



## FLEX I/O 220V ac Digital Input and Output Modules

Cat. No. 1794-IM8, -OM8

### 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://www.ab.com/manuals/gi>) 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 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.



#### IMPORTANT

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

#### ATTENTION

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



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

#### WARNING

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



#### ATTENTION

FLEX I/O is grounded through the DIN rail to chassis ground. Use zinc plated yellow-chromate steel DIN rail to assure proper grounding. The use of other DIN rail materials (e.g. aluminum, plastic, etc.) that can corrode, oxidize, or are poor conductors, can result in improper or intermittent grounding.



#### ATTENTION



#### Environment and Enclosure

This equipment is intended for use in a Pollution Degree 2 industrial environment, in overvoltage Category II applications (as defined in IEC publication 60664-1), at altitudes up to 2000 meters without derating.

This equipment is considered Group 1, Class A industrial equipment according to IEC/CISPR Publication 11. Without appropriate precautions, there may be potential difficulties ensuring electromagnetic compatibility in other environments due to conducted as well as radiated disturbance.

This equipment is supplied as "open type" equipment. It must be mounted within an enclosure that is suitably designed for those specific environmental conditions that will be present and appropriately designed to prevent personal injury resulting from accessibility to live parts. The interior of the enclosure must be accessible only by the use of a tool. Subsequent sections of this publication may contain additional information regarding specific enclosure type ratings that are required to comply with certain product safety certifications.

See NEMA Standards publication 250 and IEC publication 60529, as applicable, for explanations of the degrees of protection provided by different types of enclosure. Also, see the appropriate sections in this publication, as well as the Allen-Bradley publication 1770-4.1 ("Industrial Automation Wiring and Grounding Guidelines"), for additional installation requirements pertaining to this equipment.

#### ATTENTION



#### Preventing Electrostatic Discharge

This equipment is sensitive to electrostatic discharge, which can cause internal damage and affect normal operation. Follow these guidelines when you handle this equipment:

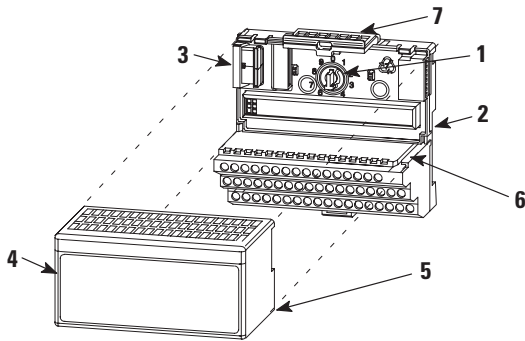
- Touch a grounded object to discharge potential static.
- Wear an approved grounding wriststrap.
- Do not touch connectors or pins on component boards.
- Do not touch circuit components inside the equipment.
- If available, use a static-safe workstation.

### North American Hazardous Location Approval

The following modules are North American Hazardous Location approved: 1794-IM8 and 1794-OM8.

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

### Installing Your 220V ac Digital Input or Output Module



The module mounts on a 1794 terminal base.

**ATTENTION**

During mounting of all devices, be sure that all debris (metal chips, wire strands, etc.) is kept from falling into the module. Debris that falls into the module could cause damage on power up.



1. Rotate the keyswitch (1) on the terminal base (2) clockwise to position 8 as required for this type of module.
2. Make certain the flexbus connector (3) is pushed all the way to the left to connect with the neighboring terminal base/adaptor. **You cannot install the module unless the connector is fully extended.**
3. Make sure the pins on the bottom of the module are straight so they will align properly with the connector in the terminal base.

**WARNING**

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



4. Position the module (4) with its alignment bar (5) aligned with the groove (6) on the terminal base.
5. Press firmly and evenly to seat the module in the terminal base unit. The module is seated when the latching mechanism (7) is locked into the module.

### Connecting Wiring for the 1794-IM8 and -OM8

1. Connect individual input or output wiring to numbered terminals on row (B) as indicated in the table below.
2. **1794-IM8:** Connect the associated 220V ac L1 power lead of the input device to the corresponding odd numbered terminal (C-1, 3, 5, 7, 9, 11, 13, or 15) on row (C) for each input as indicated in the table below. (The 220V L1 power terminals of row (C) are internally connected together.)  
**1794-OM8:** Connect the associated 220V ac common L2 lead of the output device to the corresponding odd numbered terminal (C-1, 3, 5, 7, 9, 11, 13, or 15) on row (C) as indicated in the table below. (The 220V L2 commons of odd numbered terminals on row (C) are internally connected together.)
3. Connect 220V ac power (L1) to terminal 34 on the row (C).
4. Connect 220V ac common (L2) to terminal 16 on the row (B).

5. If daisy chaining L1 power to the next terminal base, connect a jumper from terminal 51 (220V ac L1) on this base unit to terminal 34 on the next base unit.
6. If continuing 220V ac common (L2) to the next base unit, connect a jumper from terminal 33 (220V common L2) on this base unit to terminal 16 on the next base unit.

### Wiring Connections for the 1794-IM8 and -OM8

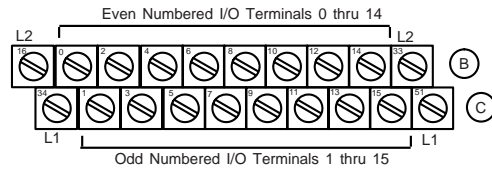
Input <sup>1</sup>	1794-IM8		Output	1794-OM8	
	Input Terminal	220V ac Supply		Output Terminal	Common
Input 0	B-0	C-1 <sup>1</sup>	Output 0	B-0	C-1 <sup>2</sup>
Input 1	B-2	C-3 <sup>1</sup>	Output 1	B-2	C-3 <sup>2</sup>
Input 2	B-4	C-5 <sup>1</sup>	Output 2	B-4	C-5 <sup>2</sup>
Input 3	B-6	C-7 <sup>1</sup>	Output 3	B-6	C-7 <sup>2</sup>
Input 4	B-8	C-9 <sup>1</sup>	Output 4	B-8	C-9 <sup>2</sup>
Input 5	B-10	C-11 <sup>1</sup>	Output 5	B-10	C-11 <sup>2</sup>
Input 6	B-12	C-13 <sup>1</sup>	Output 6	B-12	C-13 <sup>2</sup>
Input 7	B-14	C-15 <sup>1</sup>	Output 7	B-14	C-15 <sup>2</sup>

B = Even numbered Input terminals 0-14, ac common terminals 16 and 33  
C = Power terminals C-34 and C-51, and odd numbered input terminals 1 thru 15

B = Even numbered Output terminals 0-14, ac common terminals 16 and 33  
C = Power terminals C-34 and C-51, and odd numbered terminals 1-15 on row C.

<sup>1</sup> C-1, 3, 5, 7, 9, 11, 13 and 15 on the 1794-TBN are internally connected in the module to 220V ac L1.  
<sup>2</sup> C-1, 3, 5, 7, 9, 11, 13 and 15 on the 1794-TBN are internally connected in the module to 220V ac common L2.

### 1794-TBN or -TBNF Terminal Base Wiring for 1794-IM8 and 1794-OM8



L1 = 220V ac power - Connect to terminal C-34 (1794-TBN shown)  
L2 = 220V ac common - Connect to terminal B-16  
Use B-33 and C-51 for daisy chaining to the next terminal base unit

### Configuring Your ac Module

#### Image Table Memory Map for the 1794-IM8

Dec.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Oct.	17	16	15	14	13	12	11	10	7	6	5	4	3	2	1	0
Read	Not used - set to 0								17	16	15	14	13	12	11	10
Write	Not used - set to 0								Filter Time FT							

Where I = Input status  
FT = Input filter time.

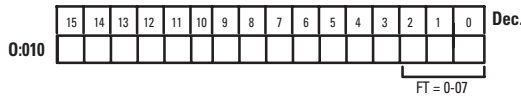
#### Image Table Memory Map for the 1794-OM8

Dec.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Oct.	17	16	15	14	13	12	11	10	7	6	5	4	3	2	1	0
Read	Not used - set to 0															
Write	Not used - set to 0								0	0	0	0	0	0	0	0
Where									7	6	5	4	3	2	1	0

Where 0 = Output status

### Setting the 1794-IM8 Input Filter Time

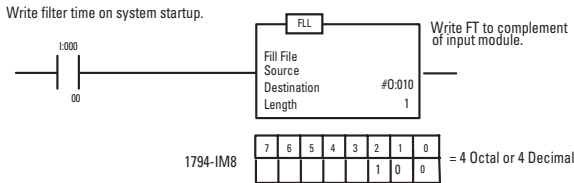
To select your input filter time (FT) for channels 00-07, set the corresponding bits in the output image table (complementary word) for the module.



### Input Filter Time for the 1794-IM8

Bits			Description	Selected Filter Time	Maximum Filter Time (ms)	
02	01	00			Off to On	On to Off
0	0	0	Filter Time 0 (Default)	256µs	7.5	26.5
0	0	1	Filter Time 1	512µs	8	27
0	1	0	Filter Time 2	1ms	9	28
0	1	1	Filter Time 3	2ms	10	29
1	0	0	Filter Time 4	4ms	12	31
1	0	1	Filter Time 5	8ms	16	35
1	1	0	Filter Time 6	16ms	24.5	44
1	1	1	Filter Time 7	32ms	42	60.5

For example, setting bits 00, 01 and 02 as shown below sets the off-to-on filter time for inputs 00 thru 07 to 12ms. For other settings, refer to the Input Filter Time table above.



### Specifications

Specifications	220V ac Input Module, Cat. No. 1794-IM8
Number of Inputs	8, (1 group of 8), nonisolated
Module Location	Cat. No. 1794-TBN
Module Mounting	See Derating Curve
On-state Voltage	159V ac minimum 220V ac nominal 264V ac maximum
On-state Current	5.27mA minimum @ 159V ac, 47Hz 9.88mA nominal @ 220V ac, 60Hz 13.21mA maximum @ 264V ac, 63Hz
Off-state Voltage	40V ac maximum
Off-state Current	2.6mA maximum
Input Impedance	22.3K ohms nominal
Nominal Input Current	10mA @ 220V ac, 60Hz
Isolation Voltage	Tested at 2600V dc for 1s between user and system No isolation between individual channels No isolation between customer power and input channels
Input Filter Time <sup>1</sup>	Refer to Input Filter Time table
Flexbus Current	30mA @5V dc
Power Dissipation	4.7W maximum @ 264V ac
Thermal Dissipation	Maximum 16.2 BTU/hr @ 264V ac

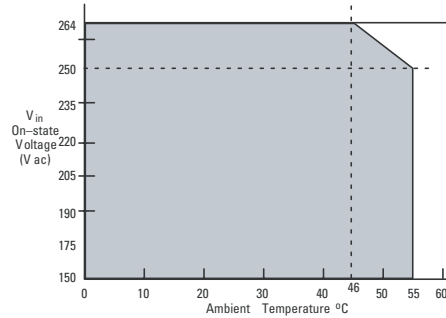
Specifications	220V ac Output Module Cat. No. 1794-OM8
Number of Outputs	8, (1 group of 8), nonisolated
Module Location	Cat. No. 1794-TBN, -TBNF
Module Mounting	See Derating Curve
Output Current Rating	4.0A (8 outputs @ 500mA)
On-state Current	50mA per output minimum 500mA per output maximum @ 55°C
On-state Voltage Drop	maximum 1.5V ac @ 0.5A
Surge Current	7A for 40ms, repeatable every 8s
Off-state leakage	2.5mA maximum
Isolation Voltage	Tested at 2600V dc for 1s between user and system No isolation between individual channels No isolation between customer power and output channels
Output Signal Delay Time <sup>2</sup> Off to On On to Off	1/2 cycle maximum 1/2 cycle maximum
Flexbus Current	60mA @5V dc
Power Dissipation	5.0W maximum @ 0.5A
Thermal Dissipation	Maximum 17.1 BTU/hr @ 0.5A
Fusing (when using the 1794-TBNF) <sup>3</sup>	0.8A, 250 slow-blow fuse (5 X 20mm SAN-O MQ4-800mA)

### General Specifications

Terminal Base Screw Torque	9 pound-inches (1.0Nm)
Dimensions (with module installed)	3.7H x 3.7W x 2.7D inches 94H x 94W x 69D mm
Indicators (field side indication, customer device driven)	1794-IM8 - 8 yellow status indicators, customer device driven 1794-OM8 - 8 yellow status indicators, logic driven
External ac power Supply voltage Input Frequency Voltage range	220V ac nominal 47-63Hz 159 to 264V ac Refer to Derating Curves below.
Keyswitch Position	8
Environmental Conditions	
Operating Temperature	IEC 60068-2-1 (Test Ad, Operating Cold), IEC 60068-2-2 (Test Bd, Operating Dry Heat), IEC 60068-2-14 (Test Nb, Operating Thermal Shock): 0 to 55°C (32 to 131°F)
Storage Temperature	IEC 60068-2-1 (Test Ab, Un-packaged Non-operating Cold), IEC 60068-2-2 (Test Bb, Un-packaged Non-operating Dry Heat), IEC 60068-2-14 (Test Na, Un-packaged Non-operating Thermal Shock): -40 to 85°C (-40 to 185°F)
Relative Humidity	IEC 60068-2-30 (Test Db, Un-packaged Non-operating Damp Heat): 5 to 95% non-condensing
Vibration	IEC60068-2-6 (Test Fc, Operating): 5g @ 10-500Hz
Shock	IEC60068-2-27 (Test Ea, Unpackaged shock): Operating 30g Non-operating 50g
Emissions	CISPR 11: Group 1, Class A (with appropriate enclosure)
ESD Immunity	IEC 61000-4-2: 4kV contact discharges 8kV air discharges
Radiated RF Immunity	IEC 61000-4-3: 10V/m with 1kHz sine-wave 80%AM from 30MHz to 1000MHz 10V/m with 200Hz 50% Pulse 100%AM at 900MHz
EFT/B Immunity	IEC 61000-4-4: ±2kV at 5kHz on signal ports ±2kV at 5kHz on power ports
Surge Transient Immunity	IEC 61000-4-5: ±1kV line-line(DM) and ±2kV line-earth(CM) on signal ports ±1kV line-line(DM) and ±2kV line-earth(CM) on power ports
Conducted RF Immunity	IEC 61000-4-6: 10Vrms with 1kHz sine-wave 80%AM from 150kHz to 80MHz
Enclosure Type Rating	None (open-style)

Conductors	Wire Size	12 to 22AWG (4 to 0.25mm <sup>2</sup> ) stranded copper wire rated at 60°C or higher 3/64 inch (1.2mm) insulation maximum
	Category <sup>4</sup>	2
Certifications (when product is marked) <sup>5</sup>	UL	UL Listed Industrial Control Equipment
	CSA	CSA certified for Class I, Division 2, Groups A, B, C and D Hazardous locations
	CE <sup>5</sup>	European Union 89/336/EEC EMC Directive, compliant with: EN 61000-6-4; Industrial Emissions EN 50082-2; Industrial Immunity EN 61326; Meas./Control/Lab., Industrial Requirements EN 61000-6-2; Industrial Immunity European Union 73/23/EEC LVD Directive, compliant with: EN 61131-2; Programmable Controllers
	C-Tick <sup>5</sup>	Australian Radiocommunications Act compliant with AS/NZS CISPR 11, Industrial Emissions
1	Input off-to-on filter time is the time from a valid input signal to recognition by the module. Input on-to-off filter time is time from the input signal dropping below the valid level to recognition by the module.	
2	Delay time is the time from the receipt of an output on or off command to the output actually turning on or off.	
3	Module outputs are not fused. We recommend that outputs be fused. If not using the 1794-TBNF, and fusing is desired, it must be provided externally.	
4	You use this category information for planning conductor routing as described in Allen-Bradley publication 1770-4.1, Industrial Automation Wiring and Grounding Guidelines.	
5	For the latest up-to-date information, see the Product Certification link at www.ab.com for Declarations of Conformity, Certificates and other certification details. For notification of any additional release notes, refer to www.ab.com/manuals/.	

## 1794-IM8 Derating Curve

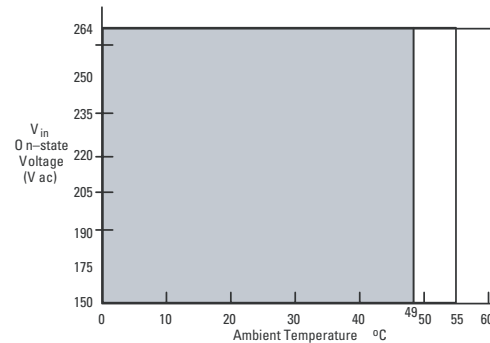


The area within the curve represents the safe operating range for the module under various conditions of user supplied 220V ac supply voltages and ambient temperatures.

■ = All mounting positions (including normal horizontal, vertical, inverted horizontal) safe operating range

Voltage (maximum)	Temperature (maximum)
264	46
250	55

## 1794-OM8 Derating Curve



The area within the curve represents the safe operating range for the module under various conditions of user supplied 220V ac supply voltages and ambient temperatures.

□ = Normal mounting safe operating range. Includes ■

■ = Other mounting positions (including inverted horizontal, vertical) safe operating range

Mounting	Temperature (maximum)
normal horizontal	55
Other mounting positions (including inverted horizontal, vertical)	49

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