



## 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:

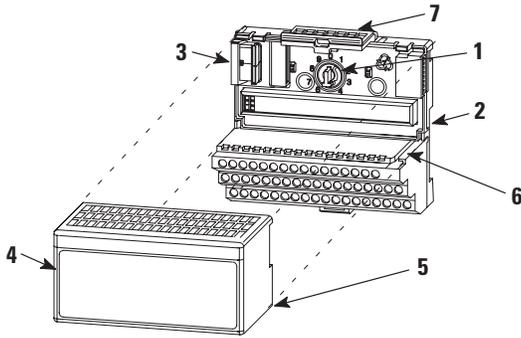
- Touch a grounded object to discharge potential static.
- Wear an approved grounding wriststrap.
- Do not touch connectors or pins on component boards.
- Do not touch circuit components inside the equipment.
- If available, use a static-safe workstation.

### 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 :   |
|--|--|
| 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.  | 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.   |
| <b>WARNING</b><br> <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> | <b>AVERTISSEMENT</b><br> <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> |
| <b>EXPLOSION HAZARD</b>  | <b>RISQUE D'EXPLOSION</b>  |

### 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

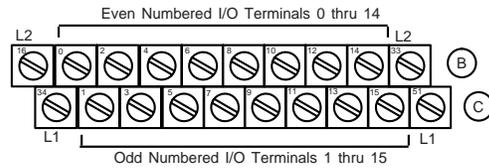
| Input <sup>1</sup> | 1794-IM8       |                   | Output   | 1794-OM8        |                   |
|--------------------|----------------|-------------------|----------|-----------------|-------------------|
|                    | Input Terminal | 220V ac Supply    |          | 1794-TBN, -TBNF | Output Terminal   |
| 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.

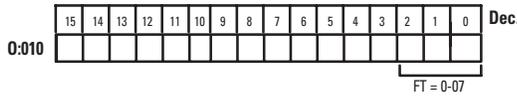
#### Image Table Memory Map for the 1794-OM8

| 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  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|       | 7                   | 6  | 5  | 4  | 3  | 2  | 1  | 0  |   |   |   |   |   |   |   |   |

Where 0 = Output status

### Setting the 1794-IM8 Input Filter Time

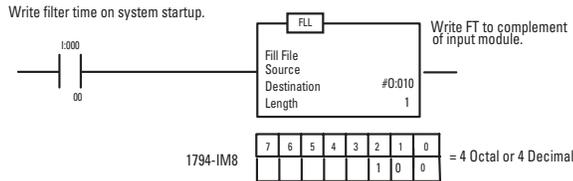
To select your input filter time (FT) for channels 00-07, set the corresponding bits in the output image table (complementary word) for the module.



### 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<br>220V ac nominal<br>264V ac maximum   |
| On-state Current               | 5.27mA minimum @ 159V ac, 47Hz<br>9.88mA nominal @ 220V ac, 60Hz<br>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<br>No isolation between individual channels<br>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<br>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<br>No isolation between individual channels<br>No isolation between customer power and output channels |
| Output Signal Delay Time <sup>2</sup><br>Off to On<br>On to Off | 1/2 cycle maximum<br>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<br>(5 X 20mm SAN-O MQ4-800mA)   |

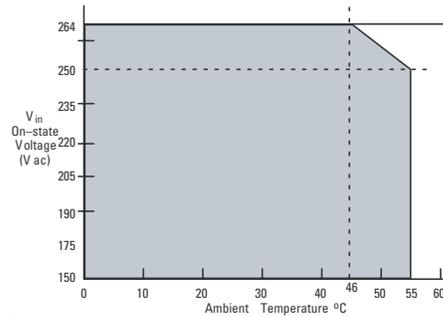
### General Specifications

|  |  |
|--|--|
| Terminal Base Screw Torque   | 9 pound-inches (1.0Nm)   |
| Dimensions (with module installed)                                   | 3.7H x 3.7W x 2.7D inches<br>94H x 94W x 69D mm  |
| Indicators (field side indication, customer device driven)           | 1794-IM8 - 8 yellow status indicators, customer device driven<br>1794-OM8 - 8 yellow status indicators, logic driven   |
| External ac power Supply voltage<br>Input Frequency<br>Voltage range | 220V ac nominal<br>47-63Hz<br>159 to 264V ac<br>Refer to Derating Curves below.  |
| Keyswitch Position   | 8  |
| Environmental Conditions   |  |
| Operating Temperature  | IEC 60068-2-1 (Test Ad, Operating Cold),<br>IEC 60068-2-2 (Test Bd, Operating Dry Heat),<br>IEC 60068-2-14 (Test Nb, Operating Thermal Shock):<br>0 to 55°C (32 to 131°F)  |
| Storage Temperature  | IEC 60068-2-1 (Test Ab, Un-packaged Non-operating Cold),<br>IEC 60068-2-2 (Test Bb, Un-packaged Non-operating Dry Heat),<br>IEC 60068-2-14 (Test Na, Un-packaged Non-operating Thermal Shock):<br>-40 to 85°C (-40 to 185°F) |
| Relative Humidity  | IEC 60068-2-30 (Test Db, Un-packaged Non-operating Damp Heat):<br>5 to 95% non-condensing  |
| Vibration  | IEC60068-2-6 (Test Fc, Operating):<br>5g @ 10-500Hz  |
| Shock  | IEC60068-2-27 (Test Ea, Unpackaged shock):<br>Operating 30g<br>Non-operating 50g   |
| Emissions  | CISPR 11:<br>Group 1, Class A (with appropriate enclosure)   |
| ESD Immunity   | IEC 61000-4-2:<br>4kV contact discharges<br>8kV air discharges   |
| Radiated RF Immunity   | IEC 61000-4-3:<br>10V/m with 1kHz sine-wave 80%AM from 30MHz to 1000MHz<br>10V/m with 200Hz 50% Pulse 100%AM at 900MHz   |
| EFT/B Immunity   | IEC 61000-4-4:<br>±2kV at 5kHz on signal ports<br>±2kV at 5kHz on power ports  |
| Surge Transient Immunity   | IEC 61000-4-5:<br>±1kV line-line(DM) and ±2kV line-earth(CM) on signal ports<br>±1kV line-line(DM) and ±2kV line-earth(CM) on power ports  |
| Conducted RF Immunity  | IEC 61000-4-6:<br>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<br>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:<br>EN 61000-6-4; Industrial Emissions<br>EN 50082-2; Industrial Immunity<br>EN 61326; Meas./Control/Lab., Industrial Requirements<br>EN 61000-6-2; Industrial Immunity<br>European Union 73/23/EEC LVD Directive, compliant with:<br>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](http://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/](http://www.ab.com/manuals/).

## 1794-IM8 Derating Curve

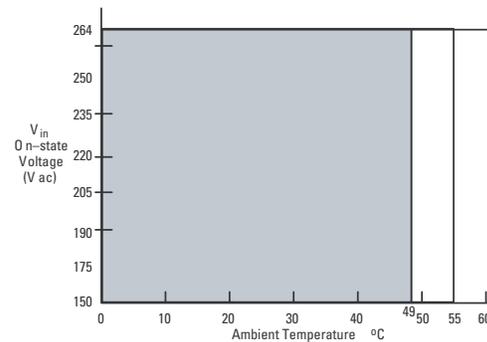


The area within the curve represents the safe operating range for the module under various conditions of user supplied 220V ac supply voltages and ambient temperatures.

■ = 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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