



Compact Combination Fast Analog I/O Module

Catalog Number 1769-IF4FXOF2F

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About This Publication

Use this document as a guide when installing a Compact Combination Fast Analog I/O Control Module.

Important User Information

Solid state equipment has operational characteristics differing from those of electromechanical equipment. Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls (Publication SGI-1.1 available from your local Rockwell Automation sales office or online at <http://literature.rockwellautomation.com>) describes some important differences between solid state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.





In no event will 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.

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

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

<p>WARNING</p> 	<p>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.</p>
<p>IMPORTANT</p>	<p>Identifies information that is critical for successful application and understanding of the product.</p>
<p>ATTENTION</p> 	<p>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 consequences.</p>
<p>SHOCK HAZARD</p> 	<p>Labels may be on or inside the equipment (for example, drive or motor) to alert people that dangerous voltage may be present.</p>
<p>BURN HAZARD</p> 	<p>Labels may be on or inside the equipment (for example, drive or motor) to alert people that surfaces may reach dangerous temperatures.</p>

Electrostatic Discharge

ATTENTION

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

- Touch a grounded object to discharge static potential.
 - Wear an approved wrist-strap grounding device.
 - Do not touch the bus connector or connector pins.
 - Do not touch circuit components inside the module.
 - Use a static-safe work station, if available.
 - Keep the module in its static-shield box when not in use.
-

Remove Power

ATTENTION

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

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

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

Hazardous Location

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

WARNING



EXPLOSION HAZARD

Substitution of components may impair suitability for Class I, Division 2.

Do not replace components or disconnect equipment unless power is switched off or the area is known to be non-hazardous.

Do not connect or disconnect components unless power is switched off or the area is known to be non-hazardous.

This product must be installed in an enclosure.

All wiring must comply with Class I, Division 2 wiring methods of Article 501 of the National Electrical Code and/or in accordance with Section 18-1J2 of the Canadian Electrical Code, and in accordance with the authority having jurisdiction.

Environnements dangereux

Cet équipement est conçu pour être utilisé dans des environnements de Classe 1, Division 2, Groupes A, B, C, D ou non dangereux. La mise en garde suivante s'applique à une utilisation dans des environnements dangereux.

AVERTISSEMENT



DANGER D'EXPLOSION

La substitution de composants peut rendre cet équipement impropre à une utilisation en environnement de Classe 1, Division 2.

Ne pas remplacer de composants ou déconnecter l'équipement sans s'être assuré que l'alimentation est coupée et que l'environnement est classé non dangereux.

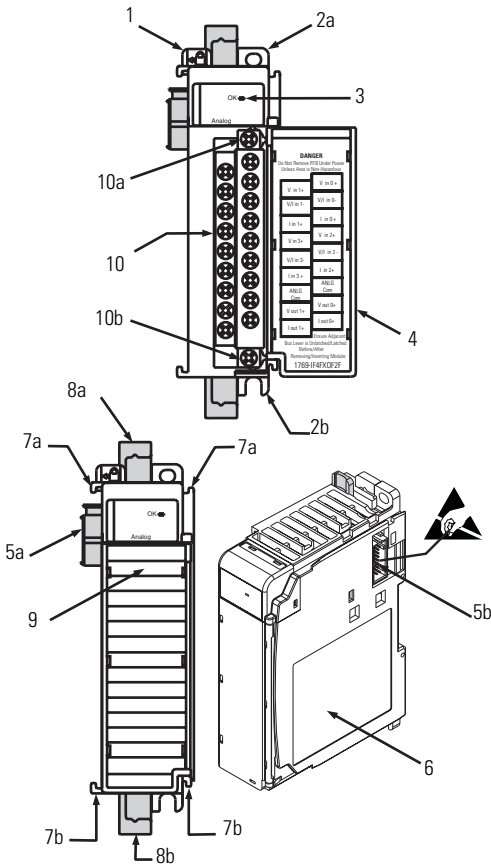
Ne pas connecter ou déconnecter des composants sans s'être assuré que l'alimentation est coupée ou que l'environnement est classé non dangereux.

Ce produit doit être installé dans une armoire.

About the 1769-IF4FXOF2F Module

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

Module Description



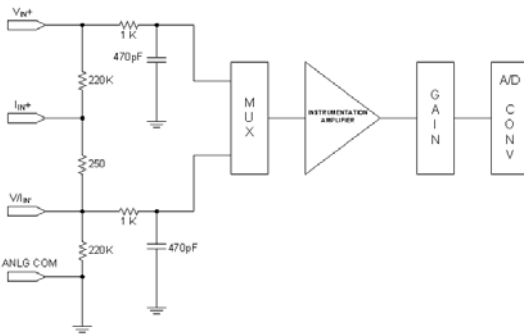
Item	Description
1	Bus lever (with locking function)
2a	Upper panel mounting tab
2b	Lower panel mounting tab
3	Module status LED
4	Module door with terminal identification label
5a	Movable bus connector with female pins
5b	Stationary bus connector with male pins
6	Nameplate label
7a	Upper tongue-and-groove slots
7b	Lower tongue-and-groove slots
8a	Upper DIN rail latch
8b	Lower DIN rail latch
9	Write-on label (user ID tag)
10	Removable terminal block (RTB) with finger-safe cover
10a	RTB upper retaining screw
10b	RTB lower retaining screw

(1) Pollution Degree 2 is an environment where, normally, only non-conductive pollution occurs except that occasionally a temporary conductivity caused by condensation is expected.

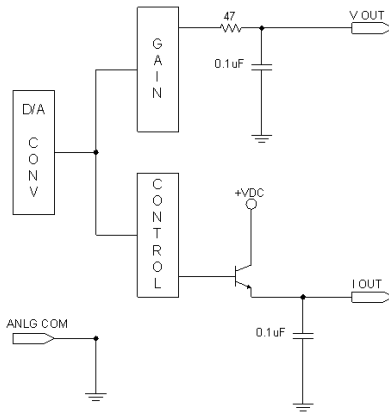
(2) Over Voltage Category II is the load level section of the electrical distribution system. At this level, transient voltages are controlled and do not exceed the impulse voltage capability of the product's insulation.

(3) Pollution Degree 2 and Over Voltage Category II are International Electrotechnical Commission (IEC) designations.

Simplified Input Circuit Diagram



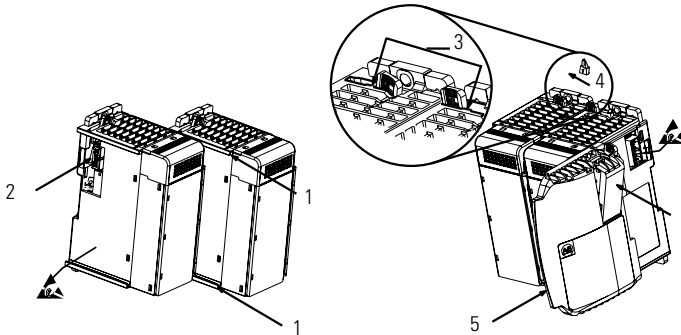
Simplified Output Circuit Diagram



Install the 1769-IF4FXOF2F Module

Attach the module to the controller or an adjacent I/O module before or after mounting. For mounting instructions, see Module to Panel Using the Dimensional Template, or Mount Module to a DIN Rail. To work with a system that is already mounted, see Replace a Single Module Within a System.

The following procedure shows you how to assemble the Compact I/O system.



1. Disconnect power.
2. Check that the bus lever of the module to be installed is in the unlocked (fully right) position.
3. Use the upper and lower tongue-and-groove slots (1) to secure the modules together or to a controller.
4. Move the module back along the tongue-and-groove slots until the bus connectors (2) line up with each other.
5. Push the bus lever back slightly to clear the positioning tab (3).

Use your fingers or a small screwdriver.

6. To allow communication between the controller and module, move the bus lever fully to the left (4) until it clicks, making sure it is locked firmly in place.

ATTENTION



When attaching I/O modules, it is very important that the bus connectors are securely locked together to be sure of proper electrical connection. Securely locking together the bus connectors is required for use in hazardous locations.

For more information on hazardous locations see page 4.

7. Attach an end-cap terminator (5) to the last module in the system by using the tongue-and-groove slots as before.

8. Lock the end-cap bus terminator (6).
-

IMPORTANT

You must use a 1769-ECR or 1769-ECL right or left end cap to terminate the end of the serial communication bus. An I/O configuration fault will occur if an end cap is not used.

Replace a Single Module Within a System

The module can be replaced while the system is mounted to a panel or DIN rail.

1. Remove power.

Refer to Remove Power on page 3.

2. Remove the upper and lower mounting screws from the module or open the DIN latches using a flat-blade or Phillips screwdriver.
3. Move the bus lever to the right to disconnect or unlock the bus.
4. On the right-side adjacent module, move its bus lever to the right (unlock) to disconnect it from the module to be removed.
5. Gently slide the disconnected module forward.

If you feel excessive resistance, check that the module is disconnected from the bus and that both mounting screws are removed or DIN latches opened.

TIP

It may be necessary to rock the module slightly from front to back to remove it, or, in a panel-mounted system, to loosen the screws of adjacent modules.

6. Be sure that the bus lever on the module and on the right-side adjacent module are in the unlocked (fully right) position before installing the replacement module.
7. Slide the replacement module into the open slot.
8. Connect the modules by locking (fully left) the bus levers on the replacement module and the right-side adjacent module.
9. Replace the mounting screws or snap the module onto the DIN rail.

Mount Expansion I/O

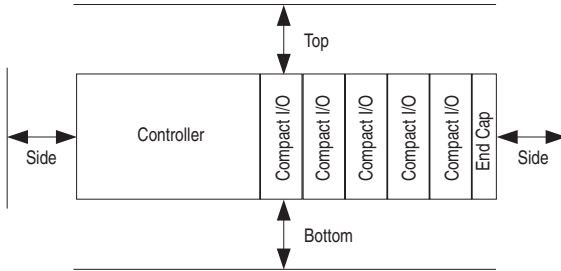
ATTENTION



During panel or DIN rail mounting of all devices, be sure that all debris, that is, metal chips or wire strands, is kept from falling into the module. Debris that falls into the module could cause damage when cycling power.

Minimum Spacing

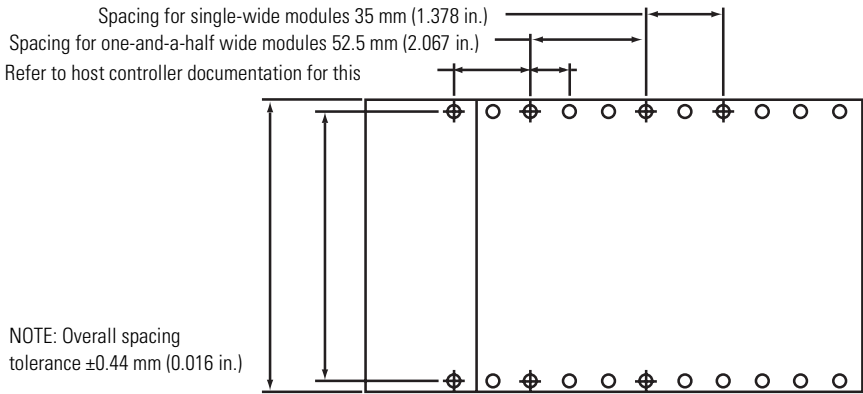
Maintain spacing from enclosure walls, wireways, or adjacent equipment. Allow 50 mm (2 in.) of space on all sides for adequate ventilation, as shown.



Mount Module to Panel

Mount the module to a panel using two screws per module. Use M4 or #8 panhead screws. Mounting screws are required on every module.

Module to Panel Using the Dimensional Template



Locate holes every 17.5 mm (0.689 in.) to allow for a mix of single-wide and one-and-a-half-wide modules (for example, the 1769-OA16 module).

Mount Module to Panel Using Modules as a Template

This procedure lets you use the assembled modules as a template for drilling holes in the panel. Refer to *Module to Panel Using the Dimensional Template* on page 10 if you have sophisticated panel mounting equipment.

On a clean work surface, assemble no more than three modules.

Due to module-mounting hole tolerance, it is important to follow this procedure.

1. Using the assembled modules as a template, carefully mark the center of all module-mounting holes on the panel.
2. Return the assembled modules to the clean work surface, including any previously mounted modules.
3. Drill and tap the mounting holes for the recommended M4 or #8 screws.
4. Place the modules back on the panel, and check for proper hole alignment.
5. Attach the modules to the panel using the mounting screws.

TIP

If mounting more modules, mount only the last one of this group and put the others aside. This reduces the remounting time during drilling and tapping of the next group.

6. Repeat steps 1 to 6 for any remaining modules.

Mount Module to a DIN Rail

The module can be mounted using these DIN rails:

- 35 x 7.5 mm (EN 50 022 - 35 x 7.5)
- 35 x 15 mm (EN 50 022 - 35 x 15)

To mount the module on a DIN rail follow these steps.

1. Close the DIN rail latches.
2. Press the DIN rail mounting area of the module against the DIN rail.

The latches will momentarily open and lock into place.

Replacement Parts

The 1769-IF4FXOF2F module has the following replacement parts:

- Terminal block, catalog no. 1769-RTBN18 (1 per kit)
- Door, catalog no. 1769-RD (2 per kit)

Field Wiring Connections

This section includes information on the following topics:

- Module grounding
- System wiring guidelines
- Module wiring
- Differential inputs wiring
- Single-ended input sensor/transmitter types wiring
- Mixed-input transmitter type wiring
- Analog outputs wiring
- Terminal labeling
- Finger-safe terminal block wiring and removal
- Wire size and terminal screw torque
- Module configuration

Ground the Module

This product is intended to be mounted to a well-grounded mounting surface such as a metal panel. Additional grounding connections from the module's mounting tabs or DIN rail, if used, are not required unless the mounting surface cannot be grounded. Refer to Industrial Automation Wiring and Grounding Guidelines, Allen-Bradley publication 1770-4.1, for additional information.

System Wiring Guidelines

Consider the following when wiring your system:

- All module commons (ANLG COM) are connected in the analog module.
- The analog common (ANLG COM) is not connected to earth ground inside the module.
- Channels are not isolated from each other.
- Use Belden 8761, or equivalent, shielded wire.
- Under normal conditions, the drain wire and shield junction must be connected to earth ground via a panel or DIN rail mounting screw at the analog I/O module end. Keep the shield connection to ground as short as possible.⁽¹⁾
- To ensure optimum accuracy, limit overall cable impedance by keeping your cable as short as possible. Locate the I/O system as close to your sensors or actuators as your application will permit.⁽²⁾
- If multiple power supplies are used with analog inputs, the power supply commons must be connected.
- The 1769-IF4FXOF2F module does not provide loop power for analog inputs. Use a power supply that matches the input transmitter specifications.
- Differential analog inputs are more immune to noise than single-ended analog inputs.
- Voltage outputs (Vout 0+ and Vout 1+) of the 1769-IF4FXOF2F module are referenced to ANLG COM. Load resistance for a voltage output channel must be equal to or greater than 1K Ω
- Current outputs (Iout 0+ and Iout 1+) of the 1769-IF4FXOF2F module source current that returns to ANLG COM. Load resistance for a current output channel must remain between 0 and 500 Ω
- Voltages on Vin+, V/Iin-, and Iin+ of the 1769-IF4FXOF2F module must be within +/-10V dc of analog common.

ATTENTION

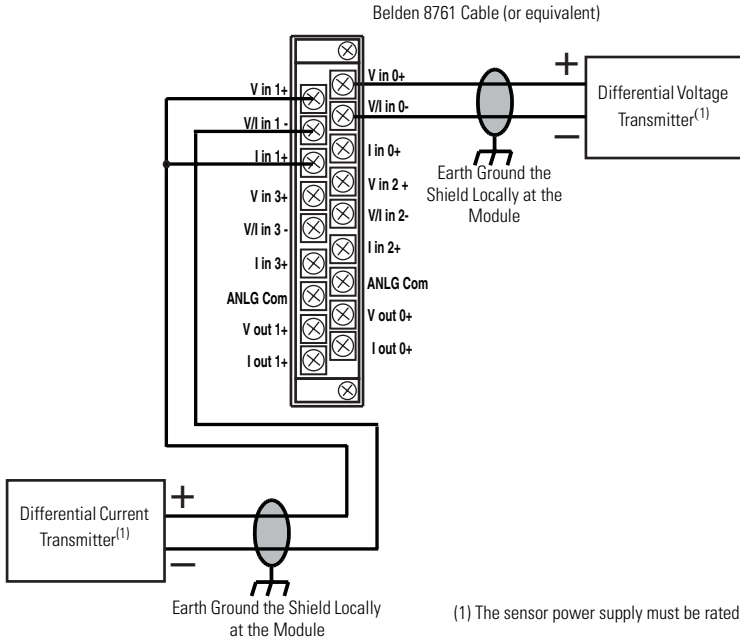


Be careful when stripping wires. Wire fragments that fall into a module could cause damage at power up. Once wiring is complete, ensure the module is free of all metal fragments.

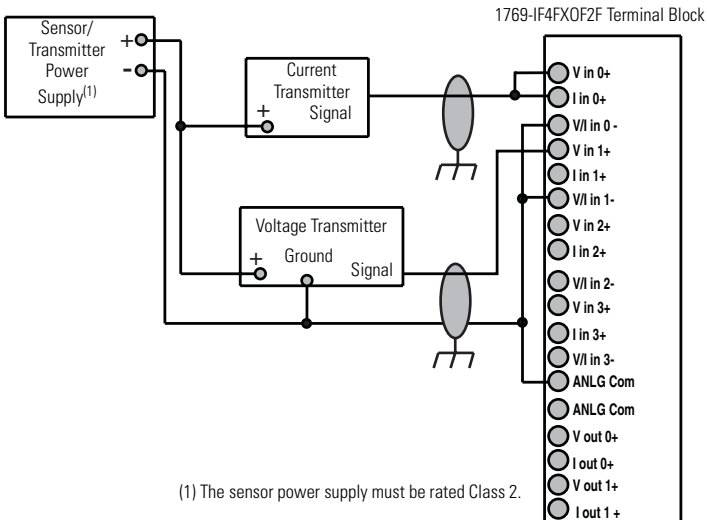
⁽¹⁾ In environments where high-frequency noise may be present, it may be necessary to directly ground cable shields to earth at the module end and via a 0.1 μ F capacitor at the sensor end.

⁽²⁾ Cable length over 50 meters may impact accuracy. For details, refer to the Compact Combination Analog I/O Module, publication 1769-UM008A-EN-P.

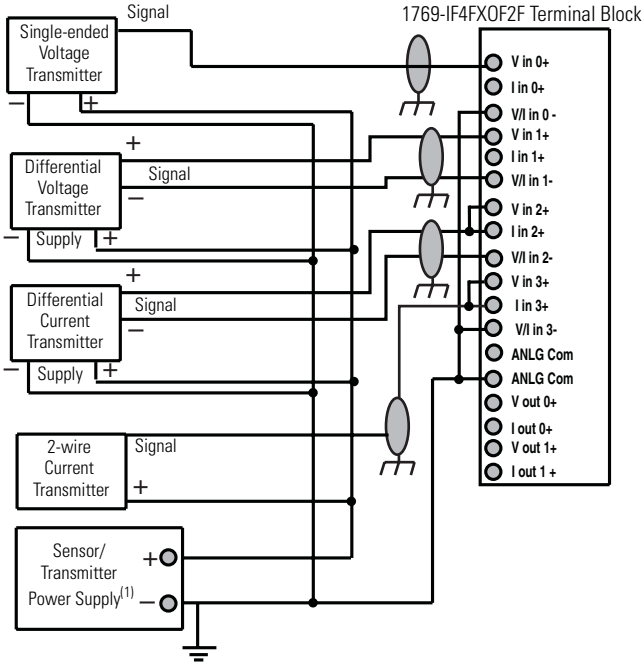
Wire Differential Inputs



Wire Single-ended Input Sensor/Transmitter Types



Wire Mixed-input Transmitter Types



(1) The sensor power supply must be rated Class 2.

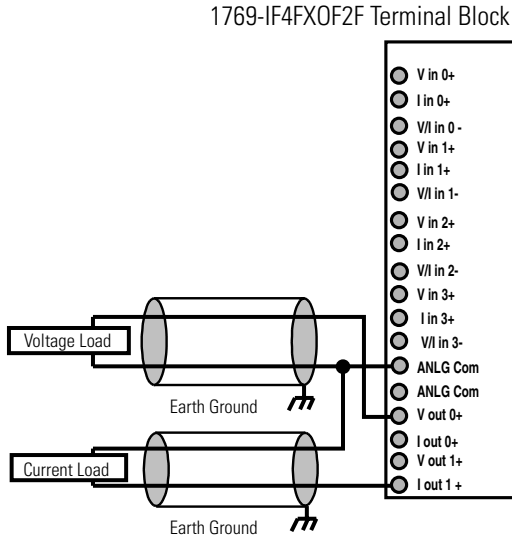
IMPORTANT

When wiring analog inputs from current transmitters, a jumper must be placed between the input channel's V_{IN+} and I_{IN+} terminals. Measurement accuracy of current input signals will be impacted if the jumper is not used.

TIP

Any analog input channel that is not wired to a voltage or current source should not be enabled in the module configuration file. Enabling unused analog inputs can result in non-zero values being displayed in the module input data file. Either disable all unused analog inputs or place a jumper wire between the V_{IN+} and V_{IIN-} terminals for those channels.

Wire Analog Outputs



ATTENTION



Analogue outputs may fluctuate for less than a second when power is applied or removed. This characteristic is common to most analogue outputs. While the majority of loads will not recognize this short signal, take preventive measures to ensure that connected equipment is not affected. Failure to take these preventative measures may result in unexpected load reactions.

Label the Terminals

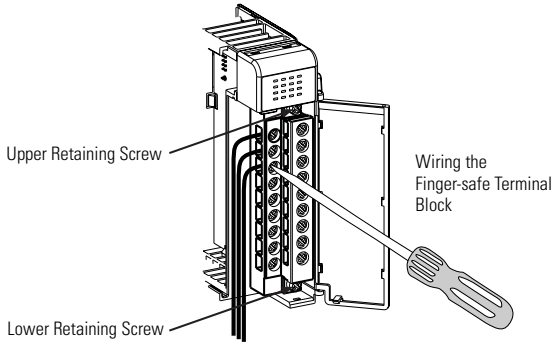
A removable, write-on label is provided with the module. Remove the label from the door, mark the identification of each terminal with permanent ink, and slide the label back into the door. Your markings (ID tag) will be visible when the module door is closed.

Remove the Finger-safe Terminal Block

When wiring field devices to the module, it is not necessary to remove the terminal block. If you remove the terminal block, use the write-on label on the side of the terminal block to identify the module slot location and type.



To remove the terminal block, loosen the upper and lower retaining screws. The terminal block will back away from the module as you remove the screws. When replacing the terminal block, torque the retaining screws to 0.46 Nm (4.1 in-lbs).



Wire the Finger-safe Terminal Block

When wiring the terminal block, keep the finger-safe cover in place.

1. Loosen the terminal screws to be wired.
2. Route the wire under the terminal pressure plate.

You can use the bare wire or a spade lug. The terminals will accept a 6.35 mm (0.25 in.) spade lug.

TIP

The terminal screws are non-captive. Therefore, it is possible to use a ring lug [maximum 1/4 inch o.d. with a 0.139 inch minimum i.d. (M3.5)] with the module.

3. Tighten the terminal screw making sure the pressure plate secures the wire. Recommended torque when tightening terminal screws is 0.68 Nm (6 in-lbs).

TIP

If you need to remove the finger-safe cover, insert a screw driver into one of the square wiring holes and gently pry the cover off. If you wire the terminal block with the finger-safe cover removed, you will not be able to put it back on the terminal block because the wires will be in the way.

Wire Size and Terminal Screw Torque

Each terminal accepts two wires with the following restrictions:

Wire Type		Wire Size	Terminal Screw Torque	Retaining Screw Torque
Solid	Cu-90°C (194°F)	#14...#22 AWG	0.68 Nm (6 in-lbs)	0.46 Nm (4.1 in-lbs)
Stranded	Cu-90°C (194°F)	#16...#22 AWG	0.68 Nm (6 in-lbs)	0.46 Nm (4.1 in-lbs)

Configure the 1769-IF4FXOF2F Module

The following I/O memory mapping lets you configure the 1769-IF4FXOF2F module.

Output Data File

For each module, slot x, words 0 and 1 in the output data file contain the control program's directed state of the module's analog output channels. Word 2 contains the cancel input channel alarm control bits. Word 3 contains the cancel output channel clamp control bits.

Word/Bit	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
Word 0	SGN	Analog Output Data Channel 0													0	0
Word 1	SGN	Analog Output Data Channel 1													0	0
Word 2	0	0	0	0	0	0	0	0	CL I3	CH I3	CL I2	CH I2	CL I1	CH I1	CL I0	CH I0
Word 3	0	0	0	0	0	0	0	0	0	0	0	0	CL O1	CH O1	CL O0	CH O0

The bits are defined as follows:

- SGN = Sign bit in 2's complement format.
- CHIx = Cancel High Process Alarm Latch for Input x: Allows each input high-process-alarm latch to be individually cancelled. NOTE: Cancel = 1.
- CLIx = Cancel Low Process Alarm Latch for Input x: Allows each input low-process-alarm latch to be individually cancelled. NOTE: Cancel = 1.
- CHOx = Cancel High Clamp Alarm Latch for Output x: Allows each output high-clamp-alarm latch to be individually cancelled. NOTE: Cancel = 1.
- CLOx = Cancel Low Clamp Alarm Latch for Output x: Allows each output low-clamp-alarm-latch to be individually cancelled. NOTE: Cancel = 1.

Input Data File

For each module, slot x, words 0...3 in the input data file contain the converted value of the module's analog input channels. Word 4 in the input data file contains the time stamp value corresponding to the module's last input data sampling period. Words 5 and 6 in the input data file contain status bits for the analog input channels. Word 7 in the input data file contains status bits for the analog output channels. Words 8 to 9 contain the directed values of the analog output channels (output data echo).

Word/Bit	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	
Word 0	SGN	Analog Read (Input) Data Value Channel 0														0	
Word 1	SGN	Analog Read (Input) Data Value Channel 1														0	
Word 2	SGN	Analog Read (Input) Data Value Channel 2														0	
Word 3	SGN	Analog Read (Input) Data Value Channel 3														0	
Word 4	0	Time Stamp Value															
Word 5	Nu	Nu	Nu	Nu	Nu	Nu	Nu	Nu	Nu	Nu	Nu	Nu	SI3	SI2	SI1	SI0	
Word 6	LI3	HI3	UI3	OI3	LI2	HI2	UI2	OI2	LI1	HI1	UI1	OI1	LI0	HI0	UI0	OI0	
Word 7	Nu	Nu	UO1	OO1	Nu	Nu	UO0	OO0	Nu	Nu	Nu	Nu	Nu	Nu	SO1	SO0	
Word 8	SGN	Output Data Loopback/Echo Channel 0														0	0
Word 9	SGN	Output Data Loopback/Echo Channel 1														0	0

The bits are defined as follows:

- SGN = Sign bit in 2's complement format.
- Nu = Not Used. Bit set to 0.
- SIx = General Status bit for input channels 0...3.
- OIx = Over range flag bits for input channels 0...3.
- UIx = Under range flag bits for input channels 0...3.
- HIx = High Alarm flag bits for input channels 0...3.
- LIx = Low Alarm flag bits for input channels 0...3.
- SOx = General Status bit for output channels 0...1.
- OOX = Over range flag bits for output channels 0...1.
- UOX = Under range flag bits for output channels 0...1.

Configuration Data File

The manipulation of bits from this file is normally done with programming software (for example, RSLogix 500 software or RSNetWorx for DeviceNet software) during initial configuration of the system. In that case, graphical screens provided by the programming software simplify configuration.

Some systems, like the 1769-ADN DeviceNet adapter system, also allow the bits to be altered as part of the control program using communication rungs. In that case, it is necessary to understand the bit arrangement.

Word/Bit	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
Word 0	0		Real Time Sample Value													
Word 1	ETS		Reserved													
Word 2	EC	Reserved				EA	AL	EI	Reserved				Input Filter Sel ChI0			
Word 3	Reserved				Input Dta Fm ChI0			Reserved				Inpt Tp/Rnge Sel ChI0				
Word 4	SGN	Process Alarm High Data Value Channel 0														0
Word 5	SGN	Process Alarm Low Data Value Channel 0														0
Word 6	SGN	Alarm Dead Band Value Channel 0														0
Word 7	Reserved															
Word 8	EC	Reserved				EA	AL	EI	Reserved				Input Filter Sel ChI1			
Word 9	Reserved				Input Dta Fm ChI1			Reserved				Inpt Tp/Rnge Sel ChI1				
Word 10	SGN	Process Alarm High Data Value Channel 1														0
Word 11	SGN	Process Alarm Low Data Value Channel 1														0
Word 12	SGN	Alarm Dead Band Value Channel 1														0
Word 13	Reserved															
Word 14	EC	Reserved				EA	AL	EI	Reserved				Input Filter Sel ChI2			
Word 15	Reserved				Input Dta Fm ChI2			Reserved				Inpt Tp/Rnge Sel ChI2				
Word 16	SGN	Process Alarm High Data Value Channel 2														0
Word 17	SGN	Process Alarm Low Data Value Channel 2														0
Word 18	SGN	Alarm Dead Band Value Channel 2														0
Word 19	Reserved															
Word 20	EC	Reserved				EA	AL	EI	Reserved				Input Filter Sel ChI3			
Word 21	Reserved				Input Dta Fm ChI3			Reserved				Inpt Tp/Rnge Sel ChI3				

Word 22	SGN	Process Alarm High Data Value Channel 3										0	
Word 23	SGN	Process Alarm Low Data Value Channel 3										0	
Word 24	SGN	Alarm Dead Band Value Channel 3										0	
Word 25	Reserved												
Word 26	EC	Reserved				EHI	ELI	LC	ER	FM	PM	0	PFE
Word 27	Reserved			Outpt Fm ChI0	Reserved				Outpt Tp/Rnge Sel ChI0				
Word 28	SGN	Fault Value Channel 0									0	0	
Word 29	SGN	Program (Idle) Value Channel 0									0	0	
Word 30	SGN	Clamp High Data Value Channel 0									0	0	
Word 31	SGN	Clamp Low Data Value Channel 0									0	0	
Word 32	SGN	Ramp Rate Channel 0									0	0	
Word 33	Reserved												
Word 34	EC	Reserved				EHI	ELI	LC	ER	FM	PM	0	PFE
Word 35	Reserved			Outpt Fm ChI1	Reserved				Outpt Tp/Rnge Sel ChI1				
Word 36	SGN	Fault Value Channel 1									0	0	
Word 37	SGN	Program (Idle) Value Channel 1									0	0	
Word 38	SGN	Clamp High Data Value Channel 1									0	0	
Word 39	SGN	Clamp Low Data Value Channel 1									0	0	
Word 40	SGN	Ramp Rate Channel 1									0	0	
Word 41	Reserved												

The bits are defined as follows:

- SGN = Sign bit in 2's complement format.
- Real Time Sample Value = Provides the ability to configure the Real Time Sample Rate.
- ETS = Enable Time Stamping.
- EC = Enable Channel.
- EA = Enable Alarm.
- AL = Alarm Latch.
- EI = Enable Input Process Alarm Interrupt.
- Inpt Filter Sel ChIx = Input Channel Filter Setting.
- Inpt Dta Fm ChIx = Input Data Format Select.
- Inpt Tp/Rnge Sel ChIx = Input Type/Range Select.

- Process Alarm High Data Value Channel x = Provides the ability to configure the Input Process Alarm High Value.
- Process Alarm Low Data Value Channel x = Provides the ability to configure the Input Process Alarm Low Value.
- Alarm Dead Band Value Channel x = Provides the ability to configure the Input Process Dead Band Value.
- Reserved = Bits not used, must be set to 0.
- EHI = Enable Output Channel Interrupt on High Clamp Alarm.
- ELI = Enable Output Channel Interrupt on Low Clamp Alarm.
- LC = Latch Low/High Clamp and Under/Over Range Alarm.
- ER = Enable Ramping.
- FM = Enable Fault Alternate Output State mode.
- PM = Enable Program/Idle Alternate Output State mode.
- PFE = Enable Program/Idle to Fault Alternate Output State mode.
- Outpt Fm ChIx = Output Data Format Select.
- Outpt Tp/Rnge Sel ChIx = Output Type/Range Select.
- Ramp Rate Channel x = Provides the ability to configure the Ramp Rate.

Define	To Select	Make these bit settings															
		15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
Input Filter Selection / -3 dB Frequency	60 Hz													0	0	0	0
	50 Hz													0	0	0	1
	5 Hz													0	0	1	0
	10 Hz													0	0	1	1
	100 Hz													0	1	0	0
	250 Hz													0	1	0	1
	500 Hz													0	1	1	0
	1000 Hz													0	1	1	1
	No Filter													1	0	0	0

Define	To Select	Make these bit settings															
		15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
Input Type / Range Select	-10 to +10V dc												0	0	0	0	
	0 to 5V dc												0	0	0	1	
	0 to 10V dc												0	0	1	0	
	4 to 20 mA												0	0	1	1	
	1 to 5V dc												0	1	0	0	
	0 to 20 mA												0	1	0	1	
Input Data Format Select	Raw/ Proportional Counts						0	0	0								
	Engineering Units						0	0	1								
	Scaled for PID						0	1	0								
	Percent Range						0	1	1								

Define	To Select	Make these bit settings															
		15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
Output Type / Range Select	-10 to +10V dc												0	0	0	0	
	0 to 5V dc												0	0	0	1	
	0 to 10V dc												0	0	1	0	
	4 to 20 mA												0	0	1	1	
	1 to 5V dc												0	1	0	0	
	0 to 20 mA												0	1	0	1	
Output Data Format Select	Raw/ Proportional Counts						0	0	0								
	Engineering Units						0	0	1								
	Scaled for PID						0	1	0								
	Percent Range						0	1	1								

Specifications

Compact Combination Fast Analog I/O Module - 1769-IF4FX0F2F

Attribute	Value
Dimensions (HxWxD), Approx.	118 mm (height) x 87 mm (depth) x 35 mm (width) Height including mounting tabs is 138 mm (5.43 in.) 4.65 in. (height) x 3.43 in (depth) x 1.38 in (width) Height including mounting tabs is 138 mm (5.43 in.)
Approximate Shipping Weight (with carton)	290 g (0.64 lbs.)
Storage Temperature	-40 °C to +85 °C (-40 °F to +185 °F)
Operating Temperature	0 °C to +60 °C (32 °F to +140 °F)
Operating Humidity	5% to 95% non-condensing
Operating Altitude	2000 m (6561 ft)
Vibration	Operating: 10 to 500 Hz, 5 G, 0.030 in. peak-to-peak
Shock	Operating: 30 G, 11 ms panel mounted (20G, 11 ms DIN rail mounted) Non-Operating: 40G panel mounted (30G DIN rail mounted)
Bus Current Draw, max.	220 mA at 5V dc 120 mA at 24V dc ⁽¹⁾
Heat Dissipation	3.39 Total Watts (<i>The Watts per point plus the minimum Watts with all points energized.</i>)
Module OK LED	On: module has power, has passed internal diagnostics, and is communicating over the bus. Off: Any of the above is not true.
System Power Supply Distance Rating	The module may not be more than 8 modules away from the system power supply.
Recommended Cable	Belden™ 8761 (shielded)
Vendor I.D. Code	1
Product Type Code	10
Product Code	43
Input Words	10
Output Words	4
Configuration Words	42

⁽¹⁾ If the optional 24V dc Class 2 power supply is used, the 24V dc current draw from the bus is 0 mA.

Certifications

Certification	Value
Agency Certification	<ul style="list-style-type: none"> • C-UL certified (under CSA C22.2 No. 142) • UL 508 listed • CE compliant for all applicable directives
Hazardous Environment Class	Class I, Division 2, Hazardous Location, Groups A, B, C, D (UL 1604, C-UL under CSA C22.2 No. 213)
Radiated and Conducted Emissions	EN50081-2 Class A
<i>Electrical /EMC:</i>	The module has passed testing at the following levels:
<ul style="list-style-type: none"> • ESD Immunity (IEC1000-4-2) 	<ul style="list-style-type: none"> • 4 kV contact, 8 kV air, 4 kV indirect
<ul style="list-style-type: none"> • Radiated Immunity (IEC1000-4-3) 	<ul style="list-style-type: none"> • 10 V/m, 80...1000 MHz, 80% amplitude modulation, +900 MHz keyed carrier
<ul style="list-style-type: none"> • Fast Transient Burst (IEC1000-4-4) 	<ul style="list-style-type: none"> • 2 kV, 5 kHz
<ul style="list-style-type: none"> • Surge Immunity (IEC1000-4-5) 	<ul style="list-style-type: none"> • 1 kV galvanic gun
<ul style="list-style-type: none"> • Conducted Immunity (IEC1000-4-6) 	<ul style="list-style-type: none"> • 10V dc, 0.15...80 MHz⁽¹⁾

⁽¹⁾ Conducted Immunity frequency range may be 150 kHz...30 MHz if the Radiated Immunity frequency range is 30 MHz...1000 MHz.

Output Specifications

Attribute	Value
Analog Normal Operating Ranges ⁽¹⁾	0...20 mA, 4...20 mA, +/-10V dc, 0...10V dc, 0...5 V dc, 1...5V dc
Full Scale Analog Ranges ⁽¹⁾	0...21 mA, 3.2...21 mA, +/-10.5V dc, -0.5...10.5V dc, -0.5...5.25V dc, 0.5...5.25V dc
Number of Outputs	Two single-ended
Digital Resolution Across Full Range	13 bits unipolar, 13 bits plus sign bipolar
Conversion Rate (all channels) max.	1 ms
Step Response to 63% ⁽²⁾	2.0 ms
Resistive Load	Current: 0...500 Ω (includes wire resistance) Voltage: 1 KΩ or greater
Max. Inductive Load	0.1 mH (current loads), 1.0 uF (voltage loads)
Field Calibration	None required
Overall Accuracy ⁽³⁾	0.2% full scale at 25 °C

⁽¹⁾ The over- or under-range flag will come on when the normal operating range (over/under) is exceeded. The module will continue to convert the analog input up to the maximum full scale range. The flag automatically resets when within the normal operating range unless configured to latch.

⁽²⁾ Step response is the period of time between when the D/A converter was instructed to go from minimum to full range until the device is at 63% of full range.

⁽³⁾ Includes offset, gain, drift, non-linearity and repeatability error terms.

Attribute	Value
Accuracy Drift with Temperature	Current load: $\pm 0.0058\%$ FS per $^{\circ}\text{C}$ Voltage load: $\pm 0.0086\%$ FS per $^{\circ}\text{C}$
Output Ripple ⁽¹⁾ range 0 to 50 kHz (referred to output range)	$\pm 0.05\%$
Non-linearity (in percent full scale)	$\pm 0.05\%$
Repeatability ⁽²⁾ (in percent full scale)	$\pm 0.05\%$
Output Error Over Full Temperature Range (0 to 60°C [$+32$ to $+140^{\circ}\text{F}$])	Current: $\pm 0.4\%$ of full scale Voltage: $\pm 0.3\%$ of full scale
Open and Short-Circuit Protection	Yes
Maximum Short-Circuit Current	50 mA
Output Overvoltage Protection	Yes
Rated Working Voltage	30V ac/30V dc
Output Group to Bus Isolation	500V ac or 710V dc for 1 minute (qualification test) 30V ac/30V dc working voltage (IEC Class 2 reinforced insulation)
Channel Diagnostics	High or Low Clamps Limit Exceeded, by status bit reporting

⁽¹⁾ Output ripple is the amount a fixed output varies with time, assuming a constant load and temperature.

⁽²⁾ Repeatability is the ability of the output module to reproduce output readings when the same controller value is applied to it consecutively, under the same conditions and in the same direction.

Input Specifications

Attribute	Value
Analog Normal Operating Ranges ⁽¹⁾	Voltage: $\pm 10V$ dc, 0 to 10V dc, 0 to 5V dc, 1 to 5V dc Current: 0 to 20 mA, 4 to 20 mA
Full Scale Analog Ranges ⁽¹⁾	Voltage: $\pm 10.5V$ dc, -0.5 to 10.5V dc, -0.5 to 5.25V dc, 0.5 to 5.25V dc Current: 0 to 21 mA, 3.2 to 21 mA
Number of Inputs	Four differential or single-ended
Converter Type	Successive Approximation
Response Speed per Channel	Input filter and configuration dependent. See your user's manual.
Resolution (max.) ⁽²⁾	14 bits (unipolar) 14 bits plus sign (bipolar)
Rated Working Voltage ⁽³⁾	30V ac/30V dc
Common Mode Voltage Range ⁽⁴⁾	$\pm 10V$ dc maximum per channel
Common Mode Rejection	greater than 70 dB at 50 and 60 Hz with the 10 Hz filter selected, respectively.
Input Impedance	Voltage Terminal: 220K Ω (typical) Current Terminal: 250 Ω
Overall Accuracy ⁽⁵⁾	Voltage Terminal: 0.15% full scale at 25 °C Current Terminal: 0.2% full scale at 25 °C

⁽¹⁾ The over- or under-range flag will come on when the normal operating range (over/under) is exceeded. The module will continue to convert the analog input up to the maximum full scale range. The flag automatically resets when within the normal operating range.

⁽²⁾ Resolution is dependent upon your filter selection.

⁽³⁾ Rated working voltage is the maximum continuous voltage that can be applied at the input terminal, including the input signal and the value that floats above ground potential (for example, 10V dc input signal and 20V dc potential above ground).

⁽⁴⁾ For proper operation, both the plus and minus input terminals must be within $\pm 10V$ dc of analog common.

⁽⁵⁾ Includes offset, gain, non-linearity and repeatability error terms.

Attribute	Value
Accuracy Drift with Temperature	Voltage Terminal: $\pm 0.003\%$ per $^{\circ}\text{C}$ Current Terminal: $\pm 0.0045\%$ per $^{\circ}\text{C}$
Calibration	None required
Non-linearity (in percent full scale)	$\pm 0.03\%$
Repeatability ⁽¹⁾	$\pm 0.03\%$
Module Error over Full Temperature Range (0 to $+60^{\circ}\text{C}$ [$+32^{\circ}\text{F}$ to $+140^{\circ}\text{F}$])	Voltage: 0.2% Current: 0.3%
Channel Diagnostics	Over- or under-range by bit reporting, process alarms
Maximum Overload at Input Terminals ⁽²⁾	Voltage Terminal: $\pm 30\text{V}$ dc continuous, 0.1 mA Current Terminal: ± 32 mA continuous, ± 7.6 V dc
Input Group to Bus Isolation	500V ac or 710V dc for 1 minute (qualification test) 30V ac/30V dc working voltage (IEC Class 2 reinforced insulation)

⁽¹⁾ Repeatability is the ability of the input module to register the same reading in successive measurements for the same input signal.

⁽²⁾ Damage may occur to the input circuit if this value is exceeded.

Additional Resources

For more information refer to the following publications.

Resource	Description
1768 CompactLogix Controllers User Manual, publication number 1768-UM001	Detailed description of how to install and use your 1768 CompactLogix controller.
MicroLogix 1200 and MicroLogix 1500 Programmable Controllers User Manual, publication number 1764-RM001	Detailed description of how to install and use your Compact I/O with MicroLogix 1200/1500 programmable controllers
1769-ADN DeviceNet Adapter User Manual, publication number 1769-UM001	Detailed description of how to install and use your Compact I/O system with the 1769-ADN DeviceNet adapter
CompactLogix System User Manual, publication number 1769-UM007	Detailed description of how to install and use your Compact I/O system with the CompactLogix system
Industrial Automation Wiring and Grounding Guidelines, publication number, publication number 1770-4.1	More information on proper wiring and grounding techniques

You can view or download publications at <http://literature.rockwellautomation.com>. To order paper copies of technical documentation, contact your local Rockwell Automation distributor or sales representative.

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