User's Manual Pub. 0300242-01 Rev. A

1794 Isolated RTD/Thermocouple Module

Catalog Number: 1794sc-IRT8I

SPECTRUM
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Important Notes

1. Please read all the information in this owner’s guide before installing the product.
2. The information in this owner's guide applies to hardware Series A and firmware version 1.0 or later.
3. This guide assumes that the reader has a full working knowledge of the relevant processor.

Notice

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Table of Contents

PREFACE

Read this preface to familiarize yourself with the rest of the manual. This preface covers the following topics:

- Who should use this manual
- How to use this manual
- Related publications
- Conventions used in this manual
- Rockwell Automation support

Who Should Use This Manual

Use this manual if you are responsible for designing, installing, programming, or troubleshooting control systems that use Allen-Bradley I/O and/or compatible controllers, such as MicroLogix, CompactLogix, ControlLogix, SLC 500 or PLC 5.

How to Use This Manual

As much as possible, we organized this manual to explain, in a task-by-task manner, how to install, configure, program, operate and troubleshoot a control system using the 1794sc-IRT8I.

Related Documentation

The table below provides a listing of publications that contain important information about Allen-Bradley PLC systems.

Document Title	Document Number
1794 Flex IO Product Data	1794-2.1
CompactLogix System Overview	1769-SO001A-EN-P
ControlLogix System User Manual	1756-6.5.13-SEP99
ControlNet Modules in Logix5000 Control Systems User Manual	CNET-UM001C-EN-P
EtherNet/IP Modules in Logix5000 Control Systems User Manual	ENET-UM001G-EN-P
Allen-Bradley Programmable Controller Grounding and Wiring Guidelines	1770-4.1

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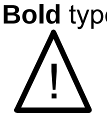
Conventions Used in This Manual

The following conventions are used throughout this manual:

- Bulleted lists (like this one) provide information not procedural steps.
- Numbered lists provide sequential steps or hierarchical information.
- *Italic* type is used for emphasis
- **Bold** type identifies headings and sub-headings
-  Attention Are used to identify critical information to the reader

Chapter 1
Module Overview

This chapter describes the 1794sc-IRT8I Isolated Universal input module and explains how the module reads current, voltage, RTD, resistance and thermocouple/millivolt analog input data. Included is information about:

- General description
- Input types and ranges
- Data Formats and filter frequencies
- Hardware Features
- System overview and module operation
- Auto-calibration

Section 1.1 General Description

The isolated RTD/Thermocouple module supports current, voltage, RTD, resistance, thermocouple and millivolt type inputs. The module digitally converts and stores analog data from any combination mentioned above. Each input channel is individually configured via software for a specific input device, data format, filter frequency, and provides open-circuit, over-range, under-range detection and indication.

Section 1.2 Input Types and Ranges

The tables below list the input types and their associated ranges.

Input Type	Range	
B Type Thermocouple	300 to 1820 ˚C	(572 to 3308 ˚F)
C Type Thermocouple	0 to 2315 ˚C	(32 to 4199 ˚F)
E Type Thermocouple	-270 to 1000 ˚C	(-454 to 1832 ˚F)
J Type Thermocouple	-210 to 1200 ˚C	(-346 to 2192 ˚F)
K Type Thermocouple	-270 to 1370 ˚C	(-454 to 2498 ˚F)
N Type Thermocouple	-210 to 1300 ˚C	(-346 to 2372 ˚F)
R Type Thermocouple	0 to 1768 ˚C	(32 to 3214 ˚F)
S Type Thermocouple	0 to 1768 ˚C	(32 to 3214 ˚F)
T Type Thermocouple	-270 to 400 ˚C	(-270 to 752 ˚F)
100 Ω Pt α 0.385	-200 to 850 ˚C	(-328 to 1562 ˚F)
200 Ω Pt α 0.385	-200 to 850 ˚C	(-328 to 1562 ˚F)
500 Ω Pt α 0.385	-200 to 850 ˚C	(-328 to 1562 ˚F)
1000 Ω Pt α 0.385	-200 to 850 ˚C	(-328 to 1562 ˚F)
100 Ω Pt α 0.3916	-200 to 630 ˚C	(-328 to 1166 ˚F)
200 Ω Pt α 0.3916	-200 to 630 ˚C	(-328 to 1166 ˚F)
500 Ω Pt α 0.3916	-200 to 630 ˚C	(-328 to 1166 ˚F)
1000 Ω Pt α 0.3916	-200 to 630 ˚C	(-328 to 1166 ˚F)
10 Ω Cu α 0.426	-100 to 260 ˚C	(-148 to 500 ˚F)
100 Ω Ni α 0.618	-100 to 260 ˚C	(-148 to 500 ˚F)

Input Type	Range	
120 Ω Ni α 0.672	-80 to 260 ˚C	(-112 to 500 ˚F)
604 Ω NiFe α 0.518	-100 to 200 ˚C	(-148 to 392 ˚F)
Resistance	0 to 150 Ω	
	0 to 1000 Ω	
	0 to 3000 Ω	
Voltage	+/- 50 mV	
	+/- 100 mV	

Section 1.3 Data Formats

For each module the data can be configured for:

- Engineering units x 1
- Engineering units x 10
- Scaled-for-PID
- Percent of full-scale
- Raw/proportional data
- CJC Engineering Units
- CJC scaled-for-PID
- CJC percent of full range

Section 1.4 Filter Frequencies

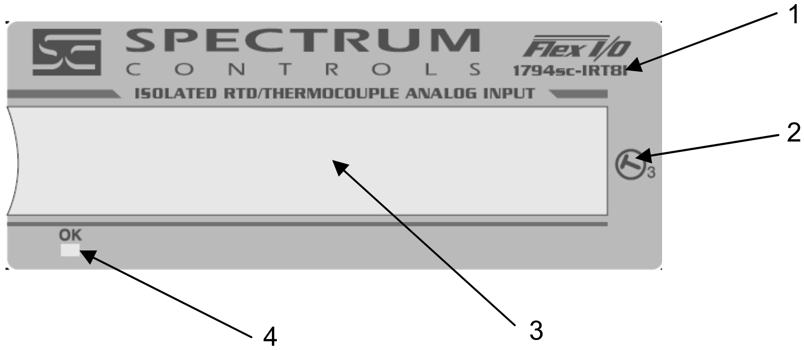
The module uses a digital filter that provides high frequency noise rejection for each input signal. The filter for each channel is programmable allowing you to select from six different filter frequencies:

- 4.17 Hz
- 10 Hz
- 16.7 Hz
- 19.6 Hz
- 62 Hz
- 470 Hz

Section 1.5 Hardware Features

Each module requires a terminal base unit. Terminal base units are connected together to form the backplane for the system. Each base unit contains terminals for field terminations. Field terminations are wired as differential inputs with the exception of RTD and resistance type inputs. Two cold junction compensation (CJC) sensors can be added to the terminal base unit to enable accurate readings when using thermocouple input types. Each CJC sensor compensates for offset voltages introduced into the input signal as a result of the cold-junction where the thermocouple wires come into contact with the base unit. Module configuration is accomplished using the controller's programming software. In addition, some controllers support configuration via the user program. In either case, the module configuration is stored in the memory of the controller. Refer to your controller's user manual for more information. The illustration below shows the module's hardware features.

Figure 1-1



Item	Description
1	Module Catalog Number
2	Module key-switch position
3	Removable label
4	Power/Status LED

Section 1.6 System Overview

The module communicates to the controller through the base unit bus interface. The module also receives 5 and 24V dc power through the bus interface.

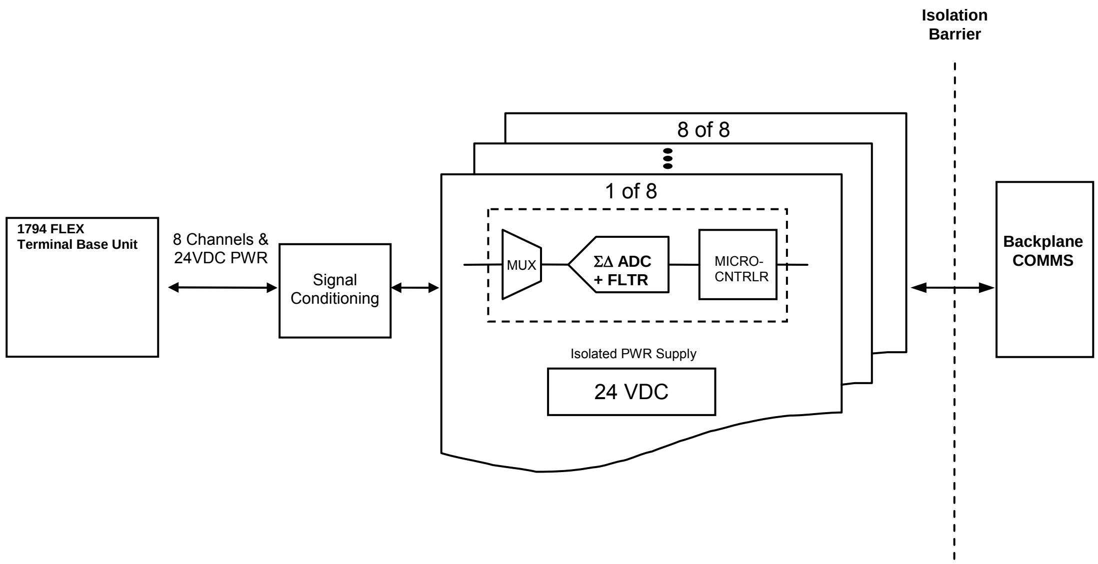
Note: An external power supply is required for all 2-wire transmitters.

1.6.1 Module Power-up

At power-up, the module performs a check of its internal circuits, memory and basic functions. After power-up checks are complete, the module waits for valid channel configuration data. If an invalid configuration is detected, the module generates a configuration error. Once a channel is properly configured and enabled, it continuously converts the input data to a digital value within the currently selected data range. Each time a channel is read by the input module, that data value is tested by the module for an over-range, under-range, or open-circuit condition. If such a condition is detected, a unique bit is set in the channel status word. The channel status word is described in the Input Data File in Chapter 3. Using the module image table, the controller reads the two's complement binary converted input data from the module. This typically occurs at the end of the program scan or when commanded by the control program. If the controller and the module determine that the data transfer has been made without error, the data is made available to the control program.

Section 1.7 Module Operation

The module measures each analog signal using a dedicated A/D converter for each channel. The converter reads the signal and converts it as required for the type of input selected. If thermocouples are being utilized, the module continuously samples each CJC sensor and compensates for temperature changes at the terminal base cold junction, between the thermocouple wire and the input terminal. See the block diagram below.



The module is designed to support up to 8 isolated channels of RTD, resistance, voltage, current, or thermocouple.

Thermocouple measurements utilize two cold junction compensation sensors placed at two different locations on the terminal base unit. The location of each CJC sensor was chosen to calculate the overall CJC error accurately for each channel. Thermocouple support includes types J, K, T, E, R, S, B, N, and C. In thermocouple mode the 1794sc-IRT8I will measure thermocouple and CJC voltages and convert the results to a linearized temperature reading.

RTD support includes types Pt 385, Pt 3916, Ni 618, Ni 672, Cu 426, and NiFe 518. In RTD and resistance mode the module will inject a constant current through the RTD or resistor, measure the voltage across the resistance and convert to a linearized temperature or resistance reading. The IFIU supports 2 and 3 wired RTD inputs.

When configured for current or voltage type inputs, the module converts the analog values directly into digital counts.

Chapter 2
Installation and Wiring

This chapter will cover:

- Compliance to European union directives
- General considerations
- Power requirements
- Installing the module
- Field wiring connections

Section 2.1 Compliance to European Union Directives

This product is approved for installation within the European Union and EEA regions. It has been designed and tested to meet the following directives.

2.1.1 EMC Directive

The 1794sc-IRT8I module is tested to meet Council Directive 89/336/EEC Electromagnetic Compatibility (EMC) and the following standards, in whole or in part, documented in a technical construction file:

- EN 61000-6-4EMC – Generic Emission Standard, Part 2 - Industrial Environment
- EN 61000-6-2EMC – Generic Immunity Standard, Part 2 - Industrial Environment

This product is intended for use in an industrial environment.

2.1.2 Low Voltage Directive

This product is tested to meet Council Directive 2006/99/EC Low Voltage, by applying the safety requirements of EN 61131-2Programmable Controllers, Part 2 – Equipment Requirements and Tests. For specific information required by EN61131-2, see the appropriate sections in this publication, as well as the following Allen-Bradley publications:

- *Industrial Automation, Wiring and Grounding Guidelines for Noise Immunity*, publication 1770-4.1
- *Automation Systems Catalog*, publication B113

Section 2.2 General Considerations

Flex I/O is suitable for use in an industrial environment when installed in accordance with these instructions. Specifically, this equipment is intended for use in clean, dry environments Pollution degree 2[1] and to circuits not exceeding Over Voltage Category II[2](IEC 60664-1)[3].

2.2.1 Hazardous Location Considerations

This equipment is suitable for use in Class I, Division 2, Groups A, B, C, D or non-hazardous locations only. The following WARNING statement applies to use in hazardous locations.

⚠ Attention

EXPLOSION HAZARD

- **Substitution of components may impair suitability for Class I, Division 2.**
- **Do not replace components or disconnect equipment unless power has been switched off or the area is known to be non-hazardous.**
- **Do not connect or disconnect components unless power has been switched off or the area is known to be non-hazardous.**
- **This product must be installed in an enclosure.**
- **All wiring must comply with N.E.C. article 501-4(b).**

2.2.2 Prevent Electrostatic Discharge

⚠ Attention

Electrostatic discharge can damage integrated circuits or semiconductors if you touch analog I/O module bus connector pins or the terminal block on the input module. Follow these guidelines when you handle the module:

- **Touch a grounded object to discharge static potential.**
- **Wear an approved wrist-strap grounding device.**
- **Do not touch the bus connector or connector pins.**
- **Do not touch circuit components inside the module.**
- **If available, use a static-safe work station.**
- **When it is not in use, keep the module in its static-shield bag.**

[1] Pollution Degree 2 is an environment where, normally, only non-conductive pollution occurs except that occasionally a temporary conductivity caused by condensation shall be expected.
[2] Over Voltage Category II is the load level section of the electrical distribution system. At this level transient voltages are controlled and do not exceed the impulse voltage capability of the product's insulation.
[3] Pollution Degree 2 and Over Voltage Category II are International Electrotechnical Commission (IEC) designations.

2.2.3 Remove Power

Attention

Remove power before removing or inserting this module. When you remove or insert a module with power applied, an electrical arc may occur. An electrical arc can cause personal injury or property damage by:

- **Sending an erroneous signal to your system's field devices, causing unintended machine motion**
- **Causing an explosion in a hazardous environment**

Electrical arcing causes excessive wear to contacts on both the module and its mating connector and may lead to premature failure.

2.2.4 Selecting a Location

Reducing Noise

Most applications require installation in an industrial enclosure to reduce the effects of electrical interference. Analog inputs are highly susceptible to electrical noise. Electrical noise coupled to the analog inputs will reduce the performance (accuracy) of the module. Group your modules to minimize adverse effects from radiated electrical noise and heat. Consider the following conditions when selecting a location for the analog module. Position the module:

- Away from sources of electrical noise such as hard-contact switches, relays, and AC motor drives
- Away from modules which generate significant radiated heat, such as the 1794-OB32. Refer to the module's heat dissipation specification.

In addition, route shielded, twisted-pair analog input wiring away from any high voltage I/O wiring.

Section 2.3 Power Requirements

The module receives power through the bus interface from the +5V dc/+24V dc system power supply. The maximum current drawn by the module is shown in the table below.

5 VDC	24 VDC
80 mA	240 mA

The wiring of the terminal base unit is determined by the current draw through the terminal base. Make certain that the current draw does not exceed 10A.

Attention

Total current draw through the terminal base unit is limited to 10A. Separate power connections may be necessary.

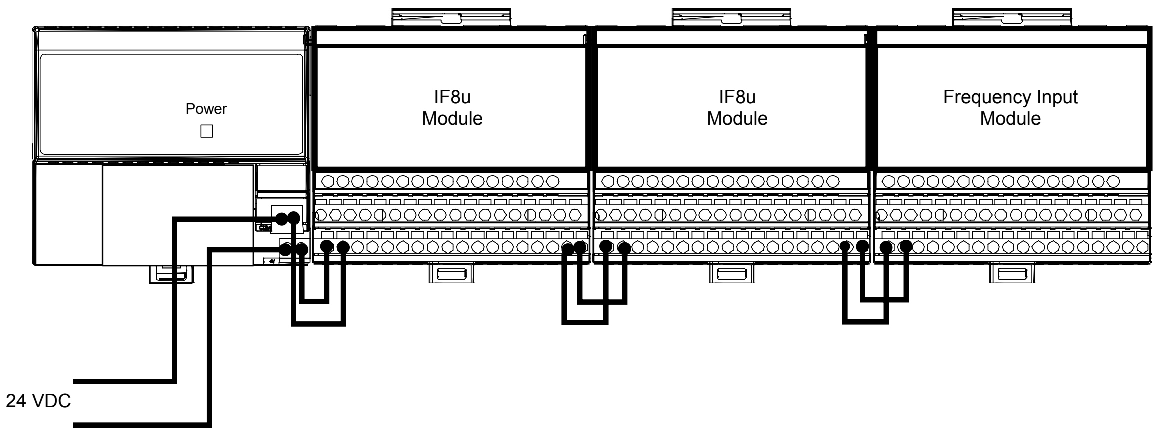
Methods of wiring the terminal base units are shown in the illustration below.

2.3.1 Wiring the Terminal Base Units (1794-TB3G shown)

Attention

Do not daisy chain power or ground from the terminal base unit to any ac or dc digital module terminal base unit.

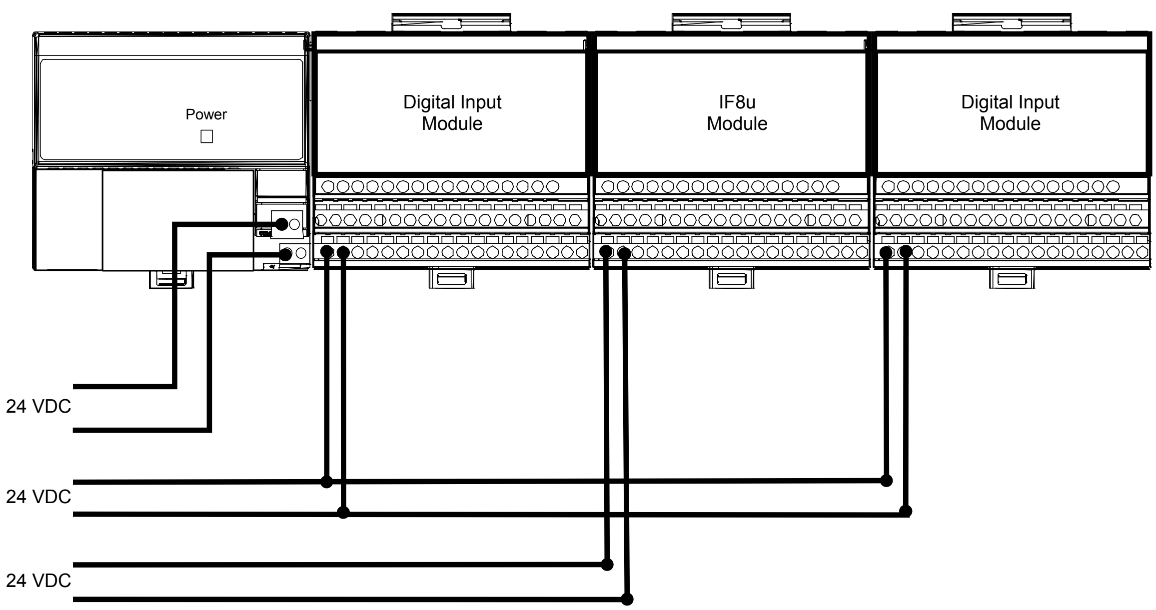
Daisy-chaining



Note: All modules must be frequency or IRT8I modules for this configuration.

Wiring when total current draw is less than 10A

Individual

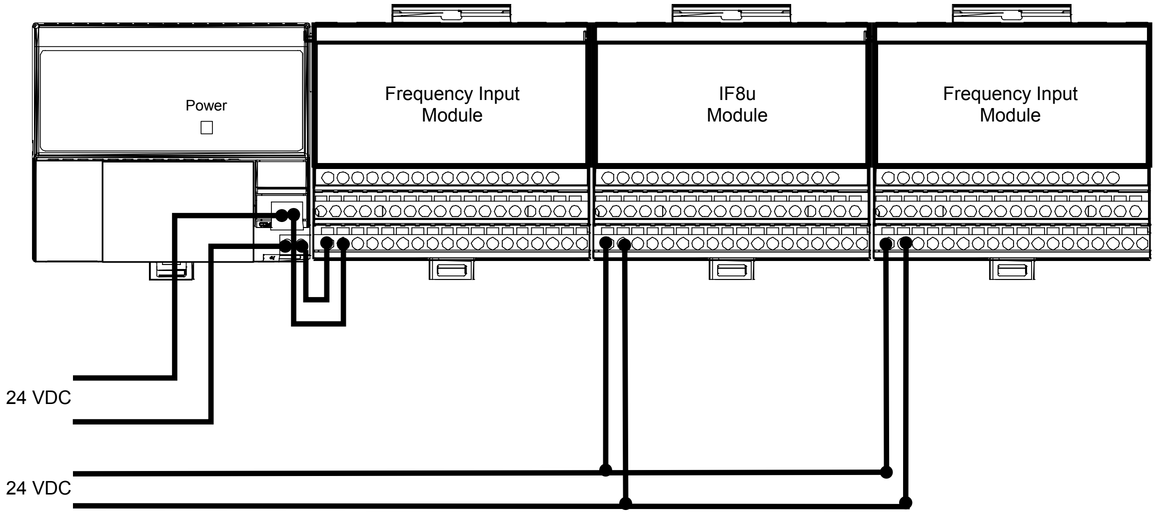


Note: Use this configuration if using any "noisy" dc digital I/O modules in your system.

IRT8I module wiring separate from digital wiring

Wiring when total current draw is greater than 10A

Combination



Note: All modules powered by the same power supply must be frequency or IRT8I modules for this configuration.

Total current draw through any base unit must not be greater than 10A

Section 2.4 Installing the Module

Installation of the analog module consists of:

- Mounting the terminal base unit
- Installing the IRT8I module into the terminal base unit
- Installing the connecting wiring to the terminal base unit

If you are installing your module into a terminal base unit that is already installed, proceed to “Mounting the IRT8I Module on the Terminal Base Unit” on page 2-9.

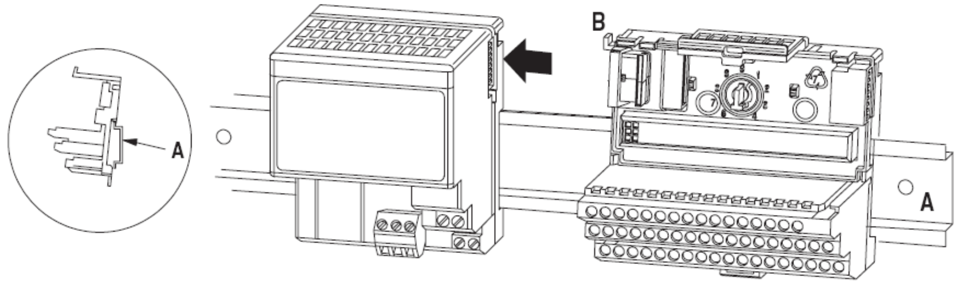
2.4.1 Mounting the Terminal Base Unit on a DIN Rail

Attention

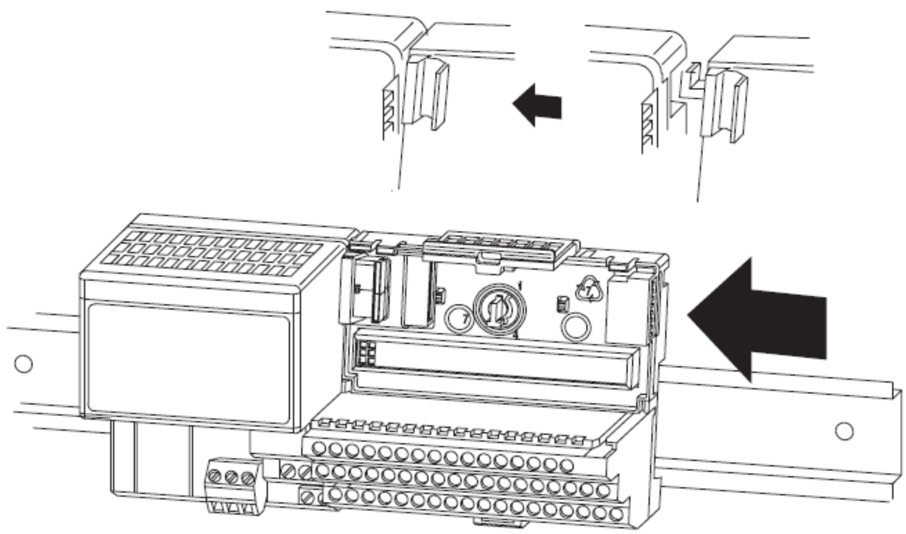
Do not remove or replace a terminal base unit when power is applied. Interruption of the flexbus can result in unintended operation or machine motion.

1) Remove the cover plug (if used) in the male connector of the unit to which you are connecting this terminal base unit.
2) Check to make sure that the 16 pins in the male connector on the adjacent device are straight and in line so that the mating female connector on this terminal base unit will mate correctly.

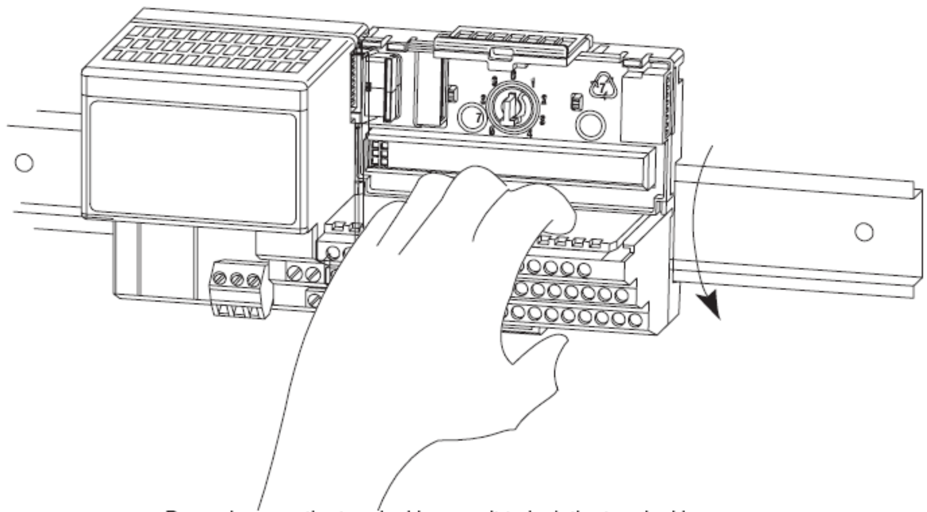
3) Position the terminal base on the 35 x 7.5mm DIN rail A (A-B pt.no. 199-DR1; 46277-3) at a slight angle with hook B on the left side of the terminal base hooked into the right side of the unit on the left. Proceed as follows:



Position terminal base at a slight angle and hooked over the top of the DIN rail.



Slide the terminal base unit over tight against the adapter.
Make sure the hook on the terminal base slides under the edge of the adapter and the flexbus connector is fully retracted.



Press down on the terminal base unit to lock the terminal base on the DIN rail. If the terminal base does not lock into place, use a screwdriver or similar device to open the locking tab, press down on the terminal base until flush with the DIN rail and release the locking tab to lock the base in place.

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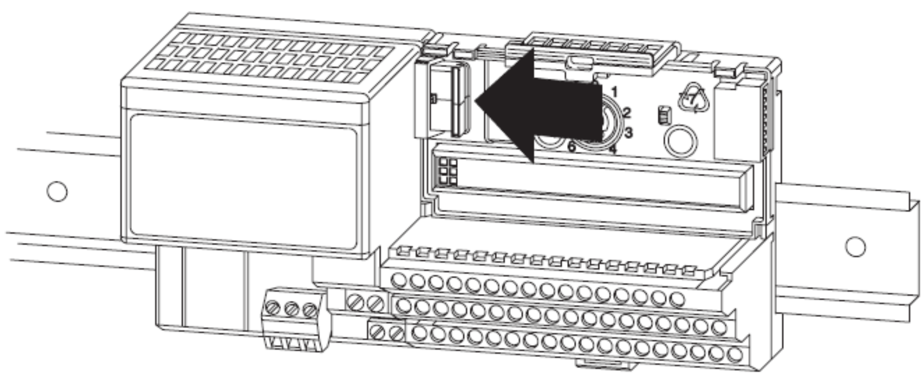


Gently push the flexbus connector into the side of the adapter to complete the backplane connection.

4) Repeat the above steps to install the next terminal base.

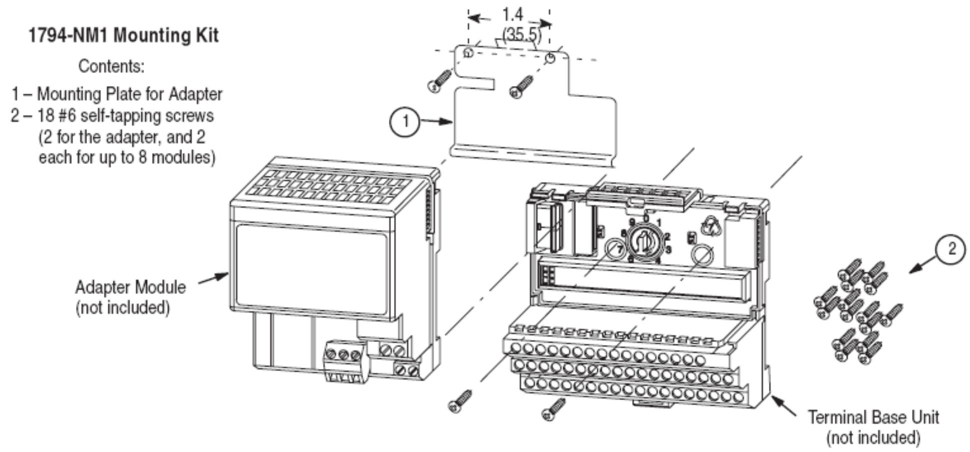
2.4.2 Panel/Wall Mounting

Installation on a wall or panel consists of:

- Laying out the drilling points on the wall or panel
- Drilling the pilot holes for the mounting screws
- Mounting the adapter mounting plate
- Installing the terminal base units and securing them to the wall or panel

If you are installing your module into a terminal base unit that is already installed, proceed to “Mounting the IRT8I Module on the Terminal Base Unit” on page 2-9.

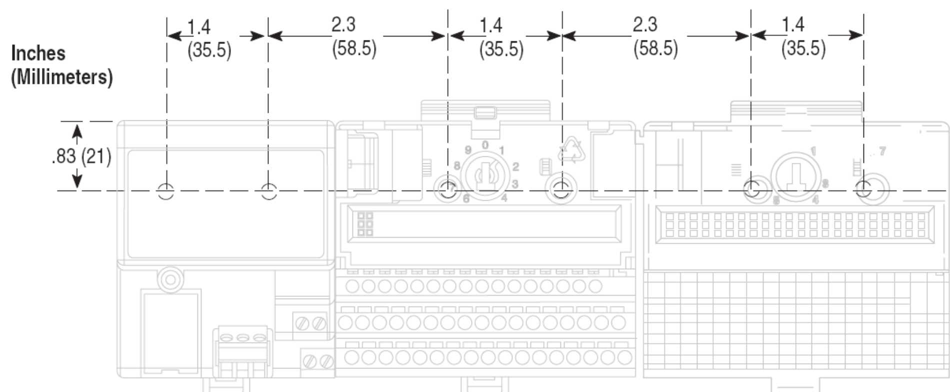
Use the mounting kit Cat. No. 1794-NM1 for panel/wall mounting.



To install the mounting plate on a wall or panel:

1) Lay out the required points on the wall/panel as shown in the drilling dimension drawing.

Drilling Dimensions for Panel/Wall Mounting of Flex IO



2) Drill the necessary holes for the #6 self-tapping mounting screws.
3) Mount the mounting plate (1) for the adapter module using two#6 self-tapping screws (18 included for mounting up to 8 modules and the adapter).

Attention

Make certain that the mounting plate is properly grounded to the panel. Refer to "Industrial Automation Wiring and Grounding Guidelines," publication1770-4.1.

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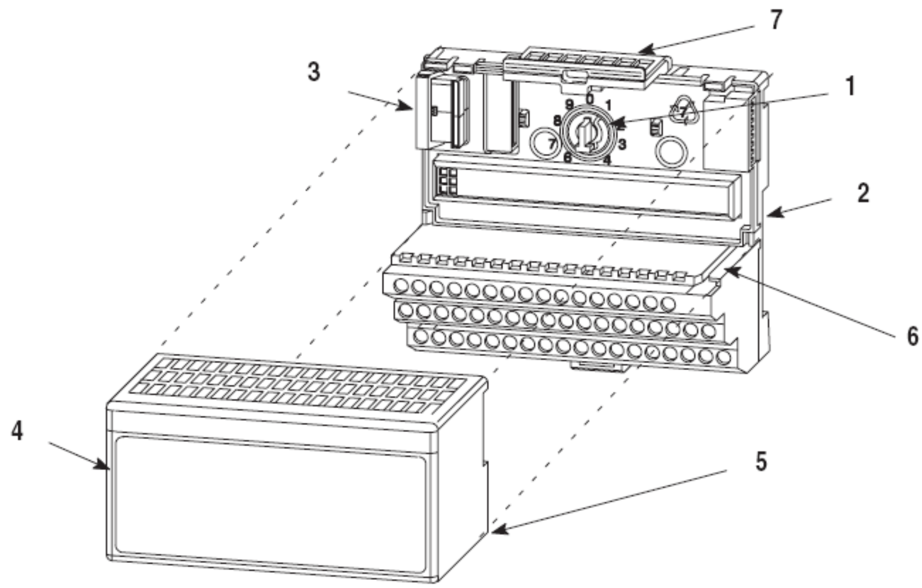
4) Hold the adapter (2) at a slight angle and engage the top of the mounting plate in the indention on the rear of the adapter module.
5) Press the adapter down flush with the panel until the locking lever locks.
6) Position the terminal base unit up against the adapter and push the female bus connector into the adapter.
7) Secure to the wall with two #6 self-tapping screws.
8) Repeat for each remaining terminal base unit.

Note: The adapter is capable of addressing eight modules. Do not exceed a maximum of eight terminal base units in your system.

2.4.3 Mounting the IRT8I Module on the Terminal Base Unit

The IRT8I isolated input module mounts on a 1794-TB3G or TB3GS terminal base unit.

1) Rotate the key-switch (1) on the terminal base unit (2) clockwise to position 3 as required for the IRT8I module.



2) Make certain the flexbus connector (3) is pushed all the way to the left to connect with the neighboring terminal base/adapter. **You cannot install the module unless the connector is fully extended.**
3) Make sure that the pins on the bottom of the module are straight so they will align properly with the connector in the terminal base unit.

Attention

This module is UL listed only when used with listed Allen-Bradley catalog numbers 1794-TB3G or TB3GS terminal base units.

Attention

Remove field-side power before removing or inserting the module. This module is designed so you can remove and insert it under backplane power. When you remove or insert a module with field-side power applied, an electrical arc may occur. An electrical arc can cause personal injury or property damage by:

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

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

4) Position the module (4) with its alignment bar (5) aligned with the groove (6) on the terminal base.
5) Press firmly and evenly to seat the module in the terminal base unit. The module

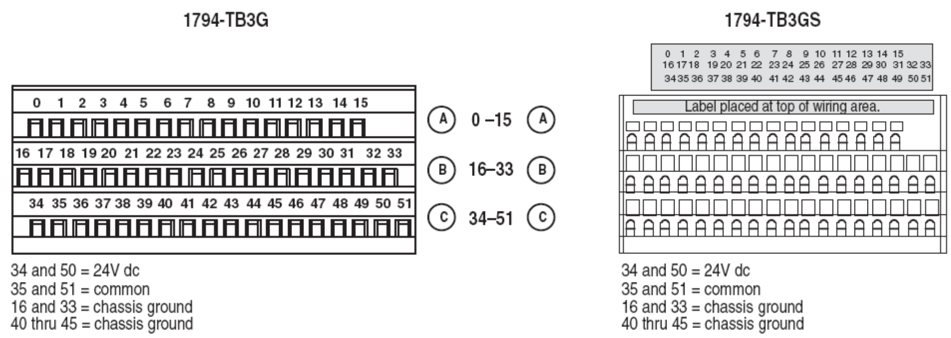
is seated when the latching mechanism (7) is locked into the module.

6) Repeat the above steps to install the next module in its terminal base unit.

Section 2.5 Field Wiring Connections

Wiring to the IRT8I module is made through the terminal base unit on which the module mounts. Compatible terminal base units are:

Module	1794-TB3G	1794-TB3GS
1794sc-IRT8I	Yes	Yes



2.5.1 Field Wiring using a 1794-TB3G and TB3GS Terminal Base

1) Connect the individual signal wiring to numbered terminals on the 0–15 row (A) and 17–32 row(B) on the terminal base unit. Connect the input devices as shown in the wiring table on page 2-11 .
2) Terminate shields: to terminals 16 or 33 on row B, or 40 through 45 on row C.
3) Connect +24V dc to terminal 34 on the 34-51 row (C), and 24V common to terminal 35 on the 34-51 row (C).

Attention

To reduce susceptibility to noise, power IRT8I modules and digital modules from separate power supplies. Do not exceed a length of 33ft (10m) for dc power cabling.

4) If daisy chaining the +24V dc power to the next base unit, connect a jumper from terminal 50 (+24V) on this base unit to terminal 34 and from terminal 51 (24V dc common) to terminal 35 on the next base unit.

Attention

Do not daisy chain power or ground from the IRT8I terminal base unit to any ac or dc digital module terminal base unit.

Attention

The IRT8I module does not receive power from the backplane. +24V dc power must be applied to your module before operation. If power is not applied, the module position will appear to the adapter as an empty slot in your chassis. If the adapter does not recognize your module after installation is completed, cycle power to the adapter.

Attention

Use supply wire for 10˚C above surrounding ambient.

Figure 2-1

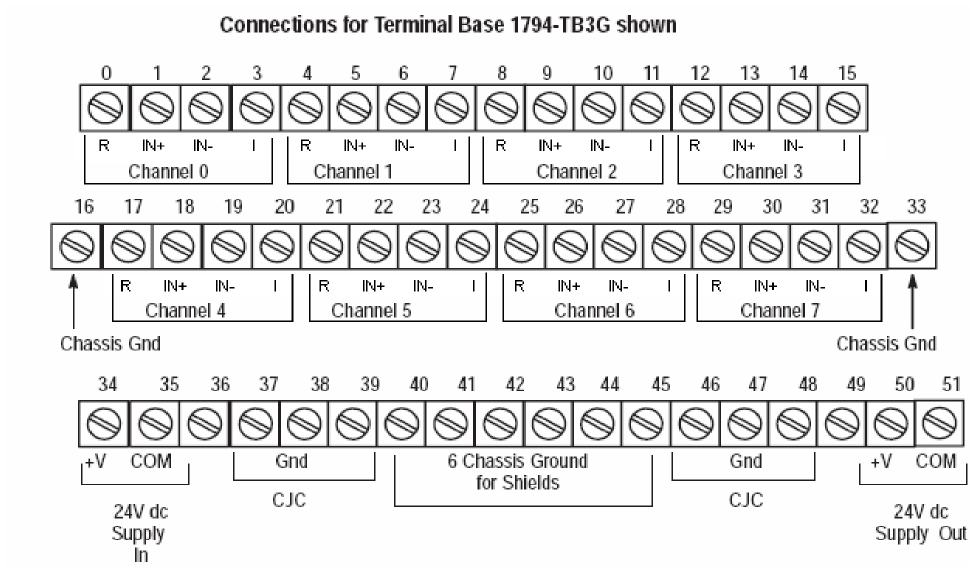
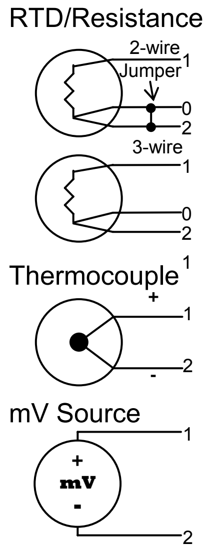


Table 2-1

Type of Input	Connect The Following				
	R	**IN+**	**IN-**	**I**	**Shield[1]**
RTD/Res 2-wire		1	2		
RTD/Res 3-wire	0	1	2		
Thermocouple		1	2		
Millivolt		1	2		

[1]Shield can be connected to chassis ground terminals 16, 33, and 40…45.



Numbers 0, 1, 2, and 3 are wiring numbers of the sensor used. For terminal numbers corresponding to R, IN+, IN-, I, refer to Terminal Base Unit Wiring Connections below.

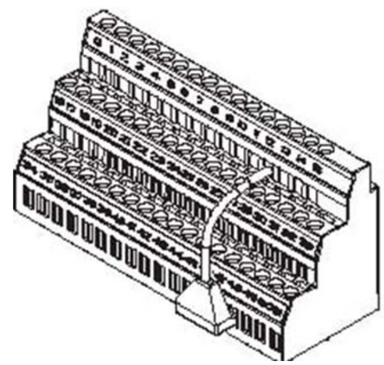


Table 2-2

Input	CJC Sensor			
	+	Chassis Ground	-	CJC Tail[1]
CJC1	C37	C38	C39	A1
CJC2	C-46	C-47	C-48	B31

[1]Terminals 37, 38, and 39, and 46, 47, and 48 are for cold junction compensation (with 38 and 47 chassis GND). Connect the tail of CJC 1 to terminal 1 and CJC2 to terminal 31 if channels 0…3 or 0…7 are configured for thermocouples.

Table 2-3

Channel Number	1794-TB3G and 1794-TB3GS Terminal Base Units			
	Signal Return (R)	Input + (IN+)	Input (-)	I Return (-)
0	A-0	A-1	A-2	A-3
1	A-4	A-5	A-6	A-7
2	A-8	A-9	A-10	A-11
3	A-12	A-13	A-14	A-15
4	B-17	B-18	B-19	B-20
5	B-21	B-22	B-23	B-24
6	B-25	B-26	B-27	B-28
7	B-29	B-30	B-31	B-32

1Terminals 16, 33, and 40…45 are chassis ground.

Attention Total current draw through the terminal base unit is limited to 10A. Separate power connections to the terminal base unit may be necessary.

The following examples show how to wire the IF8U using the tables and diagrams listed above.

Figure 2-2 (RTD & Resistance Wiring Diagram)

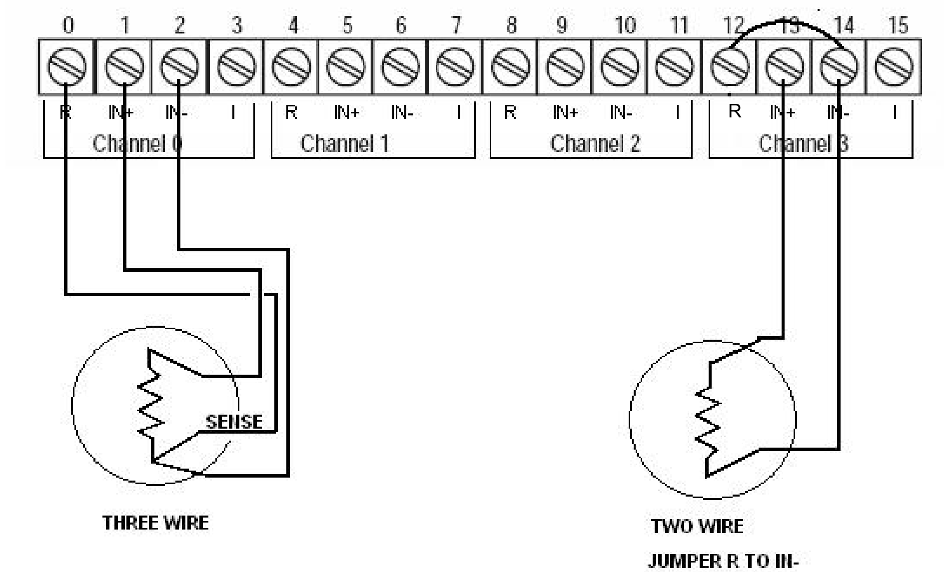


Figure 2-3 (Thermocouple Wiring Diagram)

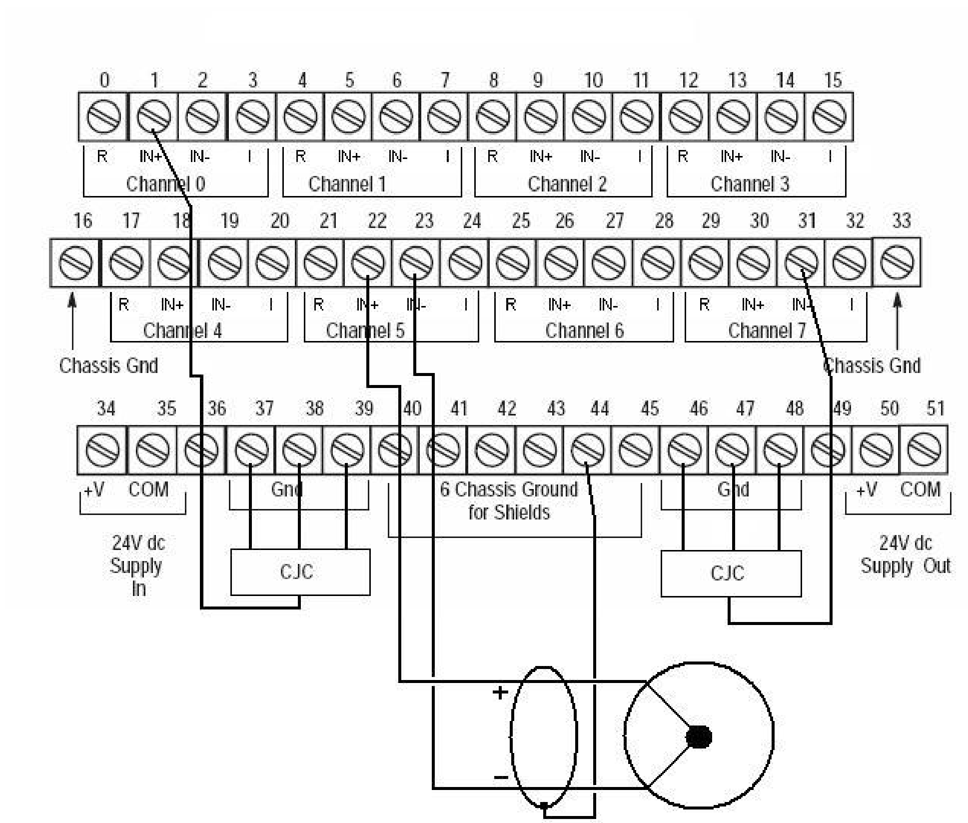
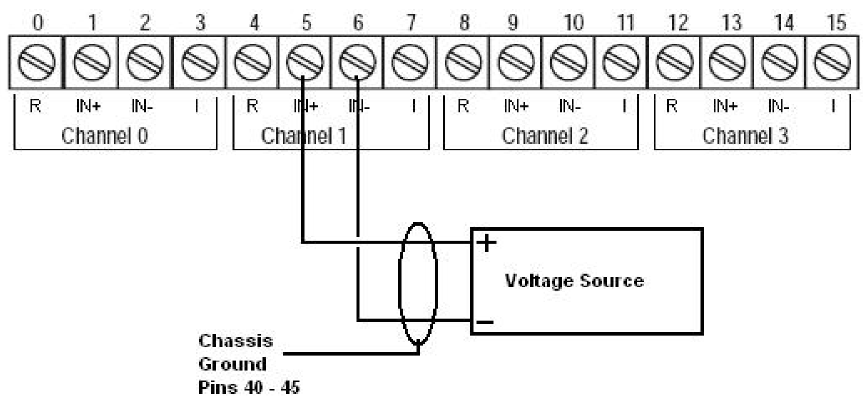


Figure 2-4 (Millivolt Wiring Diagram)



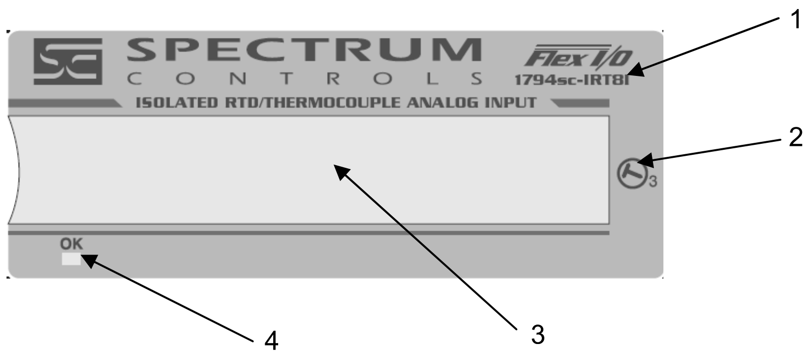
Attention

Digital and analog power must be supplied by an Isolated Secondary Limited Energy Low Voltage source.

Section 2.6
Module Indicators

The IRT8I module has one status indicator (OK) that is on when power is applied and no hardware faults are present. See figure below.

Figure 2-5



Item	Description
1	Module Catalog Number
2	Module key-switch position
3	Removable label
4	Power/Status LED

Table 2-4 (Module Status LED)

Module State	Condition	LED Color & State
New	Power up initialized complete and passed Self-Test. Loads stored configuration, if it exist. Read Module Information Block. (see notes)	RED, blink @1 Hz
Not Config	Module has not received configuration from Master. It can Set and Get attributes. (see notes)	GREEN, blink @1 Hz
Idle	Controller in Program mode. Communications normal	GREEN, solid
Active	Controller in Run mode & Communication Is normal	GREEN, solid
Fault	FlexIO Comm. Fault or PU bit is one and /Fault=0	GREEN, solid
Fatal Fault	Module fails self tests or detects illegal state transition	RED, solid

Chapter 3
Configuring the 1794sc-IRT8I Using RSLogix 5000

This chapter covers the following subjects:

- Things you should know
- Module memory map
- Configure generic profile
- Module configuration
- Reading input/status data

Section 3.1 Things You Should Know

This chapter describes how to configure the IRT8I module for the ControlLogix and CompactLogix system. In the examples below, the Control Net adapter and/or Ethernet adapter were used for communication between the Logix processor and the Flex IO bus.

Note: Refer to the associated I/O scanner documentation if using a SLC controller with Control Net.

Note: If using a PLC 5 controller, refer to the PLC 5 controller documentation for Control Net configuration information.

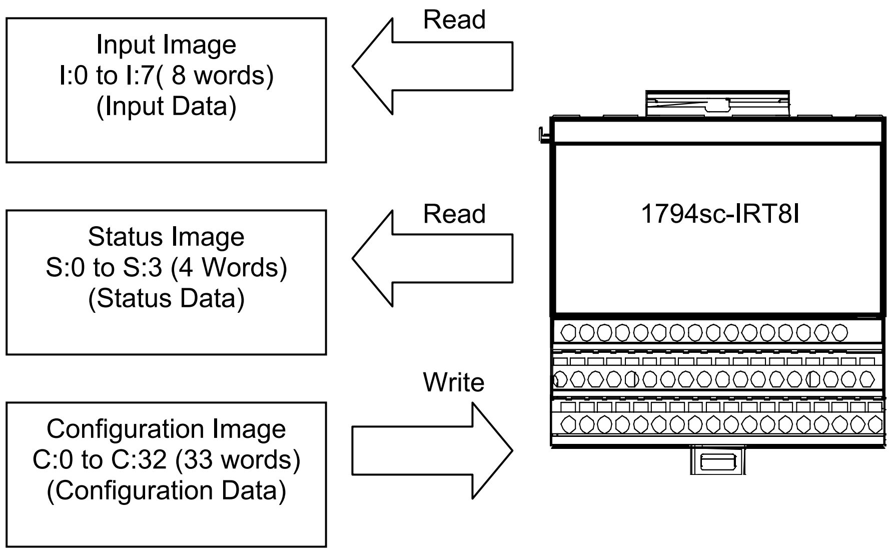
Attention

The Remote I/O and Device Net adapters do not support the 1794sc-IRT8I module. The IRT8I module is supported only by the Control Net and Ethernet adapters.

Section 3.2 Module Memory Map

The following figure describes the data mapping for the module. The configuration image is written to the module using tags generated by the "generic Flex module" profile used to represent the IRT8I within RSLogix 5000. See section 3.3.3 for more details. Input data and status data can be read from the module using the input image and status image. Again, tags generated by the "generic Flex module" profile will be used to read the input and status image data.

Figure 3-1 (Module Memory Map)



Section 3.3 Configure Generic Profile

The generic Flex module profile is used to represent the IRT8I module within RSLogix 5000 since there's no custom profile available. Before the generic profile can be added to the IO configuration, the proper communication module needs to be added to the IO configuration first. Follow the procedure below to add a communication module to RSLogix 5000.

1. Add the new local communication module to your project.
2. Configure the local module, including:
    a. Naming the module
    b. Choosing a Communication Format
    c. Setting the Revision level
    d. Setting the module location as necessary such as the slot number for a 1756-CNB module
    e. Choosing an Electronic Keying method
3. Add the new remote module to your project, such as a Flex Control Net adapter or Ethernet Adapter (i.e. 1794-ACN15 or 1794-AENT, respectively).
4. Configure the remote module similarly to the local module
5. Download the configuration to the controller

Note: If you are using Control Net, you must schedule the network using "RSNetworks for Control Net" after adding the local and remote communication modules.

Note: When you create a new RSLogix 5000 project with the CompactLogix 1769-L32C or L35CR controller, The Controller Organizer creates a Control

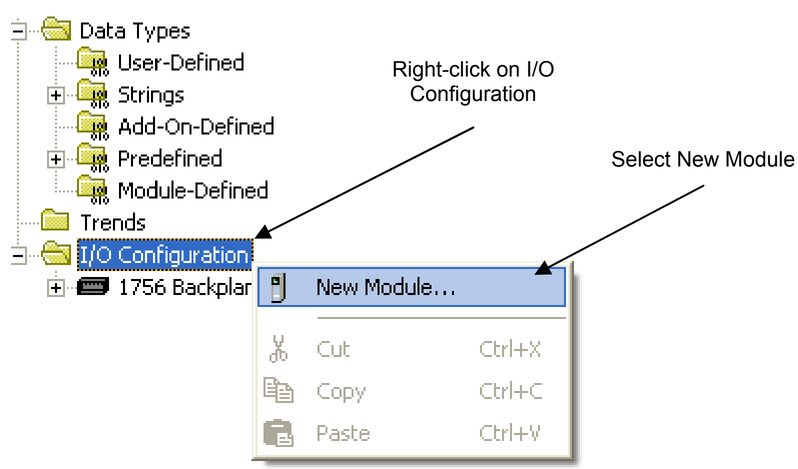
Net port in the local chassis. In this case, you don't need to add a separate local communication module.

Note: When you create a new RSLogix 5000 project with the CompactLogix 1769-L23E, 1769-L32E or L35E controller, The Controller Organizer creates a Ethernet port in the local chassis. In this case, you don't need to add a separate local communication module.

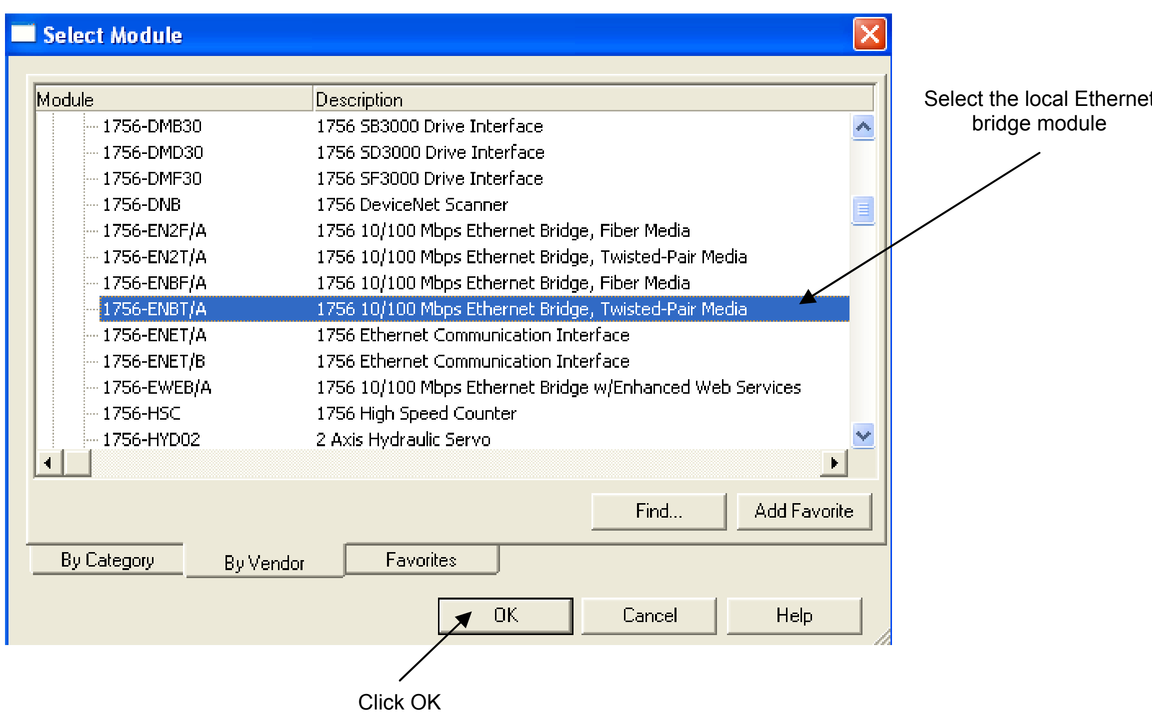
3.3.1 Add a Local Ethernet Bridge Module

After you have started RSLogix 5000 software and created a controller project, you can add Ethernet communication modules. A local Ethernet communication module is a module that resides in the same chassis as the controller.

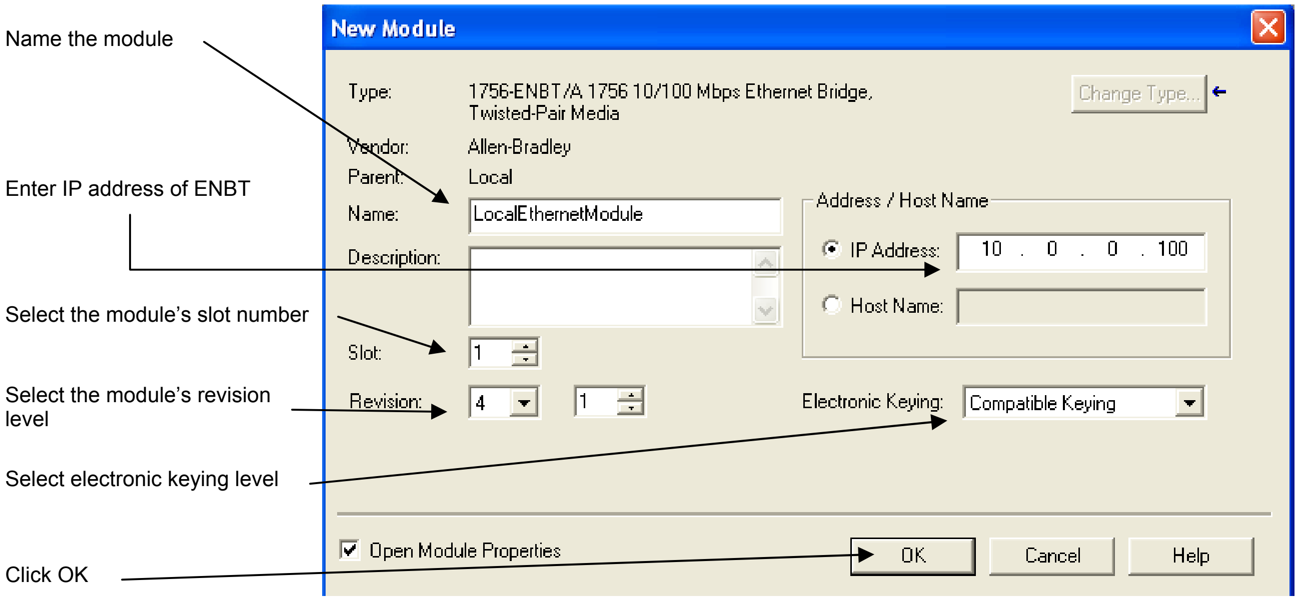
1. Select a New Module for the I/O Configuration.



2. Select the module type from the Select Module Type pop-up. The example below uses a 1756-ENBT module.



3. Configure the local Ethernet bridge module.



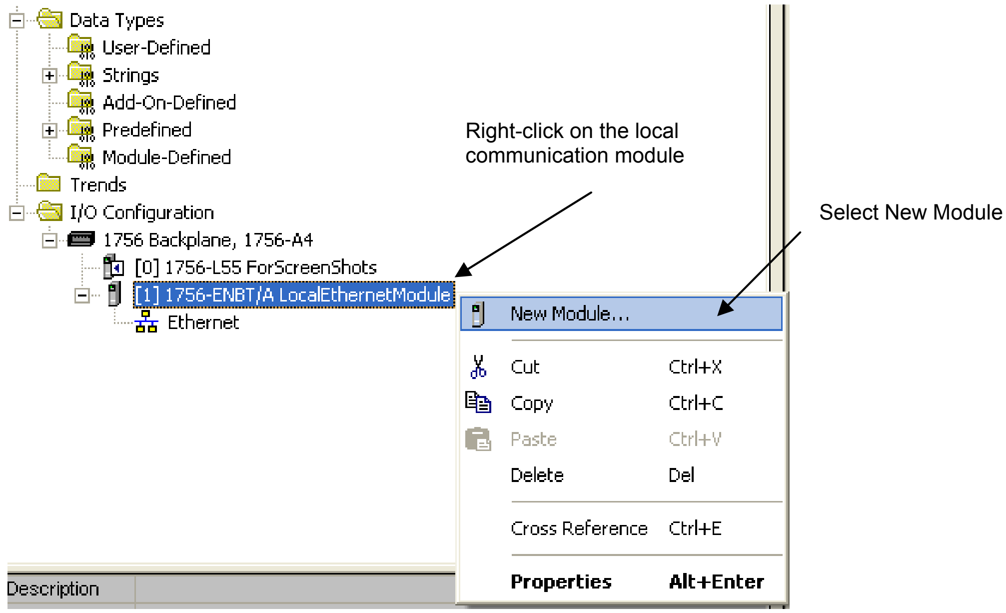
3.3.2 Add a Remote Ethernet Flex Adapter

After you have added the local Ethernet communication module, you must add remote Ethernet communication modules. A remote Ethernet module is a module that resides in a separate chassis from the controller.

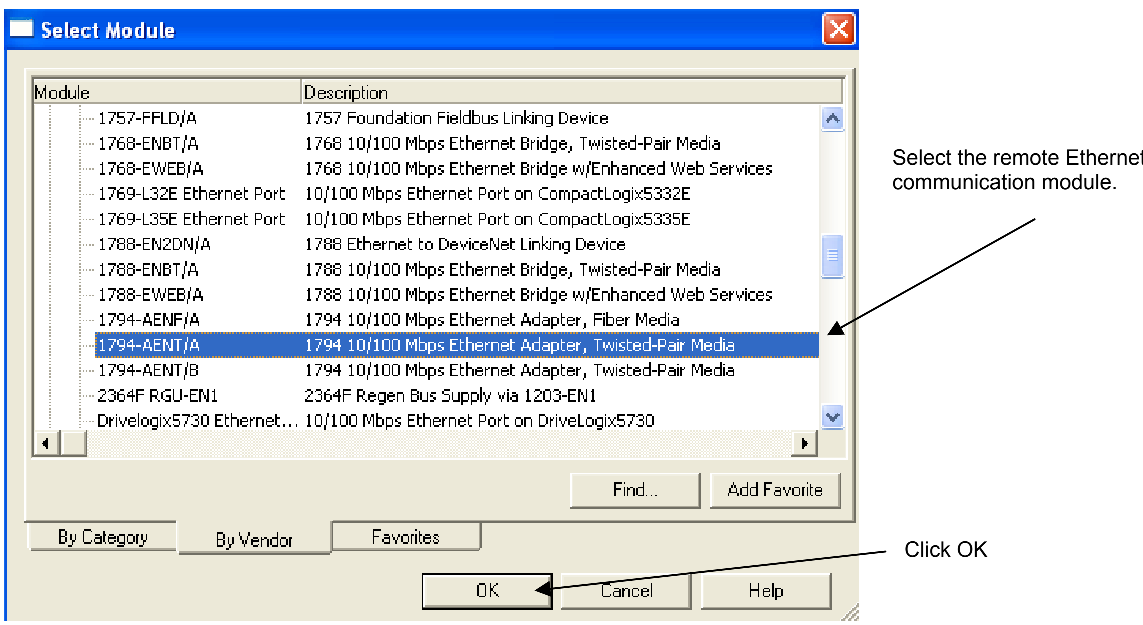
Attention

If you plan to use the Flex Control Net adapter, you will need to install the 1794sc-IRT8I EDS file before scheduling the network. The latest EDS files can be found at (www.spectrumcontrols.com).

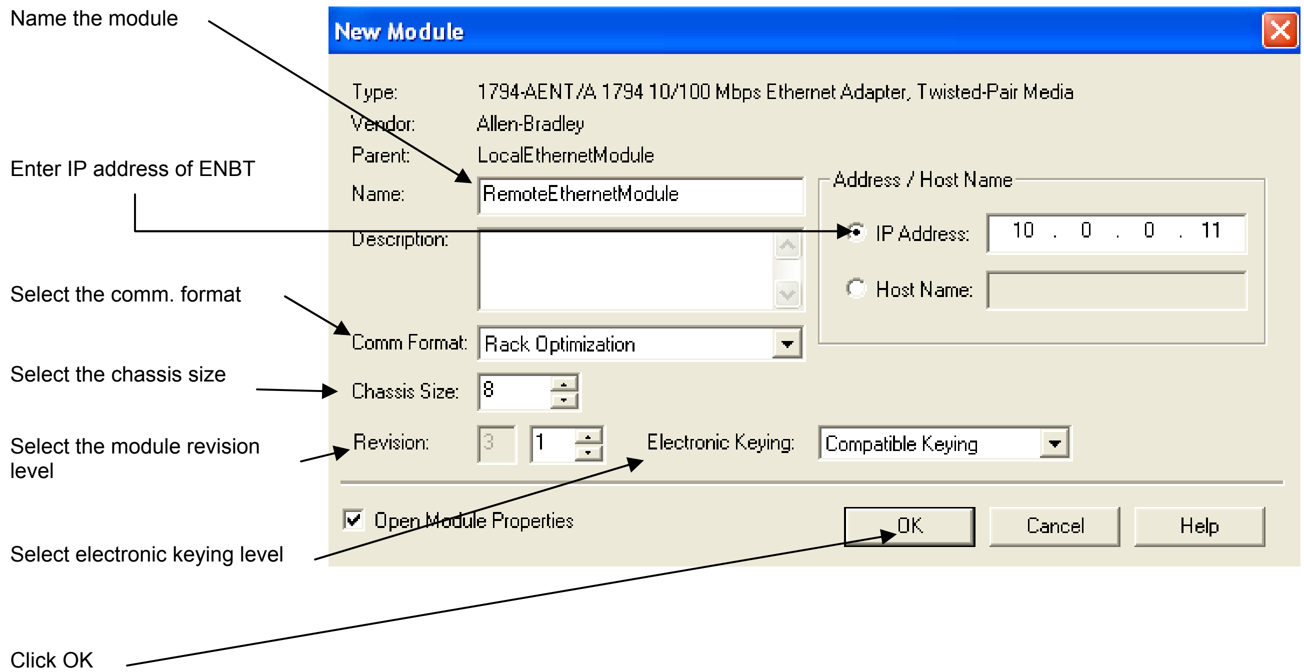
1. Select a New Module for the I/O Configuration.



2. Select the module type from the Select Module Type pop-up.



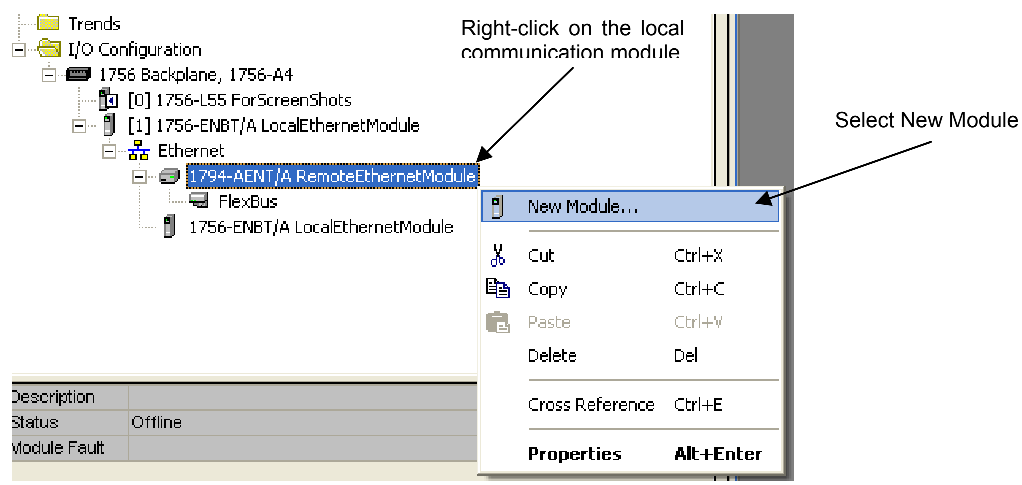
3. Configure the remote Ethernet communication module.



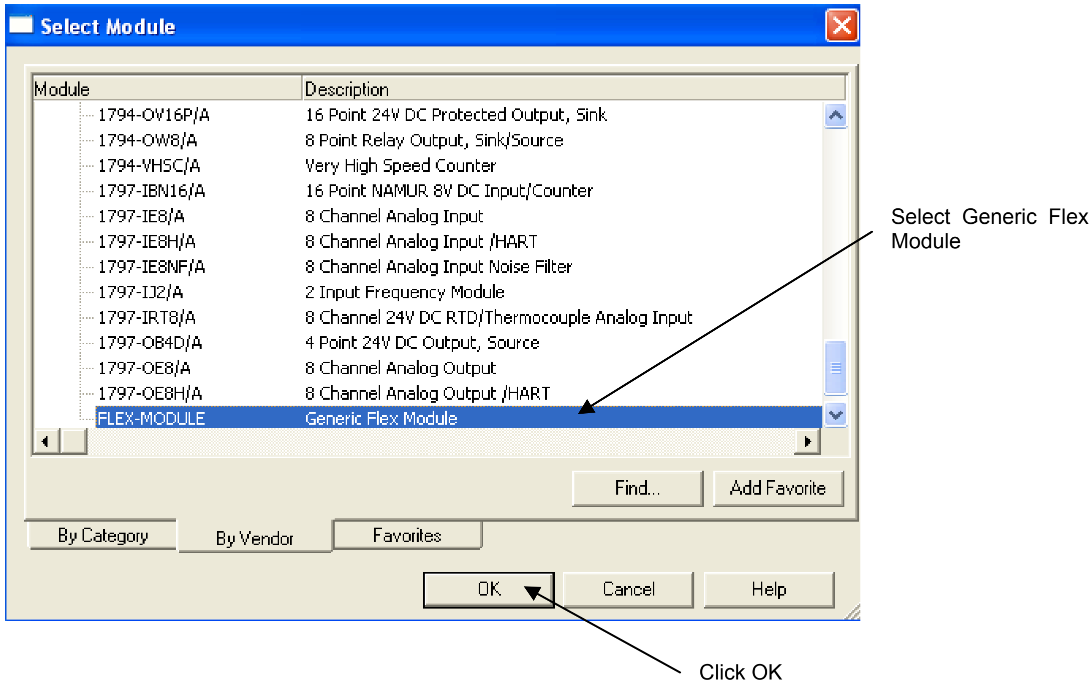
3.3.3 Add the Generic Flex Module

After adding the remote Ethernet communication module, the Generic Flex Module must be added. The Generic Flex Module is required because there is no custom profile for the 1794sc-IRT8I module. The following steps must be followed to add the Generic Flex Module.

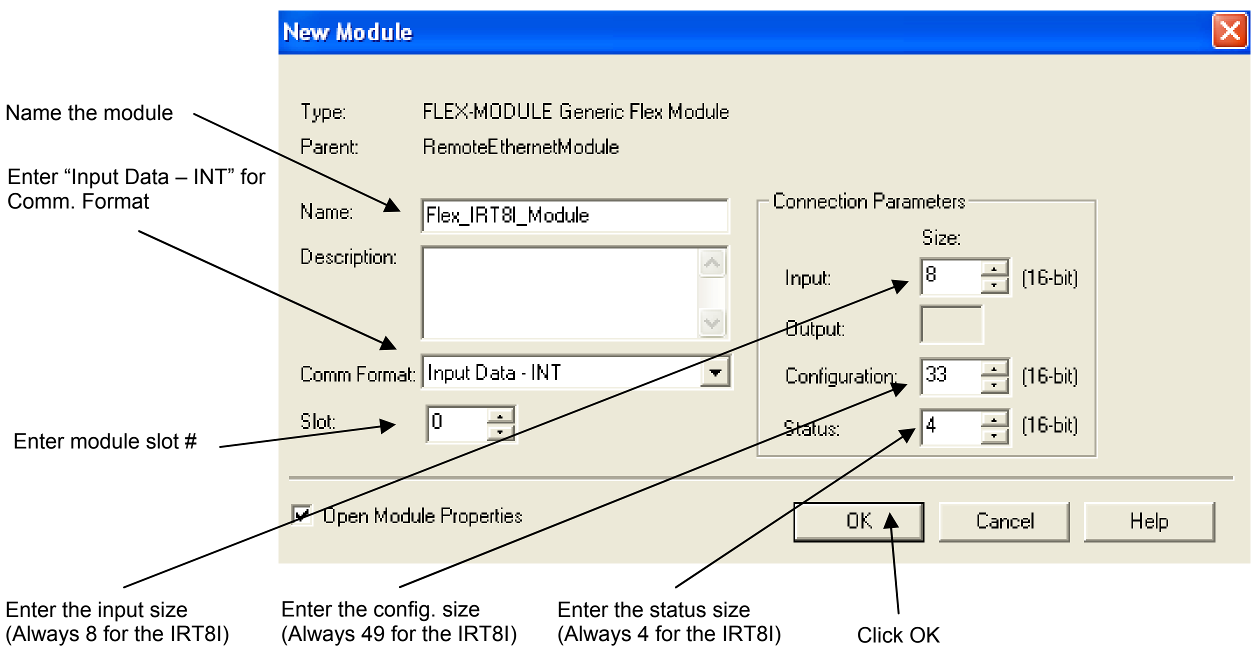
1. Select a New Module for the I/O Configuration.



2. Select the module type from the Select Module Type pop-up.



3. Configure the Generic Flex Module (i.e. 1794sc-IRT8I)



Section 3.4 Module Configuration

The addition of the Generic Flex Module profile makes it possible to enter the configuration data for the IRT8I module. The configuration tags for the IRT8I are located under the controller tags. The following figure describes the tag structure allocated by the Generic Flex Module profile.

[Name of remote communication module]:e:x.Data[0 to 184]

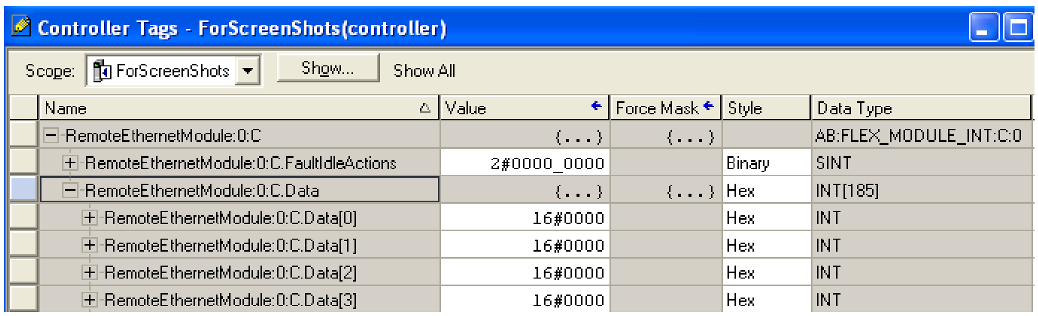
e = IRT8I slot number

x = Image Type (i.e. C, I, or O)

Note: 185 words are allocated by the Generic Flex Module profile, but only 49 are actually used by the IRT8I module for configuration.

In the example above, the configuration tags for the first IRT8I module would appear as shown in the image below.

Figure 3-2 (Configuration Tags Example)



Name	Value	Force Mask	Style	Data Type
RemoteEthernetModule:0:C	{...}	{...}		AB:FLEX_MODULE_INT:C:0
RemoteEthernetModule:0:C.FaultIdleActions	2#0000_0000		Binary	SINT
RemoteEthernetModule:0:C.Data	{...}	{...}	Hex	INT[185]
RemoteEthernetModule:0:C.Data[0]	16#0000		Hex	INT
RemoteEthernetModule:0:C.Data[1]	16#0000		Hex	INT
RemoteEthernetModule:0:C.Data[2]	16#0000		Hex	INT
RemoteEthernetModule:0:C.Data[3]	16#0000		Hex	INT

Note: The slot number is "0" and the Image type is "C" for configuration.

The following table describes the configuration settings for the 1794sc-IRT8I module.

Table 3-1 (Configuration Table)

	Usage (16 bit words):															
	15	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
C:0	R[1]	R[1]	F7	F6	F5	F4	R[1]		R[1]	R[1]	F3	F2	F1	F0	R[1]	
C:1	Temp Units Ch0	Disable CJC Ch0	Open Circuit Ch0		R[1]	Data Format Ch0			Input Filter Ch0			Input Type CH0				
C:2	Temp Units Ch1	Disable CJC Ch1	Open Circuit Ch1		R[1]	Data Format Ch1			Input Filter Ch1			Input Type CH1				
C:3	Temp Units Ch2	Disable CJC Ch2	Open Circuit Ch2		R[1]	Data Format Ch2			Input Filter Ch2			Input Type CH2				
C:4	Temp Units Ch3	Disable CJC Ch3	Open Circuit Ch3		R[1]	Data Format Ch3			Input Filter Ch3			Input Type CH3				
C:5	Temp Units Ch4	Disable CJC Ch4	Open Circuit Ch4		R[1]	Data Format Ch4			Input Filter Ch4			Input Type CH4				
C:6	Temp Units Ch5	Disable CJC Ch5	Open Circuit Ch5		R[1]	Data Format Ch5			Input Filter Ch5			Input Type CH5				

	Usage (16 bit words):															
	15	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
C:7	Temp Units Ch6	Disable CJC Ch6	Open Circuit Ch6		R[1]	Data Format Ch6			Input Filter Ch6			Input Type CH6				
C:8	Temp Units Ch7	Disable CJC Ch7	Open Circuit Ch7		R[1]	Data Format Ch7			Input Filter Ch7			Input Type CH7				
C:9	CH0 User Low Alarm Threshold															
C:10	CH0 User High Alarm Threshold															
C:11	CH0 User Alarm Deadband															
C:12	CH1 User Low Alarm Threshold															
C:13	CH1 User High Alarm Threshold															
C:14	CH1 User Alarm Deadband															
C:15	CH2 User Low Alarm Threshold															
C:16	CH2 User High Alarm Threshold															
C:17	CH2 User Alarm Deadband															
C:18	CH3 User Low Alarm Threshold															
C:19	CH3 User High Alarm Threshold															
C:20	CH3 User Alarm Deadband															
C:21	CH4 User Low Alarm Threshold															
C:22	CH4 User High Alarm Threshold															
C:23	CH4 User Alarm Deadband															
C:24	CH5 User Low Alarm Threshold															
C:25	CH5 User High Alarm Threshold															
C:26	CH5 User Alarm Deadband															
C:27	CH6 User Low Alarm Threshold															
C:28	CH6 User High Alarm Threshold															
C:29	CH6 User Alarm Deadband															
C:30	CH7 User Low Alarm Threshold															
C:31	CH7 User High Alarm Threshold															
C:32	CH7 User Alarm Deadband															

[1]Reserved set to zero

3.4.1 Fault Mode [Word 0 (Bits 2,3,4,5,10,11,12,13)]

The fault mode bits are used to enable or disable "broken wire detection". See table below.

Table 3-2 (Fault Mode)

State	Function
0	Disabled
1	Enable Broken Wire Detection

3.4.2 Input Type [Words 1 – 8 (Bits 0 to 4)]

Use the table below to select the input type for each channel.

Table 3-3 (Input Type)

Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Range:
0	0	0	0	0	B Type Thermocouple
0	0	0	0	1	C Type Thermocouple
0	0	0	1	0	E Type Thermocouple
0	0	0	1	1	J Type Thermocouple

Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Range:
0	0	1	0	0	K Type Thermocouple
0	0	1	0	1	N Type Thermocouple
0	0	1	1	0	R Type Thermocouple
0	0	1	1	1	S Type Thermocouple
0	1	0	0	0	T Type Thermocouple
0	1	0	0	1	100 Ω Pt α 0.385
0	1	0	1	0	200 Ω Pt α 0.385
0	1	0	1	1	500 Ω Pt α 0.385
0	1	1	0	0	1000 Ω Pt α 0.385
0	1	1	0	1	100 Ω Pt α 0.3916
0	1	1	1	0	200 Ω Pt α 0.3916
0	1	1	1	1	500 Ω Pt α 0.3916
1	0	0	0	0	1000 Ω Pt α 0.3916
1	0	0	0	1	10 Ω Cu α 0.426
1	0	0	1	0	100 Ω Ni α 0.618
1	0	0	1	1	120 Ω Ni α 0.672
1	0	1	0	0	604 Ω NiFe α 0.518
1	0	1	0	1	R 0 to 150 Ω
1	0	1	1	0	R 0 to 1000 Ω
1	0	1	1	1	R 0 to 3000 Ω
1	1	0	0	0	+/- 50 mV
1	1	0	0	1	+/- 100 mV

3.4.3 Input Filter [Words 1 – 8 (Bits 5 to 7)

Use the table below to select the appropriate filter for each channel.

Table 3-4 (Filter Settings)

Bit 7	Bit 6	Bit 5	ADC Filter:
0	0	0	4.17 Hz
0	0	1	10.0 Hz
0	1	0	16.7 Hz
0	1	1	19.6 Hz
1	0	0	62.0 Hz
1	0	1	470.0 Hz
1	1	0	*Unused
1	1	1	*Unused

3.4.4 Data Format [Words 1 – 8 (Bits 8 to 10)

Select the appropriate data type for each channel using the table below. Refer to Table 3-6 for data type ranges.

Table 3-5 (Data Format)

Bit 10	Bit9	Bit 8	Format:
0	0	0	Engineering Units
0	0	1	Engineering Units X10
0	1	0	Raw/Proportional Counts
0	1	1	Scaled for PID
1	0	0	Percent of Full Scale
1	0	1	[1]CJC EU
1	1	0	[1]CJC Scaled for PID
1	1	1	[1]CJC Percent of Full Scale

[1] If selected, the CJC format will override all ranges/formats and report the indicated CJC value for this channel. Channel zero will report CJC0 directly. Channel 7 will report CJC1 directly. All others will be distributed values between CJC0 and CJC1 based on channel position.

Table 3-6 (Data Ranges)

Input Type	Range	Eng. Units	Eng Units X10	Raw/Prop	PID	Percent
B Type Thermocouple	300 to 1820 ˚C (572 to 3308 ˚F)	3000 to 18200 (5720 to 33080)	300 to 1820 (572 to 3308)	-32768 to 32767	0 to 16383	0 to 10000
C Type Thermocouple	0 to 2315 ˚C (32 to 4199 ˚F)	0 to 23150 (320 to 41990)	0 to 2315 (32 to 4199)	-32768 to 32767	0 to 16383	0 to 10000
E Type Thermocouple	-270 to 1000 ˚C (-454 to 1832 ˚F)	-2700 to 10000 (-4540 to 18320)	-270 to 1000 (-454 to 1832)	-32768 to 32767	0 to 16383	0 to 10000
J Type Thermocouple	-210 to 1200 ˚C (-346 to 2192 ˚F)	-2100 to 12000 (-3460 to 21920)	-210 to 1200 (-346 to 2192)	-32768 to 32767	0 to 16383	0 to 10000
K Type Thermocouple	-270 to 1370 ˚C (-454 to 2498 ˚F)	-2700 to 13700 (-4540 to 24980)	-270 to 1370 (-454 to 2498)	-32768 to 32767	0 to 16383	0 to 10000
N Type Thermocouple	-210 to 1300 ˚C (-346 to 2372 ˚F)	-2100 to 13000 (-3460 to 23720)	-210 to 1300 (-346 to 2372)	-32768 to 32767	0 to 16383	0 to 10000
R Type Thermocouple	0 to 1768 ˚C (32 to 3214 ˚F)	0 to 17680 (320 to 32140)	0 to 1768 (32 to 3214)	-32768 to 32767	0 to 16383	0 to 10000
S Type Thermocouple	0 to 1768 ˚C (32 to 3214 ˚F)	0 to 17680 (320 to 32140)	0 to 1768 (32 to 3214)	-32768 to 32767	0 to 16383	0 to 10000
T Type Thermocouple	-270 to 400 ˚C (-270 to 752 ˚F)	-2700 to 4000 (-2700 to 7520)	-270 to 400 (-270 to 752)	-32768 to 32767	0 to 16383	0 to 10000
100 Ω Pt α 0.385	-200 to 850 ˚C (-328 to 1562 ˚F)	-2000 to 8500 (-3280 to 15620)	-200 to 850 (-328 to 1562)	-32768 to 32767	0 to 16383	0 to 10000
200 Ω Pt α 0.385	-200 to 850 ˚C (-328 to 1562 ˚F)	-2000 to 8500 (-3280 to 15620)	-200 to 850 (-328 to 1562)	-32768 to 32767	0 to 16383	0 to 10000
500 Ω Pt α 0.385	-200 to 850 ˚C (-328 to 1562 ˚F)	-2000 to 8500 (-3280 to 15620)	-200 to 850 (-328 to 1562)	-32768 to 32767	0 to 16383	0 to 10000
1000 Ω Pt α 0.385	-200 to 850 ˚C (-328 to 1562 ˚F)	-2000 to 8500 (-3280 to 15620)	-200 to 850 (-328 to 1562)	-32768 to 32767	0 to 16383	0 to 10000
100 Ω Pt α 0.3916	-200 to 630 ˚C (-328 to 1166 ˚F)	-2000 to 6300 (-3280 to 11660)	-200 to 630 (-328 to 1166)	-32768 to 32767	0 to 16383	0 to 10000
200 Ω Pt α 0.3916	-200 to 630 ˚C (-328 to 1166 ˚F)	-2000 to 6300 (-3280 to 11660)	-200 to 630 (-328 to 1166)	-32768 to 32767	0 to 16383	0 to 10000
500 Ω Pt α 0.3916	-200 to 630 ˚C (-328 to 1166 ˚F)	-2000 to 6300 (-3280 to 11660)	-200 to 630 (-328 to 1166)	-32768 to 32767	0 to 16383	0 to 10000
1000 Ω Pt α 0.3916	-200 to 630 ˚C (-328 to 1166 ˚F)	-2000 to 6300 (-3280 to 11660)	-200 to 630 (-328 to 1166)	-32768 to 32767	0 to 16383	0 to 10000
10 Ω Cu α 0.426	-100 to 260 ˚C (-148 to 500 ˚F)	-1000 to 2600 (-1480 to 5000)	-100 to 260 (-148 to 500)	-32768 to 32767	0 to 16383	0 to 10000
100 Ω Ni α 0.618	-100 to 260 ˚C (-148 to 500 ˚F)	-1000 to 2600 (-1480 to 5000)	-100 to 260 (-148 to 500)	-32768 to 32767	0 to 16383	0 to 10000
120 Ω Ni α 0.672	-80 to 260 ˚C (-112 to 500 ˚F)	-800 to 2600 (-1120 to 5000)	-80 to 260 (-112 to 500)	-32768 to 32767	0 to 16383	0 to 10000
604 Ω NiFe α 0.518	-100 to 200 ˚C (-148 to 392 ˚F)	-1000 to 2000 (-1480 to 3920)	-100 to 200 (-148 to 392)	-32768 to 32767	0 to 16383	0 to 10000
Resistance	0 to 150 Ω	0 to 15000	0 to 1500	-32768 to 32767	0 to 16383	0 to 10000
	0 to 1000 Ω	0 to 10000	0 to 1000	-32768 to 32767	0 to 16383	0 to 10000
	0 to 3000 Ω	0 to 30000	0 to 3000	-32768 to 32767	0 to 16383	0 to 10000

3.4.5 Open Circuit Mode [Words 1 – 8 (Bits 12 & 13)]

The open circuit mode determines the fail-safe data value each channel is to default to in the event of an open circuit condition. The table below lists the available options.

Table 3-7 (Open Circuit Mode)

Bit 13	Bit 12	Open Circuit Mode:
0	0	Zero analog value on broken input.
0	1	Set analog value to Max scale on broken input.
1	0	Set analog value to Min scale on broken input.
1	1	Previous Value

3.4.6 Disable CJC [Words 1 – 8 (Bit 14)]

This bit is used to disable CJC compensation for the associated channel.

Table 3-8 (Disable CJC)

State	Function
0	CJCs Enabled[1]
1	CJCs Disabled[1]

[1]This field is only used if the input type is a thermocouple and the format is not a CJC format. No compensation is performed on the thermocouple when disabled.

3.4.7 Temperature Units [Words 1 – 8 (Bit 15)]

This bit enables Celsius or Fahrenheit for the associated channel.

Note: If the associated channel is not configured for an RTD or thermocouple, the temperature units have no effect.

Table 3-9 (Temperature Units)

State	Function
0	Degrees C
1	Degrees F

3.4.8 Low Alarm Threshold [Words 9,12,15,18,21,24,27,30]

Low alarm threshold setting for channels 0 through 7, respectively.

Note: The data range is determined by the data format selected.

3.4.9 High Alarm Threshold [Words 10,13,16,19,22,25,28,31]

High alarm threshold setting for channels 0 through 7, respectively.

Note: The data range is determined by the data format selected.

3.4.10 User Alarm Deadband [Words 11,14,17,20,23,26,29,32]

The deadband is a range through which the measured input may be varied without initiating and alarm response. The deadband setting must adhere to the following rules:

- The deadband must be greater or equal to zero.
- The deadband cannot exceed 25% of full scale.
- The alarm limits including deadband may not exceed the user range limits.
- The low alarm including deadband may not overlap the high alarm including

deadband.

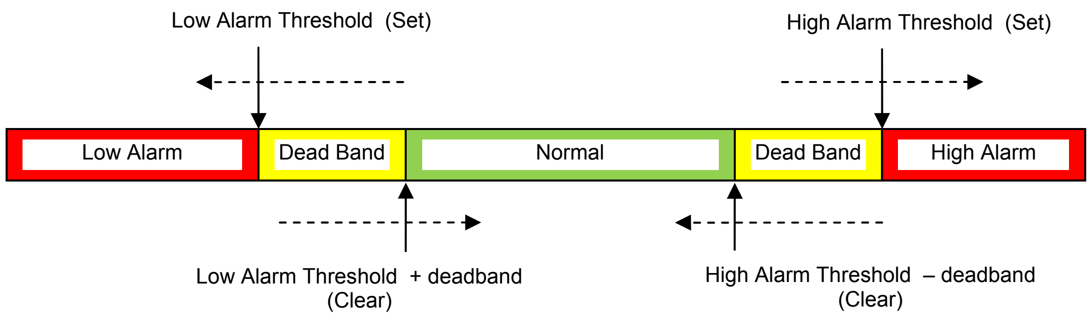
If any of these rules are violated, a configuration error is declared, and the alarm is disabled. The notable exception is when the "low" is equal to the "high" and both are set to zero. In this case, user alarms are disabled, the deadband is ignored, and no fault is declared.

Note: The data range is determined by the data format selected.

The alarm deadband allows the user to define hysteresis for alarms. The alarm set threshold may differ from the alarm clear threshold, depending on the deadband, as illustrated below. A value must transition through the indicated threshold (see dashed arrows) to have the indicated effect.

If a CJC format is selected, the alarm limits apply to that CJC format, not to that channel's analog input.

Figure 3-3 (Alarm DeadBand)



Section 3.5 Read Input & Status Data

Input and status data is read for each channel, converted to a scaled digital value, and stored in the controller tags. The following figure describes the tag structure allocated by the Generic Flex Module profile.

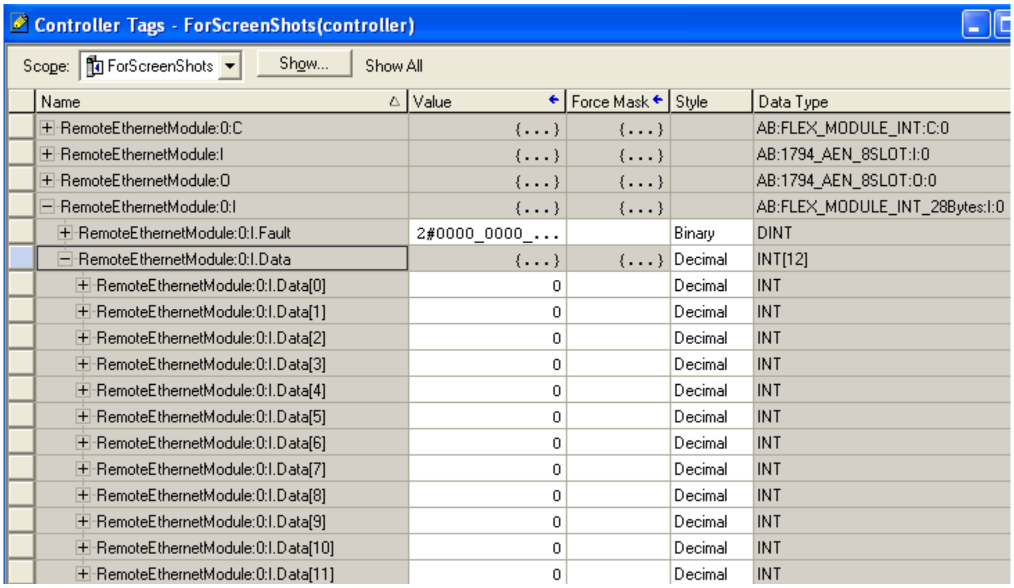
[Name of remote communication module]:e:x.Data[0 to 184]

e = IRT8I slot number

x = Image Type (i.e. C, I, or O)

Using the remote Ethernet adapter example, the input/status tags would appear under the controller tags as shown in the figure below.

Figure 3-4 (Input/Status Tags)


Controller Tags - ForScreenShots(controller)

Scope: ForScreenShots Show... Show All

Name	Value	Force Mask	Style	Data Type
+ RemoteEthernetModule:0:C	{...}	{...}		AB:FLEX_MODULE_INT:C:0
+ RemoteEthernetModule:I	{...}	{...}		AB:1794_AEN_8SLOT:I:0
+ RemoteEthernetModule:O	{...}	{...}		AB:1794_AEN_8SLOT:O:0
− RemoteEthernetModule:0:I	{...}	{...}		AB:FLEX_MODULE_INT_28Bytes:I:0
+ RemoteEthernetModule:0:I.Fault	2#0000_0000_...		Binary	DINT
− RemoteEthernetModule:0:I.Data	{...}	{...}	Decimal	INT[12]
+ RemoteEthernetModule:0:I.Data[0]	0		Decimal	INT
+ RemoteEthernetModule:0:I.Data[1]	0		Decimal	INT
+ RemoteEthernetModule:0:I.Data[2]	0		Decimal	INT
+ RemoteEthernetModule:0:I.Data[3]	0		Decimal	INT
+ RemoteEthernetModule:0:I.Data[4]	0		Decimal	INT
+ RemoteEthernetModule:0:I.Data[5]	0		Decimal	INT
+ RemoteEthernetModule:0:I.Data[6]	0		Decimal	INT
+ RemoteEthernetModule:0:I.Data[7]	0		Decimal	INT
+ RemoteEthernetModule:0:I.Data[8]	0		Decimal	INT
+ RemoteEthernetModule:0:I.Data[9]	0		Decimal	INT
+ RemoteEthernetModule:0:I.Data[10]	0		Decimal	INT
+ RemoteEthernetModule:0:I.Data[11]	0		Decimal	INT

Note: The slot number is "0" and the image type is "I".

The table below describes the input and status mapping.

Table 3-10 (Input & Status)

<table>
<tr><td></td><td colspan="16">Usage (16 bit words):</td></tr>
<tr><td>I:0</td><td colspan="16">Channel 0 input Data.</td></tr>
<tr><td>I:1</td><td colspan="16">Channel 1 input Data.</td></tr>
<tr><td>I:2</td><td colspan="16">Channel 2 input Data.</td></tr>
<tr><td>I:3</td><td colspan="16">Channel 3 input Data.</td></tr>
<tr><td>I:4</td><td colspan="16">Channel 4 input Data.</td></tr>
<tr><td>I:5</td><td colspan="16">Channel 5 input Data.</td></tr>
<tr><td>I:6</td><td colspan="16">Channel 6 input Data.</td></tr>
<tr><td>I:7</td><td colspan="16">Channel 7 input Data.</td></tr>
<tr><td></td><td>15</td><td>14</td><td>13</td><td>12</td><td>11</td><td>10</td><td>9</td><td>8</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr>
<tr><td>S:0</td><td colspan="8">OverRange (CH0/Bit 8, CH1/Bit 9, …)</td><td colspan="8">[4]UnderRange (CH0/Bit 0, CH1/Bit 1, …)</td></tr>
<tr><td>S:1</td><td colspan="8">[5]User HI Alarms (CH0/Bit8, CH1/Bit9, …)</td><td colspan="8">[5]User LO Alarms(CH0/Bit0, CH1/Bit1, …)</td></tr>
<tr><td>S:2</td><td colspan="6">Reserved</td><td colspan="2">CJC Alarm</td><td colspan="8">[6,4]Open Circuit Alarms (CH0/Bit0, CH1/Bit1, …)</td></tr>
<tr><td>S:3</td><td colspan="8">Reserved</td><td colspan="8">Diagnostic Code (See)</td></tr>
</table>

3.5.1 Input Data [Words 0 to 7]

Words 0 through 7 display the digital value for channel inputs 0 through 7, respectively. Scaling/range is determined by the data format selected. See 3.4.4 for more details.

3.5.2 UnderRange Alarms [Word 8 (Bits 0 to 7)]

The under range flag is set for the associated channel when the channel data value is below the minimum scale for the selected range.

3.5.3 OverRange Alarm [Word 8 (Bits 8 to 15)]

The over range flag is set for the associated channel when the channel data value is above the maximum scale for the selected range.

3.5.4 User Low Alarm [Word 9 (Bits 0 to 7)]

The user low alarm flag is set for the associated channel when the channel data value is below the user low alarm threshold.

3.5.5 User High Alarm [Word 9 (Bits 8 to 15)]

The user high alarm flag is set for the associated channel when the channel data value is above the user high alarm threshold.

3.5.6 Open Circuit Alarm [Word 10 (Bits 0 to 7)]

If set, the associated channel has detected a shorted or open circuit condition.

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[4] For the 0 to 20 mA range, a zero reading is valid. Therefore, under range will not trigger at the low terminus of zero, but will instead trigger when the signal goes negative at or below %2.5 of full scale. 20 – 0 = 20. -0.025 X 20 = -0.5mA.

[5] Channel specific range alarms will apply to CJC values if a CJC format is selected for that channel.

[6] Channel specific open circuit alarm will not be set if a CJC format is selected for that channel.

3.5.7 CJC Alarm [Word 10 (Bits 8 & 9)]

The CJC alarm indicates a broken wire condition for both CJC sensors. Refer to the table below.

Table 3-11 (CJC Alarms)

Bit 9	Bit 8	CJC Alarm:
0	0	No Errors
0	1	CJC1 is broken.
1	0	CJC2 is broken.
1	1	Both CJC1 and CJC2 are broken.

3.5.8 Diagnostics [Word 11 (Bits 0 to 7)]

The diagnostic byte is used to indicate module faults. Refer to the table below for more information.

Table 3-12 (Diagnostics)

Hex Error Code:	Diagnostic:
0x00	NO_ERRORS
0x10	CH0_RANGE_CFG_ERROR
0x11	CH1_RANGE_CFG_ERROR
0x12	CH2_RANGE_CFG_ERROR
0x13	CH3_RANGE_CFG_ERROR
0x14	CH4_RANGE_CFG_ERROR
0x15	CH5_RANGE_CFG_ERROR
0x16	CH6_RANGE_CFG_ERROR
0x17	CH7_RANGE_CFG_ERROR
0x20	CH0_FORMAT_CFG_ERROR
0x21	CH1_FORMAT_CFG_ERROR
0x22	CH2_FORMAT_CFG_ERROR
0x23	CH3_FORMAT_CFG_ERROR
0x24	CH4_FORMAT_CFG_ERROR
0x25	CH5_FORMAT_CFG_ERROR
0x26	CH6_FORMAT_CFG_ERROR
0x27	CH7_FORMAT_CFG_ERROR
0x30	CH0_FILTER_CFG_ERROR
0x31	CH1_FILTER_CFG_ERROR
0x32	CH2_FILTER_CFG_ERROR
0x33	CH3_FILTER_CFG_ERROR
0x34	CH4_FILTER_CFG_ERROR
0x35	CH5_FILTER_CFG_ERROR
0x36	CH6_FILTER_CFG_ERROR
0x37	CH7_FILTER_CFG_ERROR
0x40	CH0_HI_LO_ALARM_CFG_ERROR
0x41	CH1_HI_LO_ALARM_CFG_ERROR
0x42	CH2_HI_LO_ALARM_CFG_ERROR
0x43	CH3_HI_LO_ALARM_CFG_ERROR
0x44	CH4_HI_LO_ALARM_CFG_ERROR
0x45	CH5_HI_LO_ALARM_CFG_ERROR
0x46	CH6_HI_LO_ALARM_CFG_ERROR
0x47	CH7_HI_LO_ALARM_CFG_ERROR
0x50	CH0_OUT_OF_RANGE_ERROR

Hex Error Code:	Diagnostic:
0x51	CH1_OUT_OF_RANGE_ERROR
0x52	CH2_OUT_OF_RANGE_ERROR
0x53	CH3_OUT_OF_RANGE_ERROR
0x54	CH4_OUT_OF_RANGE_ERROR
0x55	CH5_OUT_OF_RANGE_ERROR
0x56	CH6_OUT_OF_RANGE_ERROR
0x57	CH7_OUT_OF_RANGE_ERROR
0x59	Unused module cfg bits set
0x5F	MODULE_NOT_CONFIGURED
0x60	CH0 Cal Offset CFG Error
0x61	CH1 Cal Offset CFG Error
0x62	CH2 Cal Offset CFG Error
0x63	CH3 Cal Offset CFG Error
0x64	CH4 Cal Offset CFG Error
0x65	CH5 Cal Offset CFG Error
0x66	CH6 Cal Offset CFG Error
0x67	CH7 Cal Offset CFG Error
0x70	CH0 CJC Offset CFG Error
0x71	CH1 CJC Offset CFG Error
0x72	CH2 CJC Offset CFG Error
0x73	CH3 CJC Offset CFG Error
0x74	CH4 CJC Offset CFG Error
0x75	CH5 CJC Offset CFG Error
0x76	CH6 CJC Offset CFG Error
0x77	CH7 CJC Offset CFG Error
0x80	FIELD_PWR_FAULT
0x90	CH0_CAL_ERROR
0x91	CH1_CAL_ERROR
0x92	CH2_CAL_ERROR
0x93	CH3_CAL_ERROR
0x94	CH4_CAL_ERROR
0x95	CH5_CAL_ERROR
0x96	CH6_CAL_ERROR
0x97	CH7_CAL_ERROR
0xA0	CH0_IOCOMM_FAILED
0xA1	CH1_IOCOMM_FAILED
0xA2	CH2_IOCOMM_FAILED
0xA3	CH3_IOCOMM_FAILED
0xA4	CH4_IOCOMM_FAILED
0xA5	CH5_IOCOMM_FAILED
0xA6	CH6_IOCOMM_FAILED
0xA7	CH7_IOCOMM_FAILED
0xB0	CH0_BROKEN_INPUT
0xB1	CH1_BROKEN_INPUT
0xB2	CH2_BROKEN_INPUT
0xB3	CH3_BROKEN_INPUT
0xB4	CH4_BROKEN_INPUT
0xB5	CH5_BROKEN_INPUT
0xB6	CH6_BROKEN_INPUT
0xB7	CH7_BROKEN_INPUT
0xC0	CJC0_BROKEN_INPUT
0xC1	CJC1_BROKEN_INPUT
0xC2	CJC_BOTH_BROKEN_INPUT

Appendix A
Module Specifications

Number of inputs	8 channels
Module Location	Cat. No. 1794-TB3G, 1794-TB3GS Terminal Base Units
Nominal input voltage ranges	±50 mV, ±100 mV
Supported thermocouple types	**Type °C Range °F Range** B 300…1820 °C (572…3308 °F) C 0…2315 °C (32…4199 °F) E -270…1000 °C (-454…1832 °F) J -210…1200 °C (-346…2192 °F) K -270…1370 °C (-454…2498 °F) N -210…1300 °C (-346…2372 °F) R 0…1768 °C (32…3214 °F) S 0…1768 °C (32…3214 °F) T -270…400 °C (-454…752 °F)
Supported RTD/Resistance types	**RTD** 100 Ω Pt α = 0.385 -200…850 °C (-328…1562 °F) 200 Ω Pt α = 0.385 -200…850 °C (-328…1562 °F) 500 Ω Pt α = 0.385 -200…850 °C (-328…1562 °F) 1000 Ω Pt α = 0.385 -200…850 °C (-328…1562 °F) 100 Ω Pt α = 0.392 -200…630 °C (-328…1166 °F) 200 Ω Pt α = 0.392 -200…630 °C (-328…1166 °F) 500 Ω Pt α = 0.392 -200…630 °C (-328…1166 °F) 1000 Ω Pt α = 0.392 -200…630 °C (-328…1166 °F) 10 Ω Cu α = 0.426 -100…260 °C (-148…500 °F) 100 Ω Ni α = 0.618 -100…260 °C (-148…500 °F) 120 Ω Ni α = 0.672 -80…260 °C (-112…500 °F) 604 Ω NiFe α = 0.518 -100…200 °C (-148…392 °F) **Resistance** 0…150 Ω 0…1000 Ω 0…3000 Ω
Resolution	16 bits

Data format	Engineering Units X1 Engineering Units X10 Raw/Proportional Counts Scaled for PID Percent of full scale
Input Impedance	>1 M ohms for voltage, thermocouple, RTD and resistance inputs
Common mode rejection	60 db @ 5V peak-to-peak, 50…60 Hz
Isolation voltage (continuous voltage withstand rating)	User power to Backplane:24 VDC continuous Channel to Backplane: 24 VDC continuous Channel to Channel: 24 VDC continuous. Channel to User power: 24 VDC continuous
Open circuit protection	Open circuit detection bias <1 uA with ON/OFF capability
Overvoltage capability	Voltage mode ± 24 VDC continuous (ten minutes)
Cold junction compensation Range	-20…100 °C
Cold junction compensator	A-B catalog number 1794-CJC2
Flexbus current	80 mA
Power dissipation	7.25 W max @ 31.2V dc
Thermal dissipation	Max 10.2 BTU/hr @ 31.2V dc
Keyswitch position	3

Module Accuracy

Thermocouple Accuracy with 4.17 Hz filter using Linearization per ITS-90	**Accuracy Limit At 25°C 4.17 Hz Filter**	**Accuracy Limit At 0-55°C 4.17 Hz Filter**	**Repeatability Limit At 25°C & 4.17 Hz filter**
Type J (-50˚C to 1200˚C):	± 0.6 °C	± 2.3 °C	± 0.17 °C
Type J (-210˚C to -50˚C):	± 0.8 °C	± 3.3 °C	± 0.25 °C
Type N (-80˚C to 1300˚C):	± 1.0 °C	± 1.5 °C	± 0.3 °C
Type N (-250˚C to -80˚C):	± 1.2 °C	± 3.0 °C	± 1.9 °C
Type T (-180˚C to 400˚C):	± 1.0 °C	± 1.5 °C	± 0.2 °C
Type T (-270˚C to -180˚C):	± 5.4 °C	± 8.5 °C	± 1.5 °C
Type K (-180˚C to 1370˚C):	± 1.0 °C	± 1.5°C	± 0.3 °C
Type K (-270˚C to -180˚C):	± 7.5 °C	± 11.5 °C	± 3.6 °C
Type E (-130˚C to 1000˚C):	± 0.5 °C	± 1.5 °C	± 0.1°C
Type E (-270˚C to -130˚C):	± 4.2 °C	± 7.3 °C	± 1.2 °C
Type C (0˚C to 2315˚C):	± 1.8 °C	± 3.5 °C	± 0.9 °C
Type B (600˚C to 1800˚C):	± 3.0 °C	± 4.0 °C	± 1°C
Type B (300˚C to 600˚C):	± 3.0 °C	± 8.0 °C	± 2°C
Type S (140˚C to -1760˚C):	± 1.7 °C	± 2.6 °C	± 0.55 °C
Type S (0˚C to 140˚C):	± 1.7 °C	± 5.0 °C	± 1.0 °C
Type R (280˚C to -1760˚C):	± 1.7 °C	± 2.6 °C	± 0.4 °C
Type R (0˚C to 280˚C):	± 1.7 °C	± 5.0 °C	± 1.0 °C
CJC accuracy	± 1.0 °C	3.0 °C	± 0.8 °C
Voltage Accuracy with 4.17 Hz filter	**Accuracy Limit At °25C**	**Accuracy Limit At 0-°55C**	**Repeatability Limit At °25C & 4.17 Hz filter**

±50 mV range	±20uV	±35uV	±10uV
±100 mV range	±40uV	±60uV	±13uV
Resistance Accuracy with 4.17 Hz filter	**Accuracy Limit At °25C**	**Accuracy Limit At 0-°55C**	**Repeatability Limit At °25C & 4.17 Hz filter**
0-150 ohms range	±0.15 ohms	±0.25 ohms	±10 milliohms
0-1000 ohms range	±1.0 ohms	±2.0 ohms	±100 milliohms
0-3000 ohms range	±1.5 ohms	±2.5 ohms	±100 milliohms
RTD Accuracy With 4.17 Hz filters	**Accuracy °C Limit At °25C**	**Accuracy °C Limit At 0°55C**	**Repeatability Limit At °25C & 4.17 Hz filter**
Platinum 385 (100, 200, 500 and 1000 ohms) (IEC751 1983, Amend 2 1995; JISC 1604 1997)	± 0.7 °C	± 1.2 °C	± 0.1 °C
Platinum 3916 (100, 200, 500 and 1000 ohms) (JISC 1604: 1981)	± 0.6 °C	± 1.1 °C	± 0.1 °C
Nickel 618 (100 ohms) (DIN 43760 Sept. 1987)	± 0.3 °C	± 0.5 °C	± 0.1 °C
Nickel 672(120 ohms) (DIN 43760 Sept. 1987)	± 0.3 °C	± 0.5 °C	± 0.1 °C
Nickel-Iron (518) (MINCO Application Aid #18,Date 5/90)	± 0.4 °C	± 0.7 °C	± 0.1 °C
Copper 426 (10 ohms) (SAMA RC21-4-1966)	± 2.4 °C	± 2.8 °C	± 0.1 °C

General Specifications

Voltage range Supply current	24V dc nom 240 mA @ 24V dc
Dimensions (with module installed in base) HxWxD approx.	94 x 94 x 69 mm (3.7 x 3.7 x 2.7 in.)

Environmental Conditions

Temperature, operating	0…55 °C (-32…131 °F)
Temperature, storage	–40…85 °C (–40…185 °F)
Relative humidity	IEC 60068-2-30 5…95% non-condensing
Vibration	IEC60068-2-6: 5 g @ 10…500Hz
Shock Operating Non-operating	IEC60068-2-27: 20 g 25 g
Emissions	IEC61000-6-4 CISPR 11: Group 1, Class A (with appropriate enclosure)
ESD immunity	IEC 61000-6-2: 6 kV contact discharges 8 kV air discharges

Radiated RF immunity	IEC 61000-6-2: 10 V/m with 1 kHz sine-wave 80% AM from 30…2000 MHz 10 V/m with 200 Hz 50% Pulse 100% AM at 900 MHz 10 V/m with 200 Hz 50% Pulse 100% AM at 1890 MHz
EFT/B immunity	IEC 61000-6-2: ±2 kV at 5 kHz on signal ports
Surge transient immunity	IEC 61000-6-2: ±2 kV line-earth (CM) on shielded ports
Conducted RF immunity	IEC 61000-6-4: 10V rms with 1 kHz sine-wave 80% AM from 150 kHz…80 MHz
Enclosure type rating	None (open-style)
Signal conductors Thermocouple Millivolt Category[7]	 Use appropriate shielded thermocouple wire[8] Belden 8761 2 - on signal ports
Power conductors Wire size Category[7]	 0.34…2.5 mm2 (22…12 AWG) solid or stranded copper wire rated at 75 °C (167 °F) or greater 1.2 mm (3/64 in.) insulation max 3 - on power ports
Terminal screw torque for cage-clamp terminal base	0.8 Nm (7 lb-in.)

[7] Use this category information for planning conductor routing as described in the Industrial Automation Wiring and Grounding Guidelines, Allen-Bradley publication 1770-4.1.
[8] Refer to the thermocouple manufacturer for proper thermocouple extension wire.

Certifications (when product is marked)	**UL** Listed for Class I, Division 2 Group A,B,C,D Hazardous Locations, certified for U.S. and Canada. See UL File E180101. **UL** Listed Industrial Control Equipment, certified for U.S. and Canada. See UL File E140954. **EEx** European Union 94/9/EEC ATEX Directive, compliant with: EN 60079-15; Potentially Explosive Atmospheres, Protection “nA” (Zone 2) **CE** European Union 89/336/EEC EMC Directive, compliant with: EN 61000-6-4; Industrial Emissions EN 61326; Meas./Control/Lab., Industrial Requirements EN 61000-6-2; Industrial Immunity EN 61131-2; Programmable Controllers (Clause 8, Zone A & B)

Index

S

T

U

W

Getting Technical Assistance

Note that your module contains electronic components which are susceptible to damage from electrostatic discharge (ESD). An electrostatic charge can accumulate on the surface of ordinary plastic wrapping or cushioning material**. In the unlikely event that the module should need to be returned to Spectrum Controls, please ensure that the unit is enclosed in approved ESD packaging (such as static-shielding / metalized bag or black conductive container).** Spectrum Controls reserves the right to void the warranty on any unit that is improperly packaged for shipment.

RMA (Return Merchandise Authorization) form required for all product returns.

For further information or assistance, please contact your local distributor, or call the Spectrum Controls technical Support at:

USA - 425-746-9481

Declaration of Conformity

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