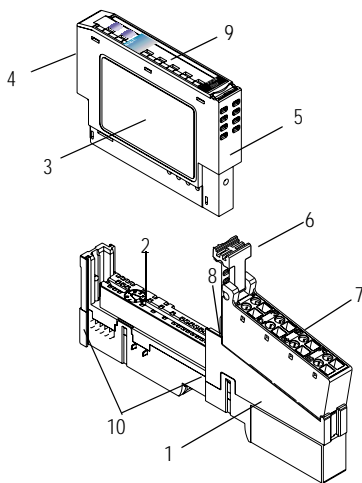


## **EH-RIO RS232 and RS485 ASCII Modules**

Catalog Numbers RIO-RS232 and RIO-RS485



43122

	<b>Description</b>		<b>Description</b>
1	Mounting Base <sup>1</sup>	6	RTB Removal Handle
2	Mechanical Keying (orange)	7	Removable Terminal Block (RTB) <sup>1</sup>
3	Module Wiring Diagram	8	DIN Rail Locking Screw (orange)
4	Module Locking Mechanism	9	Slide-in Writable Label
5	Insertable I/O Module	10	Interlocking Side Pieces

<sup>1</sup> Wiring base assembly consists of item 1) mounting base, RIO-MB and item 7) removable terminal block, RIO-SC.

### Important User Information

Solid state equipment has operational characteristics differing from those of electromechanical equipment.

Because of this difference, and also because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.





In no event will Hitachi Europe be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Hitachi Europe cannot assume responsibility or liability for actual use based on the examples and diagrams.

No patent liability is assumed by Hitachi Europe with respect to use of information, circuits, equipment, or software described in this manual.

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Throughout this manual, when necessary, we use notes to make you aware of safety considerations.

 <b>WARNING</b>	Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.
<b>IMPORTANT</b>	Identifies information that is critical for successful application and understanding of the product.
 <b>ATTENTION</b>	Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you to identify a hazard, avoid a hazard, and recognize the consequence.
 <b>SHOCK HAZARD</b>	Labels may be located on or inside the equipment (for example, drive or motor) to alert people that dangerous voltage may be present.
 <b>BURN HAZARD</b>	Labels may be located on or inside the equipment (for example, drive or motor) to alert people that surfaces may be dangerous temperatures.

**ATTENTION****Environment and Enclosure**

This equipment is intended for use in a Pollution Degree 2 industrial environment, in overvoltage Category II applications (as defined in IEC publication 60664-1), at altitudes up to 2000 meters without derating.

This equipment is considered Group 1, Class A industrial equipment according to IEC/CISPR Publication 11. Without appropriate precautions, there may be potential difficulties ensuring electromagnetic compatibility in other environments due to conducted as well as radiated disturbance.

This equipment is supplied as “open type” equipment. It must be mounted within an enclosure that is suitably designed for those specific environmental conditions that will be present and appropriately designed to prevent personal injury resulting from accessibility to live parts.

See NEMA Standards publication 250 and IEC publication 60529, as applicable, for explanations of the degrees of protection provided by different types of enclosure. Also, see the appropriate sections in this publication.

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**ATTENTION**



**Preventing Electrostatic Discharge**

This equipment is sensitive to electrostatic discharge, which can cause internal damage and affect normal operation. Follow these guidelines when you handle this equipment:

- Touch a grounded object to discharge potential static.
- Wear an approved grounding wriststrap.
- Do not touch connectors or pins on component boards.
- Do not touch circuit components inside the equipment.
- If available, use a static-safe workstation.

When not in use, store the equipment in appropriate static-safe packaging.

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**ATTENTION**



EH-RIO is grounded through the DIN rail to chassis ground. Use zinc-plated, yellow-chromated steel DIN rail to assure proper grounding. Using other DIN rail materials (for example, aluminum or plastic), which can corrode, oxidize, or are poor conductors, can result in improper or intermittent platform grounding.

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## About the Modules

The ASCII modules provide a flexible DeviceNet interface to a wide variety of RS232, RS485, and RS422 ASCII devices. The modules provide the communication connections to the ASCII device.

The RIO-RS232 module connects to the RS232 network while the RIO-RS485 module connects to the RS485 or RS422 network.

## Installing the Mounting Base

To install the mounting base on the DIN rail, proceed as follows.

1. Position the mounting base vertically above the installed units (adapter, power supply, or existing module).
2. Slide the mounting base down allowing the interlocking side pieces to engage the adjacent module or adapter.
3. Press firmly to seat the mounting base on the DIN rail.

The mounting base will snap into place.

## Installing the I/O Module

The module can be installed before or after base installation. Make sure that the mounting base is correctly keyed before installing the module into the mounting base. In addition, make sure the mounting base locking screw is positioned horizontal referenced to the base.

1. Using a bladed screwdriver, rotate the keyswitch (2) on the mounting base clockwise until the number required for the type of module being installed aligns with the notch in the base. Refer to page 1-13 for the keyswitch position.
2. Make certain the DIN rail locking screw is in the horizontal position.

You cannot insert the module if the locking mechanism is unlocked.

3. Insert the module straight down into the mounting base and press to secure.

The module will lock into place.

## Installing the Removable Terminal Block (RTB)

A removable terminal block is supplied with your wiring base assembly. To remove, pull up on the RTB handle. This allows the mounting base to be removed and replaced as necessary without removing any of the wiring. To reinsert the removable terminal block, proceed as follows.

1. Insert the end opposite the handle into the base unit. This end has a curved section that engages with the wiring base.
2. Rotate the terminal block into the wiring base until it locks itself in place.
3. If an I/O module is installed, snap the RTB handle into place on the module.

## Removing a Mounting Base

To remove a mounting base, you must remove any installed module, and remove the removable terminal block (if wired).

1. Unlatch the RTB handle on the I/O module.
2. Pull on the RTB handle to remove the removable terminal block.
3. Press on the module lock on the top of the module.
4. Pull on the I/O module to remove from the base.
5. Use a small-bladed screwdriver to rotate the orange, base-locking screw to a vertical position.

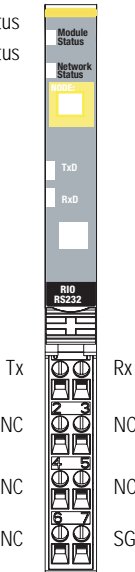
This releases the locking mechanism.

6. Then lift straight up to remove.

## Wiring the RIO-RS232 Module

### RIO-RS232

Module Status  
Network Status



Tx = Transmit  
NC = No Connection

**Shielded Cable:** The RIO-RS232 module requires shielded cable to help reduce the effects of electrical noise coupling. Ground each shield at one end only. A shield grounded at both ends forms a ground loop, which can cause module communications to fault. Never connect a shield to the common side of a logic circuit (this would introduce noise into the logic circuit).

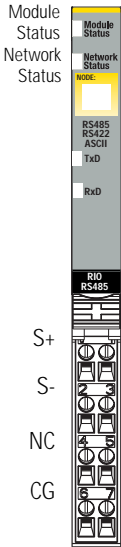
Connect the shield directly to a chassis ground. This chassis ground connection is not available on the RIO-RS232 RTB (removable terminal block). On an EH-RIO system, the chassis ground connection can be made at the DIN Rail, at the metal panel the DIN Rail is mounted to, or at the user's EH-RIO device.

riors232

Rx = Receive  
SG = Signal Ground

## Wiring the RIO-RS485 Module

### RIO-RS485



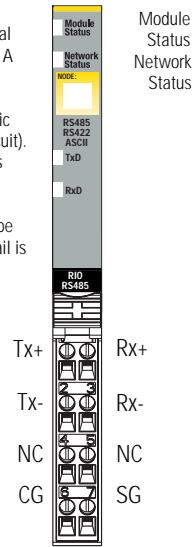
**Shielded Cable:** The RIO-RS485 module requires shielded cable to help reduce the effects of electrical noise coupling. Ground each shield at one end only. A shield grounded at both ends forms a ground loop, which can cause module communications to fault. Never connect a shield to the common side of a logic circuit (this would introduce noise into the logic circuit). Connect the shield directly to a chassis ground. This chassis ground connection is not available on the RIO-RS485 RTB (removable terminal block). On an EH-RIO system, the chassis ground connection can be made at the DIN Rail, at the metal panel the DIN Rail is mounted to, or at the user's EH-RIO device.

31548-MC

S+ = Transmit  
CG = Chassis Ground  
SG = Signal Ground

S- = Receive  
NC = No Connection

### RIO-RS422



Module Status  
Network Status

Tx+  
Tx-  
NC  
CG

Rx+  
Rx-  
NC  
SG

31548-MC

Tx = Transmit  
CG = Chassis Ground  
SG = Signal Ground

Rx = Receive  
NC = No Connection

Module Terminations			
Terminal	RIO-RS232	RIO-RS485	RIO-RS422
0	Tx <sup>1</sup>	S+ <sup>1</sup>	Tx+ <sup>1</sup>
1	Rx <sup>2</sup>	NC	Rx+ <sup>1</sup>
2	NC	S- <sup>2</sup>	Tx- <sup>2</sup>
3	NC	NC	Rx- <sup>2</sup>
4	NC	NC	NC
5	NC	NC	NC
6	NC	CG	CG
7	SG	SG	SC

<sup>1</sup> S+ and Tx+ are transmit from the module.

<sup>2</sup> S- and Rx- are receive into the module.

### RIO-RS232

0 Tx	1 Rx
2 NC	3 NC
4 NC	5 NC
6 NC	7 SG

43124

### RIO-RS485

0 S+	1 NC
2 S-	3 NC
4 NC	5 NC
6 CG	7 SG

43488

### RIO-RS422

0 Tx+	1 Rx+
2 Tx-	3 Rx-
4 NC	5 NC
6 CG	7 SG

43489

Tx, S+ = Transmit  
 NC = No Connection  
 CG = Chassis Ground

Rx, S- = Receive  
 SG = Signal Ground

## Communicating with the ASCII Modules

The ASCII modules operate as the PointBus front-end to your serial device. Data can be exchanged with the DeviceNet adapter through a polled, cyclic, or change-of-state connection. Bit-Strobe Command Response Messaging and the Unconnected Message Manager (UCMM) are not supported<sup>(1)</sup>. The module produces and consumes data as follows.

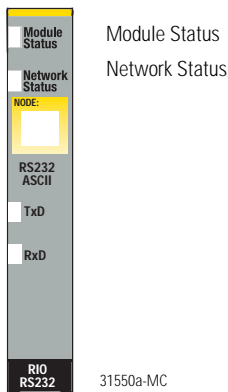
I/O Connection Type	Consumes	Produces
Polled	5-132 bytes	5-132 bytes
Cyclic	5-132 bytes	5-132 bytes
Change-of-State	5-132 bytes	5-132 bytes

For Profibus, 32 bytes of the Profibus's adapter input and output messages are used to transfer up to 118 bytes of serial data. See user manual for further information.

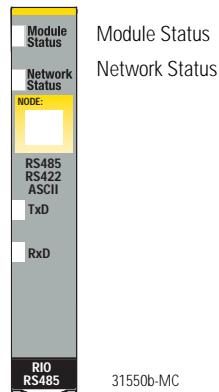
<sup>(1)</sup> If you are not familiar with these terms, see the DeviceNet Specification for definitions (online: [www.odva.org](http://www.odva.org)).

## Troubleshooting with the Indicators

### RIO-RS232



### RIO-RS485



Indication	Probable Cause
<b>Module Status</b>	
Off	No power applied to device
Green	Device operating normally
Flashing Green	Device needs commissioning due to configuration missing, incomplete or incorrect.
Flashing Red	Recoverable fault.
Red	Unrecoverable fault may require device replacement
Flashing Red/Green	Device is in self-test

Indication	Probable Cause
<b>Network Status</b>	
Off	Device is not on-line - Device has not completed dup_MAC_id test. - Device not powered - check module status indicator
Flashing Green	Device is on-line but has no connections in the established state.
Green	Device on-line and has connections in the established state.
Flashing Red	One or more I/O connections in timed-out state
Red	Critical link failure - failed communication device. Device detected error that prevents it communicating on the network.
Flashing Red/Green	Communication faulted device - the device has detected a network access error and is in communication faulted state. Device has received and accepted an Identify Communication Faulted Request - long protocol message.

Indication	Probable Cause
<b>Transmit/Receive Status</b>	
Flashing Transmit/ Off Receive	Check wiring, ground, and RX connection. User parameter object to view record numbers.
Flashing Receive/ Off Transmit	Check wiring. Watch TX light. If it does not flash, check that you are properly initiating transmission. Use EDS parameter object to try transmitting and watch the light. If it flashes, you are not properly initiating transmission via I/O messaging. If it does flash, check the remote device.
Off Transmit/ Green Receive	Check connections as you may have wired the device backwards.

## Specifications

### EH-RIO RS232 and RS485 ASCII Modules - RIO-RS232, RIO-RS485

Specification	Value
Number of Inputs	1 full duplex
Input Voltage "0", Asserted, ON, Space, Active "1", Disasserted, OFF, Mark, Inactive	Signal with respect to Signal Ground (SG) +3 to +25V dc -3 to -25V dc
Indicators	1 green/red module status indicator, logic side 1 green/red network status indicator, logic side 2 green TXD, RXD status indicators, logic side
Keyswitch Position	2 (specialty)
Module Location	RIO-BSC or RIO-BSP wiring base assembly
Pointbus 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 to withstand 2200V dc 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 Fault protected to 28.8V dc

#### Serial Port Parameters

Serial Character Framing	7N2, 7E1, 7O1, 8N1, 8N2, 8E1, 8O1, 7E2, 7O2
Serial Port Comm Speed	9600, 1200, 2400, 4800, 19.2k, 38.4k

#### Serial Port Receive from ASCII Device

Max Number of Receive Chars	1-128 (DeviceNet), 1-118 (Profibus-DP)
Receive Record Start Mode	No, exclude, include start delimiter
Receive Start Delimiter	ASCII character
Receive Record End Mode	No, exclude, include end delimiter
Receive End Delimiter	ASCII character

#### Send (Produce) on DeviceNet to Master

Receive String Data Type	Array, short_string, string
Pad Mode	Pad mode disabled, enabled

**EH-RIO RS232 and RS485 ASCII Modules - RIO-RS232, RIO-RS485**

<b>Specification</b>	<b>Value</b>
Pad Character	ASCII character
Receive Swap Mode	Disabled, 16-bit, 24-bit, 32-bit swap
DeviceNet Handshake Mode	Master/slave handshake, produce immediate
Produce Assembly Size	5-132
Serial Data	1-128 bytes
Receive Transaction ID	0-255
<b>Send (Produce) on Profibus-DP to Master</b>	
Pad Mode	Pad mode disabled, enabled
Pad Character	ASCII character
Receive Swap Mode	Disabled, 16-bit, 24-bit, 32-bit swap
Serial Data	1-118 bytes
<b>Serial Port Transmit to ASCII Device</b>	
Max Number of Transmit Chars	1-128 (DeviceNet), 1-118 (Profibus-DP)
Transmit End Delimiter Mode	No, exclude, include end delimiter
Transmit End Delimiter Character	ASCII character
<b>Consume on DeviceNet from Master</b>	
Consume String Data Type	Array, short_string, string
Transmit Swap Mode	Disabled, 16-bit, 24-bit, 32-bit swap
DeviceNet Record Header Mode	Transmit handshake/immediate
Consume Assembly Size	5-132
<b>Consume on Profibus-DP from Master</b>	
Transmit Swap Mode	Disabled, 16-bit, 24-bit, 32-bit swap
<b>Serial Port Transmit/Explicit Messages</b>	
Transmit Serial Data String	1-128 bytes (DeviceNet), 1-118 bytes (Profibus-DP)
Transmitted Serial Data Length	1-128 bytes (DeviceNet), 1-118 bytes (Profibus-DP)
Transmit Transaction ID	0-255
Status	TX FIFO overflow, RX FIFO overflow, RX parity error, handshake error, new data flag
<b>General Specifications</b>	
Dimensions	Inches (Millimeters)
	2.21H x 0.47W x 2.97L (56H x 12W x 75.5L)

**EH-RIO RS232 and RS485 ASCII Modules - RIO-RS232, RIO-RS485**

Specification	Value
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	IEC 60068-2-27 (Test Ea, Unpackaged Shock)
Operating	30g peak acceleration
Nonoperating	50g peak acceleration
Vibration	IEC 60068-2-6 (Test Fc, Operating) 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 30MHz to 2000MHz 10V/m with 200Hz 50% pulse 100%AM from 900MHz
EFT/B Immunity	IEC 61000-4-4: ±4kV at 2.5kHz on power ports ±2kV at 5kHz on signal ports
Surge Transient Immunity	IEC 61000-4-5: ±1kV line-line(DM) and ±2kV line-earth(CM) on power ports ±2kV line-earth (CM) on shielded ports
Conducted RF Immunity	IEC 61000-4-6: 10Vrms with 1kHz sine-wave 80%AM from 150kHz to 80MHz

## EH-RIO RS232 and RS485 ASCII Modules - RIO-RS232, RIO-RS485

Specification	Value
Emissions	CISPR 11 Group 1, Class A
Enclosure Type Rating	None (open-style)
Conductors Wire Size	14 AWG (2.5mm <sup>2</sup> ) - 22AWG (0.25mm <sup>2</sup> ) shielded solid or stranded copper wire rated at 75 °C or greater 3/64 inch (1.2mm) insulation
RS-232 Field Wiring Terminations	0 - Tx                      1 - Rx 2 - NC                      3 - NC 4 - NC                      5 - NC 6 - NC                      7 - SG
RS-485 Field Wiring Terminations	0 - S+                      1 - NC 2 - S-                      3 - NC 4 - NC                      5 - NC 6 - CG                      7 - SG
RS-422 Field Wiring Terminations	0 - Tx+                      1 - Rx+ 2 - Tx-                      3 - Rx- 4 - NC                      5 - NC 6 - CG                      7 - SG
Terminal Base Screw Torque	7 pound-inches (0.6Nm) maximum
Mass	1.22 oz/34.6 grams
Certifications (when product is marked)	<b>CE</b> - European Union 89/335/EEC EMC Directive, compliant with: EN 61000-6-4; Industrial Emissions EN 50082-2; Industrial Immunity EN 61326; Meas./Control/Lab., Industrial Requirements EN 61000-6-2; Industrial Immunity