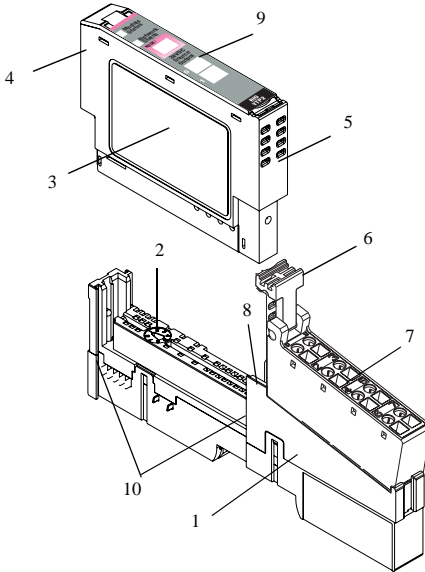


## Installation Instructions

### EH-RIO Protected Output Module (RIO-YTP2, RIO-YTP4 and RIO-YTP8)



	Description		Description
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 or RIO-SP.

### 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 Ltd. 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 Ltd. cannot assume responsibility or liability for actual use based on the examples and diagrams.

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

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

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**WARNING**

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.

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**ATTENTION**

Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you:

- identify a hazard
- avoid a hazard
- recognize the consequence

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**IMPORTANT**

Identifies information that is critical for successful application and understanding of the product.

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**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. The interior of the enclosure must be accessible only by the use of a tool. Subsequent sections of this publication may contain additional information regarding specific enclosure type ratings that are required to comply with certain product safety certifications.

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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**WARNING****EXPLOSION HAZARD**

- Do not disconnect equipment unless power has been removed or the area is known to be nonhazardous.
  - Do not disconnect connections to this equipment unless power has been removed or the area is known to be nonhazardous. Secure any external connections that mate to this equipment by using screws, sliding latches, threaded connectors, or other means provided with this product.
  - Substitution of components may impair suitability for Class I, Division 2.
  - If this product contains batteries, they must only be changed in an area known to be nonhazardous.
-

**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.
- 

**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 (e.g. aluminum, plastic, etc.) which can corrode, oxidize or are poor conductors can result in improper or intermittent platform grounding.

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## 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.
4. To remove the mounting base from the DIN rail, remove the module, and use a small bladed screwdriver to rotate the base locking screw to a vertical position. This releases the locking mechanism. Then lift straight up to remove.

## 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.

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**WARNING**

When you insert or remove the module while backplane power is on, an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding.

- 
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.
  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.

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### WARNING



When you connect or disconnect the Removable Terminal Block (RTB) with field side power applied, an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding.

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## 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.

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### WARNING



When you connect or disconnect the Removable Terminal Block (RTB) with field side power applied, an electrical arc can occur. This could cause an explosion in hazardous location installations.

Be sure that power is removed or the area is nonhazardous before proceeding.

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3. Press on the module lock on the top of the module.

- Pull on the I/O module to remove from the base.

**WARNING**

When you insert or remove the module while backplane power is on, an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding.

- Use a small bladed screwdriver to rotate the orange base locking screw to a vertical position. This releases the locking mechanism.
- Then lift straight up to remove.

Open style devices must be provided with environmental and safety protection by proper mounting in enclosures designed for specific application conditions. See NEMA Standards publication 250 and IEC publication 529, as applicable, for explanations of the degrees of protection provided by different types of enclosures.

## Communicating with Your Module

I/O messages are sent to (consumed) and received from (produced) the EH-RIO modules. These messages are mapped into the processor's memory. This EH-RIO output module produces 1 byte of input data (scanner Rx) (status). It consumes 1 byte of I/O data (scanner Tx).

### Default Data Map for the RIO-YTP2 Output Module

Message size: 1 Byte

	7	6	5	4	3	2	1	0	
Produces (scanner Rx)	Not used						Ch 1	Ch 0	Channel status
Where: 0 = no error, 1 = error									

Message size: 1 Byte

	7	6	5	4	3	2	1	0	
Consumes (scanner Tx)	Not used						Ch 1	Ch 0	Channel state
Where: 0 = Off, 1 = On									

### Default Data Map for the RIO-YTP4 Output Module

Message size: 1 Byte

	7	6	5	4	3	2	1	0	
Produces (scanner Rx)	Not used				Ch 3	Ch 2	Ch 1	Ch 0	Channel status
Where: 0 = no error, 1 = error									

Message size: 1 Byte

	7	6	5	4	3	2	1	0	
Consumes (scanner Tx)	Not used				Ch 3	Ch 2	Ch 1	Ch 0	Channel state
Where: 0 = Off, 1 = On									

### Default Data Map for the RIO-YTP8 Output Module

Message size: 2 Bytes

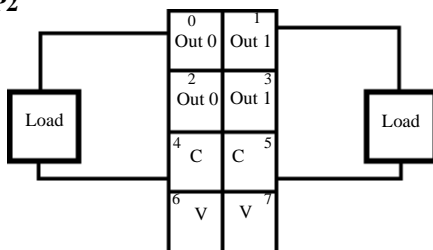
	7	6	5	4	3	2	1	0	
Produces (scanner Rx)	Ch 3	Ch 3	Ch 3	Ch 3	Ch 3	Ch 2	Ch 1	Ch 0	Channel status
Where: 0 = no error, 1 = error									

Message size: 2 Bytes

	7	6	5	4	3	2	1	0	
Consumes (scanner Tx)	Ch 7	Ch 6	Ch 5	Ch 4	Ch 3	Ch 2	Ch 1	Ch 0	Channel state
Where: 0 = Off, 1 = On									



### RIO-YTP2

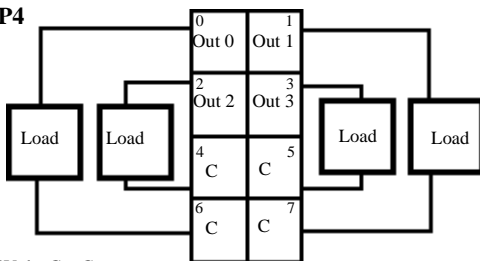


V = 12/24V dc, C = Common  
 Field power is supplied from internal power bus

	Output Terminal	Common Terminal	Power
Channel 0	0, 2	4	6
Channel 1	1, 3	5	7

Module power is supplied from the internal power bus.

### RIO-YTP4

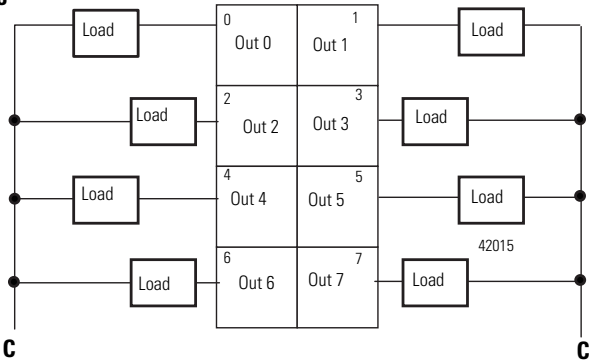


V = 12/24V dc, C = Common  
 Field power is supplied from internal power bus

	Output Terminal	Common Terminal	Power
Channel 0	0	6	
Channel 1	1	7	
Channel 2	2	4	
Channel 3	3	5	

Module power is supplied from internal power bus.

**RIO-YTP8**

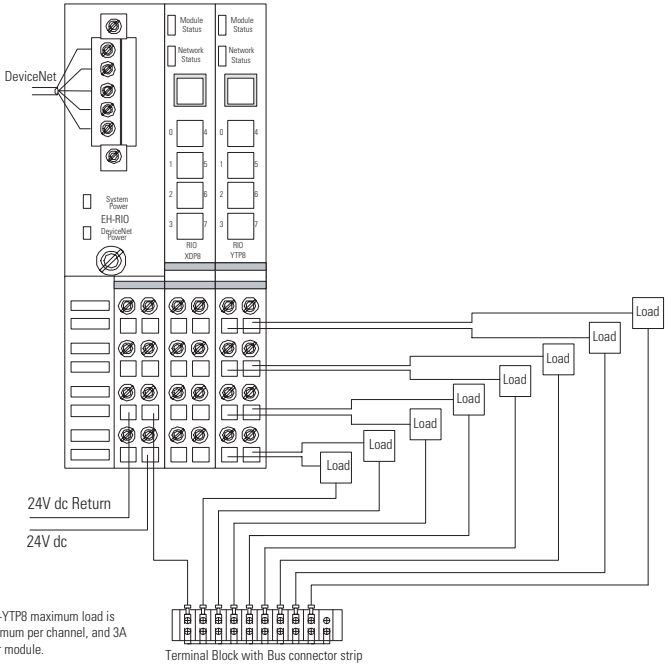


Common must be daisy-chained from an RIO adapter, RIO-PS, RIO-PSD, or from a user-supplied auxiliary terminal block. The 24V dc power to the module is supplied by the internal power bus and comes from the same rio adapter, RIO-PS, or RIO-PSD as common.

Channel Number	Output Terminal	Common Terminal	Power
Channel 0	0	Common is daisy-chained from either an RIO adapter, RIO-PS, RIO-PSD or from a user-supplied external terminal block.	The 24V dc power for the module is supplied by the internal power bus and originates from the same adapter, RIO-PS or RIO-PSD as common.
Channel 1	1		
Channel 2	2		
Channel 3	3		
Channel 4	4		
Channel 5	5		
Channel 6	6		
Channel 7	7		

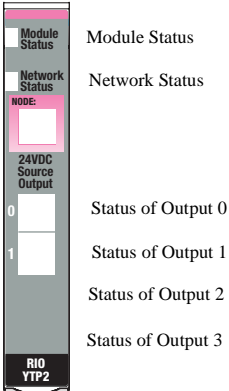
Module power is supplied from the internal power bus.

Example of Wiring for the RIO-YTP8 Output Module

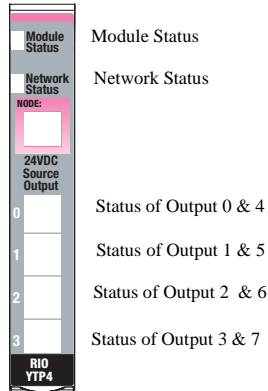


## Troubleshooting with the Indicators

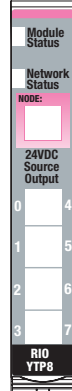
### RIO-YTP2



### RIO-YTP4





### RIO-YTP8



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>I/O Status</b>	
Off	All outputs inactive
Yellow	One or more output is active and under control
Flashing Red	Open circuit detected. No load. (Off-State only)
Red	Short circuit detected. No load (On-State only)

## North American Hazardous Location Approval

<p><b>The following information applies when operating this equipment in hazardous locations:</b></p>		<p><b>Informations sur l'utilisation de cet équipement en environnements dangereux:</b></p>	
<p>Products marked "CL I, DIV 2, GP A, B, C, D" are suitable for use in Class I Division 2 Groups A, B, C, D, Hazardous Locations and nonhazardous locations only. Each product is supplied with markings on the rating nameplate indicating the hazardous location temperature code. When combining products within a system, the most adverse temperature code (lowest "T" number) may be used to help determine the overall temperature code of the system. Combinations of equipment in your system are subject to investigation by the local Authority Having Jurisdiction at the time of installation.</p>		<p>Les produits marqués "CL I, DIV 2, GP A, B, C, D" ne conviennent qu'à une utilisation en environnements de Classe I Division 2 Groupes A, B, C, D dangereux et non dangereux. Chaque produit est livré avec des marquages sur sa plaque d'identification qui indiquent le code de température pour les environnements dangereux. Lorsque plusieurs produits sont combinés dans un système, le code de température le plus défavorable (code de température le plus faible) peut être utilisé pour déterminer le code de température global du système. Les combinaisons d'équipements dans le système sont sujettes à inspection par les autorités locales qualifiées au moment de l'installation.</p>	
<p><b>WARNING</b></p> 	<p><b>EXPLOSION HAZARD -</b></p> <ul style="list-style-type: none"> <li>• Do not disconnect equipment unless power has been removed or the area is known to be nonhazardous.</li> <li>• Do not disconnect connections to this equipment unless power has been removed or the area is known to be nonhazardous. Secure any external connections that mate to this equipment by using screws, sliding latches, threaded connectors, or other means provided with this product.</li> <li>• Substitution of components may impair suitability for Class I, Division 2.</li> <li>• If this product contains batteries, they must only be changed in an area known to be nonhazardous.</li> </ul>	<p><b>AVERTISSEMENT</b></p> 	<p><b>RISQUE D'EXPLOSION –</b></p> <ul style="list-style-type: none"> <li>• Couper le courant ou s'assurer que l'environnement est classé non dangereux avant de débrancher l'équipement.</li> <li>• Couper le courant ou s'assurer que l'environnement est classé non dangereux avant de débrancher les connecteurs. Fixer tous les connecteurs externes reliés à cet équipement à l'aide de vis, loquets coulissants, connecteurs filetés ou autres moyens fournis avec ce produit.</li> <li>• La substitution de composants peut rendre cet équipement inadapté à une utilisation en environnement de Classe 1, Division 2.</li> <li>• S'assurer que l'environnement est classé non dangereux avant de changer les piles.</li> </ul>

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**Specifications - RIO-YTP2, RIO-YTP4 and -YTP8 Protected Output Modules**


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**Output Specifications**


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Number of Outputs	RIO-YTP2 - 2 (1 group of 2) non-isolated, sourcing RIO-YTP4 - 4 (1 group of 4) non-isolated, sourcing RIO-YTP8 - 8 (1 group of 8) non-isolated, sourcing
ON-State Voltage Range	10V dc minimum 24V dc nominal 28.8V dc maximum
ON-State Voltage Drop	0.2V dc maximum
ON-State Current	1.0mA minimum per channel
OFF-State Voltage	28.8V dc maximum
OFF-State Leakage	0.5mA maximum
Output Signal Delay <sup>1</sup> OFF to ON ON to OFF	0.1ms maximum 0.1ms maximum
Output Current Rating	RIO-YTP2 - Maximum 1.0A per output; 2.0A maximum per module RIO-YTP4, RIO-YTP8 - Maximum 1.0A per output; 3.0A maximum per module
Surge Current	2A for 10ms, repeatable every 3 seconds
Indicators (field side indication, logic driven)	<b>RIO-YTP2</b> 2 yellow output status; 2 red output fault 2 green/red module/network status <b>RIO-YTP4</b> 4 yellow output status; 4 red output fault 2 green/red module/network status <b>RIO-YTP8</b> 8 yellow output status; 8 red output fault 2 green/red module/network status
Keyswitch Position	1

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**General Specifications**

Module Location	RIO-BSC or RIO-BSP wiring base assembly
Backplane Bus Current	75mA maximum @ 5V dc
Power Dissipation	RIO-YTP2 - 0.8W maximum @ 28.8V dc RIO-YTP4 - 1.2W maximum @ 28.8V dc RIO-YTP8 - 2.0W maximum @ 28.8V dc
Thermal Dissipation	RIO-YTP2 - 2.7 BTU/hr maximum @ 28.8V dc RIO-YTP4 - 4.1 BTU/hr maximum @ 28.8V dc RIO-YTP8 - 6.8 BTU/hr maximum @ 28.8V dc
External dc Power Supply Voltage Voltage Range Supply Current	24V dc nominal 10 to 28.8V dc RIO-YTP2 - 8mA RIO-YTP4 - 16mA RIO-YTP8 - 32mA
Dimensions Inches (Millimeters)	2.21H x 0.47W x 2.97L (56.0H x 12.0W x 75.5L)
<b>Environmental Conditions</b>	
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 200Hz 50% Pulse 100% AM at 1890Mhz 10V/m with 200Hz 50% Pulse 100% AM at 900Mhz 10V/m with 1kHz sine-wave 80% AM from 30MHz to 2000MHz
EFT/B Immunity	IEC 61000-4-4: ±4kV at 5kHz on signal ports ±4kV at 5kHz on power ports
Surge Transient Immunity	IEC 61000-4-5: ±1kV line-line(DM) and ±2kV line-earth(CM) on power and 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)
Conductors Wire Size	14 AWG (2.5mm <sup>2</sup> ) - 22 AWG (0.25mm <sup>2</sup> ) solid or stranded wire rated at 75°C or higher 3/64 inch (1.2mm) insulation maximum
Terminal Base Screw Torque	7 pound-inches (0.8Nm)
Field Wiring Terminations	<p><b>RIO-YTP2</b></p> <p>0 - Output 0                      1 - Output 1 2 - Output 0                      3 - Output 1 4 - Common                        5 - Common 6 - Supply                         7 - Supply</p> <p><b>RIO-YTP4</b></p> <p>0 - Output 0                      1 - Output 1 2 - Output 2                      3 - Output 3 4 - Common                        5 - Common 6 - Common                        7 - Common</p> <p><b>RIO-YTP8</b></p> <p>0 - Output 0                      1 - Output 1 2 - Output 2                      3 - Output 3 4 - Output 4                        5 - Output 5 6 - Output 6                        7 - Output 7</p>
Mass	RIO-YTP2 - 1.15 oz/32.60 grams RIO-YTP4 - 1.17 oz/33.17 grams RIO-YTP8 - 1.25 oz/35.4 grams

<p>Certifications (when product is marked)</p>	<p><b>C-UL-US</b> - UL Listed Industrial Control Equipment, certified for US and Canada  <b>C-UL-US</b> - UL Listed for Class I, Division 2, Groups A, B, C and D Hazardous locations, certified for US and Canada  <b>CE</b> European Union 89/336/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</p>
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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.



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