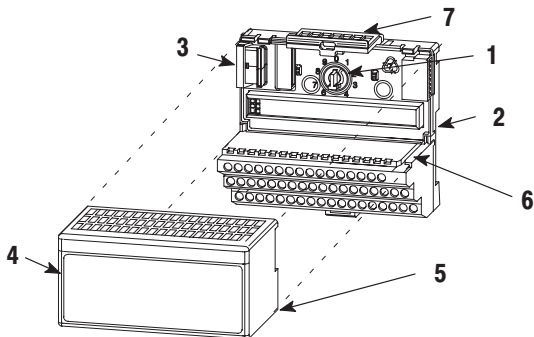




Installation Instructions

24V dc FLEX I/O 4 Channel Frequency Counter Module

Cat. No. 1794-IP4 Series B



English

Module Installation

This module mounts on a 1794 terminal base unit.

1. Rotate keyswitch (1) on terminal base unit (2) clockwise to position 1 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.

Wiring to a 1794-TB3 or -TB3S Terminal Base Unit

1. Connect individual input wiring (N+, N-) or (D+, D-) for each channel to numbered terminals on the **0-15** row (A) as indicated in the table below.
2. Connect the associated input common to the corresponding terminal on row (B) for each input as indicated in the table below.

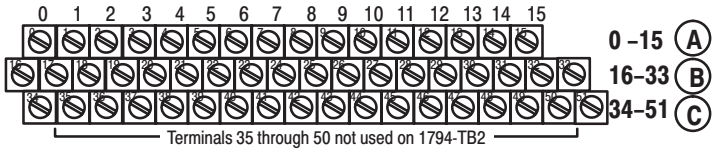


ATTENTION: Do not connect maximum input voltage simultaneously to all inputs if the module ambient temperature is expected to exceed 40°C.



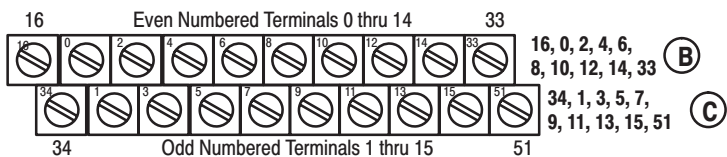
ATTENTION: If the module ambient temperature is expected to continuously exceed 40°C, you must limit the input voltage using an external resistor on each input. A 1KΩ resistor effectively limits a 24V sensor signal to about 15V at the input. Do not limit the input to less than 6V.

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



1794-TB2, -TB3

5. If continuing power to the next terminal base unit, connect a jumper from terminal 51 (24V dc) 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.



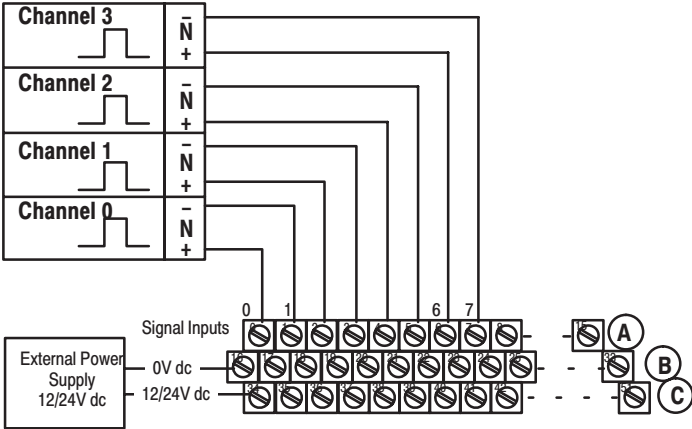
1794-TBN

6 24V dc FLEX I/O 4 Channel Frequency Counter Module

Channel		Terminal Base Units 1794-TB2, -TB3, -TB3S			Terminal Base Units 1794-TBN, -TBNF ¹	
		Signal	0V dc	12/24V dc	Signal	Input
16-bit Period Time Measurement						
0	N+	0	17	35	0	
	N-	1	18	36	1	
1	N+	2	19	37	2	
	N-	3	20	38	3	
2	N+	4	21	39	4	
	N-	5	22	40	5	
3	N+	6	23	41	6	
	N-	7	24	42	7	
32-bit Period Time Measurement						
0	D+	8	25	43	8	
	D-	9	26	44	9	
1	D+	10	27	45	10	
	D-	11	28	46	11	
2	D+	12	29	47	12	
	D-	13	30	48	13	
3	D+	14	31	49	14	
	D-	15	32	50	15	
	0V dc	Terminals 16 and 33 (1794-TB2) Terminals 16 thru 33 (1794-TB3, -TB3S)			Terminals 16 and 33	
	12/24V dc	Terminals 34 and 51 (1794-TB2) Terminals 34 thru 51 (1794-TB3)			Terminals 34 and 51	
¹ Auxiliary terminal blocks are required when using these terminal base units.						

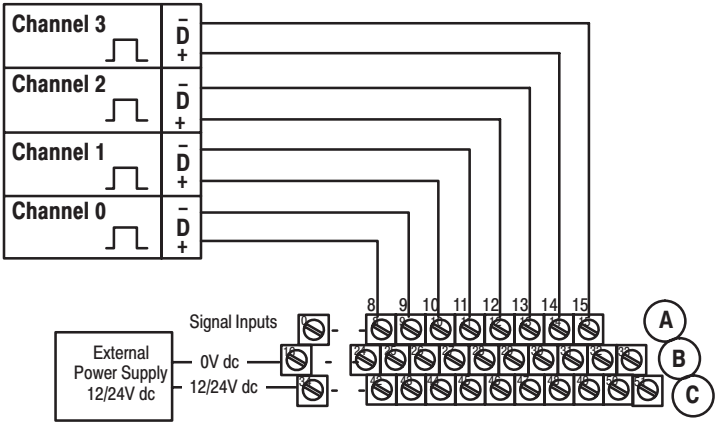
Example of 16-bit Period Time Measurement and 16-bit Accumulating Pulse Counter Wiring (4 channels)

Pulse Counter Channel 0

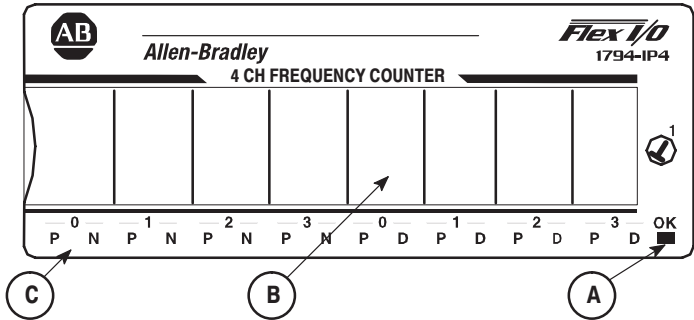


Example of 32-bit Period Time Measurement Wiring (4 channels)

32-bit period time measurement



Indicators



A = Power/status indicator –

Red – indicates initialization of internal logic at powerup

Green – indicates initialization of internal logic is complete and correct.

B = Insertable label for writing individual I/O assignments.

C = Status indicators – for each channel:

Indication	Color	Description
P	Yellow	When on, indicates the input is active
N	Yellow	When on, indicates the input is configured for 16-bit period time measurement and 16-bit accumulating pulse counter function
D	Yellow	When on, indicates the input is configured for 32-bit period time measurement

Input/Status Image

Bit→	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word↓	Read															
0	Reserved															
1	Counter 00 – 16-bit period measurement for channel 0															
2	Counter 01 – pulse counter for channel 0															
3	Counter 10 – 16-bit period measurement for channel 1															

Bit⇒	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
4	Counter 11 – pulse counter for channel 1															
5	Counter 20 – 16-bit period measurement for channel 2															
6	Counter 21 – pulse counter for channel 2															
7	Counter 30 – 16-bit period measurement for channel 3															
8	Counter 31 – pulse counter for channel 3															
9	Readback of Control Word 2															
	Reserved												M3	M2	M1	M0
10	Revision read – software version code															

Where: M = positive edge measurement ready for the respective channel.

Output/Configuration Image

Bit⇒	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word↓	Write															
0	Control Word 0 – selects the measure function															
1	Control Word 1 – sets the clock frequency and period multiple															
2	Control Word 2 – sets the start of a new measurement															
3–4	Not used															

Description of Control Word 0

Bit	Description
Bit 00	Pulse counting and period time measurement selection for Channel 0 – 0 = pulse counting and period time measurement selected 1 = period time measurement selected
Bit 01	Pulse counting and period time measurement selection for Channel 1 – 0 = pulse counting and period time measurement selected 1 = period time measurement selected
Bit 02	Pulse counting and period time measurement selection for Channel 2 – 0 = pulse counting and period time measurement selected 1 = period time measurement selected
Bit 03	Pulse counting and period time measurement selection for Channel 3 – 0 = pulse counting and period time measurement selected 1 = period time measurement selected
Bit 04–15	Not used

Description of Control Word 1

Bit	Description			
Bit 00	Clock frequency for period time measurement – Channel 0 – 0 = period time measurement with 10MHz internal clock selected 1 = period time measurement with 1MHz internal clock selected			
Bits 01–03	03	02	01	Number of periods for measurement – Channel 0
	0	0	0	1 period
	0	0	1	2 periods
	0	1	0	4 periods
	0	1	1	8 periods
	1	0	0	16 periods
	1	0	1	32 periods
	1	1	0	64 periods
	1	1	1	128 periods
Bit 04	Clock frequency for period time measurement – Channel 1 – refer to bit 00.			
Bits 05–07	Selection of Number of periods for measurement – Channel 1 – see bits 01–03 above			
Bit 08	Clock frequency for period time measurement – Channel 2 – refer to bit 00.			
Bits 09–11	Selection of Number of periods for measurement – Channel 2 – see bits 01–03 above			
Bit 12	Clock frequency for period time measurement – Channel 1 – refer to bit 00.			
Bits 13–15	Selection of Number of periods for measurement – Channel 1 – see bits 01–03 above			

Description of Control Word 2

Bit	Description
Bit 00	Start new measurement bit – Channel 0 – when set, start new measurement on positive edge
Bit 01	Start new measurement bit – Channel 1 – when set, start new measurement on positive edge
Bit 02	Start new measurement bit – Channel 2 – when set, start new measurement on positive edge

Bit	Description
Bit 03	Start new measurement bit - Channel 3 - when set, start new measurement on positive edge
Bit 04	Reset Counter, Channel 0 - a positive edge on this bit resets counter 01
Bit 05	Reset Counter, Channel 1 - a positive edge on this bit resets counter 11
Bit 06	Reset Counter, Channel 2 - a positive edge on this bit resets counter 21
Bit 07	Reset Counter, Channel 3 - a positive edge on this bit resets counter 31
Bit 08-15	Not used

Description of Control Word 2 Readback

Bit	Description
Bit 00	Positive edge - Channel 0 - measurement ready
Bit 01	Positive edge - Channel 1 - measurement ready
Bit 02	Positive edge - Channel 2 - measurement ready
Bit 03	Positive edge - Channel 3 - measurement ready
Bit 04	Reset Done, Channel 0 - a positive edge on this bit indicates counter 01 reset done
Bit 05	Reset Done, Channel 1 - a positive edge on this bit indicates counter 11 reset done
Bit 06	Reset Done, Channel 2 - a positive edge on this bit indicates counter 21 reset done
Bit 07	Reset Done, Channel 3 - a positive edge on this bit indicates counter 31 reset done
Bit 08-15	Reserved for factory use

CUL Hazardous Location Approval

CUL[®] certifies products for general use as well as for use in hazardous locations. **Actual CUL certification is indicated by the product label** as shown below, and not by statements in any user documentation.

Example of the CUL certification product label

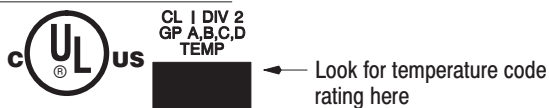


To comply with CUL certification for use in hazardous locations, the following information becomes a part of the product literature for CUL-certified Allen-Bradley industrial control products.

- 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 CUL 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 CUL or the local inspection office having jurisdiction.
-

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.

Temperature code rating



The following warnings apply to products having CUL certification for use in hazardous locations.

CUL Hazardous Location Approval



ATTENTION: 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 CUL

La CUL[®] certifie les produits d'utilisation générale aussi bien que ceux qui s'utilisent dans des emplacements dangereux. **La certification CUL en vigueur est indiquée par l'étiquette du produit** et non par des affirmations dans la documentation à l'usage des utilisateurs.

Exemple d'étiquette de certification d'un produit par la CUL



Pour satisfaire à la certification de la CUL dans des endroits dangereux, les informations suivantes font partie intégrante de la documentation des produits industriels de contrôle Allen-Bradley certifiés par la CUL.

- 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 CUL (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 CUL ou le bureau local d'inspection qualifié.

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.

CUL Hazardous Location Approval

Approbation d'utilisation dans des emplacements dangereux par la CUL

Taux du code de température



Les avertissements suivants s'appliquent aux produits ayant la certification CUL pour leur utilisation dans des emplacements dangereux.



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 CUL est la marque déposée de Underwriters Laboratories.

PLC est une marque déposée de Allen-Bradley Company, Inc.

CUL logo is a registered trademark of the Underwriters Laboratories

PLC is a registered trademark of Allen-Bradley Company, Inc.

Specifications – 1794-IP4 4 Channel Frequency Counter Module

Number of Inputs	4 frequency counter interfaces – 2 inputs each
Counting Frequency	100KHz maximum. Each signal condition must be stable for at least 2µs to be recognized.
Input Range	
Input ON	Maximum 26.4V dc (24V dc +10%) Minimum 6V dc
Input OFF	Maximum 3V dc Minimum -26.4V dc

Specifications continued on the next page.

Specifications - 1794-IP4 4 Channel Frequency Counter Module

Input Current (typical)	3mA @ 6V dc 9mA @ 12V dc 15mA @ 24V dc
Module Location	Mounts on Cat. No. 1794-TB2, TB3, -TB3S, and -TBN Terminal Base Units
Isolation Voltage	500V dc
Flexbus Current	5mA @ 5V dc
Power Supply (external)	12-24V dc ($\pm 10\%$)
Current consumption from external power supply	150mA @ 12V dc 75mA @ 24V dc
Power Dissipation	5W maximum @ 26.4V dc
Thermal Dissipation	Maximum 17.1 BTU/hr @ 26.4V dc
Indicators (field side driven, logic side indication)	1 green/red power/status indicator 8 yellow status indicators - logic side
Keyswitch Position	1

General Specifications

Dimensions Inches (Millimeters)	1.8H x 3.7W x 2.1D (45.7 x 94.0 x 53.3)
Environmental Conditions	
Operational Temperature	0 to 55°C (32 to 131°F) Note: Do not connect maximum input voltage simultaneously to all inputs if the module ambient temperature is expected to exceed 40°C.
Storage Temperature	-40 to 85°C (-40 to 185°F)
Relative Humidity	5 to 90% noncondensing (operating) 5 to 80% noncondensing (nonoperating)
Shock	Operating Nonoperating
Vibration	30g peak acceleration, 11(± 1)ms pulse width 50g peak acceleration, 11(± 1)ms pulse width Tested 5g @ 10-500Hz per IEC 68-2-6

Specifications continued on the next page.

Specifications – 1794-IP4 4 Channel Frequency Counter Module

Input Conductors	
Wire Category	Belden 8761
Length (max)	2 ¹ 1000ft (304.8m)
Agency Certification (when product is marked)	<ul style="list-style-type: none"> • CUL listed Class I, Division 2 Groups A, B, C, D certified • UL listed • CE marked for all applicable directives
User Manual	Publication 1794-6.5.16
<small>1 Use this conductor category information for planning conductor routing . Refer to publication 1770-4.1, "Industrial Automation Wiring and Grounding Guidelines for Noise Immunity."</small>	

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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