield 4 - White Wire CAN High 5 - Red Wire +V 0 - No Connection 1 - No Connection 2 - Chassis Ground 3 - Chassis Ground 4 - Common 5 - Common 6 - Supply 7 - Supply
Mass	9.0 oz/255 grams
Publication Installation Instructions	 IG-RIO-DNA-e
Agency Certification (when product is marked)	**C-UL-US** - UL Listed Industrial Control Equipment, certified for US and Canada **C-UL-US** - UL Listed for Class I, Division 2, Groups A, B, C and D Hazardous locations, certified for US and Canada **CE** - European Union 89/336/EEC EMC Directive,compliant with: EN 50081-2; Industrial Emissions EN 50082-2; Industrial Immunity EN 61326; Meas./Control/Lab., Industrial RequirementsEN 61000-6-2; Industrial Immunity **ODVA** - ODVA Conformance tested to ODVA DeviceNet specifications

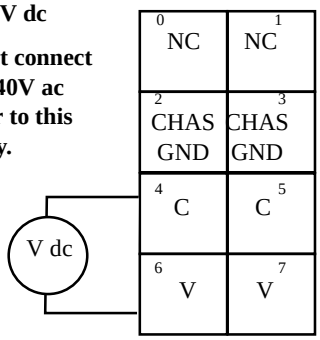
RIO-PBA PROFIBUS Interface



Wiring

12/24V dc

Do not connect 120/240V ac power to this supply.



This dc supply will be connected to the internal power bus.

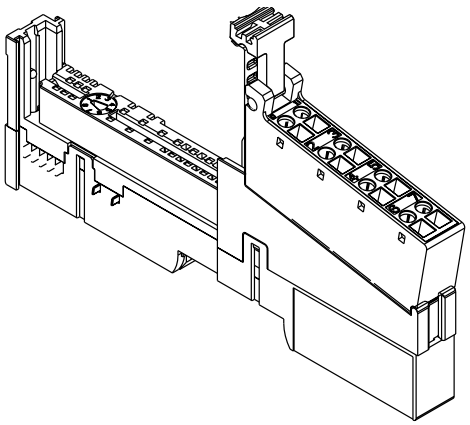
NC = No Connection
C = Common
CHAS GND = Chassis Ground
V = Supply

Specifications - RIO-PBA PROFIBUS Adapter Module	
Communication Interface Specifications	
Expansion I/O Capacity	Up to 13 modules, dependent on backplane bus current draw (13 times 75mA = 0.975, just under the limit of 1.0A). The actual number of modules can vary. Add up the current requirements of the modules you want to use to make sure they do not exceed the amperage limit of the RIO-PBA. (Note: Total expansion up to 63 modules - 13 modules maximum with RIO-PBA - add RIO-PSD modules for an additional 17 modules (or less based on current requirements), up to 63 module maximum). **Cat. No. — Backplane Bus Current** RIO-XDP2 — 75mA RIO-XDP4 — 75mA RIO-XD2 — 75mA RIO-XD4 — 75mA RIO-YTP2 — 75mA RIO-YTP4 — 75mA RIO-YR2 — 80mA RIO-AX2I — 75mA RIO-AY2I — 75mA RIO-AX2V — 75mA RIO-AY2V — 75mA RIO-XAH2 — 75mA RIO-YS2 — 75mA RIO-CU5L — 160mA RIO-CU24L — 160mA RIO-PT2 — 220mA RIO-TC2 — 175mA RIO-CU5 — 180mA RIO-CU24 — 180mA
Module Location	Starter module - left side of EH-RIO system
Power Supply Specifications	
Power Supply	**Note:** In order to comply with CE Low Voltage Directives (LVD), you must use a Safety Extra Low Voltage (SELV) or a Protected Extra Low Voltage (PELV) power supply to power this adapter.
Input Voltage Rating	24V dc nominal 10-28.8V dc range
Field Side Power Requirements	24V dc (+20% = 28.8V dc maximum) @ 400mA maximum
Inrush Current	6A maximum for 10ms
Backplane Bus Output Current	1A maximum @ 5V dc ±5% (4.75 - 5.25)
Input Overvoltage Protection	Reverse polarity protected
Interruption	Output voltage will stay within specifications when input drops out for 10ms at 10V with maximum load.
General Specifications	
Indicators	3 red/green status indicators Adapter status PROFIBUS status Backplane Bus status 2 green power supply status indicators: System Power (Backplane Bus 5V power) Field Power (24V from field supply)
Power Consumption	8.1W maximum @ 28.8V dc

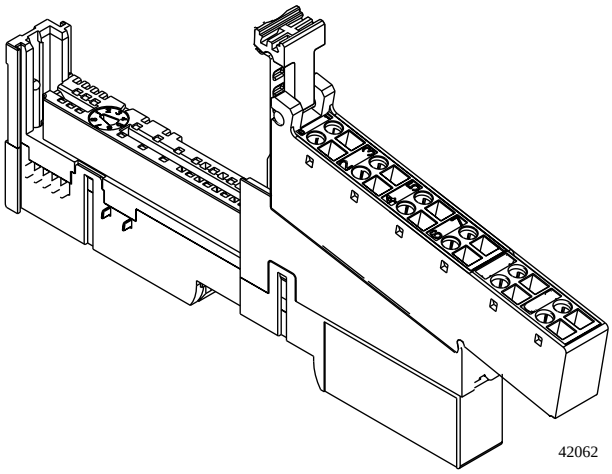
Power Dissipation	2.8W maximum @ 28.8V
Thermal Dissipation	9.5 BTU/hr maximum @ 28.8V dc
Isolation Voltage	1250V rms/V ac
Field Power Bus Nominal Voltage Supply Voltage Range Supply Current	 24V dc 10-28.8V dc range, 10A maximum
Dimensions Inches (Millimeters)	3.0H x 2.16W x 5.25L (76.2H x 54.9W x 133.4L)
Environmental Conditions Operational Temperature Storage Temperature Relative Humidity Shock Operating Non-operating Vibration	 -20 to 55°C (-4 to 131°F) -40 to 85°C (-40 to 185°F) 5 to 95% noncondensing 30g peak accel., 11(±1)ms pulse width 50g peak accel., 11(±1)ms pulse width Tested 5g @ 10-500Hz per IEC 68-2-6
Conductors Wire Size	14 AWG (2.5mm^2) - 22 AWG (0.25mm^2) solid or stranded copper wire rated @ 75°C or higher 3/64 inch (1.2mm) insulation maximum
Terminal Base Screw Torque	7 pound-inches (0.6Nm)
Field Wiring Terminations PROFIBUS Power Supply	 1 - Not connected 6 - +5V Bus 2 - Not connected 7 - Not connected 3 - +RTX/TX data 8 - Neg. RTX/TX 4 - Request to send 9 - Not connected 5 - Ground Bus Housing - Earth ground 0 - No Connection 1 - No Connection 2 - Chassis Ground 3 - Chassis Ground 4 - Common 5 - Common 6 - Supply 7 - Supply
Mass	9.0 oz/255 grams
Publication Installation Instructions	 IG-RIO-PBA-e
Agency Certification (when product is marked)	c-**UL**-us - UL Listed Industrial Control Equipment, certified for US and Canada c-**UL**-us - UL Listed for Class I, Division 2, Groups A, B, C and D Hazardous locations, certified for US and Canada **CE** - Marked for all applicable directives **ODVA** - ODVA Conformance tested to ODVA DeviceNet specifications

Use the following table to determine which wiring base assembly will meet your application needs.

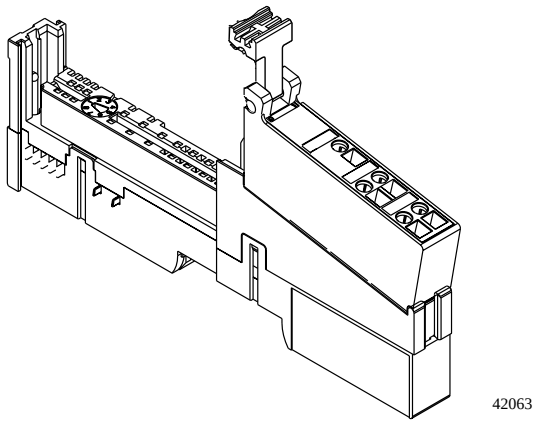
Wiring Base Assembly with Removable Terminal Block



The mounting base (RIO-MB) and Removable Terminal Blocks (RIO-SC or -SP) are sold together as wiring assemblies under the catalog number RIO-BSC (screw clamp terminations) and RIO-BSP (spring clamp terminations).



The mounting base (RIO-MB) and Removable Terminal Blocks (RIO-SC3 or -SP3) are sold together as wiring assemblies under the catalog number RIO-BSC3 (screw clamp terminations) and RIO-BSP3 (spring clamp terminations).



The mounting base (RIO-MB) and Removable Terminal Blocks (RIO-SCT) are sold together as wiring assemblies under the catalog number RIO-BSCT (screw clamp terminations).

Wiring

RI0-BSC and -BSP

0 CH 0	CH 1 1
2 CH 2	CH 3 3
4 C	C 5
6 V	V 7

RI0-BSC3 and -BSP3

0 CH 0	CH 1 1
2 CH 2	CH 3 3
4 C	C 5
6 V	V 7
8 C	C 9
10 V	V 11

RI0-BSCT

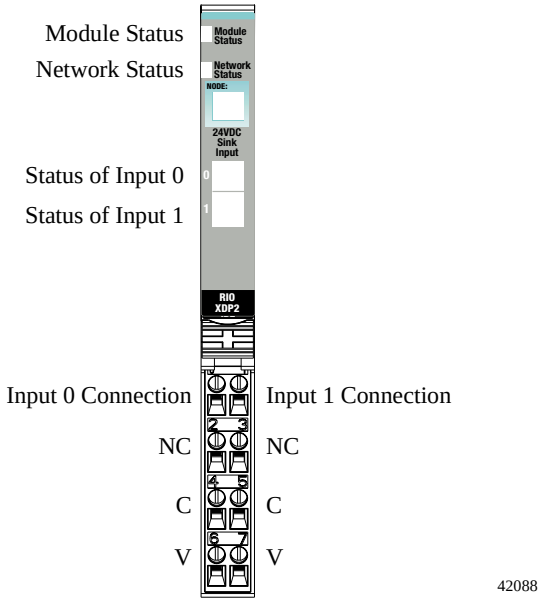
	3 Shield
4 1 +	1 – 5
6 0 +	0 – 7

Specifications - RIO-BSC, -BSP, -BSC3 and -BSP3	
General Specifications	
Number of Terminations	**RIO-BSC and RIO-BSP** 4 channel 2 power 2 chassis ground **RIO-BSC3 and RIO-BSP3** 4 channel 4 power 4 chassis ground
Field Power Bus Supply Voltage Supply Current	 28.8V dc, 120/240V ac 2A max
Dimensions HxWxL	**RIO-BSC and RIO-BSP** 65.0mm x 12.0mm x 133.4mm (2.56in x 0.47in x 5.25in **RIO-BSC3 and RIO-BSP3** 65.0mm x 12.0mm x 160.0mm (2.56in x 0.47in x 6.25in)
Environment. Conditions Operational Temperature Storage Temperature Relative Humidity Shock Operating Non-operating Vibration	 -20 to +55°C (-4 to +131°F) -40 to 85°C (-40 to 185°F) 5 to 95% noncondensing 30g peak acceleration, 11(±1)ms pulse width 50g peak acceleration, 11(±1)ms pulse width Tested 5g @ 10-500Hz per IEC 68-2-6
Conductors Wire Size	14 AWG (2.5mm²) - 22 AWG (0.25mm²) solid or stranded copper wire rated @ 75°C or greater 3/64 inch (1.2mm) insulation max
Terminal Base Screw Torque	7 pound-inches (0.6Nm)
Mass	RIO-BSC, -BSP - 2.94 oz/83.35 grams RIO-BSC3 - 3.44 oz/97.5 grams RIO-BSP3 - 3.07 oz/87.0 grams
Publication Installation Instructions	 RIO-BSC, -BSP - IG-RIO-BSx-e RIO-BSC3, -BSCP - IG-RIO-BSx3-e
Agency Certification (when product is marked)	$_{C}UR_{US}$ marked by Underwriters Laboratories CE marked for all applicable directives

Specifications - RIO-BSCT (screw-clamp)	
General Specifications	
Number of Terminations (5 terminal block)	**RIO-BSCT** 0- channel 0 0+ channel 0 power 1- channel 1 1+ channel 1 power Shield
Field Power Bus Supply Voltage Supply Current	 28.8V dc, 120/240V ac 10A maximum
Dimensions HxWxL	65mm x 12mm x 133.4mm (2.56in x 0.472in x 5.25in)
Environmental Conditions Operational Temperature Storage Temperature Relative Humidity ShockOperating Non-operating Vibration	 -20 to 55°C (-4 to 131°F) -40 to 85°C (-40 to 185°F) 5 to 95% noncondensing 30g peak acceleration, 11(±1)ms pulse width 50g peak acceleration, 11(±1)ms pulse width Tested 5g @ 10-500Hz per IEC 68-2-6
Conductors Wire Size	14 AWG (2.5mm²) - 22 AWG (0.25mm²) thermocouple wire 3/64 inch (1.2mm) insulation maximum
Terminal Base Screw Torque	7 pound-inches (0.6Nm)
Mass	3.44 oz/97.5 grams
Publication Installation Instructions	 IG-RIO-BSCT-e
Agency Certification (when product is marked)	$_{C}UR_{US}$ marked by Underwriters Laboratories CE marked for all applicable directives

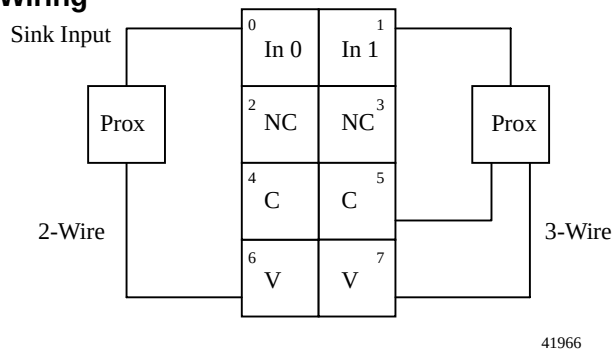
Use the following table to determine which input module will meet your application needs.

RIO-XDP2 Module



NC = No Connection C = Common
V = Supply

Wiring

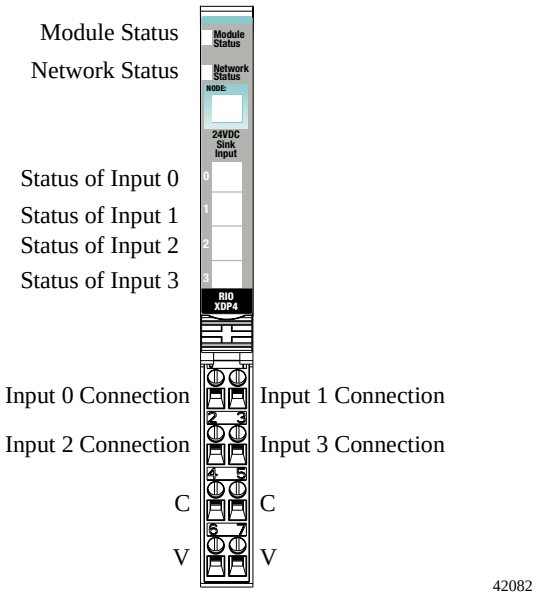


V = 12/24V dc, C = Common
12/24V dc is supplied from the internal power bus

Specifications - RIO-XDP2	
Input Specifications (IEC 1+ 24V dc Input Compliant)	
Inputs per Module	2 (1 group of 2) sinking
ON-State Voltage	10V dc min 24V dc nominal 28.8V dc max
ON-State Current	2mA min 4mA nominal @ 24V dc 5mA max
OFF-State Voltage	5V dc max
OFF-State Current	1.5mA min
Input Impedance	5.3K Ω max
Input Filter Time[1] OFF to ON ON to OFF	 0.5 hardware plus 0-63ms (user selectable) 0.5 hardware plus 0-63ms (user selectable)
Indicators	2 yellow input status, logic side 1 green/red network status, logic side 1 green/red module status, logic side
Keyswitch Position	1
General Specifications	
Module Location	RIO-BSC or -BSP wiring assembly
Backplane Bus Current	75 mA max @ 5V dc
Power Dissipation	0.7W max @ 28.8V dc
Thermal Dissipation	2.4 BTU/hr max @ 28.8V dc
Isolation Voltage	1250V rms/V ac
Field Power Bus Supply Voltage Voltage Range	 24V dc nominal 10-28.8V dc
Dimensions HxWxL	56.0mm x 12.0mm x 75.5mm (2.21in x 0.47in x 2.97in)
Environm. Conditions Operational Temp. Storage Temperature Relative Humidity Shock Operating Non-operating Vibration	 -20 to 55°C (-4 to 131°F) -40 to 85°C (-40 to 185°F) 5 to 95% noncondensing 30g peak acceleration, 11(±1)ms pulse width 50g peak acceleration, 11(±1)ms pulse width Tested 5g @ 10-500Hz per IEC 68-2-6
Conductors Wire Size	14 AWG (2.5mm²) - 22 AWG (0.25mm²) solid or stranded rated @ 75°C or greater max 3/64 inch (1.2mm) insulation max
Terminal Base Screw Torque	7 pound-inches (0.6Nm)
Field Wiring Terminations	0 - Input 0 1 - Input 1 2 - No Connection 3 - No Connection 4 - Common 5 - Common 6 - User Supply 7 - User Supply
Mass	1.09 oz/30.90 grams
Publication Installation Instruction	 IG-RIO-XDPx-e
Agency Certification (when product is marked)	**c-UL-us** - UL Listed Industrial Control Equipment, certified for US and Canada **c-UL-us** - UL Listed for Class I, Division 2, Groups A, B, C and D Hazardous locations, certified for US and Canada **CE** - European Union 89/336/EEC EMC Directive,compliant with: EN 50081-2; Industrial Emissions EN 50082-2; Industrial Immunity EN 61326; Meas./Control/Lab., Industrial RequirementsEN 61000-6-2; Industrial Immunity **ODVA** - ODVA Conformance tested to ODVA DeviceNet specifications

1 Input off-to-on filter time is the time from a valid input signal to recognition by the module. Input on-to-off time is the time from a valid input signal to recognition by the module.

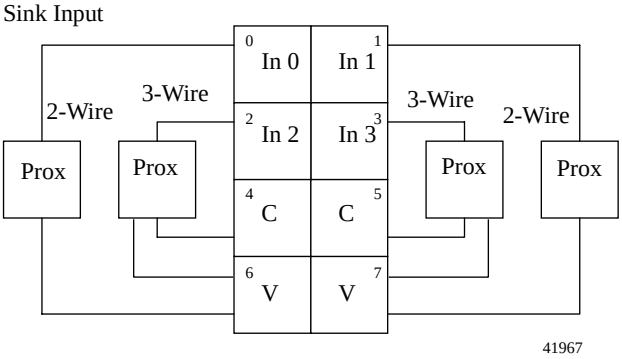
RIO-XDP4 Module



NC = No Connection C = Common
V = Supply

Wiring

Sink Input

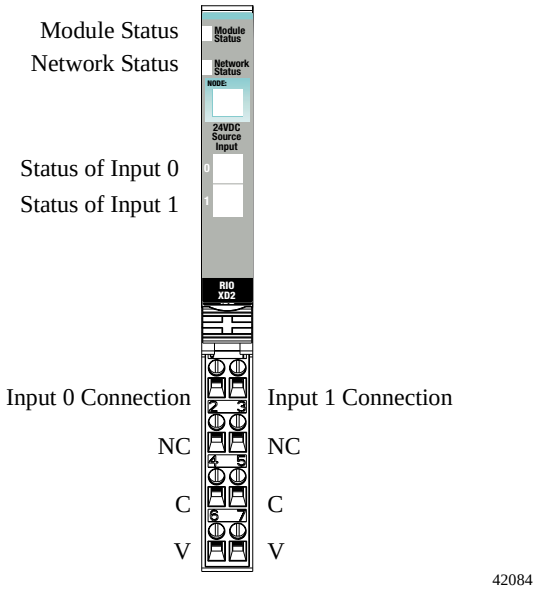


V = 12/24V dc, C = Common
12/24V dc is supplied from internal power bus

Specifications - RIO-XDP4	
Input Specifications (IEC 1+ 24V dc Input Compliant)	
Inputs per Module	4 (1 group of 4) sinking
ON-State Voltage	10V dc min 24V dc nominal 28.8V dc max
ON-State Current	2mA min 4mA nominal @ 24V dc 5mA max
OFF-State Voltage	5V dc max
OFF-State Current	1.5mA min
Input Impedance	5.3K Ω max
Input Filter Time[1] OFF to ON ON to OFF	 0.5 hardware plus 0-63ms (user selectable) 0.5 hardware plus 0-63ms (user selectable)
Indicators	4 yellow input status, logic side 1 green/red network status, logic side 1 green/red module status, logic side
Keyswitch Position	1
General Specifications	
Module Location	RIO-BSC3 or -BSP3 wiring assembly
Backplane Bus Current	75 mA max @ 5V dc
Power Dissipation	0.9W max @ 28.8V dc
Thermal Dissipation	3.1 BTU/hr max @ 28.8V dc
Isolation Voltage	1250V rms/V ac
Field Power Bus Supply Voltage Voltage Range	 24V dc nominal 10-28.8V dc
Dimensions HxWxL	56.0mm x 12.0mm x 75.5mm (2.21in x 0.47in x 2.97in)
Environm. Conditions Operational Temp. Storage Temperature Relative Humidity ShockOperating Non-operating Vibration	 -20 to 55°C (-4 to 131°F) -40 to 85°C (-40 to 185°F) 5 to 95% noncondensing 30g peak acceleration, 11(±1)ms pulse width 50g peak acceleration, 11(±1)ms pulse width Tested 5g @ 10-500Hz per IEC 68-2-6
Conductors Wire Size	14 AWG (2.5mm²) - 22 AWG (0.25mm²) solid or stranded rated @ 75°C or greater 3/64 inch (1.2mm) insulation max
Terminal Base Screw Torque	7 pound-inches (0.6Nm)
Field Wiring Terminations	0 - Input 0 1 - Input 1 2 - Input 2 3 - Input 3 4 - Common 5 - Common 6 - User Supply 7 - User Supply
Mass	1.12 oz/31.75 grams
Publication Installation Instruction	 IG-RIO-XDPx-e
Agency Certification (when product is marked)	**c-UL-us** - UL Listed Industrial Control Equipment, certified for US and Canada **c-UL-us** - UL Listed for Class I, Division 2, Groups A, B, C and D Hazardous locations, certified for US and Canada **CE** - European Union 89/336/EEC EMC Directive,compliant with: EN 50081-2; Industrial Emissions EN 50082-2; Industrial Immunity EN 61326; Meas./Control/Lab., Industrial RequirementsEN 61000-6-2; Industrial Immunity **ODVA** - ODVA Conformance tested to ODVA DeviceNet specifications

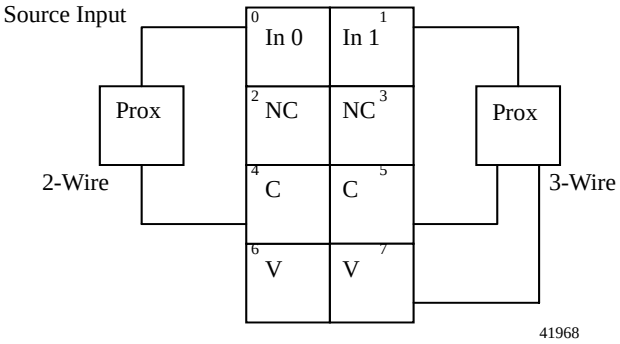
1 Input off-to-on filter time is the time from a valid input signal to recognition by the module. Input on-to-off time is the time from a valid input signal to recognition by the module.

RIO-XD2 Module



NC = No Connection C = Common
V = Supply

Wiring

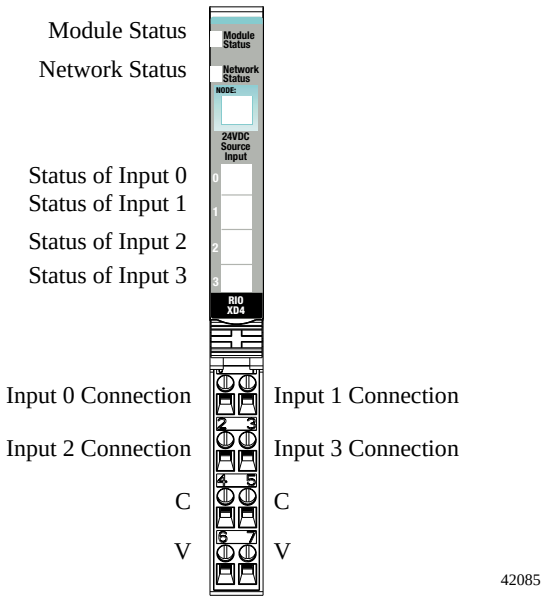


V = 12/24V dc, C = Common
12/24V dc is supplied from internal power bus

Specifications - RIO-XD2	
Input Specifications (IEC 1+ 24V dc Input Compliant)	
Inputs per Module	2 (1 group of 2) sourcing
ON-State Voltage	10V dc min 24V dc nominal 28.8V dc max
ON-State Current	2mA min 4mA nominal @ 24V dc 5mA max
OFF-State Voltage	5V dc max
OFF-State Current	1.5mA min
Input Impedance	5.3K Ω max
Input Filter Time[1] OFF to ON ON to OFF	 0.5 hardware plus 0-63ms (user selectable) 0.5 hardware plus 0-63ms (user selectable)
Indicators	2 yellow input status, logic side 1 green/red network status, logic side 1 green/red module status, logic side
Keyswitch Position	1
General Specifications	
Module Location	RIO-BSC or -BSP wiring assembly
Backplane Bus Current	75mA max @ 5V dc
Power Dissipation	0.7W max @ 28.8V dc
Thermal Dissipation	2.4 BTU/hr max @ 28.8V dc
Isolation Voltage	1250V rms/V ac
Field Power Bus Supply Voltage Voltage Range	 24V dc nominal 10-28.8V dc
Dimensions HxWxL	56.0mm x 12.0mm x 75.5mm (2.21in x 0.47in x 2.97in)
Environm. Conditions Operational Temperat. Storage Temperature Relative Humidity Shock Operating Non-operating Vibration	 -20 to 55°C (-4 to 131°F) -40 to 85°C (-40 to 185°F) 5 to 95% noncondensing 30g peak acceleration, 11(±1)ms pulse width 50g peak acceleration, 11(±1)ms pulse width Tested 5g @ 10-500Hz per IEC 68-2-6
Conductors Wire Size	14 AWG (2.5mm²) - 22 AWG (0.25mm²) solid or stranded rated @ 75°C or greater max 3/64 inch (1.2mm) insulation max
Terminal Base Screw Torque	7 pound-inches (0.6Nm)
Field Wiring Terminations	0 - Input 0 1 - Input 1 2 - No Connection 3 - No Connection 4 - Common 5 - Common 6 - User Supply 7 - User Supply
Mass	1.10 oz/31.19 grams
Publication Installation Instruction	 IG-RIO-XDx-e
Agency Certification (when product is marked)	**c-UL-us** - UL Listed Industrial Control Equipment, certified for US and Canada **c-UL-us** - UL Listed for Class I, Division 2, Groups A, B, C and D Hazardous locations, certified for US and Canada **CE** - European Union 89/336/EEC EMC Directive,compliant with: EN 50081-2; Industrial Emissions EN 50082-2; Industrial Immunity EN 61326; Meas./Control/Lab., Industrial RequirementsEN 61000-6-2; Industrial Immunity **ODVA** - ODVA Conformance tested to ODVA DeviceNet specifications

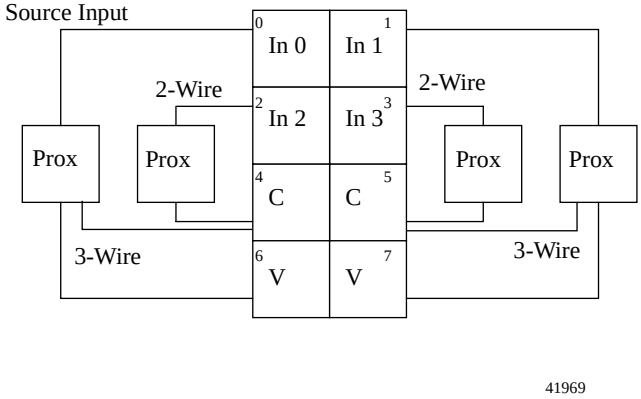
1 Input off-to-on filter time is the time from a valid input signal to recognition by the module. Input on-to-off time is the time from a valid input signal to recognition by the module.

RIO-XD4 Module



NC = No Connection C = Common
V = Supply

Wiring

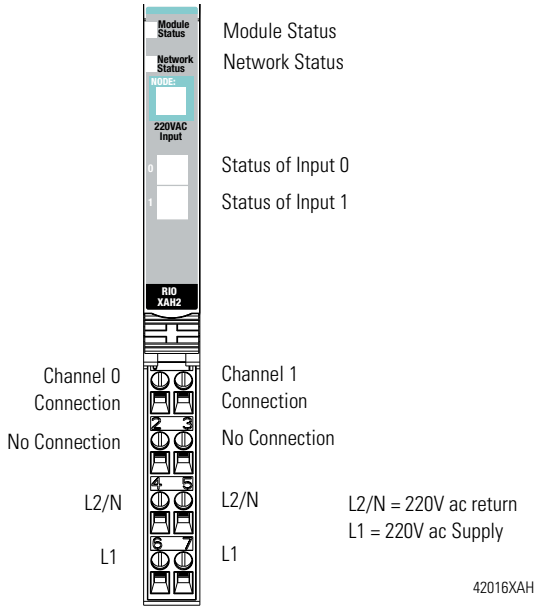


V = 12/24V dc, C = Common
12/24V dc is supplied from internal power bus

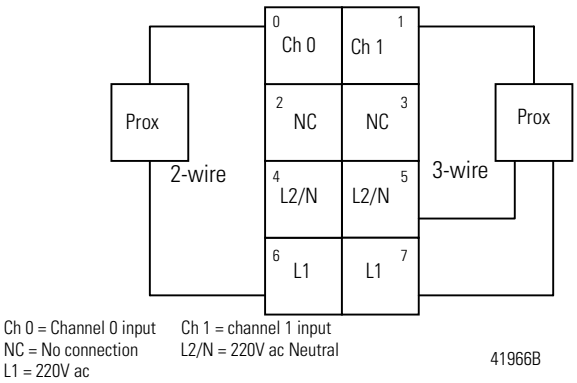
Specifications - RIO-XD4	
Input Specifications (IEC 1+ 24V dc Input Compliant)	
Inputs per Module	4 (1 group of 4) sourcing
ON-State Voltage	10V dc min 24V dc nominal 28.8V dc max
ON-State Current	2mA min 4mA nominal @ 24V dc 5mA max
OFF-State Voltage	5V dc max
OFF-State Current	1.5mA min
Input Impedance	5.3K Ω max
Input Filter Time[1] OFF to ON ON to OFF	 0.5 hardware plus 0-63ms (user selectable) 0.5 hardware plus 0-63ms (user selectable)
Indicators	4 yellow input status, logic side 1 green/red network status, logic side 1 green/red module status, logic side
Keyswitch Position	1
General Specifications	
Module Location	RIO-BSC3 or -BSP3 wiring assembly
Pointbus Current	75mA max @ 5V dc
Power Dissipation	0.9W max @ 28.8V dc
Thermal Dissipation	3.1 BTU/hr max @ 28.8V dc
Isolation Voltage	1250V rms/V ac
Field Power Bus Supply Voltage Voltage Range	 24V dc nominal 10-28.8V dc
Dimensions HxWxL	56.0mm x 12.0mm x 75.5mm (2.21in x 0.47in x 2.97in)
Environm. Conditions Operational Temperat. Storage Temperature Relative Humidity Shock Operating Non-operating Vibration	 -20 to 55°C (-4 to 131°F) -40 to 85°C (-40 to 185°F) 5 to 95% noncondensing 30g peak acceleration, 11(±1)ms pulse width 50g peak acceleration, 11(±1)ms pulse width Tested 5g @ 10-500Hz per IEC 68-2-6
Conductors Wire Size	14 AWG (2.5mm²) - 22 AWG (0.25mm²) solid or stranded rated @ 75°C or greater 3/64 inch (1.2mm) insulation max
Terminal Base Screw Torque	7 pound-inches (0.6Nm)
Field Wiring Terminations	0 - Input 0 1 - Input 1 2 - Input 2 3 - Input 3 4 - Common 5 - Common 6 - User Supply 7 - User Supply
Mass	1.12 oz/31.75 grams
Publication Installation Instruction	 IG-RIO-XDn-e
Agency Certification (when product is marked)	**c-UL-us** - UL Listed Industrial Control Equipment, certified for US and Canada **c-UL-us** - UL Listed for Class I, Division 2, Groups A, B, C and D Hazardous locations, certified for US and Canada **CE** - European Union 89/336/EEC EMC Directive,compliant with: EN 50081-2; Industrial Emissions EN 50082-2; Industrial Immunity EN 61326; Meas./Control/Lab., Industrial RequirementsEN 61000-6-2; Industrial Immunity **ODVA** - ODVA Conformance tested to ODVA DeviceNet specifications

1 Input off-to-on filter time is the time from a valid input signal to recognition by the module. Input on-to-off time is the time from a valid input signal to recognition by the module.

RIO-XAH2 220V ac Input Module



Wiring

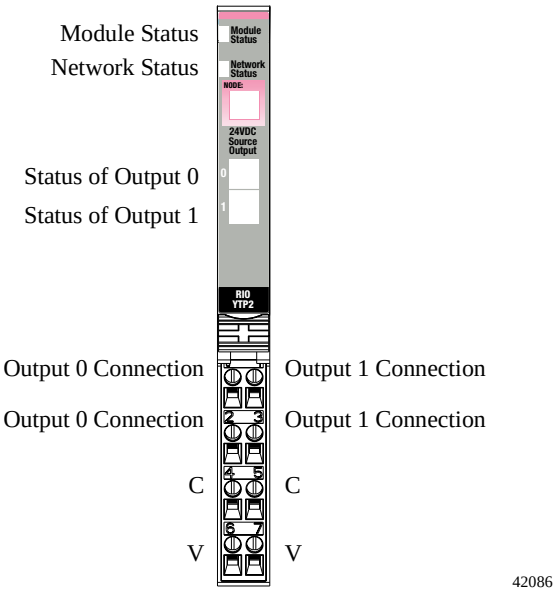


Specifications - RIO-XAH2 220V ac Input Module	
This module is IEC3 220V ac input compliant.	
Input Specifications	
Number of Inputs	2 (1 group of 2) non-isolated
ON-State Voltage	159V ac minimum 220V ac nominal 264V ac maximum
ON-State Current	5.7mA minimum 8.0mA nominal 9.61mA maximum
OFF-State Voltage	43V ac maximum
OFF-State Current	2.9mA maximum
Nominal Input Impedance	22.3kΩ
Delay Time[1] OFF to ON and ON to OFF	20ms hardware filter plus 1ms - 64ms digital filter programmable in increments of 1ms
Indicators	2 yellow input status, logic side 1 green/red network status, logic side 1 green/red module status, logic side
Keyswitch Position	8
General Specifications	
Module Location	RIO-BSC, -BSP wiring base assembly
Backplane Bus Current	75mA maximum @ 5V dc
Power Dissipation	0.7W maximum @ 28.8V dc
Thermal Dissipation	2.4 BTU/hr maximum @ 28.8V dc
Isolation Voltage	Tested at 1500V rms/V for 1s
External AC Power Supply Voltage	220V ac, 60Hz nominal
External AC Power Supply Voltage Range	159-264V ac, 47-63Hz
Dimensions Inches (Millimeters)	2.21H x 0.47W x 2.97L (56.0H x 12.0W x 75.5L)
Environmental Conditions Operational Temperature Storage Temperature Relative Humidity Shock Operating Non-operating Vibration	 -20 to 55°C (-4 to 131°F) -40 to 85°C (-40 to 185°F) 5 to 95% noncondensing 30g peak acceleration, 11(±1)ms pulse width 50g peak acceleration, 11(±1)ms pulse width Tested 5g @ 10-500Hz per IEC 68-2-6
Conductors Wire Size	14 AWG (2.5mm^2) - 22 AWG (0.25mm^2) solid or stranded wire rated at 75°C or greater 3/64 inch (1.2mm) insulation maximum
Terminal Base Screw Torque	7 pound-inches (0.6Nm)
Field Wiring Terminations	0 - Input 0 1 - Input 1 2 - No Connection 3 - No Connection 4 - L2N 5 - L2/N 6 - L1 7 - L1
Mass	1.09 oz/30.90 grams
Publication Installation Instruction	IG-RIO-XAH2-e
Agency Certification (when product is marked)	**C-UL-US** - UL Listed Industrial Control Equipment, certified for US and Canada **C-UL-US** - UL Listed for Class I, Division 2, Groups A, B, C and D Hazardous locations, certified for US and Canada **CE** - European Union 89/336/EEC EMC Directive,compliant with: EN 50081-2; Industrial Emissions EN 50082-2; Industrial Immunity EN 61326; Meas./Control/Lab., Industrial Requirements EN 61000-6-2; Industrial Immunity **ODVA** - ODVA Conformance tested to ODVA DeviceNet specifications

1 Off/on delay is time from a valid input signal to recognition by the module. Input on-to-off time is the time from a valid input signal to recognition by the module.

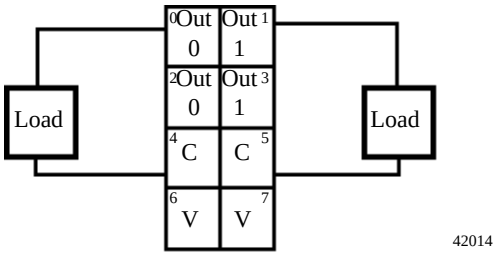
Use the following table to determine which output module will meet your application needs.

RIO-YTP2 Module



NC = No Connection C = Common
V = Supply

Wiring

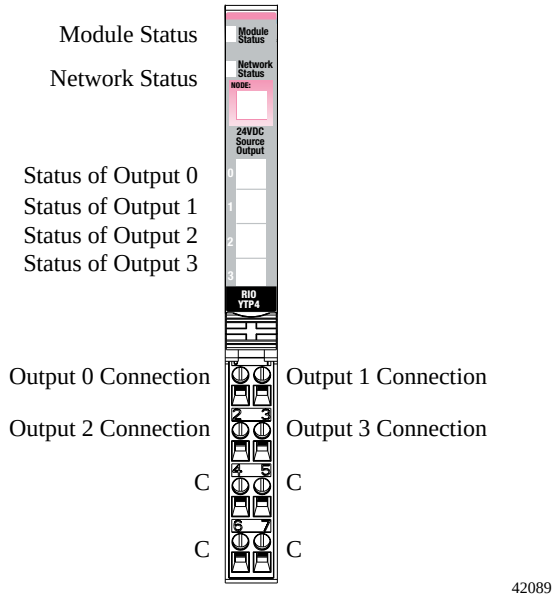


V = 12/24V dc, C = Common
12/24V dc is supplied from internal power bus

Specifications - RIO-YTP2	
Output Specifications	
Number of Outputs	2 (1 group of 2) sourcing
ON-State Voltage Range	10V dc min 24V dc nominal 28.8V dc max
ON-State Voltage Drop	0.2V dc max
ON-State Current	1.0mA min per channel
OFF-State Voltage	28.8V dc max
OFF-State Leakage	0.5mA max
Output Signal Delay[1] OFF to ON ON to OFF	 0.1ms max 0.1ms max
Output Current Rating	Max 1.0A per output 2.0 max per module
Surge Current	2A for 10ms, repeatable every 3 seconds
Indicators (field side indication, logic driven)	2 yellow output status; 2 red output fault 2 green/red module/network status
Keyswitch Position	1
General Specifications	
Module Location	RIO-BSC or -BSP wiring assembly
Backplane Bus Current	75mA max @ 5V dc
Power Dissipation	0.8W max @ 28.8V dc
Thermal Dissipation	2.7 BTU/hr max @ 28.8V dc
Isolation Voltage	1250V rms/V ac
External dc Power Supply Voltage Voltage Range Supply Current	 24V dc nominal 10 to 28.8V dc 8mA
Dimensions HxWxL	56.0mm x 12.0mm x 75.5mm (2.21in x 0.47in x 2.97in)
Environm. Conditions Operational Temp. Storage Temperature Relative Humidity Shock Operating Non-operating Vibration	 -20 to 55°C (-4 to 131°F) -40 to 85°C (-40 to 185°F) 5 to 95% noncondensing 30g peak acceleration, 11(±1)ms pulse width 50g peak acceleration, 11(±1)ms pulse width Tested 5g @ 10-500Hz per IEC 68-2-6
Conductors Wire Size	14 AWG (2.5mm²) - 22 AWG (0.25mm²) solid or stranded rated @ 75°C or greater 3/64 inch (1.2mm) insulation max
Terminal Base Screw Torque	7 pound-inches (0.6Nm)
Field Wiring Terminations	0 - Output 0 1 - Output 1 2 - Output 0 3 - Output 1 4 - Common 5 - Common 6 - Supply 7 - Supply
Mass	1.15 oz/32.60 grams
Publication Installation Instruction	 IG-RIO-YTPn-e
Agency Certification (when product is marked)	**C-UL-US** - UL Listed Industrial Control Equipment, certified for US and Canada **C-UL-US** - UL Listed for Class I, Division 2, Groups A, B, C and D Hazardous locations, certified for US and Canada **CE** - European Union 89/336/EEC EMC Directive,compliant with: EN 50081-2; Industrial Emissions EN 50082-2; Industrial Immunity EN 61326; Meas./Control/Lab., Industrial RequirementsEN 61000-6-2; Industrial Immunity **ODVA** - ODVA Conformance tested to ODVA DeviceNet specifications

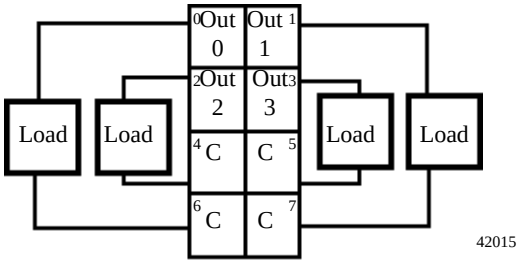
1 Off/on delay is time from a valid output “on” signal to output energization. On/off delay is time from a valid output “off” signal to output deenergization.

RIO-YTP4 Module



NC = No Connection C = Common
V = Supply

Wiring

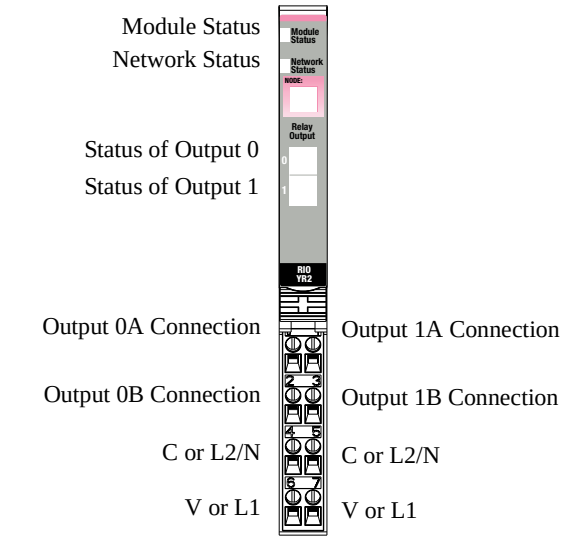


V = 12/24V dc, C = Common
12/24V dc is supplied from internal power bus

Specifications - RIO-YTP4	
Output Specifications	
Number of Outputs	4 (1 group of 4) sourcing
ON-State Voltage Range	10V dc min 24V dc nominal 28.8V dc max
ON-State Voltage Drop	0.2V dc max
ON-State Current	1.0mA min per channel
OFF-State Voltage	28.8V dc max
OFF-State Leakage	0.5mA max
Output Signal Delay[1] OFF to ON ON to OFF	 0.1ms max 0.1ms max
Output Current Rating	Max 1.0A per output 3.0 max per module
Surge Current	2A for 10ms, repeatable every 3 seconds
Indicators (field side indication, logic driven)	4 yellow output status; 4 red output fault 2 green/red module/network status
Keyswitch Position	1
General Specifications	
Module Location	RIO-BSC or -BSP wiring assembly
Backplane Bus Current	75mA max @ 5V dc
Power Dissipation	1.2W max @ 28.8V dc
Thermal Dissipation	4.1 BTU/hr max @ 28.8V dc
Isolation Voltage	1250V rms/V ac
External dc Power Supply Voltage Voltage Range Supply Current	 24V dc nominal 10 to 28.8V dc 16mA
Dimensions HxWxL	56.0mm x 12.0mm x 75.5mm (2.21in x 0.47in x 2.97in)
Environm. Conditions Operational Temp. Storage Temperature Relative Humidity Shock Operating Non-operating Vibration	 -20 to 55°C (-4 to 131°F) -40 to 85°C (-40 to 185°F) 5 to 95% noncondensing 30g peak acceleration, 11(±1)ms pulse width 50g peak acceleration, 11(±1)ms pulse width Tested 5g @ 10-500Hz per IEC 68-2-6
Conductors Wire Size	14 AWG (2.5mm^2) - 22 AWG (0.25mm^2) solid or stranded rated @ 75°C or greater max 3/64 inch (1.2mm) insulation max
Terminal Base Screw Torque	7 pound-inches (0.6Nm)
Field Wiring Terminations	0 - Output 0 1 - Output 1 2 - Output 2 3 - Output 3 4 - Common 5 - Common 6 - Common 7 - Common
Mass	1.17 oz/33.17 grams
Publication Installation Instruction	 IG-RIO-YTPn-e
Agency Certification (when product is marked)	**C-UL-US** - UL Listed Industrial Control Equipment, certified for US and Canada **C-UL-US** - UL Listed for Class I, Division 2, Groups A, B, C and D Hazardous locations, certified for US and Canada **CE** - European Union 89/336/EEC EMC Directive,compliant with: EN 50081-2; Industrial Emissions EN 50082-2; Industrial Immunity EN 61326; Meas./Control/Lab., Industrial Requirements EN 61000-6-2; Industrial Immunity **ODVA** - ODVA Conformance tested to ODVA DeviceNet specifications

1 Off/on delay is time from a valid output “on” signal to output energization. On/off delay is time from a valid output “off” signal to output deenergization.

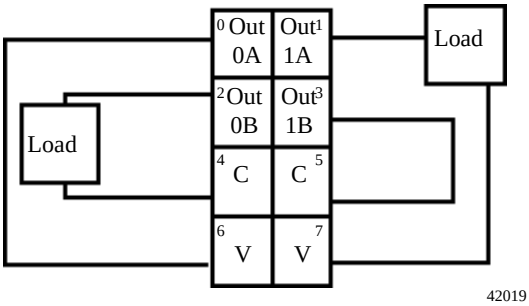
RIO-YR2 Module



Chas Gnd = Chassis Ground C = Common V = Supply
L2/N = AC Return/Neutral L1 = AC Power

42081

Wiring



42019

Out = Output channel relay contacts
V = Supply (can range from +5V dc to 240V ac)
C = Common

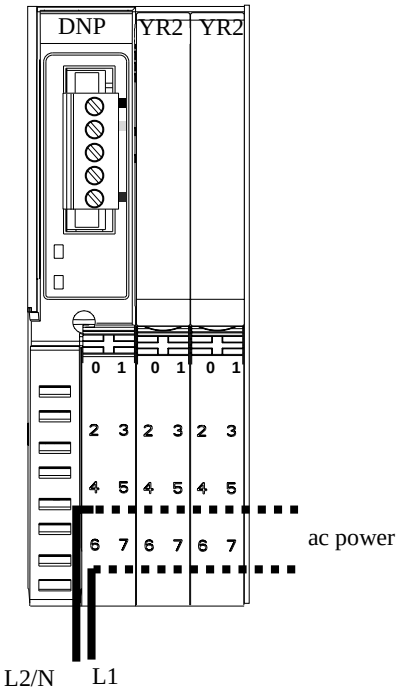
IMPORTANT Relay contacts are <u>not</u> connected to the internal power bus.

Load power can be obtained from a variety of sources, and can range from +5V dc to 240V ac.

ATTENTION

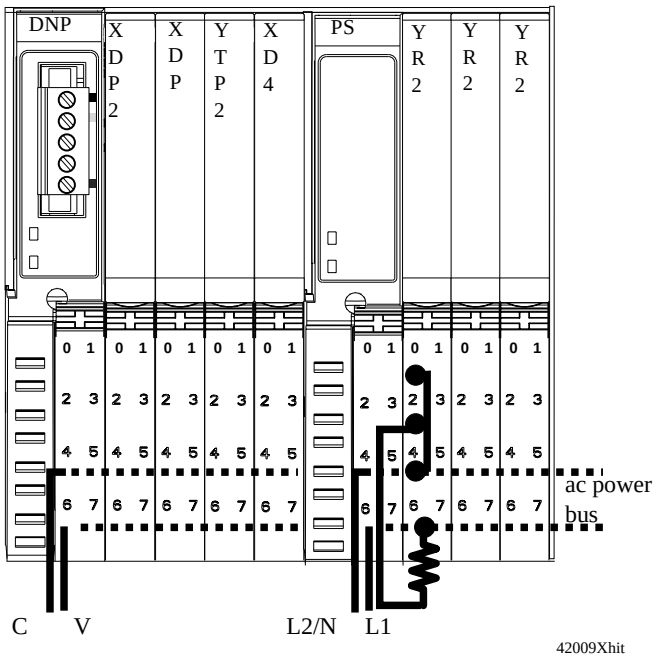
- Do not attempt to increase load current or wattage capability beyond the maximum rating by connecting 2 or more outputs in parallel. The slightest variation in relay switching time may cause one relay to momentarily switch the total load current.
- Make certain that all relay wiring is properly connected before applying any power to the module.
- Total current draw through the wiring base unit is limited to 10A. Separate power connections to the terminal base unit may be necessary.

Wiring with AC Modules Only



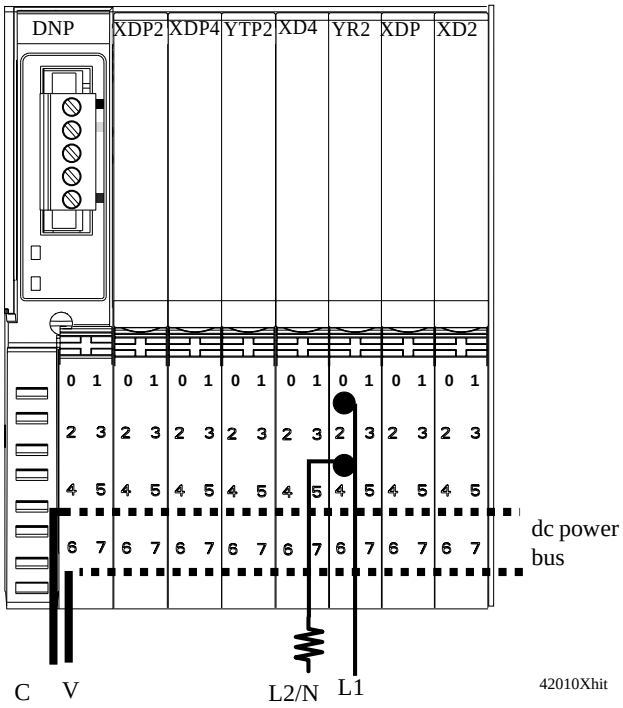
42008

Wiring Using a RIO-PS to Create a New AC Power Bus



42009Xhit

Wiring Using External Wiring for AC Power



Specifications - RIO-YR2

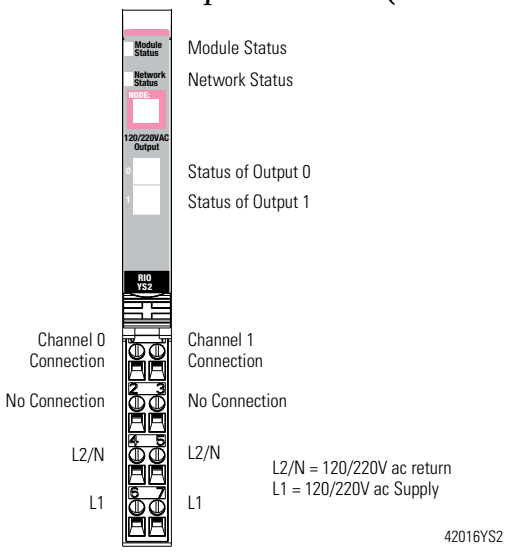
Outputs per Module	2 Form A isolated (normally open) electromechanical relays
Off-State Leakage Current (max at 240V ac)	1.2mA (max @ 240V ac) Bleed resistor thru snubber circuit
Output Voltage Range (load dependent)	5-28.8V dc @ 2.0A resistive 48V dc @ 0.5A resistive 125V dc @ 0.25A resistive 125V ac @ 2.0A resistive 240V ac @ 2.0A resistive
Output Current Rating (at rated power)	Resistive: 2A @ 5-28.8V dc; 0.5A @ 48V dc 0.25A @ 125V dc; 2A @ 125V ac 2A @ 240V ac Inductive: 2.0A steady state @ 5-28.8Vdc, L/R = 7ms 0.5A steady state @ 48V dc, L/R = 7ms 0.25A steady state @ 125V dc, L/R = 7ms 2.0A steady state, 15A make @ 125V ac, PF = cos θ = 0.4 2.0A steady state, 15A make @ 240V ac, PF = cos θ = 0.4
Power Rating (steady state)	250W max. for 125V ac resistive output 480W max. for 240V ac resistive output 60W max. for 28.8V dc resistive output 24W max. for 48V dc resistive output 31W max. for 125V dc resistive output 250VA max. for 125V ac induct. output 480VA max. for 240V ac induct. output 60VA max. for 28.8V dc induct. output 24VA max. for 48V dc inductive output 31VA max. for 125V dc inductive output
Output Signal Delay OFF to ON ON to OFF	 10ms max. (time from valid output on signal to relay energization by module) 26ms max. (time from valid output off signal to relay deenergization by module)
Init. Contact Resistance	30mΩ
Switching Frequency	1 operation/3s (0.3Hz at rated load) max
Operate/Release Time	10ms max
Bounce Time	1.2ms (mean)
Minimum Contact Load	100µA at 100mV dc
Expected Life of Electrical Contacts	Minimum 100,000 operations @ rated loads
Indicators	2 green/red module/network status 2 yellow output status
Keyswitch Positions	7

General Specifications

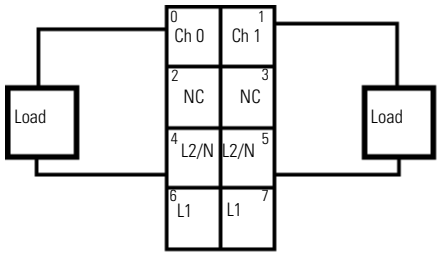
Module Location	RIO-BSC or -BSP wiring assembly
Backplane Bus Current	80mA max @ 5V dc
Power Dissipation	0.5W max @ 28.8V dc
Thermal Dissipation	1.7 BTU/hr max
Isolation Voltage Between any 2 sets of contacts Customer load to logic	 2550V dc for 1s 2550V dc for 1s
Field Power Bus Supply Voltage Voltage Range Supply Current	 None required 240V ac max 2A per channel max., 4A per module
Dimensions HxWxL	56.0mm x 12.0mm x 75.5mm (2.21in x 0.47in x 2.97in)
Environm. Conditions Operational Temp. Storage Temp. Relative Humidity Shock Operating Non-operating Vibration	 -20 to 55°C (-4 to 131°F) -40 to 85°C (-40 to 185°F) 5 to 95% noncondensing 12g peak accel., 11(±1)ms pulse width 50g peak accel., 11(±1)ms pulse width Tested 2g @ 10-500Hz per IEC 68-2-6
Conductors Wire Size	14 AWG (2.5mm²) - 22 AWG (0.25mm²) solid or stranded rated @ 75°C or greater 3/64 inch (1.2mm) insulation maximum
Terminal Base Screw Torque	7 pound-inches (0.6Nm)
Field Wiring Terminations	0 - Output 0A 1 - Output 1A 2 - Output 0B 3 - Output 1B 4 - Common 5 - Common 6 - Supply 7 - Supply
Mass	1.30 oz/36.86 grams
Publication Installation Instruction	 IG-RIO-YR2-e
Agency Certification (when product is marked)	**c-UL-us** - UL Listed Industrial Control Equipment, certified for US and Canada **c-UL-us** - UL Listed for Class I, Division 2, Groups A, B, C and D Hazardous locations, certified for US and Canada **CE** - European Union 89/336/EEC EMC Directive,compliant with: EN 50081-2; Industrial Emissions EN 50082-2; Industrial Immunity EN 61326; Meas./Control/Lab., Industrial Requirements EN 61000-6-2; Industrial Immunity **ODVA** - ODVA Conformance tested to ODVA DeviceNet specifications

1 Module outputs are not fused. If external fusing is desired, you must provide external fusing.

120/220V ac Output Module (RIO-YS2)



Wiring



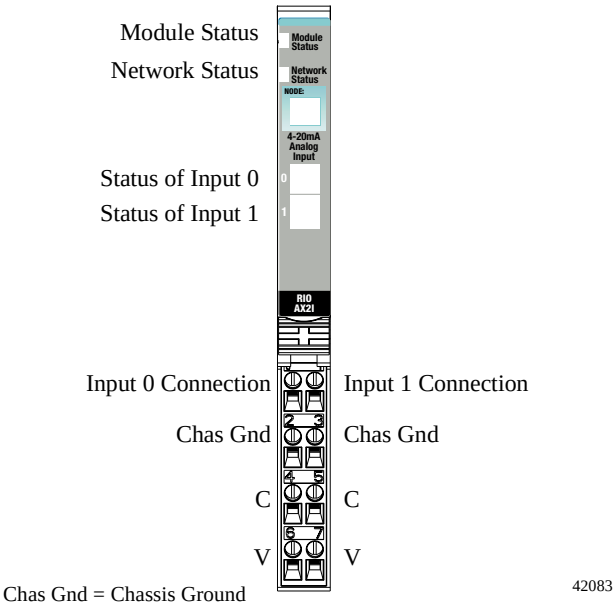
L1 =120/220V ac supply, L2/N = 120/220V ac return 42014
Ch 0 = Channel 0 Ch 1 = Channel 1
Field power is supplied from internal power bus

Specifications - RIO-YS2 120/220V ac Output Module	
This module is IEC3 120V/220V ac Output Compliant	
Output Specifications	
Outputs per Module	2 non-isolated, sourcing
ON-State Voltage Range	74V ac minimum 120/220V ac nominal 264V ac maximum
ON-State Voltage Drop	1.0V maximum @ 0.75A
ON-State Current	10mA minimum per channel 750mA maximum per channel
OFF-State Leakage	2.7mA max
Output Current Rating	1.5A (2 channels @ 0.75A each)
Surge Current	16A for 100ms, repeatable every 10s
Delay Time[1] OFF to ON ON to OFF	 1/2 cycle maximum 1/2 cycle maximum
Indicators (field side indication, logic driven)	2 yellow status 1 green/red network status, logic side 1 green/red module status, logic side
Keyswitch Position	8
General Specifications	
Module Location	RIO-BSC, -BSP wiring base assembly
Backplane Bus Current	75mA maximum @ 5V dc
Power Dissipation	0.8W maximum @ 28.8V dc
Thermal Dissipation	2.7 BTU/hr maximum @ 28.8V dc
Isolation Voltage	Tested at 1500V ac rms for 1s
External AC Power Supply Voltage	120/220V ac, 60Hz nominal
External AC Power Supply Voltage Range	85-264V ac, 47-63Hz
Dimensions Inches (Millimeters)	2.21H x 0.47W x 2.97L (56.0H x 12.0W x 75.5L)
Environmental Conditions Operational Temperature Storage Temperature Relative Humidity Shock Operating Non-operating Vibration	 -20 to 55°C (-4 to 131°F) -40 to 85°C (-40 to 185°F) 5 to 95% noncondensing 30g peak acceleration, 11(±1)ms pulse width 50g peak acceleration, 11(±1)ms pulse width Tested 5g @ 10-500Hz per IEC 68-2-6
Conductors Wire Size	14 AWG (2.5mm^2) - 22 AWG (0.25mm^2) solid or stranded rated at 75°C or greater 3/64 inch (1.2mm) insulation maximum
Terminal Base Screw Torque	7 pound-inches (0.6Nm)
Field Wiring Terminations	0 - Output 0 1 - Output 1 2 - No Connection 3 - No Connection 4 - L2N Return 5 - L2/N Return 6 - L1 7 - L1
Mass	1.09 oz/30.9 grams
Publications Installation Instructions	 IG-RIO-YS2-e
Agency Certification (when product is marked)	**c-UL-us** - UL Listed Industrial Control Equipment, certified for US and Canada **c-UL-us** - UL Listed for Class I, Division 2, Groups A, B, C and D Hazardous locations, certified for US and Canada **CE** - European Union 89/336/EEC EMC Directive,compliant with: EN 50081-2; Industrial Emissions EN 50082-2; Industrial Immunity EN 61326; Meas./Control/Lab., Industrial RequirementsEN 61000-6-2; Industrial Immunity **ODVA** - ODVA Conformance tested to ODVA DeviceNet specifications

1 Off/on delay is time from a valid output "on" signal to output energization. On/off delay is time from a valid output "off" signal to output deenergization.

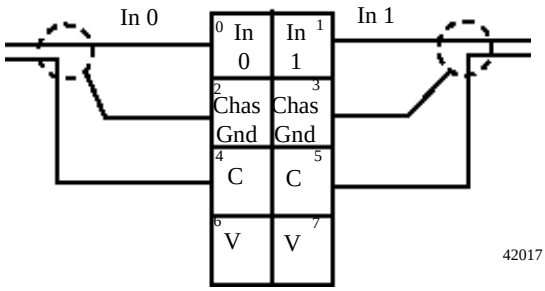
Use the following table to determine which analog module will meet your application needs.

RIO-AX2I Module



Chas Gnd = Chassis Ground
C = Common V = Supply

iring



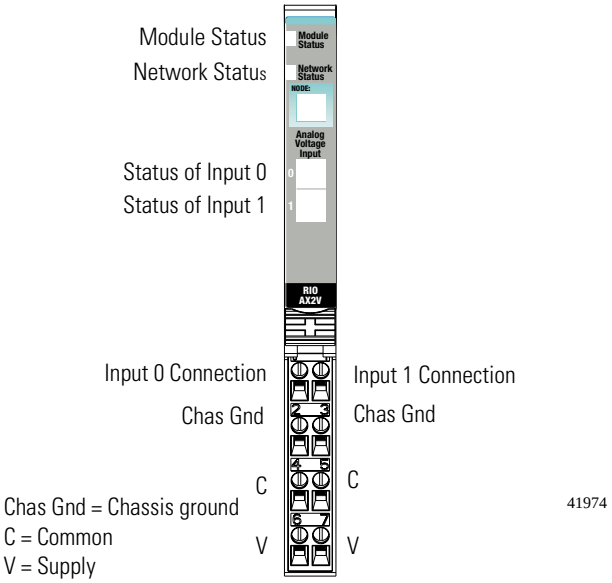
V = 12/24V dc, C = Common
12/24V dc is supplied from the internal power bus

Specifications - RIO-AX2I	
Input Specifications	
Number of Inputs	2 single-ended
Resolution	16 bits - over 21mA 0.32µA/cnt
Input Current Terminal	4-20mA 0-20mA
Absolute Accuracy[1] Current Terminal	0.1% Full Scale @ 25°C
Accuracy Drift w/Temp. Current Terminal	30ppm/°C
Input Update Rate (per module)	50ms @ Notch = 60Hz (default) 60ms @ Notch - 50Hz 12ms @ Notch = 250Hz 6ms @ Notch = 500Hz
Step Response (per channel)	70ms @ Notch = 60Hz (default) 80ms @ Notch = 50Hz 16ms@ Notch = 250Hz 8ms @ Notch = 500Hz
Input Impedance	60Ω
Conversion Type	Delta Sigma
Common Mode Rejection Ration	120dB
Normal Mode Rejection Ratio	-60dB -3db Notch filter 15.7Hz @ Notch = 60Hz 13.1Hz @ Notch = 50Hz 65.5Hz @ Notch = 250Hz 131Hz @ Notch = 500Hz
Data Format	Signed integer
Maximum Overload	Fault protected to 28.8V dc
Calibration	Factory calibrated
Indicators	4 green/red indicators 1 green/red network status, logic side 1 green/red module status, logic side 2 green/red input status, logic side
Keyswitch Position	3
General Specifications	
Module Location	RIO-BSC or -BSP wiring assembly
Backplane Bus	75mA @ 5V dc
Power Dissipation	0.6W max @ 28.8V dc
Thermal Dissipation	1.7 BTU/hr max @ 28.8V dc
Isolation Voltage	1250V rms/V ac No isolation between individual channels
External dc Power Supply Voltage Voltage Range Supply Current	 24V dc nominal 10-28.8V dc 10mA @ 24V dc
Dimensions HxWxL	56.0mm x 12.0mm x 75.5mm (2.21in x 0.47in x 2.97in)
Environm. Conditions Operational Temp. Storage Temperature Relative Humidity Shock Operating Non-operating Vibration	 -20 to 55°C (-4 to 131°F) -40 to 85°C (-40 to 185°F) 5 to 95% noncondensing 30g peak accel., 11(±1)ms pulse width 50g peak accel., 11(±1)ms pulse width Tested 5g @ 10-500Hz per IEC 68-2-6
Conductors Wire Size	14 AWG (2.5mm²) - 22 AWG (0.25mm²) solid or stranded rated @ 75°C or greater 3/64 inch (1.2mm) insulation max
Terminal Base Screw Torque	7 pound-inches (0.6Nm)
Field Wiring Terminations	0 - Input 0 1 - Input 1 2 - Ground 3 - Ground 4 - Common 5 - Common 6 - Supply 7 - Supply
Mass	1.22 oz/34.59 grams
Publication Installation Instruction	 IG-RIO-AX2I-e

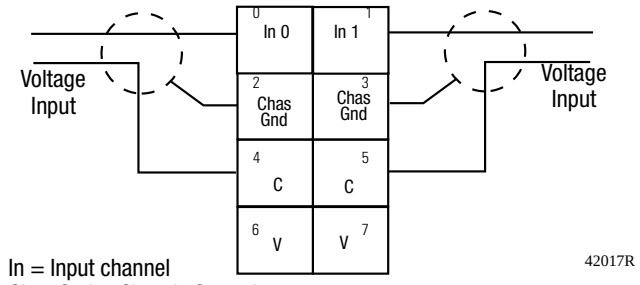
Agency Certification (when product is marked)	**C-UL-US** - UL Listed Industrial Control Equipment, certified for US and Canada **C-UL-US** - UL Listed for Class I, Division 2, Groups A, B, C and D Hazardous locations, certified for US and Canada **CE** - European Union 89/336/EEC EMC Directive,compliant with: EN 50081-2; Industrial Emissions EN 50082-2; Industrial Immunity EN 61326; Meas./Control/Lab., Industrial Requirements EN 61000-6-2; Industrial Immunity **ODVA** - ODVA Conformance tested to ODVA DeviceNet specifications

1 Includes offset, gain, non-linearity and repeatability error terms.

RIO-AX2V Module



Wiring



In = Input channel
Chas Gnd = Chassis Ground
C = Common
V = 12/24V dc supply

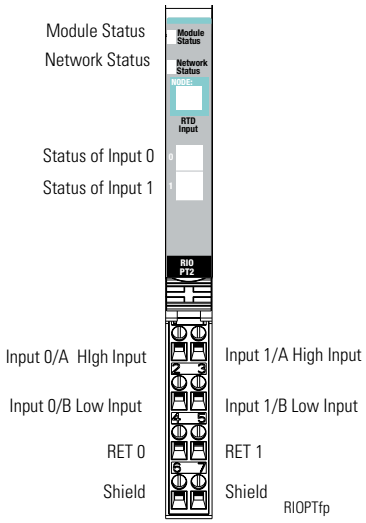
Specifications - RIO-AX2V 2 Analog Voltage Input Module

Input Specifications	
Number of Inputs	2 single-ended, non-isolated
Resolution	15 bits plus sign 320µV/cnt in unipolar or bipolar mode
Input Voltage	0-10V user configurable (-0.0V under, +0.5V over) ±10V user configurable (-0.5V under, +0.5V over)
Absolute Accuracy[1]	0.1% Full Scale @ 25°C
Accuracy Drift w/ Temp.	30ppm/°C
Input Update Rate (per module)	100ms @ Notch = 60Hz (default) 120ms @ Notch = 50Hz 24ms @ Notch = 250Hz 12ms @ Notch = 500Hz
Step Response (per channel)	70ms @ Notch = 60Hz (default) 80ms @ Notch = 50Hz 16ms@ Notch = 250Hz 8ms @ Notch = 500Hz
Digital Filter Time Constant	0-10,000ms (default = 0ms)
Input Impedance	100KΩ
Input Resistance	200KΩ
Conversion Type	Delta Sigma
Common Mode Rejection Ratio	120dB
Normal Mode Rejection Ratio	-60dB -3db Notch filter 15.7Hz @ Notch = 60Hz 13.1Hz @ Notch = 50Hz 65.5Hz @ Notch = 250Hz 131Hz @ Notch = 500Hz
Data Format	Signed integer
Maximum Overload	Fault protected to 28.8V dc
Calibration	Factory calibrated
Indicators (logic side)	1 green/red module status indicator 1 green/red network status indicator 2 green/red input status indicators
Keyswitch Position	3
General Specifications	
Module Location	RIO-BSC or -BSP wiring base assembly
Backplane Bus Current	75mA @ 5V dc
Power Dissipation	0.75W maximum @ 28.8V dc
Thermal Dissipation	2.5 BTU/hr maximum @ 28.8V dc
Isolation Voltage	Tested at 1250V rms for 60s No isolation between individual channels
External dc Power Supply Voltage Voltage Range Supply Current	 24V dc nominal 10-28.8V dc 15mA @ 24V dc
Dimensions Inches (Millimeters)	2.21H x 0.47W x 2.97L (56H x 12W x 75.5L)
Environmental Cond. Operational Temp. Storage Temperature Relative Humidity ShockOperating Nonoperating Vibration	 -20 to 55°C (-4 to 131°F) -40 to 85°C (-40 to 185°F) 5 to 95% noncondensing 30g peak accel, 11(±1)ms pulse width 50g peak accel, 11(±1)ms pulse width Tested 5g @ 10-500Hz per IEC 68-2-6
Conductors Wire Size	14 AWG (2.5mm²) - 22 AWG (0.25mm²) shielded solid or stranded copper wire rated @ 75°C or greater 3/64 inch (1.2mm) insulation maximum
Terminal Base Screw Torque	7 pound-inches (0.6Nm)
Field Wiring Terminations	0 - Input 0 1 - Input 1 2 - Chassis Ground 3 - Chassis Ground 4 - Common 5 - Common 6 - Supply 7 - Supply
Mass	1.22 oz/34.6 grams
Publication Installation Instruction	IG-RIO-AX2V-e

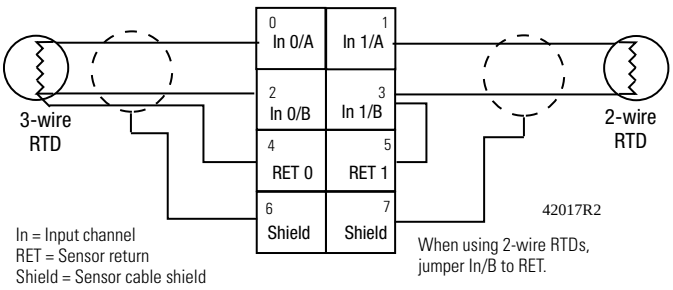
Agency Certification (when product is marked)	**C-UL-US** - UL Listed Industrial Control Equipment, certified for US and Canada **C-UL-US** - UL Listed for Class I, Division 2, Groups A, B, C and D Hazardous locations, certified for US and Canada **CE** - European Union 89/336/EEC EMC Directive,compliant with: EN 50081-2; Industrial Emissions EN 50082-2; Industrial Immunity EN 61326; Meas./Control/Lab., Industrial RequirementsEN 61000-6-2; Industrial Immunity **ODVA** - ODVA Conformance tested to ODVA DeviceNet specifications

1 Includes offset, gain, non-linearity and repeatability error terms.

RIO-PT2 Module



Wiring



Specifications - RIO-PT2 RTD Input Analog Module

Input Specifications

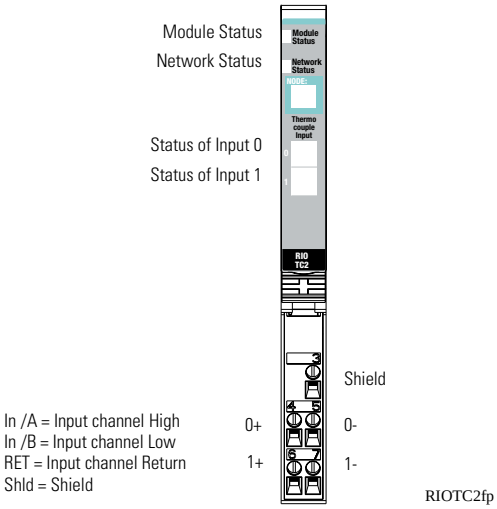
Number of Inputs	2 single-ended, non-isolated
Resolution	16 bits 9.5mV/cnt 0.03°C/cnt (Pt385 @ 25°)
Input Range	0-600Ω
Sensors Supported	100Ω Pt α = 0.00385 Euro (-200 to +870°C) 200Ω Pt α = 0.00385 Euro (-200 to +630°C) 100Ω Pt α = 0.003916 U.S.(-200 to +630°C) 200Ω Pt α = 0.003916 U.S. (-200 to +630°C) 10Ω Cu α = 0.00427 (-200 to +260°C) 100Ω Ni α = 0.00618 (-60 to +250°C) 120Ω Ni α = 0.00672 (-60 to +250°C) 120Ω Ni α = 0.00618 (-60 to +250°C)
Absolute Accuracy[1]	0.1% Full Scale @ 25°C
Accuracy Drift w/Temp.	30ppm/°C
Input Update Rate (per module)	40ms @ Notch = 50Hz 33ms @ Notch = 60Hz (default) 20ms @ Notch = 100Hz 17ms @ Notch = 120Hz 10ms @ Notch = 200Hz 8ms @ Notch = 240Hz 7ms @ Notch = 300Hz 5ms @ Notch = 400Hz 4ms @ Notch = 480Hz
Step Response (per channel)	60ms @ Notch = 50Hz 50ms @ Notch = 60Hz 30ms @ Notch = 100Hz 25ms @ Notch = 120Hz 15ms @ Notch = 200Hz 13ms @ Notch = 240Hz 10ms @ Notch = 300Hz 8ms @ Notch = 400Hz 6ms @ Notch = 480Hz
Conversion Type	Delta Sigma
Common Mode Rejection Ratio	120dB
Normal Mode Rejection Ratio	100dB -3db Notch filter 13.1Hz @ Notch = 50Hz 15.7Hz @ Notch = 60Hz 26.2Hz @ Notch = 100Hz 31.4Hz @ Notch = 120Hz 52.4Hz @ Notch = 200Hz 62.9Hz @ Notch = 240Hz 78.6Hz @ Notch = 300Hz 104.8Hz @ Notch = 400Hz 125.7Hz @ Notch = 380Hz
Data Format	Signed integer
Maximum Overload	No input protection
Calibration	Factory calibrated
Indicators	1 green/red module status indicator, logic side 1 green/red network status indicator, logic side 2 green/red input status indicators, logic side
Keyswitch Position	6

General Specifications

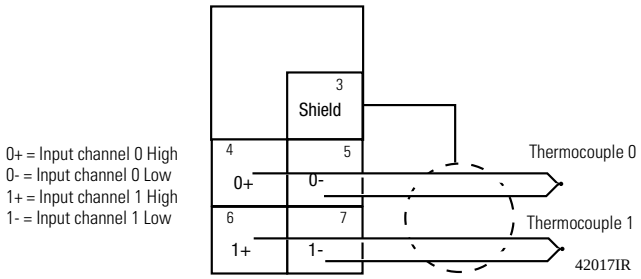
Module Location	RIO-BSC or -BSP wiring base assembly
Backplane Bus Current	220mA @ 5V dc
Power Dissipation	1.0W maximum
Thermal Dissipation	3.3 BTU/hr maximum
Isolation Voltage	50V ac rms No isolation between individual channels
Dielectric Test	1000V rms flash for 1s
External dc Power	No external supply required
Dimensions Inches (Millimeters)	2.21H x 0.47W x 2.97L (56H x 12W x 75.5L)
Environ. Conditions Oper. Temperature Storage Temperature Relative Humidity Shock Operating Non-operating Vibration	 -20 to 55°C (-4 to 131°F) -40 to 85°C (-40 to 185°F) 5 to 95% noncondensing 30g peak acceleration, 11(±1)ms pulse width 50g peak acceleration, 11(±1)ms pulse width Tested 5g @ 10-500Hz per IEC 68-2-6
Conductors Wire Size	14 AWG (2.5mm^2) - 22 AWG (0.25mm^2) shielded solid or stranded copper wire rated @ 75°C or greater 3/64 inch (1.2mm) insulation maximum
Terminal Base Screw Torque	7 pound-inches (0.6Nm)
Field Wiring Terminations	0 - Input + 1 - Input + 2 - Input - 3 - Input - 4 - Return 5 - Return 6 - Shield 7 - Shield
Mass	1.22 oz/34.6 grams
Publications Installation Instructions	 IG-RIO-PT2-e
Agency Certification (when product is marked)	**C-UL-US -** UL Listed Industrial Control Equipment, certified for US and Canada **C-UL-US -** UL Listed for Class I, Division 2, Groups A, B, C and D Hazardous locations, certified for US and Canada **ODVA -** ODVA Conformance tested to ODVA DeviceNet specifications

1 Includes offset, gain, non-linearity and repeatability error terms.

RIO-TC2 Module



Wiring



RIO-TC2 2 Thermocouple Input Analog Module

Input Specifications

Number of Inputs	2 differential, individually isolated
Resolution (also see Thermocouple Type)	15 bits plus sign 2.5µV/cnt
Thermocouple Type (and resolution average over span)	**Sensor Range Resolution (Average Over Span)** Type B 30 to 1820°C 3 counts/°C Type C 0 to 2315°C 6 counts/°C Type E -270 to 1000°C 24 counts/°C Type J -210 to 1200°C 21 counts/°C Type K -270 to 1372°C 13 counts/°C Type N -270 to 1300°C 11 counts/°C Type R -50 to 1768.1°C 4 counts/°C Type S -50 to 1768.1°C 4 counts/°C Type T -270 to 400°C 15 counts/°C
Cold Junction Comp.	Included in RIO-SCT remote termination block
Cold Junction Compensation Range	0 to 70°
Resolution	15 bits plus sign 2.5µV/cnt
Input Voltage	±75mV
Absolute Accuracy[1]	0.1% Full Scale @ 25°C
Accuracy Drift w/Temp.	30ppm/°C
Input Impedance	100KΩ
Input Resistance	1MΩ
Calibration	Factory calibrated
Input Update Rate (per module)	20ms @ Notch = 50Hz 17ms @ Notch = 60Hz (default) 10ms @ Notch = 100Hz 8ms @ Notch = 120Hz 5ms @ Notch = 200Hz 4ms @ Notch = 240Hz 3ms @ Notch = 300Hz 3ms @ Notch = 400Hz 2ms @ Notch = 480Hz
Step Response (per channel)	60ms @ Notch = 50Hz 50ms @ Notch = 60Hz 30ms @ Notch = 100Hz 25ms @ Notch = 120Hz 15ms @ Notch = 200Hz 13ms @ Notch = 240Hz 10ms @ Notch = 300Hz 8ms @ Notch = 400Hz 6ms @ Notch = 480Hz
Conversion Type	Delta Sigma
Common Mode Rejection Ratio	120dB
Normal Mode Rejection Ratio	-60dB -3db Notch filter 13.1Hz @ Notch = 50Hz 15.7Hz @ Notch = 60Hz 26.2Hz @ Notch = 100Hz 31.4Hz @ Notch = 120Hz 52.4Hz @ Notch = 200Hz 62.9Hz @ Notch = 240Hz 78.6Hz @ Notch = 300Hz 104.8Hz @ Notch = 400Hz 125.7Hz @ Notch = 380Hz
Data Format	Signed integer
Maximum Overload	Input not overvoltage protected
Indicators	1 green/red module status indicator, logic side 1 green/red network status indicator, logic side 2 green/red input status indicators, logic side
Keyswitch Position	3

General Specifications

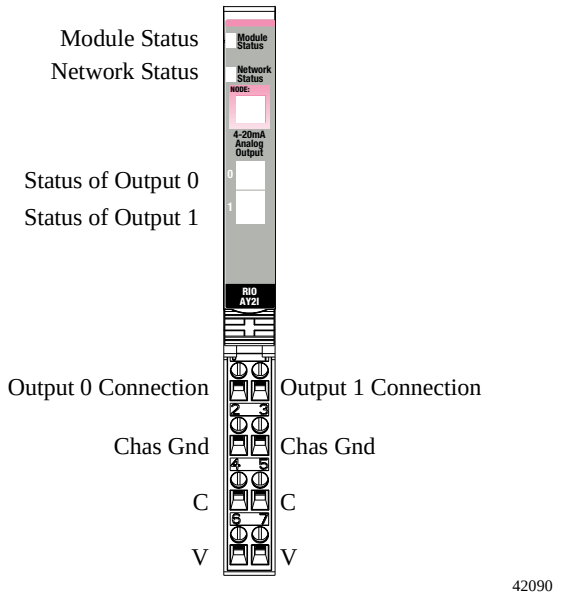
Module Location	RIO-BSCT wiring base assembly
Backplane Bus Current	175mA @ 5V dc
Power Dissipation	1.0W maximum
Thermal Dissipation	3.3 BTU/hr maximum
Isolation Voltage	50V rms ac Isolation between individual channels
Dielectric Test	1000V rms flash for 1s
Dimensions Inches (Millimeters)	2.21H x 0.47W x 2.97L (56H x 12W x 75.5L)
Environmental Conditions Operational Temperature Storage Temperature Relative Humidity ShockOperating Non-operating Vibration	 -20 to 55°C (-4 to 131°F) -40 to 85°C (-40 to 185°F) 5 to 95% noncondensing 30g peak acceleration, 11(±1)ms pulse width 50g peak acceleration, 11(±1)ms pulse width Tested 5g @ 10-500Hz per IEC 68-2-6
Conductors Wire Size	14 AWG (2.5mm^2) - 22 AWG (0.25mm^2) shielded thermocouple wire 3/64 inch (1.2mm) insulation maximum
Terminal Base Screw Torque	7 pound-inches (0.6Nm)
Field Wiring Terminations	3 - Shield 6 - Input 0+ (High) 4 - Input 0- (Low) 7 - Input 1+ (High) 5 - Input 1- (Low)

Mass	1.22 oz/34.6 grams
Publications Installation Instructions	IG-RIO-TC2-e
Agency Certification (when product is marked)	**C-UL-US -** UL Listed Industrial Control Equipment, certified for US and Canada **C-UL-US -** UL Listed for Class I, Division 2, Groups A, B, C and D Hazardous locations, certified for US and Canada **ODVA -** ODVA Conformance tested to ODVA DeviceNet specifications

1 Includes offset, gain, non-linearity and repeatability error terms.

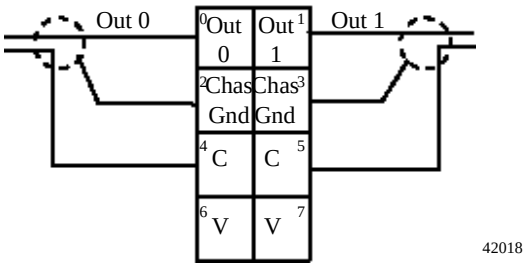
Use the following table to determine which analog output module will meet your application needs.

RIO-AY2I Module



Chas Gnd = Chassis Ground
C = Common V = Supply

Wiring

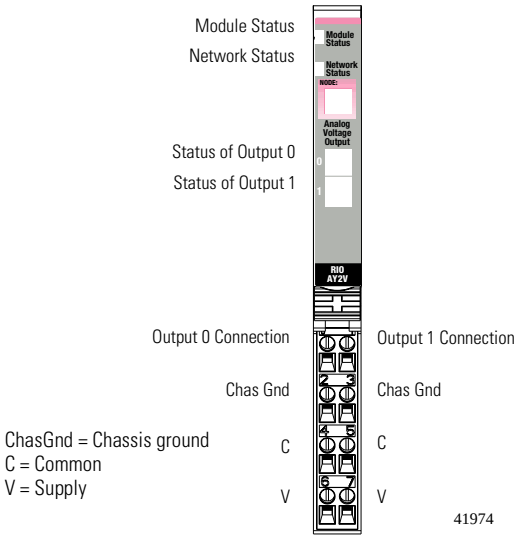


V = 12/24V dc, C = Common
12/24V dc is supplied from the internal power bus

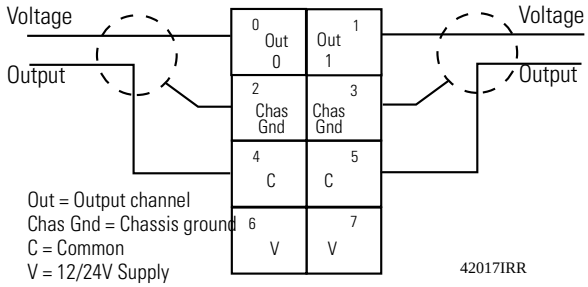
Specifications - RIO-AY2I	
Output Specifications	
Number of Outputs	2 single-ended
Resolution Current	13 bits over 21mA 513µA/cnt
Output Current Terminal	0mA output until communication is established 4-20mA user configurable 0-20mA user configurable
Absolute Accuracy[1]	0.1% Full Scale @ 25°C
Accuracy Drift w/ Temp.	30ppm/°C
Step Response to 63% of FS	24µs
Resistive Load on mA Output	0-330Ω
Conversion Type	Digital to analog converter
Conversion Rate	16µs
Data Format	Signed integer
Calibration	Factory calibrated
Indicators	4 green/red indicators 1 green/red network status, logic side 1 green/red module status, logic side 2 green/red output status, logic side
Keyswitch Position	4
General Specifications	
Module Location	RIO-BSC or -BSP wiring assembly
Backplane Bus Current	75mA max @ 5V dc
Power Dissipation	Max 1.0W max @ 28.8V dc
Thermal Dissipation	3.4 BTU/hr max @ 28.8V dc
Isolation Voltage	1250V rms/V ac No isolation between individual channels
External dc Power Supply Voltage Voltage Range Supply Current	 24V dc nominal 10-28.8V dc (includes 5% ac ripple) 50mA @ 24V dc (including outputs @ 20mA)
Dimensions HxWxL	56.0mm x 12.0mm x 75.5mm (2.21in x 0.47in x 2.97in)
Environm. Conditions Operational Temperat. Storage Temperature Relative Humidity Shock Operating Non-operating Vibration	 -20 to 55°C (-4 to 131°F) -40 to 85°C (-40 to 185°F) 5 to 95% noncondensing 30g peak acceleration, 11(±1)ms pulse width 50g peak acceleration, 11(±1)ms pulse width Tested 5g @ 10-500Hz per IEC 68-2-6
Conductors Wire Size	14 AWG (2.5mm²) - 22 AWG (0.25mm²) solid or stranded rated @ 75°C or greater 3/64 inch (1.2mm) insulation max
Terminal Base Screw Torque	7 pound-inches (0.6Nm)
Field Wiring Terminations	0 - Output 0 1 - Output 1 2 - Ground 3 - Ground 4 - Common 5 - Common 6 - Supply 7 - Supply
Mass	1.26 oz/35.72 grams
Publication Installation Instructions	 IG-RIO-AY2I-e
Agency Certification (when product is marked)	**C-UL-US** - UL Listed Industrial Control Equipment, certified for US and Canada **C-UL-US** - UL Listed for Class I, Division 2, Groups A, B, C and D Hazardous locations, certified for US and Canada **CE** - European Union 89/336/EEC EMC Directive,compliant with: EN 50081-2; Industrial Emissions EN 50082-2; Industrial Immunity EN 61326; Meas./Control/Lab., Industrial RequirementsEN 61000-6-2; Industrial Immunity **ODVA** - ODVA Conformance tested to ODVA DeviceNet specifications

1 Includes offset, gain, non-linearity and repeatability error terms.

RIO-AY2V Module



Wiring

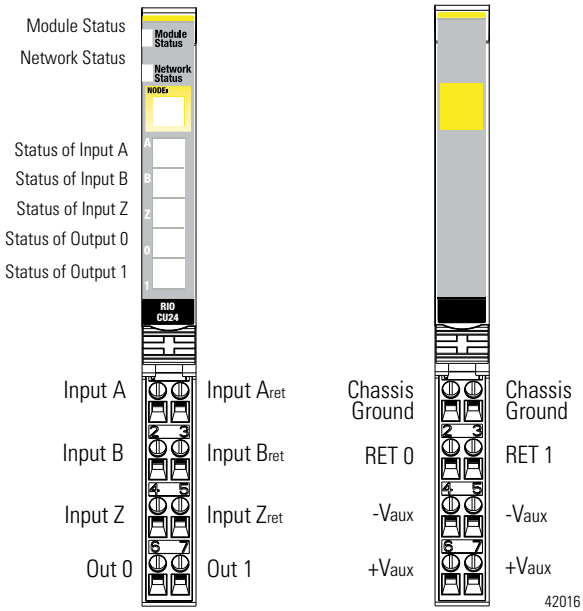


Specifications - RIO-AY2V 2 Analog Voltage Output Module	
Output Specifications	
Number of Outputs	2 single-ended, non-isolated
Resolution	14 bits (13 plus sign) 1.28mV/cnt in unipolar or bipolar mode
Output Voltage	0V output until communication established 0-10V (user configurable) (-0.0V under, +0.5V over) ±10V (user configurable) (-0.5V under, +0.5V over)
Absolute Accuracy[1]	0.1% Full Scale @ 25°C
Step Response to 63% of FS	24µs
Accuracy Drift w/Temp.	30ppm/°C
Current Load on Output	3mA
Conversion Type	Digital to analog converter
Conversion Rate	20µs
Data Format	Signed Integer
Calibration	Factory calibrated
Indicators	1 green/red module status indicator, logic side 1 green/red network status indicator, logic side 2 green/red output status indicators, logic side
Keyswitch Position	4
General Specifications	
Module Location	RIO-BSC or -BSP wiring assembly
Backplane Bus Current	75mA @ 5V dc
Power Dissipation	1.0W maximum @ 28.8V dc
Thermal Dissipation	3.4 BTU/hr maximum @ 28.8V dc
Isolation Voltage	Tested at 1250V rms for 60s No isolation between individual channels
External dc Power Supply Voltage Voltage Range Supply Current	 24V dc nominal 10-28.8V dc 35mA @ 24V dc (including outputs @ 3mA)
Dimensions Inches (Millimeters)	2.21H x 0.47W x 2.97L (56H x 12W x 75.5L)
Environmental Conditions Operational Temperature Storage Temperature Relative Humidity Shock Operating Nonoperating Vibration	 -20 to 55°C (-4 to 131°F) -40 to 85°C (-40 to 185°F) 5 to 95% noncondensing 30g peak acceleration, 11(±1)ms pulse width 50g peak acceleration, 11(±1)ms pulse width Tested 5g @ 10-500Hz per IEC 68-2-6
Conductors Wire Size	14 AWG (2.5mm^2) - 22 AWG (0.25mm^2) shielded solid or stranded copper wire rated @ 75°C or greater 3/64 inch (1.2mm) insulation maximum
Terminal Base Screw Torque	7 pound-inches (0.6Nm)
Field Wiring Terminations	0 - Output 0 1 - Output 1 2 - Chassis Ground 3 - Chassis Ground 4 - Common 5 - Common 6 - Supply 7 - Supply
Mass	1.26 oz/35.7 grams
Publication Installation Instruction	 IG-RIO-AY2V-e
Agency Certification (when product is marked)	**c-UL-us** - UL Listed Industrial Control Equipment, certified for US and Canada **c-UL-us** - UL Listed for Class I, Division 2, Groups A, B, C and D Hazardous locations, certified for US and Canada **CE** - European Union 89/336/EEC EMC Directive,compliant with: EN 50081-2; Industrial Emissions EN 50082-2; Industrial Immunity EN 61326; Meas./Control/Lab., Industrial RequirementsEN 61000-6-2; Industrial Immunity **ODVA** - ODVA Conformance tested to ODVA DeviceNet specifications

1 Includes offset, gain, non-linearity and repeatability error terms.

Use the following table to determine which specialty module will meet your application needs.

RIO-CU24 Module



Wiring

	Module 1		Module 2	
0	A	1 Aret	0 Chas Gnd	1 Chas Gnd
2	B	3 Bret	2 RET 0	3 RET 1
4	Z	5 Zret	4 -Vaux	5 -Vaux
6	Out 0	7 Out 1	6 +Vaux	7 +Vaux

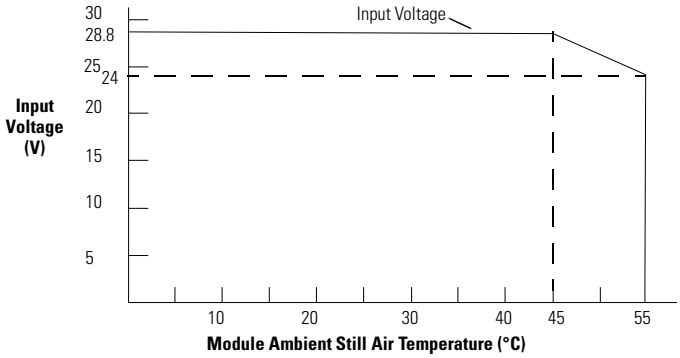
Specifications - RIO-CU24 Very High Speed Counter Module

Input Specifications	
Number of Inputs	1 - 1 group of A/Areturn, B/Breturn and Z/Zreturn
Input Voltage	15-24V dc
Input Current	6.1mA @ 15V dc 10.2mA @ 24V dc
Input OFF-State Current	≤0.250mA max
Input OFF-State Voltage	≤1.8V dc
Input ON-State Current	≥5mA
Input ON-State Voltage	≥12.5V dc
Maximum ON-State Voltage	Refer to derating curve below.
Input Filter Selections	Off 10µs 100µs 1.0ms 10.0ms
Maximum Input Frequency	1.0MHz counter and encoder X1 configurations 500kHz encoder X2 configuration (no filter) 250kHz encoder X4 configuration (no filter)
Output Specifications	
Number of Outputs	1 isolated group of 2 capable of 0.5A @ 24V dc
Output Control	Outputs can be tied to any of 4 compare windows
Output Supply Voltage Range	10-28.8V dc
OFF-State Leakage Current	≤0.5mA
ON-State Voltage Drop	≤0.3V dc @ 0.5A
ON-State Current	0.5A maximum
Short Circuit Current	6A - Outputs are short circuit protected and either cycle until the fault is corrected, or latch off (depending upon programming) Short circuit detected when output is turned on.
Open Wire Detection	Open wire detected when output is turned off
Delay Time OFF to ON ON to OFF	 25µs (load dependent) 150µs (load dependent)
General Specifications	
Module Location	RIO-BSC, -BSP wiring base assembly
Keyswitch Position	2
Backplane Bus Current	180mA maximum
Power Dissipation	1.9W maximum @ rated load
Thermal Dissipation	6.5 BTU/hr maximum @ rated load
Isolation Voltage (minimum)	Prequalified for 1250V ac/rms between: **Module 1** System side (PointBus) Chassis ground A/B/Z inputs O0/O1 and user power supply **Module 2** System side Chassis ground Vaux ± User power supply common
External dc Power (does not represent power required to supply outputs)	No additional external power required to power module
Field Power Bus	24V dc nominal; range 10-28.8V dc
Dimensions Inches (Millimeters)	2.21H x 0.47W x 2.97L (56.0H x 12.0W x 75.5L)
Environmental Conditions Operational Temperature Storage Temperature Relative Humidity Shock Operating Non-operating Vibration	 -20 to 55°C (-4 to 131°F) -40 to 85°C (-40 to 185°F) 5 to 95% noncondensing 30g peak acceleration, 11(±1)ms pulse width 50g peak acceleration, 11(±1)ms pulse width Tested 5g @ 10-500Hz per IEC 68-2-6
Conductors Wire Size	14 AWG (2.5mm^2) - 22 AWG (0.25mm^2) solid or stranded copper wire rated at 75°C or higher 3/64 inch (1.2mm) insulation maximum
Terminal Base Screw Torque	7 pound-inches (0.6Nm)
Field Wiring Terminations	Module 1 0 - A 1 - Aret 2 - B 3 - Bret 4 - Z 5 - Zret 6 - Output 0 7 - Output 1 Module 2 0 - Chassis ground 1 - Chassis ground 2 - Return 0 3 - Return 1 4 - -V 5 - -V 6 - +V 7 - +V
Mass	1.15 oz/32.60 grams

Publications Installation Instructions	IG-RIO-CU24-e
Agency Certification (when product is marked)	**C-UL-US** - UL Listed Industrial Control Equipment, certified for US and Canada **C-UL-US** - UL Listed for Class I, Division 2, Groups A, B, C and D Hazardous locations, certified for US and Canada **ODVA** - ODVA Conformance tested to ODVA DeviceNet specifications

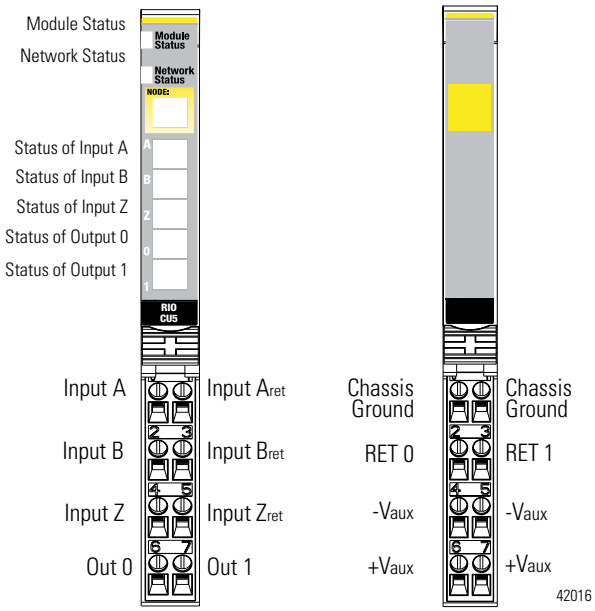
1 Off/on delay is time from a valid output "on" signal to output energization.
On/off delay is time from a valid output "off" signal to output deenergization.

Input Derating Curve



Note: Exceeding the maximum input voltage can cause permanent damage to the input

RIO-CU5 Module



Wiring

	Module 1		Module 2	
0	A	1 Aret	0 Chas Gnd	1 Chas Gnd
2	B	3 Bret	2 RET 0	3 RET 1
4	Z	5 Zret	4 -Vaux	5 -Vaux
6	Out 0	7 Out 1	6 +Vaux	7 +Vaux

Specifications - RIO-CU5 Very High Speed Counter Module

Input Specifications

Number of Inputs	1 - 1 group of A/Areturn, B/Breturn and Z/Zreturn
Input Voltage	5V dc
Input Current	19.1mA @ 5V dc 25.7mA @ 6V dc
Input OFF-State Current	≤0.250mA max
Input OFF-State Voltage	≤1.25V dc)
Input ON-State Current	≥5mA
Input ON-State Voltage	≥2.6V dc
Maximum ON-State Voltage	±6V
Input Filter Selections	Off,10µs,100µs,1.0ms,10.0ms
Maximum Input Frequency	1.0MHz counter and encoder X1 configurations 500kHz encoder X2 configuration (no filter) 250kHz encoder X4 configuration (no filter)

Output Specifications

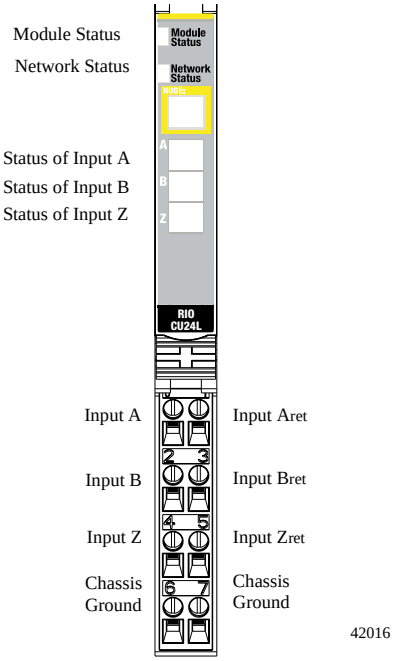
Number of Outputs	1 isolated group of 2 capable of 0.5A @ 24V dc
Output Control	Outputs can be tied to any of 4 compare windows
Output Supply Voltage Range	10-28.8V dc
OFF-State Leakage Current	≤0.5mA
ON-State Voltage Drop	≤0.3V dc @ 0.5A
ON-State Current	0.5A maximum
Short Circuit Current	6A - Outputs are short circuit protected and either cycle until the fault is corrected, or latch off (depending upon programming) Short circuit detected when output is turned on.
Open Wire Detection	Open wire detected when output is turned off
Delay Time OFF to ON ON to OFF	25µs (load dependent) 150µs (load dependent)

General Specifications

Module Location	RIO-BSC, -BSP wiring base assembly
Keyswitch Position	2
Backplane Bus Current	180mA maximum
Power Dissipation	1.5W maximum @ rated load
Thermal Dissipation	5.1 BTU/hr maximum @ rated load
Isolation Voltage (minimum)	Prequalified at 1250V ac/rms between: **Module 1** System side Chassis ground A/B/Z inputs O0/O1 and user power supply **Module 2** System side Chassis ground Vaux ± User power supply common
External dc Power (does not represent power required for outputs)	No additional external power required to power module.
Field Power Bus	24V dc nominal; range 10-28.8V dc
Dimensions Inches (Millimeters)	2.21H x 0.47W x 2.97L (56.0H x 12.0W x 75.5L)
Environmental Conditions Operational Temperature Storage Temperature Relative Humidity Shock Operating Non-operating Vibration	 -20 to 55°C (-4 to 131°F) -40 to 85°C (-40 to 185°F) 5 to 95% noncondensing 30g peak acceleration, 11(±1)ms pulse width 50g peak acceleration, 11(±1)ms pulse width Tested 5g @ 10-500Hz per IEC 68-2-6
Conductors Wire Size	14 AWG (2.5mm^2) - 22 AWG (0.25mm^2) solid or stranded copper wire rated at 75°C or higher 3/64 inch (1.2mm) insulation maximum
Terminal Base Screw Torque	7 pound-inches (0.6Nm)
Field Wiring Terminations	Module 1 0 - A 1 - Aret 2 - B 3 - Bret 4 - Z 5 - Zret 6 - Output 0 7 - Output 1 Module 2 0 - Chassis ground 1 - Chassis ground 2 - Return 0 3 - Return 1 4 - -V 5 - -V 6 - +V 7 - +V
Mass	1.15 oz/32.60 grams
Publications Installation Instructions	 IG-RIO-CU5-e
Agency Certification (when product is marked)	**C-UL-US** - UL Listed Industrial Control Equipment, certified for US and Canada **C-UL-US** - UL Listed for Class I, Division 2, Groups A, B, C and D Hazardous locations, certified for US and Canada **ODVA** - ODVA Conformance tested to ODVA DeviceNet specifications

1 Off/on delay is time from a valid output "on" signal to output energization. On/off delay is time from a valid output "off" signal to output deenergization.

RIO-CU24L Module



Wiring

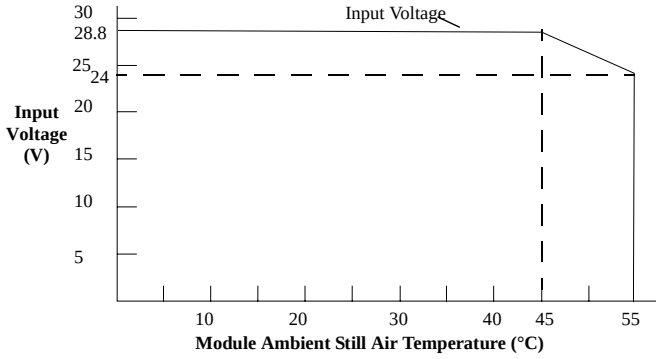
0 A	1 Aret
2 B	3 Bret
4 Z	5 Zret
6 Chas Gnd	7 Chas Gnd

A, B and Z , and Aret, Bret, and Zret are inputs
Chas Gnd = Chassis ground

Specifications - RIO-CU24L Encoder/Counter Module	
Input Specifications	
Number of Inputs	1 - 1 group of A/Areturn, B/Breturn and Z/Zreturn
Input Voltage	15-24V dc
Input Current	6.1mA @ 15V dc 10.2mA @ 24V dc
Input OFF-State Current	≤0.250mA max
Input OFF-State Voltage	≤1.8V dc
Input ON-State Current	≥5mA
Input ON-State Voltage	≥12.5V dc
Maximum ON-State Volts	Refer to Input Derating Curve below
Input Filter Selections (per A/B/Z group)	Off,10µs,100µs,1.0ms,10.0ms
Maximum Input Frequency	1.0MHz counter and encoder X1 configurations 500kHz encoder X2 configuration (no filter) 250kHz encoder X4 configuration (no filter)

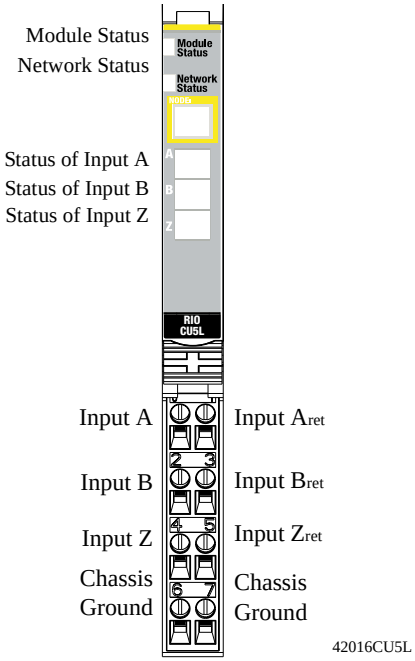
General Specifications	
Module Location	RIO-BSC, -BSP wiring base assembly
Keyswitch Position	2
Backplane Bus Current	160mA maximum
Power Dissipation	1.5W maximum @ rated load
Thermal Dissipation	5.1 BTU/hr maximum @ rated load
Isolation Voltage (minimum)	Prequalified at 1250V ac/rms between: System side Chassis ground A/B/Z inputs
External dc Power	No additional external power required to power module.
Dimensions Inches (Millimeters)	2.21H x 0.47W x 2.97L (56.0H x 12.0W x 75.5L)
Environmental Conditions Operational Temperature Storage Temperature Relative Humidity Shock Operating Non-operating Vibration	 -20 to 55°C (-4 to 131°F) -40 to 85°C (-40 to 185°F) 5 to 95% noncondensing 30g peak accel, 11(±1)ms pulse width 50g peak accel, 11(±1)ms pulse width Tested 5g @ 10-500Hz per IEC 68-2-6
Conductors Wire Size	14 AWG (2.5mm^2) - 22 AWG (0.25mm^2) solid or stranded copper wire rated at 75°C or higher 3/64 inch (1.2mm) insulation maximum
Terminal Base Screw Torque	7 pound-inches (0.6Nm)
Field Wiring Terminations	Module 1 0 - A 1 - Aret 2 - B 3 - Bret 4 - Z 5 - Zret 6 - Chassis ground 7 - Chassis ground
Mass	1.15 oz/32.60 grams
Publications Installation Instructions	 IG-RIO-CU24L-e
Agency Certification (when product is marked)	**C-UL-US** - UL Listed Industrial Control Equipment, certified for US and Canada **C-UL-US** - UL Listed for Class I, Division 2, Groups A, B, C and D Hazardous locations, certified for US and Canada **ODVA** - ODVA Conformance tested to ODVA DeviceNet specifications

Input Derating Curve



Note: Exceeding the maximum input voltage can cause permanent damage to the input.

RIO-CU5L Module



Wiring

0 A	1 Aret
2 B	3 Bret
4 Z	5 Zret
6 Chas Gnd	7 Chas Gnd

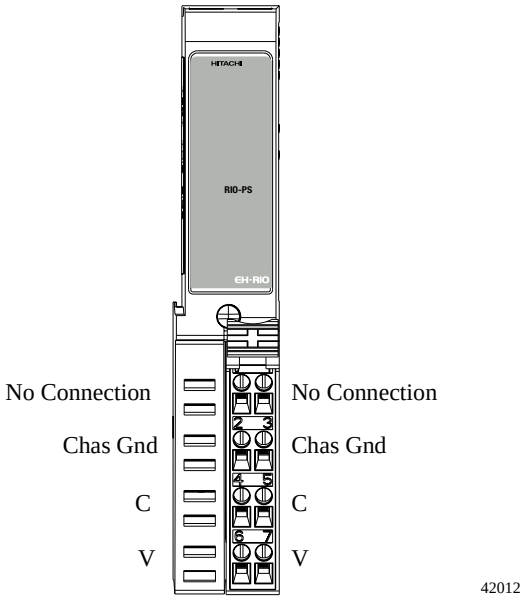
A, B and Z , and Aret, Bret, and Zret are inputs
Chas Gnd = Chassis ground

Specifications - RIO-CU5L Encoder/Counter Module	
Input Specifications	
Number of Inputs	1 - 1 group of A/Areturn, B/Breturn and Z/Zreturn
Input Voltage	5V
Input Current	19.1mA @ 5V dc 25.7mA @ 6V dc
Input OFF-State Current	≤0.250mA max
Input OFF-State Voltage	≤1.25V dc
Input ON-State Current	≥5mA
Input ON-State Voltage	≥2.6V dc
Maximum ON-State Voltage	±6V
Input Filter Selections (per A/B/Z group)	Off 10µs 100µs 1.0ms 10.0ms
Maximum Input Frequency	1.0MHz counter and encoder X1 configurations 500kHz encoder X2 configuration (no filter) 250kHz encoder X4 configuration (no filter)
General Specifications	
Module Location	RIO-BSC, -BSP wiring base assembly
Keyswitch Position	2
Backplane Bus Current	160mA maximum
Power Dissipation	1.1W maximum @ rated load
Thermal Dissipation	3.75 BTU/hr maximum @ rated load
Isolation Voltage (minimum)	Prequalified at 1250V ac/rms between: System side Chassis ground A/B/Z inputs
External dc Power	No additional external power required to power module.
Dimensions Inches (Millimeters)	2.21H x 0.47W x 2.97L (56.0H x 12.0W x 75.5L)
Environmental Conditions Operational Temperature Storage Temperature Relative Humidity Shock Operating Non-operating Vibration	 -20 to 55°C (-4 to 131°F) -40 to 85°C (-40 to 185°F) 5 to 95% noncondensing 30g peak acceleration, 11(±1)ms pulse width 50g peak acceleration, 11(±1)ms pulse width Tested 5g @ 10-500Hz per IEC 68-2-6
Conductors Wire Size	14 AWG (2.5mm²) - 22 AWG (0.25mm²) solid or stranded copper wire rated at 75°C or higher 3/64 inch (1.2mm) insulation maximum
Terminal Base Screw Torque	7 pound-inches (0.6Nm)
Field Wiring Terminations	Module 1 0 - A 1 - Aret 2 - B 3 - Bret 4 - Z 5 - Zret 6 - Chassis ground 7 - Chassis ground
Mass	1.15 oz/32.60 grams
Publications Installation Instructions	 IG-RIO-CU5L-e
Agency Certification (when product is marked)	c-**UL**-us - UL Listed Industrial Control Equipment, certified for US and Canada c-**UL**-us - UL Listed for Class I, Division 2, Groups A, B, C and D Hazardous locations, certified for US and Canada **ODVA** - ODVA Conformance tested to ODVA DeviceNet specifications

Use the following table to determine which power supply module will meet your application needs.

Interface	Purpose	*See Page*
RIO-PS	Field Power Supply	**51**
RIO-PSD	Power Supply (DC)	**53**

RIO-PS Field Power Supply

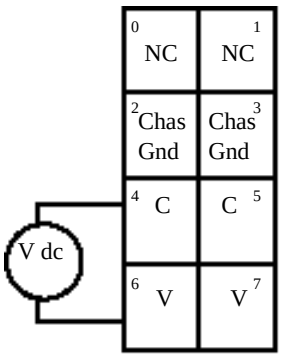


42012

NC = No Connection Chas Gnd = Chassis Ground
C = Common V = Supply

Wiring

12/24V dc

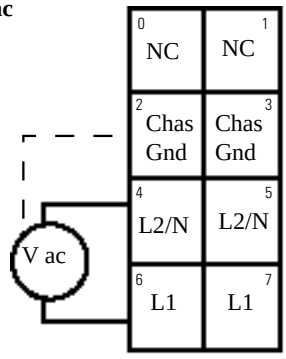


This supply will be connected to the internal power bus.

V = 12/24V dc, C = Common

42065

120/240V ac

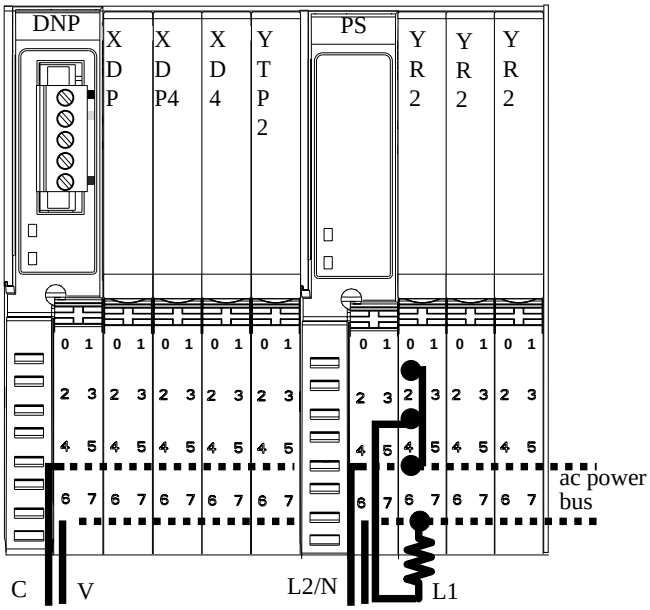


This supply will be connected to the internal power bus.

L2/N = Neutral, L1 = 120/240V ac
CHAS GND = Chassis ground

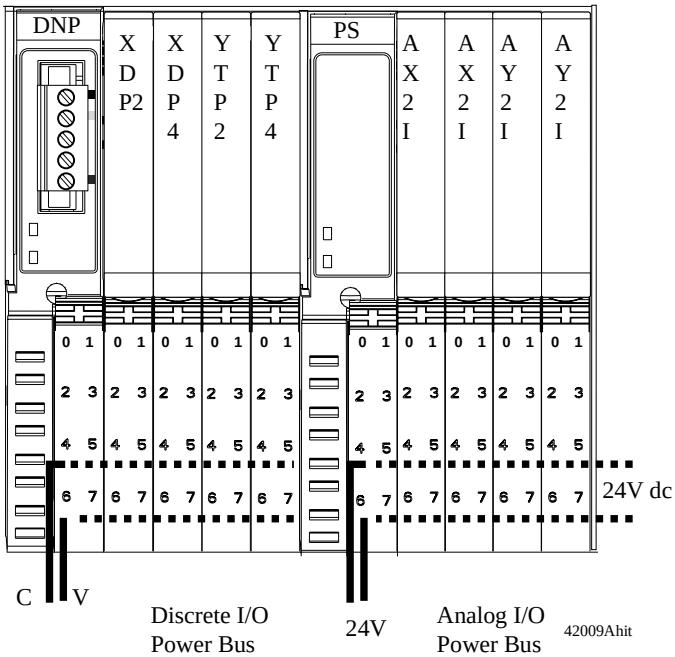
Specifications - RIO-PS Field Power Supply	
Input Voltage Rating	12V dc, 24V dc, 120V ac, 240V ac nominal
Input Current	10A maximum
Indicators	None
Backplane Bus Current	Pass through
General Specifications	
Module Location	Between I/O modules in EH-RIO System Breaks power bus
Power Consumption	None
Power Dissipation	None
Thermal Dissipation	None
Isolation Voltage	1528V rms/V ac
Field Power Bus Supply Voltage Supply Current	 264V ac maximum, 12V dc, 24V dc, 120V ac, 240V ac nominal 10A maximum
Dimensions HxWxL	76.2mm x 25.4mm x 133.4mm (3.00in x 1.00in x 5.25in)
Environm. Conditions Operational Temp. Storage Temperature Relative Humidity Shock Operating Non-operating Vibration	 -20 to +85°C (-4 to +185°F) -40 to 85°C (-40 to 185°F) 5 to 95% noncondensing 30g peak acceleration, 11(±1)ms pulse width 50g peak acceleration, 11(±1)ms pulse width Tested 5g @ 10-500Hz per IEC 68-2-6
Conductors Wire Size	14 AWG (2.5mm²) - 22 AWG (0.25mm²) solid or stranded rated @ 75°C or greater 3/64 inch (1.2mm) insulation maximum
Terminal Base Screw Torque	7 pound-inches (0.6Nm)
Field Wiring Terminations	0 - No Connection 1 - No Connection 2 - Chassis Ground 3 - Chassis Ground 4 - Common 5 - Common 6 - Supply 7 - Supply
Mass	4.38 oz/124.17 grams
Publication Installation Instructions	IG-RIO-PS-e
Agency Certification (when product is marked)	**C-UL-US** - UL Listed Industrial Control Equipment, certified for US and Canada **C-UL-US** - UL Listed for Class I, Division 2, Groups A, B, C and D Hazardous locations, certified for US and Canada **CE** - European Union 89/336/EEC EMC Directive,compliant with: EN 50081-2; Industrial Emissions EN 50082-2; Industrial Immunity EN 61326; Meas./Control/Lab., Industrial RequirementsEN 61000-6-2; Industrial Immunity **ODVA** - ODVA Conformance tested to ODVA DeviceNet specifications

Wiring Using a RIO-PS to Create a New AC Power Bus



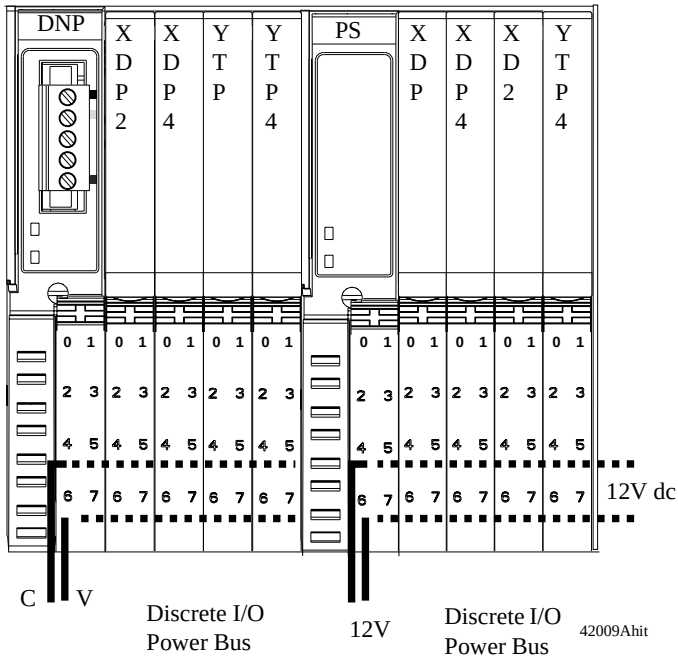
Wiring Using an RIO-PS to Create a New Analog Power Bus

This configuration isolates noisy discrete I/O power from sensitive analog I/O power.

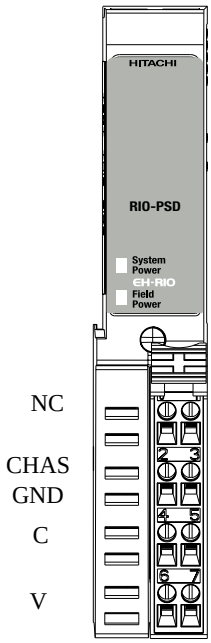


Wiring Using a RIO-PS to Create a New DC Power Bus

This configuration changes power bus voltage for 12/24V dc systems.



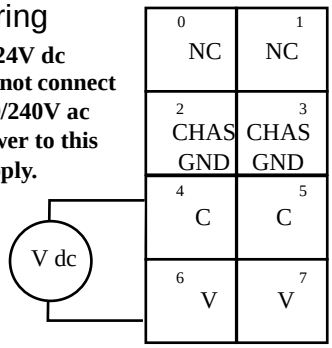
RIO-PSD Power Supply (DC)



NC = No Connection
CHAS GND = Chassis Ground
C = Common
V = Supply

Wiring

12/24V dc
Do not connect 120/240V ac power to this supply.



This dc supply will be connected to the internal power bus.

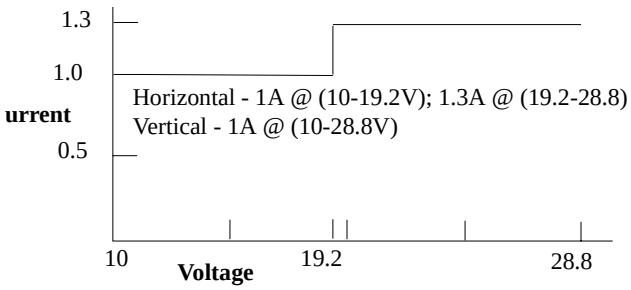
V = 12/24V dc, C = Common
CHAS GND = Chassis ground

Specifications - RIO-PSD Power Supply Module	
I/O Module Capacity (continued in next column)	Up to 17 modules, dependent on backplane bus current draw (17 times 75mA = 1.275A, just under the limit of 1.3A) and mounting position of the PSD. The actual number of modules can vary. Add up the current requirements of the modules you want to use to make sure they do not exceed the amperage limit of the RIO-PSD. (Note: Total expansion up to 63 modules - 13 modules maximum with RIO-DNA and RIO-PBA - add RIO-PSD modules for an additional 17 modules (or less based on current requirements and/or mounting position of the PSD), up to 63 module maximum)

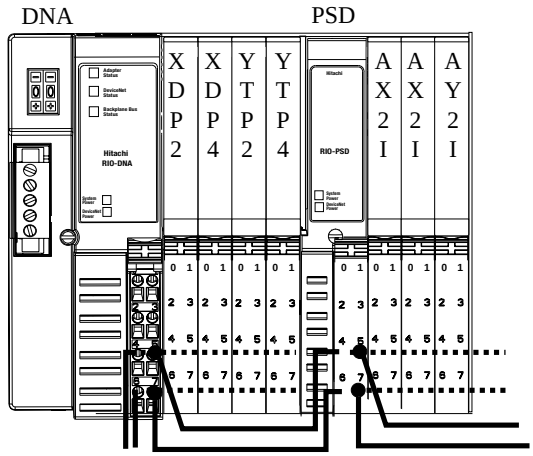
I/O Module Capacity (continued from previous column)	**Cat. No.**	**Backplane Bus Current**
	RIO-XDP2	75mA
	RIO-XDP4	75mA
	RIO-XD2	75mA
	RIO-XD4	75mA
	RIO-YTP2	75mA
	RIO-YTP4	75mA
	RIO-YR2	80mA
	RIO-AX2I	75mA
	RIO-AY2I	75mA
	RIO-AX2V	75mA
	RIO-AY2V	75mA
	RIO-XAH2	75mA
	RIO-YS2	75mA
	RIO-CU5L	160mA
	RIO-CU24L	160mA
	RIO-PT2	220mA
	RIO-TC2	175mA
	RIO-CU5	180mA
	RIO-CU24	180mA
Power Supply	**Note:** In order to comply with CE Low Voltage Directives (LVD), you must use either a NEC Class 2, a Safety Extra Low Voltage (SELV) or a Protected Extra Low Voltage (PELV) power supply to power this adapter.A SELV supply cannot exceed 30V rms, 42.4V peak or 60V dc under normal conditions and under single fault conditions. A PELV supply has the same rating and is connected to protected earth.	
Input Voltage Rating	24V dc nominal; 10-28.8V dc range	
Field Side Power Requirements	24V dc (+20% = 28.8V dc maximum) @ 400mA maximum	
Inrush Current	6A maximum for 10ms	
Indicators	1 Green Field Power Status Indicator 1 Green 5V System Power Indicator	
Output Current to Backplane Bus	**Horizontal mounting -** 1A at 10-19.2V input; 1.3A at 19.2-28.8V input **Vertical mounting -** 1A at 10-28.8V input	
Input Overvoltage Protection	Reverse polarity protected	
Interruption	Output voltage will stay within specifications when input drops out for 10ms at 10V with maximum load.	
Limitations	Use with EH-RIO Adapters only	
General Specifications		
Module Location	Between I/O modules in EH-RIO system Breaks field power bus	
Power Consumption	9.8W maximum @ 28.8V dc	
Power Dissipation	3.0W maximum @ 28.8V dc	
Thermal Dissipation	10.0 BTU/hr maximum @ 28.8V dc	
Isolation Voltage	1250V rms/V ac	
Field Power Bus Supply Voltage Voltage Range	 24V dc nominal 10-28.8V dc range	
Dimensions Inches (Millimeters)	3.00H x 1.00W x 5.25L (76.2H x 25.4W x 133.4L)	

Environmental Cond. Operational Temperature Storage Temperature Relative Humidity Shock Operating Non-operating Vibration	 -20 to 55°C (-4 to 131°F) -40 to 85°C (-40 to 185°F) 5 to 95% noncondensing 30g peak acceleration, 11(±1)ms pulse width 50g peak acceleration, 11(±1)ms pulse width Tested 5g @ 10-500Hz per IEC 68-2-6
Conductors Wire Size	14AWG (2.5mm^2) - 22AWG (0.25mm^2) solid or stranded wire rated @ 75°C or higher 3/64 inch (1.2mm) insulation maximum
Term. Base Screw Torque	7 pound-inches (0.6Nm)
Field Wiring Terminations	0 - No Connection 1 - No Connection 2 - Chassis Ground 3 - Chassis Ground 4 - Common 5 - Common 6 - Supply Voltage 7 - Supply Voltage
Mass	4.38 oz/12.42 grams
Publication Installation Instructions	 IG-RIO-PSD-e
Agency Certification (when product is marked)	**C-UL-US** - UL Listed Industrial Control Equipment, certified for US and Canada **C-UL-US** - UL Listed for Class I, Division 2, Groups A, B, C and D Hazardous locations, certified for US and Canada **CE** - European Union 89/336/EEC EMC Directive,compliant with: EN 50081-2; Industrial Emissions EN 50082-2; Industrial Immunity EN 61326; Meas./Control/Lab., Industrial RequirementsEN 61000-6-2; Industrial Immunity **ODVA** - ODVA Conformance tested to ODVA DeviceNet specifications

Current Derating for Mounting



Example of continuing power



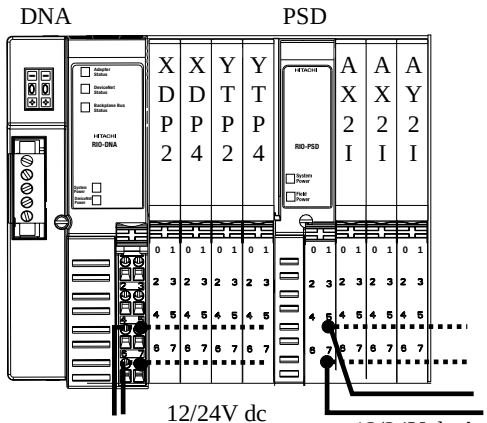
12/24V dc only

Example of continued power.

RIOPS3

Important: The RIO-PSD expansion power supply can **only** be used with EH-RIO adapters.

Example of Functional Partitioning

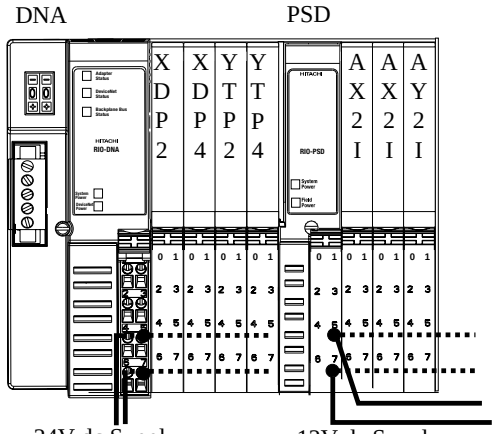


RIOPS1

12/24V dc Digital Supply

12/24V dc Analog Supply

Example of Logical Partitioning



RIOPS1

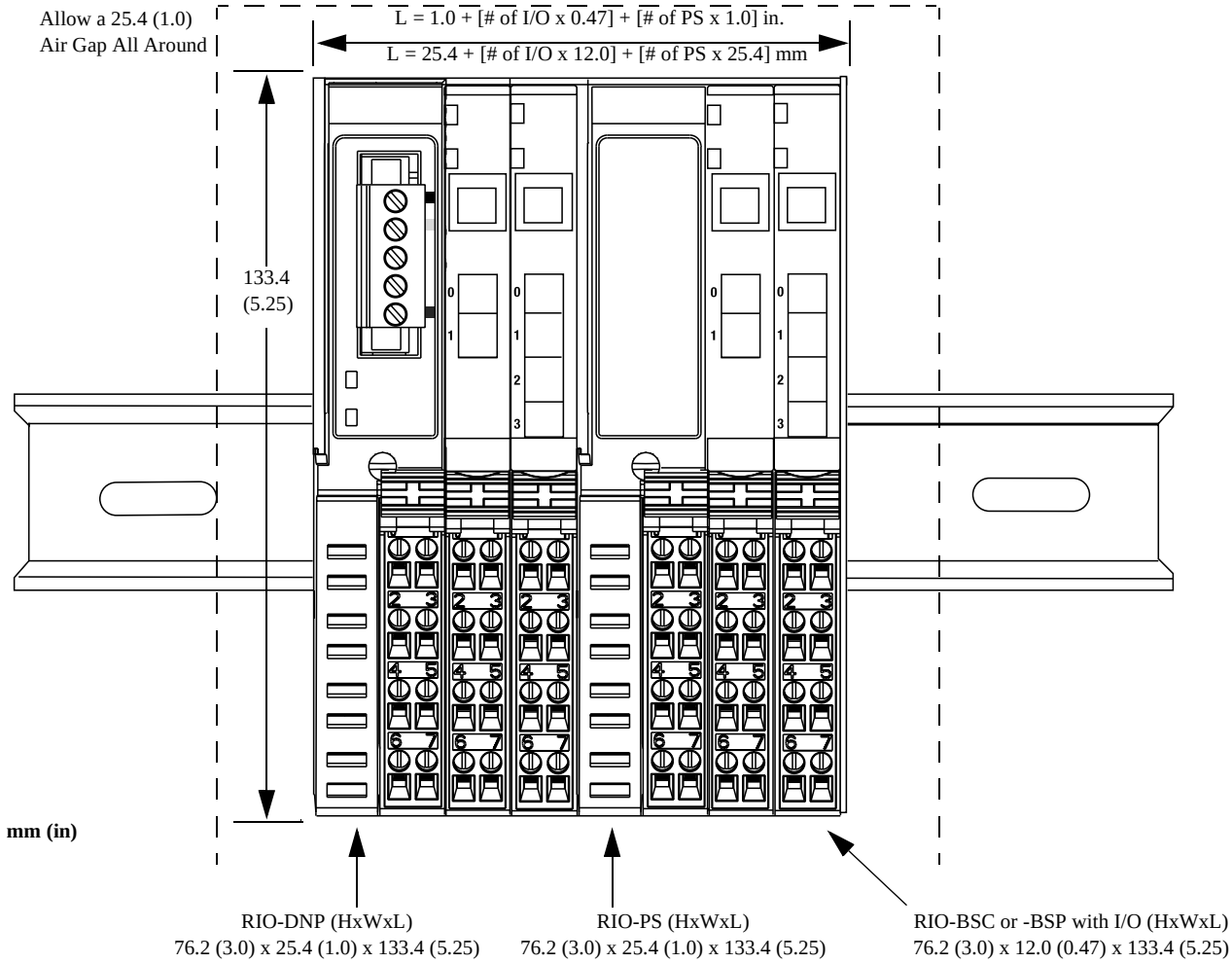
24V dc Supply

12V dc Supply

For electronic copies of these publications, go to:
http://www.hitachi-ds.com/manuals

Catalog Number	Description	Installation Instructions
RIO-DNP	DeviceNet Interface	IG-RIO-DNP-e
RIO-DNA	DeviceNet Adapter	IG-RIO-DNA-e
RIO-PBA	PROFIBUS Adapter	IG-RIO-PBA-e
RIO-BSC	8 Terminal Wiring Base Assembly with Screw-Clamp Removable Terminal Block	IG-RIO-BSx-e
RIO-BSP	8 Terminal Wiring Base Assembly with Spring-Clamp Removable Terminal Block	IG-RIO-BSx-e
RIO-BSC	12 Terminal Wiring Base Assembly with Screw-Clamp Removable Terminal Block	IG-RIO-BSx3-e
RIO-BSP	12 Terminal Wiring Base Assembly with Spring-Clamp Removable Terminal Block	IG-RIO-BSx3-e
RIO-XDP2	24V dc 2 Input Sink Module	IG-RIO-XDPx-e
RIO-XDP4	24V dc 4 Input Sink Module	IG-RIO-XDPx-e
RIO-XD2	24V dc 2 Input Source Module	IG-RIO-XDx-e
RIO-XD4	24V dc 4 Input Source Module	IG-RIO-XDx-e
RIO-YTP2	24V dc Electronically Protected 2 Output Module	IG-RIO-YTPn-e
RIO-YTP4	24V dc Electronically Protected 4 Output Module	IG-RIO-YTPn-e
RIO-AX2I	24V dc Analog 2 Current Input Module	IG-RIO-AX2I-e
RIO-AY2I	24V dc Analog 2 Current Output Module	IG-RIO-AY2I-e
RIO-AX2V	24V dc Analog 2 Voltage Input Module	IG-RIO-AX2V-e
RIO-AY2V	24V dc Analog 2 Voltage Output Module	IG-RIO-AY2V-e
RIO-CU5	5V dc Very High Speed Counter Module	IG-RIO-CU5-e
RIO-CU24	24V dc Very High Speed Counter Module	IG-RIO-CU24-e
RIO-CU5L	5V dc Encoder Counter Module	IG-RIO-CU5L-e
RIO-CU24L	24V dc Encoder Counter Module	IG-RIO-CU24L-e
RIO-PT2	2 RTD Input Module	IG-RIO-PT2-e
RIO-TC2	2 Thermocouple Input Module	IG-RIO-TC2-e
RIO-XAH2	220V ac 2 Input Sink Module	IG-RIO-XAH2-e
RIO-YS2	120/220V ac 2 Input Sink Module	IG-RIO-YS2-e
RIO-YR2	24Vdc, 120V ac, and 240V ac 2 Relay Sink/Source Output Module	IG-RIO-YR2-e
RIO-PS	Field Power Supply	IG-RIO-PS-e
RIO-PSD	Power Supply (DC)	IG-RIO-PSD-e

EH-RIO Mounting Dimensions



HITACHI

Publication TGB-RIO-e - August 2002
Supersedes publication TGB-RIO-e - September 2000