Reference Manual

Original Instructions

Allen-Bradley

# Migrating 6-channel to 8-channel 1756 Analog Modules

Catalog Numbers 1756-IF6CIS, 1756-IF6I, 1756-IF8I, 1756-IR6I, 1756-IRT8I, 1756-IT6I, 1756-IT6I2, 1756-OF6CI, 1756-OF6VI, 1756-OF8I

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Rockwell Automation

## Important User Information

Read this document and the documents listed in the additional resources section about installation, configuration, and operation of this equipment before you install, configure, operate, or maintain this product. Users are required to familiarize themselves with installation and wiring instructions in addition to requirements of all applicable codes, laws, and standards.

Activities including installation, adjustments, putting into service, use, assembly, disassembly, and maintenance are required to be carried out by suitably trained personnel in accordance with applicable code of practice.

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

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

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

| | |
|---|---|
|  | **WARNING:** Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss. |
|  | **ATTENTION:** Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence. |
| **IMPORTANT** | Identifies information that is critical for successful application and understanding of the product. |

Labels may also be on or inside the equipment to provide specific precautions.

| | |
|---|---|
|  | **SHOCK HAZARD:** Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present. |
|  | **BURN HAZARD:** Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures. |
|  | **ARC FLASH HAZARD:** Labels may be on or inside the equipment, for example, a motor control center, to alert people to potential Arc Flash. Arc Flash will cause severe injury or death. Wear proper Personal Protective Equipment (PPE). Follow ALL Regulatory requirements for safe work practices and for Personal Protective Equipment (PPE). |

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## Overview

This manual describes how to migrate from 1756, 6-channel isolated analog I/O modules to their newer 8-channel isolated counter parts in the 1756 analog I/O platform.

## Migration Services

Throughout the product lifecycle, as products mature, Rockwell Automation will be there as your partner to help you get the most out of your current equipment, to help you determine your next steps, and to help you lay out a plan for the transition to newer technology.

Whether you choose to migrate all at once or use our unique, phased approach to help minimize the costs, risks, and complexities involved with managing legacy products and systems, Rockwell Automation has the tools and the experience to guide you through the transition.

For more information, see Migration Solutions Brochure, publication MIGRAT-BR002.

## Integrated Architecture Tools

The Integrated Architecture tools can help you plan and configure a system, as well as migrate system architectures. For more information, go to: http://www.rockwellautomation.com/rockwellautomation/products-technologies/integrated-architecture/tools/overview.page?

## Additional Resources

These documents contain additional information concerning related products from Rockwell Automation.

| Resource | Description |
|---|---|
| High Resolution Analog I/O Modules User Manual, publication 1756-UM540 | Describes how to install, configure, and troubleshoot high resolution ControlLogix analog I/O modules. |
| ControlLogix Analog I/O Modules User Manual, publication 1756-UM009 | Describes how to install, configure, and troubleshoot a ControlLogix analog I/O module. |
| Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1 | Provides general guidelines for installing a Rockwell Automation industrial system. |
| Product Certifications website, http://www.rockwellautomation.com/global/certification/overview.page | Provides declarations of conformity, certificates, and other certification details. |

You can view or download publications at http://www.rockwellautomation.com/global/literature-library/overview.page. To order paper copies of technical documentation, contact your local Allen-Bradley distributor or Rockwell Automation sales representative.

## Notes:

# Replacement Considerations


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## 6- and 8-Channel Modules

This manual refers to 6-channel and 8-channel modules. The 6-channel modules can refer to the following:

- 1756-IF6CIS
- 1756-IF6I
- 1756-IR6I
- 1756-IT6I
- 1756-IT6I2
- 1756-OF6CI
- 1756-OF6VI

The 8-channel modules can refer to the following:

- 1756-IF8I
- 1756-IRT8I
- 1756-OF8I

## Product Comparison

| Characteristic | Replacement Product | Original Product |
|---|---|---|
| 8-point general purpose isolated analog current/voltage input module. | 1756-IF8I | 1756-IF6CIS<br>1756-IF6I |
| 8-point isolated combined temperature and mV sensing input module. | 1756-IRT8I | 1756-IR6I<br>1756-IT6I<br>1756-IT6I2 |
| 8-point general purpose isolated analog current/voltage output module. | 1756-OF8I | 1756-OF6CI<br>1756-OF6VI |

# Wiring

While this document covers the ease of replacement from a 6- to 8- channel module from a programming standpoint a user must still make changes to the physical system due to differences across all modules RTBs.

## Wiring with 1492 Analog Interface Modules

The 8-channel modules use different RTBs than their predecessors. This means that the wiring and terminals used are different across the various modules. There are various 1492 wiring solutions available for the 8-channel modules.

If your existing 6-channel application is already wired using a 1492-AIFM*xxx* interface module, then you may be able to convert to a new analog module by replacing the 1492 cable.

For example, if you have an existing application with a 1756-IF6I module used in Voltage mode that is wired with 1492 products, you would be using a 1492-AIFM6S-3 terminal block. Attached to the terminal block, you would have a 1492-ACABLE*xxx*Y cable. You could replace the 1756-IF6I module with a 1756-IF8I module, keep all wires intact to the 1492-AIFM6S-3 terminal block, remove the 1492-ACABLE*xxx*Y cable, and replace it with a 1492-ACABLE*xxx*YB cable. The new cable is configured to adjust the current 6-channel field wiring into the appropriate terminals on the new 8-channel module. Then you would be finished with minimal cost and effort.

Table 1 shows available 1492 catalog numbers for 8-channel analog modules used in existing 6-channel applications that are already using a 1492-AIFM*xxx* terminal block.

**Table 1 - Backwards Compatible 8-Channel Analog Matrix (New PLC Card to Old IFM)**

| Current 6-Channel I/O Card | | New 8-Channel I/O Card | Current 6-Channel IFM | New Cable Catalog Number[(1)] |
|---|---|---|---|---|
| 1756-IF61 | Current | 1756-IF8I | 1492-AIFM6S-3 | 1492-ACABLExxxYA |
| 1756-OF6CI | Current | 1756-OF8I | 1492-AIFM6S-3 | |
| 1756-IF61 | Voltage | 1756-IF8I | 1492-AIFM6S-3 | 1492-ACABLExxxYB |
| 1756-OF6CI | Voltage | 1756-OF8I | 1492-AIFM6S-3 | |
| 1756-IT6I | Thermocouple | 1756-IR8TI | 1492-AIFM6TC-3 | 1492-ACABLExxxYC |
| 1756-IT6I2 | Thermocouple | 1756-IR8TI | 1492-AIFM6TC-3 | |
| 1756-IF6CIS | Internal Loop Power | 1756-IF8I | 1492-AIFM6S-3 | 1492-ACABLExxxYD |
| 1756-IF6CIS | External Loop Power | 1756-IF8I | 1492-AIFM6S-3 | 1492-ACABLExxxYE |
| 1756-IR6I | RTD | 1756-IR8TI | 1492-AIFM6S-3 | 1492-ACABLExxxYF |

(1) Add the appropriate length code to the end of the cable catalog number. The choices include 0.5 M cable with that catalog number 005, 1.0 M cable (010), 2.5 M cable (025), and 5.0 M cable (050). Custom Length cables are also available on www.ab.com.

## Wiring without 1492 Analog Interface Modules

If your existing system does not already use 1492 products then you must replace and rewire your existing RTB. See **Appendix B, RTB Wiring** for examples of converting from the existing 6 channel RTB to the new 8 channel RTB.

## Notes:

# Emulation Mode


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## Emulation Mode Overview

The 8-channel modules that are discussed in the manual refer to any 8-channel module at firmware revision 2.011 or later. Firmware revision 2.011 and later supports Emulation mode. This mode allows an 8-channel module to be configured, return input data and accept output data that acts as if it were a 6-channel module.

In Emulation mode, when a forward open containing configuration data is sent to the 8-channel module it can accept it and respond as if it were a 6-channel module. After the connection is established, all data (input/output) will be sent to or from the controller in the same format and tag structures as a 6-channel module. You can directly replace a 6-channel module with an 8-channel module with no I/O tree modifications or program changes with this method.

When the 8-channel module receives configuration data for a 6-channel module, it takes that information and formats it to replicate the configuration data of an 8-channel module. The 8-channel module then scans its 8-channel module firmware but reformats all input or output data to match the 6-channel module.

Additionally, the 8-channel module is internally behaving as an 8-channel module because most of the firmware has not changed. The difference in 8-channel module firmware is that in Emulation mode configuration, input data, and output data is reformatted to match the appropriate 6-channel module.

All data to or from an 8-channel module is rearranged from a 6-channel module format to an 8-channel module format. The controller still sends data in the 1756-IF6I format but firmware internally moves data to the 1756-IF8I format.

1756-IF6I configuration example controller (Figure 1) still sends data in the 1756-IF6I format, but firmware internally moves data to the 1756-IF8I format (Figure 2). An 8-channel module still behaves as an 8-channel module, but accepts a 6-channel module format.

Figure 1 shows the data sent from IF6I to IF8I.

**Figure 1 - IF6I Configuration Example**

| Name | Value | Style | Data Type |
|---|---|---|---|
| Local:1:C | {...} | | AB:1756_AI6_Float:C:0 |
| Local:1:C.Ch0Config | {...} | | AB:1756_AI6_Struct:C:0 |
| Local:1:C.Ch0Config.AlarmDeadband | 0.0 | Float | REAL |
| Local:1:C.Ch0Config.AlarmDisable | 0 | Decimal | BOOL |
| Local:1:C.Ch0Config.CalBias | 0.0 | Float | REAL |
| Local:1:C.Ch0Config.DigitalFilter | 0 | Decimal | INT |
| Local:1:C.Ch0Config.HAlarmLimit | 10.0 | Float | REAL |
| Local:1:C.Ch0Config.HHAlarmLimit | 10.0 | Float | REAL |
| Local:1:C.Ch0Config.HighEngineering | 10.0 | Float | REAL |
| Local:1:C.Ch0Config.HighSignal | 10.0 | Float | REAL |
| Local:1:C.Ch0Config.LAlarmLimit | -10.0 | Float | REAL |
| Local:1:C.Ch0Config.LLAlarmLimit | -10.0 | Float | REAL |
| Local:1:C.Ch0Config.LowEngineering | -10.0 | Float | REAL |
| Local:1:C.Ch0Config.LowSignal | -10.0 | Float | REAL |
| Local:1:C.Ch0Config.ProcessAlarmLatch | 0 | Decimal | BOOL |
| Local:1:C.Ch0Config.RangeTypeNotch | 16#0002 | Hex | INT |
| Local:1:C.Ch0Config.RateAlarmLatch | 0 | Decimal | BOOL |
| Local:1:C.Ch0Config.RateAlarmLimit | 0 | Decimal | INT |
| Local:1:C.Ch0Config.TenOhmOffset | 0 | Decimal | INT |
| Local:1:C.Ch1Config | {...} | | AB:1756_AI6_Struct:C:0 |
| Local:1:C.Ch2Config | {...} | | AB:1756_AI6_Struct:C:0 |
| Local:1:C.Ch3Config | {...} | | AB:1756_AI6_Struct:C:0 |
| Local:1:C.Ch4Config | {...} | | AB:1756_AI6_Struct:C:0 |
| Local:1:C.Ch5Config | {...} | | AB:1756_AI6_Struct:C:0 |
| Local:1:C.CJDisable | 0 | Decimal | BOOL |
| Local:1:C.CJOffset | 0.0 | Float | REAL |
| Local:1:C.RealTimeSample | 50 | Decimal | INT |
| Local:1:C.RemoteTermination | 0 | Decimal | BOOL |
| Local:1:C.TempMode | 0 | Decimal | BOOL |

Figure 2 shows how the IF8I sees the data internally.

**Figure 2 - 1756-IF8I Data Example**

| Name | Value | Style | Data Type |
|---|---|---|---|
| Local:1:C | {...} | | AB:1756_IF8I:C:0 |
| Local:1:C.Ch | {...} | | AB:1756_IF8I_ChStruct:C:0[8] |
| Local:1:C.Ch[0] | {...} | | AB:1756_IF8I_ChStruct:C:0 |
| Local:1:C.Ch[0].AlarmDeadband | 0.0 | Float | REAL |
| Local:1:C.Ch[0].AlarmDisable | 0 | Decimal | BOOL |
| Local:1:C.Ch[0].DigitalFilter | 0 | Decimal | INT |
| Local:1:C.Ch[0].Disable | 0 | Decimal | BOOL |
| Local:1:C.Ch[0].HAlarmLimit | 10.0 | Float | REAL |
| Local:1:C.Ch[0].HHAlarmLimit | 10.0 | Float | REAL |
| Local:1:C.Ch[0].HighEngineering | 10.0 | Float | REAL |
| Local:1:C.Ch[0].HighSignal | 10.0 | Float | REAL |
| Local:1:C.Ch[0].InputRange | 0 | Decimal | SINT |
| Local:1:C.Ch[0].LAlarmLimit | -10.0 | Float | REAL |
| Local:1:C.Ch[0].LLAlarmLimit | -10.0 | Float | REAL |
| Local:1:C.Ch[0].LowEngineering | -10.0 | Float | REAL |
| Local:1:C.Ch[0].LowSignal | -10.0 | Float | REAL |
| Local:1:C.Ch[0].NotchFilter | 2 | Decimal | SINT |
| Local:1:C.Ch[0].ProcessAlarmLatch | 0 | Decimal | BOOL |
| Local:1:C.Ch[0].RateAlarmLatch | 0 | Decimal | BOOL |
| Local:1:C.Ch[0].RateAlarmLimit | 0.0 | Float | REAL |
| Local:1:C.Ch[0].Sourcing | 0 | Decimal | BOOL |
| Local:1:C.Ch[0].SynchronizeSampling | 0 | Decimal | BOOL |
| Local:1:C.Ch[1] | {...} | | AB:1756_IF8I_ChStruct:C:0 |
| Local:1:C.Ch[2] | {...} | | AB:1756_IF8I_ChStruct:C:0 |
| Local:1:C.Ch[3] | {...} | | AB:1756_IF8I_ChStruct:C:0 |
| Local:1:C.Ch[4] | {...} | | AB:1756_IF8I_ChStruct:C:0 |
| Local:1:C.Ch[5] | {...} | | AB:1756_IF8I_ChStruct:C:0 |
| Local:1:C.Ch[6] | {...} | | AB:1756_IF8I_ChStruct:C:0 |
| Local:1:C.Ch[7] | {...} | | AB:1756_IF8I_ChStruct:C:0 |

# Emulation Mode Differences

The following is a list of differences resulting from using an 8-channel module to emulate a 6-channel module.

## Input Ranges

The input ranges are slightly different on the 8-channel modules resulting in differing overrange/underrange trip channels that usually denote wire off.

**Table 2 - Input Range Emulation Differences**

| Module | Input Range | 6-Channel Underrange | 6-Channel Overrange | Emulation Underrange | Emulation Overrange |
|---|---|---|---|---|---|
| 1756-IF6I | +/- 10V | -10.54688 | 10.54688 | -10.50(1) | 10.50(1) |
| | 0…10V | 0.00 | 10.54688 | 0.00 | 10.50(1) |
| | 0…5V | 0.00 | 5.27344 | 0.00 | 5.25(1) |
| | 0…20mA | 0.00 | 21.09376 | 0.00 | 21.00(1) |
| 1756-IF6CIS | 0…20mA | 0.00 | 21.44622 | 0.00 | 21.00(1) |
| 1756-IR6I | 1…487 Ohms | 0.859068 | 507.86211 | 0.00 | 510.00 |
| | 2…1000 Ohms | 2.00 | 1016.50237 | 0.00 | 1020.00 |
| | 4…2000 Ohms | 4.00 | 2033.77999 | 0.00 | 2040.00 |
| | 8…4000 Ohms | 8.00 | 4068.39211 | 0.00 | 4080.00 |
| 1756-IT6I | -12…30mV | -15.80323 | 31.39626 | -101.00 | 101.00 |
| 1756-IT6I2 | -12…78mV | -15.15836 | 79.24062 | -101.00 | 101.00 |

(1) Emulation in these values is limited compared to the 6-channel modules.

## Output Ranges

The output ranges are slightly different on the 8-channel modules resulting in differing output limits.

**Table 3 - Output Range Emulation Differences**

| Module | Output Range | 6-Channel Underrange | 6-Channel Overrange | Emulation Underrange | Emulation Overrange |
|---|---|---|---|---|---|
| 1756-OF6CI | 0…20mA | 0.00 | 21.07435 | 0.00 | 21.00(1) |
| 1756-OF6VI | +/- 10V | -10.5172 | 10.5172 | -10.50(1) | 10.50(1) |

(1) Emulation in these values is limited compared to the 6-channel modules.

## Notes:

# Hardware Specifications and Considerations


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## Backplane Power

### Current Draw

Depending on the module, configuration, and operating conditions, 8-channel modules can draw more backplane power than their 6-channel counter parts. Calculate the expected backplane current of an 8-channel module before replacing a 6-channel module to ensure you are within the limits of your power supply.

*Backplane Current Draw at 5.1V*

All 8-channel modules are equal to or less than the 5.1V current draw of their 6-channel counterpart, therefore there are no issues at 5.1V.

*Backplane Current Draw at 24V*

All 8-channel modules require more current at 24V than their 6-channel counterpart, therefore you must recalculate the load on your power supply to be sure you are within limits.

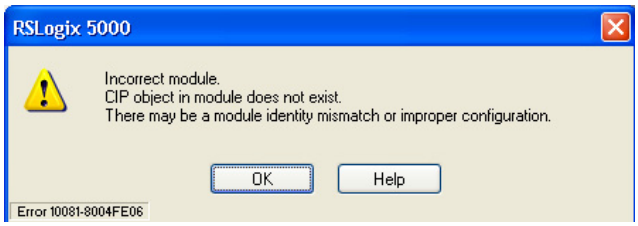
## Calibration

All 8-channel modules use precise analog components that maintain their specifications over time. The modules are calibrated at the factory and recalibration is not required.

If you want to calibrate an 8-channel module in 6-channel Emulation mode, the calibration cannot be performed using the 6-channel module profile. The recommended way to calibrate the 8-channel module would be to temporarily relocate the module to a test bench, recalibrate it, and then return the module to the desired slot.

If you have any program code to facilitate the calibration of a 6-channel module, that code will no longer function. If you were to select the Calibration tab of a 6-channel module, they would most likely get an error similar to Figure 3. This error will not harm the application.

**Figure 3 - Module Error Message**




## RPI and RTS Values of 6-channel versus 8-channel Modules

The rate at which all 6-channel modules send or receive data is determined by a combination of RTS (Real-Time Sample) and RPI (Requested Packet Interval). Depending on the settings of these two parameters, the 6-channel module behaves a certain way when sending input data to the controller. When an 8-channel module is in Emulation mode, inputs are sampled at the faster of the configured RPI and RTS. This maintains the fastest production time for the user, but can change the exact sampling behavior depending on precise user configuration. Adjustments would need to be made to the RPI or RPS to maintain exact data update rates if this change occurred.

For example, if you are using a 1756-IF6I with the RPI set to 25 ms and the RTS set to 50 ms, the IF6I scans and changes the actual input data at the 50 ms RTS rate. The 1756-IF8I examines the 25 ms RPI and the 50 ms RTS and scans the inputs using the faster of the two, which in this case, would be 25 ms. Therefore the 6-channel module was scanning the inputs at a 50 ms rate, but the 8-channel module is scanning inputs at a 25 ms rate. It is up to the user to determine if any adjustments in RTS and RPI are needed. In most cases, no changes are necessary. However, if analog input data is being supplied to a sensitive PID loop, you can make adjustments to accommodate.

In general, if in the 6-channel module RPI is less than RTS, adjustments can be made in the 6-channel Emulation module configuration to achieve the same performance. Keep in mind that if RPI is less than RTS your performance in Emulation mode is faster than it was as a 6-channel module.

**IMPORTANT** If you change the RPI of an 8-channel module on a ControlNet network, you need to reschedule the network, which requires that the process be placed in Program mode.

In general, if in the 6-channel module RPI is greater than RTS then no adjustments are necessary in the 6-channel Emulation module configuration to achieve the same performance.

## Cold Junction Compensation on Thermocouple Modules

ControlLogix® thermocouple modules use cold junction compensation (CJC) sensors. You must order the senors separately by ordering catalog number 1756-CJC, which consists of two CJC jumpers.

All CJCs for all 1756 Rockwell Automation® thermocouple modules are electrically the same. The modules use a precision thermistor, but not all CJCs can physically fit in all RTBs so you cannot substitute different CJCs from different modules.

If you are using a 1756-IT6I or 1756-IT6I2 module with thermocouples and are not using Remote CJC Compensation, be sure to order a 1756-CJC sensor for the 1756-IRT8I RTB. The1771 thermocouple modules do not always use a CJC resistor that is electrically compatible with 1756 modules.

## Using an External Loop Supply with the 1756-IF6CIS Module

The 1756-IF6CIS module can be used to supply loop power to an end device. The module can simplify wiring and reduce the cost of installation by eliminating the need for an external loop supply. While the 1756-IF6CIS module typical case can be to supply loop power, the 1756-IF6CIS module can still be used with an external loop supply on one or more channels. If one or more of your 1756-IF6CIS channels uses an external loop supply, then you must add some additional logic to your program to accommodate those channels with an external loop supply.

## All 1756-IF6CIS channels are supplying loop power

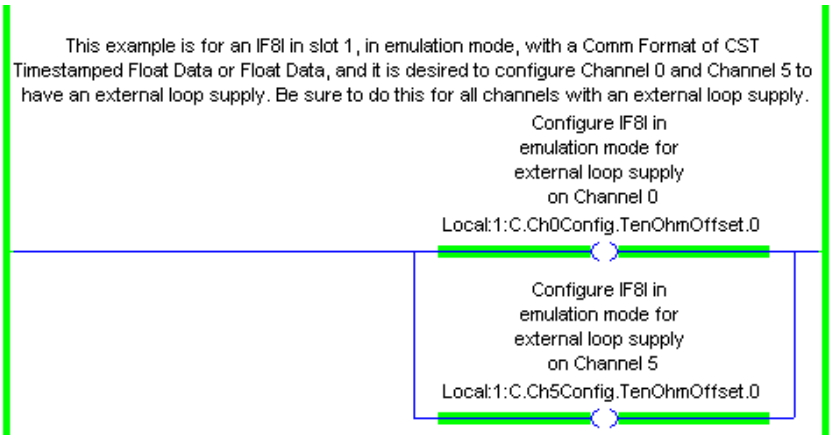
If all RTB VOUT-*x* terminals are used and all RTB RTN-*x* terminals are unused then all channels of the IF6CIS are supplying loop power, and there is no additional work required.

## One or more 1756-IF6CIS channels use external loop supply

If one or more RTB VOUT-x terminals are unused and one or more RTB RTN-x terminals are used, then one or more of the IF6CIS channels has an external loop supply, and you must use the following format.

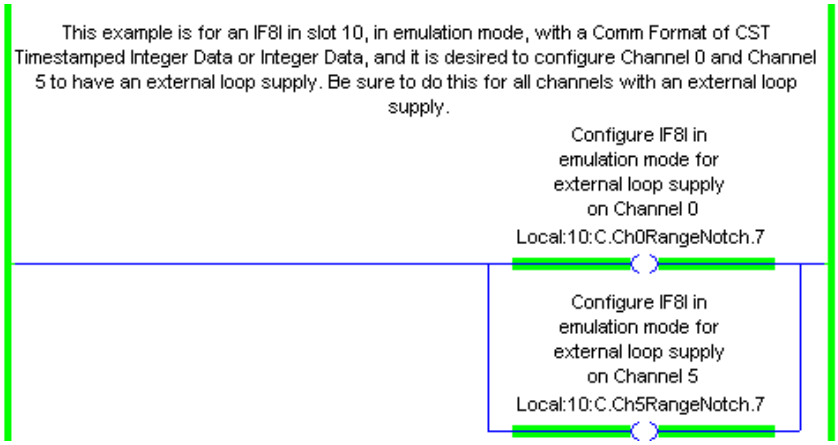
*If Floating Point Configuration: Communication Format is Float Data or CST Time Stamped Float Data*

Set the Ch*x*Config.TenOhmOffset configuration tag to a non-zero value for each channel that uses an external loop power source. This tag was previously ignored by the 1756-IF6CIS module.



*If Integer Configuration: Communication Format is Integer Data or CST Timestamped Integer Data*

Set bit 7 of the channels Ch*x*RangeNotch configuration tag for each channel that uses an external loop power source. This bit was previously ignored by the IF6CIS.




**IMPORTANT** For a Communication Format of CST Timestamped Integer Data or Integer Data:

If you change anything on the IF6CIS Configuration Tab and hit apply, it is possible that the IF6CIS will not see the Ch*x*RangeNotch bit 7 as set. To remedy this, you must do one of the following: RIUP the module, issue a Module Reconfigure MSG, Issue a CIP Generic Device Reset MSG, or Inhibit and Uninhibit the IF6CIS after any applied Configuration Tab changes.

**WARNING:** The 1756-IF6CIS module, when used for sourcing, has a sourcing voltage maximum of 30V DC and a sourcing current maximum of 30 mA. The 1756-IF8I module, when used for sourcing, has a sourcing voltage maximum of 38V DC and a sourcing current maximum of 45 mA. Be sure to verify that this specification difference does not conflict with your end device to avoid damage to the device.

## Notes:

# Application Conversion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This chapter discusses topics for consideration when converting applications.

## Updating the Firmware

By using ControlFlash™ software, the 8-channel module firmware can be upgraded or downgraded between major revisions 1 and 2. A 6-channel module can be updated if any owning connection was in Run mode.

An 8-channel input module (catalog number 1756-IF8I or 1756-IRT8I) in Emulation mode can only be updated if there are no owner connections to the module. If necessary, temporarily inhibit the connection or move the module to an unused slot when you update an 8-channel input module with a 6-channel module owner connection.

An 8-channel output module (catalog number 1756-OF8I) in Emulation mode can only be updated if the owner connection to the module is in Program mode or if there is no owner connection. If necessary, temporarily inhibit the connection or move the module to an unused slot when you update an 8-channel input module with a 6-channel module owner connection.

To update an 8-channel module with an 8-channel module owner connection, the owning connection must be in Program mode.

When used in Emulation mode, the 8-channel modules do not support the automatic firmware update feature of RSLogix 5000® software.

## Communication Format Support Between 6- and 8-channel Modules

Each of the 6-channel modules had multiple types of communication formats that could be selected. The 8-channel modules support all possible communication formats. Also any version of RSLogix 5000 software can now support the 8-channel modules as long as the 8-channel module is used in 6-channel Emulation mode. If you are currently using a 6-channel module, it can be directly replaced with an 8-channel module with no I/O tree modifications or program changes. If necessary, wiring or removable terminal block (RTB) changes can be made and are covered later in this document.

If you have an older system that does not inherently support the 8-channel modules (RSLogix 5000 software V17 and earlier) and you must add additional new I/O, you can now use 8-channel modules. You can use these modules by selecting the 6-channel equivalent module in the I/O tree.

In all cases of using an 8-channel module in 6-channel Emulation mode, only the 6-channel modules functionality is available. For example, 8-channel modules can scan all channels as fast as 1 ms but in 6-channel Emulation mode all channels can only be scanned at the rate specified by the 6-channel module.

**IMPORTANT** When 8-channel modules are used in 6-channel Emulation mode, only six (channels 0…5) of the eight channels are functional. Channels six and seven of the 8-channel module cannot be used.

## Electronic Keying

When using Emulation mode, we recommend that you select Compatible Keying as your electronic keying option.

Exact match as an electronic keying selection does not work. The connection will error with, "(Code 16#0116) Electronic Keying Mismatch: Major and/or Minor revision invalid or incorrect."

The use of Disable Keying is not recommended.

**ATTENTION:** Be extremely cautious when using Disable Keying; if used incorrectly, this option can lead to personal injury or death, property damage, or economic loss. We strongly recommend that you do not use Disable Keying. If you use Disable Keying, you must take full responsibility for understanding whether the device being used can fulfill the functional requirements of the application.

## CST Time Stamp Data and Rolling Time Stamp

Depending on which 6-channel module is used and its configuration, the various 6-channel modules returned various combinations of a Rolling time stamp and/or a Coordinated System time stamp (CST).

When used in 8-channel mode all 8-channel modules return a Rolling time stamp and a CIP Sync time stamp. A CIP Sync time stamp is essentially the same as UTC time (Coordinated Universal Time). See KB ID 40008 for more information on differences between CST and CIP Sync.

When used in Emulation mode, all 8-channel modules return a CST time stamp if the user configuration calls for a CST time stamp. Therefore CST time stamp behavior is the same in 6-channel and 8-channel modules when used in Emulation mode.

## CIP Generic Messages

In the unlikely event that you have any CIP generic messages to the 6-channel module, those messages do not always complete. Due to the large number of possibilities for using a CIP generic message, it cannot be determined what messages do and do not work. For instance, a “Device Who”, “Module Reconfigure,” or an “Unlatch Analog High Alarm” work, but it is not guaranteed that all messages work as intended.

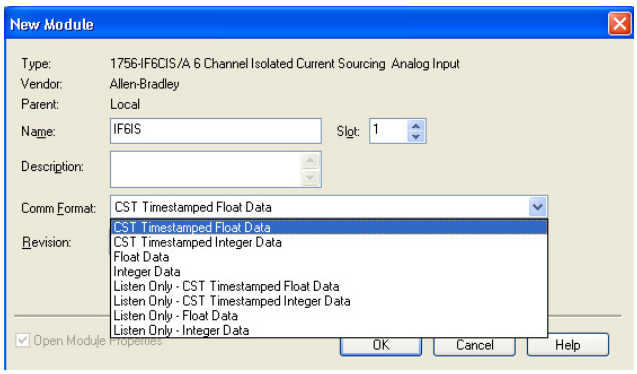
If an 8-channel module in Emulation mode has a valid connection to it, the module gives you a “Mode or State of module doesn’t allow object to perform requested service” error because it didn’t accept a “Device Reset” CIP generic message. Under the same conditions, a 6-channel module would accept a Device Reset command.

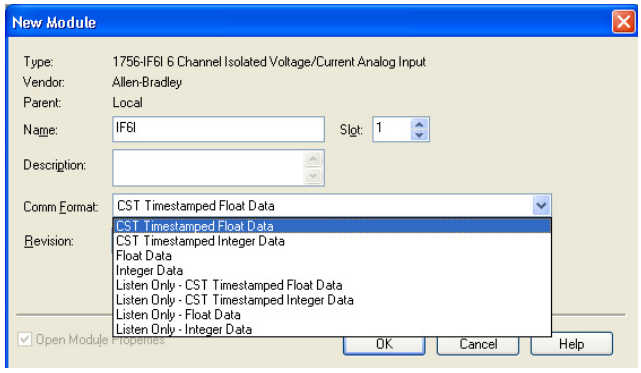
# Communication Formats

The examples in this section show the communication formats for the 6- and 8- channel modules.

## 1756-IF8I Communication Formats

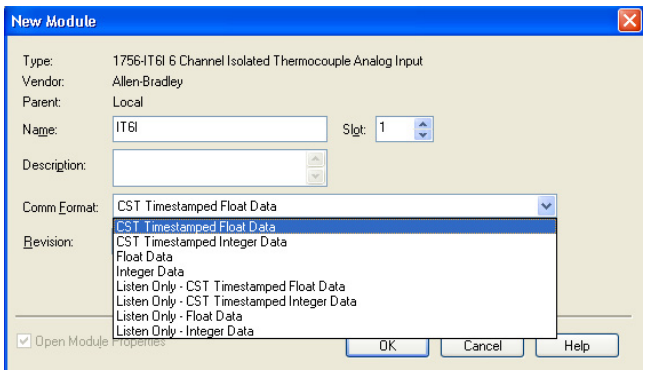
The 1756-IF8I will support all of the following 6-channel modules and their respective Communication Formats:

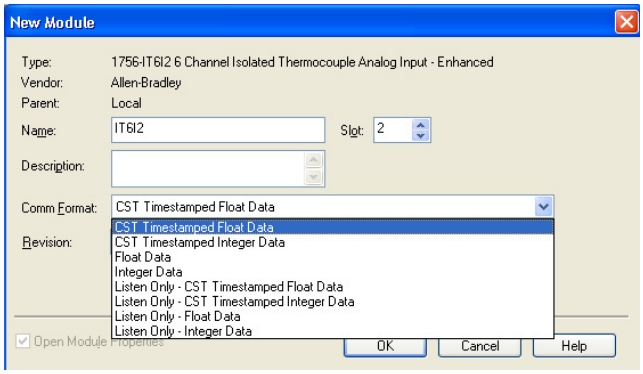


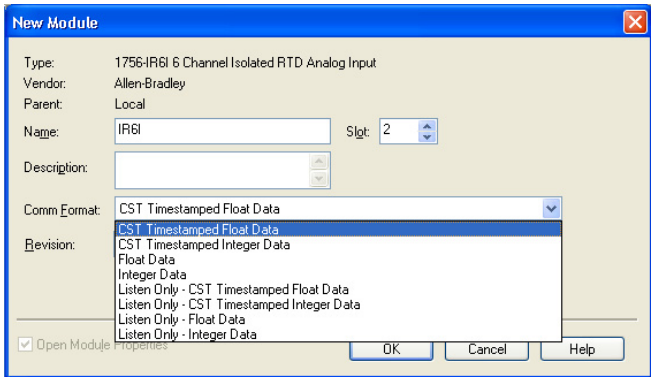




## 1756-IRT8I Communication Formats

The 1756-IF8I will support all of the following 6-channel modules and their respective Communication Formats:

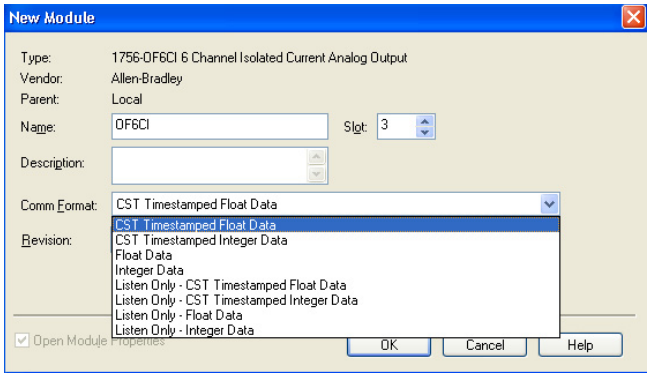


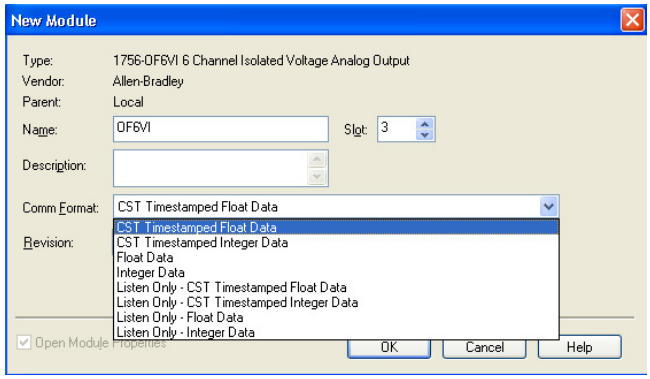



## 1756-OF8I Communication Formats

The 1756-OF8I will support all of the following 6-channel modules and their respective Communication Formats:




## Configuration

When used in Emulation mode, all 8-channel modules will accept configuration data in the 6-channel module style. Therefore, any way the 6-channel module configuration data is generated, the 8-channel module will accept it. Whether all configuration is done on the module properties, configuration tab, or via an HMI populating the configuration tags, no changes are necessary.

## Tag Structures

All configuration, input, and output tags will remain intact in their 6-channel format. The 8-channel module will accept and/or report all data in the original module format.

## RSLogix 5000 Version Support

When 8-channel modules are used in the I/O tree as an 8-channel module, they are only supported in RSLogix 5000 software, V18 and later.

When an 8-channel module is used in 6-channel Emulation mode, it can be used in any version of RSLogix 5000 software that supports the 6-channel module you are emulating.

## EDS Updates for RSLinx Software

For most applications, you will probably have yellow question marks when browsing a chassis via RSLinx® software containing an 8-channel module. The yellow question marks do not affect module operation.

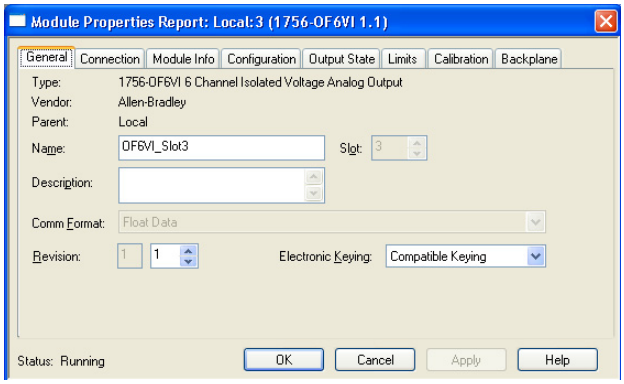
To remove the yellow question marks you must obtain and install the latest EDS file for the 8-channel module. Even if you are using the 8-channel modules in 6-channel Emulation mode they will always show up in RSLinx software as 8-channel modules.

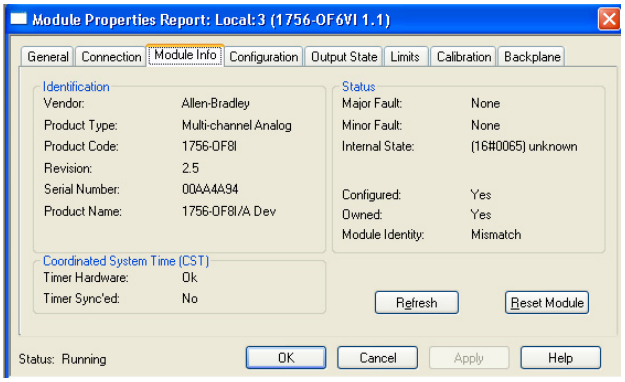
Before EDS installation:


After EDS installation:


## Module Info Tab

If an entry for a 6-channel module is in the I/O tree, the module info tab still reports the actual module identity, which is that of an 8-channel module. The module identity also reports a Mismatch and an Internal State of 16#0065 unknown (if in Run mode) or 16#0075 unknown (if in Program mode). Mismatch and “unknown” does not create any issues. See KB ID 581299 for more information on Mismatch and “unknown”.



# Diagnostics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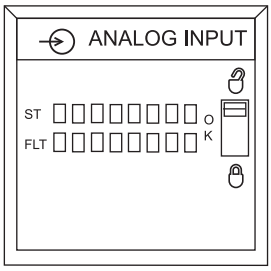
## Status Indicators

All 8-channel modules have Status (ST) and Fault (FLT) indicators on the front of the module that have no equivalent on the 6-channel modules. All 8-channel ST and FLT indicators operate according to the description in the 8-channel module manual, even when in Emulation mode. Also in Emulation mode, only ST, and FLT indicators 0...5 are active, indicators 6...7 are always off.

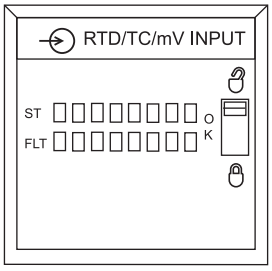
## Status Indicators for the 1756-IF8I Module




The following table describes the status indicators.

| Indicator | Status | Description |
|---|---|---|
| OK | Steady green | The module is in a normal operating state in Run mode. |
| | Flashing green | The module passed internal diagnostics and is not actively controlled or the connection is open and the controller is in Program mode. |
| | Flashing red | Previously established communication has timed out. |
| | Steady red | Replace the module. |
| ST | Steady yellow | The channel is operating as expected. |
| | Flashing yellow | The channel is being calibrated. |
| | Off | The channel is not in use or is faulted. |
| FLT | Off | The channel is operating as expected. |
| | Steady red | • The channel is faulted. Possible causes of the fault include:<br>– Underrange/overrange detection<br>– Triggered process alarm<br>– Triggered rate alarm<br>– Wire off detection<br>– Calibration fault |
| | Flashing red | One of the following:<br>• The channel is faulted. See the previous row for more information about faults.<br>• The channel is being calibrated. |

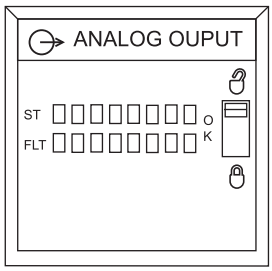
## Status Indicators for the 1756-IRT8I Module




The following table describes the status indicators.

| Indicator | Status | Description |
|---|---|---|
| OK | Steady green | The module is in a normal operating state in Run mode. |
| | Flashing green | The module passed internal diagnostics and is not actively controlled or the connection is open and the controller is in Program mode. |
| | Flashing red | Previously established communication has timed out. |
| | Steady red | Replace the module. |
| ST | Steady yellow | The channel is operating as expected. |
| | Flashing yellow | The channel is being calibrated. |
| | Off | The channel is not in use or is faulted. |
| FLT | Off | The channel is operating as expected. |
| | Steady red | • The channel is faulted. Some possible causes of the fault include:<br>– Underrange/overrange detection<br>– Wire off detection<br>– Calibration fault |
| | Flashing red | One of the following:<br>• The channel is faulted. See the previous row for more information about faults.<br>• The channel is being calibrated. |

## Status Indicators for the 1756-OF8I Module

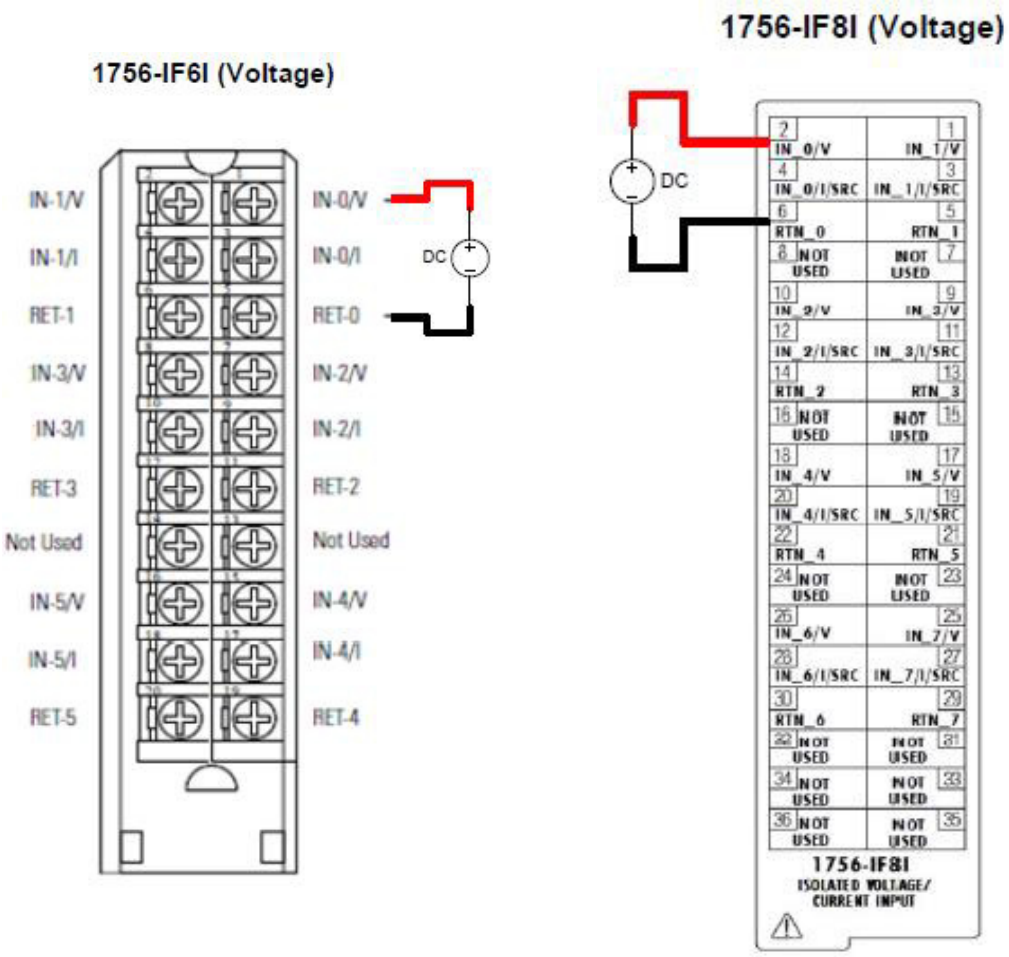



The following table describes the status indicators.

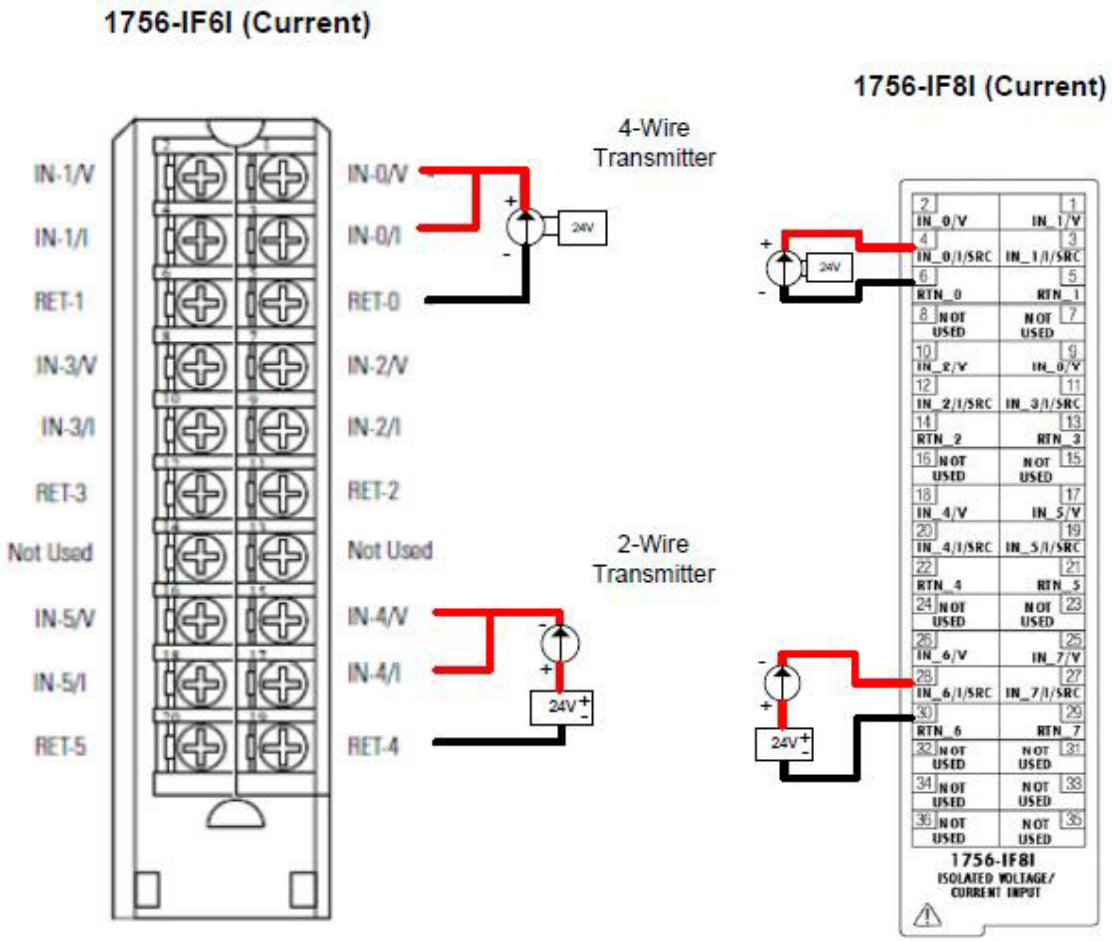
| Indicator | Status | Description |
|---|---|---|
| OK | Steady green | The module is in a normal operating state in Run mode. |
| | Flashing green | The module passed internal diagnostics and is not actively controlled or the connection is open and the controller is in Program mode. |
| | Flashing red | Previously established communication has timed out. |
| | Steady red | Replace the module. |
| ST | Steady yellow | The channel is operating as expected. |
| | Flashing yellow | The channel is being calibrated. |
| | Off | The channel is not in use or is faulted. |
| FLT | Off | The channel is operating as expected. |
| | Steady red | • The channel is faulted. Some possible causes of the fault include:<br>– Triggered clamp alarm<br>– Wire off detection<br>– Calibration fault |
| | Flashing red | The channel is faulted. See the previous row for more information about faults. |

# RTB Wiring

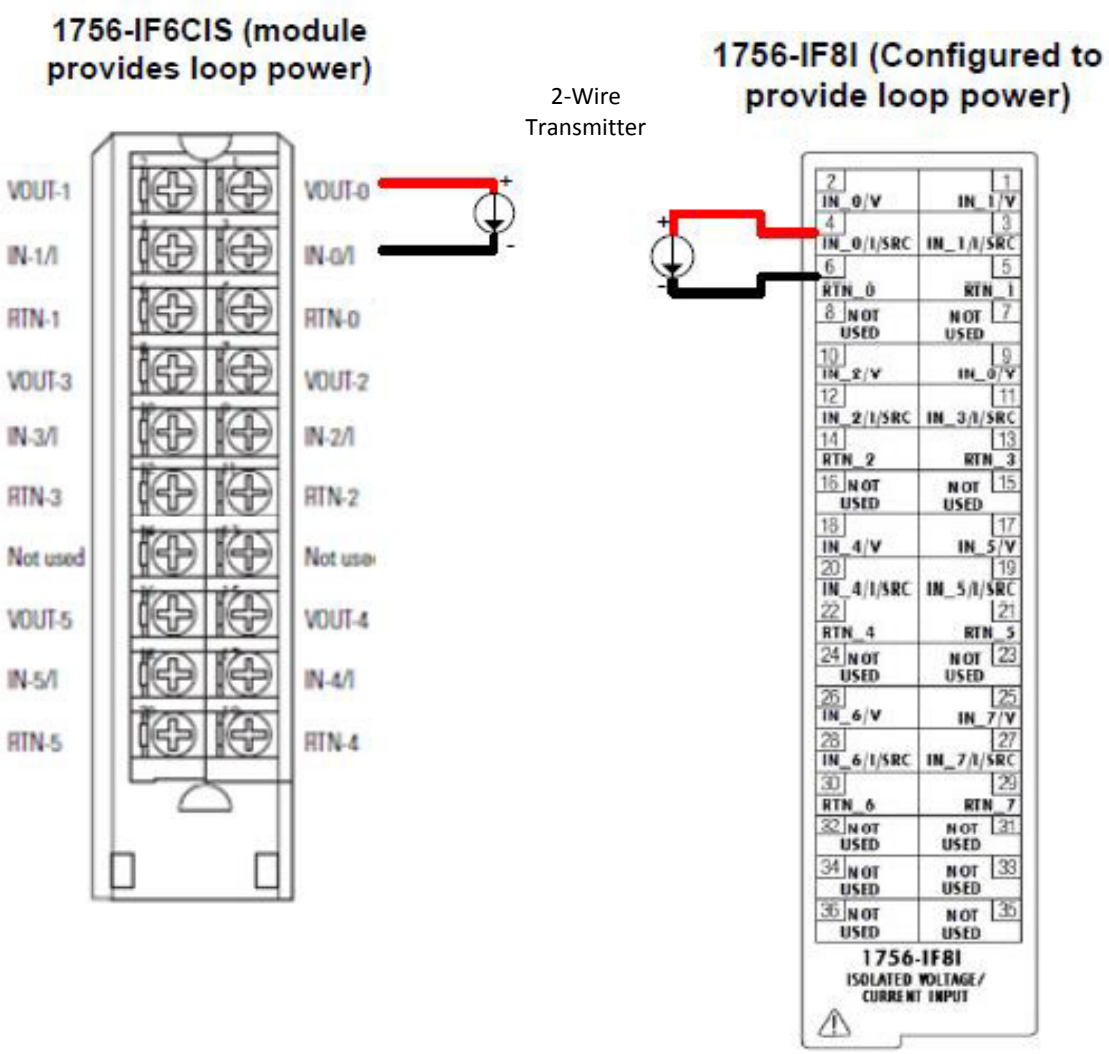
## 1756-IF6I to 1756-IF8I Voltage Mode



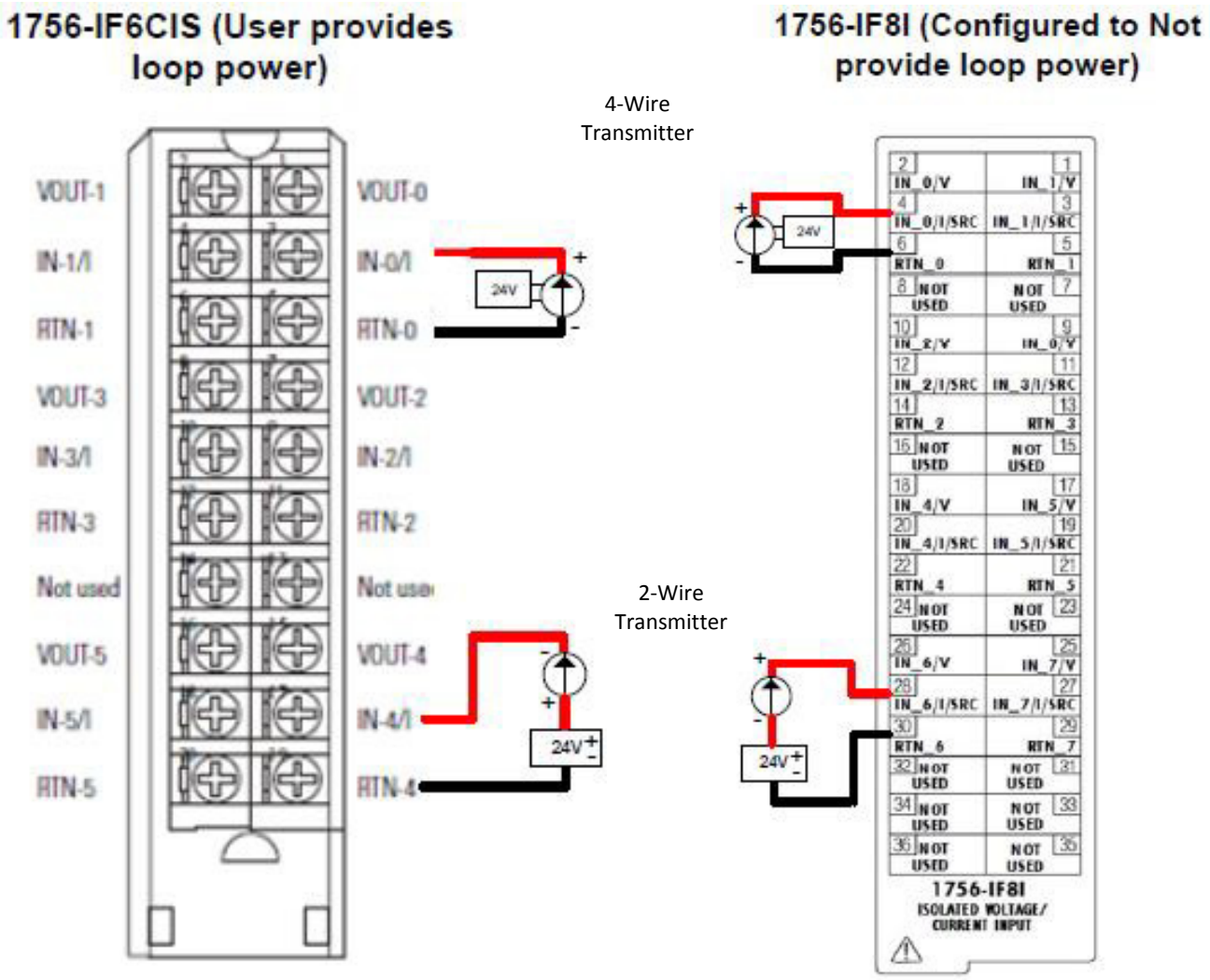
# 1756-IF6I to 1756-IF8I Current Mode



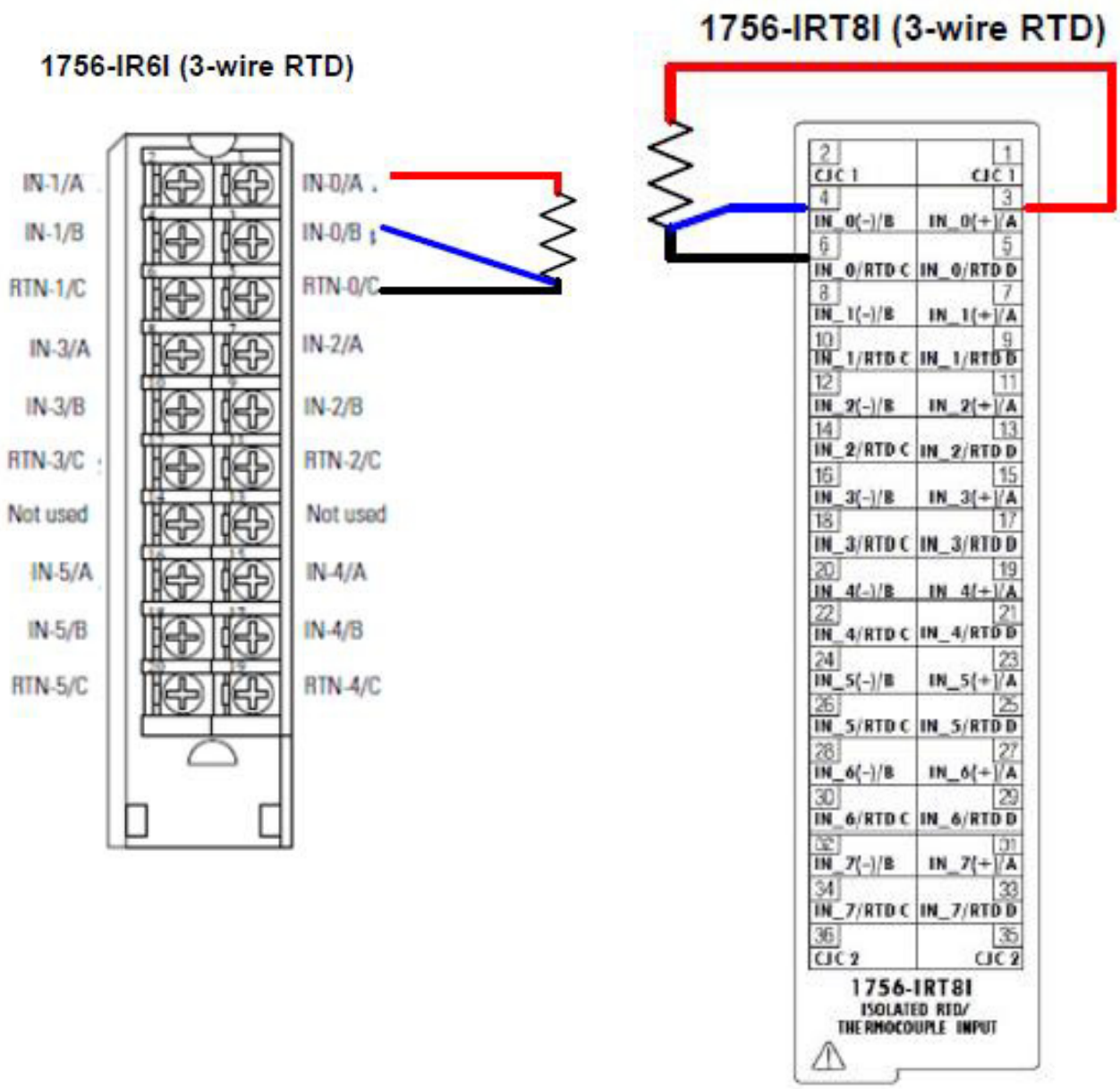
## 1756-IF6CIS to 1756-IF8I Modules Provide Loop Power



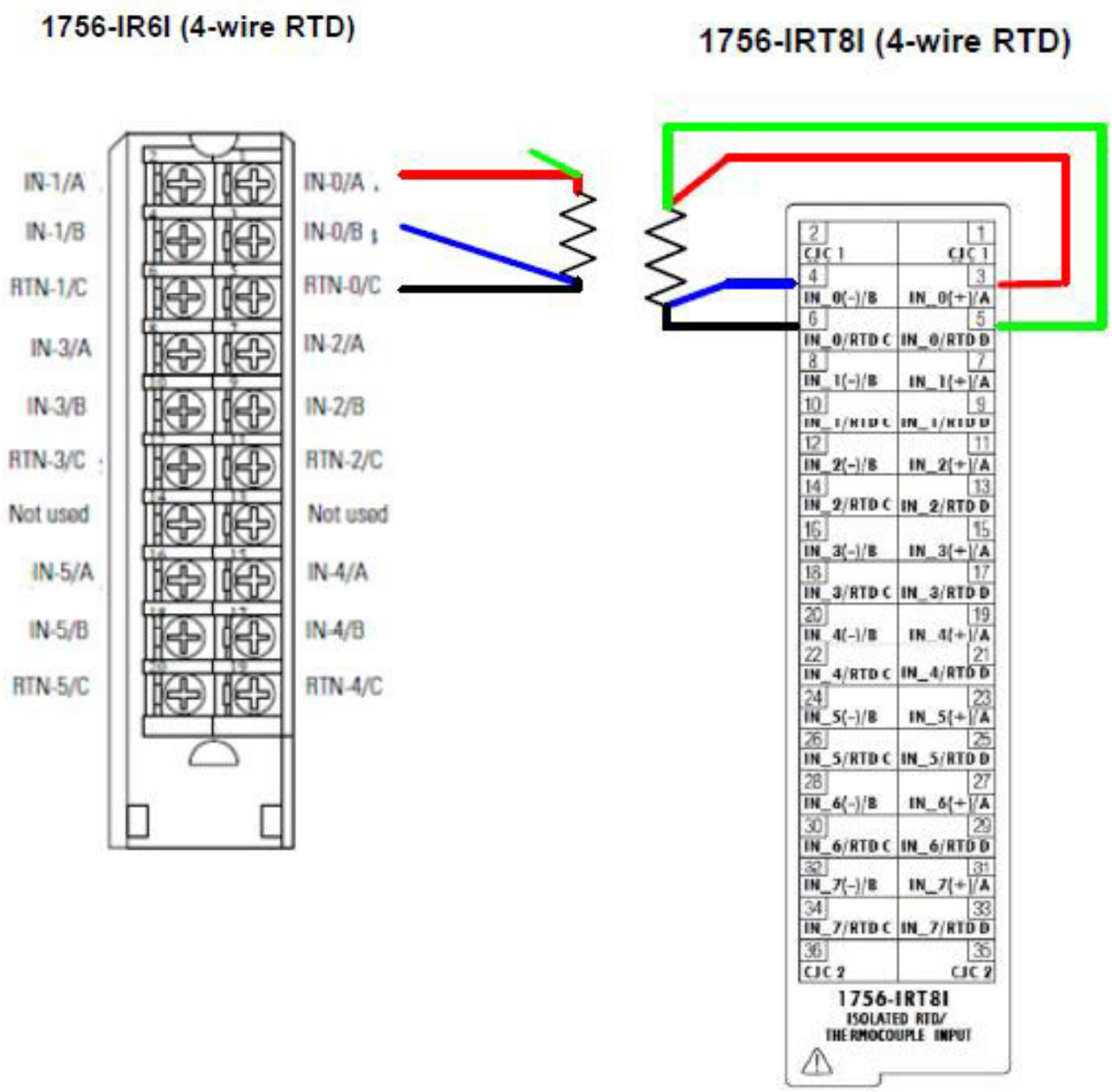
## 1756-IF6CIS to 1756-IF8I User Supplied Loop Power



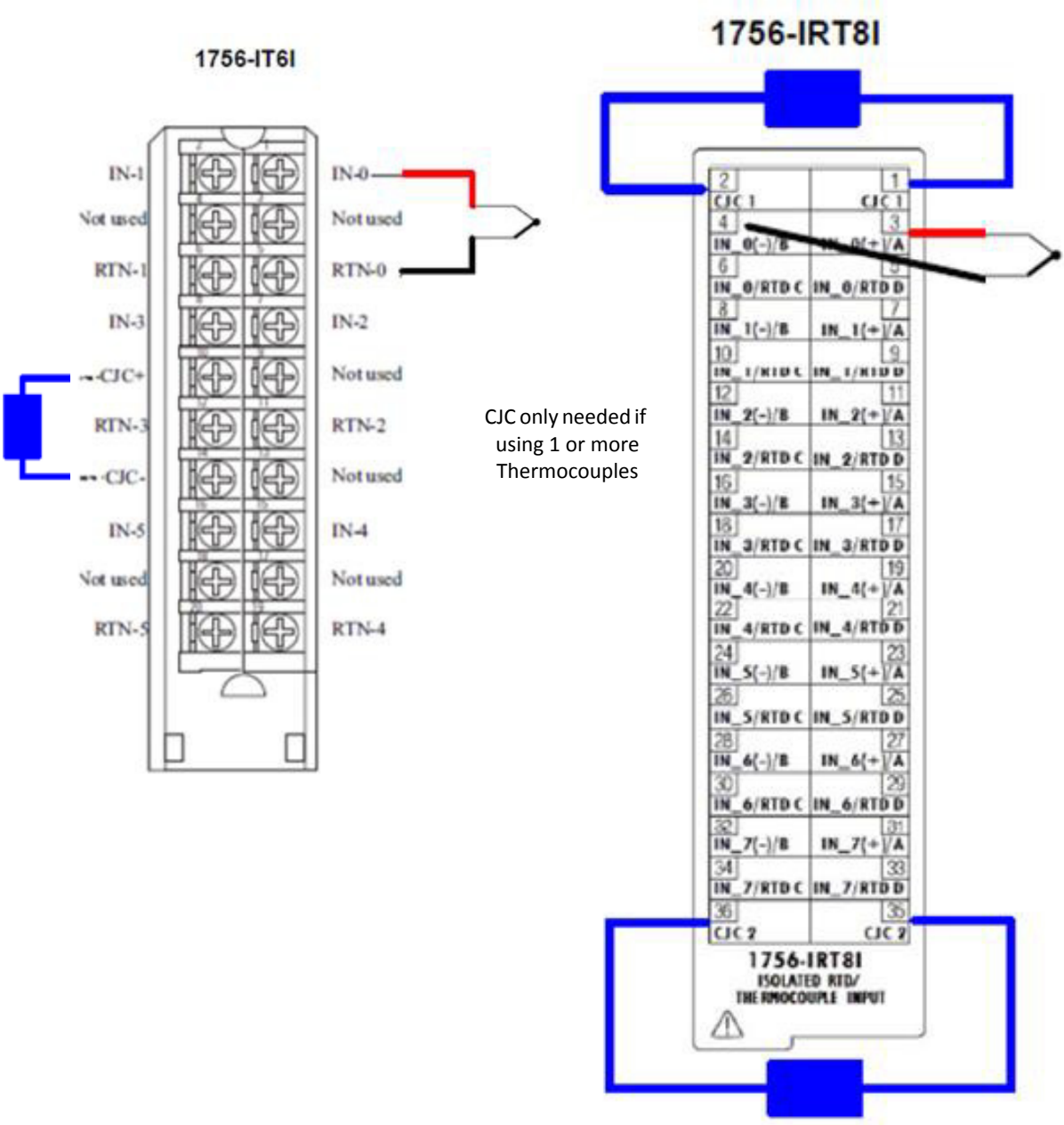
## 1756-IR6I to 1756-IRT8I 3-Wire RTD



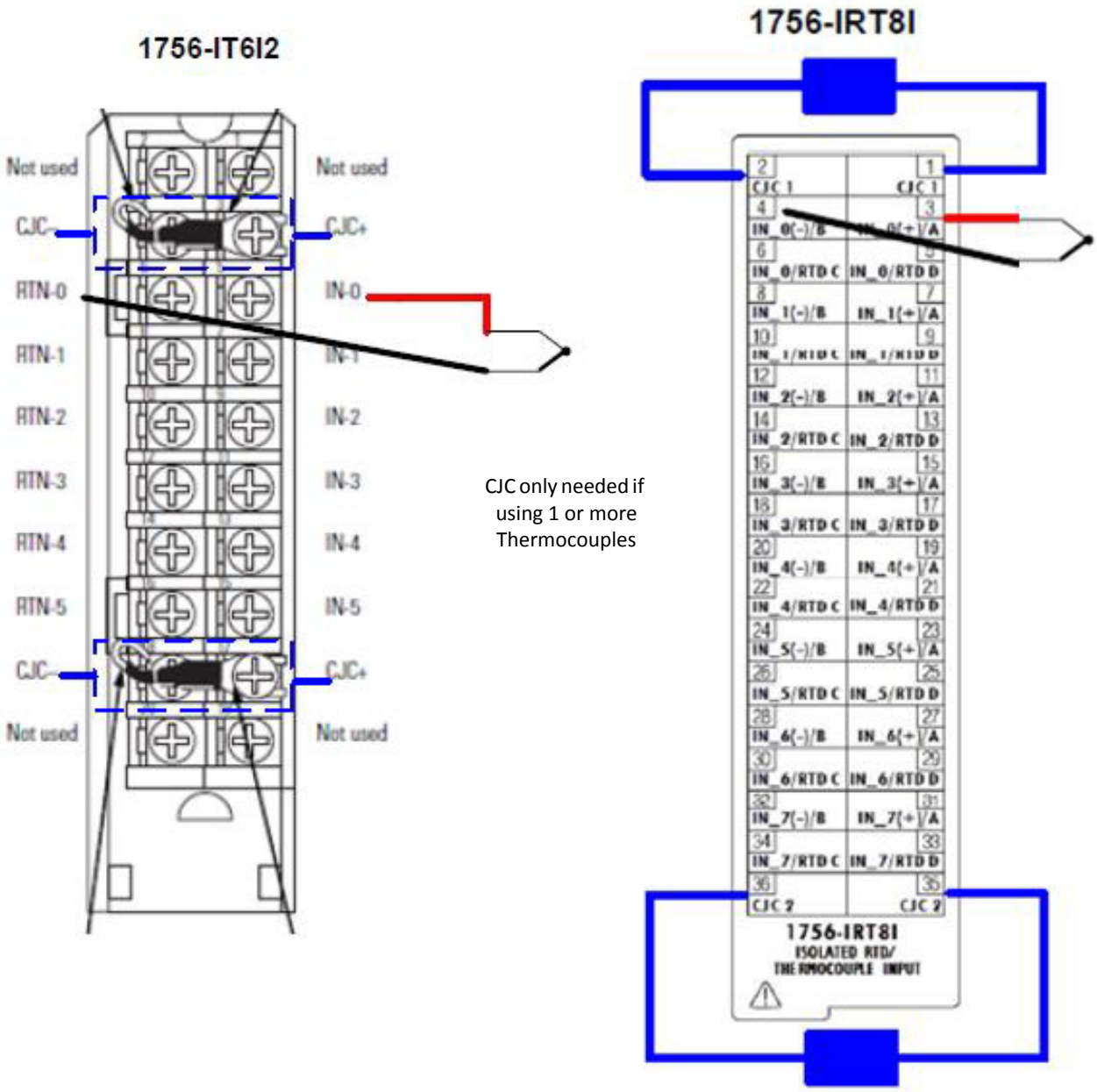
## 1756-IR6I to 1756-IRT8I 4-Wire RTD



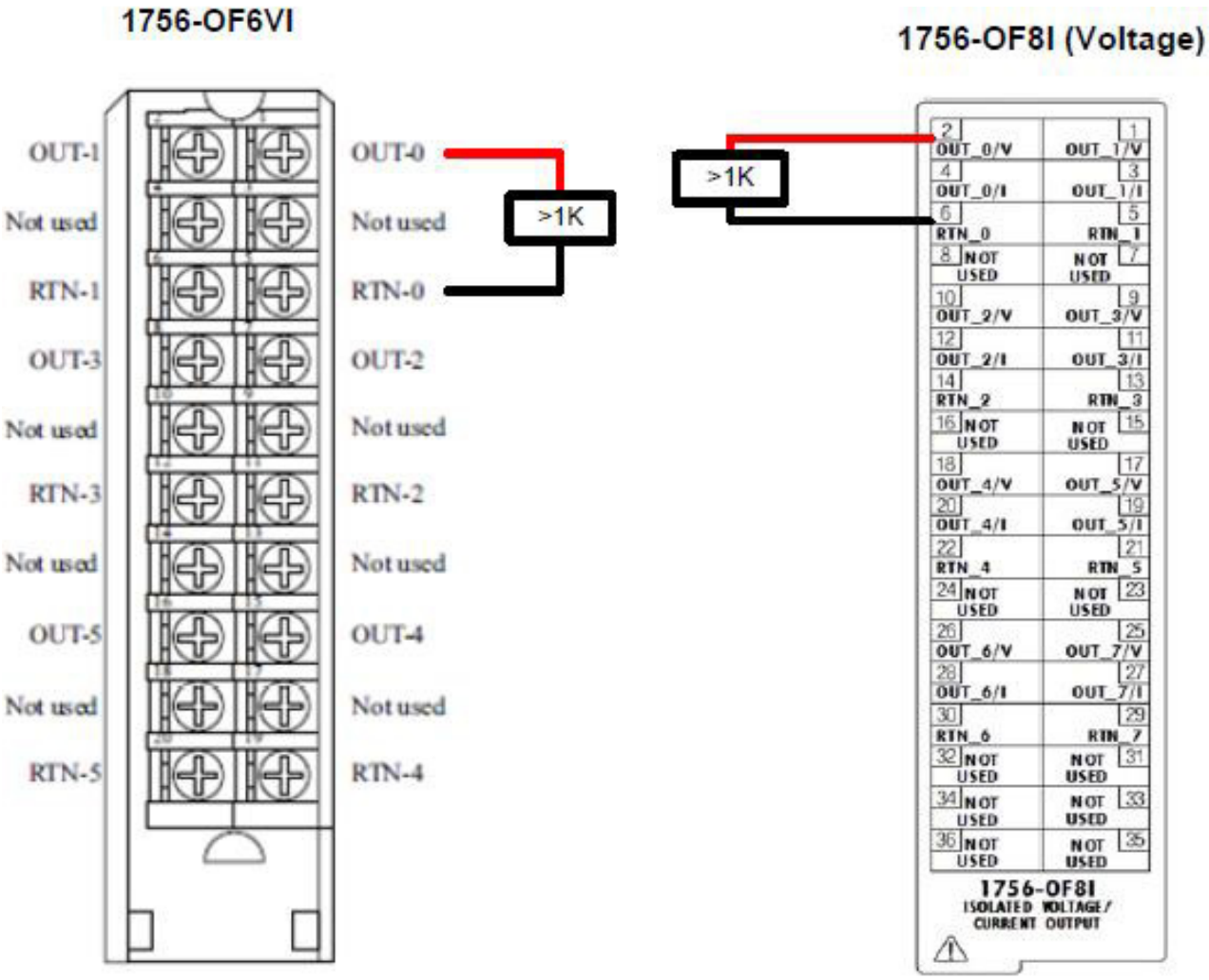
## 1756-IT6I to 1756-IRT8I TC or mV



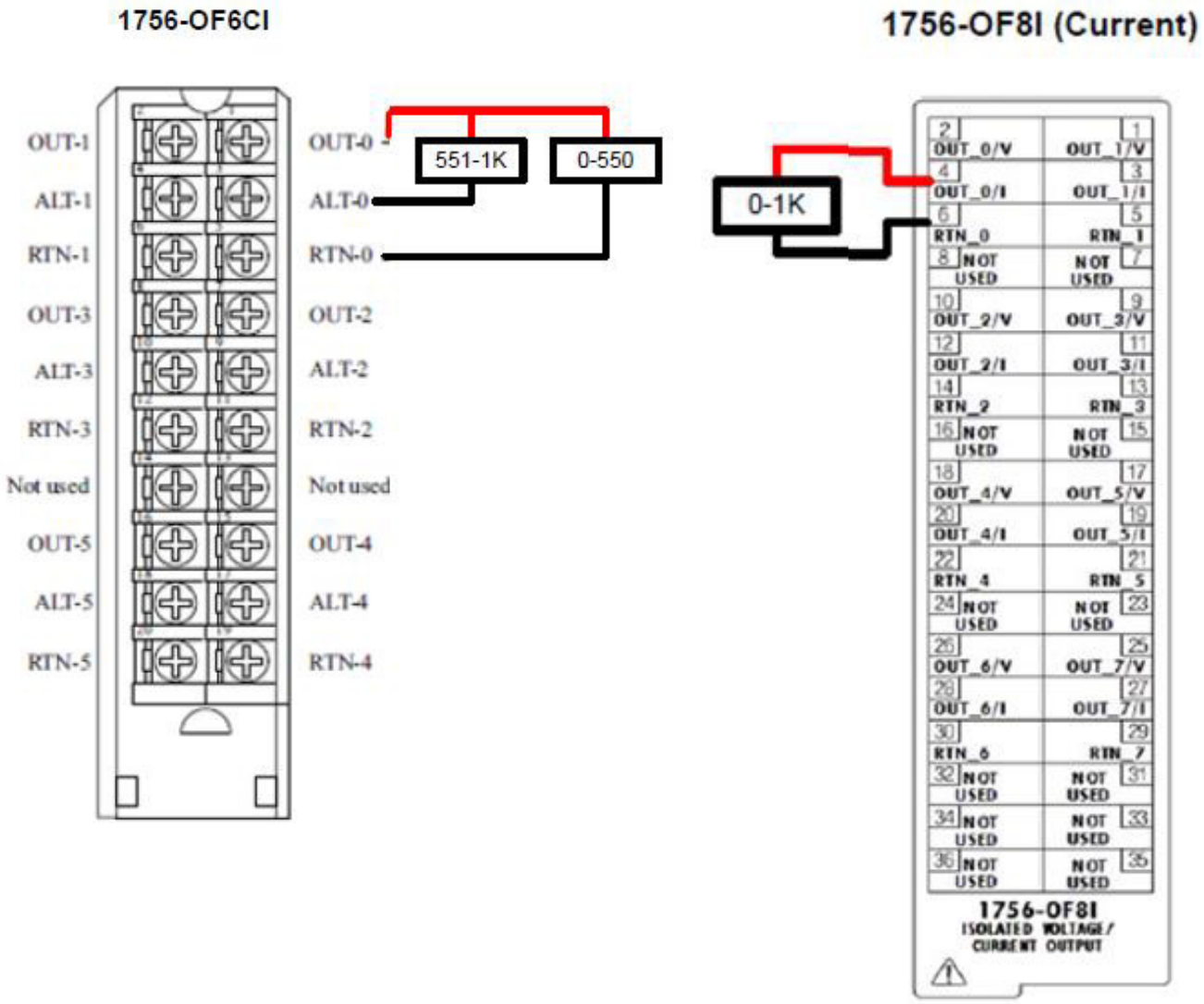
## 1756-IT6I2 to 1756-IRT8I TC or mV



## 1756-OF6VI to 1756-OF8I Voltage Mode



## 1756-OF6CI to 1756-OF8I Current Mode



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## Rockwell Automation Support

Use the following resources to access support information.

| | | |
|---|---|---|
| **Technical Support Center** | Knowledgebase Articles, How-to Videos, FAQs, Chat, User Forums, and Product Notification Updates. | https://rockwellautomation.custhelp.com/ |
| **Local Technical Support Phone Numbers** | Locate the phone number for your country. | http://www.rockwellautomation.com/global/support/get-support-now.page |
| **Direct Dial Codes** | Find the Direct Dial Code for your product. Use the code to route your call directly to a technical support engineer. | http://www.rockwellautomation.com/global/support/direct-dial.page |
| **Literature Library** | Installation Instructions, Manuals, Brochures, and Technical Data. | http://www.rockwellautomation.com/global/literature-library/overview.page |
| **Product Compatibility and Download Center (PCDC)** | Get help determining how products interact, check features and capabilities, and find associated firmware. | http://www.rockwellautomation.com/global/support/pcdc.page |

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