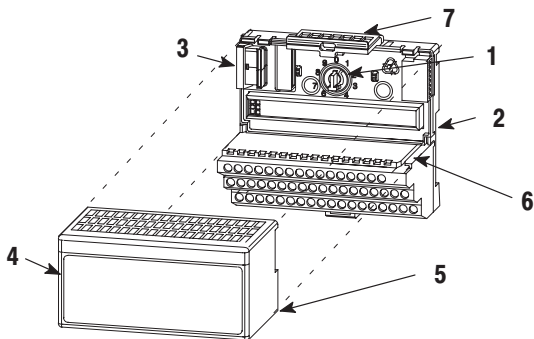




Installation Instructions

English

24V dc FLEX I/O 4 Isolated Output Analog Module (Cat. No. 1794-OF4I)



Module Installation

This module mounts on a 1794 terminal base unit.

1. Rotate keyswitch (1) on terminal base unit (2) clockwise to position 4 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 that the pins on the bottom of the module are straight so they will align properly with the connector in the terminal base unit.
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.



ATTENTION: Remove field-side power before removing or inserting this module. This module is designed so you can **remove and insert it under backplane power**. When you remove or insert a module with field-side 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

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

European Union Directive Compliance

If this product has the CE mark it is approved for installation within the European Union and EEA regions. It has been designed and tested to meet the following directives.

EMC Directive

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

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

This product is intended for use in an industrial environment.

Low Voltage Directive

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

For specific information required by EN 61131-2, see the appropriate sections in this publication, as well as the following Allen-Bradley publications:

- Industrial Automation Wiring and Grounding Guidelines For Noise Immunity, publication 1770-4.1
- Automation Systems Catalog, publication B111

This equipment is classified as open equipment and must be mounted in an enclosure during operation to provide safety protection.

Connect the Wiring for Analog Outputs to 1794-TB3, -TB3S, -TB3T and -TB3TS Terminal Base Units

1. Connect the individual signal wiring to numbered terminals on the **0–15** row (**A**) on the terminal base unit. (Use Belden 8761 cable for signal wiring.)
2. Connect channel common/return to the associated terminal on row **A** (1794-TB3, -TB3S, -TB3T).

NOTE: Connect only one current or one voltage signal per channel. Do not connect both current and voltage on one channel.

3. Connect +24V dc to terminal 34 on the **34-51** row (**C**), and 24V common to terminal 16 on the **B** row.



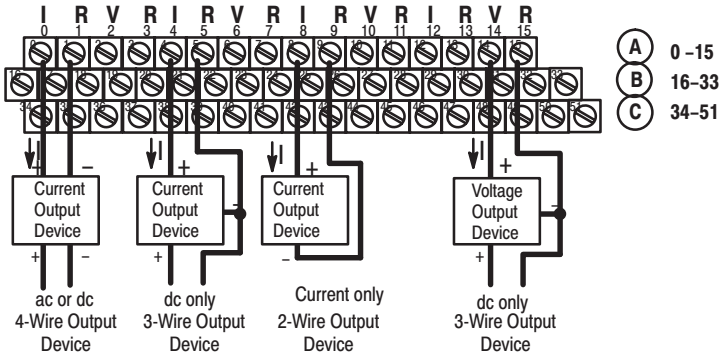
ATTENTION: To reduce susceptibility to noise, power analog modules and digital modules from separate power supplies. Do not exceed a length of 33 ft (10m) for dc power cabling.

-
4. If daisy-chaining +24V dc to the next terminal base, connect a jumper from terminal 51 on this base unit to terminal 34 on the next base unit.
 5. If daisy-chaining 24V dc common to the next terminal base, connect a jumper from terminal 33 on this base unit to terminal 16 on the next base unit.
 6. Connect the shield to functional earth ground as near as possible to the module.
 7. 1794-TB3T only: connect the shield to screw terminals 39 through 46 (earth ground).

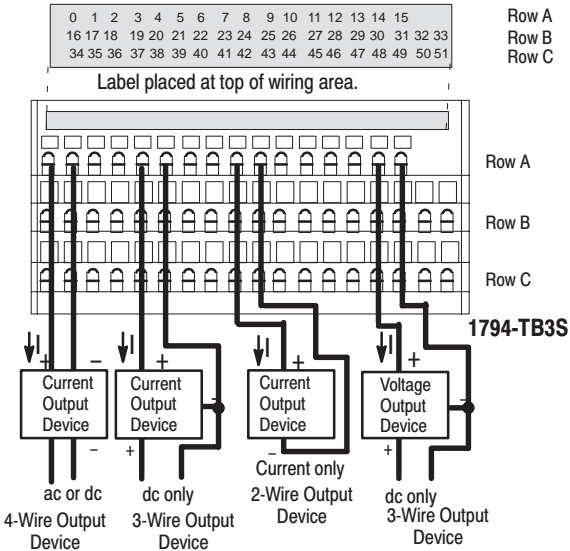


ATTENTION: Total current draw through the terminal base unit is limited to 10A. Separate power connections to the terminal base unit may be necessary.

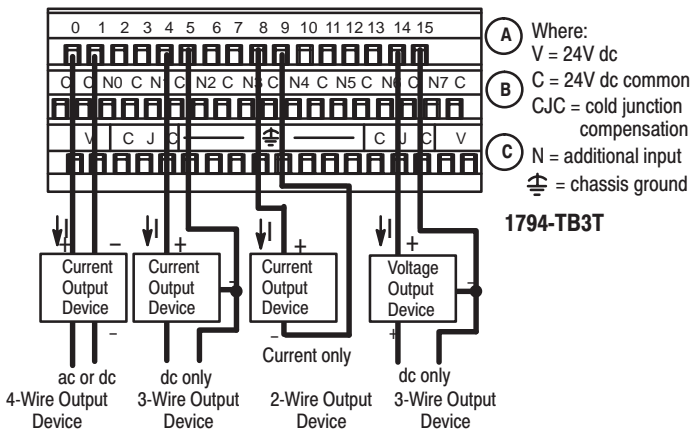
Examples of Input Wiring for 1794-TB3 Base Units



Examples of Input Wiring for 1794-TB3S Base Units



Examples of Input Wiring for 1794-TB3T and -TB3TS Base Units



Connect the Wiring for Analog Outputs to a 1794-TBN or 1794-TBNF Terminal Base



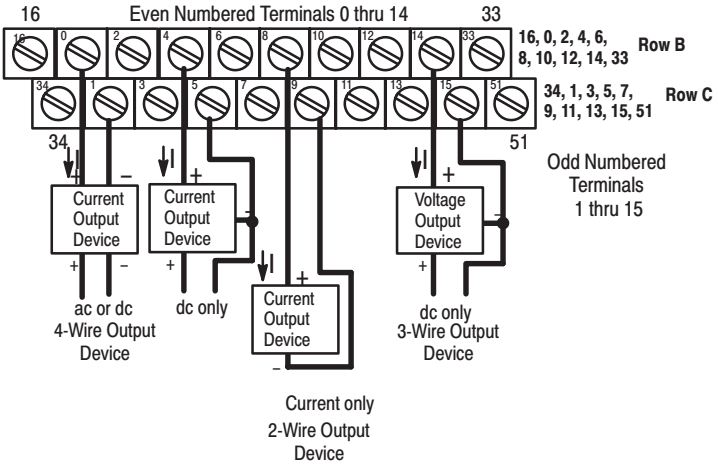
ATTENTION: To reduce susceptibility to noise, power analog modules and digital modules from separate power supplies. Do not exceed a length of 33 ft (10m) for dc power cabling.

1. Connect individual output wiring to even numbered terminals on row (B) as indicated in the above table.
2. Connect the associated common/return to the corresponding odd numbered terminal on row (B) for each output as indicated in the above table.

NOTE: Connect only one current or one voltage signal per channel. Do not connect both current and voltage on one channel.

3. Connect 24V dc (+) to terminal 34 on row (C).
4. Connect 24V dc common/return (-) to terminal 16 on row (B).
5. If continuing power to the next terminal base unit, connect a jumper from terminal 51 (24V dc power) on this base unit to terminal 34 on the next base unit.
6. If continuing common to the next terminal base unit, connect a jumper from terminal 33 (24V dc common) on this base unit to terminal 16 on the next base unit.

Examples of Output Wiring for 1794-TBN and -TBNF Base Units

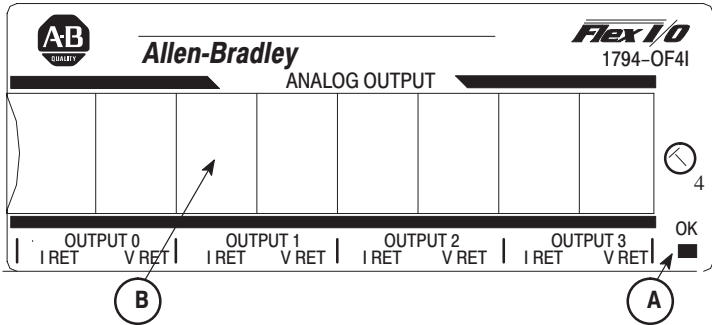


Channel	Signal Type	Label Markings	1794-TB3, -TB3S, -TB3T ² , TB3TS ² , -TBN and -TBNF	
			Signal Terminal	Signal Return
0	Current	I0	0	
	Current	I0 Ret		1
	Voltage	V0	2	
	Voltage	V0 Ret		3
1	Current	I1	4	
	Current	I1 Ret		5
	Voltage	V1	6	
	Voltage	V Ret		7
2	Current	I2	8	
	Current	I2 Ret		9
	Voltage	V2	10	
	Voltage	V2 Ret		11
3	Current	I3	12	
	Current	I3 Ret		13
	Voltage	V3	14	
	Voltage	V3 Ret		15
	24V dc Common		16 thru 33 ¹	
	+24V dc power		34 thru 51	

¹ Terminals 16 thru 33 are internally connected in the terminal base unit

² 1794-TB3T and -TB3TS only: terminals 39 thru 46 are connected to chassis ground

Indicators



A = Power/Status Indicator – indicates power applied to module and status of module.

B = Insertable label for writing individual output designations.

Input Map

Dec. Bit	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
Octal Bit	17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00
Word 0	Read Back Channel 0															
Word 1	Read Back Channel 1															
Word 2	Read Back Channel 2															
Word 3	Read Back Channel 3															
Word 4	PU	FP	CF	0	Reserved			0	0	0	0	0	0	BD	DN	0
Word 5	0	0	0	0	P3	P2	P1	P0	0	0	0	0	W3	W2	W1	W0

Where:
 PU = Power up unconfigured state
 FP = Field power off
 CF = In configuration mode
 BD = Calibration bad
 DN = Calibration accepted
 P0 thru P3 = Output holding in response to Q0 thru Q3
 W0 thru W3 = Wire off current loop status for channels 0 thru 3 respectively

Output Map

Dec. Bit	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
Octal Bit	17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00
Word 0	EN	S1	S0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1	Output Data Channel 0															
Word 2	Output Data Channel 1															
Word 3	Output Data Channel 2															
Word 4	Output Data Channel 3															
Word 5	Chnl 3 Configuration				Chnl 2 Configuration				Chnl 1 Configuration				Chnl 0 Configuration			
Word 6	IC	1	TR	IT	Q3	Q2	Q1	Q0	RV	QK	CK	GO	Channel Number			

Where:

- EN = Enable outputs; 0 = output follows S1/S0, 1 = output enabled
- S1/S0 = Safe State Source
- IC = Initiate configuration bit
- TR = Transparent bit
- IT = Interrupt toggle bit
- Q0 thru Q3 = Requests for outputs to hold
- RV = Revert to defaults bit
- QK = Quick calibration
- CK = Calibration clock
- GO = Gain offset select

Output Range Selection and Update Rate

Configuration Bits				Nominal Range	Data Type	Output Values	Module Update Rate
MSD			LSD				
0	0	0	1	4-20mA	2's complement	<0000-7878>	5.0ms
0	0	1	0	±10V	2's complement	<8618-79E8>	2.5ms
0	0	1	1	±5V	2's complement	<8618-79E8>	2.5ms
0	1	0	0	0-20mA	2's complement %	0-10000>	5.0ms
0	1	0	1	4-20mA	2's complement %	<0-10000>	5.0ms
0	1	1	0	0-10V	2's complement %	0-10000>	5.0ms
0	1	1	1	±10V	2's complement %	<-10000-10000>	5.0ms
1	0	0	0	0-20mA	binary	0000-F3CF>	2.5ms
1	0	0	1	4-20mA	binary	0000-F0F1>	5.0ms
1	0	1	0	0-10V	binary	0000-F3CF>	2.5ms
1	0	1	1	0-5V	binary	0000-F3CF>	2.5ms
1	1	0	0	±20mA	offset binary	8000-F9E8>	2.5ms
1	1	0	1	4-20mA	offset binary	8000-F878>	5.0ms
1	1	1	0	±10V	offset binary	<0618-F9E8>	2.5ms
1	1	1	1	±5V	offset binary	<0618-F9E8>	2.5ms

Specifications - 4 Isolated Output Module (Cat. No. 1794-OF4I)**Output Specifications**

Number of Outputs	4 isolated
Resolution	15 bits plus sign
Voltage	0.320mV/cnt
Current	0.656 μ A/cnt
Data Format	2's complement 2's complement % binary offset binary
Conversion Type	digital to analog converter
Update Rate	2.5/5.0ms
Output Current Terminal	0mA output until module is configured 4-20mA user configurable 0-20mA user configurable
Output Voltage Terminal	0V output until module is configured \pm 10V user configurable 0-10V user configurable \pm 5V (user configurable) 0-5V (user configurable)
Step Response to 63% of FS	<25 μ s
Current Load on Voltage Output	3mA maximum
Resistive Load on mA Output	0 - 750 ohms
Absolute Accuracy ¹	
Voltage Terminal	0.1% Full Scale @ 25°C
Current Terminal	0.1% Full Scale @ 25°C
Accuracy Drift with Temperature	
Voltage Terminal	0.0012% Full Scale/°C
Current Terminal	0.0025% Full Scale/°C

Specifications continued on next page

Specifications - 4 Isolated Output Module (Cat. No. 1794-OF4I)

Output Specifications

Isolation Voltage	120V ac continuous (when used with 1794-TB3, -TB3S or -TB3T) 250V ac continuous (when used with 1794-TBN) Module is 100% tested to 2550V dc for 1s between channel to channel, channel to user power, channel to system, and user power to system
Flexbus Current	50mA
Indicators	1 green power/status indicator
Power Dissipation	4.7W maximum @ 31.2V dc
Thermal Dissipation	Maximum 16 BTU/hr @ 31.2V dc
Calibration	Yes
Keyswitch Position	4

General Specifications

Module Location	Cat. No. 1794-TB3, -TB3S, -TB3T, -TB3TS -TBN and-TBNF Terminal Base
External dc Power Supply Voltage Voltage Range Supply Current	24V dc nominal 19.2 to 31.2V dc (includes 5% ac ripple) 210mA @ 24V dc
Dimensions Inches (Millimeters)	1.8H x 3.7W x 2.1D (45.7 x 94.0 x 53.3)





Specifications continued on next page

Specifications - 4 Isolated Output Module (Cat. No. 1794-OF4I)

Environmental Conditions	
Operational Temperature	0 to 55°C (32 to 131°F)
Storage Temperature	-40 to 85°C (-40 to 185°F)
Relative Humidity	5 to 95% noncondensing (operating) 5 to 80% noncondensing (nonoperating)
Shock	30 g peak acceleration, 11(±1)ms pulse width
Operating	
Non-operating	50 g peak acceleration, 11(±1)ms pulse width
Vibration	Tested 5 g @ 10-500Hz per IEC 68-2-6
Conductors	
Wire Size	12 gauge (4mm ²) stranded maximum 3/64 inch (1.2mm) insulation maximum
Category	2 ²
Agency Certification (when product is marked)	<ul style="list-style-type: none"> • CSA certified • CSA Class I, Division 2 Groups A, B, C, D certified • UL listed • CE marked for all applicable directives • C-Tick marked for all applicable acts
User Manual	Publication 1794-6.5.8

¹ Includes offset, gain, non-linearity and repeatability error terms.

² Use this conductor category information for planning conductor routing . Refer to publication 1770-4.1, "Industrial Automation Wiring and Grounding Guidelines for Noise Immunity."

CSA Hazardous Location Approval	Approbation d'utilisation dans des emplacements dangereux par la CSA
<p>CSA® certifies products for general use as well as for use in hazardous locations. Actual CSA certification is indicated by the product label as shown below, and not by statements in any user documentation.</p>	<p>La CSA® certifie les produits d'utilisation générale aussi bien que ceux qui s'utilisent dans des emplacements dangereux. La certification CSA en vigueur est indiquée par l'étiquette du produit et non par des affirmations dans la documentation à l'usage des utilisateurs.</p>
<p>Example of the CSA certification product label</p> 	<p>Exemple d'étiquette de certification d'un produit par la CSA</p> 
<p>To comply with CSA certification for use in hazardous locations, the following information becomes a part of the product literature for CSA-certified Allen-Bradley industrial control products.</p> <ul style="list-style-type: none"> • This equipment is suitable for use in Class I, Division 2, Groups A, B, C, D, or non-hazardous locations only. • The products having the appropriate CSA markings (that is, Class I Division 2, Groups A, B, C, D), are certified for use in other equipment where the suitability of combination (that is, application or use) is determined by the CSA or the local inspection office having jurisdiction. 	<p>Pour satisfaire à la certification de la CSA dans des endroits dangereux, les informations suivantes font partie intégrante de la documentation des produits industriels de contrôle Allen-Bradley certifiés par la CSA.</p> <ul style="list-style-type: none"> • Cet équipement convient à l'utilisation dans des emplacements de Classe I, Division 2, Groupes A, B, C, D, ou ne convient qu'à l'utilisation dans des endroits non dangereux. • Les produits portant le marquage approprié de la CSA (c'est à dire, Classe I, Division 2, Groupes A, B, C, D) sont certifiés à l'utilisation pour d'autres équipements où la convenance de combinaison (application ou utilisation) est déterminée par la CSA ou le bureau local d'inspection qualifié.
<p>Important: Due to the modular nature of a PLC® control system, the product with the highest temperature rating determines the overall temperature code rating of a PLC control system in a Class I, Division 2 location. The temperature code rating is marked on the product label as shown.</p>	<p>Important: Par suite de la nature modulaire du système de contrôle PLC®, le produit ayant le taux le plus élevé de température détermine le taux d'ensemble du code de température du système de contrôle d'un PLC dans un emplacement de Classe I, Division 2. Le taux du code de température est indiqué sur l'étiquette du produit.</p>
<p>Temperature code rating</p>  <p>Look for temperature code rating here</p>	<p>Taux du code de température</p>  <p>Le taux du code de température est indiqué ici</p>
<p>The following warnings apply to products having CSA certification for use in hazardous locations.</p>	<p>Les avertissements suivants s'appliquent aux produits ayant la certification CSA pour leur utilisation dans des emplacements dangereux.</p>

CSA Hazardous Location Approval**WARNING:** Explosion hazard —

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

Approbation d'utilisation dans des emplacements dangereux par la CSA**AVERTISSEMENT:** Risque d'explosion —

- La substitution de composants peut rendre ce matériel inacceptable pour les emplacements de Classe I, Division 2.
- Couper le courant ou s'assurer que l'emplacement est désigné non dangereux avant de remplacer les composants.
- Avant de débrancher l'équipement, couper le courant ou s'assurer que l'emplacement est désigné non dangereux.
- Avant de débrancher les connecteurs, couper le courant ou s'assurer que l'emplacement est reconnu non dangereux. Attacher tous connecteurs fournis par l'utilisateur et reliés aux circuits externes d'un appareil Allen-Bradley à l'aide de vis, loquets coulissants, connecteurs filetés ou autres moyens permettant aux connexions de résister à une force de séparation de 15 newtons (3,4 lb. - 1,5 kg) appliquée pendant au moins une minute.

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

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User Manuals

Thank you for purchasing this product. This product has a user manual associated with it. If you would like a manual, you can:

- download a free electronic version from the internet:
www.ab.com/manuals or
www.theautomationbookstore.com
- purchase a printed manual by:
 - contacting your local distributor or Rockwell Automation representative,
 - visiting www.theautomationbookstore.com and placing your order
 - calling 1.800.963.9548 (USA/Canada) or 001.330.725.1574 (Outside USA/Canada)

The publication number of the user manual for your product is listed under "Specifications" in this installation instruction.



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