Honeywell

Experion PKS
Rail I/O Series A Implementation Guide

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EPDOC-X114-en-431A	431	0	February 2015

Disclaimer

Contents

1 About this document

Provides information about interfacing Series A Rail I/O components with your Experion system through Control Builder configuration. It includes component installation, configuration, operation, and service data.

Revision history

Revision	Date	Description
A	February 2015	Initial release of the document.

2 Introduction

Related topics

“Overview” on page 12
“Getting started with the Rail Input/Output Module - Series A” on page 14
“Conventions” on page 17
“Typical RIOM-A system architecture” on page 18

2.1 Overview

The Rail Input/Output Module - Series A (RIOM-A) products are designed for use in the same general-purpose locations as other Experion control hardware components. They complement the existing Experion system Chassis I/O Modules - Series A (CIOM-A) and Rail I/O Modules - Series H (RIOM-H) components by providing a seamless integration with the ControlNet communications network through a Gateway.

This guide is intended to provide information about the RIOM-A components only as a supplement to the existing data.

If this is a new Experion system installation, we recommend that you familiarize yourself with the contents of these other Experion guides before reading this guide:

- *Planning GuideControlNet Installation Guide*
- *Control Hardware Installation Guide*
- *Rail I/O - Series H Implementation Guide* (Only if RIOM-H components are also being used in your system.)

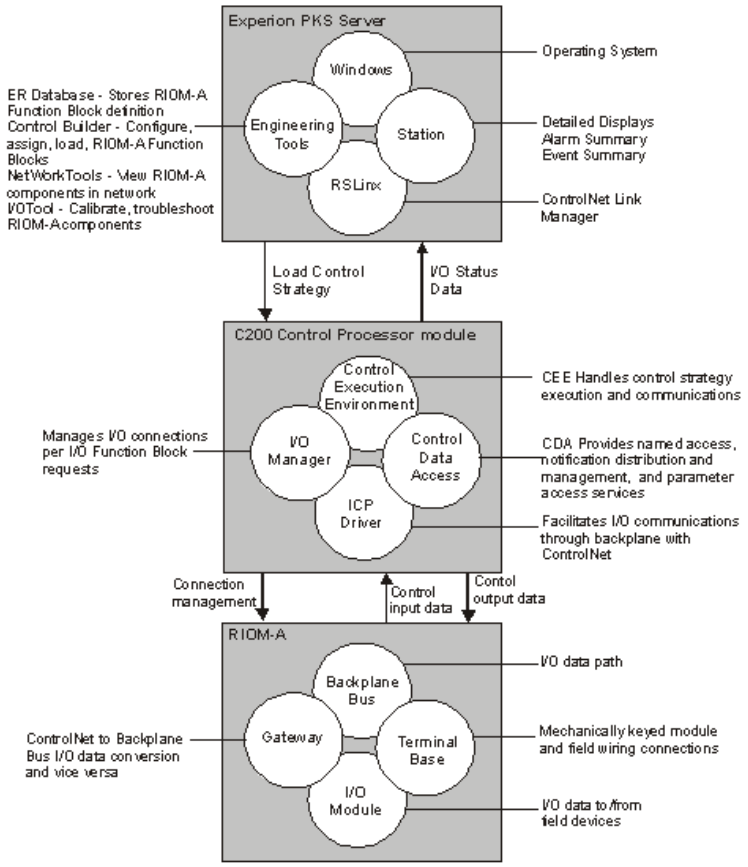
These guides provide general planning details and installation considerations for the Experion system in general. For the sake of brevity, this guide does not repeat the applicable general guidelines, considerations, cautions, an so on, that are covered in these other guides.

2.1.1 System block diagram

The following diagram gives a simplified graphic representation of the RIOM-A integration with the Experion system. This will give you a quick idea of how the RIOM-A components are functionally integrated with the overall operation of the Experion system.

Attention
Refer to the latest Experion Specification document for the operating system specifications.

Table 1: Block diagram of RIOM-A functional integration with the Experion System



2.2 Getting started with the Rail Input/Output Module - Series A

We assume that:

- You have reviewed and/or are familiar with the information provided for planning and installing a basic Experion system consisting of a Experion Server and Hybrid Controller. This information provides general guidelines that are pertinent to overall system implementation.
- You have ordered and received your RIOM-A components.

2.2.1 Installation declaration

Attention

This equipment shall be installed in accordance with the requirements of the National Electrical Code (NEC), ANSI/NFPA 70, or the Canadian Electrical Code (CEC), C22.1. It is supplied as "open equipment" that is intended to be mounted on a sub-panel within an enclosure. The suitability of the enclosure and installed system shall be acceptable to the local "authority having jurisdiction," as defined in the NEC, or "authorized person" as defined in the CEC.

2.2.2 Selecting wiring and cabling

You will need shielded, stranded 24 to 14 AWG wire for I/O connections, coaxial cable for ControlNet connections, and fiber optic cable type 62.5/125 micron with ST termination for fiber optic system connections.

You are responsible for selecting the wire and cable that is appropriate for your planned routing method and meets both national and local electrical and fire codes.

Since cable routes can vary from using plenum air returns to being buried underground, we suggest that you work with a cable manufacturer to select the wiring that meets your particular installation requirements. If you have access to the Internet, you can visit the Belden Wire and Cable Company web site at for helpful technical data on a wide variety of wire and cable types.

2.2.3 Reviewing CE Mark requirements

If a Series A Rail I/O component has a CE mark, it is approved for installation within the European Union and EEA regions. The RIOM-A component has been designed and tested to meet the following directives.

EMC Directive

This component is tested to meet Council Directive 89//336/EEC Electromagnetic Compatibility (EMC) and the following standards, in whole or part, documented in a technical construction file:

- EN 50081-2 EMC - Generic Emission Standard, Part 2 - Industrial Environment
- EN 50082-2 EMC - Generic Immunity Standard, Part 2 - Industrial Environment

This component is intended for use in an industrial environment.

Low Voltage Directive

This component is tested to meet Council Directive 73/23/EEC Low Voltage, by applying the safety requirements of EN 61131-2 Programmable Controllers, Part 2 - Equipment Requirements and Tests.

Attention

The RIOM-A equipment is classified as open equipment and must be mounted in an enclosure during operation to provide safety protection.

2.2.4 Observing good wiring practices

To promote electromagnetic compatibility, observe the following four general wiring practice guidelines.

Guideline 1: Be sure all inactive metal parts have a good ground connection

- Connect all inactive metal parts, including their entire surface and with low impedance, to ground.
- Use special contact plates or remove the insulated protective layers on the contact points for screw connections on varnished or anodized metal parts.
- Avoid using aluminum parts whenever possible for grounding. Since aluminum oxidizes easily, it is not very suitable for grounding.
- Make a central connection between ground and the protective conductor.
- Connect an equipment-grounding conductor directly from the mounting bolt on the DIN rail to an individual bolt on the ground bus. The RIOM-A components are grounded only through the DIN rail.

Guideline 2: Be sure the wiring is properly run

- Separate the wiring according to these four categories: high current, power supply, signal line and data line.
- Always run the high current wiring and signal/data line wiring in separate conduits or bundles.
- Run the signal/data line wiring in metal trays or as close as possible to bus bar, metal rails, and metal enclosure areas.

Guideline 3: Be sure the shielded wires are securely fastened

- Use shielded cable for signal and data lines.
- Run the entire surface area of the shielded wire inside the enclosure on a shielded bus bar and fasten it with a cable clamp. Then, run the shielded signal line to the I/O module terminal connections. Remove the last 10 cm (4 in) of the shield from the signal line before connecting it to the terminal.
- Never use “pigtails” to connect the cable shield to the protective conductor.
- All shields should be grounded at one end only - preferably the I/O module end in the enclosure
- Never connect a shield to the common side of a logic circuit (this would introduce noise into the logic). Connect each shield directly to a chassis ground.
- When a distribution box is used for dividing a multicore cable into separate cables, be sure the potential of the cable shields is isolated from the metal housing of the distribution box. The distribution box must be made of metal. The metal housing can be connected to a protective conductor

Guideline 4: Make a uniform reference potential

- If a module or block has individually isolated I/O or multiple isolated commons and multiple power sources are used, be sure that the difference in potential between any two power sources does not exceed the specified maximum continuous voltage that can be applied between the channels.
- Check the use of ground. It can serve as a measure of protection.
- Avoid ground loops by connecting the installations and enclosures with central and additional devices radically to the earth ground and protective conductor.

2.2.5 Reviewing Removal and Insertion Under Power (RIUP) function guidelines

Review the Removal and Insertion Under Power (RIUP) Function Guidelines in the *Control Hardware Installation Guide* before you RIUP any module.

2.2.6 Observing component handling guidelines

Electrostatic discharge can damage integrated circuits or semiconductors if you touch backplane connector pins. Follow these guidelines when you handle a module:

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

2.3 Conventions

The following table summarizes the terms and type representation conventions used in this Guide.

Term/Type Representation	Meaning	Example
click	Click left mouse button once. (Assumes cursor is positioned on object or selection.)	Click the Browse button.
double-click	Click left mouse button twice in quick succession. (Assumes cursor is positioned on object or selection.)	Double click the Station icon.
drag	Press and hold the left mouse button while dragging cursor to new screen location and then release the button. (Assumes cursor is positioned on object or selection to be moved.)	Drag the PID function block onto the Control Drawing.
right-click	Click right mouse button once. (Assumes cursor is positioned on object or selection.)	Right-click the AND function block.
<F1>	Keys to be pressed are shown in angle brackets.	Press <F1> to view the online Help.
<Ctrl>+<C>	Keys to be pressed together are shown with a plus sign.	Press <Ctrl>+<C> to close the window.
File > New	Shows menu selection as menu name followed by menu selection	Click File > New to start new drawing.
>D:\setup.exe<	Data to be keyed in at prompt or in an entry field.	Key in this path location >D:\setup.exe<.

2.4 Typical RIOM-A system architecture

Figure 2 is a graphic representation of the components functionally identified in the block diagram in Figure 1. A typical RIOM-A system includes:

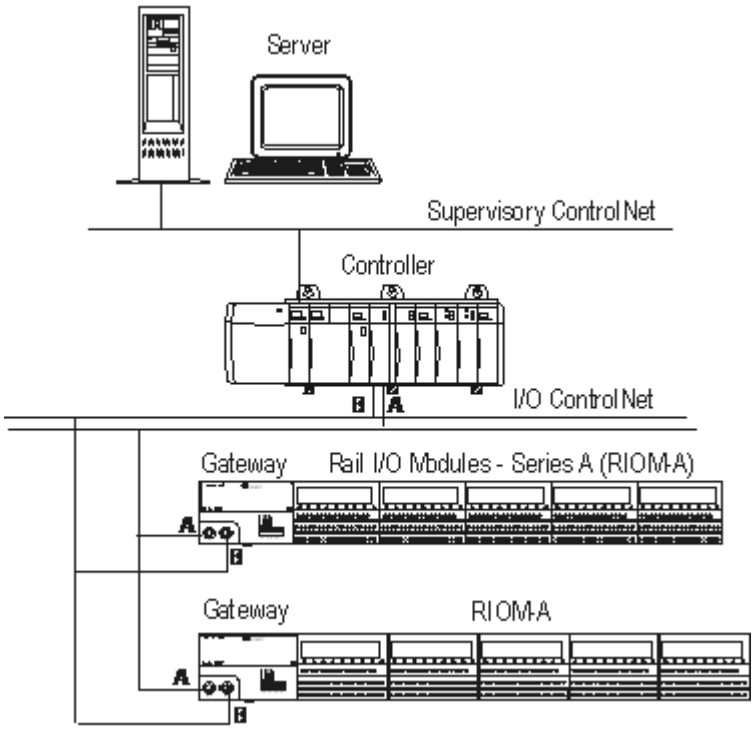
- ControlNet Gateway Redundant Media
- Terminal Base (up to eight per Gateway)
- Analog and/or Digital Plugin I/O Modules (mechanically keyed to Terminal Base)
- Power Supply (not shown)

The ControlNet Gateway serves as the communication interface between the field I/O data on the backplane bus and the ControlNet I/O data bus to the Experion system. The ControlNet Gateway module and Terminal Base components connect together to form an instant internal backplane bus. Each Terminal Base features a mechanical key, so it can be “keyed” to support any one of the given plugin I/O modules before making field wiring connections to the base.

Attention

An I/O network can have up to four downlink CNIs installed in a C200 chassis with multiple uplink CNIs and Rail Gateways physically connected to the same network. However, be sure each Rail Gateway has **configured communication paths** from only **one** downlink CNI. The downlink CNIs may have **configured communication paths** to multiple Rail Gateways and chassis mounted I/O modules through uplink CNIs. Each downlink CNI may have a maximum number of 24 **configured communication paths**. Each C200 can support a maximum of 64 I/O modules on the controller's I/O network.

Table 2: Typical RIOM-A system architecture integrated with the Experion system using redundant ControlNet media.



3 Installation of the Rail Input/Output Module - Series A

Related topics

3.1 Planning considerations

Related topics

“I/O module allowance” on page 20
“Reviewing power distribution considerations” on page 20
“Determining power supply requirements” on page 21
“Selecting an enclosure” on page 22
“Calculating maximum ambient temperature inside an enclosure” on page 24
“Maximum ambient temperature calculation example” on page 25

3.1.1 I/O module allowance

Attention
A C200 Control Processor module (CPM) with a 5 millisecond Control Execution Environment (CEE-5ms) does not support operation with RIOM-A components. Only the 50 millisecond Control Execution Environment (CEE-50ms) is compatible with RIOM-A.

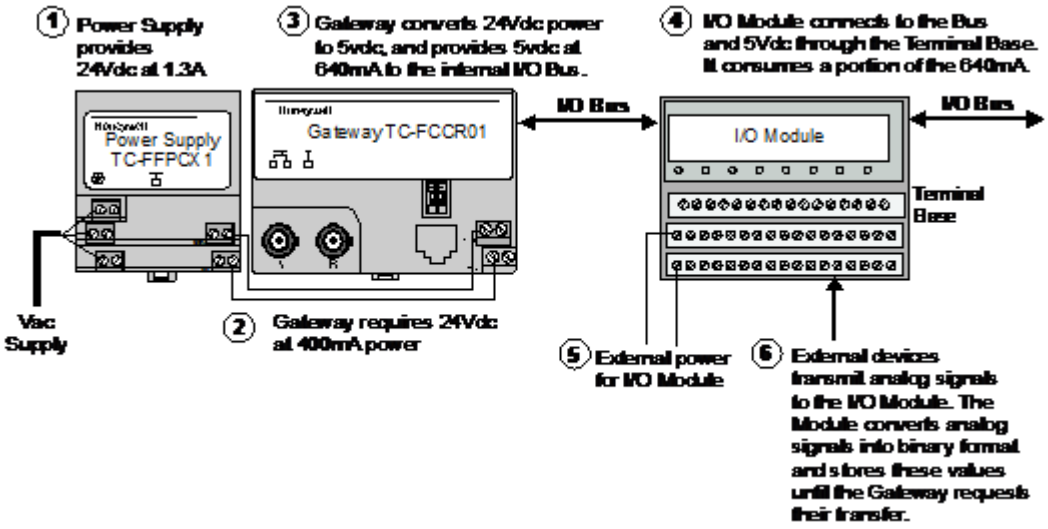
Be sure your Experion System I/O requirements do not exceed the capacities listed in the following table.

Description	Total
Maximum number of I/O modules(including local and remote chassis I/O, RIOM-A, and RIOM-H) per CPM	64
Maximum number of remote I/O chassis and/or RIOM-A and RIOM-H Gateways per CPM	8

3.1.2 Reviewing power distribution considerations

Figure 3 shows how power is distributed through an RIOM-A system and how it is related to data communications. The 24Vdc Power supply provides power to the Gateway. The Gateway, in turn, powers the internal logic through the I/O Bus for as many as eight I/O modules. The user must connect an external power supply to the Terminal Base to provide additional I/O module and field device power. The I/O module contains the Bus interface and circuitry for signal processing and data transfer. Refer to the Table in the next section Determining power supply requirements for a list of individual module Bus current and external power requirements.

Table 3: Overview of RIOM-A power distribution.



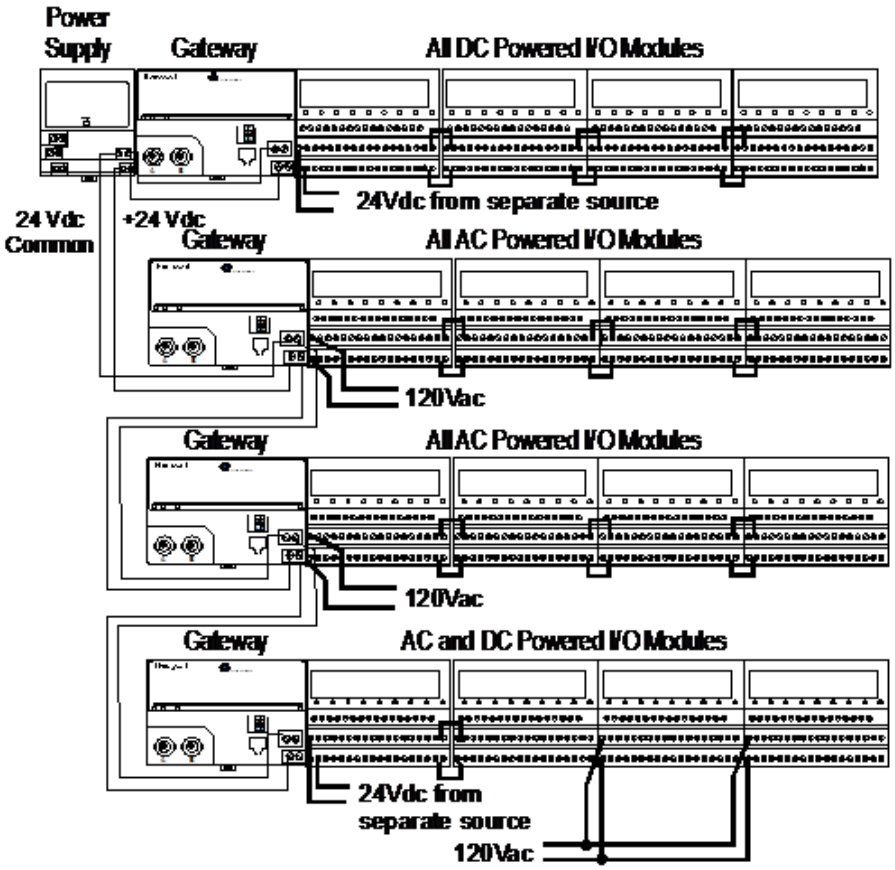
3.1.3 Determining power supply requirements

Each Series A Rail I/O power supply can handle up to four ControlNet Gateways. The following table lists the I/O Bus current and power dissipation in Watts for the given RIOM-A component for reference.

Component	Model Number	I/O Bus Current (mA) @ 5Vdc	External Power Requirement	Power Dissipation (Watts)
ControlNet Gateway (Single-Media)	TC-FCCN01	-	24Vdc	4.6
ControlNet Gateway (Dual-Media)	TC-FCCR01	-	24Vdc	4.6
Analog Input Module (8 points)	TC-FIAH81	20	24Vdc	3
Digital Vdc Input Module (16 points)	TC-FID161	30	24Vdc	6.1
Digital Vac Input Module (8 points)	TC-FIDA81	30	120Vac	4.3
Thermocouple Input Module (8 points)	TC-FIL081	20	24Vdc	3
RTD Input Module (8 points)	TC-FIR081	20	24Vdc	3
Analog Output Module (4 points)	TC-FOA041	20	24Vdc	4.5
Digital Vdc Output Module (16 points)	TC-FOD161	80	24Vdc	5.3
Digital Vac Output Module (8 points)	TC-FODA81	80	120Vac	5.2
Relay Output Module (8 points)	TC-FOR081	69	24Vdc	5.5
Power Supply (24 Vdc output)	TC-FFPCX1	-	120Vac	21

Figure 4 shows how 24Vdc power is typically distributed to four Gateways.

Table 4: Example of typical 24 Vdc power distribution within an RIOM-A system.



3.1.4 Selecting an enclosure

Attention
To meet EMC directive requirements, you must mount all components in an enclosure.

Consider the following things when selecting an enclosure for RIOM-A components:

- The number of RIOM-A components to be installed in one enclosure, including power supplies.
- Are all the components to be mounted in one large enclosure or several small enclosures?
- What are the thermal dynamics of the enclosure?
- Will component heat dissipation cause the interior temperature to exceed 55\C(131\F)?

You can mount the RIOM-A components in either a horizontal or vertical arrangement. You must always install the ControlNet Gateway at the left end of an I/O module segment. Figures 5 and 6 show typical RIOM-A component arrangements in two different size enclosures.

For reference, the small size enclosure in Figure 5 is equivalent to a Rittal model number AE1073-600 with an EMC shielding option for CE Mark Compliance. The larger size enclosure in Figure 6 is equivalent to a Rittal model number AE1180.700 that includes EMC shielding.

Table 5: Typical RIOM-A component layout in a 760 (H) x 760 (W) x 300 (D) mm (30 x 30 x 12 in) enclosure.

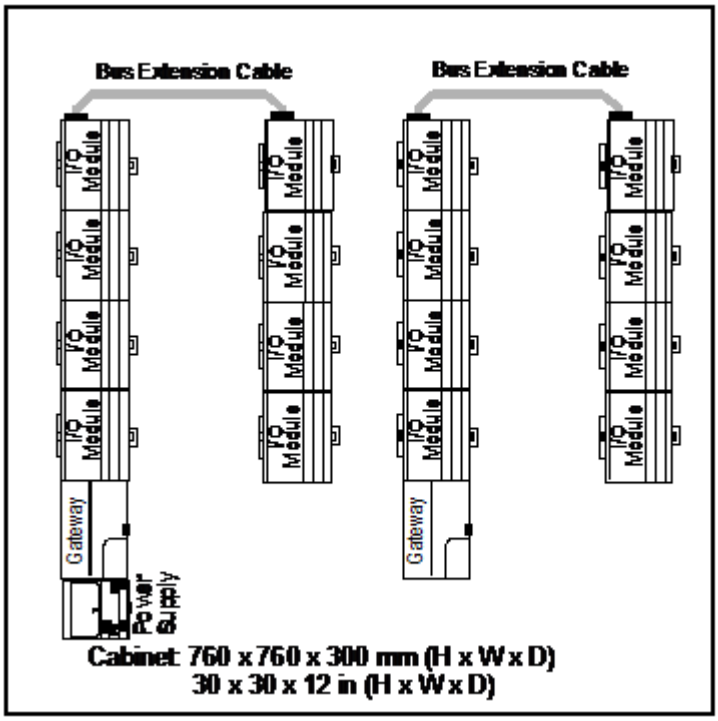
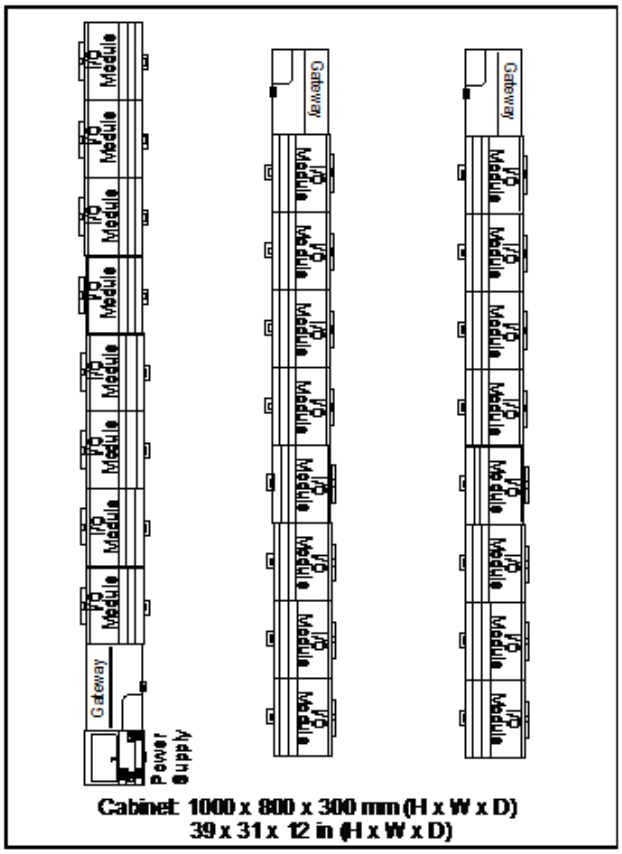


Table 6: Typical RIOM-A component layout in a 1000 (H) x 800 (W) x 300 (D) mm (39 x 31 x 12 in) enclosure.



3.1.5 Calculating maximum ambient temperature inside an enclosure

Since ambient temperature can affect the working life of components, you must calculate the maximum ambient temperature inside an enclosure based on the power dissipation of the installed components and the thermal characteristics of the enclosure. Use the following formula to calculate the maximum temperature increase that can occur inside an enclosure with respect to the outside ambient temperature.

- $\text{deltaT}_{max} = Q_v / k\ A_{eff}$

Where:		
deltaT_{max}	=	Maximum temperature increase
Q_v	=	Total power dissipation of all components in the enclosure
k	=	Heat transfer coefficient of the enclosure
A_{eff}	=	Effective surface of the enclosure

To calculate the total power dissipation (Q_v), simply multiply the power dissipation listed in the previous power requirement table by the corresponding number of components installed in the enclosure and sum the values.

Look in the enclosure manufacturer's technical documentation to find the heat transfer coefficient (k) of the enclosure. A typical coefficient for a sheet steel housing is $5W/m^2\backslash C$ (0.9 BTU)

Use the following formula to calculate the effective surface area (A_{eff}) for a wall-mounted enclosure. In this case, the back of the enclosure is mounted against the wall and the outside top, bottom, sides, and front surfaces are exposed to free air.

- A_{eff} [m^2] = H x (W +2 x D) + 2 x W x D

Where:		
W	=	Width of the enclosure in meters
H	=	Height of the enclosure in meters
D	=	Depth of the enclosure in meters

Where an enclosure is mounted can have an impact on the effective surface area calculation. For example, an enclosure mounted in a location with plenty of surrounding free space provides better heat dissipation. You may want to refer to an Engineering Handbook to review the rules for calculating the effective surface area or review DIN 57600 Part 500 and VDE 660 Part 500 standards.

If the calculation reveals that the maximum ambient temperature inside the case will exceed the 55\C(131\F) operating limit for RIOM-A components, you must consider moving the enclosure to a location with a lower maximum ambient temperature, removing some components from the enclosure, or getting a larger enclosure.

3.1.6 Maximum ambient temperature calculation example

For example, assume that you have these components mounted inside a 1000(H) x 800 (W) x 300 (D) mm enclosure mounted to a wall:

- 3 Gateways = 3 x 4.6 = 13.8
- 4 Digital Vdc Output Modules = 4 x 5.2 = 20.8
- 4 Digital Vdc Input modules = 4 x 6.1 = 24.4
- 4 Analog Input modules = 4 x 3 = 12
- 1 Power Supply = 1 x 21 = 21

The total power dissipation (Q_v) equals 13.8 + 20.8 + 24.4 + 12 + 21 = 92 W total.

The enclosure's heat transfer coefficient (k) is 5W/m^2 \C

The effective surface area (A_{eff}) of the wall-mounted enclosure is:

A_{eff} = 1 x (0.8 + 2 x 0.3) + 2 x 0.8 x 0.3 = 1.88 m^2

Then, substituting into the formula for maximum temperature increase yields:

deltaT$_{max}$ = 92 W / (m^2\C / 5W) 1.88m^2 = 9.8\C (17.6\F)

In this example, if the ambient temperature outside the enclosure reaches a maximum of 45\C (113\F), the maximum ambient temperature inside the enclosure will be approximately 55\C (131\F). This means the maximum ambient temperature inside the case is at the 55\C (131\F) operating limit for RIOM-A components. In this case, it might be better to use a larger case or mount the power supply in a separate case.

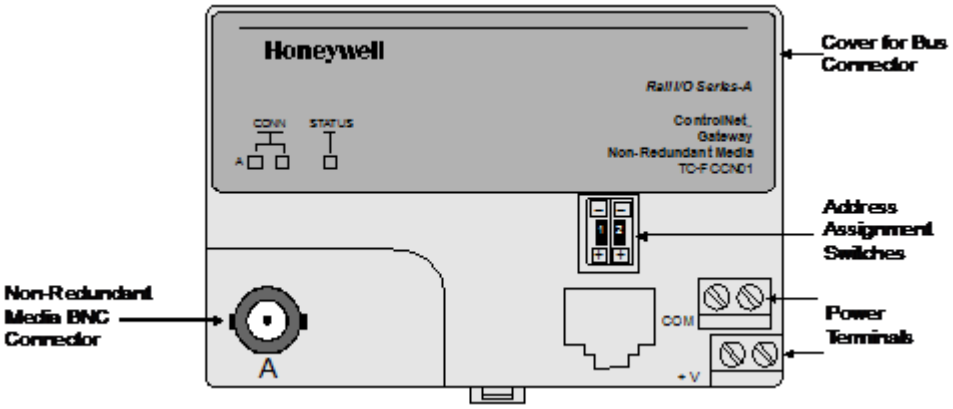
3.2 Installing the ControlNet Gateway TC-FCCN01/TC-FCCR01

Related topics

"Front view of the ControlNet Gateway TC-FCCN01" on page 26
"Front view of the ControlNet Gateway TC-FCCR01" on page 26
"Mounting the ControlNet Gateway on a DIN rail" on page 27
"Wiring the ControlNet Gateway" on page 27
"Setting the MAC ID on the ControlNet Gateway" on page 28

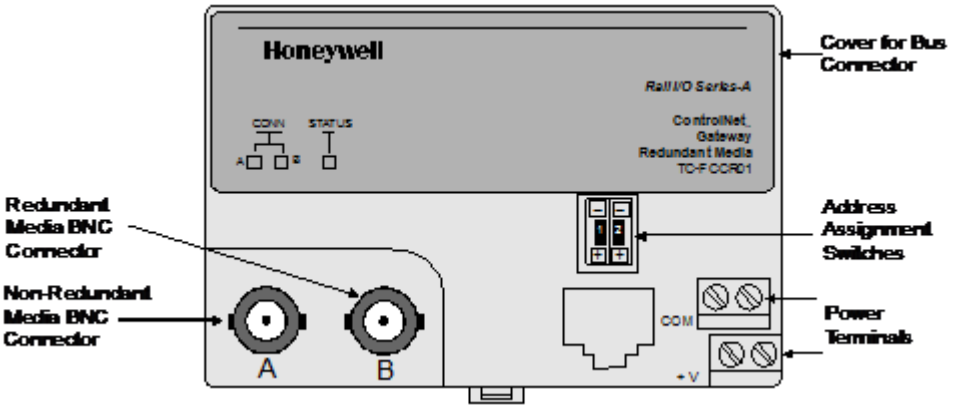
3.2.1 Front view of the ControlNet Gateway TC-FCCN01

Table 7: Front view of single-media ControlNet Gateway model TC-FCCN01.



3.2.2 Front view of the ControlNet Gateway TC-FCCR01

Table 8: Front view of dual-media ControlNet Gateway model TC-FCCR01.



3.2.3 Mounting the ControlNet Gateway on a DIN rail

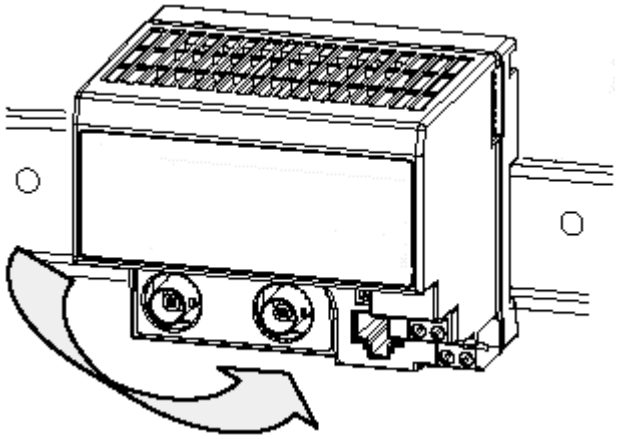
Attention

- You are responsible for obtaining and mounting the 35 x 7.5 mm metal, top hat rails (DIN EN50022) to be used for mounting RIOM-A components.
- Be sure you install the ControlNet Gateway at the left end of an I/O module segment.
- We highly recommend that you use ControlNet dual-media with every RIOM-A Gateway segment.

1 Orient the Gateway so the top of the unit is over the top of the DIN rail.

2 Slightly rotate the module to slip its top mounting flange on the top of the DIN rail.

3 Press the module down flush with the DIN rail so its locking tab snaps into place, securing the module to the rail. If necessary, you can use a screwdriver to manually retract the lock while pressing the module firmly against the rail and then releasing it when in position.

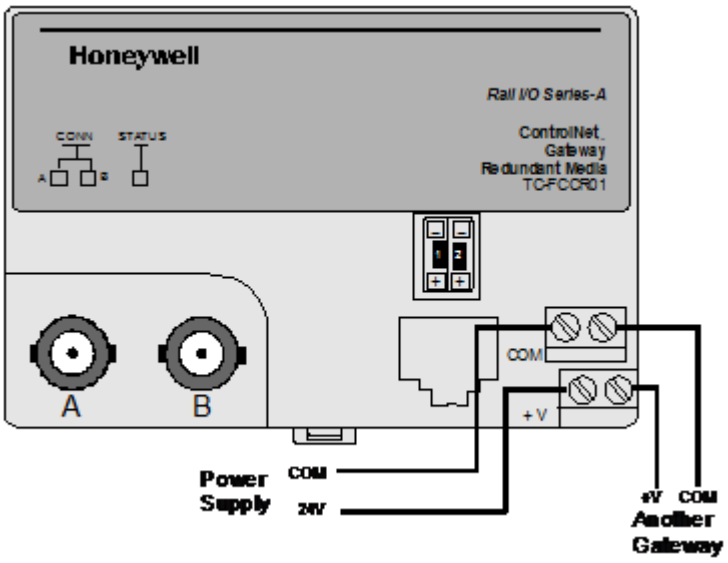


4 Leave the protective covers on the connectors until you are ready to make the connections.

3.2.4 Wiring the ControlNet Gateway

1 Be sure the enclosure is connected to a protective earth ground using 8 AWG solid copper wire. There should be metal to metal contact between the grounding bus bar and the enclosure as well as the DIN rails.

2 Observing polarity, connect the leads from the 24Vdc power supply terminals to either pair of the COM and +V terminals, respectively. The recommended wire size is 14 AWG stranded cable. Torque terminal screws to 7 to 9 inch pounds (0.8 to 1 Newton meter)



(Note that the Gateway does not have a power switch, so it is powered whenever the power supply is turned on. The unused COM and +V terminals can be used to “daisy chain” power to another Gateway as shown in Figure 4, or a Terminal Base unit.)

Attention

- The TC-FFPCX1 power supply provides sufficient 24Vdc power to operate 4 ControlNet Gateways. Do not attempt to operate an entire RIOM-A system with this power supply.
- To comply with CE Low Voltage Directives, you must use a Safety Extra Low Voltage (SELV) or Protected Extra Low Voltage (PELV) power supply to power this Gateway.

3 For non-redundant media, only remove the protective cover from the BNC connector marked A and connect a drop cable from a ControlNet T or Y Tap to it. For redundant media, also remove the protective cover from the BNC connector marked B and connect a drop cable from a ControlNet T or Y Tap to it as well.

4 Use the red and yellow cable markers supplied with taps to mark the A and B cables, respectively, in a redundant-media system.

3.2.5 Setting the MAC ID on the ControlNet Gateway

You must set the required Media Access Control (MAC) ID (or I/O ControlNet address) by using the address assignment switches on the front of the Gateway module. Press the - or + button to lower or raise the value of each digit. The valid address range for a Gateway on an I/O ControlNet network of the Experion system is 02 to 20. Since the Gateway cannot function as a “Keeper node” on the I/O ControlNet network, it must **not** use an address of 01. It must also **not** use any address already assigned to another node on the same I/O ControlNet network.

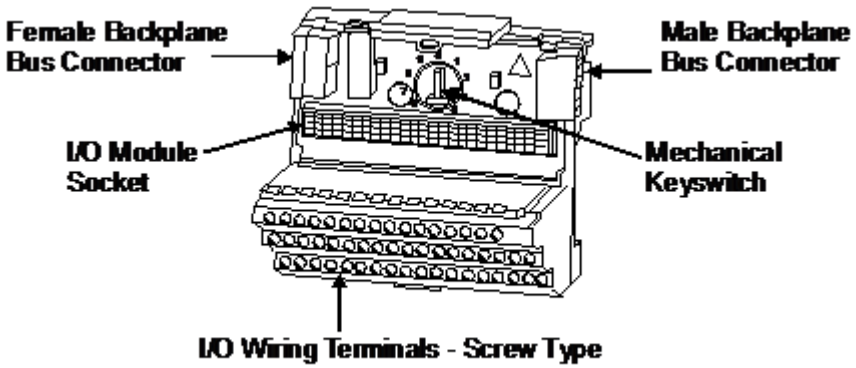
3.3 Installing the Terminal Base TC-FTB301/TC-FTB3T1

Related topics

“Front view of the Terminal Base” on page 29
“Mounting the Terminal Base on a DIN rail” on page 29
“Wiring the Terminal Base” on page 30
“Model TC-FTB301 Terminal Base unit” on page 31
“Model TC-FTB3T1 Terminal Base unit” on page 31
“Setting the keyswitch position on the Terminal Base” on page 32
“Using Bus Extension cable accessories on the Terminal Base” on page 33

3.3.1 Front view of the Terminal Base

Table 9: Front view of Terminal Base model TC-FTB301 screw type or TC-FTB3T1 screw type.



Attention

You must use the TC-FTB3T1 Terminal Base with the TC-FIL081 Thermocouple Analog Input module. This Terminal Base also provides chassis ground connections for the TC-FIR081 3-Wire RTD Analog Input module and analog modules. But, you can also use the TC-FTB301 Terminal Base with the TC-FIR081 3-Wire RTD Analog Input module.

3.3.2 Mounting the Terminal Base on a DIN rail

Attention

This procedure assumes that a ControlNet Gateway or another Terminal Base is already installed and that the power supply is turned Off.

CAUTION

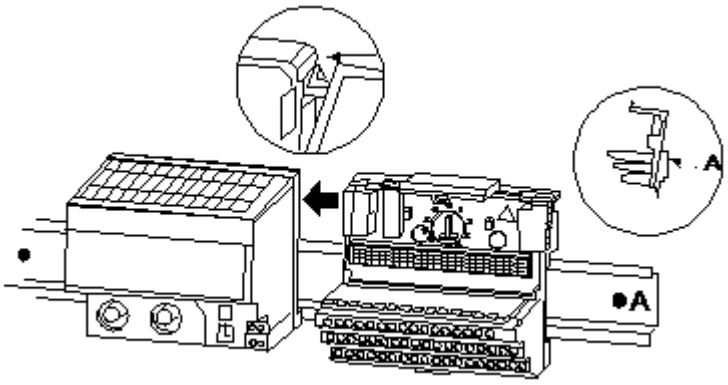
Do **not** remove or replace a Terminal Base unit when power is applied. Interruption of the backplane bus can result in unintended operation or machine motion.

1 Remove the protective cover from the backplane bus connector on the Gateway or the male backplane bus connector on the Terminal Base.

2 Be sure the female bus connector on this Terminal Base is fully retracted into the Base module.

3 Orient the Terminal Base so the top of the unit is over the top of the DIN rail to the right of the installed Gateway or adjacent Terminal Base.

4 Slightly rotate the Terminal Base to slip its top mounting flange on the top of the DIN rail and slide the unit against the Gateway or mating Terminal Base, so its hook is aligned with the notch on the rear of the Gateway or mating Terminal Base.

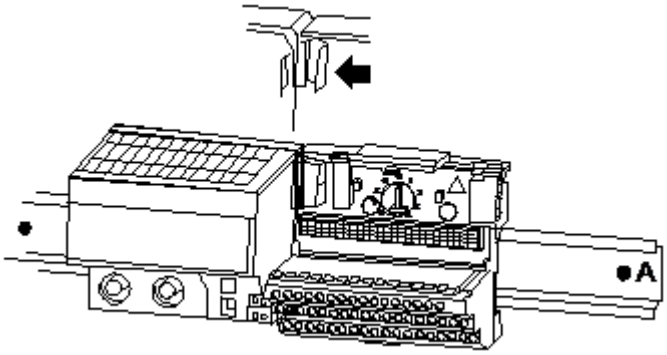


Attention

Do **not** force the Terminal Base into the adjacent Base/ Gateway. Forcing the units together can bend or break the hook and allow the units to separate and break communication over the backplane.

5 Press the Terminal Base down flush with the DIN rail so its locking tab snaps into place, securing the Terminal Base to the rail. If necessary, you can use a screwdriver to manually retract the lock while pressing the Base firmly against the rail and then releasing it when in position.

6 Carefully slide the female backplane bus connector to the left until it is fully seated in the mating Gateway or Terminal Base bus connector.



7 Leave the protective cover on the male backplane bus connector until you are ready to make the connection.

3.3.3 Wiring the Terminal Base

CAUTION

- Total current draw through the Terminal Base unit is limited to 10A. Separate power connections may be necessary.
- Do **not** "daisy chain" power or ground from the TC-FTB3T1 Terminal Base unit with a thermocouple module to any Terminal Base unit with an ac or dc digital module.

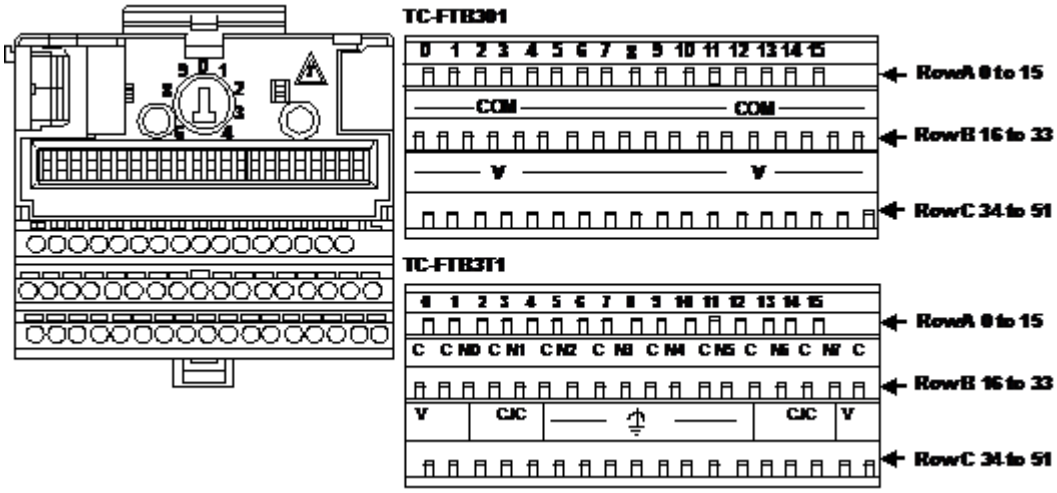
1 Connect the leads from the power supply to the appropriate voltage Common and plus (+) voltage terminals on the Terminal Base. For example, connect 24Vdc Common to terminal 16 and +24Vdc power to terminal 34. See Figure 10 for the general terminal layout for the respective Terminal Base unit. The recommended wire size is 14 AWG stranded cable.

(Note that the Terminal Base does not have a power switch, so it is powered whenever the power supply is turned on.)

2 Refer to the given I/O module installation section in this Guide for specific I/O wiring details.

3 If applicable, use the other voltage Common and plus (+) voltage terminals to “daisy chain” power to another module, as long as the total power consumption does not exceed 10A. For example, connect 24Vdc Common to terminal 33 and +24Vdc power to terminal 51. See Figure 11 for examples of Terminal Base power wiring for given current draw conditions.

Table 10: Terminal layout for TC-FTB301 and TC-FTB3T1 Terminal Base units.



3.3.4 Model TC-FTB301 Terminal Base unit

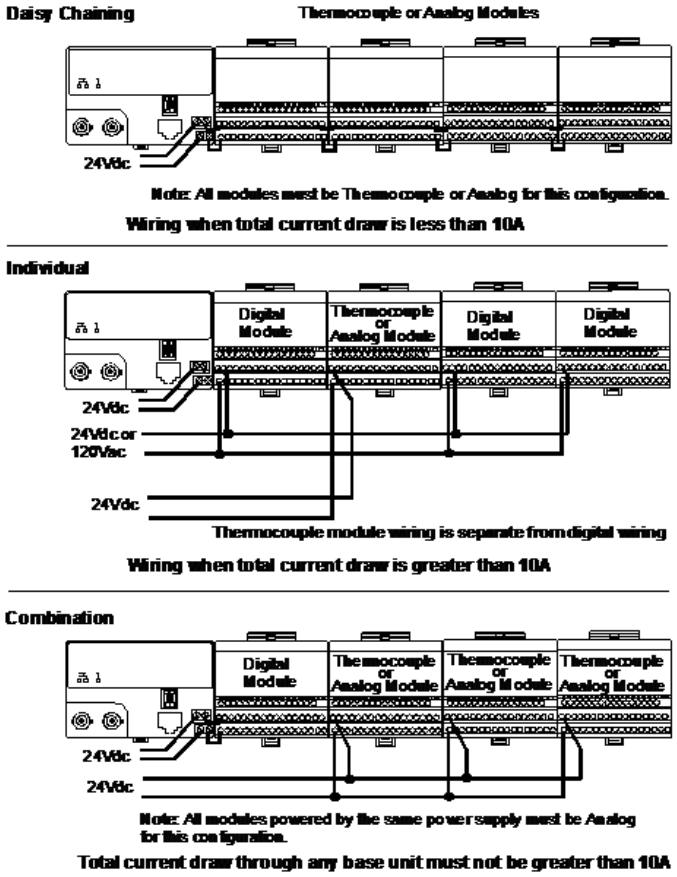
Terminal	Function
Row A 0 to 15	Input/Output
Row B 16 to 33	24Vdc Common or 120Vac Common
Row C 34 to 51	+24Vdc Power or 120Vac

3.3.5 Model TC-FTB3T1 Terminal Base unit

Function	High Signal Terminal (+)	Low Signal Terminal (-)	Signal Return Terminal	Reserved Terminal	Shield Return (Chassis Ground)
Channel 0	0	1	17 (C)	18 (N0)	39
Channel 1	2	3	19 (C)	20 (N1)	40
Channel 2	4	5	21 (C)	22 (N2)	41
Channel 3	6	7	23 (C)	24 (N3)	42
Channel 4	8	9	25 (C)	26 (N4)	43
Channel 5	10	11	27 (C)	28 (N5)	44
Channel 6	12	13	29 (C)	30 (N6)	45
Channel 7	14	15	31 (C)	32 (N7)	46
24Vdc Common	Terminals 16, 17, 19, 21, 23, 25, 27, 29, 31, and 33				

Function	High Signal Terminal (+)	Low Signal Terminal (-)	Signal Return Terminal	Reserved Terminal	Shield Return (Chassis Ground)
+24Vdc Power	Terminals 34, 35, 50, and 51				
Cold Junction Compensators	Terminals 36 to 38 and 47 to 49 only				

Table 11: Examples of power wiring for Terminal Base units depending on total current draw and modules used.



3.3.6 Setting the keyswitch position on the Terminal Base

CAUTION
Once you set the keyswitch position for a given I/O module and make the I/O wiring connections specific to that module, do not change the keyswitch position or module type without rewiring the I/O connections accordingly.

The position of the keyswitch on the Terminal Base is I/O module related as noted in the following table. This keys the Terminal Base to a given I/O module type, so a keyed module cannot be accidentally replaced with another type of module.

If you use this I/O module . . .	Then, set the Keyswitch to this position . . .
24Vdc Sink Digital Input model TC-FID161	2
24Vdc Source Digital Output model TC-FOD161	2
High Level Analog Input model TC-FIAH81	3

If you use this I/O module . . .	Then, set the Keyswitch to this position . . .
Thermocouple Analog Input model TC-FIL081	3
3-Wire RTD Analog Input model TC-FIR081	3
Analog Output model TC-FOA041	4
120Vac Digital Input model TC-FIDA81	8
120Vac Digital Output model TC-FODA81	8
Relay Digital Output model TC-FOR081	9

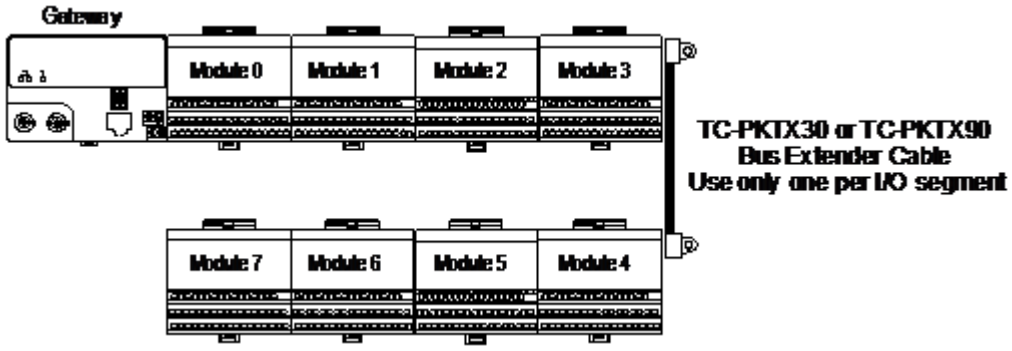
3.3.7 Using Bus Extension cable accessories on the Terminal Base

The following bus extension cables are available to connect split DIN Rail configurations together.

- TC-PKTX30: 30 cm (12 in) long, two female connectors
- TC-PKTX90: 90 cm (36 in) long, two female connectors

Use the TC-PKTXxx cables to join rails in a split configuration as shown in Figure 12. You can use only one bus extension cable per I/O segment. Once you plug the cable connectors into the corresponding backplane bus connectors on the Terminal Bases, secure the cable connectors to the panel with the hardware supplied.

Table 12: Using bus extension cable to connect split rail I/O segment.



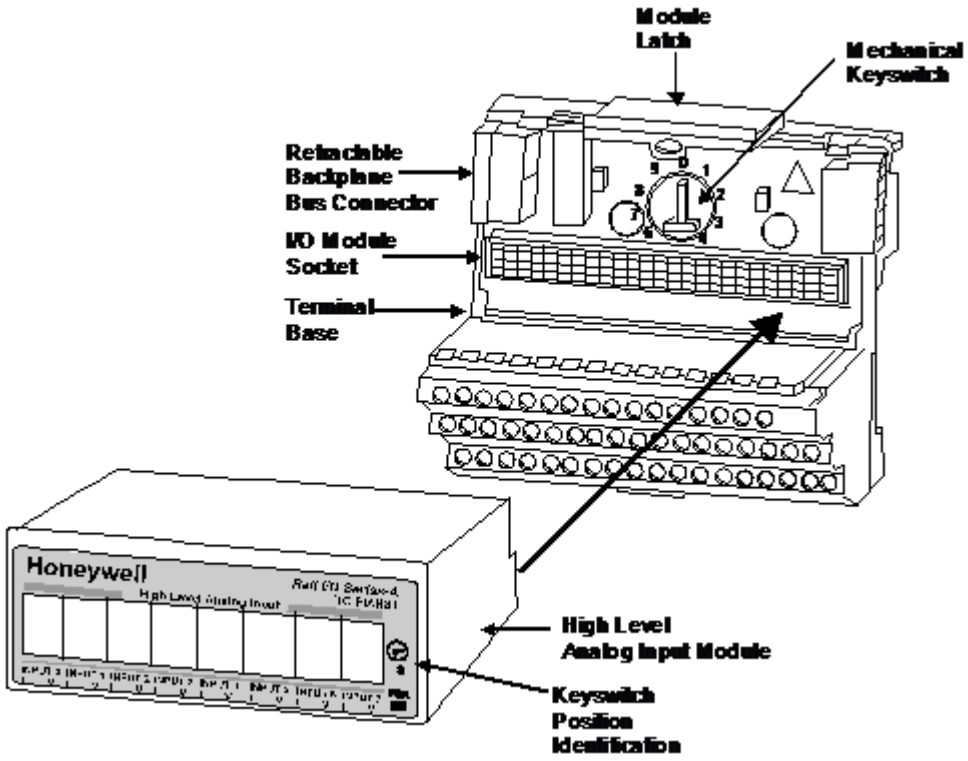
3.4 Installing the High Level Analog Input Module TC-FIAH81

Related topics

“Front view of the High Level Analog Input Module” on page 34
“Plugging the High Level Analog Input Module into an installed Terminal Base” on page 34
“Wiring the High Level Analog Input Module” on page 35
“Channel connection reference for the High Level Analog Input Module” on page 36

3.4.1 Front view of the High Level Analog Input Module

Table 13: High Level Analog Input Module model TC-FIAH81 plugs into Terminal Base model TC-FTB301 or TC-FTB3T1.



3.4.2 Plugging the High Level Analog Input Module into an installed Terminal Base

Attention

This procedure assumes that the Terminal Base TC-FTB301 or TC-FTB3T1 is already installed and connected to another Terminal Base or the Gateway, and that the power supply is turned Off.

1 Turn the keyswitch on the Terminal Base clockwise to its number 3 position.
(Note that the module's keyswitch position is identified on its front label.)

2 Be sure the retractable backplane bus connector on the Terminal Base is fully inserted into the mating module. Do **not** install an I/O module into a Terminal Base that is **not** installed.

3 Orient the Analog Input module so its connector is aligned with the I/O socket on the Terminal Base. Carefully press the module into the Terminal Base so it is fully seated in the I/O socket and the Terminal Base's module latch snaps into place.

3.4.3 Wiring the High Level Analog Input Module

Attention

- Connect only one current (4 to 20 mA) or one voltage (0 to 10V or -10V to +10V) signal input per channel. Do not connect both current and voltage inputs to the same channel. Be sure you configure the channel to accept the correct input signal type.
- To reduce susceptibility to noise, power Analog modules and Digital modules from separate power supplies. Be sure the length of the dc power cabling does not exceed 33 ft (10 m).

1 Observing polarity, connect the leads from a current or voltage analog input device to the appropriate Signal and Common terminals for channels 0 to 7. See the tables in the next section *Channel Connection Reference* for the general connection scheme for the given Terminal Base unit. Refer to Figures 14 and 15 for typical transmitter connections to Terminal Base units TC-FTB301 and TC-FTB3T1.

2 Connect individual shields to functional earth ground as near as possible to the module, if you are using a TC-FTB301 Terminal Base. Otherwise, use the chassis ground terminals 39 to 46 on a TC-FTB3T1 Terminal Base.

3 Refer to the Terminal Base Wiring section for power supply connections.

Next steps

Table 14: Typical High Level Analog Input module transmitter connections using Terminal Base TC-FTB301.

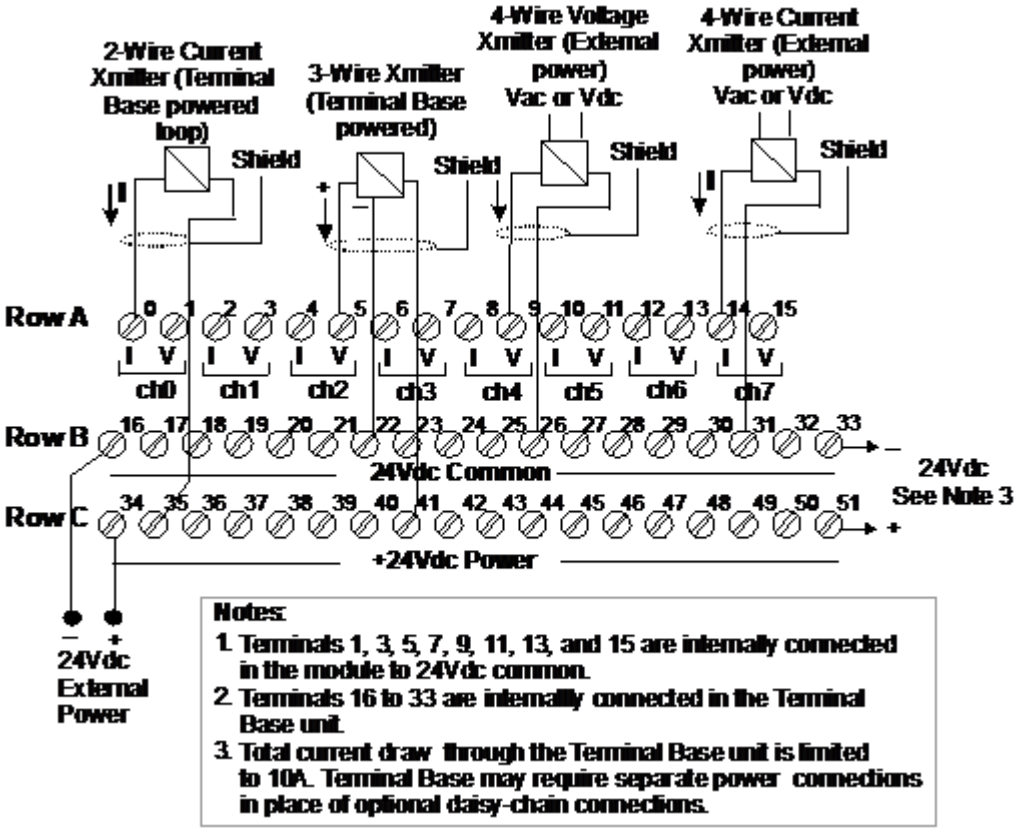
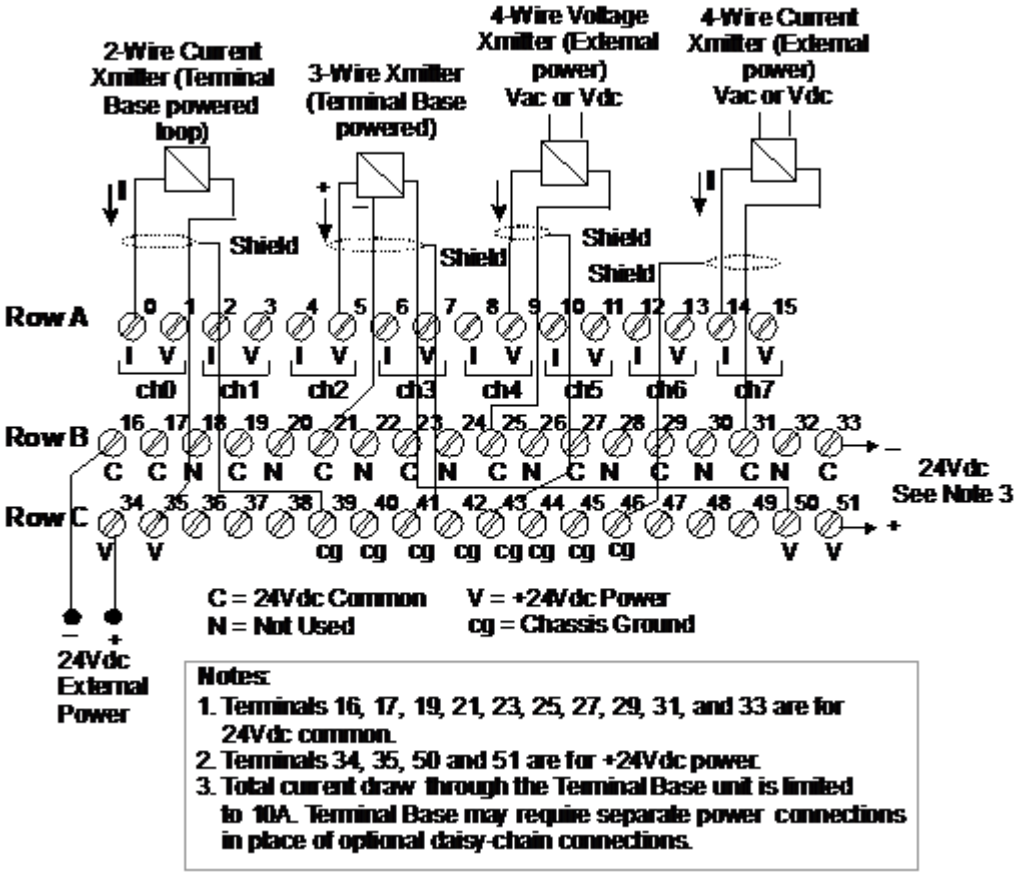


Table 15: Typical High Level Analog Input module transmitter connections using Terminal Base TC-FTB3T1.



3.4.4 Channel connection reference for the High Level Analog Input Module

The following tables identify the individual channel connections for current and voltage signal inputs using either a model TC-FTB301 or TC-FTB3T1 Terminal Base unit. See Figure 16 for a simplified circuit schematic for voltage inputs or Figure 17 for current inputs. The schematics are based on using a TC-FTB301 Terminal Base so the terminal connections shown will vary slightly for voltage inputs and shield returns using a TC-FTB3T1 Terminal Base as noted in the following tables.

Model TC-FTB301 Terminal Base unit

Channel	Signal Type	Signal Terminal	Common Terminal
0	Current (I)	0	17
	Voltage (V)	1	18
1	Current (I)	2	19
	Voltage (V)	3	20
2	Current (I)	4	21
	Voltage (V)	5	22
3	Current (I)	6	23
	Voltage (V)	7	24

Channel	Signal Type	Signal Terminal	Common Terminal
4	Current (I)	8	25
	Voltage (V)	9	26
5	Current (I)	10	27
	Voltage (V)	11	28
6	Current (I)	12	29
	Voltage (V)	13	30
7	Current (I)	14	31
	Voltage (V)	15	32
	24Vdc Common	16 to 33	
	+24Vdc Power	34 to 51	

Model TC-FTB3T1 Terminal Base unit

Channel	Signal Type	Signal Terminal	Common Terminal	Shield
0	Current (I)	0	17	39
	Voltage (V)	1	17	39
1	Current (I)	2	19	40
	Voltage (V)	3	19	40
2	Current (I)	4	21	41
	Voltage (V)	5	21	41
3	Current (I)	6	23	42
	Voltage (V)	7	23	42
4	Current (I)	8	25	43
	Voltage (V)	9	25	43
5	Current (I)	10	27	44
	Voltage (V)	11	27	44
6	Current (I)	12	29	45
	Voltage (V)	13	29	45
7	Current (I)	14	31	46
	Voltage (V)	15	31	46
	24Vdc Common	16, 17, 19, 21, 23, 25, 27, 29, 31, and 33		
	+24Vdc Power	34, 35, 50, and 51		

Table 16: Simplified Schematic of Voltage Input circuit for Channel 0.

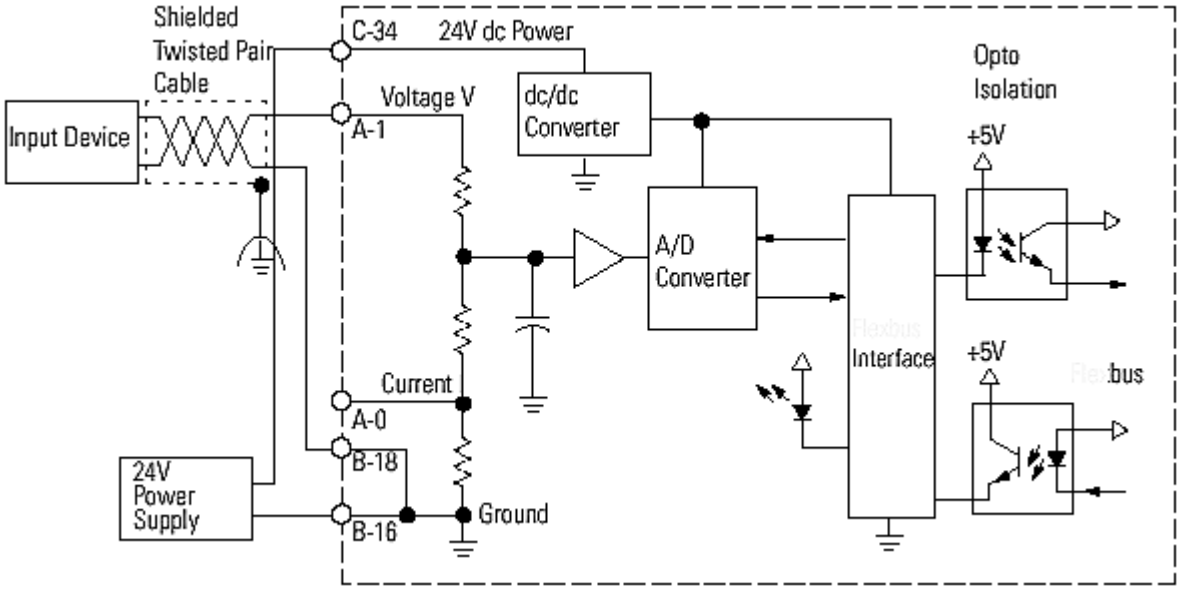
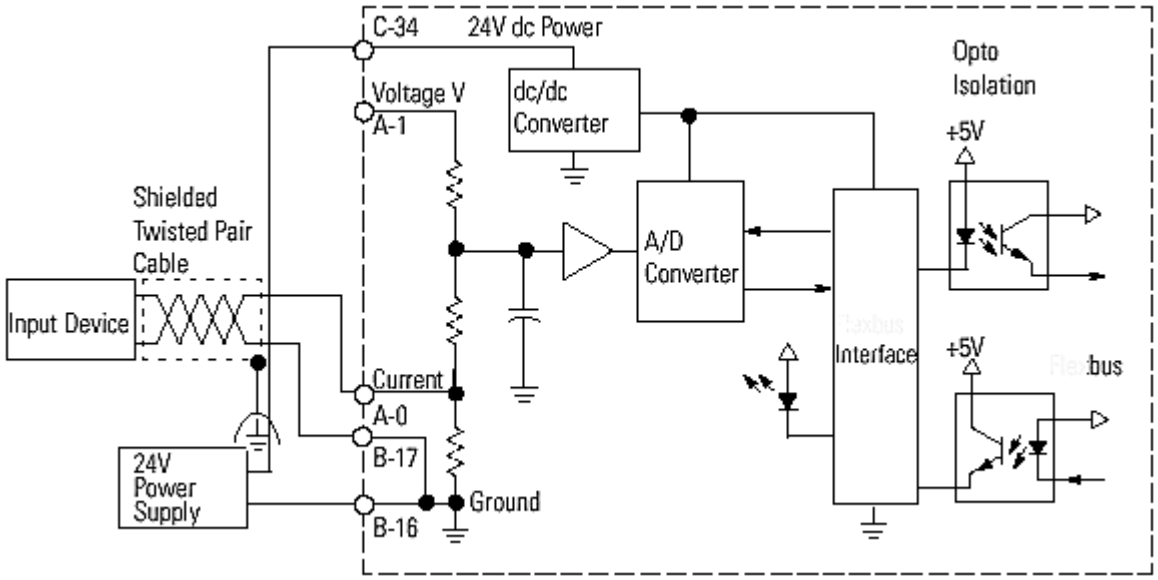


Table 17: Simplified Schematic of Current Input circuit for Channel 0.



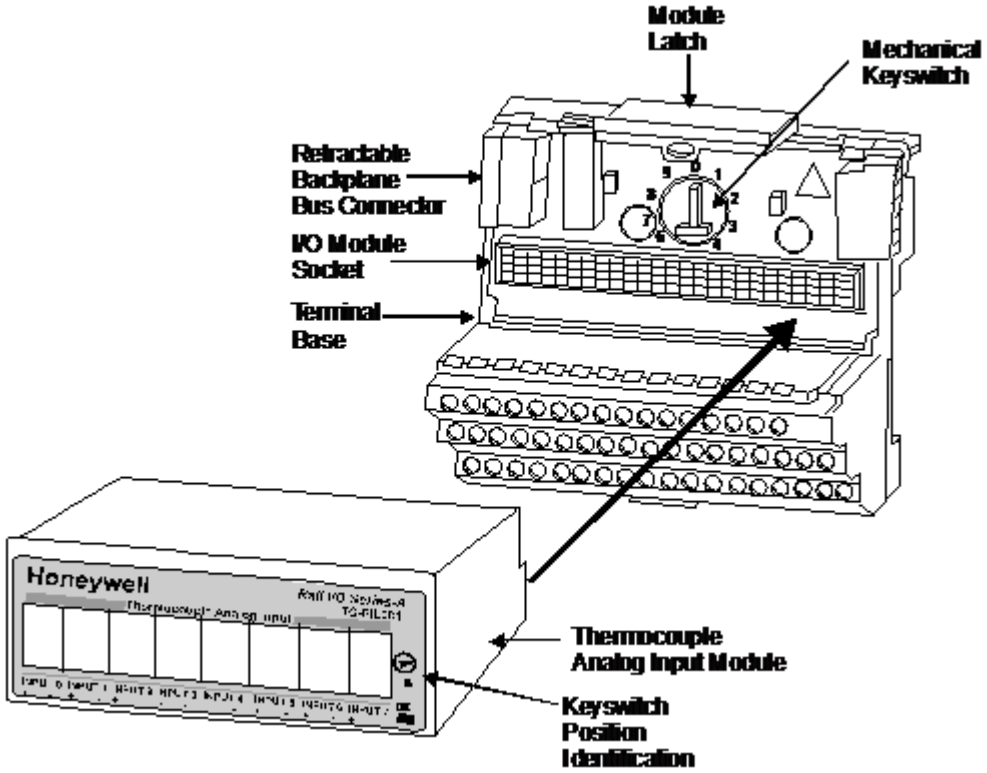
3.5 Installing the Thermocouple Analog Input Module TC-FIL081

Related topics

"Front view of the Thermocouple Analog Input Module" on page 39
"Plugging the Thermocouple Analog Input Module into an installed Terminal Base" on page 39
"Wiring the Thermocouple Analog Input Module" on page 40
"Channel connection reference for the Thermocouple Analog Input Module" on page 42

3.5.1 Front view of the Thermocouple Analog Input Module

Table 18: Thermocouple Analog Input Module model TC-FIL081 plugs into Terminal Base model TC-FTB3T1.



3.5.2 Plugging the Thermocouple Analog Input Module into an installed Terminal Base

Attention

- This procedure assumes that the model TC-FTB3T1 Terminal Base is already installed and connected to another Terminal Base or the Gateway, and that the power supply is turned Off.
- You must use the TC-FTB3T1 Terminal Base for Thermocouple inputs, but you can use the TC-FTB301 Terminal Base, if you will only be using Millivolt inputs.

1 Turn the keyswitch on the Terminal Base clockwise to its number 3 position.

2 (Note that the module's keyswitch position is identified on its front label.)

3 Be sure the retractable backplane bus connector on the Terminal Base is fully inserted into the mating module. Do **not** install an I/O module into a Terminal Base that is **not** installed.

4 Orient the Thermocouple Analog Input module so its connector is aligned with the I/O socket on the Terminal Base. Carefully press the module into the Terminal Base so it is fully seated in the I/O socket and the Terminal Base's module latch snaps into place.

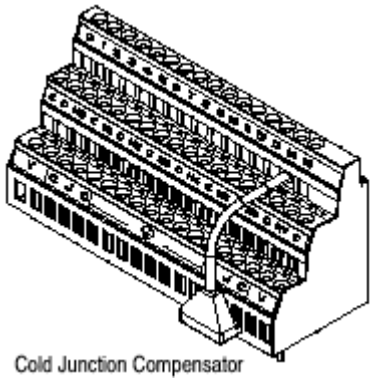
3.5.3 Wiring the Thermocouple Analog Input Module

Attention

- You must power the Terminal Base for this module from the same power supply that supplies the Gateway for the segment so they both power up or down together. You must cycle power for the Gateway to recognize this module.
- To reduce susceptibility to noise, power Analog modules and Digital modules from separate power supplies. Be sure the length of the dc power cabling does not exceed 33 ft (10 m).

1 For thermocouple input, connect sensor leads to the appropriate high (+) and Low (-) signal terminals for channels 0 to 7. For example, connect + thermocouple lead to terminal 0 and - thermocouple lead to terminal 1 for a channel 0 thermocouple input. Connect shield to terminal 39 (chassis ground).

2 For external Cold Junction Compensation (CJC), connect one cold junction compensator (CJC1) to terminals 36, 37, and 38 and the other compensator (CJC2) to terminals 47, 48, and 49. Connect the tail of CJC1 to an associated thermocouple input terminal for channels 0 to 3, and the tail of CJC2 to a terminal associated with a thermocouple input to channels 4 to 7. You must connect the tail of the cold junction compensator to an input terminal with a thermocouple lead connected.



Cold Junction Compensator

3 For millivolt input, observing polarity, connect the leads from the millivolt source in range of +/- 76.5mV to the appropriate high (+) and Low (-) signal terminals for channels 0 to 7. For example, connect + millivolt source lead to terminal 0 and - millivolt source lead to terminal 1 for a channel 0 millivolt input. Connect shield to terminal 17. These connections are the same for both model TC-FTB301 and TC-FTB3T1 Terminal Base units.

Refer to Figures 19 and 20 for typical input connections. See the tables in the next section *Channel Connection Reference* for the general connection scheme

4 Connect individual shields for Thermocouple inputs to the shield return terminals 39 to 46 (chassis ground). Connect individual shields for Millivolt inputs to the shield return terminals 17 to 31

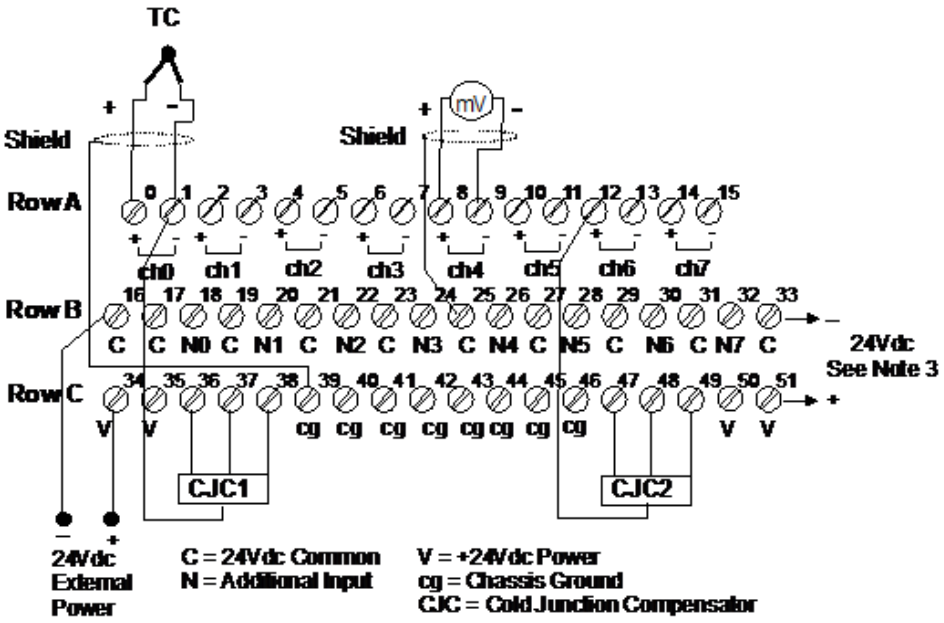
Refer to the Terminal Base Wiring section for power supply connections.

Next steps

Attention

The sensor type accepted as inputs to Channels 0 to 7 are user configurable. This means that Channel 0 could be configured to accept a Thermocouple input from a selected sensor type and Channel 1 could be configured to accept a Millivolt input with a TC-FTB3T1 Terminal Base unit. You must configure inputs as Millivolt only with a TC-FTB301 Terminal Base unit.

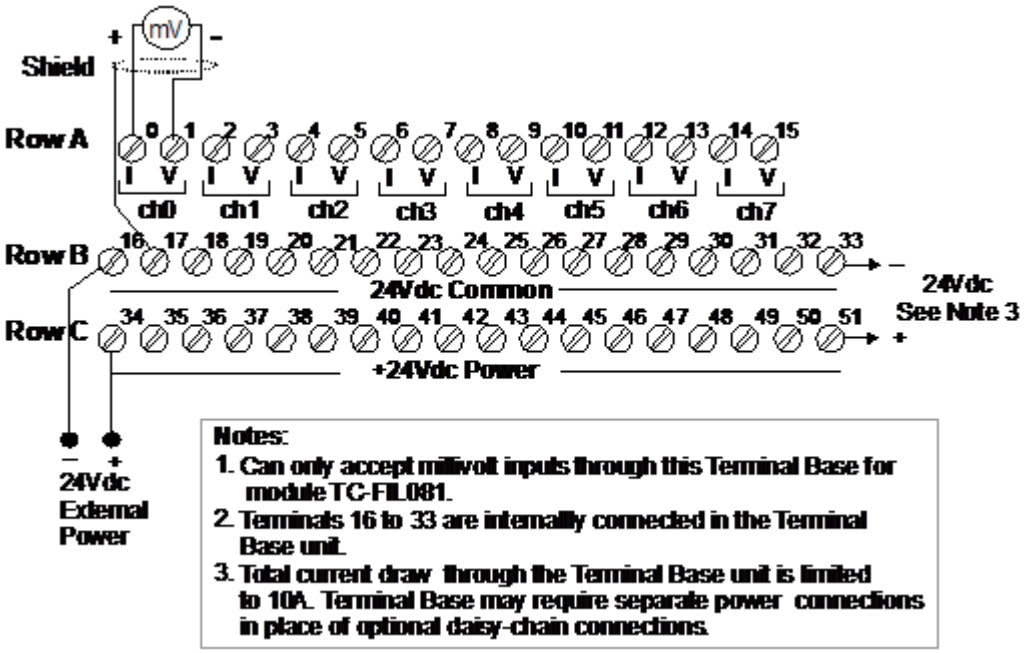
Table 19: Typical Thermocouple Analog Input module connections using TC-FTB3T1 Terminal Base.



Notes:

1. Allen-Bradley kit number 1794-CJC2IA contains two Cold Junction Compensators.
2. This is a non-isolated module. You may need to take extra precautions when using grounded thermocouples, like tying 24Vdc common to earth ground.
3. Total current draw through the Terminal Base unit is limited to 10A. Terminal Base may require separate power connections in place of optional daisy-chain connections.

Table 20: Typical Thermocouple Analog Input module connections using TC-FTB301 Terminal Base.



3.5.4 Channel connection reference for the Thermocouple Analog Input Module

The following tables identify the individual channel connections for Thermocouple signal inputs using a TC-FTB3T1 Terminal Base unit, and Millivolt signal inputs using either a model TC-FTB3T1 or TC-FTB301 Terminal Base unit. See Figure 21 for a simplified circuit schematic for Thermocouple inputs.

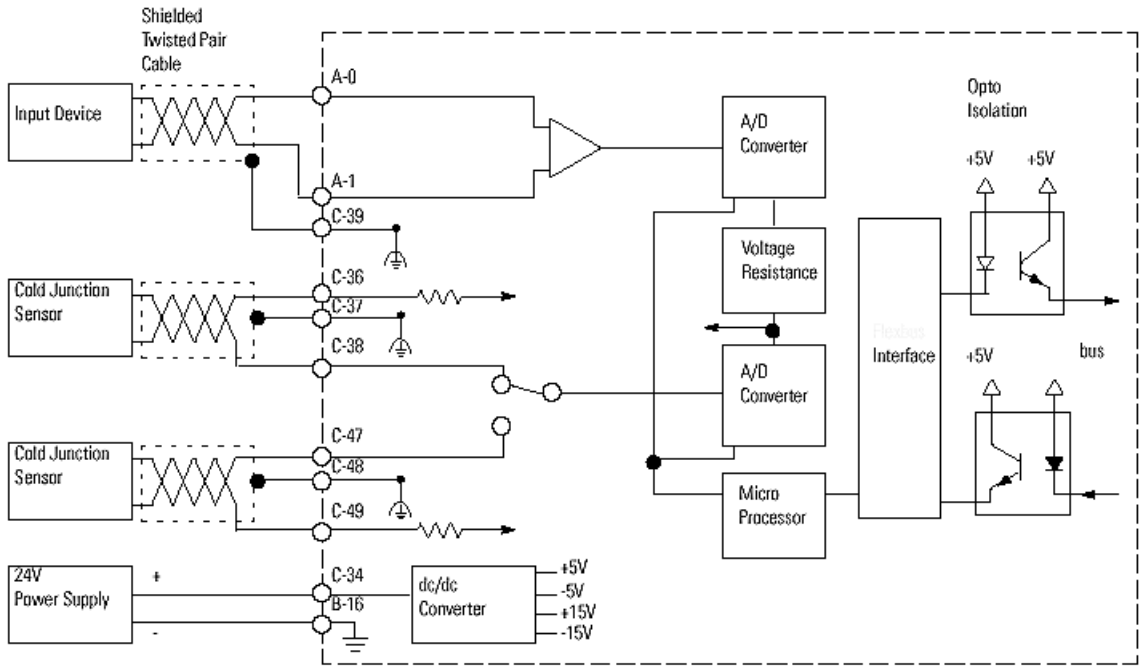
Model TC-FTB3T1 Terminal Base unit

Thermocouple Channel	High Signal Terminal (+)	Low Signal Terminal (-)	Not Used Terminal	Shield Return Terminal (Chassis Ground)
0	0	1	17	39
1	2	3	19	40
2	4	5	21	41
3	6	7	23	42
4	8	9	25	43
5	10	11	27	44
6	12	13	29	45
7	14	15	31	46
24Vdc Common	16,17, 19, 21, 23, 25, 27, 29, 31, and 33			
Cold Junction Compensator	CJC1 36, 37, and 38; CJC2 47, 48, and 49			
+24Vdc Power	34, 35, 50, and 51			

Model TC-FTB3T1 or TC-FTB301 Terminal Base unit

Millivolt Channel	High Signal Terminal (+)	Low Signal Terminal (-)	Not Used Terminal	Shield Return Terminal
0	0	1	18	17
1	2	3	20	19
2	4	5	22	21
3	6	7	24	23
4	8	9	26	25
5	10	11	28	27
6	12	13	30	29
7	14	15	32	31
24Vdc Common	Model TC-FTB3T1: 16,17, 19, 21, 23, 25, 27, 29, 31, and 33 Model TC-FTB301: 16 to 33			
+24Vdc Power	Model TC-FTB3T1: 34, 35, 50, and 51 Model TC-FTB301: 34 to 51			

Table 21: Simplified Schematic of Thermocouple Input circuit for Channel 0.



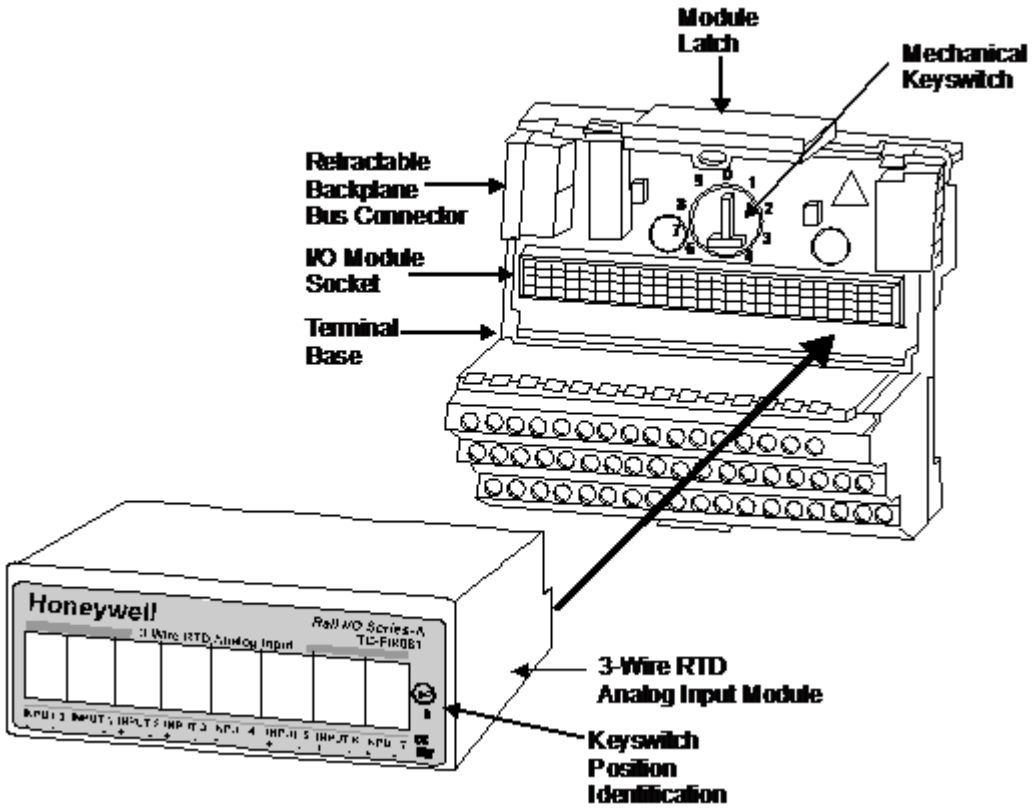
3.6 Installing the 3-Wire RTD Analog Input Module TC-FIR081

Related topics

“Front view of the 3-Wire RTD Analog Input Module” on page 44
“Plugging the 3-Wire RTD Analog Input Module into an installed terminal base” on page 44
“Wiring the 3-Wire RTD Analog Input Module” on page 45
“Channel connection reference for the 3-Wire RTD Analog Input Module” on page 47

3.6.1 Front view of the 3-Wire RTD Analog Input Module

Table 22: 3-Wire RTD Analog Input Module model TC-FIR081 plugs into Terminal Base model TC-FTB3T1 or TC-FTB301.



3.6.2 Plugging the 3-Wire RTD Analog Input Module into an installed terminal base

Attention

This procedure assumes that the Terminal Base is already installed and connected to another Terminal Base or the Gateway, and that the power supply is turned Off.

1 Turn the keyswitch on the Terminal Base clockwise to its number 3 position.
(Note that the module's keyswitch position is identified on its front label.)

2 Be sure the retractable backplane bus connector on the Terminal Base is fully inserted into the mating module. Do not install an I/O module into a Terminal Base that is not installed.

3 Orient the 3-Wire RTD Analog Input module so its connector is aligned with the I/O socket on the Terminal Base. Carefully press the module into the Terminal Base so it is fully seated in the I/O socket and the Terminal Base's module latch snaps into place.

3.6.3 Wiring the 3-Wire RTD Analog Input Module

Attention

- You **must** power the Terminal Base for this module from the same power supply that supplies the Gateway for the segment so they both power up or down together. You **must** cycle power for the Gateway to recognize this module.
- To reduce susceptibility to noise, power Analog modules and Digital modules from separate power supplies. Be sure the length of the dc power cabling does not exceed 33 ft (10 m).
- Use Belden cable 9501 or equivalent for 2-wire RTD wiring. Use Belden 9533 or equivalent for 3-wire RTD wiring, if humidity is normal and cable length is less that 100 ft (30.5 m); or Belden 83503 or equivalent, if humidity is greater than 55\ for over eight hours or the cable length exceeds 100 ft (30.5 m).

1 For 2-wire RTD, connect leads to appropriate High (+) and Low (-) signal terminals for the given channel. For example, connect signal leads to terminals 14 (+) and 15 (-) with a jumper from terminal 15 to the signal return terminal 31 for channel 7.

2 For 3-wire RTD, connect signal leads to appropriate High (+) and Low (-) signal terminals and signal return to associated signal return terminal for the given channel. For example, connect signal leads to terminals 8 and 9 and the signal return lead to terminal 25 for channel 4.

3 For 4-wire RTD, same as for 3-wire RTD but clip or tieback the fourth lead.

Refer to Figures 23 and 24 for typical input connections. See the tables in the next section *Channel Connection Reference* for the general connection scheme.

4 Connect individual shields for RTD inputs to the associated shield return terminals on row B for the TC-FTB301Terminal Base or row C 39 to 46 (chassis ground) for the TC-FTB3T1 Terminal Base. See the tables in the next section *Channel Connection Reference* for the general connection scheme.

5 Refer to the Terminal Base Wiring section for power supply connections.

Attention

The sensor type accepted as inputs to Channels 0 to 7 are user configurable. This means that Channel 0 could be configured to accept a 500-ohm Platinum RTD input and Channel 1 could be configured to accept a 100-ohm Nickel RTD input

Table 23: Typical 3-Wire RTD Analog Input module connections using TC-FTB3T1 Terminal Base.

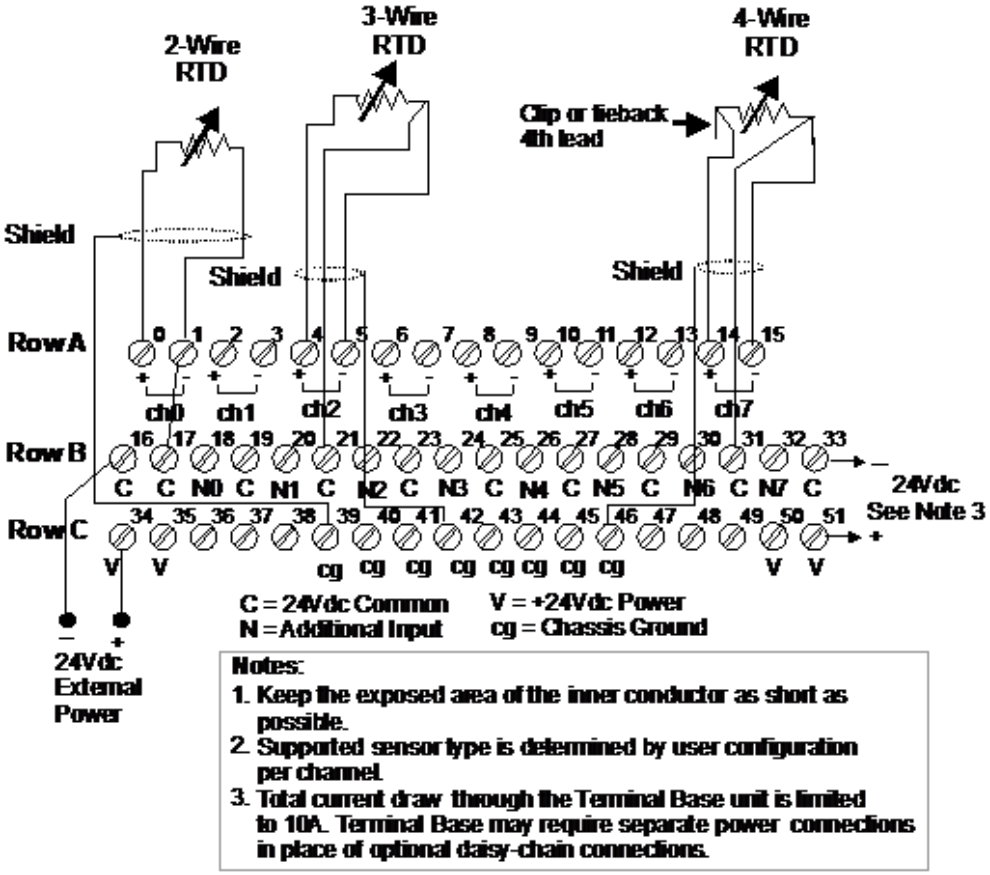
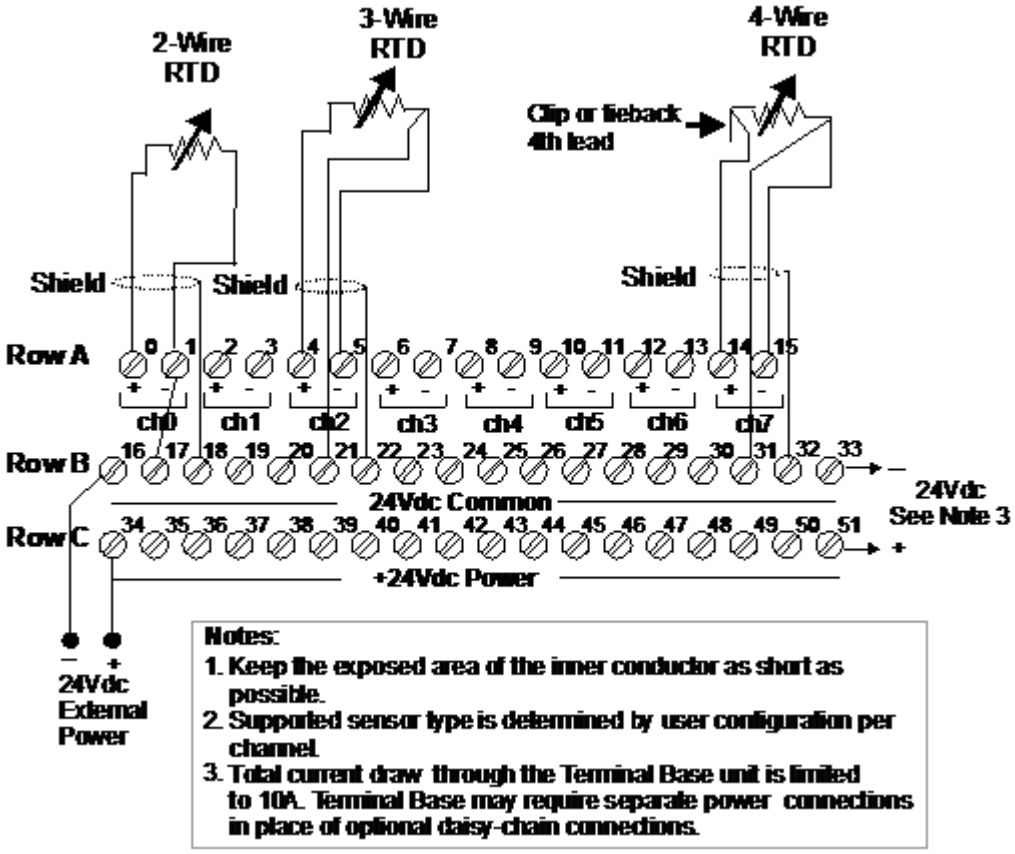


Table 24: Typical 3-Wire RTD Analog Input module connections using TC-FTB301 Terminal Base.



3.6.4 Channel connection reference for the 3-Wire RTD Analog Input Module

The following tables identify the individual channel connections for RTD signal inputs using a model TC-FTB3T1 or TC-FTB301 Terminal Base unit. See Figure 25 for a simplified circuit schematic for RTD inputs.

Model TC-FTB3T1 Terminal Base unit

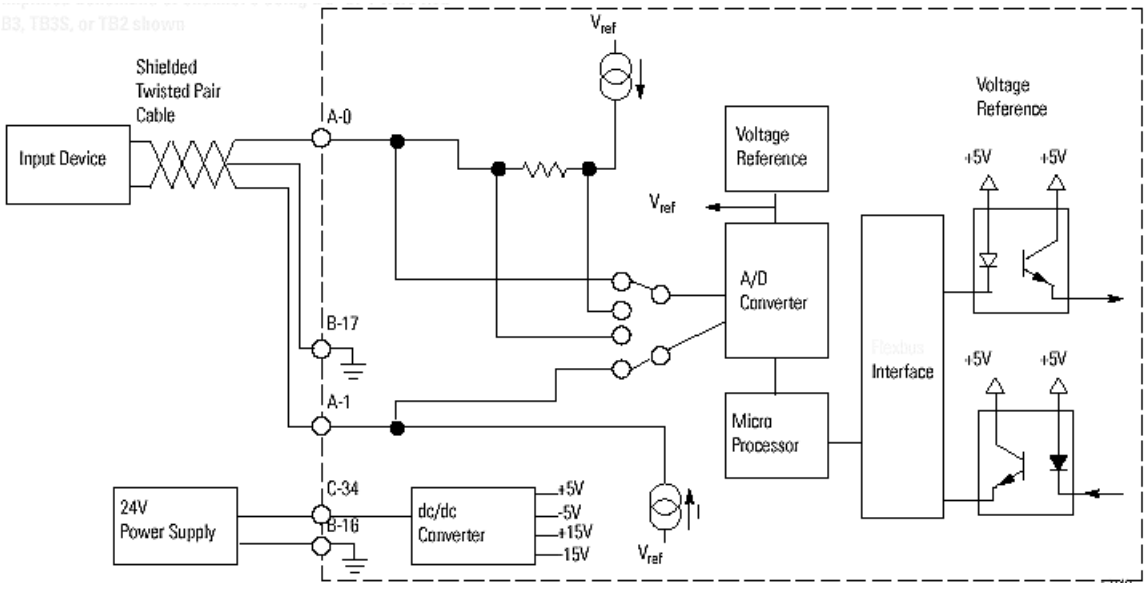
Thermocouple Channel	High Signal Terminal (+)	Low Signal Terminal (-)	Not Used Terminal	Shield Return Terminal (Chassis Ground)
0	0	1	17	39
1	2	3	19	40
2	4	5	21	41
3	6	7	23	42
4	8	9	25	43
5	10	11	27	44
6	12	13	29	45
7	14	15	31	46
24Vdc Common	16,17, 19, 21, 23, 25, 27, 29, 31, and 33			

Thermocouple Channel	High Signal Terminal (+)	Low Signal Terminal (-)	Not Used Terminal	Shield Return Terminal (Chassis Ground)
Cold Junction Compensator	Not used with RTD CJC1 36, 37, and 38; CJC2 47, 48, and 49			
+24Vdc Power	34, 35, 50, and 51			

Model TC-FTB301 Terminal Base unit

Millivolt Channel	High Signal Terminal (+)	Low Signal Terminal (-)	Signal Return Terminal	Shield Return Terminal
0	0	1	17	18
1	2	3	19	20
2	4	5	21	22
3	6	7	23	24
4	8	9	25	26
5	10	11	27	28
6	12	13	29	30
7	14	15	31	32
24Vdc Common	16 to 33			
+24Vdc Power	34 to 51			

Table 25: Simplified Schematic of 3-Wire RTD Input circuit for Channel 0.



3.7 Installing the 24Vdc Sink Digital Input Module TC-FID161

Related topics

"Front view the 24Vdc Sink Digital Input Module" on page 49
"Plugging the 24Vdc Sink Digital Input Module into an installed terminal base" on page 49
"Wiring the 24Vdc Sink Digital Input Module" on page 50
"Channel connection reference for the 24Vdc Sink Digital Input Module" on page 50

3.7.1 Front view the 24Vdc Sink Digital Input Module

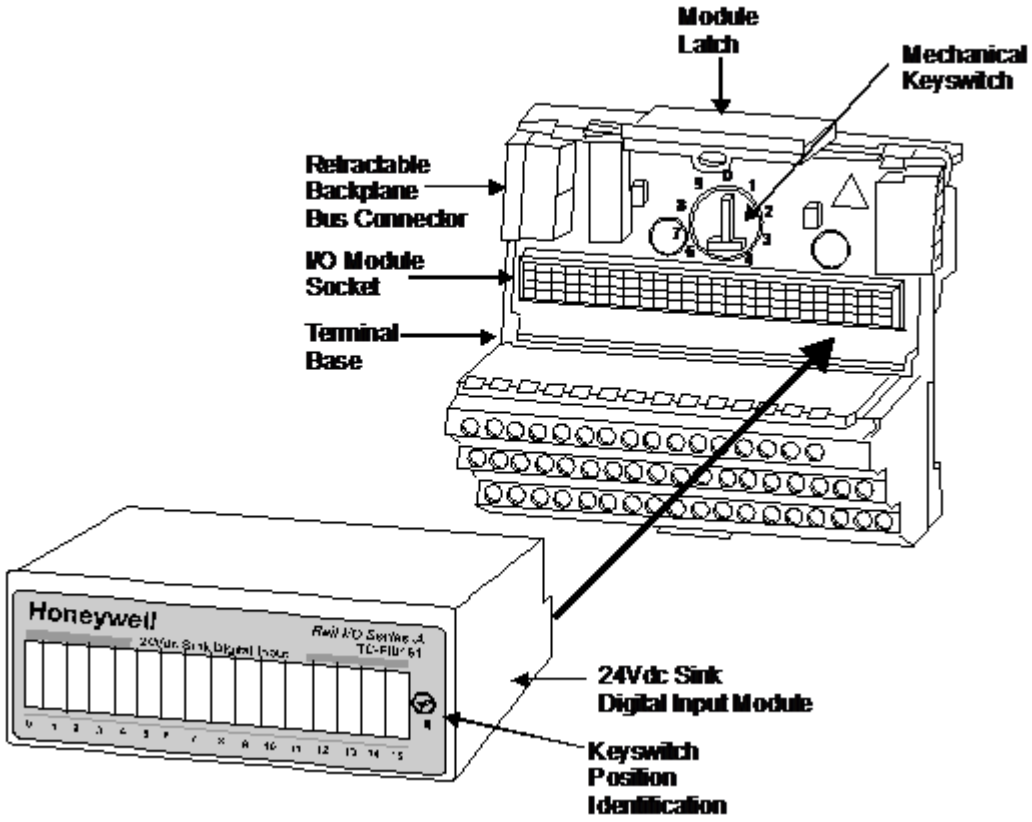


Figure 1: 24Vdc Sink Digital Input Module model TC-FID161 plugs into Terminal Base model TC-FTB301.

3.7.2 Plugging the 24Vdc Sink Digital Input Module into an installed terminal base

Attention

This procedure assumes that the Terminal Base TC-FTB301 is already installed and connected to another Terminal Base or the Gateway, and that the power supply is turned Off.

1 Turn the keyswitch on the Terminal Base clockwise to its number 2 position.
(Note that the module's keyswitch position is identified on its front label.)

2 Be sure the retractable backplane bus connector on the Terminal Base is fully inserted into the mating module. Do **not** install an I/O module into a Terminal Base that is **not** installed.

3 Orient the Digital Input module so its connector is aligned with the I/O socket on the Terminal Base. Carefully press the module into the Terminal Base so it is fully seated in the I/O socket and the Terminal Base's module latch snaps into place.

3.7.3 Wiring the 24Vdc Sink Digital Input Module

1 For 2-wire input device, connect the leads to the Input and +24Vdc terminals for inputs 0 to 15. The connection scheme is input source to the +24 Vdc terminal on Row C, sink input to the Input terminal on Row A.

2 For 3-wire input device, same as for 2-wire device but connect the input common lead to the associated Common terminal or Row B.

3 Refer to Figure 27 for typical input connections. See the table in the next section *Channel Connection Reference* for the general connection scheme

(Note that the Common terminals are internally connected together.)

4 Refer to the Terminal Base Wiring section for power supply connections.

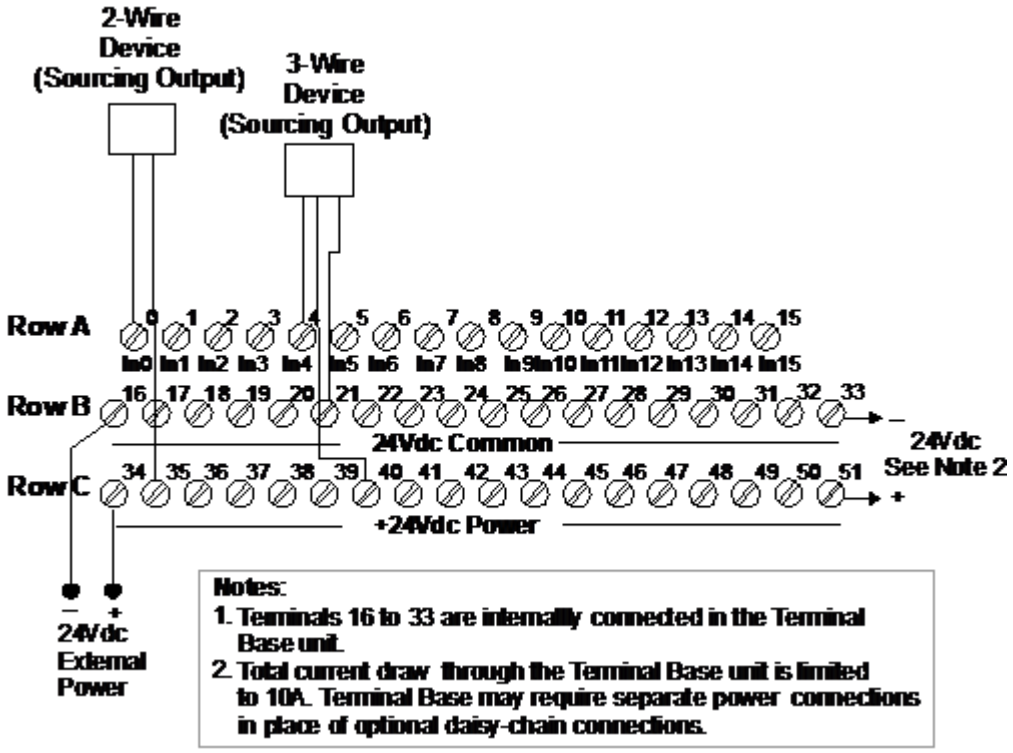


Figure 2: Typical 24Vdc Sink Digital Input module connections.

3.7.4 Channel connection reference for the 24Vdc Sink Digital Input Module

The following table identifies the individual channel connections for 24Vdc sink signal inputs using a model TC-FTB301 Terminal Base unit. See Figure 28 for a simplified circuit schematic for digital inputs.

Model TC-FTB301 Terminal Base unit

Input	Input Terminal	Voltage Terminal	Common Terminal (3-wire Only)
0	0	35	17

Input	Input Terminal	Voltage Terminal	Common Terminal (3-wire Only)
1	1	36	18
2	2	37	19
3	3	38	20
4	4	39	21
5	5	40	22
6	6	41	23
7	7	42	24
8	8	43	25
9	9	44	26
10	10	45	27
11	11	46	28
12	12	47	29
13	13	48	30
14	14	49	31
15	15	50	32
24Vdc Common	16 to 33		
+24Vdc Power	34 to 51		

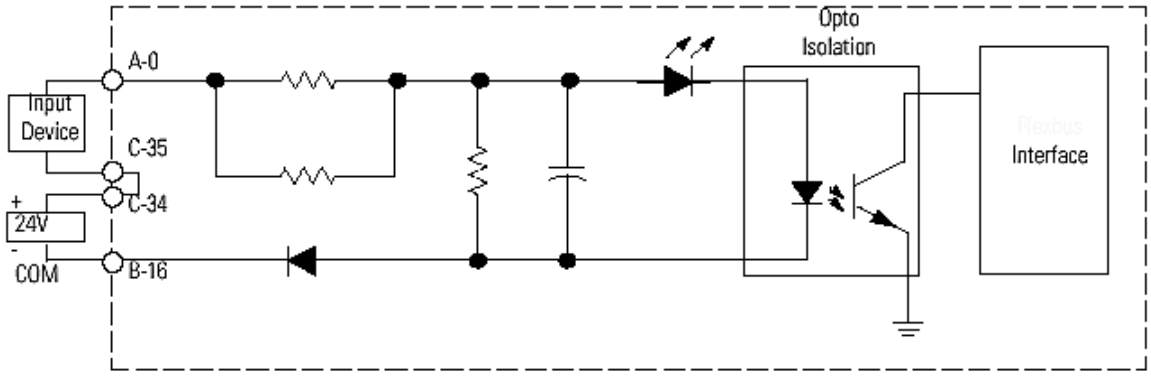


Figure 3: Simplified Schematic of 24Vdc Sink Digital Input circuit for Input 0.

3.8 Installing the 120Vac Digital Input Module TC-FIDA81

Related topics

"Front view of the 120Vac Digital Input Module" on page 52
"Plugging the 120Vac Digital Input Module into an installed Terminal Base" on page 52
"Wiring the 120Vac Digital Input Module" on page 53
"Channel connection reference for the 120Vac Digital Input Module" on page 53

3.8.1 Front view of the 120Vac Digital Input Module

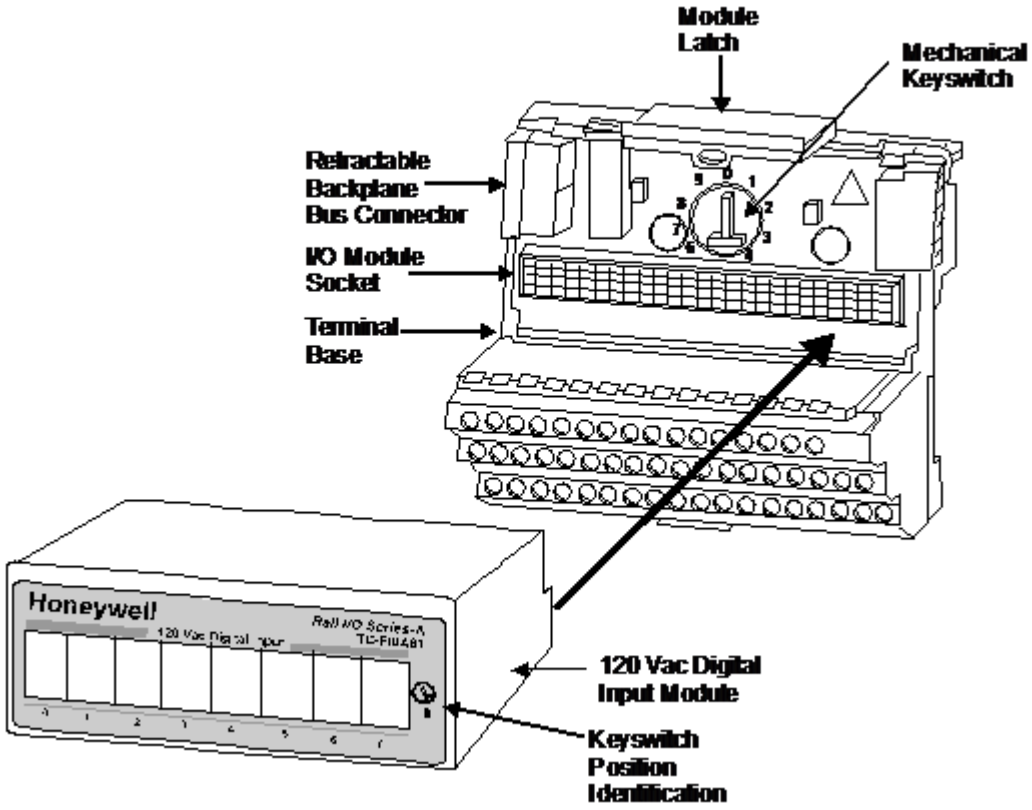


Figure 4: 120Vac Digital Input Module model TC-FIDA81 plugs into Terminal Base model TC-FTB301.

3.8.2 Plugging the 120Vac Digital Input Module into an installed Terminal Base

Attention

This procedure assumes that the Terminal Base TC-FTB301 is already installed and connected to another Terminal Base or the Gateway, and that the power supply is turned Off.

1 Turn the keyswitch on the Terminal Base clockwise to its number 8 position.
(Note that the module's keyswitch position is identified on its front label.)

2 Be sure the retractable backplane bus connector on the Terminal Base is fully inserted into the mating module. Do **not** install an I/O module into a Terminal Base that is **not** installed.

3 Orient the Digital Input module so its connector is aligned with the I/O socket on the Terminal Base. Carefully press the module into the Terminal Base so it is fully seated in the I/O socket and the Terminal Base's module latch snaps into place.

3.8.3 Wiring the 120Vac Digital Input Module

1 Connect the device leads to the hot (L1) and common (L2) terminals for inputs 0 to 7. The connection scheme is input (L1) to the odd numbered terminal on Row A or the associated terminal on Row C and the common (L2) to the even numbered terminal on Row A for the given input. For example, for input 0 connect the L1 lead for the device to terminal 1 or terminal 35 and the L2 lead to terminal 0.

Refer to Figure 30 for typical input connections. See the table in the next section *Channel Connection Reference* for the general connection scheme.

(Note that the odd numbered terminals on Row A and terminals 34 to 51 on Row C are internally connected together.)

2 Refer to the Terminal Base Wiring section for power supply connections.

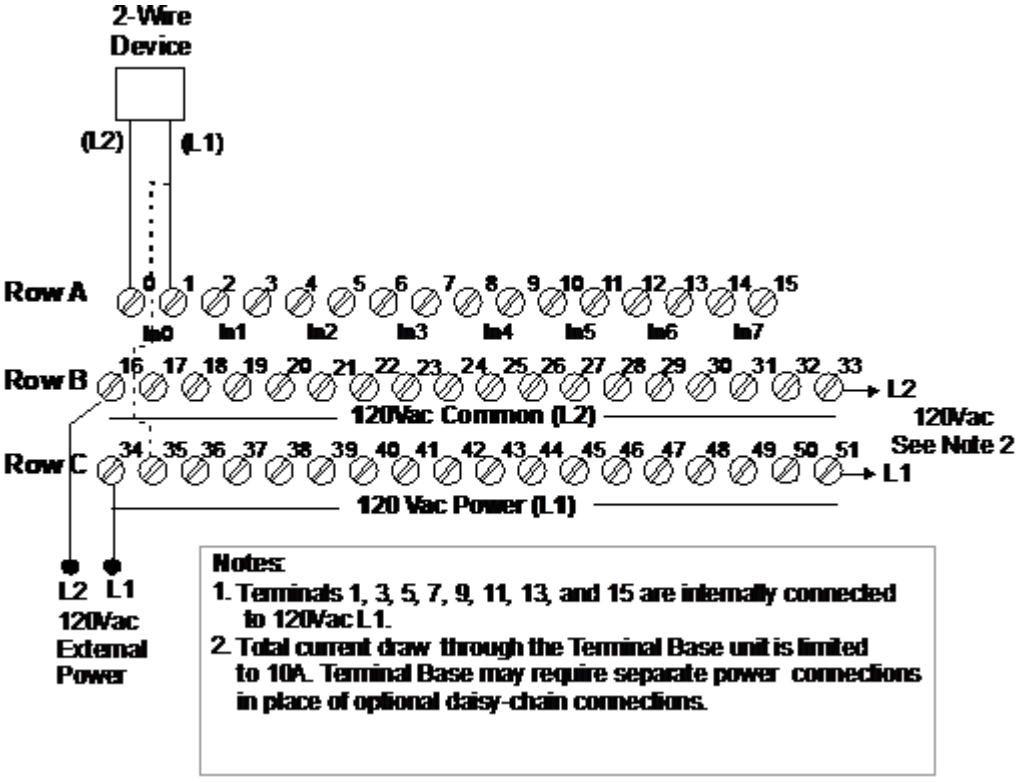


Figure 5: Typical 120Vac Digital Input module connections to input 0.

3.8.4 Channel connection reference for the 120Vac Digital Input Module

The following table identifies the individual channel connections for 120Vac digital signal inputs using a model TC-FTB301 Terminal Base unit. See Figure 31 for a simplified circuit schematic for 120Vac digital inputs.

Input	Input Terminal	120 Vac Supply Terminal	
Row A		*Or Row C*	
0	0	1	35
1	2	3	37

Input	Input Terminal	120 Vac Supply Terminal	
Row A		***Or Row C***	
2	4	5	39
3	6	7	41
4	8	9	43
5	10	11	45
6	12	13	47
7	14	15	49
120Vac Common	16 to 33		
120Vac Power	34 to 51		

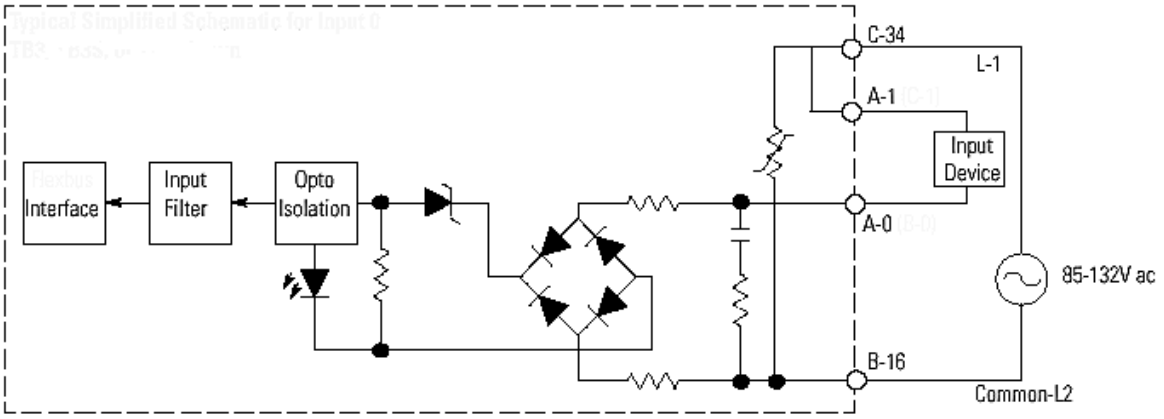


Figure 6: Simplified Schematic of 120Vac Digital Input circuit for Input 0.

3.9 Installing the Analog Output Module TC-FOA041

Related topics

"Front view of the Analog Output Module" on page 55
"Plugging the Analog Output Module into an installed Terminal Base" on page 55
"Wiring the Analog Output Module" on page 56
"Channel connection reference for the Analog Output Module" on page 57

3.9.1 Front view of the Analog Output Module

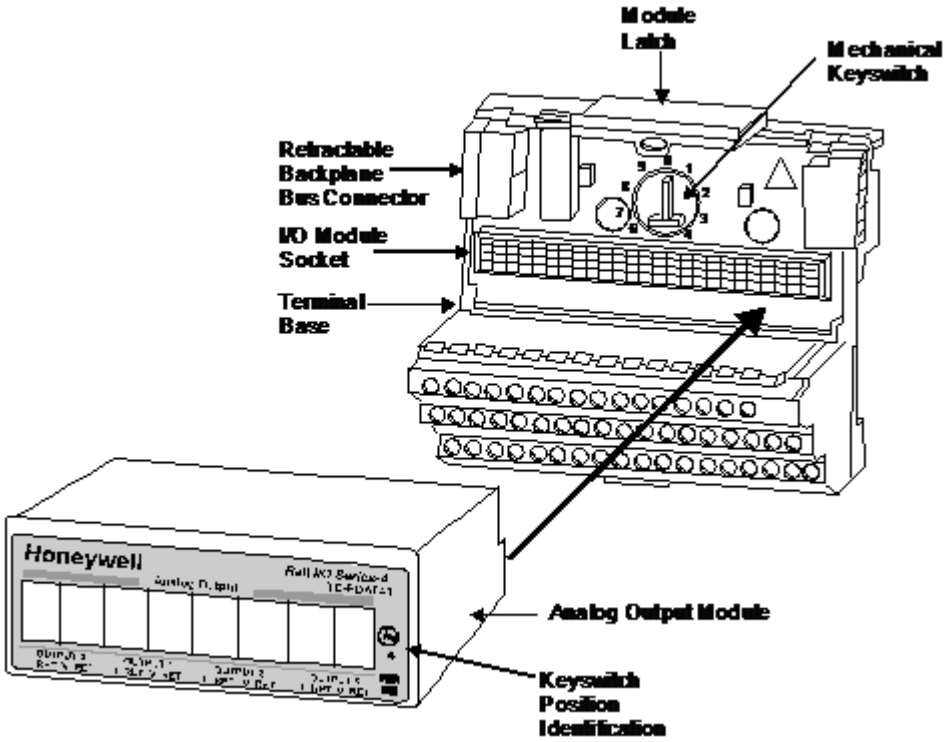


Figure 7: Analog Output Module model TC-FOA041 plugs into Terminal Base model TC-FTB301 or TC-FTB3T1.

3.9.2 Plugging the Analog Output Module into an installed Terminal Base

Attention

This procedure assumes that the Terminal Base TC-FTB301 or TC-FTB3T1 is already installed and connected to another Terminal Base or the Gateway, and that the power supply is turned Off.

1. Turn the keyswitch on the Terminal Base clockwise to its number 4 position.
   (Note that the module's keyswitch position is identified on its front label.)
2. Be sure the retractable backplane bus connector on the Terminal Base is fully inserted into the mating module. Do **not** install an I/O module into a Terminal Base that is **not** installed.
3. Orient the Analog Output module so its connector is aligned with the I/O socket on the Terminal Base. Carefully press the module into the Terminal Base so it is fully seated in the I/O socket and the Terminal Base's module latch snaps into place.

3.9.3 Wiring the Analog Output Module

Attention

- Connect only one current (4 to 20 mA) or one voltage (0 to 10V or -10V to +10V) signal output per channel. Do not connect both current and voltage outputs to the same channel. Be sure you configure the channel to provide the correct output signal type.
- To reduce susceptibility to noise, power Analog modules and Digital modules from separate power supplies. Be sure the length of the dc power cabling does not exceed 33 ft (10 m).

CAUTION

When connecting an output to a low impedance device, such as a panel meter, connect a 100 ohm 25W or greater, resistor in series with the device. Failure to do so can result in damage to the module's output circuitry.

1 Observing polarity, connect the leads from a current or voltage analog device to the appropriate Signal and Common terminals for outputs 0 to 3. For example, connect the signal lead for current output 0 to Signal terminal 0 and the common lead to Common terminal 1.

2 Refer to Figures 33 and 34 for typical output connections for the given Terminal Base unit. See the tables in the next section *Channel Connection Reference* for the general connection scheme.

3 Connect individual shields to functional earth ground as near as possible to the module, if you are using a TC-FTB301 Terminal Base. Otherwise, use the chassis ground terminals 39 to 46 on a TC-FTB3T1 Terminal Base.

4 Refer to the Terminal Base Wiring section for power supply connections.

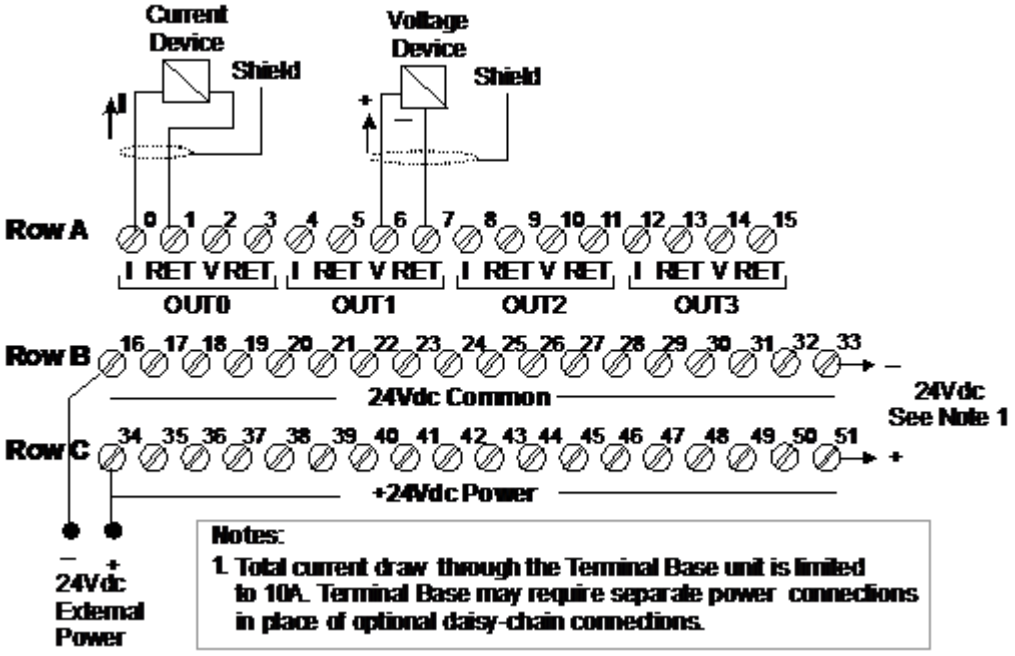


Figure 8: Typical Analog Output module connections using Terminal Base TC-FTB301.

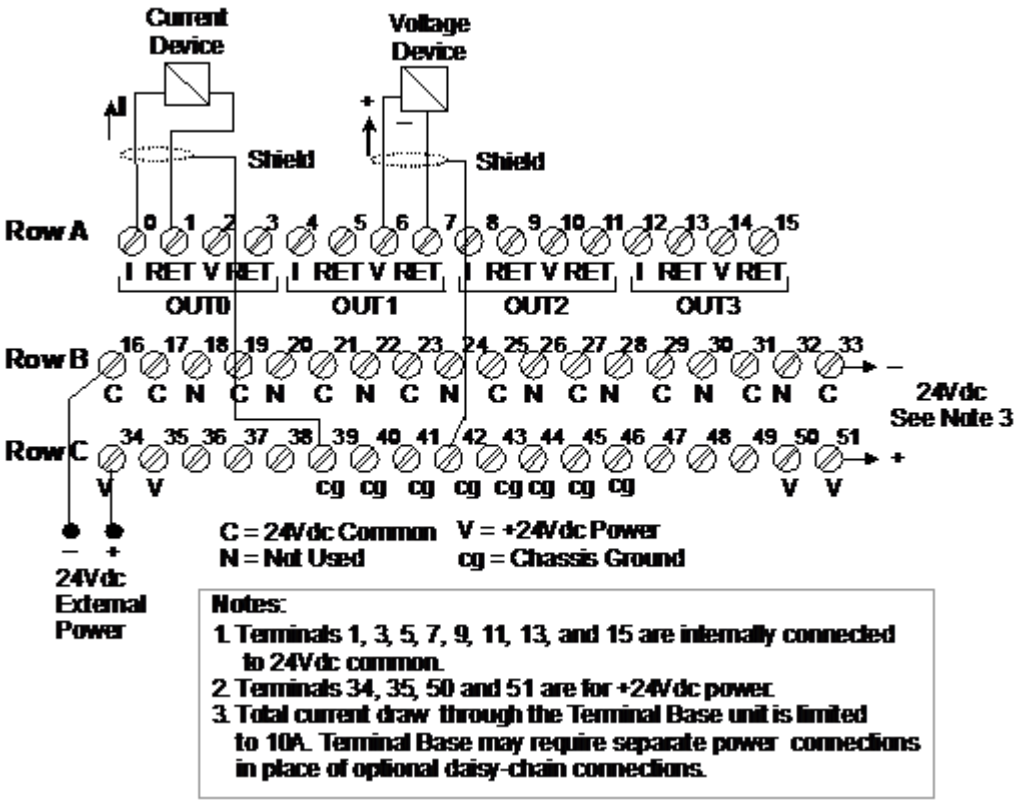


Figure 9: Typical Analog Output module connections using Terminal Base TC-FTB3T1.

3.9.4 Channel connection reference for the Analog Output Module

The following tables identify the individual connections for current and voltage signal outputs using either a model TC-FTB301 or TC-FTB3T1 Terminal Base unit. See Figure 35 for a simplified circuit schematic for voltage outputs or Figure 36 for current outputs.

Model TC-FTB301 Terminal Base unit

Output	Signal Type	Signal Terminal	Common Terminal
0	Current (I)	0	1
	Voltage (V)	2	3
1	Current (I)	4	5
	Voltage (V)	6	7
2	Current (I)	8	9
	Voltage (V)	10	11
3	Current (I)	12	13
	Voltage (V)	14	15
	24Vdc Common	16 to 33	
	+24Vdc Power	34 to 51	

Model TC-FTB3T1 Terminal Base unit

Output	Signal Type	Signal Terminal	Common Terminal	Shield
0	Current (I)	0	1	39
	Voltage (V)	2	3	40
1	Current (I)	4	5	41
	Voltage (V)	6	7	42
2	Current (I)	8	9	43
	Voltage (V)	10	11	44
3	Current (I)	12	13	45
	Voltage (V)	14	15	46
	24Vdc Common	16, 17, 19, 21, 23, 25, 27, 29, 31, and 33		
	+24Vdc Power	34, 35, 50, and 51		

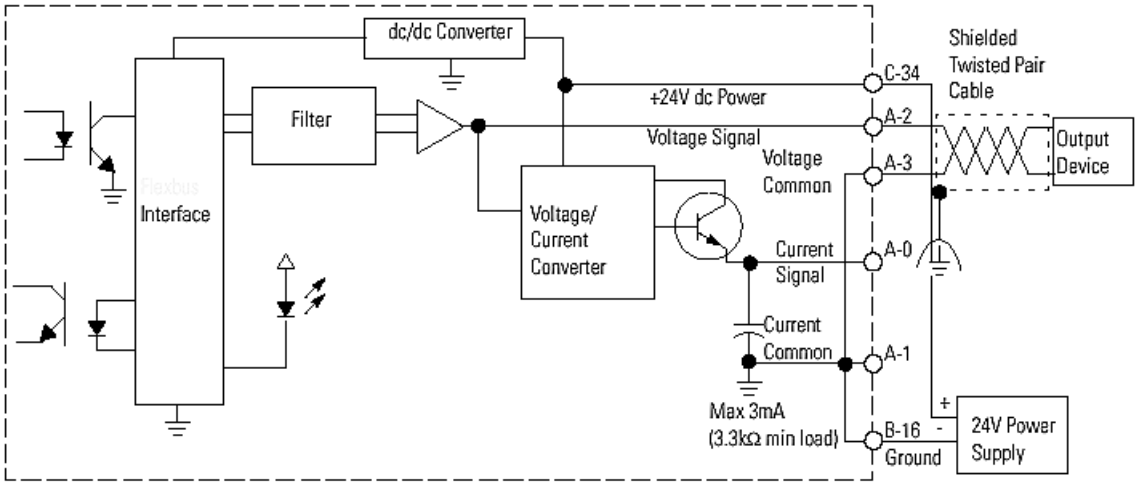


Figure 10: Simplified Schematic of Analog output circuit for voltage output 0.

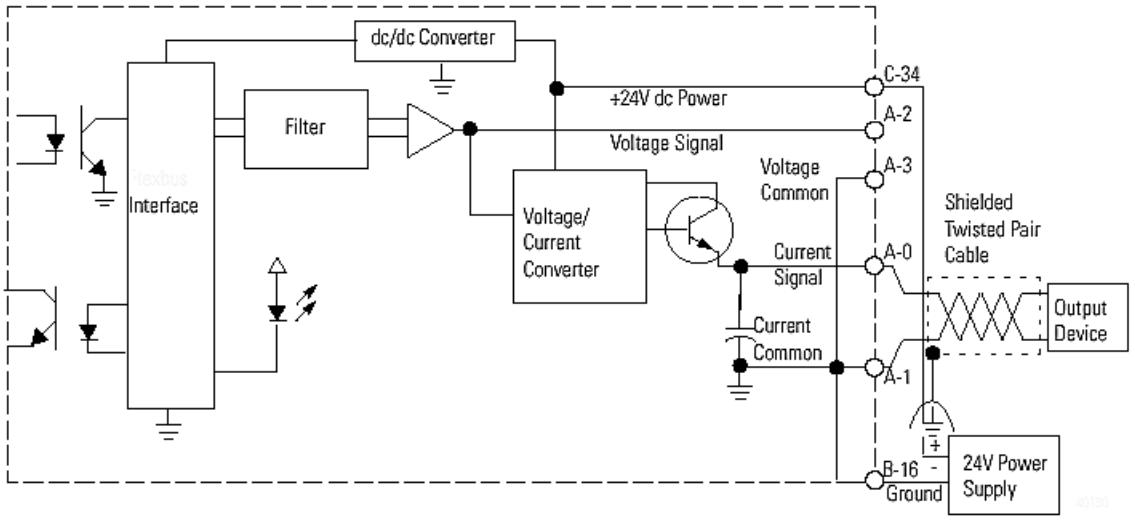


Figure 11: Simplified Schematic of Analog output circuit for current output 0.

3.10 Installing the 24Vdc Source Digital Output Module TC-FOD161

Related topics

"Front view of the 24Vdc Source Digital Output Module" on page 59
"Plugging the 24Vdc Source Digital Output Module into an installed Terminal Base" on page 59
"Wiring the 24Vdc Source Digital Output Module" on page 60
"Channel connection reference for the the 24Vdc Source Digital Output Module" on page 60

3.10.1 Front view of the 24Vdc Source Digital Output Module

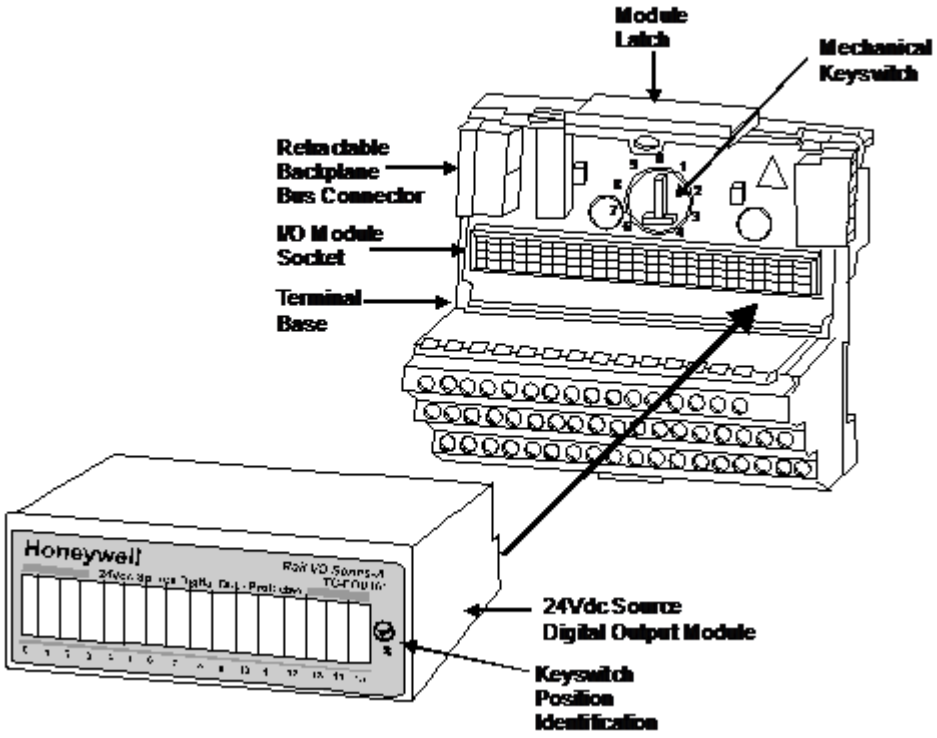


Figure 12: Digital Output Module model TC-FOD161 plugs into Terminal Base model TC-FTB301.

3.10.2 Plugging the 24Vdc Source Digital Output Module into an installed Terminal Base

Attention

This procedure assumes that the Terminal Base TC-FTB301 is already installed and connected to another Terminal Base or the Gateway, and that the power supply is turned Off.

1. Turn the keyswitch on the Terminal Base clockwise to its number 2 position.
   (Note that the module's keyswitch position is identified on its front label.)
2. Be sure the retractable backplane bus connector on the Terminal Base is fully inserted into the mating module. Do not install an I/O module into a Terminal Base that is **not** installed.
3. Orient the Digital Output module so its connector is aligned with the I/O socket on the Terminal Base. Carefully press the module into the Terminal Base so it is fully seated in the I/O socket and the Terminal Base's module latch snaps into place.

3.10.3 Wiring the 24Vdc Source Digital Output Module

1 Observing polarity, connect the output leads from the device to the Signal and Common terminals for Outputs 0 to 15 - see the following curve. For example, connect the signal output lead for Output 0 to terminal 0 and the common output lead to terminal 17.

The area within the curve represents the safe operating range for the module under various conditions of user supplied 24Vdc supply voltages and ambient temperatures.

Refer to Figure 38 for typical output connections. See the table in the next section *Channel Connection Reference* for the general connection scheme.

(Note that the common terminals are internally connected together.)

2 Connect individual shields to an external ground source such as a bus bar.

3 Refer to the Terminal Base Wiring section for power supply connections.

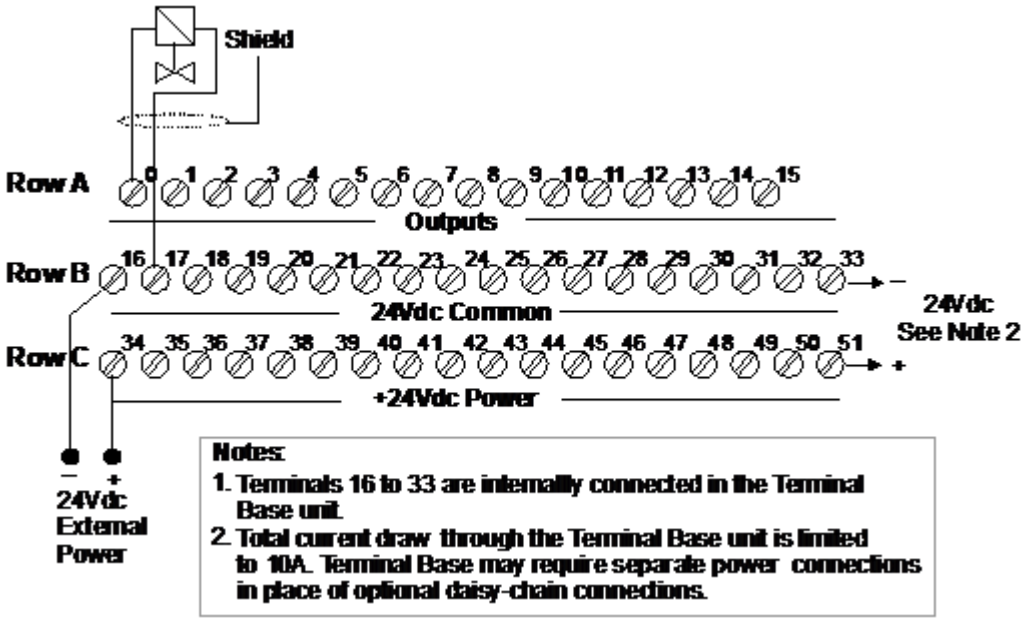


Figure 13: Typical Digital Output module connections.

3.10.4 Channel connection reference for the the 24Vdc Source Digital Output Module

The following table identifies the individual connections for 24Vdc digital signal outputs using a model TC-FTB301 Terminal Base unit. See Figure 39 for a simplified circuit schematic for 24Vdc digital outputs.

Model TC-FTB301 Terminal Base unit

Output	Signal Terminal	Common Terminal
0	0	17
1	1	18
2	2	19
3	3	20
4	4	21
5	5	22

Output	Signal Terminal	Common Terminal
6	6	23
7	7	24
8	8	25
9	9	26
10	10	27
11	11	28
12	12	29
13	13	30
14	14	31
15	15	32
24Vdc Common	16 to 33	
+24Vdc Power	34 to 51	

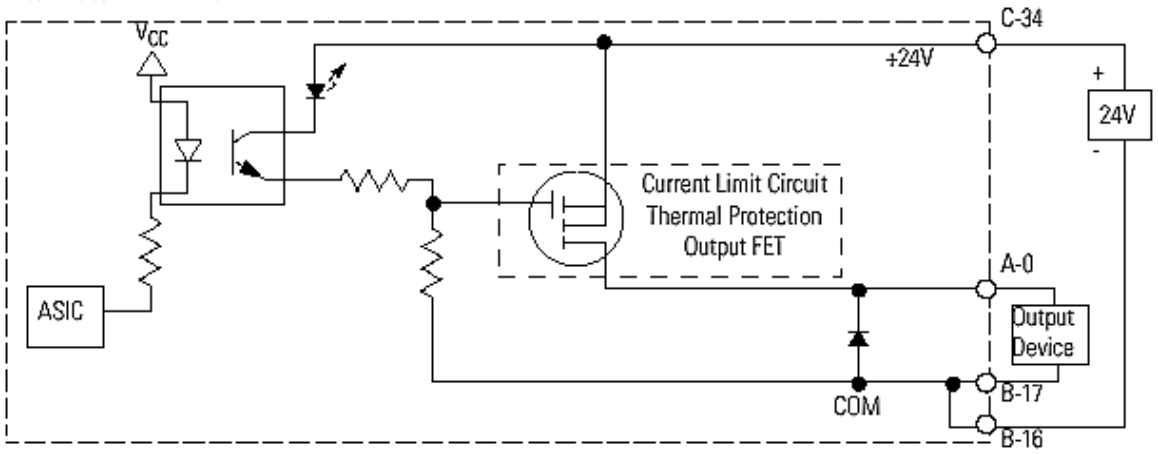


Figure 14: Simplified Schematic of 24Vdc digital output circuit - protected.

3.11 Installing the 120Vac Digital Output Module TC-FODA81

Related topics

"Front view of the 120Vac Digital Output Module" on page 62
"Plugging the 120Vac Digital Output Module into an installed terminal base" on page 62
"Wiring the 120Vac Digital Output Module" on page 63
"Channel connection reference for the the 120Vac Digital Output Module" on page 63

3.11.1 Front view of the 120Vac Digital Output Module

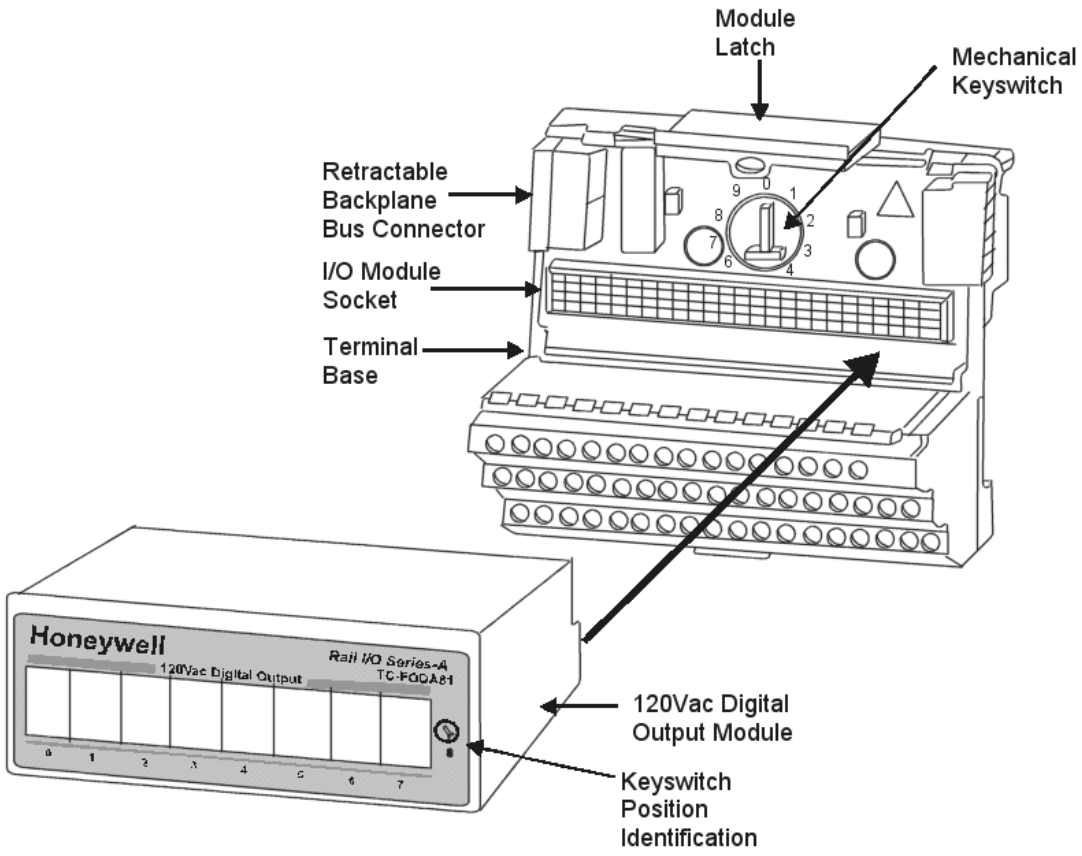


Figure 15: 120Vac Digital Output Module model TC-FODA81 plugs into Terminal Base model TC-FTB301.

3.11.2 Plugging the 120Vac Digital Output Module into an installed terminal base

Attention
This procedure assumes that the Terminal Base TC-FTB301 is already installed and connected to another Terminal Base or the Gateway, and that the power supply is turned Off.

1 Turn the keyswitch on the Terminal Base clockwise to its number 8 position.
(Note that the module's keyswitch position is identified on its front label.)

2 Be sure the retractable backplane bus connector on the Terminal Base is fully inserted into the mating module. Do **not** install an I/O module into a Terminal Base that is **not** installed.

3 Orient the Digital Output module so its connector is aligned with the I/O socket on the Terminal Base. Carefully press the module into the Terminal Base so it is fully seated in the I/O socket and the Terminal Base‘s module latch snaps into place.

3.11.3 Wiring the 120Vac Digital Output Module

1 Connect the device leads to the hot (L1) and common (L2) terminals for outputs 0 to 7. The connection scheme is output (L1) to the even numbered terminal on Row A and the common (L2) to the odd numbered terminal on Row A or the associated terminal on Row B for the given output. For example, for output 0 connect the L1 lead for the device to terminal 0 and the L2 lead to terminal 1 or terminal 17.

2 Refer to Figure 41 for typical input connections. See the table in the next section *Channel Connection Reference* for the general connection scheme.

(Note that the odd numbered terminals on Row A and terminals 17 to 32 on Row B are internally connected together.)

3 Refer to the Terminal Base Wiring section for power supply connections.

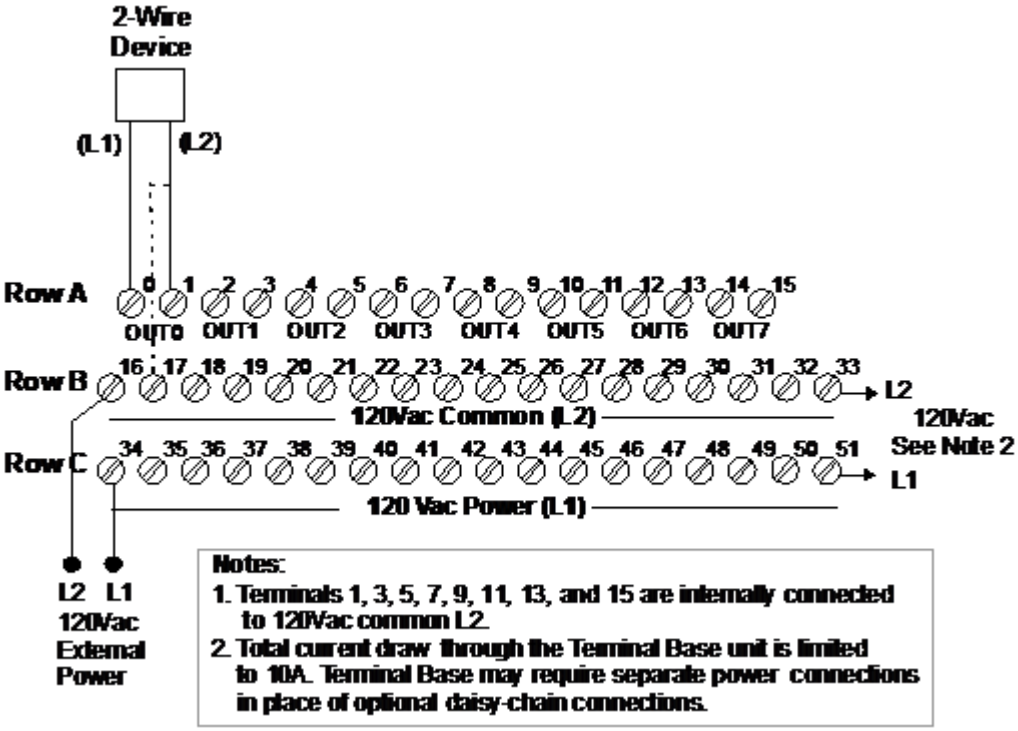


Figure 16: Typical 120Vac Digital Output module connections to output 0.

3.11.4 Channel connection reference for the the 120Vac Digital Output Module

The following table identifies the individual channel connections for 120Vac digital signal outputs using a model TC-FTB301 Terminal Base unit. See Figure 42 for a simplified circuit schematic for 120Vac digital outputs.

Model TC-FTB301 terminal base unit

Output	Output Terminal	120 Vac Common Terminal	
		Row A	*Or Row C*
0	0	1	17

Output	Output Terminal	120 Vac Common Terminal	
		Row A	*Or Row C*
1	2	3	19
2	4	5	21
3	6	7	23
4	8	9	25
5	10	11	27
6	12	13	29
7	14	15	31
120Vac Common	16 to 33		
120Vac Power	34 to 51		

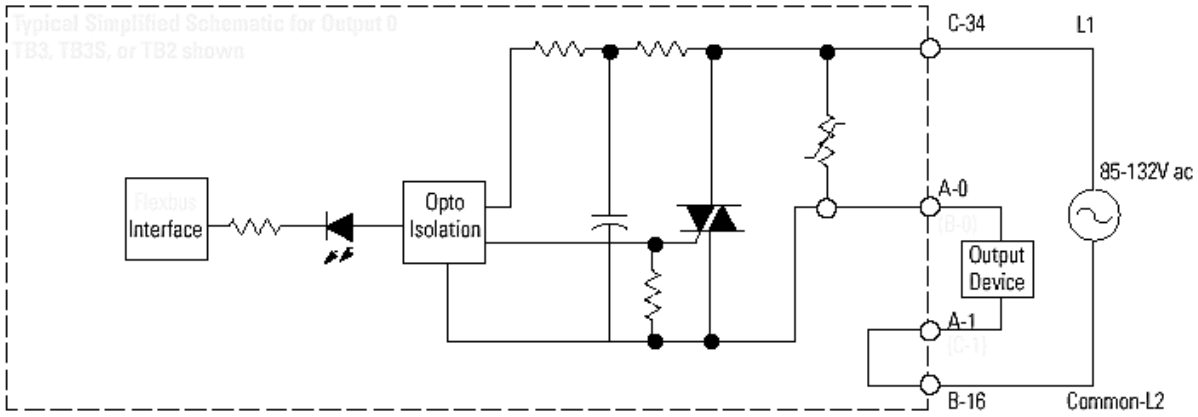


Figure 17: Simplified Schematic of 120Vac Digital Output circuit for output 0.

3.12 Installing the Relay Digital Output Module TC-FOR081

Related topics

"Front view of the Relay Digital Output Module" on page 65
"Plugging the Relay Digital Output Module into an installed Terminal Base" on page 65
"Wiring the Relay Digital Output Module" on page 66
"Channel connection reference for the the Relay Digital Output Module" on page 67

3.12.1 Front view of the Relay Digital Output Module

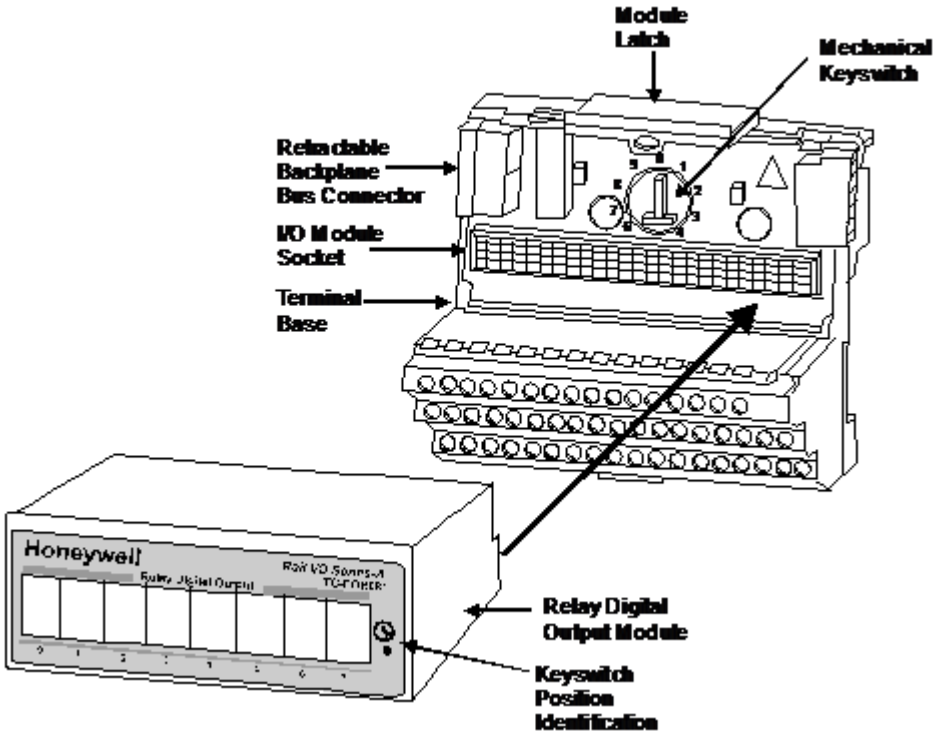


Figure 18: Relay Digital Output Module model TC-FOR081 plugs into Terminal Base model TC-FTB301.

3.12.2 Plugging the Relay Digital Output Module into an installed Terminal Base

Attention
This procedure assumes that the Terminal Base TC-FTB301 is already installed and connected to another Terminal Base or the Gateway, and that the power supply is turned Off.

1. Turn the keyswitch on the Terminal Base clockwise to its number 9 position.
   (Note that the module's keyswitch position is identified on its front label.)
2. Be sure the retractable backplane bus connector on the Terminal Base is fully inserted into the mating module. Do **not** install an I/O module into a Terminal Base that is **not** installed.
3. Orient the Relay Output module so its connector is aligned with the I/O socket on the Terminal Base. Carefully press the module into the Terminal Base so it is fully seated in the I/O socket and the Terminal Base's module latch snaps into place.

3.12.3 Wiring the Relay Digital Output Module

CAUTION

Apply only +24Vdc power to the power terminals on the Terminal Base unit. Make certain that all relay wiring is properly connected before applying any power to the module. Note that user supplied relay load power can come from a variety of sources, and can range from +5Vdc to 240Vac.

Attention

- Do not attempt to increase load current or wattage capability beyond the maximum rating by connecting 2 or more outputs in parallel. The slightest variation in relay switching time may cause one relay to momentarily switch the total load current.
- When using 240V power to a relay, you must connect a snubber across the load. Failure to connect a snubber across the load can result in generation of electromagnetic noise that could disrupt nearby electrical equipment, including your RIOM-A components. Use Allen- Bradley part number 599- KA04 or 1401- NX1.

1 Connect the load leads to relay contact poles for relay outputs 0 to 7. The connection scheme is one contact pole to the even numbered terminal on Row A and the other pole to the odd numbered terminal on Row A for the given relay output. For example, for output 0 connect the one lead for the load to terminal 0 and the other lead to terminal 1.

Refer to Figure 44 for typical input connections. See the table in the next section *Channel Connection Reference* for the general connection scheme.

(Note that the common terminals 16 to 32 on Row B are internally connected together.)

2 Refer to the Terminal Base Wiring section for power supply connections.

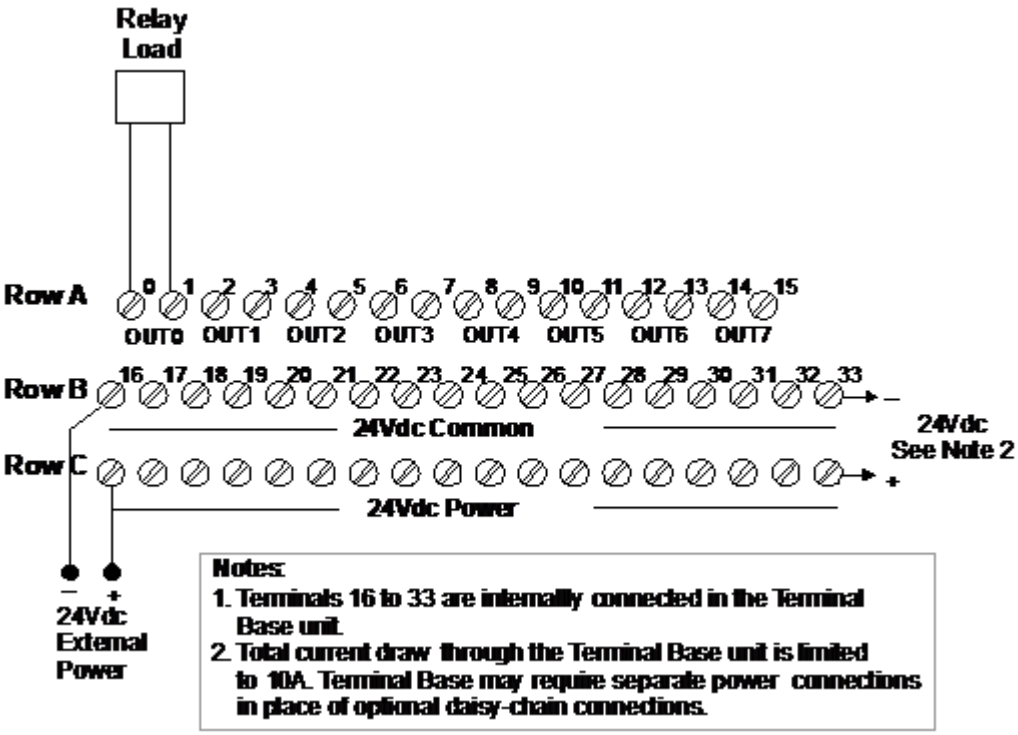


Figure 19: Typical Relay Digital Output module connections to output 0.

3.12.4 Channel connection reference for the the Relay Digital Output Module

The following table identifies the individual relay connections for user supplied loads using a model TC-FTB301 Terminal Base unit. See Figure 45 for a simplified circuit schematic for relay digital outputs.

Model TC-FTB301 Terminal Base unit

Output	Contact Terminal	Contact Terminal
0	0	1
1	2	3
2	4	5
3	6	7
4	8	9
5	10	11
6	12	13
7	14	15
24Vdc Common	16 to 33	
24Vdc Power	34 to 51	

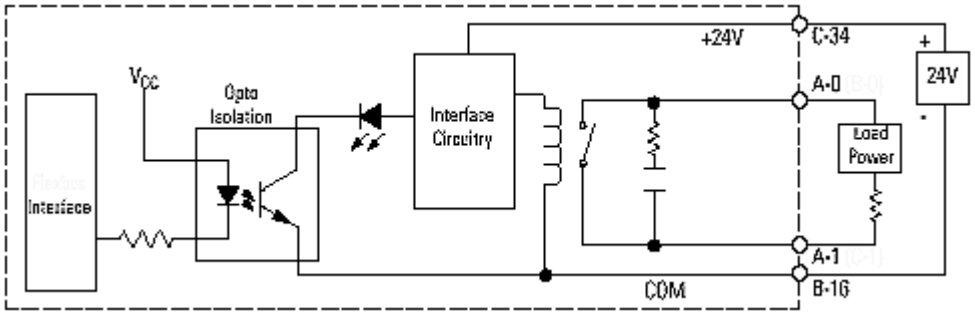


Figure 20: Simplified Schematic of Relay Digital Output circuit for output 0.

3.13 Installing the 24Vdc Power Supply

Related topics

"Front view of the 24Vdc Power Supply" on page 68
"Mounting the 24Vdc Power Supply on a wall or panel (optional)" on page 68
"Dimensions of the 24Vdc Power Supply" on page 70
"Mounting the 24Vdc Power Supply on a DIN rail" on page 70
"Wiring the 24Vdc Power Supply" on page 71

3.13.1 Front view of the 24Vdc Power Supply

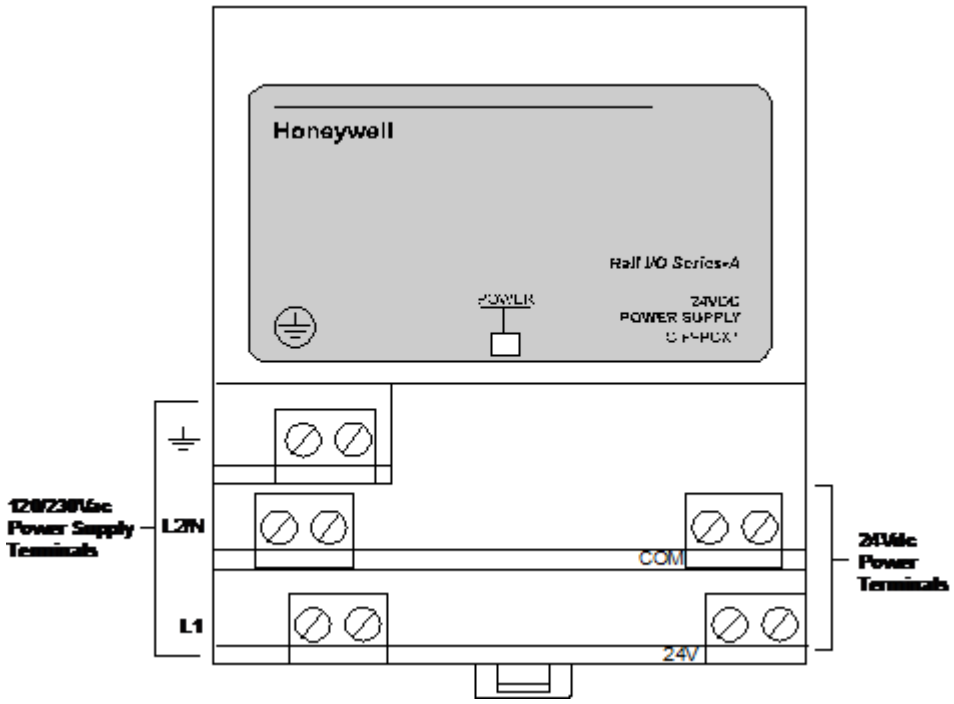


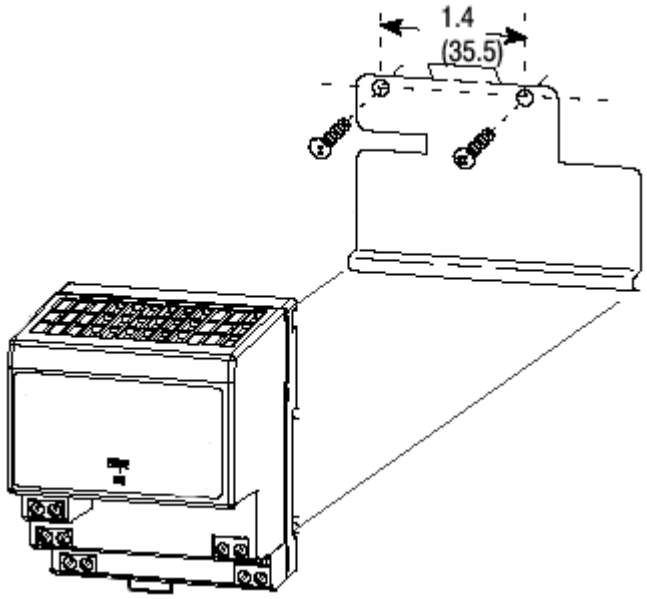
Figure 21: 24Vdc Power Supply model TC-FFPCX1

3.13.2 Mounting the 24Vdc Power Supply on a wall or panel (optional)

Attention

To mount the power supply on a wall or panel, you will need the optional mounting kit that is available from Allen-Bradley as catalog number 1794-NM1.

1. Position the mounting plate from kit 1794-NM1 at the desired location on the wall or panel. Hold the mounting plate in place and use a center punch to mark the location of the two mounting holes on the wall or panel. See Figure 47 for mounting dimension reference.
2. Drill the required tap holes for the 6-32 mounting screws supplied with the kit.
3. Be sure there is good metal-to-metal contact between the mounting plate and the mounting surface. Secure the mounting plate to the wall or panel with two 6-32 screws.



4 Slightly rotate the Power Supply to slip its top rear indentation on the tab on the top of the mounting plate.

5 Press the Power Supply down flush with the wall or panel so its locking tab snaps into place, securing the Power Supply to the mounting plate. If necessary, you can use a screwdriver to manually retract the lock while pressing the module firmly against the mounting plate and then releasing it when in position.

3.13.3 Dimensions of the 24Vdc Power Supply

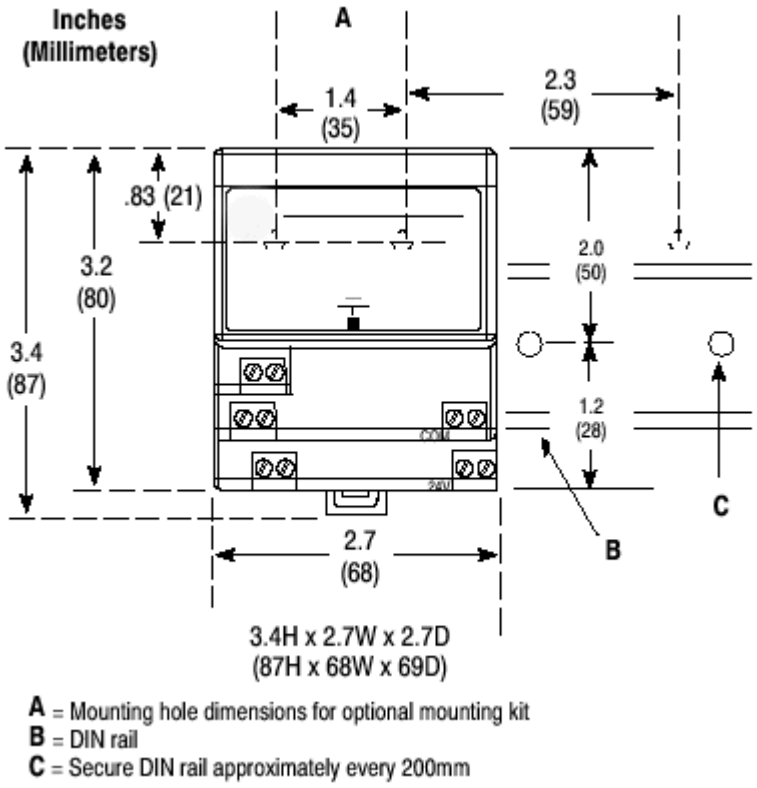


Figure 22: Mounting dimensions for 24Vdc Power Supply TC-FFPCX1.

3.13.4 Mounting the 24Vdc Power Supply on a DIN rail

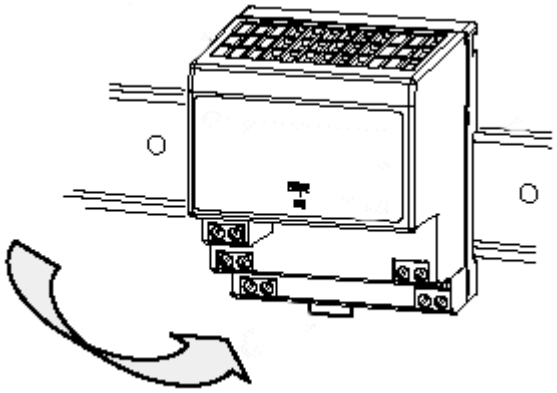
Attention

- You are responsible for obtaining and mounting the 35 x 7.5 mm metal, top hat rails (DIN EN50022) to be used for mounting RIOM-A components.
- Be sure you install the Power Supply at the left end of an I/O module segment.

1 Orient the Power Supply so the top of the unit is over the top of the DIN rail.

2 Slightly rotate the Power Supply to slip its top mounting flange on the top of the DIN rail.

3 Press the Power Supply down flush with the DIN rail so its locking tab snaps into place, securing it to the rail. If necessary, you can use a screwdriver to manually retract the lock while pressing the Power Supply firmly against the rail and then releasing it when in position.



3.13.5 Wiring the 24Vdc Power Supply

Attention

The TC-FFPCX1 Power Supply provides sufficient 24Vdc power to operate four ControlNet Gateways. Do not attempt to operate an entire RIOM-A system with this Power Supply.

1. Connect a known earth ground to a ground terminal on the top terminals on the left side of the Supply.
2. Connect 120/230Vac power line to the appropriate GND, Common (L2/N), and Power (L1) terminals as shown in Figure 48.

   (Note that the spare power terminals can be used to “daisy chain” the 120/230Vac power to another Power Supply, or 120Vac to Vac modules in the adjacent system.)
3. Connect leads from the Com and 24V terminals to corresponding terminals (Com and +V) on up to two ControlNet Gateways. See Figure 3 for typical power distribution scheme for four Gateways.

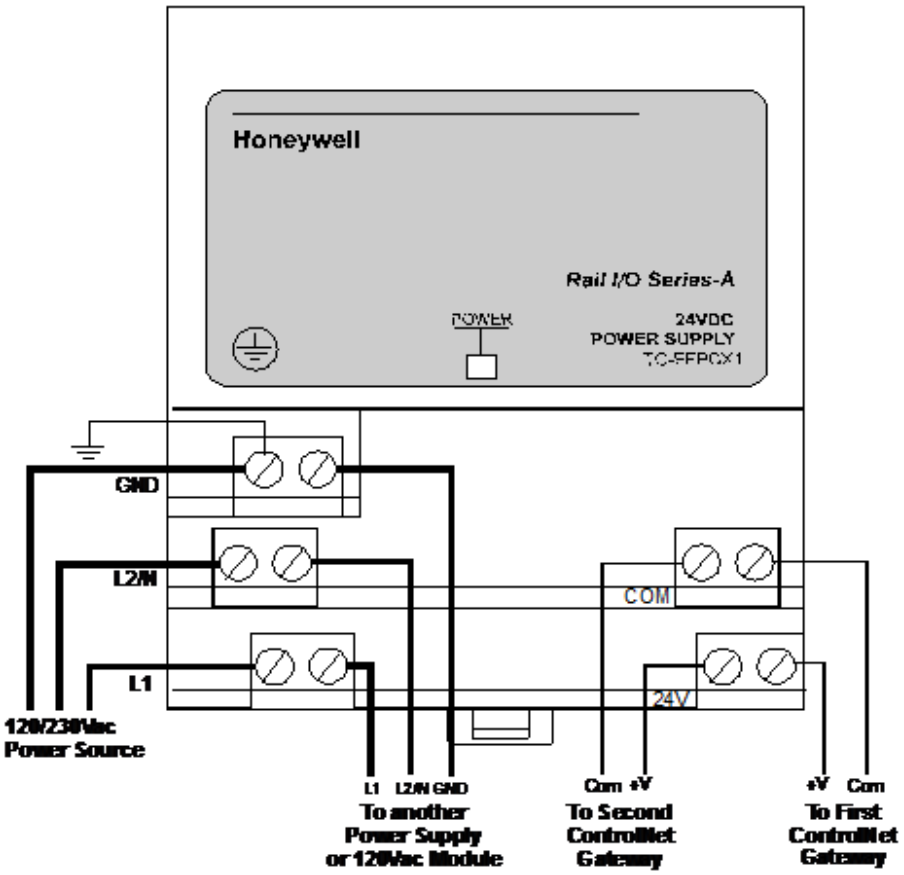


Figure 23: Typical 24Vdc Power Supply wiring connections.

4 Configuration and Parameter Reference

Related topics

“Configuring an RIOM-A in an Experion control strategy” on page 74
“Using the CNTRCHANNEL (Counter Input Channel) block” on page 100
“RIOM-A parameter reference” on page 101

4.1 Configuring an RIOM-A in an Experion control strategy

Related topics

4.1.1 About control strategy configuration

You use Experion's Control Builder application to configure a process Control Strategy using predefined function blocks. Since RIOM-A components have been functionally integrated with the Experion system, the Control Builder includes Series A Rail I/O module Function Blocks in its Library database tab.

This means each Series A Rail IOM block has an associated configuration form for defining its configurable attributes. These attributes include naming and identifying the component's location within the network as well as setting module and channel specific parameters, as applicable. If you have used Control Builder to configure Series A chassis IOM blocks, you will use the same process to configure Series A Rail IOM blocks.

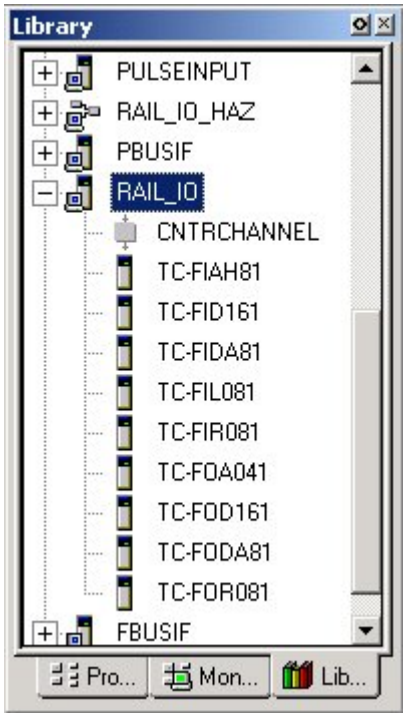
Refer to the *Control Building Guide* for overall information about using Control Builder to build a Control Strategy.

Attention

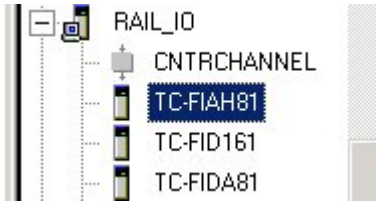
The following information is only intended as a supplement to the Control Building Guide and does not repeat the basic functionality details for calling up, navigating, and interacting with the application. All the basic configuration tasks, such as assigning function blocks to a CEE and loading modules to a Controller, are the same for the RIOM-A function blocks as they are for any other block.

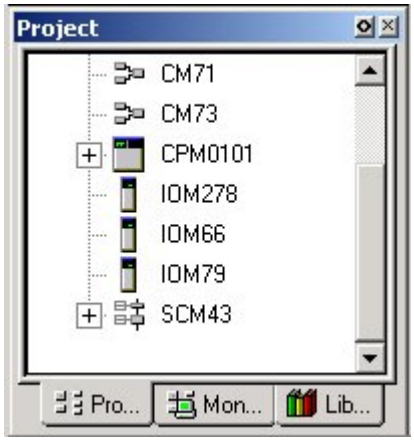
4.1.2 Adding a Series A Rail IOM block to a project

1 In the Library tab, click the + sign to the left of the RAIL_IO icon to open the menu tree.

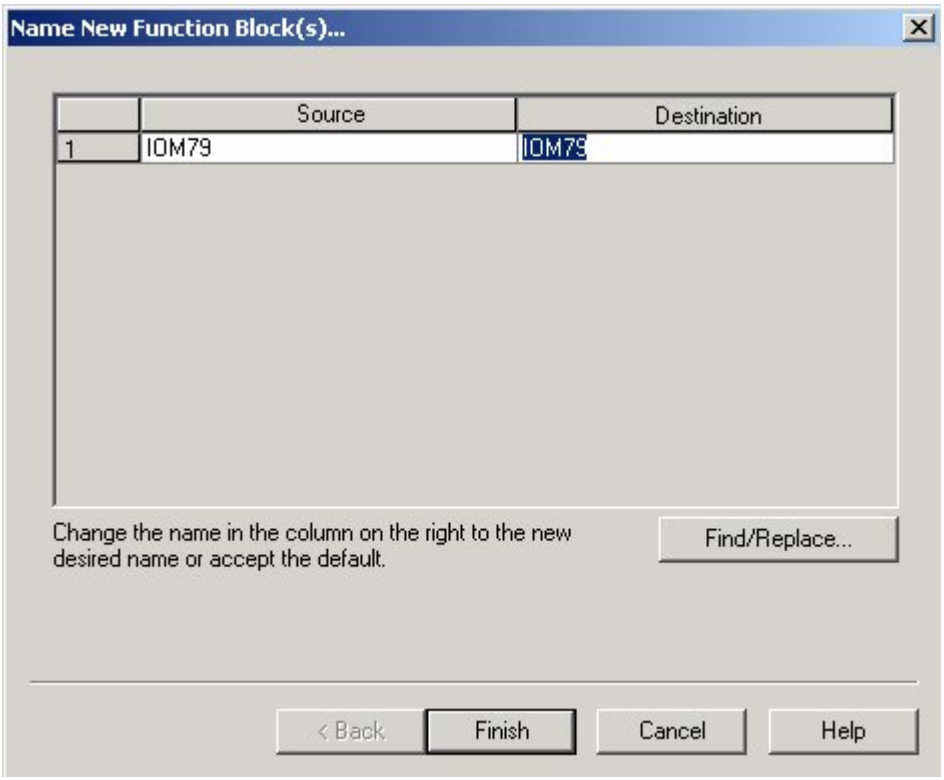


2 Click the IOM icon for the model number of the module you want to add and drag it to the Project tab.





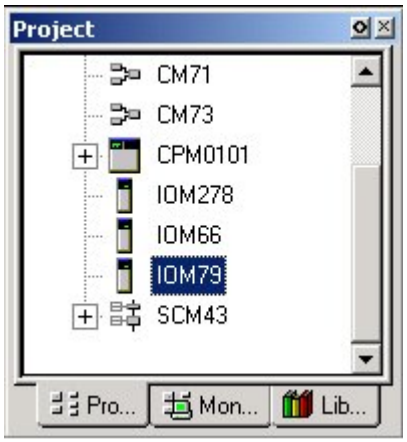
The New Name Function dialog box opens. Control Builder automatically assigns a sequential IOM name to the added block, such as IOM79.

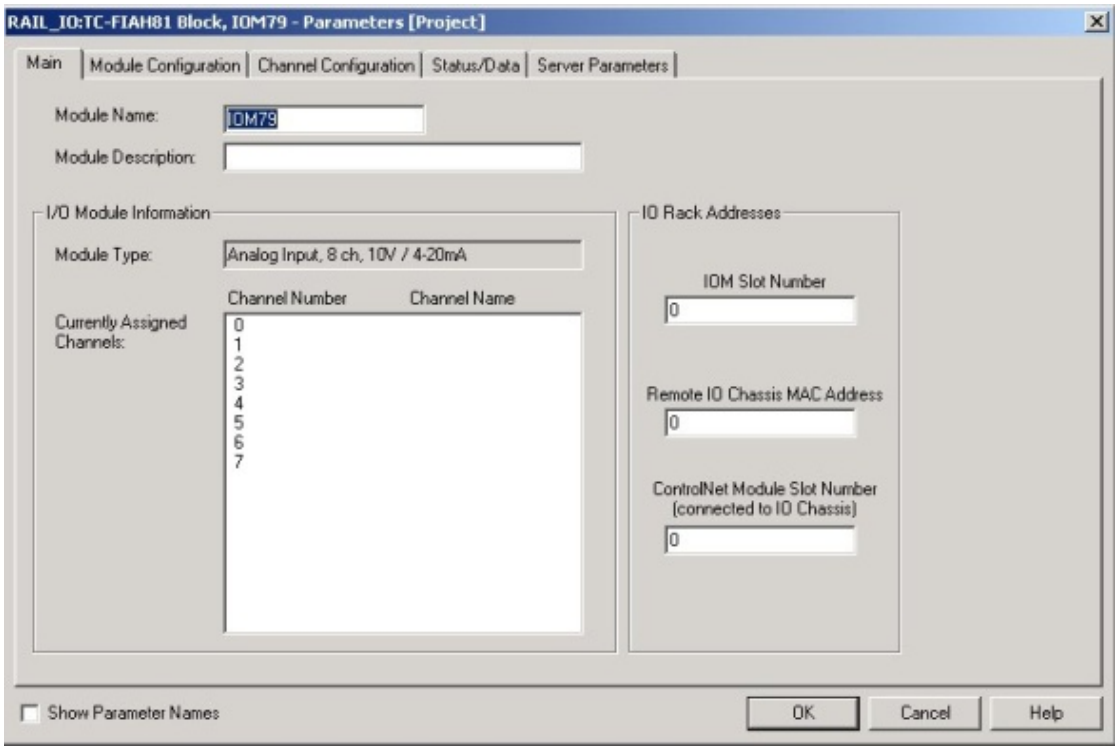


3 Key in a new name and click the Finish button to assign it, or just click the Finish button to accept the assigned name.

Dialog box closes.

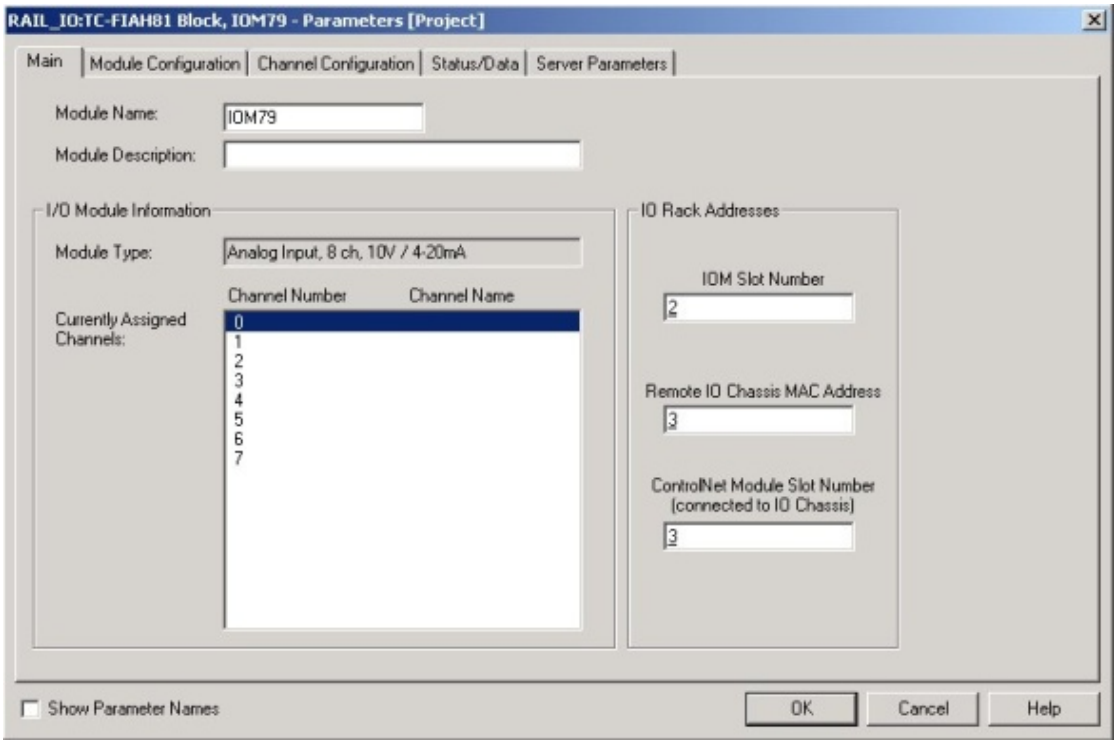
4 Double-click the icon for the added IOM block in Project to call up the block's configuration form





5 On the form's Main tab, enter :

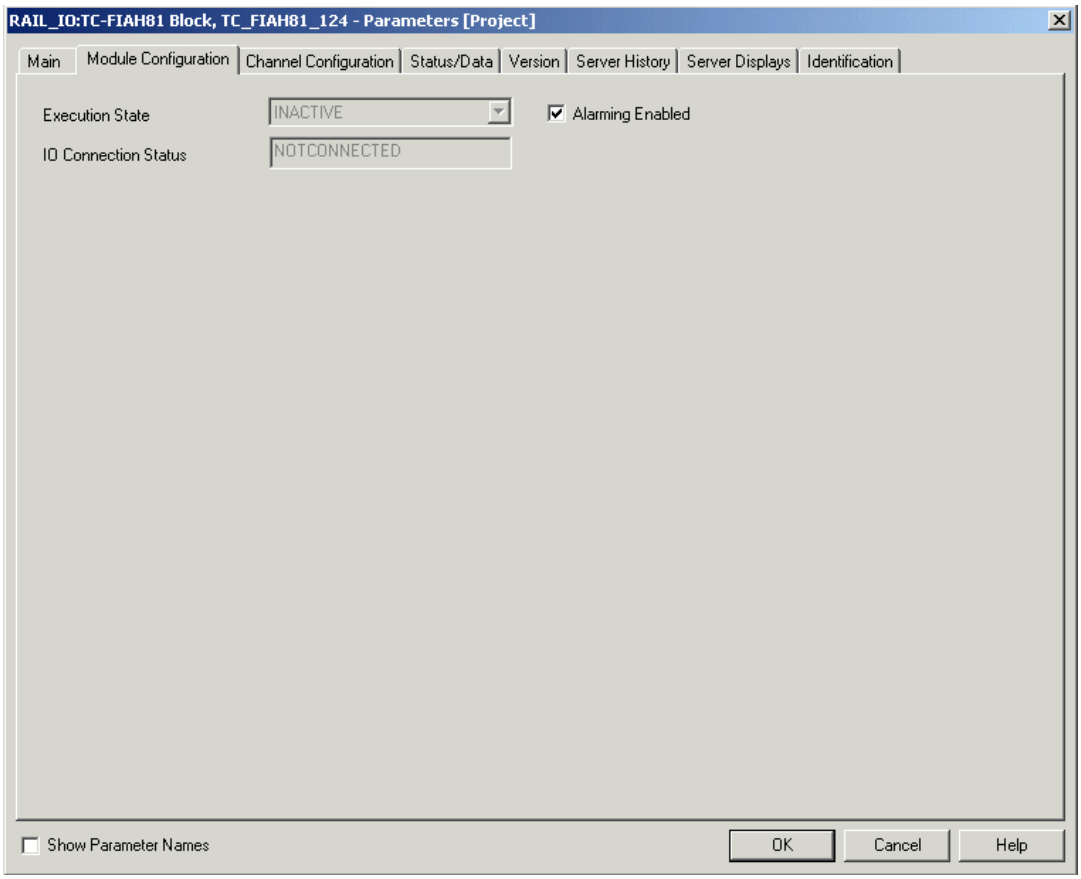
- Desired Module Name and Description (optional)
- IOM Slot Number: This corresponds to the position of the Terminal Base containing the module. The Terminal Base connected to the ControlNet Gateway in the segment is Number 0 or Slot Number 0. The next Terminal Base in the segment is Number 1 or Slot Number 1 and so on up to Number 7 or Slot Number 7 for the maximum number of Terminal Bases allowed in a segment.
- Remote IO Chassis MAC Address: This corresponds to the address of the ControlNet Gateway for the segment containing the Terminal Base that contains this module.
- CNI Slot Number: This corresponds to the location of the downlink CNI in the I/O chassis or the Controller Chassis. The slot numbers are zero-based from left to right.



6 Go to the appropriate section that follows to configure the module and channel parameters for a given module.

4.1.3 Configuring module/channel data for a High Level Analog Input module TC-FIAH81

Use the Module Configuration tab to configure or monitor the following data.

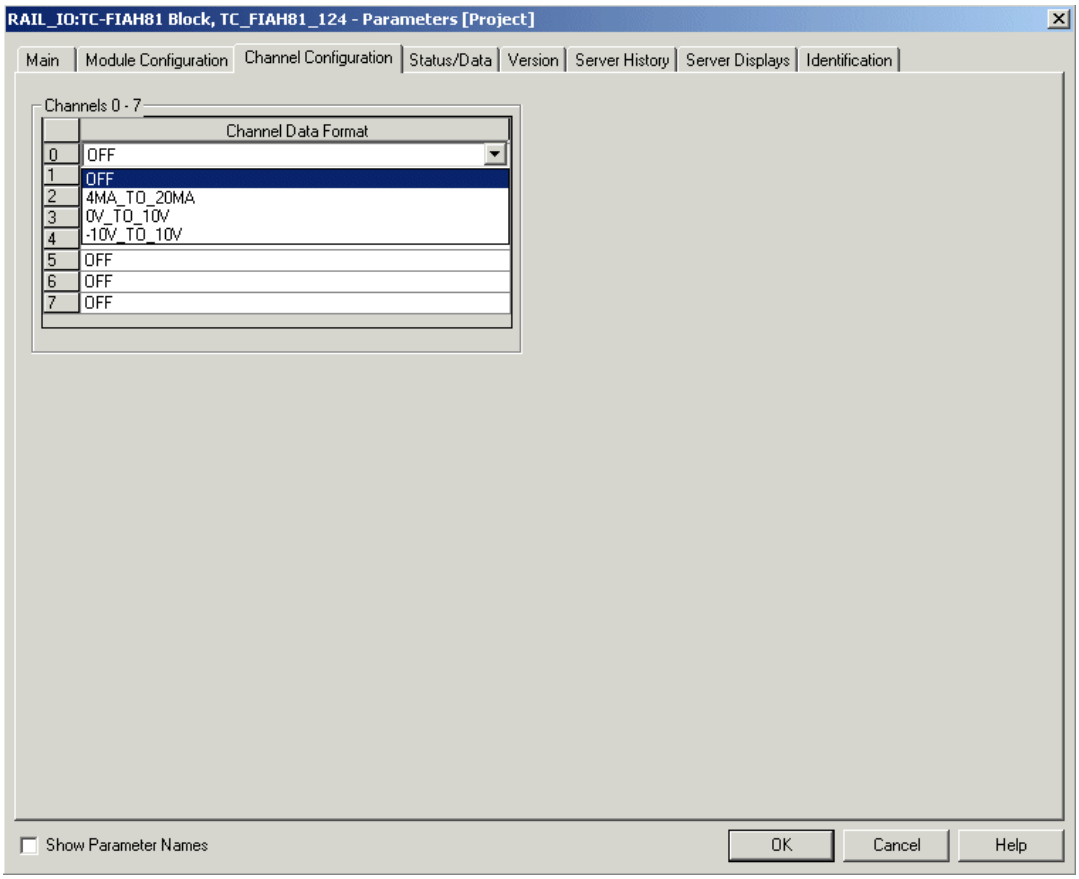


Enable or disable the communication faults alarm for the module by checking or unchecking the Alarming Enabled check box.

Note that Execution State and IO Connection Status fields are only active when the Analog Input module is accessed through the Monitoring tab after it has been downloaded as part of a Control Strategy to a Controller. The Execution State lets you change the Module State to Inactive or Active. The I/O Connection Status shows whether the module is connected or not to the ControlNet Gateway.

Configure one of the following range parameters (DATAFORMAT[0..7]) for each of the modules 0 to 7 input channels through the Channel Configuration tab.

- Off - No input accepted (default selection)
- 4 to 20 mA
- 0 to 10V
- -10 to +10V (Bipolar)



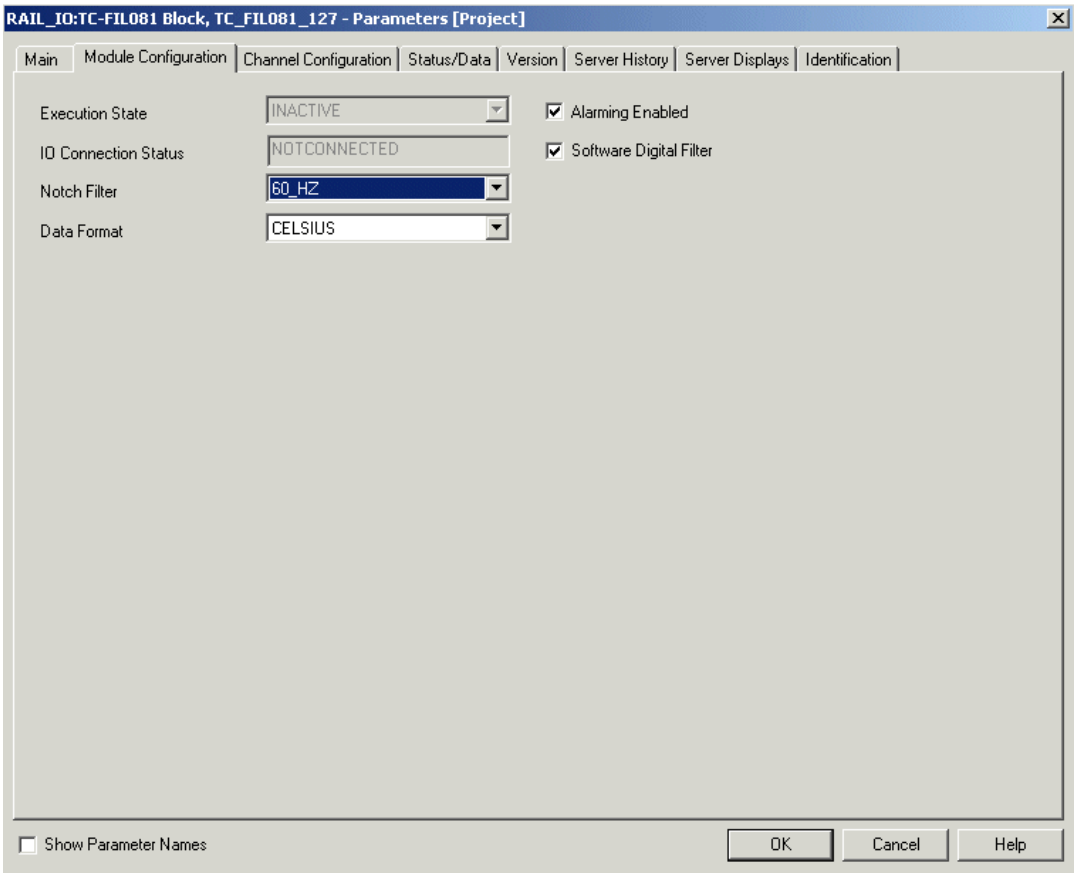
4.1.4 TC-FIAH81 alarm flags

The Analog Input module can assert an internal flag for the following condition, when it is Active.

Condition	Description
Communications Fault	If enabled, indicates loss of ControlNet communications or removal of the module.

4.1.5 Configuring module/channel data for Thermocouple Analog Input module TC-FIL081

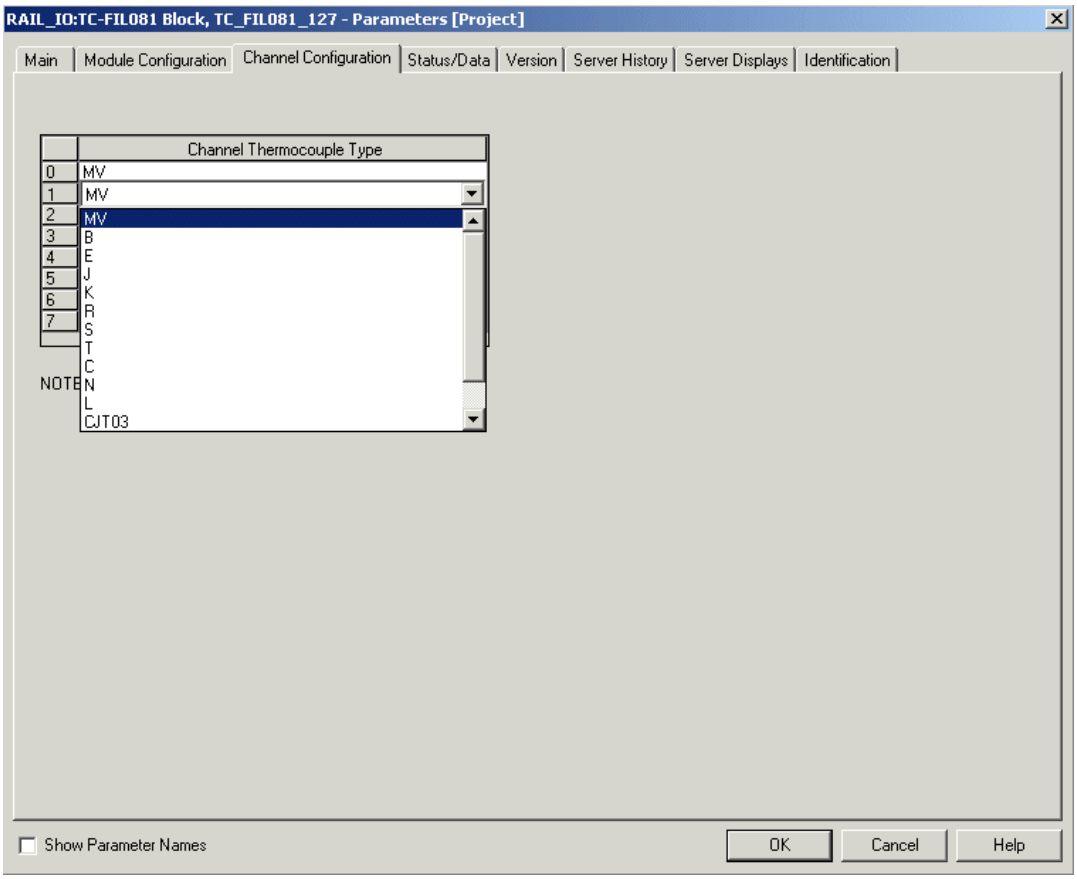
Configure the following parameters through the Module Configuration tab of the configuration form for all module channels.



Parameter (Name)	Description
Execution State (EXECSTATE)	Lets you change the module state to Inactive or Active, in the Monitoring mode.
IO Connection Status (IOCONNSTATUS)	Shows whether the module is connected or not to the ControlNet Gateway, in Monitoring mode.
Alarming Enabled (ALMENBSTATE)	Enable or disable the communication faults alarm for the module by checking or unchecking the check box. Default is checked (enabled).
Software Digital Filter (DIGFILTER)	Enable or disable the fixed digital filter by checking or unchecking the check box. Default is checked (enabled). This filter settles to 100% of a Full Scale step input in 60 times the selected first notch filter time that is function of the number of inputs and the selected filter frequency.
Notch Filter NOTCHFILTER)	Select the frequency for the first notch of the hardware filter in the analog to digital converter. Default is 60Hz. This influences the analog to digital output data rate and changes the module's throughput. Throughput is a function of the number of inputs used and the first notch filter frequency. Both of these influence the time for a thermocouple input to arrive at the backplane.
Data Format (DATATYPE)	Select the data format for the process value units used for temperature measurements. Default is CELSIUS.

Note that Execution State selection and the IO Connection Status on the Module Configuration tab are only active when the Thermocouple Analog Input module is accessed through the Monitoring tab after it has been downloaded as part of a Control Strategy to a Controller.

Configure the following parameter through the Channel Configuration tab of the configuration form for channels 0 to 7.



Parameter (Name)	Description
Channel Thermocouple Type (TCTYPE)	Defines type of input to be accepted as a channel input. Default is MV. The thermocouple type selections and ranges are listed below for reference. The millivolt range is -76.50 to +76.50 mV.

Thermocouple Selection	*Range*	
	Degrees C	*Degrees F*
B	300 to 1800	572 to 3272
C	0 to 2315	32 to 4199
E	-270 to 1000	-454 to 1832
J	-210 to 1200	-346 to 2192
K	-270 to 1372	-454 to 2502
N	-270 to 1300	-454 to 2372
R	-50 to 1768	-58 to 3214
S	-50 to 1768	-58 to 3214
T	-270 to 400	-454 to 752

4.1.6 TC-FIL081 alarm flags

The Thermocouple Analog Input module can assert an internal flag for these conditions, when it is Active.

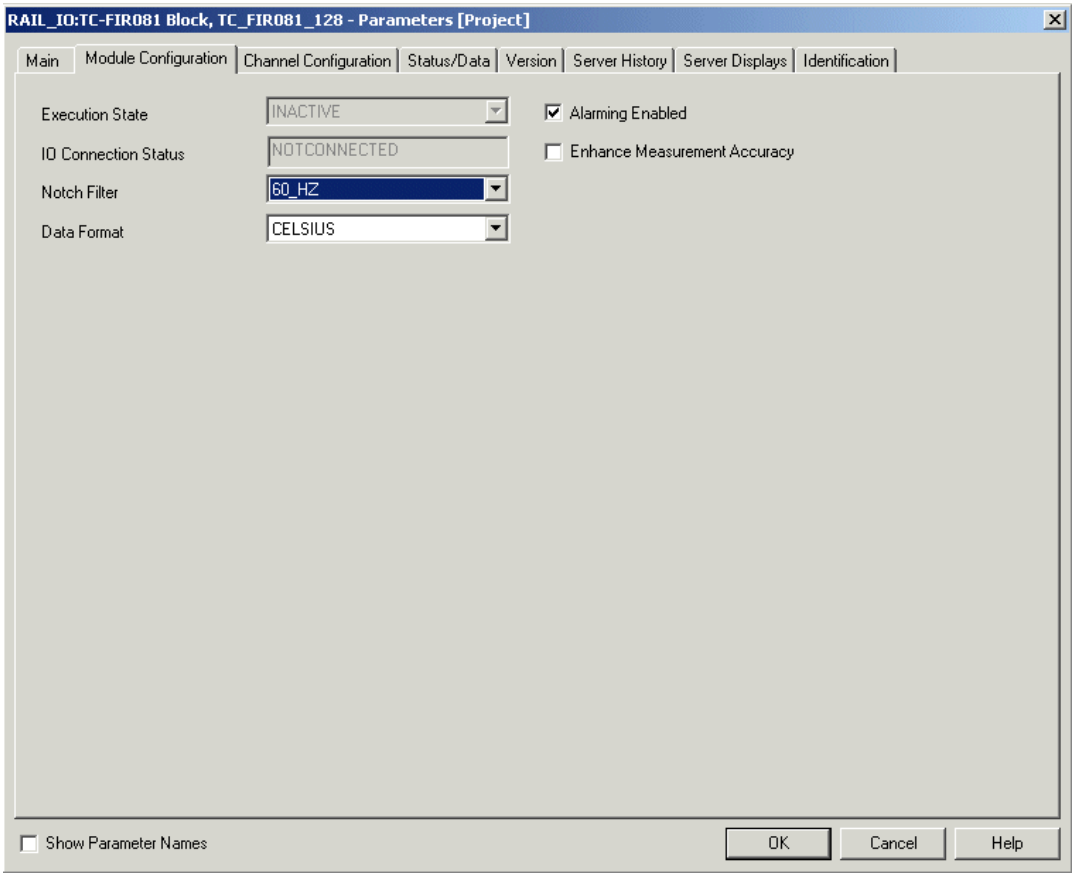
Condition	Description
CJC Overrange Alarm	Indicates if the Cold Junction temperature is above 70\C (158\F).
CJC Underrange Alarm	Indicates if the Cold Junction temperature is below 0\C (32\F).
Bad Calibration Status	Indicates if channel has not had a valid calibration.
Invalid Thermocouple Type Selected	Indicates if an invalid thermocouple type is selected.
Critical Module HW Failure	Indicates whether the module has detected an internal fault. (Must return the module to the factory for repair.)
Communications Fault	If enabled, indicates loss of ControlNet communications or removal of the module.

4.1.7 TC-FIL081 performance considerations

CAUTION	To obtain the maximum input accuracy, the IOM calibration procedure must be performed with the actual Thermocouple and field lead wiring connected. This procedure accounts for the resistance imposed by the Thermocouple and wiring from the sensor to the IOM terminal connections. The IOM should be recalibrated whenever the input resistance changes for an existing input, or when a new Thermocouple is added to the IOM. Since sensor lead resistance adversely affects signal accuracy, be sure you calibrate the input using one of the setup methods covered in the *Alternate calibration setup for wire resistance compensation* heading in the *Using IOTOOL for Calibration* section of this document.

4.1.8 Configuring module/channel data for a 3-Wire RTD Analog Input module TC-FIR081

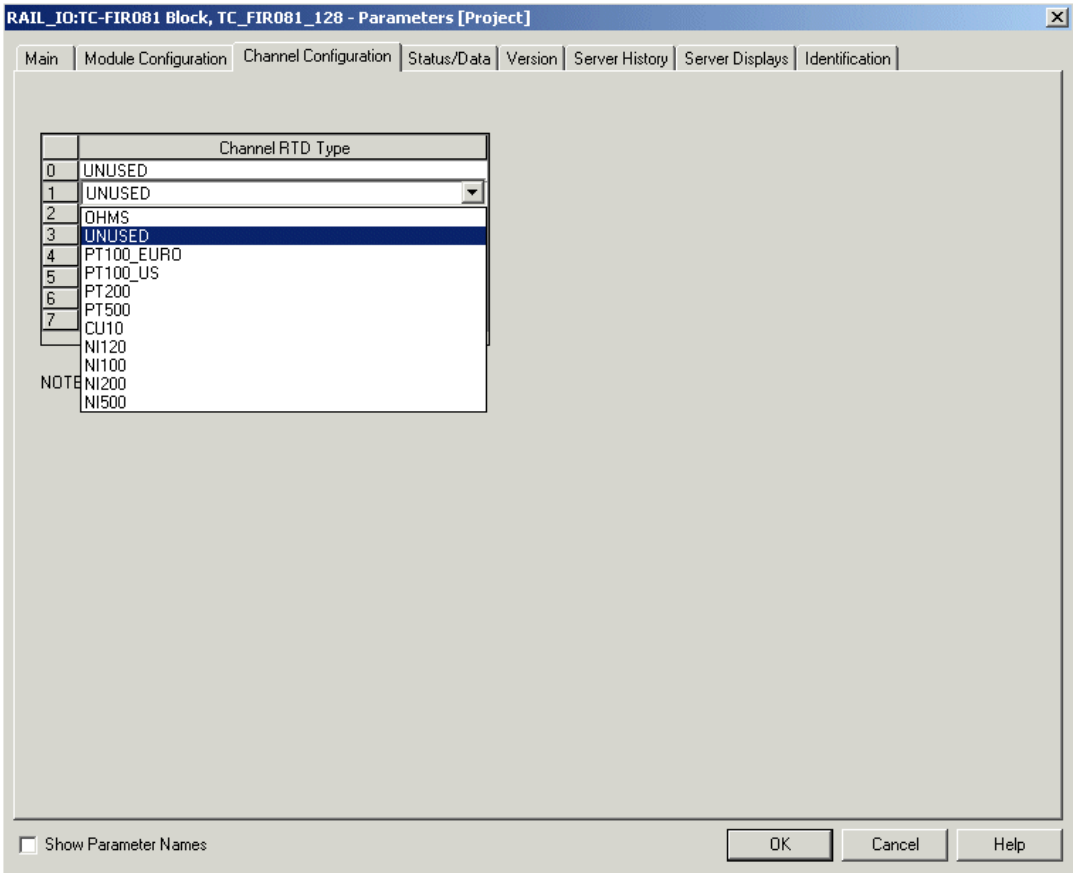
Configure the following parameters through the Module Configuration tab of the configuration form for all module channels.



Parameter (Name)	Description
Execution State (EXECSTATE)	Lets you change the module state to Inactive or Active, in the Monitoring mode.
IO Connection Status (IOCONNSTATUS)	Shows whether the module is connected or not to the ControlNet Gateway, in Monitoring mode.
Alarming Enabled (ALEMENBSTATE)	Enable or disable the communication faults alarm for the module by checking or unchecking the check box. Default is checked (enabled).
Enhanced Mode Enable (ENMODE)	Enable or disable the Enhanced Mode to determine the value of an unknown RTD input. Default is unchecked (disabled). When enabled, the module takes the voltage drop across an internal precision resistor and compares it to the unknown input. It uses the result to determine the value of the unknown RTD. This improves module temperature drift characteristics and accuracy, but decreases module throughput.
Notch Filter (NOTCHFILTER)	Select the frequency for the first notch of the hardware filter in the analog to digital converter. Default is 60Hz. This influences the analog to digital output data rate and changes the module's throughput. Throughput is a function of the number of inputs used and the first notch filter frequency. Both of these influence the time for an RTD input to arrive at the backplane.
Data Format (DATATYPE)	Select the data format for the process value units used for temperature measurements. Default is CELSIUS.

Note that Execution State selection and the IO Connection Status on the Module Configuration tab are only active when the 3-Wire RTD Analog Input module is accessed through the Monitoring tab after it has been downloaded as part of a Control Strategy to a Controller.

Configure the following parameter through the Channel Configuration tab of the configuration form for channels 0 to 7.



Parameter (Name)	Description
Channel RTD Type (RTDTYPE)	Defines type of input to be accepted as a channel input. Default is UNUSED. The RTD type selections and ranges are listed below for reference. The Ohms range is 1 to 433 ohms.

RTD Selection	*Range*	
	Degrees C	*Degrees F*
100 ohm Pt α = 0.00385 Euro	-200 to 870	-328 to 1598
100 ohm Pt α = 0.003916 U.S.	-200 to 630	-328 to 1166
200 ohm Pt α = 0.00385 Euro	-200 to 630	-328 to 1166
500 ohm Pt α = 0.00385 Euro	-200 to 630	-328 to 1166
100 ohm Nickel α =0.00618	-60 to 250	-76 to 482
120 ohm Nickel α =0.00672	-60 to 250	-76 to 482
200 ohm Nickel α =0.00618	-60 to 250	-76 to 482
500 ohm Nickel α =0.00618	-60 to 250	-76 to 482
10 ohm Copper α = 0.00427	-200 to 260	-328 to 500

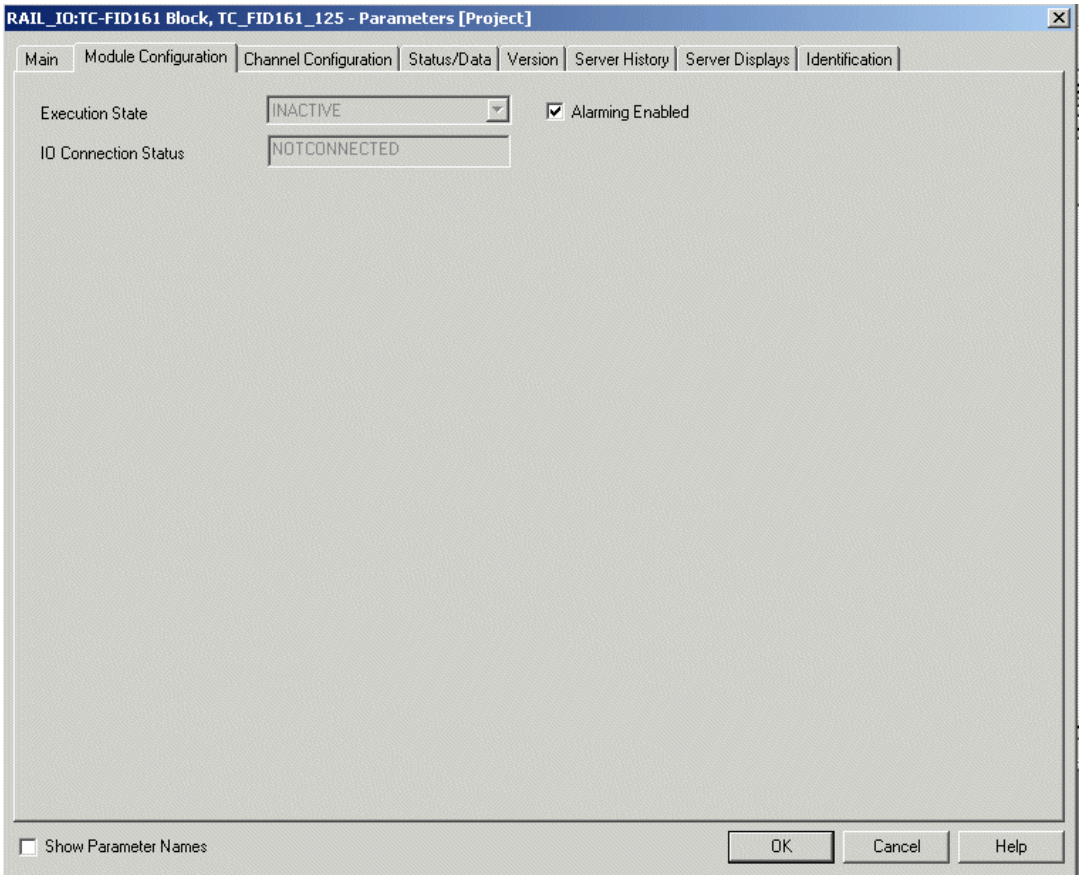
4.1.9 TC-FIR081 alarm flags

The Thermocouple Analog Input module can assert an internal flag for these conditions, when it is Active.

Condition	Description
Bad Calibration Status	Indicates if channel has not had a valid calibration.
Critical Module HW Failure	Indicates whether the module has detected an internal fault. (Must return the module to the factory for repair.)
Communications Fault	If enabled, indicates loss of ControlNet communications or removal of the module.

4.1.10 Configuring module/channel data for a 24Vdc Sink Digital Input module TC-FID161

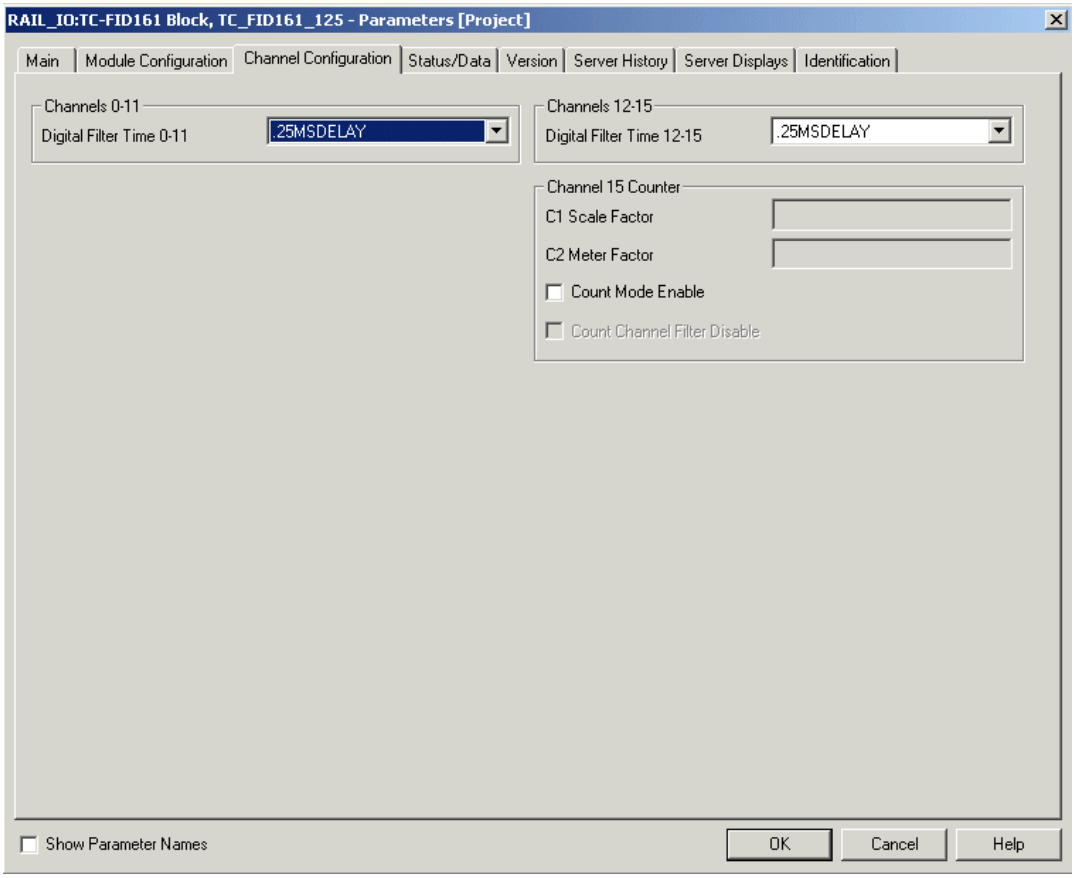
Configure the following parameters through the Module Configuration tab of the configuration form for all module channels.



Parameter (Name)	Description
Execution State (EXECSTATE)	Lets you change the module state to Inactive or Active, in the Monitoring mode.
IO Connection Status (IOCONNSTATUS)	Shows whether the module is connected or not to the ControlNet Gateway, in Monitoring mode.

Parameter (Name)	Description
Alarming Enabled (ALMENBSTATE)	Enable or disable the communication faults alarm for the module by checking or unchecking the check box. Default is checked (enabled).

Note that Execution State selection and the IO Connection Status on the Module Configuration tab are only active when the 120Vac Digital Input module is accessed through the Monitoring tab after it has been downloaded as part of a Control Strategy to a Controller.



Configure the following parameters through the Channel Configuration tab of the configuration form for channels 0 to 15.

Parameter (Name)	Description
Digital Filter Time-Channels 0 to 11 (DIGFILTER)	Lets you select the input filter time to be applied to the inputs connected to channels 0 to 11 as a group. Default is .25MSDELAY.
Digital Filter Time-Channels 12 to 15 (DIGFILT1215)	Lets you select the input filter time to be applied to the inputs connected to channels 12 to 15 as a group. Default is .25MSDELAY.
C1 Scale Factor (C1)	Only applicable when Count Mode is enabled, lets you set a scaling factor to be used in the Accumulated Value (AV) calculation as follows. AV = (C1/C2) \ AVRAW (Raw Accumulated Value) The default value is 1.

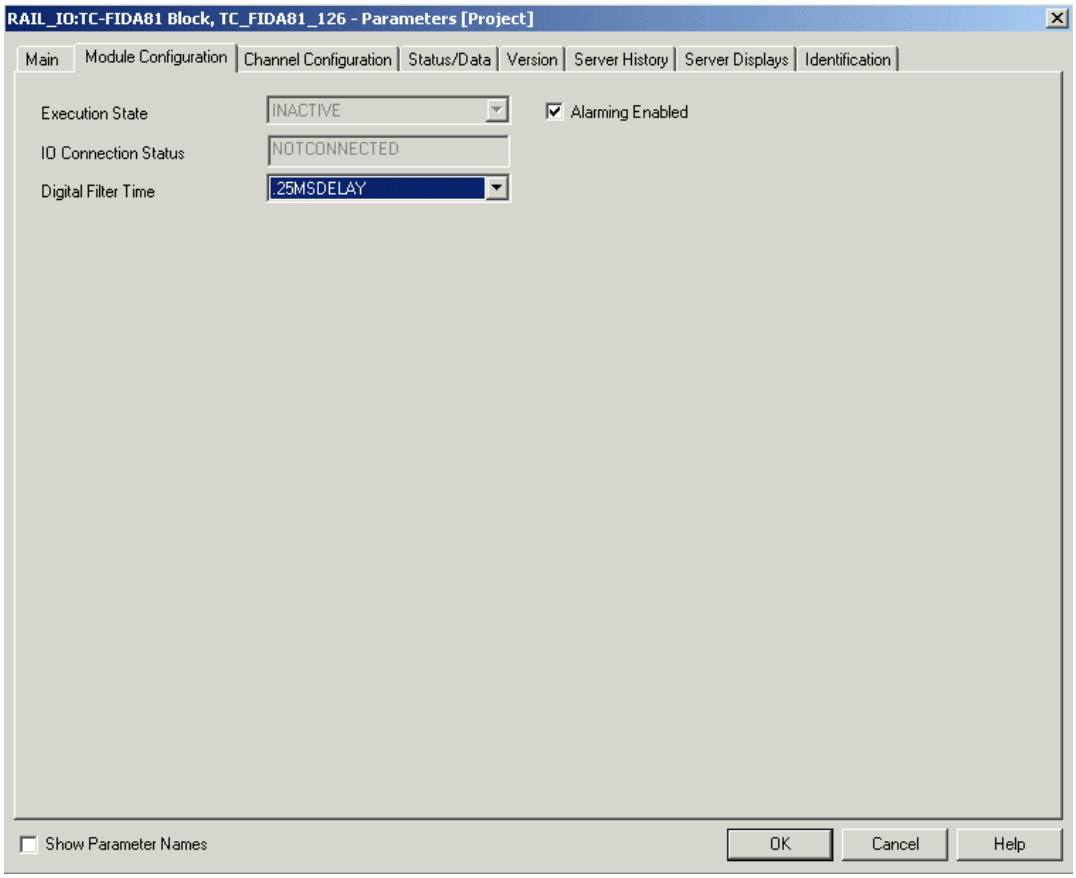
Parameter (Name)	Description
C2 Scale Factor (C2)	Only applicable when Count Mode is enabled lets you set a scaling factor to be used in the Accumulated Value (AV) calculation as follows. AV = (C1/C2) \ AVRAW The default value is 1.
Count Mode (COUNTMODE)	Lets you enable (checked) or disable (unchecked) input 15 as a counter. Default is checked (enabled). When enabled, the module maintains a count of the transitions on input 15 as the Raw Accumulated Value (AVRAW) parameter.
Fast Count (FASTCOUNT)	Only applicable when Count Mode is enabled, lets you enable (checked) or disable (unchecked) fast input (raw) data on input 15. Default is unchecked (disabled) for standard input filtered data on input 15.

4.1.11 TC-FID161 alarm flags

When it is Active, the Digital Input module can assert an internal flag for each of the 16 discrete inputs to indicate whether a communications fault exists.

4.1.12 Configuring module/channel data for a 120Vac Digital Input module TC-FIDA81

Configure the following parameters through the Module Configuration tab of the configuration form for all module channels.



Parameter (Name)	Description
Execution State (EXECSTATE)	Lets you change the module state to Inactive or Active, in the Monitoring mode.
IO Connection Status (IOCONNSTATUS)	Shows whether the module is connected or not to the ControlNet Gateway, in Monitoring mode.
Alarming Enabled (ALMENBSTATE)	Enable or disable the communication faults alarm for the module by checking or unchecking the check box. Default is checked (enabled).
Digital Filter Time (DIGFILTER)	Lets you select the input delay time for channels 0 to 7. Default is . 25MSDELAY.

Note that Execution State selection and the IO Connection Status on the Module Configuration tab are only active when the 120Vac Digital Input module is accessed through the Monitoring tab after it has been downloaded as part of a Control Strategy to a Controller.

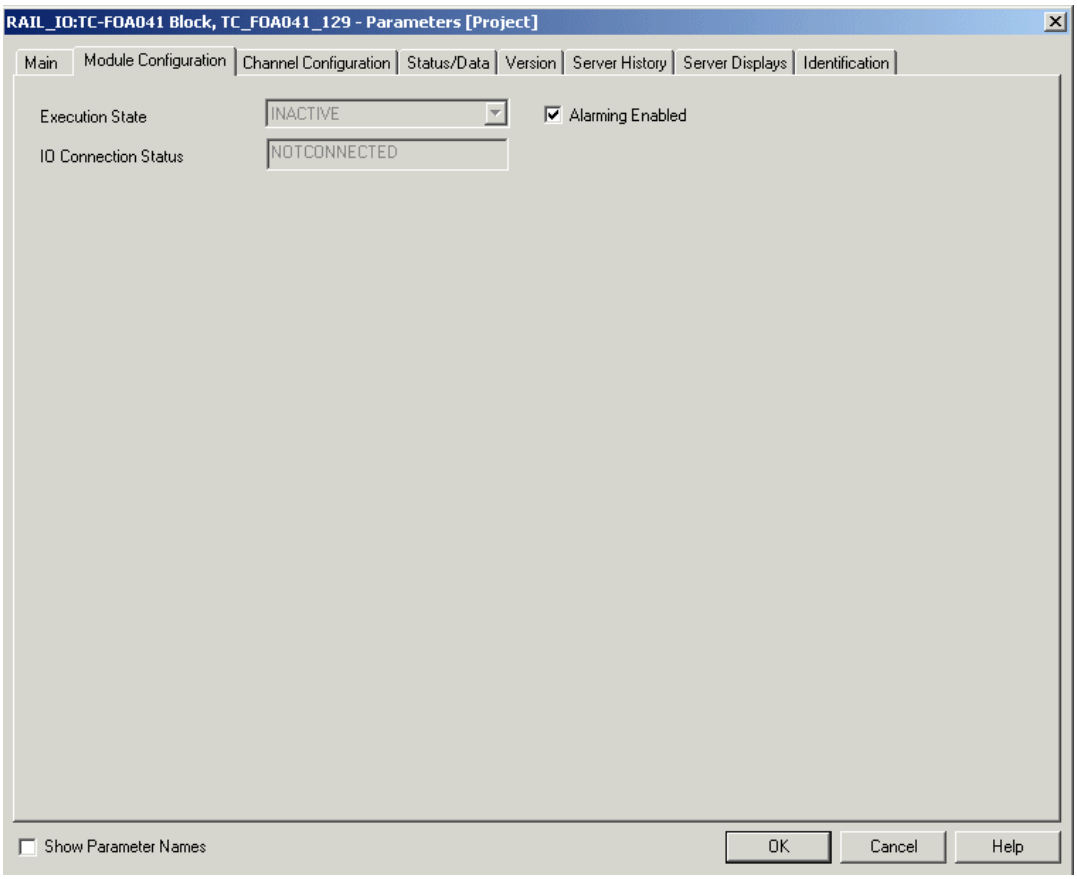
There are no parameters to configure through the Channel Configuration tab of the configuration form for this module.

4.1.13 TC-FIDA81 alarm flags

When it is Active, the Digital Input module can assert an internal flag for each of the 8 discrete inputs to indicate whether a communications fault exists.

4.1.14 Configuring module/channel data for an Analog Output module TC-FOA041

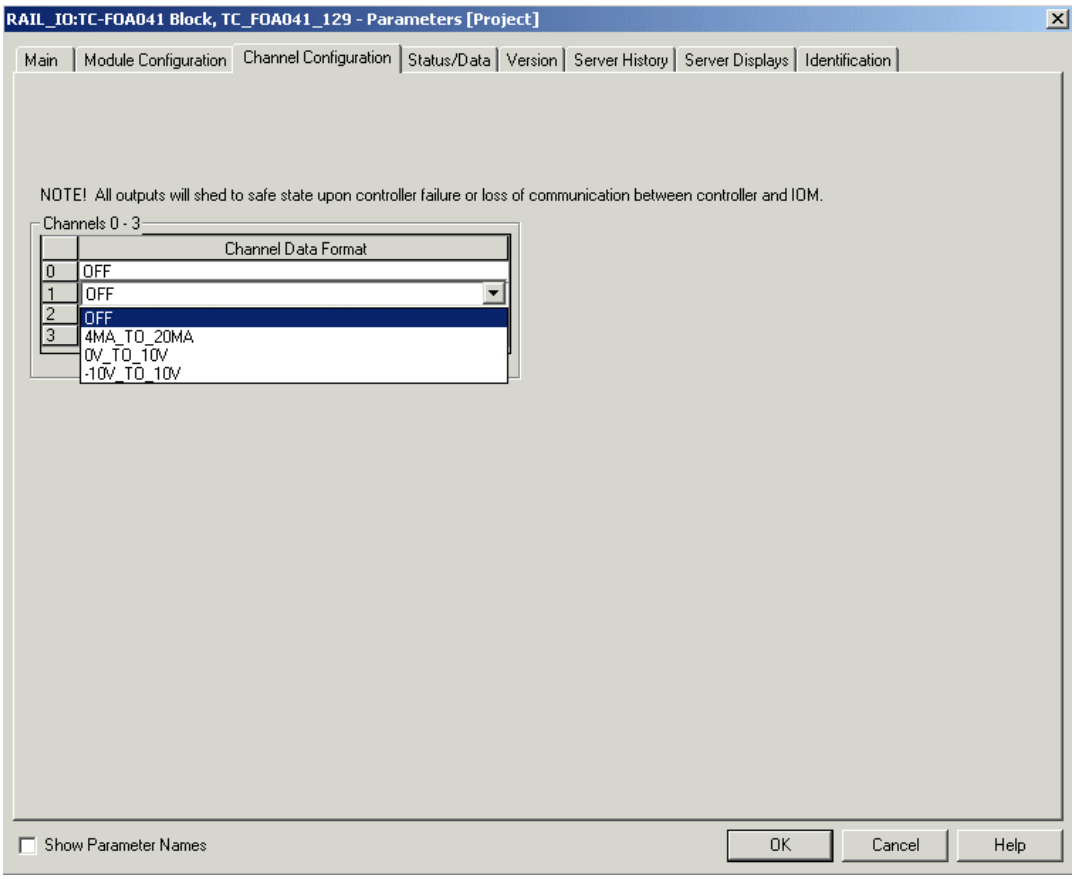
Configure the following parameters through the Module Configuration tab of the configuration form for all module channels.



Parameter	Description
Execution State (EXECSTATE)	Lets you change the module state to Inactive or Active, in the Monitoring mode.
IO Connection Status (IOCONNSTATUS)	Shows whether the module is connected or not to the ControlNet Gateway, in Monitoring mode.
Alarming Enabled (ALMENBSTATE)	Enable or disable the communication faults alarm for the module by checking or unchecking the check box. Default is checked (enabled).

Note that Execution State selection and the IO Connection Status on the Module Configuration tab are only active when the Analog Output module is accessed through the Monitoring tab after it has been downloaded as part of a Control Strategy to a Controller.

Configure the following parameter through the Channel Configuration tab of the configuration form for channels 0 to 3.



Parameter (Name)	Description
Channel Data Format (DATAFORMAT[0..3])	Lets you select the type of output and measurement range for each channel 0 to 3. Default is OFF or 0V/0mA output. The current and voltage range selections in addition to OFF are: • 4 to 20 mA • 0 to 10 V • -10 to +10V (Bipolar)

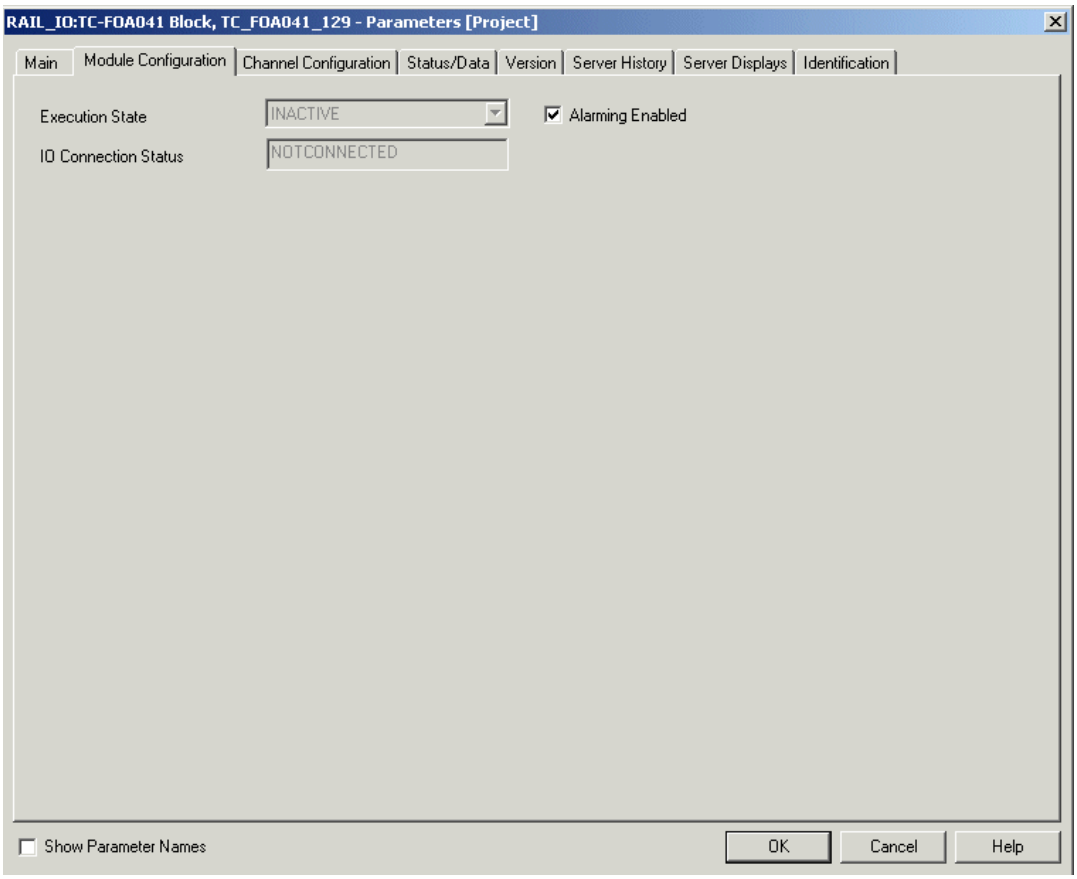
4.1.15 TC-FOA041 alarm flags

The Analog Output module can assert an internal flag for these conditions, when it is Active.

Condition	Description
Open Wire Fault	For 4 to 20 mA output only, indicates whether a ‘wire-off’ condition exists.
Communications Fault	If enabled, indicates loss of ControlNet communications or removal of the module.

4.1.16 Configuring module/channel data for a 24Vdc Digital Output module TC-FOD161

Configure the following parameters through the Module Configuration tab of the configuration form for all module channels.



Parameter (Name)	Description
Execution State (EXECSTATE)	Lets you change the module state to Inactive or Active, in the Monitoring mode.
IO Connection Status (IOCONNSTATUS)	Shows whether the module is connected or not to the ControlNet Gateway, in Monitoring mode.
Alarming Enabled (ALMENBSTATE)	Enable or disable the communication faults alarm for the module by checking or unchecking the check box. Default is checked (enabled).

Note that Execution State selection and the IO Connection Status on the Module Configuration tab are only active when the 24Vdc Digital Output module is accessed through the Monitoring tab after it has been downloaded as part of a Control Strategy to a Controller.

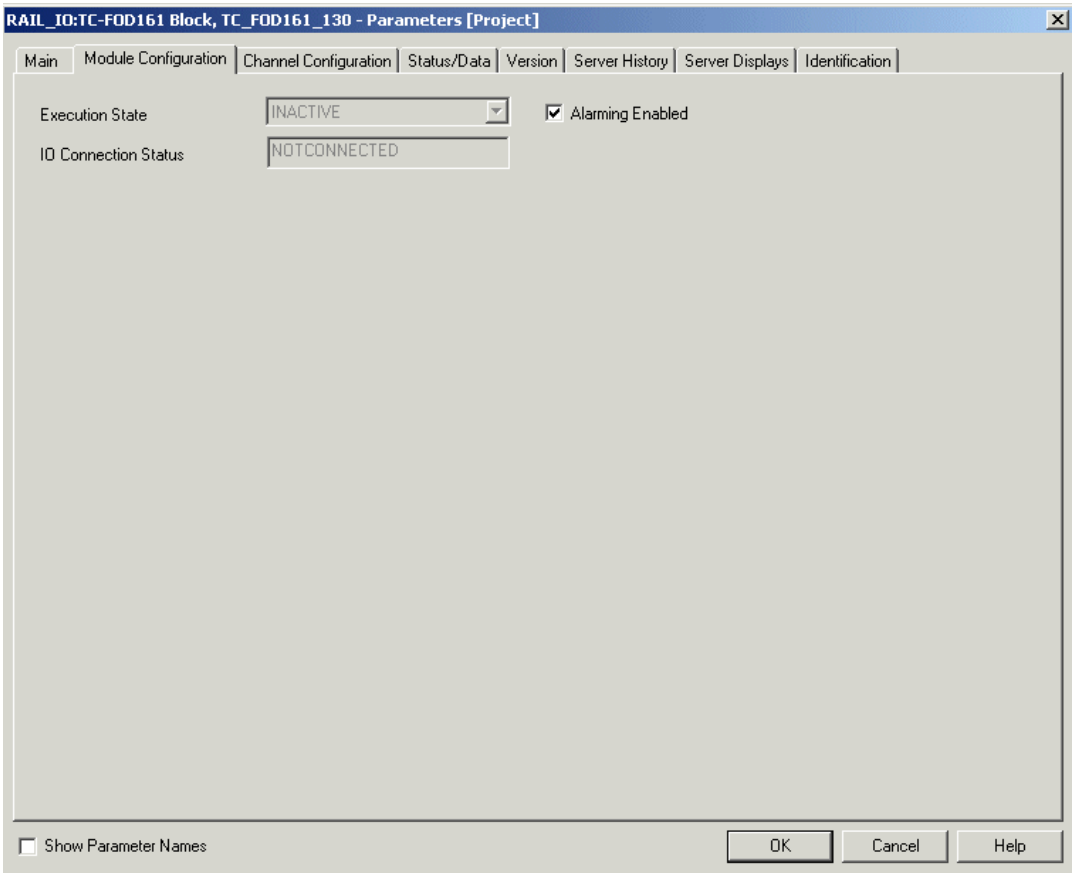
There are no parameters to configure through the Channel Configuration tab of the configuration form for this module.

4.1.17 TC-FOD161 alarm flags

When it is Active, the Digital Output module can assert an internal flag for each of the 16 discrete outputs to indicate whether a communications fault exists.

4.1.18 Configuring module/channel data for a 120Vac Digital Output module TC-FODA81

Configure the following parameters through the Module Configuration tab of the configuration form for all module channels.



Parameter (Name)	Description
Execution State (EXECSTATE)	Lets you change the module state to Inactive or Active, in the Monitoring mode.
IO Connection Status (IOCONNSTATUS)	Shows whether the module is connected or not to the ControlNet Gateway, in Monitoring mode.
Alarming Enabled (ALMENBSTATE)	Enable or disable the communication faults alarm for the module by checking or unchecking the check box. Default is checked (enabled).

Note that Execution State selection and the IO Connection Status on the Module Configuration tab are only active when the 120Vac Digital Output module is accessed through the Monitoring tab after it has been downloaded as part of a Control Strategy to a Controller.

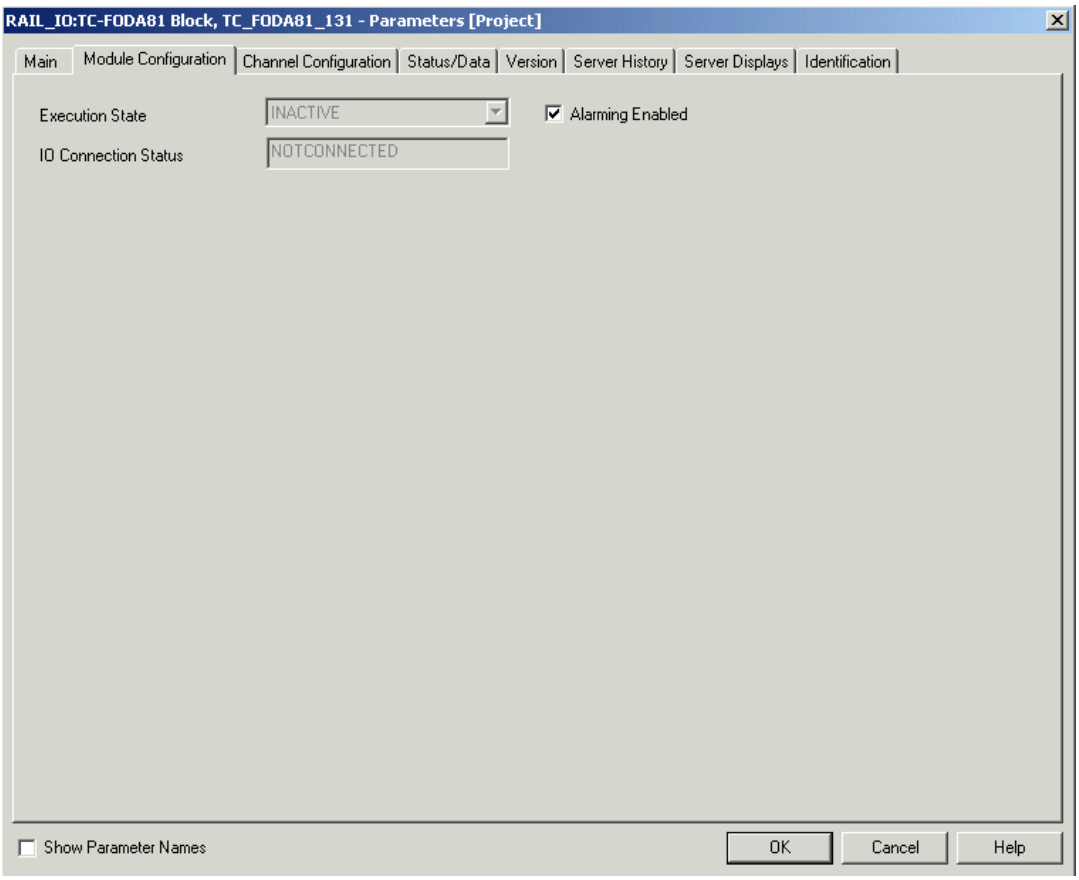
There are no parameters to configure through the Channel Configuration tab of the configuration form for this module.

4.1.19 TC-FODA81 alarm flags

When it is Active, the Digital Output module can assert an internal flag for each of the 8 discrete outputs to indicate whether a communications fault exists.

4.1.20 Configuring module/channel data for a Relay Digital Output module TC-FOR081

Configure the following parameters through the Module Configuration tab of the configuration form for all module channels.



Parameter (Name)	Description
Execution State (EXECSTATE)	Lets you change the module state to Inactive or Active, in the Monitoring mode.
IO Connection Status (IOCONNSTATUS)	Shows whether the module is connected or not to the ControlNet Gateway, in Monitoring mode.
Alarming Enabled (ALMENBSTATE)	Enable or disable the communication faults alarm for the module by checking or unchecking the check box. Default is checked (enabled).

Note that Execution State selection and the IO Connection Status on the Module Configuration tab are only active when the Relay Digital Output module is accessed through the Monitoring tab after it has been downloaded as part of a Control Strategy to a Controller.

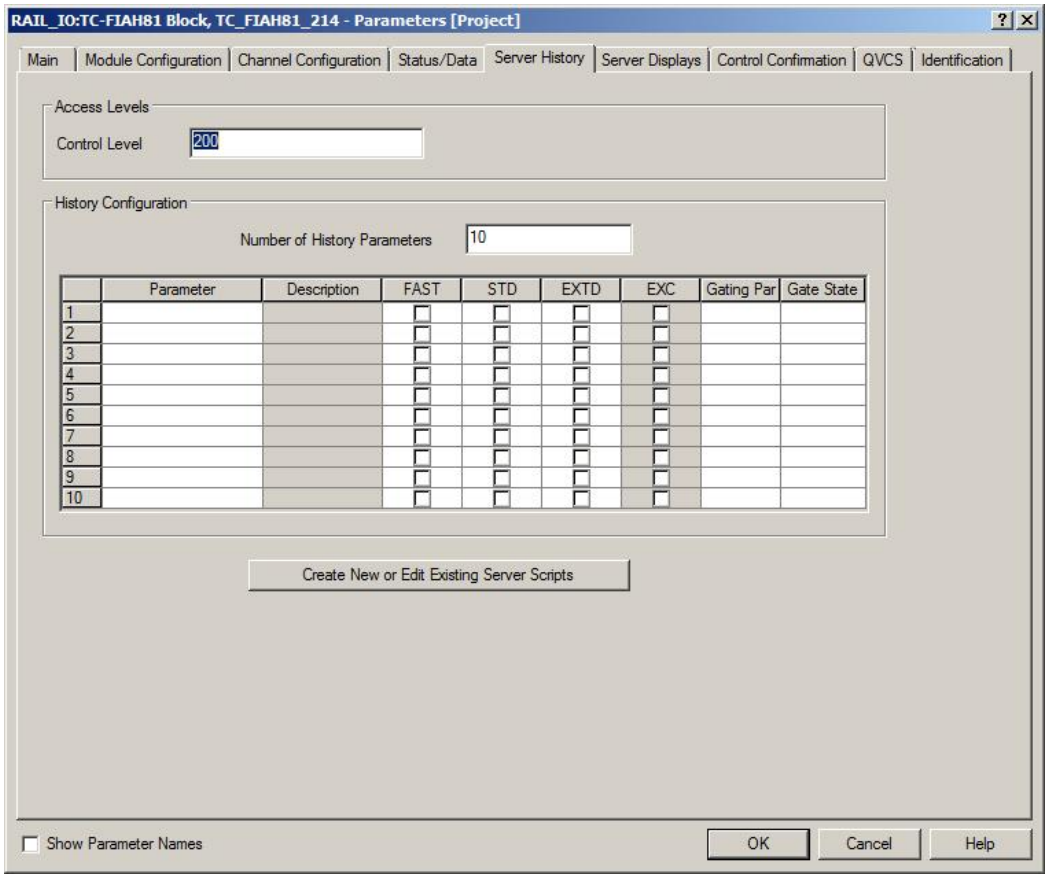
There are no parameters to configure through the Channel Configuration tab of the configuration form for this module.

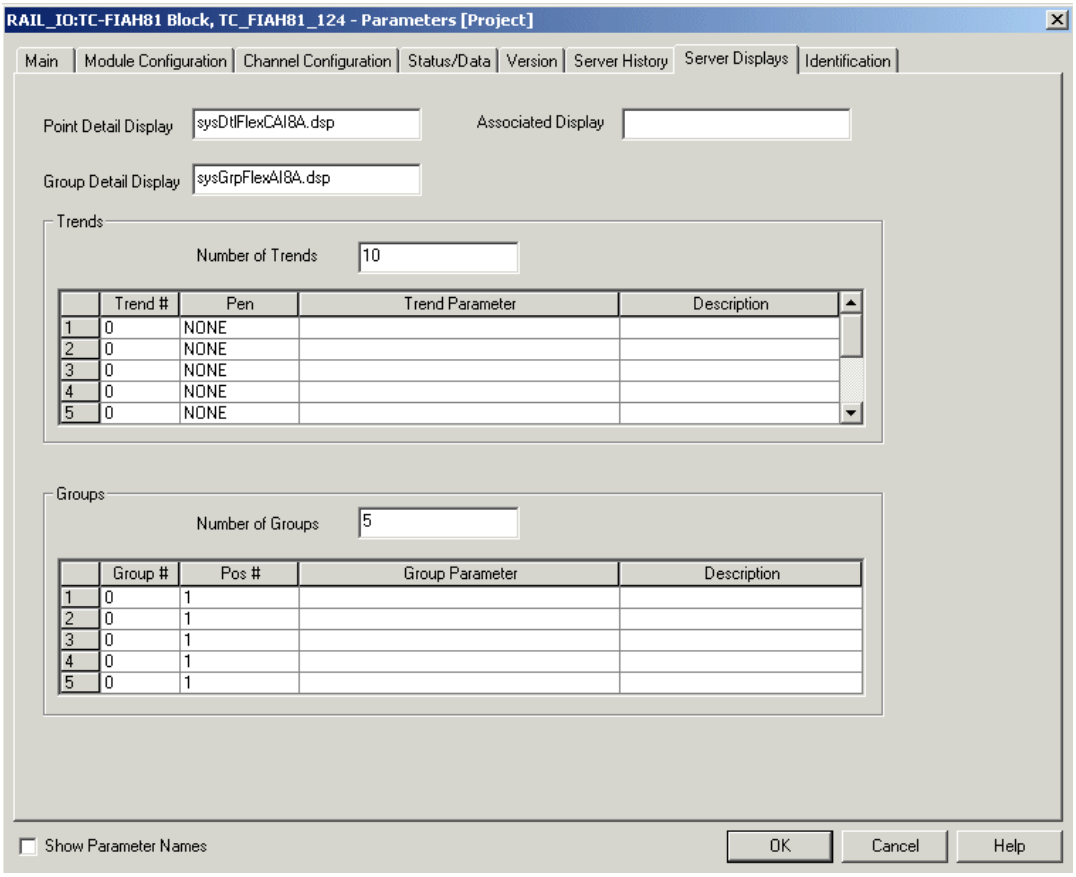
4.1.21 TC-FOR081 alarm flags

When it is Active, the Relay Digital Output module can assert an internal flag for each of the 8 relay outputs to indicate whether a communications fault exists.

4.1.22 Defining Server related configuration data

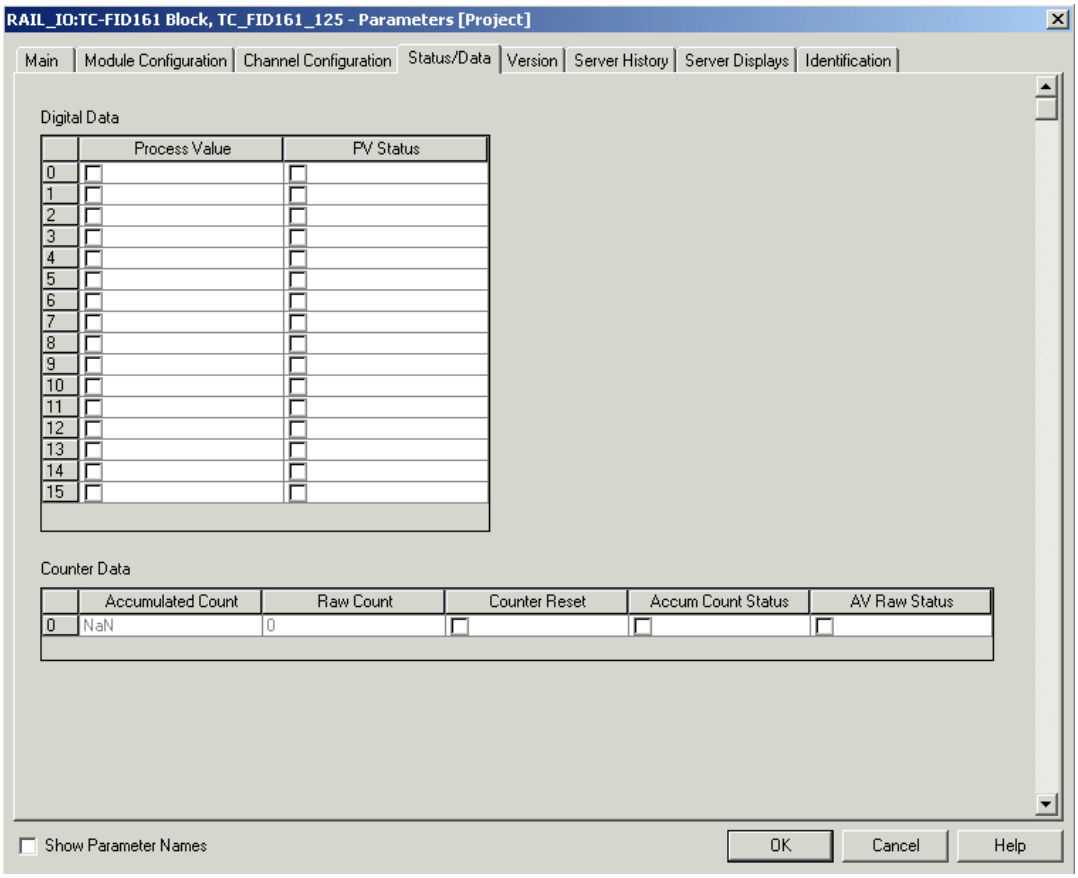
The Server History and Server Displays tabs in the module configuration form let you configure parameters related to collecting history data and displaying of module data through standard and custom displays in the Station application. These tabs include pre-configured entries for links to the standard Point Detail and Group Detail displays as well as the default Control Level. Refer to the online Help for more information about the individual parameter entries.





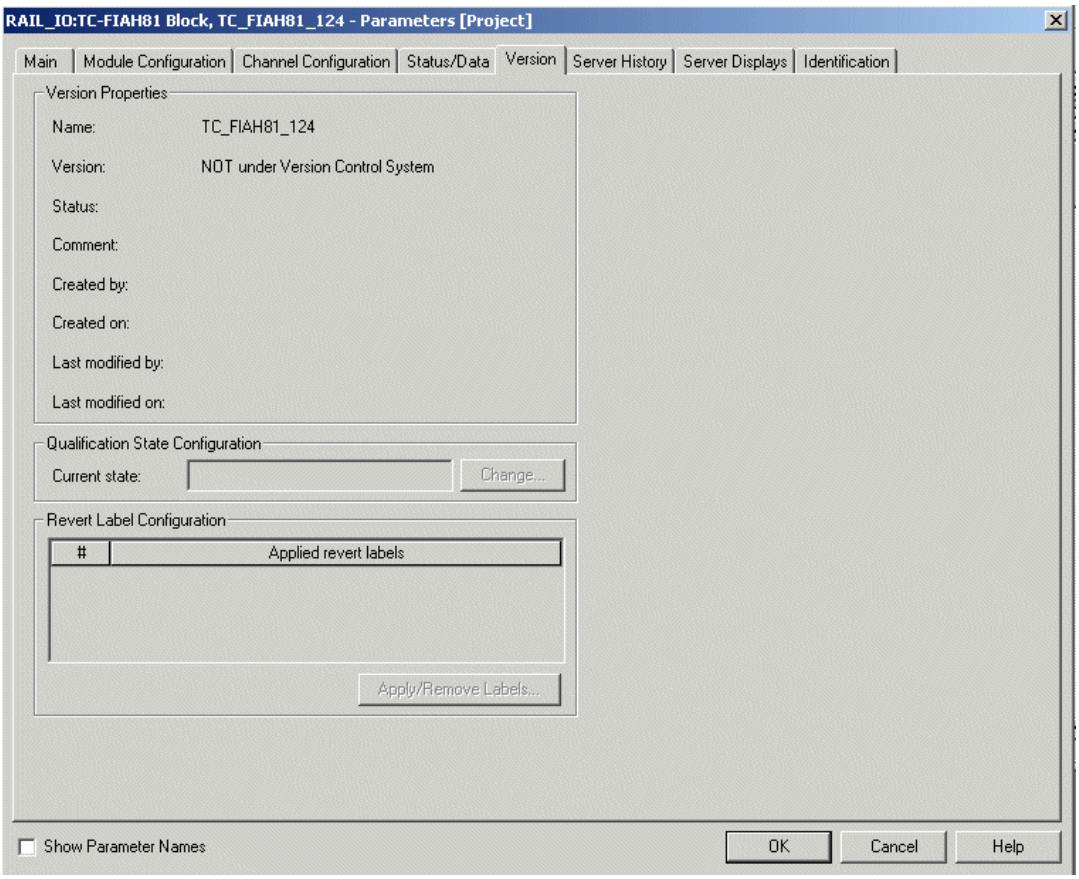
4.1.23 About the Status/Data tab

The Status/Data tab of the module's configuration form is only functional when the module is active in the Monitoring tab of Control Builder. It provides information about the general status of the module. This same information appears on the module's Detail display in Station. See the *Operation* section in this *Guide* for more monitoring information.



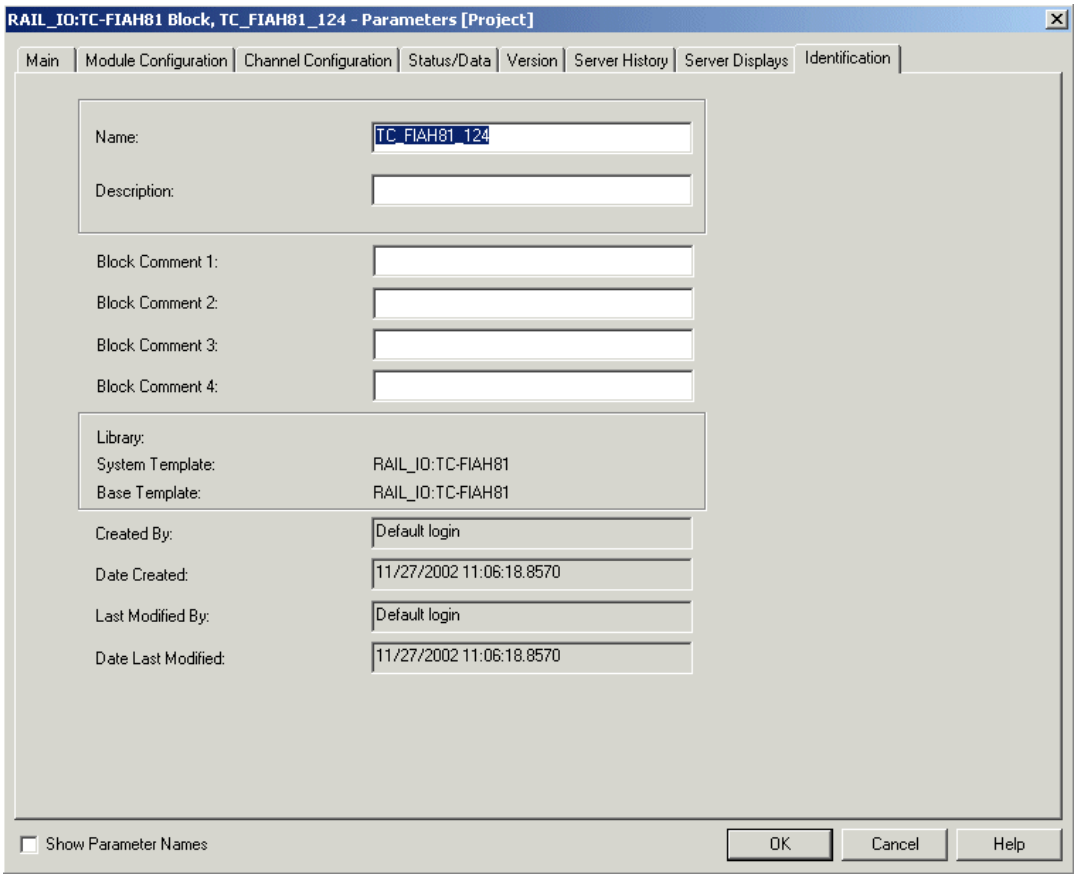
4.1.24 About the Version tab

The Version tab in the module configuration form lets you view information relevant to the Qualification and Version Control system function, if you have a Version Control System license. See the online help for more information about monitoring the data on this tab.



4.1.25 About the Identification tab

The Identification tab in the module configuration form lets you view information relevant to the Template building function, if you have a Template license. See the online help for more information about monitoring the data on this tab.


RAIL_IO:TC-FIAH81 Block, TC_FIAH81_124 - Parameters [Project]
Main
Module Configuration
Channel Configuration
Status/Data
Version
Server History
Server Displays
Identification
Name:
TC_FIAH81_124
Description:
Block Comment 1:
Block Comment 2:
Block Comment 3:
Block Comment 4:
Library:
System Template:
RAIL_IO:TC-FIAH81
Base Template:
RAIL_IO:TC-FIAH81
Created By:
Default login
Date Created:
11/27/2002 11:06:18.8570
Last Modified By:
Default login
Date Last Modified:
11/27/2002 11:06:18.8570
Show Parameter Names
OK
Cancel
Help

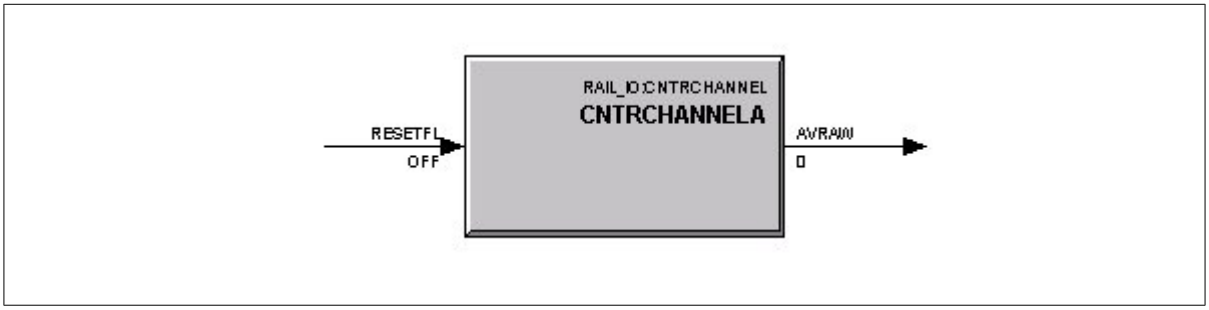
4.2 Using the CNTRCHANNEL (Counter Input Channel) block

Related topics

“Description” on page 100
“Function” on page 100
“Configuring a CNTRCHANNEL block” on page 100

4.2.1 Description

The CNTRCHANNEL block is designed to complement the Count Mode for Channel 15 on the 24Vdc Sink Digital Input module TC-FID161. The block reads and writes values to channel 15, when it is configured for the Count Mode. It is part of the RAIL_IO library and looks like this graphically in a control chart.



4.2.2 Function

The CNTRCHANNEL block reads the calculated and raw values along with their status from channel 15 of the TC-FID161 module. And, it writes the value of the Reset Flag (RESETFL) parameter to the module. This makes the CNTRCHANNEL block the master of channel 15 because it determines whether the RESETFL parameter is On or Off regardless of the RESETFL parameter setting made through the Status/Data tab in the configuration form for the module.

Attention

An operator can still change the value of the RESETFL parameter (Counter Reset) through the module's Status/Data tab, but the parameter will immediately revert to the value set by the CNTRCHANNEL block. However, even if the RESETFL is set to Off through the CNTRCHANNEL block, turning the parameter On through the module's Status/Data tab may still initiate a reset of the counts.

4.2.3 Configuring a CNTRCHANNEL block

You configure the CNTRCHANNEL block the same way you do any other I/O Channel block. Refer to the appropriate topics in the *Control Module Creation* section of the *Control Building Guide* to add the block to a Control Module and *Associating I/O Channels to I/O Modules (IOMs)* to associate it with channel 15 of the module.

Attention

If you associate the CNTRCHANNEL block with channel 15 of a module that is **not** configured for the Count Mode, an error will be generated when you try to load the Control Module to the Controller.

4.3 RIOM-A parameter reference

The following parameters are unique to the rail IOM blocks. They are listed in alphabetical order for general reference. Refer to the *Control Builder Parameter Reference* document for parameters that are common to all IOM blocks.

4.3.1 AV

Specific to Block(s)	TC-FID161 24Vdc Sink Digital Input module
Description	Accumulated Value = Engineering Units value corresponding to the raw pulse count parameter AVRAW.
Data Type	Float 64
Range	N/A
Default	NaN
Config Load	No
Access Lock	View Only
Residence	CEE
Active Connector	Yes
Related Parameters	AVRAW, AVSTS, COUNTMODE, FASTCOUNT
Remarks	AV = C1/C2 \ AVRAW This represents the count from input 15 of the associated module in scaled Engineering Units.

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Specific to Block(s)	CNTRCHANNEL (Counter Input Channel) block.
Description	Accumulated Value = Engineering Units value corresponding to the raw pulse count.
Data Type	Float 64
Range	N/A
Default	1.0
Config Load	No
Access Lock	View Only
Residence	CEE
Active Connector	Yes
Related Parameters	AV, AVSTS
Remarks	AV = C1/C2 \ AVRAW

4.3.2 AVRAW

Specific to Block(s)	TC-FID161 24Vdc Sink Digital Input module
Description	Represents count of input 15 transitions, when Count Mode is enabled. The descriptive string is “Input 15 Raw Count.”
Data Type	Unit 16
Range	0 to 65535

Default	None
Config Load	No
Access Lock	View Only
Residence	CEE
Active Connector	No
Related Parameters	COUNTMODE, FASTCONT, RESETFL
Remarks	Contains the accumulated count of input 15 transitions on the associated module. When COUNTMODE = OFF, AVRAW shall be 0.

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Specific to Block(s)	CNTRCHANNEL (Counter Input Channel) block
Description	Raw Accumulated Value - Raw pulse count
Data Type	Unit 32
Range	N/A
Default	0
Config Load	No
Access Lock	View Only
Residence	CEE
Active Connector	Yes
Related Parameters	AVRAW, AVRAWSTS
Remarks	The raw count value from the TC-FID161 function block and input 15 of the associated module.

4.3.3 AVRAWSTS

Specific to Block(s)	TC-FID161 24Vdc Sink Digital Input module
Description	AV Raw status - Indicates whether the count value in AVRAW is good.
Data Type	Boolean
Range	True/False
Default	False
Config Load	No
Access Lock	View Only
Residence	CEE
Active Connector	No
Related Parameters	AVRAW, COUNTMODE, FASTCOUNT, RESETFL
Remarks	Indicates status of count value. Asserted True when there is reason to question the integrity of the count value. (Block is inactive or there is a communications fault to the I/O module.)

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Specific to Block(s)	CNTRCHANNEL (Counter Input Channel) block
Description	Bad Raw Accumulated Value status

Data Type	Boolean
Range	Bad = On Normal = Off
Default	None
Config Load	No
Access Lock	View Only
Residence	CEE
Active Connector	No
Related Parameters	AVRAW
Remarks	

4.3.4 AVSTS

Specific to Block(s)	TC-FID161 24Vdc Sink Digital Input module
Description	Bad Accumulated Value status - Indicates whether the count value in AV is good.
Data Type	Boolean
Range	True/False
Default	False
Config Load	No
Access Lock	View Only
Residence	CEE
Active Connector	No
Related Parameters	AV, COUNTMODE, FASTCOUNT, RESETFL
Remarks	Indicates status of count value. Asserted True when there is reason to question the integrity of the count value. (Block is inactive or there is a communications fault to the I/O module.)

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Specific to Block(s)	CNTRCHANNEL (Counter Input Channel) block
Description	Bad Accumulated Value status
Data Type	Boolean
Range	BAD = On NORMAL = Off
Default	Off
Config Load	No
Access Lock	View Only
Residence	CEE
Active Connector	No
Related Parameters	AV
Remarks	

4.3.5 BADCAL

Specific to Block(s)	TC-FIL081 Thermocouple Analog Input module, TC-FIRO81 3-Wire RTD Input module
Description	This module does not have a valid calibration
Data Type	Boolean
Range	On, Off
Default	Off
Config Load	No
Access Lock	View Only
Residence	CEE
Active Connector	No
Related Parameters	
Remarks	

4.3.6 BADTCTYPE

Specific to Block(s)	TC-FILO81 Thermocouple Analog Input module
Description	Invalid thermocouple has been selected.
Data Type	Boolean
Range	On, Off
Default	Off
Config Load	No
Access Lock	View Only
Residence	CEE
Active Connector	No
Related Parameters	
Remarks	

4.3.7 C1

Specific to Block(s)	TC-FID161 24Vdc Sink Digital Input module
Description	Engineering Units scale factor (dimensionless) - For example, a factor to convert transitions to thousands.
Data Type	Float 64
Range	3.4e -38 to 3.4e 38
Default	1.0
Config Load	Yes
Access Lock	App Dev Only
Residence	CEE
Active Connector	No
Related Parameters	C2, AV

Remarks	For count input 15, this is used to calculate AV in EU as follows: AV in EU = (C1/C2) \ AVRAW

4.3.8 C2

Specific to Block(s)	TC-FID161 24Vdc Sink Digital Input module
Description	Meter factor in pulses per Engineering Units - For example, number of pulses per gallon.
Data Type	Float 64
Range	3.4 e -38 to 3.4 e 38
Default	1.0
Config Load	Yes
Access Lock	App Dev Only
Residence	CEE
Active Connector	No
Related Parameters	C1, AV
Remarks	For count input 15, this is used to calculate AV in EU as follows: AV in EU = (C1/C2) \ AVRAW

4.3.9 CJTEMPOVER

Specific to Block(s)	TC-FILO81 Thermocouple Analog Input module
Description	Cold Junction Compensator overrange - The CJ temperature is greater than 70\C (158\F).
Data Type	Boolean
Range	On, Off
Default	Off
Config Load	No
Access Lock	View Only
Residence	CEE
Active Connector	No
Related Parameters	CJTEMPUNDER
Remarks	

4.3.10 CJTEMPUNDER

Specific to Block(s)	TC-FILO81 Thermocouple Analog Input module
Description	Cold Junction Compensator underrange - The CJ temperature is less than 0\C (32\F).
Data Type	Boolean
Range	On, Off
Default	Off
Config Load	No
Access Lock	View Only
Residence	CEE

Active Connector	No
Related Parameters	CJTEMPOVER
Remarks	

4.3.11 COUNTMODE

Specific to Block(s)	TC-FID161 24Vdc Sink Digital Input module
Description	Input 15 Counter Mode (Descriptive string is “Input 15 Counter Mode”.)
Data Type	Boolean
Range	On, Off
Default	Off
Config Load	Yes
Access Lock	App Dev Only
Residence	CEE
Active Connector	No
Related Parameters	FASTCOUNT, RESETFL, AVRAW
Remarks	This parameter determines whether or not the module maintains a count of transitions on input 15 in the parameter AVRAW When parameter is Off (disabled), AVRAW shall contain 0.

4.3.12 DATAFORMAT[0..3]

Specific to Block(s)	TC-FOA041 Analog Output Module
Description	Sets the format /interpretation of the output to the module.
Data Type	ENUM
Range	Off 4_20_mA 0_20_mA 0_10V Bipolar_10_V
Default	Off
Config Load	Yes
Access Lock	App Dev Only
Residence	CEE
Active Connector	No
Related Parameters	
Remarks	This parameter is translated to a two-bit combination for use by the physical device.

4.3.13 DATAFORMAT[0…7]

Specific to Block(s)	TC-FIAH81 High Level Analog Input module
Description	Sets the format /interpretation of the input signalt to the module.

Data Type	ENUM
Range	Off 4_20_mA 0_20_mA 0_10V Bipolar_10_V
Default	Off
Config Load	Yes
Access Lock	App Dev Only
Residence	CEE
Active Connector	No
Related Parameters	PV, PVRAW
Remarks	This parameter is translated to a two-bit combination for use by the physical device.

4.3.14 DATATYPE

Specific to Block(s)	TC-FIL081 Thermocouple Analog Input module, TC-FIRO81 3-Wire RTD Input module
Description	Data format produced by module
Data Type	ENUM
Range	C F Bipolar Count Unipolar Count
Default	C
Config Load	Yes
Access Lock	App Dev Only
Residence	CEE
Active Connector	No
Related Parameters	TCTYPE or RTDTYPE
Remarks	C = Celsius F = Fahrenheit Bipolar Count = A/D counts over range -32768 to 32767 Unipolar Count = A/D counts over range 0 to 65535

4.3.15 DIGFILT1215

Specific to Block(s)	TC-FID161 24Vdc Sink Digital Input module
Description	Digital Filter Time Delay for Channels 12 to 15. (Descriptive string is “Digital Filter Time” placed with box labeled Channels 12 - 15 on I/O Configuration form.)
Data Type	ENUM

Range	.25mS .5mS 1mS 2mS 4mS 8mS 16mS 32mS
Default	.25mS
Config Load	Yes
Access Lock	App Dev Only
Residence	CEE
Active Connector	No
Related Parameters	DIGFILTER
Remarks	

4.3.16 DIGFILTER

Specific to Block(s)	TC-FID161 24Vdc Sink Digital Input module
Description	Digital Filter Time Delay for Channels 0 to 11. (Descriptive string is “Digital Filter Time” placed with box labeled Channels 0 - 11 on I/O Configuration form.)
Data Type	ENUM
Range	.25mS .5mS 1mS 2mS 4mS 8mS 16mS 32mS
Default	.25mS
Config Load	Yes
Access Lock	App Dev Only
Residence	CEE
Active Connector	No
Related Parameters	DIGFILT1215
Remarks	

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Specific to Block(s)	TC-FIDA81 120Vac Digital Input module
Description	Digital Filter Time Delay applied to the transition of an input signal. (The descriptive string for this parameter is “Digital Filter Time”.)

Data Type	ENUM
Range	.25mS .5mS 1mS 2mS 4mS 8mS 16mS 32mS
Default	.25mS
Config Load	Yes
Access Lock	App Dev Only
Residence	CEE
Active Connector	No
Related Parameters	None
Remarks	The range values listed above correspond to the following maximum OFF-to-ON filter times and ON-to-OFF filter times are as follows. .25MS = 8.4MS OFF-ON = 26.4MS ON-OFF .5MS = 8.6MS OFF-ON = 26.6MS ON-OFF 1MS = 9MS OFF-ON = 27MS ON-OFF 2MS = 10MS OFF-ON = 28MS ON-OFF 4MS = 12MS OFF-ON = 30MS ON-OFF 8MS = 16MS OFF-ON = 34MS ON-OFF 16MS = 24MS OFF-ON = 42MS ON-OFF 32MS = 40MS OFF-ON = 58MS ON-OFF

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Specific to Block(s)	TC-FIL081 Thermocouple Analog Input module
Description	Software digital filter enable
Data Type	Boolean
Range	On, Off
Default	On
Config Load	Yes
Access Lock	App Dev Only
Residence	CEE
Active Connector	No
Related Parameters	NOTCHFILTER
Remarks	This filter settles to 100% of full scale step input in 60 times the selected first notch filter time.

4.3.17 DOMSO[0…7]

Specific to Block(s)	TC-FOR081 Relay Digital Output module, TC-FODA81 120Vac Digital Output module
Description	Output value
Data Type	Boolean
Range	On, Off
Default	Off
Config Load	No
Access Lock	View Only
Residence	CEE
Active Connector	No
Related Parameters	PVVAL[0…7], PVSTS[0…7]
Remarks	Output value written to the device.

4.3.18 DOMSO[0…15]

Specific to Block(s)	TC-FOD161 24Vdc Digital Output module
Description	Output value
Data Type	Boolean
Range	On, Off
Default	Off
Config Load	No
Access Lock	View Only
Residence	CEE
Active Connector	No
Related Parameters	PVVAL[0…15], PVSTS[0…15]
Remarks	Output value written to the device.

4.3.19 ENHMODE

Specific to Block(s)	TC-FIR081 3-Wire RTD Analog Input module
Description	Enhanced measurement accuracy enable
Data Type	Boolean
Range	On, Off
Default	Off
Config Load	Yes
Access Lock	App Dev Only
Residence	CEE
Active Connector	No
Related Parameters	

Remarks	When enabled, the module measures the voltage drop across an internal precision resistor and compares it to the input signal. This improves the module's temperature drift characteristics, but reduces its throughput.

4.3.20 FASTCOUNT

Specific to Block(s)	TC-FID161 24Vdc Sink Digital Input module
Description	Unfiltered input for Count Mode enable
Data Type	Boolean
Range	On, Off
Default	Off
Config Load	Yes
Access Lock	App Dev Only
Residence	CEE
Active Connector	No
Related Parameters	COUNTMODE, RESETFL, AVRAW
Remarks	When enabled with Count Mode ON, the module applies no digital filtering to the channel 15 input. All transitions, unfiltered, will be counted.

4.3.21 HWFAULT

Specific to Block(s)	TC-FIL081 Thermocouple Analog Input module, TC-FIR081 3-Wire RTD Analog Input module
Description	Critical module hardware failure detection
Data Type	Boolean
Range	On, Off
Default	Off
Config Load	No
Access Lock	View Only
Residence	CEE
Active Connector	No
Related Parameters	
Remarks	Associated with the Critical Error Bits in Status Word 2 of the module's I/O data table.

4.3.22 NOTCHFILTER

Specific to Block(s)	TC-FIL081 Thermocouple Analog Input module, TC-FIR081 3-Wire RTD Analog Input module.
Description	Hardware A/D filter first notch frequency selection.
Data Type	ENUM
Range	• 50_Hz • 60_Hz
Default	60_Hz

Config Load	Yes
Access Lock	App Dev Only
Residence	CEE
Active Connector	No
Related Parameters	
Remarks	Module throughput is a function of the number of inputs used and first notch filter frequency as well as the normal or enhanced mode for the 3-Wire RTD Analog Input module.

4.3.23 OFFPULSE[0…7]

Specific to Block(s)	TC-FODA81 120Vac Digital Output module, TC-FOR081 Relay Digital Output module
Description	Off pulse timer
Data Type	Float 64
Range	
Default	0.0
Config Load	No for the module Yes for the Off-Pulse channel block
Access Lock	View Only
Residence	CEE
Active Connector	No
Related Parameters	ONPLUSE[0…7]
Remarks	Only configured when Off-Pulse Channel block is associated with an output channel.

4.3.24 OFFPULSE[0…15]

Specific to Block(s)	TC-FOD161 24Vdc Digital Output module
Description	Off pulse timer
Data Type	Float 64
Range	
Default	0.0
Config Load	No for the module Yes for the Off-Pulse channel block
Access Lock	View Only
Residence	CEE
Active Connector	No
Related Parameters	ONPLUSE[0…15]
Remarks	Only configured when Off-Pulse Channel block is associated with an output channel.

4.3.25 ONPULSE[0…7]

Specific to Block(s)	TC-FODA81 120Vac Digital Output module, TC-FOR081 Relay Digital Output module

Description	On pulse timer
Data Type	Float 64
Range	
Default	0.0
Config Load	No for the module Yes for the On-Pulse channel block
Access Lock	View Only
Residence	CEE
Active Connector	No
Related Parameters	OFFPULSE
Remarks	Only configured when On-Pulse Channel block is associated with an output channel.

4.3.26 ONPULSE[0…15]

Specific to Block(s)	TC-FOD161 24Vdc Digital Output module
Description	On pulse timer
Data Type	Float 64
Range	
Default	0.0
Config Load	No for the module Yes for the On-Pulse channel block
Access Lock	View Only
Residence	CEE
Active Connector	No
Related Parameters	OFFPULSE[0...15]
Remarks	Only configured when On-Pulse Channel block is associated with an output channel

4.3.27 OPECHO

Specific to Block(s)	TC-FOA041 Analog Output module
Description	Process value read back from the device
Data Type	Float 64
Range	
Default	0
Config Load	No
Access Lock	View Only
Residence	CEE
Active Connector	No
Related Parameters	OPFINAL

Remarks	The module block presents this value in the form of percent Full Range when the parameter is read. The module itself uses the two's complement binary for internal processor calculations. However, the data format for 4 to 20 mA is unsigned binary. The others reserve the most significant bit for a sign bit.

4.3.28 OPFINAL

Specific to Block(s)	TC-FOA041 Analog Output module
Description	Process value written to the device
Data Type	Float 64
Range	
Default	0
Config Load	No
Access Lock	View Only
Residence	CEE
Active Connector	No
Related Parameters	OPECHO
Remarks	The module block receives this value in the form of percent Full Range and must convert it to the representation expected by the device itself. The module itself uses the two's complement binary for internal processor calculations. However, the data format for 4 to 20 mA is unsigned binary. The others reserve the most significant bit for a sign bit.

4.3.29 PV[0…7]

Specific to Block(s)	TC-FIAH81 High Level Analog Input module
Description	Process value (channel specific)
Data Type	Float 64
Range	
Default	0
Config Load	No
Access Lock	View Only
Residence	CEE
Active Connector	No
Related Parameters	PVRAW[0…7]
Remarks	This parameter should: Present a Float value indicating percent of Full Range. Report a NaN value for any of the following circumstances: LOCALFAULT asserted Bad communications status Module block inactive

Module block inactive

Specific to Block(s)	TC-FILO81 Thermocouple Analog Input module, TC-FIR081 3-Wire RTD Analog Input module

Description	Process value (channel specific)
Data Type	Float 64
Range	
Default	0
Config Load	No
Access Lock	View Only
Residence	CEE
Active Connector	No
Related Parameters	PVRAW[0…7]
Remarks	This parameter should: • Present a Float value indicating percent of Full Range. • Report a NaN value for any of the following circumstances HWFAULT, BADCAL, BADTYPE asserted Bad communications status Module block inactive

4.3.30 PVRAW[0…7]

Specific to Block(s)	TC-FIAH81 Analog Input module, TC-FIL081 Thermocouple Analog Input module, TC-FIR081 3-Wire RTD Analog Input module
Description	Raw Process Value (channel specific)
Data Type	Float 64
Range	
Default	0
Config Load	No
Access Lock	View Only
Residence	CEE
Active Connector	No
Related Parameters	PV[0…7]
Remarks	This parameter should: • Report the channel data value sent by the device without any processing within the I/O module block. • Report a NaN value under the following circumstances: • Bad communications status • IOM block inactive

4.3.31 PVSTS[0…7]

Specific to Block(s)	TC-FIDA81 120Vac Digital Input module
Description	Good versus Bad status of a channel Process Value (Descriptive string is “PV Status”.)
Data Type	Boolean
Range	On, Off
Default	None

Config Load	No
Access Lock	View Only
Residence	CEE
Active Connector	No
Related Parameters	PVVAL[0…7]
Remarks	Indicates whether or not a Process Value is good based on fault detection for the associated channel. Since this module does not detect or signal any fault conditions, this parameter is only set to ON when there is a communications fault.

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Specific to Block(s)	TC-FODA81 Analog Output module, TC-FOR081 Relay Digital Output module
Description	Echo back status
Data Type	Boolean
Range	On, Off
Default	None
Config Load	No
Access Lock	View Only
Residence	CEE
Active Connector	No
Related Parameters	PVVAL[0…7]
Remarks	Failsafe value is On.

4.3.32 PVSTS[0…15]

Specific to Block(s)	TC-FID161 24Vdc Sink Digital Input module
Description	Good versus Bad status of a channel Process Value (Descriptive string is “PV Status”.)
Data Type	Boolean
Range	On, Off
Default	None
Config Load	No
Access Lock	View Only
Residence	CEE
Active Connector	No
Related Parameters	PVVAL[0…15]
Remarks	Indicates whether or not a Process Value is good based on fault detection for the associated channel. Since this module does not detect or signal any fault conditions, this parameter is only set to ON when there is a communications fault.

SpecHTML hidden text, hr rule in output

Specific to Block(s)	TC-FOD161 24Vdc Digital Output module
Description	Echo back status)
Data Type	Boolean
Range	On, Off

Default	None
Config Load	No
Access Lock	View Only
Residence	CEE
Active Connector	No
Related Parameters	PVVAL[0…15]
Remarks	Failsafe value is On.

4.3.33 PVVAL[0…7]

Specific to Block(s)	TC-FIDA81 120Vac Digital Input module
Description	Process Value - ON or OFF value of a channel (Descriptive string is “Process Value”)
Data Type	Boolean
Range	On, Off
Default	None
Config Load	No
Access Lock	View Only
Residence	CEE
Active Connector	No
Related Parameters	PVSTS[0…7]
Remarks	This parameter reflects the Boolean value of the actual field data. Failsafe value is Zero.

SpecHTML hidden text, hr rule in output

Specific to Block(s)	TC-FODA81 Analog Output module, TC-FOR081 Relay Digital Output module
Description	Echo back value
Data Type	Boolean
Range	On, Off
Default	None
Config Load	No
Access Lock	View Only
Residence	CEE
Active Connector	No
Related Parameters	DOMSO[0..7], PVSTS[0..7]
Remarks	Indicates the echo back data value received from the device for each input. Failsafe value is OFF.

4.3.34 PVVAL[0…15]

Specific to Block(s)	TC-FID161 24Vdc Sink Digital Input module
Description	Process Value - ON or OFF value of a channel (Descriptive string is “Process Value”)
Data Type	Boolean
Range	On, Off

Default	None
Config Load	No
Access Lock	View Only
Residence	CEE
Active Connector	No
Related Parameters	PVSTS[0…15]
Remarks	This parameter reflects the Boolean value of the actual field data. Failsafe value is Zero.

SpecHTML hidden text, hr rule in output

Specific to Block(s)	TC-FOD161 24Vdc Digital Output module
Description	Echo back value
Data Type	Boolean
Range	On, Off
Default	None
Config Load	No
Access Lock	View Only
Residence	CEE
Active Connector	No
Related Parameters	DOMSO[0..15], PVSTS[0..15]
Remarks	Indicates the echo back data value received from the device for each input. Failsafe value is OFF.

4.3.35 PWMPERIOD[0…7]

Specific to Block(s)	TC-FODA81 120Vac Digital Output module, TC-FOR081 Relay Digital Output module
Description	Pulse Width Module period in seconds
Data Type	Float 64
Range	
Default	0.0
Config Load	Digital Output Module: No PWM Channel Block: Yes
Access Lock	View Only
Residence	CEE
Active Connector	No
Related Parameters	
Remarks	Only configured when PWM Channel block is associated with the channel.

4.3.36 PWMPERIOD[0…15]

Specific to Block(s)	TC-FOD161 24Vdc Digital Output module
Description	Pulse Width Module period in seconds
Data Type	Float 64

Range	
Default	0.0
Config Load	Digital Output Module: No PWM Channel Block: Yes
Access Lock	View Only
Residence	CEE
Active Connector	No
Related Parameters	
Remarks	Only configured when PWM Channel block is associated with the channel.

4.3.37 RESETFL

Specific to Block(s)	TC-FID161 24Vdc Sink Digital Input module
Description	Counter reset for input 15 in Count Mode (Descriptive string is “Counter Reset”)
Data Type	Boolean
Range	On, Off
Default	Off
Config Load	Yes
Access Lock	Operator
Residence	CEE
Active Connector	No
Related Parameters	COUNTMODE, FASTCOUNT, AVRAW
Remarks	When COUNTMODE is ON, resets the input 15 transitions within the module to zero. (0). The Count Reset is level sensitive. A level 1 (ON) resets the device. A persistent level 1 (ON) holds the device in reset.

SpecHTML hidden text, hr rule in output

Specific to Block(s)	CNTRCHANNEL (Counter Input Channel) block
Description	Reset counter flag
Data Type	Boolean
Range	0 = Off 1 = On
Default	0 (Off)
Config Load	No
Access Lock	Operator
Residence	CEE
Active Connector	No
Related Parameters	
Remarks	Turning On this parameter will cause the pulse count associated with the Counter Input Channel to reset to 0. This parameter takes preference over the RESETFL parameter on the module's Status/ Data tab.

4.3.38 RTDTYPE[0…7]

Specific to Block(s)	TC-FIR081 3-Wire RTD Analog Input module
Description	Channel RTD type
Data Type	ENUM
Range	• Ohms (0) • Unused - (1) • Unused - (1) • Pt100…US - (3) • Pt200 - (4) • Pt500 - (5) • Cu10 - (7) • Ni120 - (8) • Ni100 - (9) • Ni200 - (10) • Ni500 - (11)
Default	Unused (So module performance is not impaired by needlessly scanning unused channels)
Config Load	Yes
Access Lock	App Dev Only
Residence	CEE
Active Connector	No
Related Parameters	
Remarks	Specifies the type of RTD to be attached to a channel. If no RTD is to be attached to a channel, set this parameter to Unused so the module does not take the time to scan the channel. Each channel scanned significantly loads the module

4.3.39 TCTYPE

Specific to Block(s)	TC-FIL081 Thermocouple Analog Input module
Description	Channel thermocouple type
Data Type	ENUM
Range	• MV - (0) • B - (1) • E - (2) • J - (3) • K - (4) • R - (5) • S - (6) • T - (7) • C - (8) • N - (9) • CT03 - (12) • CJT47 - (13) • Unused - (16)

Default	MV
Config Load	Yes
Access Lock	App Dev Only
Residence	CEE
Active Connector	No
Related Parameters	
Remarks	Specifies the type of Thermocouple to be attached to a channel. If no T/C is to be attached to a channel, set this parameter to Unused so the module does not take the time to scan the channel. Each channel scanned significantly loads the module.

4.3.40 WIREOFF[0…3]

Specific to Block(s)	TC-FOA041 Analog Output module
Description	Indicates the wire on an output channel is broken or the lead resistance is too high
Data Type	Boolean
Range	On, Off
Default	Off
Config Load	No
Access Lock	View Only
Residence	CEE
Active Connector	No
Related Parameters	
Remarks	Only active when current output data format is chosen.

5 Operation

Related topics

“Monitoring and interacting with process data” on page 124

5.1 Monitoring and interacting with process data

Related topics

“Using Station Displays” on page 124
“Using Control Builder Monitoring tab” on page 124
“Using Network Tools” on page 129
“Summary of RIOM-A inactivation affects on outputs” on page 129
“Output interaction with redundant Controller switchover” on page 131

5.1.1 Using Station Displays

The Experion Server Station application includes pre-configured Detail displays for each Series A Rail IOM block. Once you establish communications with a ControlNet Gateway, you can begin monitoring the status of any rail IOM block that has been loaded as part of a Control Strategy to a Controller with points registered in the Experion Server. The Detail displays let you quickly view the module's current state, fault status, and pertinent configuration data.

Refer to the *Operator's Guide* for detailed information about calling up, navigating, and viewing Station displays

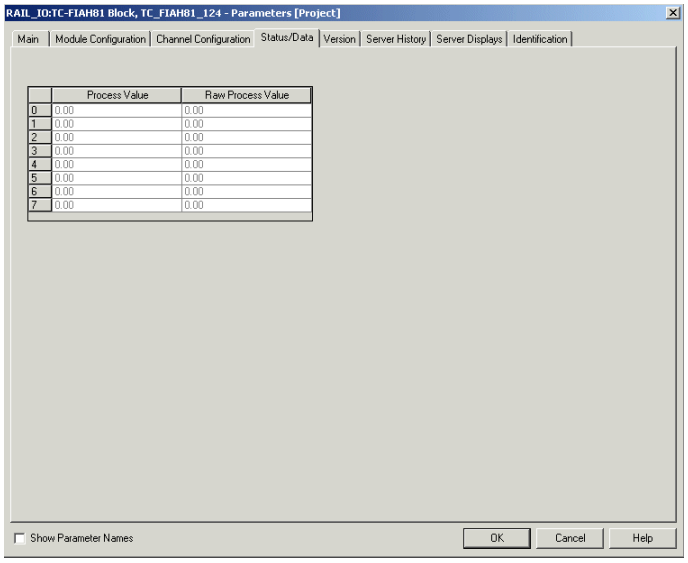
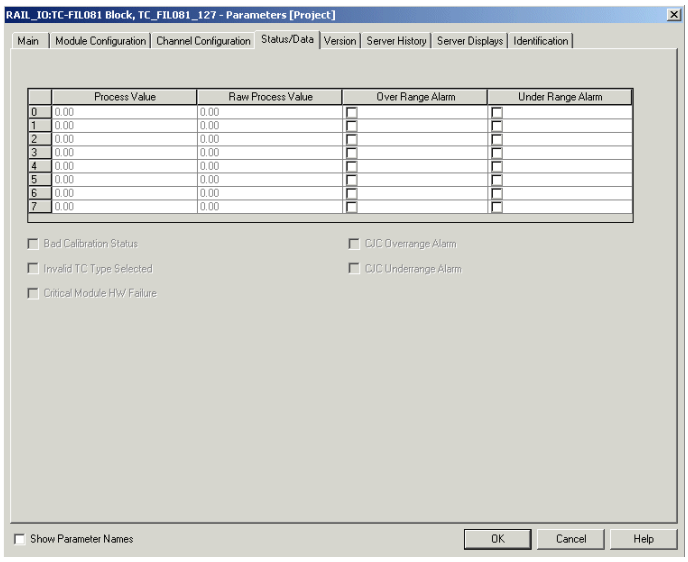
5.1.2 Using Control Builder Monitoring tab

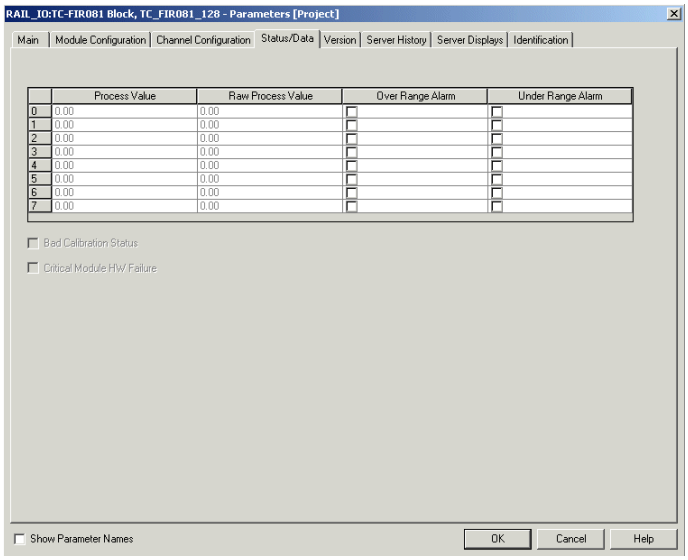
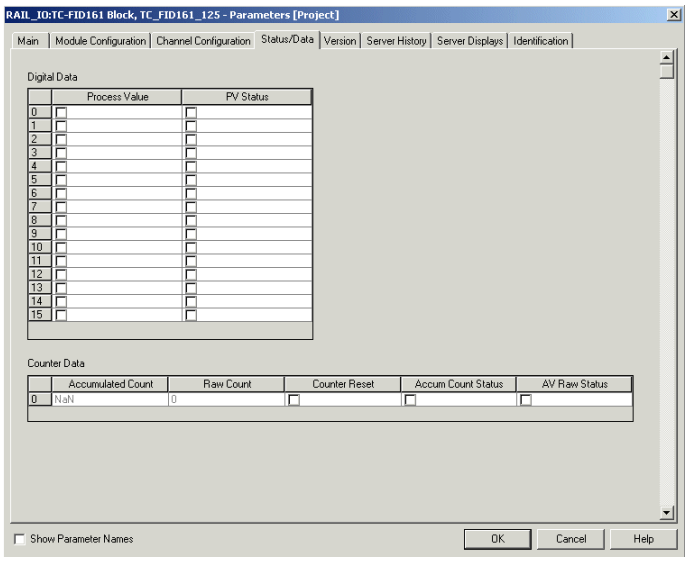
Once you download a control strategy to a Controller, you can use the Monitoring tab to interact with the function blocks in the Control Modules, Sequential Control Modules, and IOMs assigned to the Control Execution Environment (CEE).

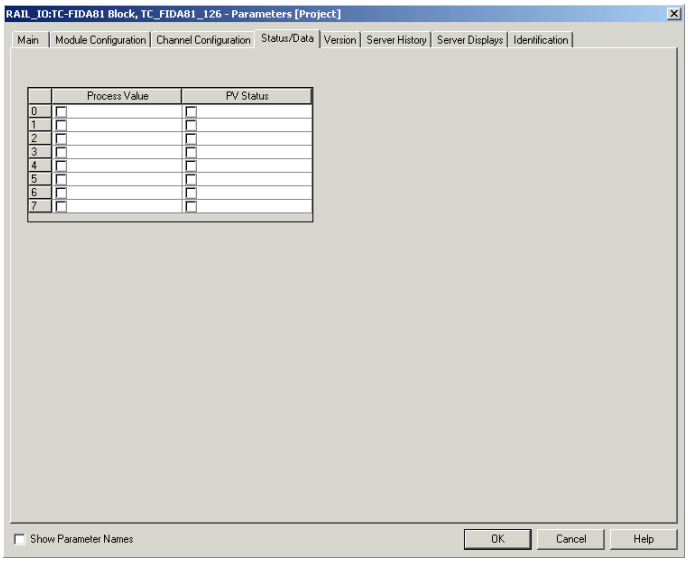
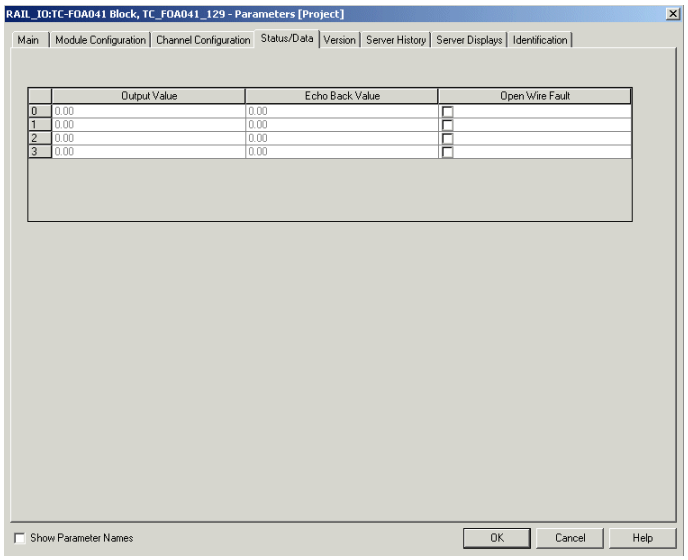
You simply double-click the desired IOM icon in the I/O tree menu under the CEE icon to call up the module's Configuration form. Click the Status/Data tab to view the module's current status. Both the CEE and IOM function block must be active to view on-line data. The following table summarizes the data that you can monitor from a given module's Status/Data tab.

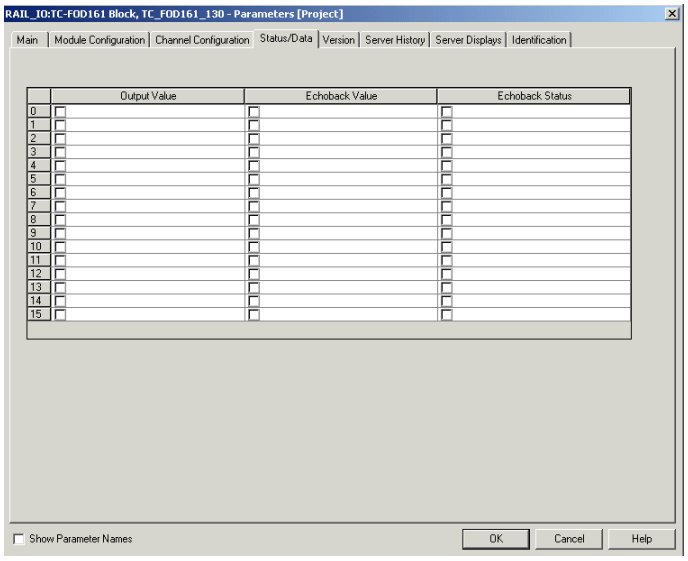
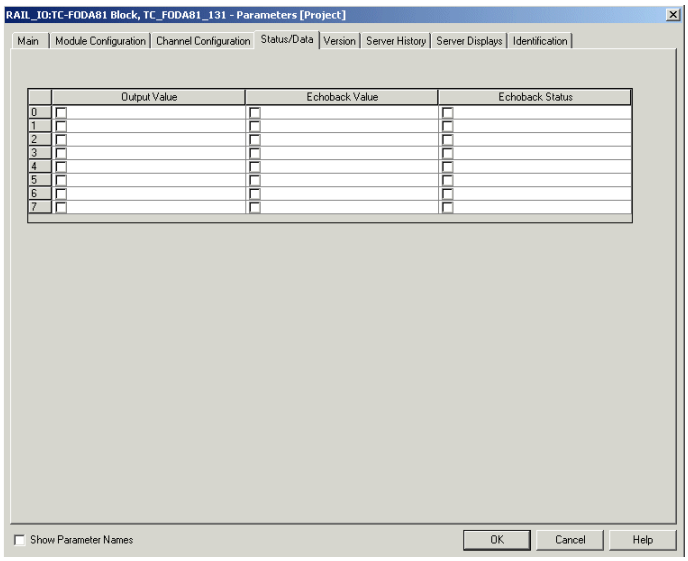
Refer to the *Control Building Guide* sections in *On-Line Monitoring Using Control Builder* for detailed information:

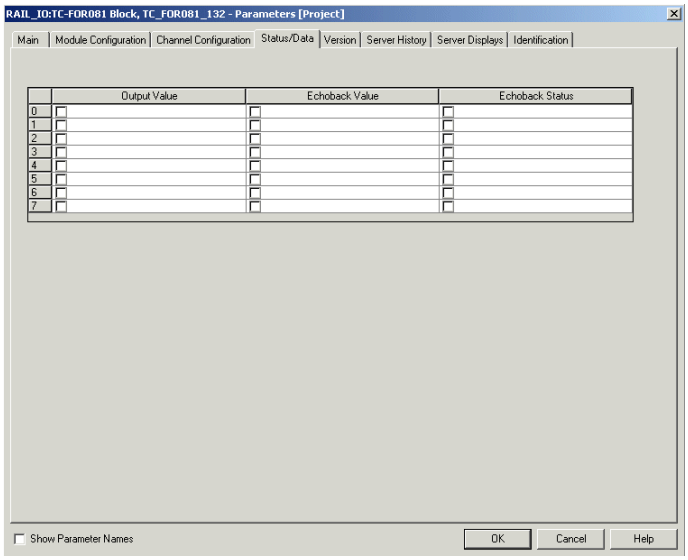
- *Setting the CEE Inactive*
- *Setting I/O Active*
- *Setting I/O Inactive*
- *Changing Parameters while Monitoring*

Module	Status/Data Tab	Description
TC-FIAH81		**Process Value**: The value in % of the input signal corresponding to the selected range. **Raw Process Value**: The value equal to the raw counts coming from the module.
TC-FIL081		**Process Value**: The value of the input signal corresponding to the Thermocouple type selected. **Raw Process Value**: The raw counts.

Module	Status/Data Tab	Description
TC-FIRO81		**Process Value**: The value of the input signal corresponding to the RTD type selected. **Raw Process Value**: The raw counts.
TC-FID161		**Process Value**: The value for power applied ON (checked) or no power applied OFF (unchecked). **PV Status**: OFF (unchecked) represents no fault and ON (checked) represents communication fault. **Accumulated Count**: This is equal to the calculated value. **Raw Count**: This is equal to the counts coming directly from input 15 to the module. **Counter Reset**: ON (checked) resets the count of Input 15 transitions maintained within the module to zero. Note: The counts will continuously be reset to zero until this is turned OFF (unchecked) **Accumulated Count Status**: OFF (unchecked) means AV calculation is okay and ON (checked) means there is a communication fault.

Module	Status/Data Tab	Description
TC-FIDA81		**Process Value**: The value for power applied ON (checked) or no power applied OFF (unchecked). **PV Status**: OFF (unchecked) represents no fault and ON (checked) represents communication fault.
TC-FOA041		**Output Value**: The value in % of the output signal corresponding to the selected range. **Echo Back Value**: The value in % sent to any connected Regulatory Controller (used for back initialization). **Open Wire Fault**: For the 4-20mA range only, ON (checked) means wire is no longer connected to the channel terminals.

Module	Status/Data Tab	Description
TC-FOD161		**Output Value**: Digital outputs are either ON (checked) or OFF (unchecked). **Echoback Value**: Value sent for backward initialization ON (checked) or OFF (unchecked). **Echoback Status**: OFF (unchecked) means no fault and ON (checked) means communication fault.
TC-FODA81		**Output Value**: Digital outputs are either ON (checked) or OFF (unchecked). **Echoback Value**: Value sent for backward initialization ON (checked) or OFF (unchecked). **Echoback Status**: OFF (unchecked) means no fault and ON (checked) means communication fault.

Module	Status/Data Tab	Description
TC-FOR081		**Output Value**: Relay outputs are either ON (checked) or OFF (unchecked). **Echoback Value**: Value sent for backward initialization ON (checked) or OFF (unchecked). **Echoback Status**: OFF (unchecked) means no fault and ON (checked) means communication fault.

5.1.3 Using Network Tools

You can use the Network Tools (NTOOLS) application supplied with Experion Engineering Tools to monitor and interact with the ControlNet Network. The RIOM-A system components are displayed in the same way as other Controller and chassis I/O components. The ControlNet Gateway always appears as the leftmost component in the RIOM-A segment graphic representation in the Detail pane of NTOOLS. **Not** all NTOOLS menu functions can be used with RIOM-A system components and unusable functions will appear faded or "grayed out" in the menus. Only the Gateway supports firmware loads through NTOOLS - All other RIOM-A modules do not support loadable firmware.

- Refer to the on-line Help provided with Network Tools for more information about the application.
- Refer to the *Process Software Installation and Upgrade Guide*, if you need to update the firmware in the ControlNet Gateway.

5.1.4 Summary of RIOM-A inactivation affects on outputs

The following table summarizes the affects on field outputs from directly or indirectly inactivating a rail output module based on various operating conditions.

If you inactivate…	Then, expect these results…
A Rail Analog Output or Digital Output module with no association to a PWM CHANNEL or ON/OFF Pulse DO CHANNEL block in a Control Module,	• Module holds the output value applied to the field terminals at the time of the inactivation. • The INIT_REQ parameter is asserted on all associated Output Channel blocks. • The module's icon turns blue in Monitoring tab. • The module's detail display shows INACTIVE state with proper failsafe values for parameters. • No fault alarms appear on the Station's Alarm Summary (communication with the module is not disrupted). • No change in the Gateway's Status LED.
A Control Module that has IO CHANNEL blocks, but **not** a PWM CHANNEL or ON/OFF Pulse DO CHANNEL block, associated with a Rail Analog Output or Digital Output module,	• Module holds the output value applied to the field terminals at the time of the inactivation. • The INIT_REQ parameter is asserted on all associated Output Channel blocks. • No fault alarms appear on the Station's Alarm Summary (communication with the module is not disrupted). • No change in the Gateway's Status LED.
A CEE that contains Rail Analog Output and/or Digital Output module assignments,	• Module holds the output value applied to the field terminals at the time of the inactivation. • The INIT_REQ parameter is asserted on all associated Output Channel blocks. • No fault alarms appear on the Station's Alarm Summary (communication with the module is not disrupted). • No change in the Gateway's Status LED.
A Rail Digital Output module associated with a PWM CHANNEL block in a Control Module,	• Module terminates the generated pulse at the time of inactivation and field terminals go to UNPOWERED state. • All module parameters are set to their failsafe values. • The INIT_REQ parameter is asserted on associated PWM CHANNEL block. • The module's icon turns blue in Monitoring tab. • The module's detail display shows INACTIVE state with proper failsafe values for parameters. • No fault alarms appear on the Station's Alarm Summary (communication with the module is not disrupted). • No change in the Gateway's Status LED.
A Control Module that has a PWM CHANNEL block associated with a Rail Digital Output module,	• Module continues pulse generation for field terminals. • The INIT_REQ parameter is asserted on associated PWM CHANNEL block. • No fault alarms appear on the Station's Alarm Summary (communication with the module is not disrupted). • No change in the Gateway's Status LED.

If you inactivate…	Then, expect these results…
A Rail Digital Output module associated with an ON or OFF Pulse DO CHANNEL block in a Control Module,	• Module terminates the generated pulse at the time of inactivation and field terminals go to UNPOWERED state. • All module parameters are set to their failsafe values. • The INIT_REQ parameter is asserted on associated DO CHANNEL block. • The module's icon turns blue in Monitoring tab. • The module's detail display shows INACTIVE state with proper failsafe values for parameters. • No fault alarms appear on the Station's Alarm Summary (communication with the module is not disrupted). • No change in the Gateway's Status LED.
A Control Module that has an ON or OFF Pulse DO CHANNEL block associated with a Rail Digital Output module,	• Module continues pulse generation for field terminals until the pulse width period expires. • The INIT_REQ parameter is asserted on associated DO CHANNEL block. • No fault alarms appear on the Station's Alarm Summary (communication with the module is not disrupted). • No change in the Gateway's Status LED.

5.1.5 Output interaction with redundant Controller switchover

Expect the following interaction with on-line Rail Analog Output and Digital Output modules in response to a redundant Controller switchover.

- No loss of connection to the Rail Output modules
  - The Gateway status LED remains solid Green.
  - No communication fault alarms are generated for the module as a result of the switchover.

The Rail Output module holds its value for the field terminal signal during the switchover of the connection. The switchover lasts no more than 400 milliseconds and typically lasts only 150 to 200 milliseconds.

6 Maintenance, checkout, and I/O calibration

Related topics

“Adding, removing, and replacing RIOM-A system components” on page 134
“Interpreting RIOM-A component LED indications” on page 135
“Reviewing output behavior in response to communication faults and IOM deletion” on page 140
“Using the IOTOOL for calibration” on page 142

6.1 Adding, removing, and replacing RIOM-A system components

Related topics

“About removal and insertion under power” on page 134
“General procedure” on page 134

6.1.1 About removal and insertion under power

Review the Removal and Insertion Under Power (RIUP) Function Guidelines in the *Control Hardware Installation Guide* before you RIUP any module.

Attention
The removal or failure of one or more I/O modules does not affect the function of the remaining modules.

6.1.2 General procedure

Attention
The RIOM-A components are not repairable in the field. Any attempt to repair a component will void the warranty. If repair is necessary, return the component to the factory.

The direct replacement of an RIOM-A component of the same kind is just a matter of removing the existing component and installing a new one in its place.

If you are adding an RIOM-A component, follow the installation instructions for the component and then configure it through Control Builder to integrate it with your control strategy.

If you are removing and/or replacing an RIOM-A component, proceed with **extreme caution**. You must delete, restore, and/or create all hardware connections and the control strategy database configuration through the Control Builder.

6.2 Interpreting RIOM-A component LED indications

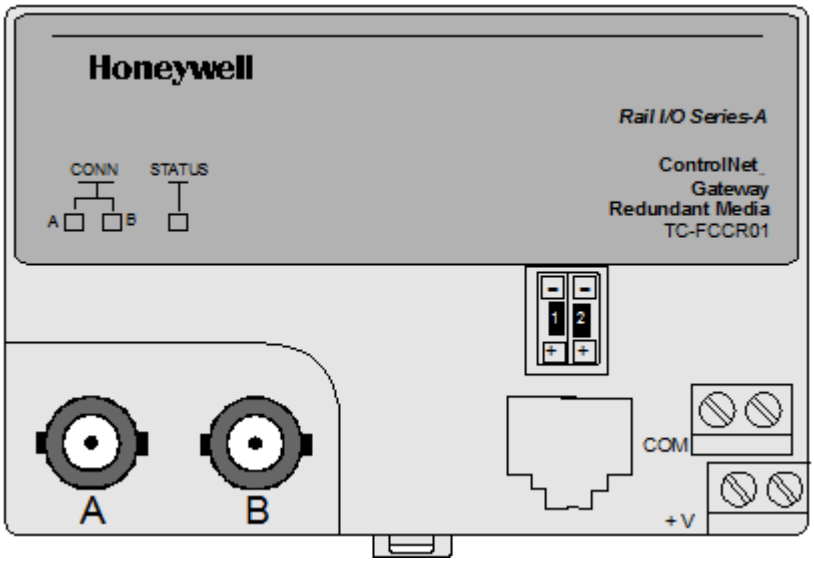
Related topics

“ControlNet Gateway LEDs” on page 135
“TC-FIAH81 High Level Analog Input module LEDs” on page 136
“TC-FIL081 Thermocouple Analog Input module LEDs” on page 136
“TC-FIR081 3-Wire RTD Analog Input module LEDs” on page 136
“TC-FID161 24Vdc Sink Digital Input module LEDs” on page 137
“TC-FIDA81 120Vac Digital Input module LEDs” on page 137
“TC-FOA041 Analog Output module LEDs” on page 137
“TC-FOD161 24Vdc Digital Output module LEDs” on page 138
“TC-FIDA81 120Vac Digital Output module LEDs” on page 138
“TC-FOR081 Relay Digital Output module LEDs” on page 138
“TC-FFPCX1 24Vdc Power Supply LEDs” on page 138

6.2.1 ControlNet Gateway LEDs

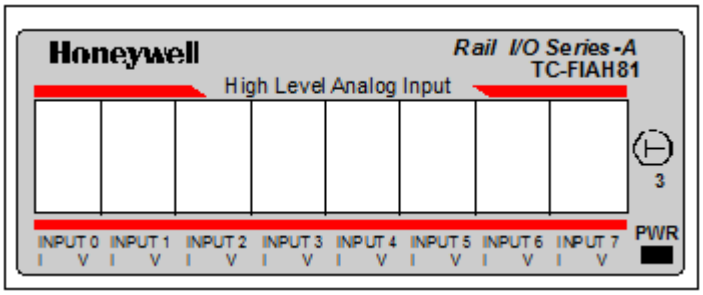
The following table summarizes the meanings of typical LED indications on the ControlNet Gateway.

Indication	Probable Cause
Comm A and B LEDs Together	
Off	No power or reset
Red	Gateway inoperative
Red/Green - Flashing	Gateway self-test
Red/Off - Flashing	Bad node configuration (Same MAC ID as another ControlNet device)
Comm A or B LED Individually	
Off	Channel disabled
Green	Channel operational
Green/Off - Flashing	Temporary network errors
Red/Off - Flashing	Cable fault, broken cable, redundancy warning
Red/Green - Flashing	Bad Network configuration
Status LED	
Off	No power
Green	Online, link okay, connected
Green - Flashing	Online but not connected
Red	Critical - Gateway failure
Red - Flashing	I/O module removed, wrong I/O module inserted, firmware update (flash) in progress



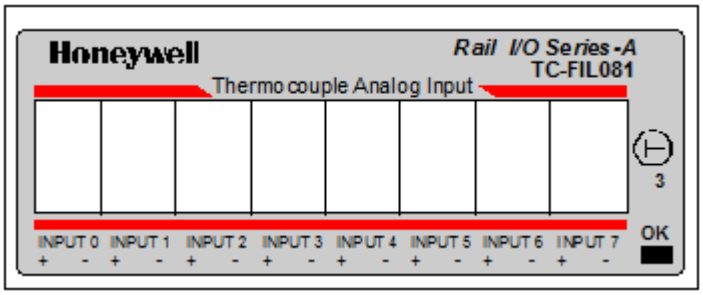
6.2.2 TC-FIAH81 High Level Analog Input module LEDs

The High Level Analog Input module only has a PWR LED to indicate power is applied to the module.



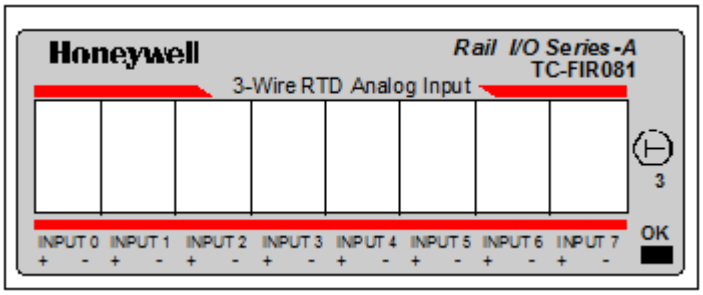
6.2.3 TC-FIL081 Thermocouple Analog Input module LEDs

The Thermocouple Analog Input module only has an OK LED to indicate diagnostic results and configuration status.



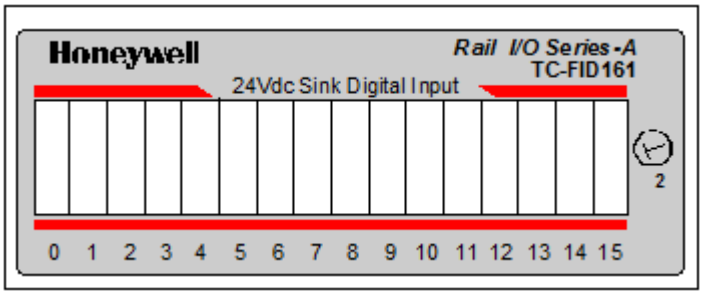
6.2.4 TC-FIR081 3-Wire RTD Analog Input module LEDs

The 3-Wire RTD Analog Input module only has an OK LED to indicate diagnostic results and configuration status.



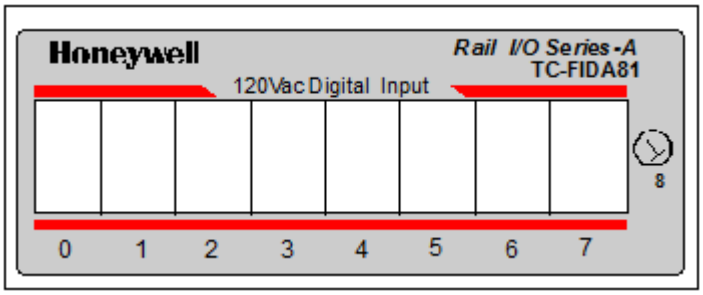
6.2.5 TC-FID161 24Vdc Sink Digital Input module LEDs

The 24Vdc Sink Digital Input module has individual channel LEDs 0 to 15 to indicate the status of individual inputs.



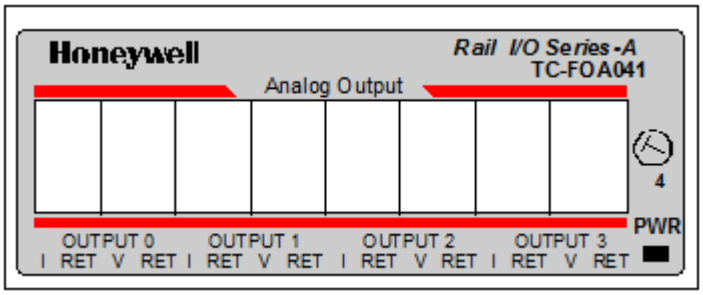
6.2.6 TC-FIDA81 120Vac Digital Input module LEDs

The 120Vac Digital Input module has individual channel LEDs 0 to 7 to indicate the status of individual inputs.



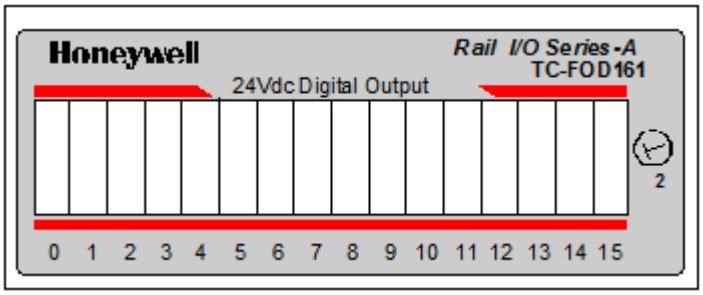
6.2.7 TC-FOA041 Analog Output module LEDs

The Analog Output module only has a PWR LED to indicate power is applied to the module.



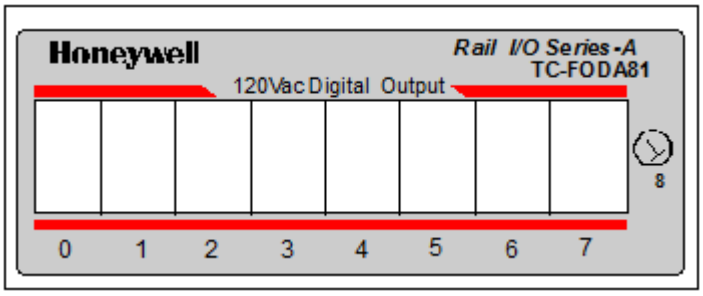
6.2.8 TC-FOD161 24Vdc Digital Output module LEDs

The 24Vdc Digital Output module has individual channel LEDs 0 to 15 to indicate the status of individual outputs.



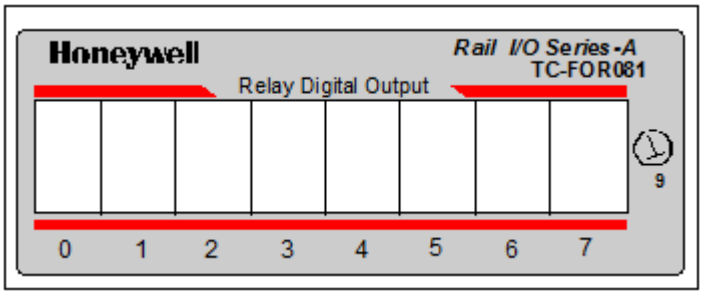
6.2.9 TC-FIDA81 120Vac Digital Output module LEDs

The 120Vac Digital Output module has individual channel LEDs 0 to 7 to indicate the status of individual outputs.



6.2.10 TC-FOR081 Relay Digital Output module LEDs

The Relay Digital Output module has individual channel LEDs 0 to 7 to indicate the status of individual outputs. If relay output bit is ON, corresponding output indicator is lit.

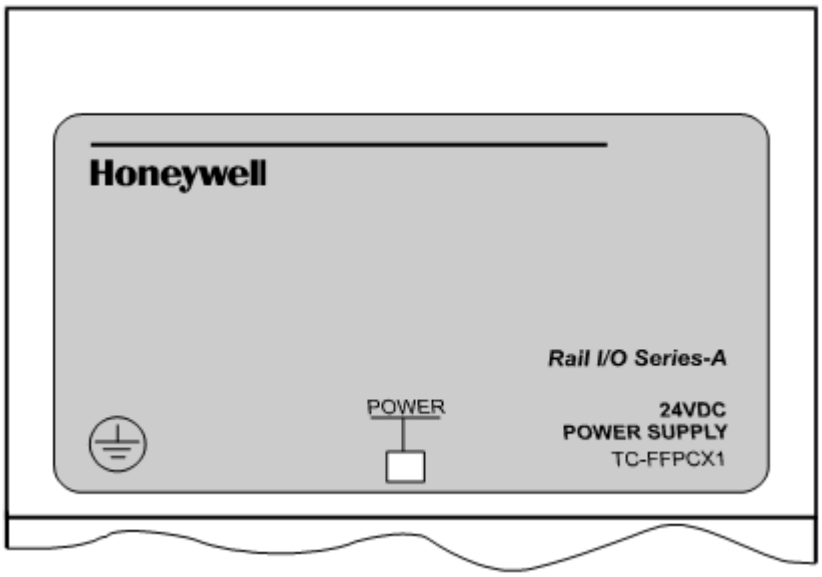


6.2.11 TC-FFPCX1 24Vdc Power Supply LEDs

The 24Vdc Power Supply only has a PWR LED to provide the following indications.

Indication	Description
ON (Green)	Output voltage is greater than 20.4Vdc, but less than 35Vdc.

Indication	Description
OFF	• No power applied to Power Supply. • Output voltage exceeded 35Vdc, and overvoltage protection shut down the unit. • Output current is below 0.1A. • Output current is above 1.0A



6.3 Reviewing output behavior in response to communication faults and IOM deletion

Related topics

“Faulty ControlNet cable or Gateway loses power” on page 140
“Restoration of ControlNet Cable connections or Gateway power” on page 140
“Deletion of an Analog or Digital Output module” on page 141

6.3.1 Faulty ControlNet cable or Gateway loses power

If both cables in a redundant ControlNet media fail or the ControlNet Gateway losses power, the Rail I/O modules will exhibit the following behavior.

Attention
The following behavior also applies to the removal of an individual Rail IOM with the exception that only the connections to the given IOM are lost and the output of an Analog Output module will go unpowered instead of going to the safe state value.

- Connections to all Rail IOMs in the Gateway segment are lost.
  - Affected Rail IOM icons in Monitoring tab turn Red, if connected and activated.
  - Affected Rail IOM Detail display in Station shows Comm Failure alarms.
  - Alarm Summary display in Station shows Communication Failure alarms for affected Rail IOMs as well as the Gateway.
- Outputs for Analog Output modules go to the safe state value at the field terminals.
- Outputs for Digital Output modules go to unpowered at the field terminals.
- IOM function blocks for the Rail I/O modules on the failed Gateway segment will:
  - Stop writing data to the device as long as the connection is bad.
  - Clear all fault indications
  - Indicate “Path Broken” and assert INITREQ on all associated Output IO CHANNEL blocks.
  - Set OPECHO to 0.0 and OPFINAL to NaN on Rail Analog Output blocks.
  - Set DOMSO to Last Value, PVVAL to 0, and PVSTS to 1 on Rail Digital Output blocks

6.3.2 Restoration of ControlNet Cable connections or Gateway power

If both cables in a redundant ControlNet media are restored or the power is restored to the Gateway, the Rail I/O modules will exhibit the following behavior.

- Connections to all Rail IOMs in the Gateway segment are restored.
  - Affected Rail IOM icons in Monitoring tab turn Blue for connected and inactive.
  - Affected Rail IOM Detail display in Station shows OK status.
  - Alarm Summary display in Station shows Communication Failure alarms for affected Rail IOMs “return to normal” as well as the Gateway.
- Outputs at the field terminals continue to hold at:
  - safe state value for Analog Output devices.
  - unpowered for Digital Output devices.

These outputs are held until the Rail IOM blocks complete two successful execution cycles. After two successful cycles, the IO CHANNEL blocks will resume writing to the output device.

6.3.3 Deletion of an Analog or Digital Output module

If you delete a Rail Output module from the Monitoring tab in Control Builder, the Rail I/O modules will exhibit the following behavior.

- Outputs for Analog Output modules go to safe state value at the field terminals.
- Outputs for Digital Output modules go to unpowered at the field terminals.
- The IOM Function Block closes the connection to the Rail Output module.
- The Rail Output module holds the last values written to it.
- The icon for the Rail Output Module is removed from the Monitoring Tab.

6.4 Using the IOTOOL for calibration

Related topics

“About the IOTOOL” on page 142
“Modules you can calibrate” on page 142
“When to calibrate” on page 142
“Equipment requirements” on page 142
“Preparing for calibration” on page 143
“Setting up the calibration equipment” on page 143
“Alternate calibration setup for wire resistance compensation” on page 145
“Calling up the IOTOOL and establishing communication” on page 146
“Calibrating the TC-FIL081 Thermocouple Analog Input module” on page 147
“Calibrating the TC-FIR081 3-Wire RTD Analog Input module” on page 148

6.4.1 About the IOTOOL

You can use the IO Maintenance Tool (IOTOOL) application supplied with Experion Engineering Tools to calibrate Rail I/O modules. It is included in the Programs menu under Experion Engineering Tools. The RIOM-A system components are accessed in the same way as other Controller and Chassis I/O components. You must identify the ControlNet Gateway segment by its MAC ID and the Rail I/O module by its slot number or group position in the segment.

Refer to the on-line help for the IO Maintenance Tool for general information.

6.4.2 Modules you can calibrate

You can calibrate the TC-FIL081Thermocouple Analog Input module and the TC-FIR081 3-Wire RTD Analog Input module.

6.4.3 When to calibrate

Your module is shipped to you already calibrated. If calibration is required, follow the procedures in this section. Perform calibration periodically, based on your application needs. Module calibration may also be required to remove error due to aging of components. In addition, calibration may be required to eliminate long lead wire resistance to open circuit detection current.

6.4.4 Equipment requirements

To calibrate an input module, you will need precision calibration equipment to simulate the input signals. The following table summarizes the equipment requirements for Thermocouple and RTD modules, respectively.

Module	Equipment	Manufacturer Reference
TC-FIL081	Precision voltage source 0-100mV, 1 microvolt resolution. OR	Analogic 3100, Precision 8200, or equivalent

Module	Equipment	Manufacturer Reference
	Thermocouple simulator	Simulator/Calibrator model 1120 or equivalent Ectron Corporation 8159 Engineer Road San Diego, CA 92111-1990
TC-FIR081	High precision resistors: 432 ohms, 846 ohms, and 1782 ohms 0.01%, 5ppm/ \C; and 1 ohm 0.1%, 5ppm/ \C OR	Any electronics supply store
	Precision decade resistance boxes: 10 ohm decade, 1 ohm per step, better that 0.005 ohms (0.5% accuracy) 100 ohm decade, 10 ohms per step, better than 0.005 ohms (0.05% accuracy) 1000 ohm decade, 100 ohms per step, better than 0.01% accuracy	Electro Scientific Industries Portland, OR Series DB 42 IET Labs Westbury, NY HARS-X Series Julie Research Labs New York, NY DR 100 Series

6.4.5 Preparing for calibration

Attention
For calibration purposes, you can connect a ControlNet Gateway directly to the CNI ISA/KTC card in the Experion Server. You do not need to have a CPM present in the ControlNet network to calibrate an IOM. This makes it easier to conduct calibration in a lab setting.

- Label and disconnect all field wiring from the Terminal Base containing the module to be calibrated.
- Remove power from other Rail I/O modules in the same segment.
- Be sure you have the necessary calibration equipment on hand.
- Be sure you allow the module to warm-up at least **40 minutes** before starting the calibration procedure.
- Be sure you inactive the IOM block and delete it from the Monitoring tab in Control Builder before calibrating it.

6.4.6 Setting up the calibration equipment

For TC-FIL081 Thermocouple Analog Input module, Figure 49 shows the typical connections for calibrating millivolt inputs only through a TC-FTB301 Terminal Base unit. Figure 50 shows the typical connections for calibrating Thermocouple inputs through a TC-FTB3T1 Terminal Base unit. You can calibrate input channels one at a time or all at once.

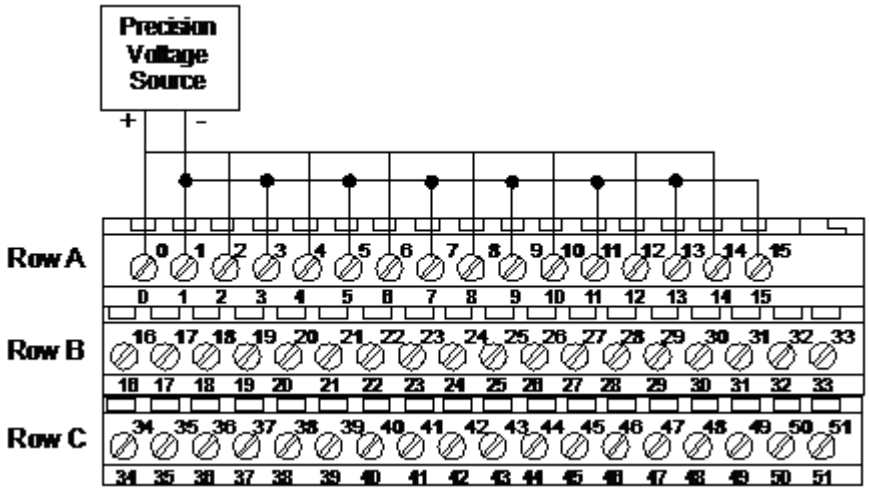


Figure 24: Typical calibration setup for TC-FIL081 millivolt inputs to TC-FTB301 Terminal Base.

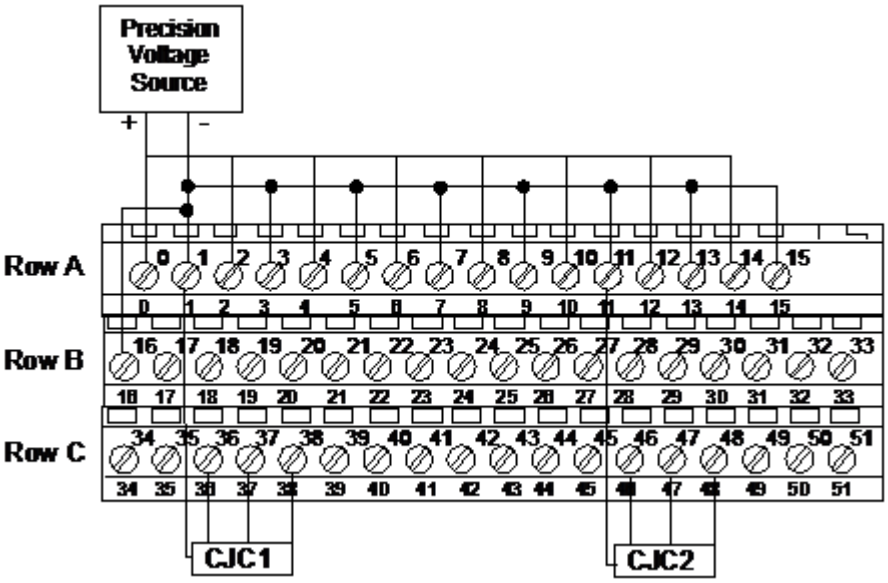


Figure 25: Typical calibration setup for TC-FIL081 thermocouple inputs to TC-FTB3T1 Terminal Base.

For TC-FIR081 3-Wire RTD Analog Input module, Figure 51 shows the typical connections for RTD inputs using precision resistors through a TC-FTB3T1 Terminal Base unit. Figure 52 shows the typical connections for calibrating RTD inputs using a decade box through a TC-FTB3T1 Terminal Base unit. You can calibrate input channels one at a time or all at once.

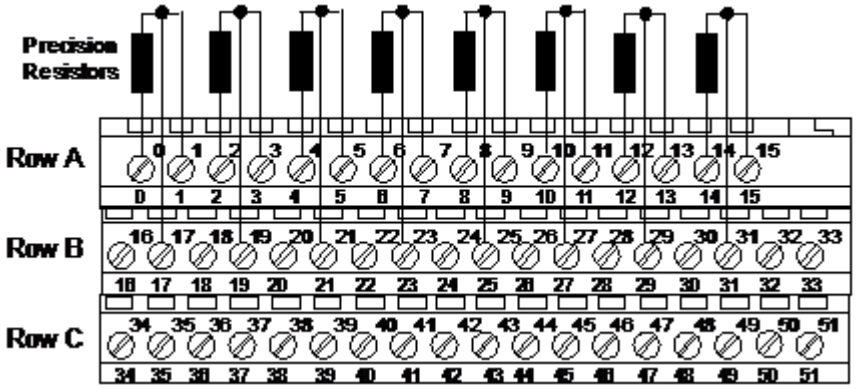


Figure 26: Typical calibration setup using precision resistors for TC-FIR081 RTD inputs to TC-FTB3T1 Terminal Base.

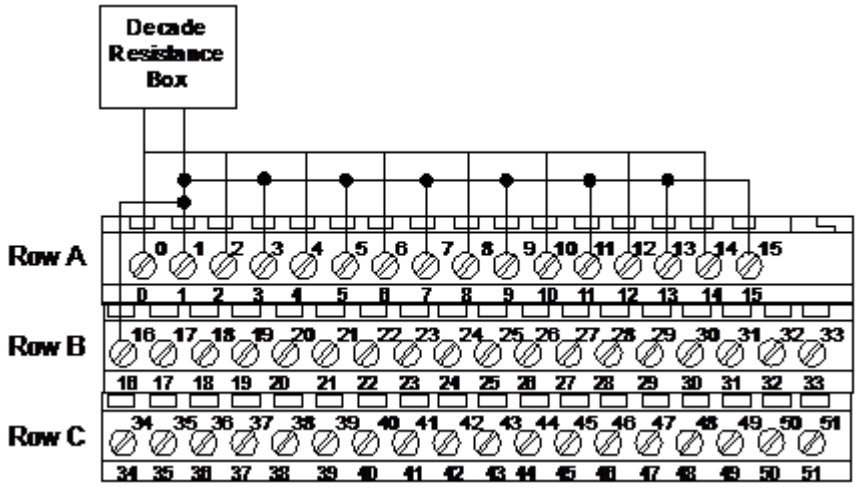


Figure 27: Typical calibration setup using decade box for TC-FIR081 RTD inputs to TC-FTB3T1 Terminal Base.

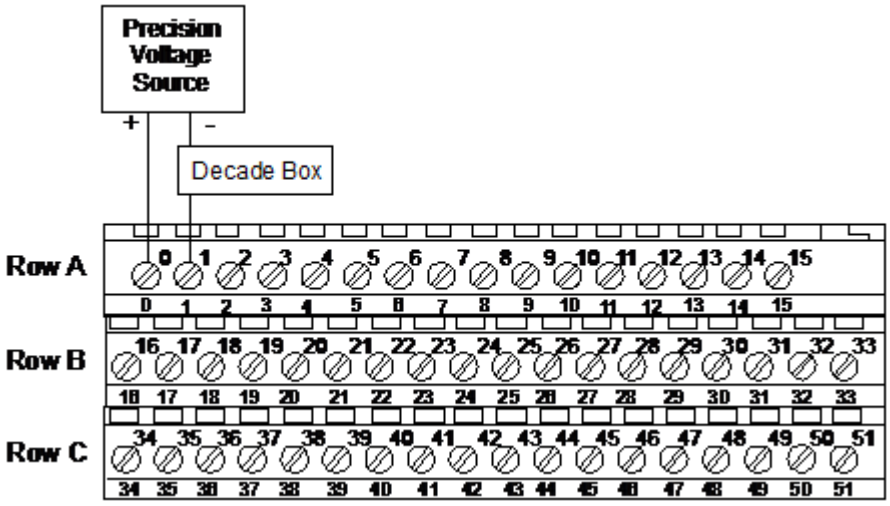
6.4.7 Alternate calibration setup for wire resistance compensation

The TC-FIL081 Thermocouple Analog Input module has open circuit detection. The module sends a 1 microampere current through the lead wire or thermocouple extension wire for this purpose. This current flow generates an error or offset voltage in the reading.

Use one of the following methods to compensate for this error through the calibration setup.

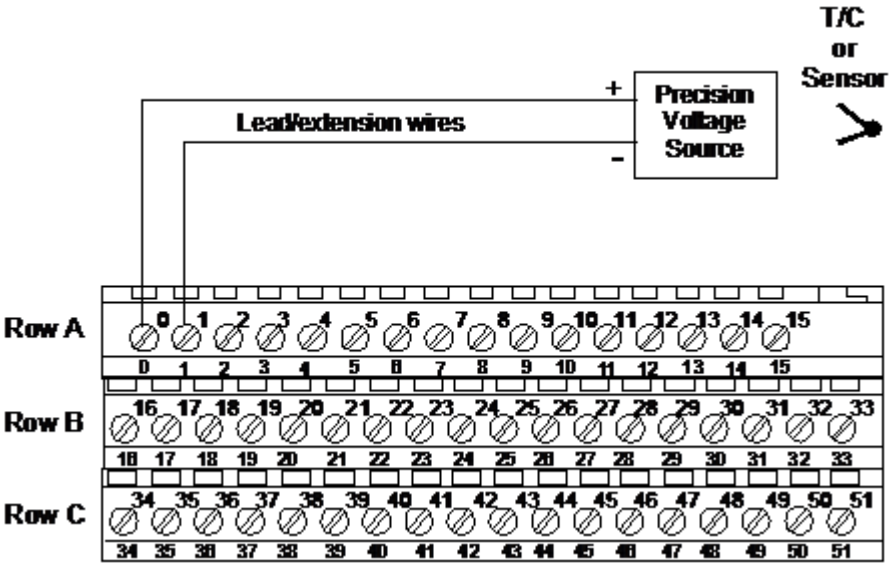
Method 1

Use an ohmmeter to measure the total loop resistance for a given input including the lead/extension wires and thermocouple. For a millivolt sensor, disconnect the lead wires from the sensor and tie them together for this measurement. Set a decade box to the measured value and connect it in series with the precision voltage source connected to the given input channel terminals on the Terminal Base as shown below. Repeat this action for each input channel.



Method 2

Leave the lead/extension wires from the sensor or thermocouple connected to the input channel terminals on the Terminal Base. Disconnect the lead/extension wires from the sensor or thermocouple and connect them to the precision voltage source as shown below. Repeat this action for each input channel.



6.4.8 Calling up the IOTOOL and establishing communication

Use the following procedure to launch the IOTOOL application and to establish communications with the Rail I/O module to be calibrated.

1. **Click Start > Programs > Experion Engineering Tools > IOTOOL to launch the application.**
2. In the Navigator tab, click Rail I/O and Rail Utilities selections so they are checked.
3. If the Gateway is connected directly to the CNI ISA/KTC card, be sure the Enable Remote ControlNet check box is not checked and in the appropriate Local ControlNet fields:
   a. Enter the Gateway's MAC ID
   b. Enter the SLOT number of the module to be calibrated. Remember that slot (or group) numbers are zero based (0 to 7) starting with the first module (Slot 0) to the right of the Gateway.

4 If the Gateway is connected to a downlink ControlNet Interface module (CNI) in a rack I/O or Controller chassis, be sure the Enable Remote ControlNet check box is checked and in the appropriate Local ControlNet and Remote ControlNet fields:
   a Enter the MAC ID (Local) of the uplink CNI (connects to KTC card or Supervisory ControlNet) in the associated rack chassis
   b Enter the SLOT (Local) number of the downlink CNI (Connects to Gateway or I/O ControlNet) in the associated rack chassis
   c Enter the Gateway's MAC ID (Remote)
   d Enter the MODULE # (Slot number) (Remote) of the module to be calibrated.
5 Click the Show Detail button.
6 Click the Get Module Data button and verify that the listed ControlNet Gateway and Device information are correct and that no fault is signaled. .
7 Click the Calibration tab and go to the appropriate section that follows to calibrate the module.

6.4.9 Calibrating the TC-FIL081 Thermocouple Analog Input module

Use the following general procedure to calibrate each channel individually by selecting one channel at a time and applying the calibration signal to the corresponding field terminals. It is possible to calibrate all input channels simultaneously by applying the calibration signal to the all the corresponding field terminals at the same time.

1 Click Channel 0 so its check box is checked.
   (To calibrate all of the channels simultaneously, click the Sel All button.).
2 Be sure the calibration equipment is set up as previously outlined.
3 Click the Start Calibration Mode button and check that the Cal Active LED turns Green.
   (If Cal Active does not turn Green, be sure the IOM block has been inactivated and deleted from the Monitoring tab in Control Builder.)
4 Set the mV source to 0.000 mV.
5 Click the Offset Cal button to initiate calibration.
6 A GREEN indication in the Offset box for the channel signals the successful completion of the Offset calibration. Proceed to the next Step.
   (Note that a RED indication means the calibration failed, recheck measurement connections and setting, and repeat the calibration.)
7 Repeat Steps 1, 5, and 6 to calibrate the remaining input channels substituting the appropriate channel number in Step 1.
8 Click Channel 0 so its check box is checked.
   (To calibrate all of the channels simultaneously, click the Sel All button.).
9 Set the mV source to 75.000 mV.
10 Click the Gain Cal button to initiate calibration.
11 A GREEN indication in the Gain box for the channel signals the successful completion of the Gain calibration. Proceed to the next Step.
   (Note that a RED indication means the calibration failed, recheck measurement connections and setting, and repeat the calibration.)
12 Repeat Steps 8, 10, and 11 to calibrate the remaining input channels substituting the appropriate channel number in Step 8.
13 Click the Stop Calibration Mode button to exit the calibration process.
   a Exit the IOTOOL.
   b Disconnect the calibration equipment.
   c Restore field wiring and power to all modules.

6.4.10 Calibrating the TC-FIR081 3-Wire RTD Analog Input module

Use the following general procedure to calibrate each channel individually by selecting one channel at a time and applying the calibration signal to the corresponding field terminals. It is possible to calibrate all input channels simultaneously by applying the calibration signal to all the corresponding field terminals at the same time.

1. Click Channel 0 so its check box is checked.
   (To calibrate all of the channels simultaneously, click the Sel All button.).
2. Be sure the calibration equipment is set up as previously outlined.
3. Click the Start Calibration Mode button and check that the Cal Active LED turns Green.
   (If Cal Active does not turn Green, be sure the IOM block has been inactivated and deleted from the Monitoring tab in Control Builder.)
4. Set the decade box to 1.00 ohm or be sure a 1 ohm resistor is connected to the input terminals.
5. Click the Offset Cal button to initiate calibration.
6. A GREEN indication in the Offset box for the channel signals the successful completion of the Offset calibration. Proceed to the next Step.
   (Note that a RED indication means the calibration failed, recheck measurement connections and setting, and repeat the calibration.)
7. Repeat Steps 1, 4, 5, and 6 to calibrate the remaining input channels substituting the appropriate channel number in Step 1.
8. Click Channel 0 so its check box is checked.
   (To calibrate all of the channels simultaneously, click the Sel All button.).
9. Set the Decade box to 432.00 ohms or be sure a 432 ohm resistor is connected to the input terminals.
10. Click the Gain Cal button to initiate calibration.
11. A GREEN indication in the Gain box for the channel signals the successful completion of the Gain calibration. Proceed to the next Step.
    (Note that a RED indication means the calibration failed, recheck measurement connections and setting, and repeat the calibration.)
12. Repeat Steps 8 to 11 to calibrate the remaining input channels substituting the appropriate channel number in Step 8.
13. Click Channel 0 so its check box is checked.
    (To calibrate all of the channels simultaneously, click the Sel All button.).
14. Set the Decade box to 864.00 ohms or be sure an 864 ohm resistor is connected to the input terminals.
15. Click the Gain Cal button to initiate calibration.
16. A GREEN indication in the Gain box for the channel signals the successful completion of the Gain calibration. Proceed to the next Step.
    (Note that a RED indication means the calibration failed, recheck measurement connections and setting, and repeat the calibration.)
17. Repeat Steps 13 to 16 to calibrate the remaining input channels substituting the appropriate channel number in Step 13.
18. Click Channel 0 so its check box is checked.
    (To calibrate all of the channels simultaneously, click the Sel All button.).
19. Set the Decade box to 1728.00 ohms or be sure a 1728 ohm resistor is connected to the input terminals.
20. Click the Gain Cal button to initiate calibration.
21. A GREEN indication in the Gain box for the channel signals the successful completion of the Gain calibration. Proceed to the next Step.

(Note that a RED indication means the calibration failed, recheck measurement connections and setting, and repeat the calibration.)

22 Repeat Steps 18 to 21 to calibrate the remaining input channels substituting the appropriate channel number in Step 18.

23 Click the Stop Calibration Mode button to exit the calibration process.

- **a** Exit the IOTOOL.
- **b** Disconnect the calibration equipment.
- **c** Restore field wiring and power to all modules.

7 Appendix A

Related topics

“CSA hazardous location approval” on page 152
“Approbation d'utilisation dans des environments dangereux par la CSA” on page 154

7.1 CSA hazardous location approval

Related topics

“About CSA” on page 152
“CSA certification” on page 152
“Temperature Ratings” on page 152
“Notices” on page 153

7.1.1 About CSA

CSA certifies products for general use as well as for use in hazardous locations. Actual CSA certification is indicated by the product label as shown below, and not by statements in any user documentation.

Example of the CSA certification product label:

CSA logo is a registered trademark of the Canadian Standards Association.

7.1.2 CSA certification

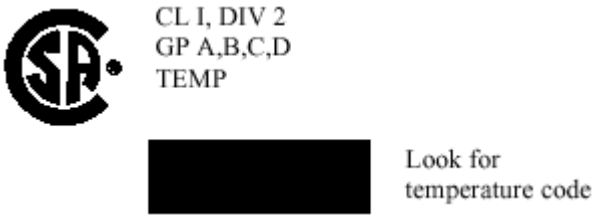
To comply with CSA certification for use in hazardous locations, the following information becomes a part of the product literature for this CSA-certified industrial control product:

- This equipment is suitable for use in Class I, Division 2, Groups A, B, C, D, or non-hazardous locations only.
- The products having the appropriate CSA markings (that is, Class I, Division 2, Groups A, B, C, D) are certified for use in other equipment where the suitability of combination (that is, application or use) is determined by the CSA or the local inspection office having jurisdiction.

7.1.3 Temperature Ratings

Attention
Due to the modular nature of a programmable control system, the product with the highest temperature rating determines the overall temperature code rating of a programmable control system in a Class I, Division 2 location.

The temperature code rating is marked on the product label as shown.



7.1.4 Notices

The following warnings apply to products having CSA certification for use in hazardous locations.

- Substitution of components may impair suitability for Class I, Division 2.
- Do not replace components unless power has been switched off or the area is known to be non-hazardous.
- Do not disconnect equipment unless power has been switched off or the area is known to be non-hazardous.
- Do not disconnect connectors unless power has been switched off or the area is known to be non-hazardous. Secure any user-supplied connectors that mate to external circuits on this equipment by using screws, sliding latches, threaded connectors, or other means such that any connection can withstand a 15 Newton (3.4 lbf) separating force applied for a minimum of one minute.
- If the Product contains batteries, they must only be changed in an area known to be non-hazardous.

7.2 Approbation d'utilisation dans des environments dangereux par la CSA

Related topics

“La CSA” on page 154
“La certification CSA” on page 154
“Autour de temperature” on page 154
“Discerner” on page 155

7.2.1 La CSA

La CSA certifie des produits pour une utilisation générale aussi bien que pour une utilisation en environnements dangereux. La certification CSA en vigueur est indiquée par l'étiquette produit et non par des indications dans la documentation utilisateur.

Exemple d'étiquette de certification d'un produit par la CSA:

7.2.2 La certification CSA

Pour satisfaire à la certification CSA en environnements dangereux, les informations suivantes fontpartie intégrante de la documentation des produits de commande industrielle certifiés.

- Cet équipement ne convient qu'à une utilisation en environnements de Classe 1, Division 2, Groupes A, B, C, D ou non dangereux.
- Les produits portant le marquage CSA approprié (c'est-à-dire Classe 1, Division 2, Groupes A, B, C, D) sont certifiés pour une utilisation avec d'autres équipements, les combinaisons d'applications et d'utilisations étant déterminées par la CSA ou le bureau local d'inspection qualifié.

7.2.3 Autour de temperature

Attention
De par la nature modulaire des systèmes de commande programmables, le produit ayant le code de température le plus élevé détermine le code de température global du système dans un environnement de Classe 1, Division 2.

Le code de température est indiqué sur l'étiquette produit.

CL I, DIV 2
GP A,B,C,D
TEMP

[redacted] Le code de température est

7.2.4 Discerner

Les avertissements suivants s'appliquent aux produits ayant la certification CSA pour une utilisation en environnements dangereux.

- La substitution de composants peut rendre cet équipement inadapté à une utilisation en environnements de Classe 1, Division 2.
- Couper le courant ou s'assurer que l'environnement est classé non dangereux avant de remplacer des composants.
- Couper le courant ou s'assurer que l'environnement est classé non dangereux avant de débrancher l'équipement.
- Couper le courant ou s'assurer que l'environnement est classé non dangereux avant de débrancher les connecteurs. Fixer tous les connecteurs fournis par l'utilisateur pour se brancher aux circuits externes de cet équipement à l 'aide de vis, loquets coulissants, connecteurs filetés ou autres, de sorte que les connexions résistent à une force de séparation de 15 Newtons (1,5 kg - 3,4 lb.) appliquée pendant au moins une minute.
- S'assurer que l'environnement est classé non dangereux avant de changer les piles.

Le sigle CSA est une marque déposée de l'Association des Standards pour le Canada.

8 Notices

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8.1 Documentation feedback

You can find the most up-to-date documents on the Honeywell Process Solutions support website at:

http://www.honeywellprocess.com/support

If you have comments about Honeywell Process Solutions documentation, send your feedback to:

hpsdocs@honeywell.com

Use this email address to provide feedback, or to report errors and omissions in the documentation. For immediate help with a technical problem, contact your local Honeywell Process Solutions Customer Contact Center (CCC) or Honeywell Technical Assistance Center (TAC) listed in the “Support and other contacts” section of this document.

8.2 How to report a security vulnerability

For the purpose of submission, a security vulnerability is defined as a software defect or weakness that can be exploited to reduce the operational or security capabilities of the software.

Honeywell investigates all reports of security vulnerabilities affecting Honeywell products and services.

To report a potential security vulnerability against any Honeywell product, please follow the instructions at:

https://honeywell.com/pages/vulnerabilityreporting.aspx

Submit the requested information to Honeywell using one of the following methods:

- Send an email to security@honeywell.com.

  or

- Contact your local Honeywell Process Solutions Customer Contact Center (CCC) or Honeywell Technical Assistance Center (TAC) listed in the “Support and other contacts” section of this document.

8.3 Support

For support, contact your local Honeywell Process Solutions Customer Contact Center (CCC). To find your local CCC visit the website, https://www.honeywellprocess.com/en-US/contact-us/customer-support-contacts/Pages/default.aspx.

8.4 Training classes

Honeywell holds technical training classes on Experion PKS. These classes are taught by experts in the field of process control systems. For more information about these classes, contact your Honeywell representative, or see http://www.automationcollege.com.