

Installation Instructions

Original Instructions



Allen-Bradley

by ROCKWELL AUTOMATION

FLEX I/O 2-input Frequency Modules

Catalog Numbers 1794-IJ2, 1794-IJ2XT

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Summary of Changes

This publication contains the following new or updated information. This list includes substantive updates only and is not intended to reflect all changes.

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ATTENTION: Read this document and the documents listed in the Additional Resources section about installation, configuration and operation of this equipment before you install, configure, operate or maintain this product. Users are required to familiarize themselves with installation and wiring instructions in addition to requirements of all applicable codes, laws, and standards.

Activities including installation, adjustments, putting into service, use, assembly, disassembly, and maintenance are required to be carried out by suitably trained personnel in accordance with applicable code of practice. If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

注意：在安装、配置、操作和维护本产品前，请阅读本文档以及“其他资源”部分列出的有关设备安装、配置和操作的相应文档。除了所有适用规范、法律和标准的相关要求之外，用户还必须熟悉安装和接线说明。

安装、调整、投运、使用、组装、拆卸和维护等各项操作必须由经过适当训练的专业人员按照适用的操作规范实施。

如果未按照制造商指定的方式使用该设备，则可能会损害设备提供的保护。

ATENCIÓN: Antes de instalar, configurar, poner en funcionamiento o realizar el mantenimiento de este producto, lea este documento y los documentos listados en la sección Recursos adicionales acerca de la instalación, configuración y operación de este equipo. Los usuarios deben familiarizarse con las instrucciones de instalación y cableado y con los requisitos de todos los códigos, leyes y estándares vigentes. El personal debidamente capacitado debe realizar las actividades relacionadas a la instalación, ajustes, puesta en servicio, uso, ensamblaje, desensamblaje y mantenimiento de conformidad con el código de práctica aplicable. Si este equipo se usa de una manera no especificada por el fabricante, la protección provista por el equipo puede resultar afectada.

ATENÇÃO: Leia este e os demais documentos sobre instalação, configuração e operação do equipamento que estão na seção Recursos adicionais antes de instalar, configurar, operar ou manter este produto. Os usuários devem se familiarizar com as instruções de instalação e fiação além das especificações para todos os códigos, leis e normas aplicáveis.

É necessário que as atividades, incluindo instalação, ajustes, colocação em serviço, utilização, montagem, desmontagem e manutenção sejam realizadas por pessoal qualificado e especializado, de acordo com o código de prática aplicável.

Caso este equipamento seja utilizado de maneira não estabelecida pelo fabricante, a proteção fornecida pelo equipamento pode ficar prejudicada.

ВНИМАНИЕ: Перед тем как устанавливать, настраивать, эксплуатировать или обслуживать данное оборудование, прочитайте этот документ и документы, перечисленные в разделе «Дополнительные ресурсы». В этих документах изложены сведения об установке, настройке и эксплуатации данного оборудования. Пользователи обязаны ознакомиться с инструкциями по установке и прокладке соединений, а также с требованиями всех применимых норм, законов и стандартов.

Все действия, включая установку, наладку, ввод в эксплуатацию, использование, сборку, разборку и техническое обслуживание, должны выполняться обученным персоналом в соответствии с применимыми нормами и правилами.

Если оборудование используется не предусмотренным производителем образом, защита оборудования может быть нарушена.

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設置調整、運転の開始、使用、組立て、解体、保守を含む諸作業は、該当する実施規則に従って訓練を受けた適切な作業員が実行する必要があります。

本機器が製造メーカーにより指定されていない方法で使用されている場合、機器により提供されている保護が損なわれる恐れがあります。

ACHTUNG: Lesen Sie dieses Dokument und die im Abschnitt „Weitere Informationen“ aufgeführten Dokumente, die Informationen zu Installation, Konfiguration und Bedienung dieses Produkts enthalten, bevor Sie dieses Produkt installieren, konfigurieren, bedienen oder warten. Anwender müssen sich neben den Bestimmungen aller anwendbaren Vorschriften, Gesetze und Normen zusätzlich mit den Installations- und Verdrahtungsanweisungen vertraut machen.

Arbeiten im Rahmen der Installation, Anpassung, Inbetriebnahme, Verwendung, Montage, Demontage oder Instandhaltung dürfen nur durch ausreichend geschulte Mitarbeiter und in Übereinstimmung mit den anwendbaren Ausführungsvorschriften vorgenommen werden.

Wenn das Gerät in einer Weise verwendet wird, die vom Hersteller nicht vorgesehen ist, kann die Schutzfunktion beeinträchtigt sein.

ATTENTION : Lisez ce document et les documents listés dans la section Ressources complémentaires relatifs à l'installation, la configuration et le fonctionnement de cet équipement avant d'installer, configurer, utiliser ou entretenir ce produit. Les utilisateurs doivent se familiariser avec les instructions d'installation et de câblage en plus des exigences relatives aux codes, lois et normes en vigueur.

Les activités relatives à l'installation, le réglage, la mise en service, l'utilisation, l'assemblage, le démontage et l'entretien doivent être réalisées par des personnes formées selon le code de pratique en vigueur.

Si cet équipement est utilisé d'une façon qui n'a pas été définie par le fabricant, la protection fournie par l'équipement peut être compromise.

주의: 본 제품 설치, 설정, 작동 또는 유지보수하기 전에 본 문서를 포함하여 설치, 설정 및 작동에 관한 참고 자료 섹션의 문서들을 반드시 읽고 숙지하십시오. 사용자는 모든 관련 규정, 법규 및 표준에서 요구하는 사항에 대해 반드시 설치 및 배선 지침을 숙지해야 합니다.

설치, 조정, 작동, 사용, 조립, 분해, 유지보수 등 모든 작업은 관련 규정에 따라 적절한 교육을 받은 사용자를 통해서만 수행해야 합니다.

본 장비를 제조사가 명시하지 않은 방법으로 사용하면 장비의 보호 기능이 손상될 수 있습니다.

ATTENZIONE Prima di installare, configurare ed utilizzare il prodotto, o effettuare interventi di manutenzione su di esso, leggere il presente documento ed i documenti elencati nella sezione "Altre risorse", riguardanti l'installazione, la configurazione ed il funzionamento dell'apparecchiatura. Gli utenti devono leggere e comprendere le istruzioni di installazione e cablaggio, oltre ai requisiti previsti dalle leggi, codici e standard applicabili.

Le attività come installazione, regolazioni, utilizzo, assemblaggio, disassemblaggio e manutenzione devono essere svolte da personale adeguatamente addestrato, nel rispetto delle procedure previste.

Qualora l'apparecchio venga utilizzato con modalità diverse da quanto previsto dal produttore, la sua funzione di protezione potrebbe venire compromessa.

DIKKAT: Bu ürünün kurulumu, yapilandırılması, işletilmesi veya bakımı öncesinde bu dokümanı ve bu ekipmanın kurulumu, yapilandırılması ve işletimi ile ilgili ilave Kaynaklar bölümünde yer listelenmiş dokümanları okuyun. Kullanıcılar yürürlükteki tüm yönetmelikler, yasalar ve standartların gereksinimlerine ek olarak kurulum ve kablolama talimatlarını da öğrenmek zorundadır.

Kurulum, ayarlama, hizmete alma, kullanma, parçaları birleştirme, parçaları sökme ve bakım gibi aktiviteler sadece uygun eğitimleri almış kişiler tarafından yürürlükteki uygulama yönetmeliklerine uygun şekilde yapılabilir.

Bu ekipman üretici tarafından belirlenmiş amacın dışında kullanılırsa, ekipman tarafından sağlanan koruma bozulabilir.

注意事項：在安装、設定、操作或維護本產品前，請先閱讀此文件以及列於「其他資源」章節中有關安裝、設定與操作此設備的文件。使用者必須熟悉安裝和配線指示，並符合所有法規、法律和標準要求。

包括安裝、調整、交付使用、使用、組裝、拆卸和維護等動作都必須交由已經過適當訓練的人員進行，以符合適用的實作法規。

如果將設備用於非製造商指定的用途時，可能會造成設備所提供的保護功能受損。

POZOR: Než začnete instalovat, konfigurovat či provozovat tento výrobek nebo provádět jeho údržbu, přečtěte si tento dokument a dokumenty uvedené v části Dodatečné zdroje ohledně instalace, konfigurace a provozu tohoto zařízení. Uživatelé se musejí vedle požadavků všech relevantních vyhlášek, zákonů a norem nutně seznámit také s pokyny pro instalaci a elektrické zapojení.

Činnosti zahrnující instalaci, nastavení, uvedení do provozu, užívání, montáž, demontáž a údržbu musí vykonávat vhodně proškolený personál v souladu s příslušnými prováděcími předpisy.

Pokud se toto zařízení používá způsobem neodpovídajícím specifikaci výrobce, může být narušena ochrana, kterou toto zařízení poskytuje.

UWAGA: Przed instalacją, konfiguracją, użytkowaniem lub konserwacją tego produktu należy przeczytać niniejszy dokument oraz wszystkie dokumenty wymienione w sekcji Dodatkowe źródła omawiające instalację, konfigurację i procedury użytkowania tego urządzenia. Użytkownicy mają obowiązek zapoznać się z instrukcjami dotyczącymi instalacji oraz oprzewodowania, jak również z obowiązującymi kodeksami, prawem i normami.

Działania obejmujące instalację, regulację, przekazanie do użytkowania, użytkowanie, montaż, demontaż oraz konserwację muszą być wykonywane przez odpowiednio przeszkolony personel zgodnie z obowiązującym kodeksem postępowania.

Jeśli urządzenie jest użytkowane w sposób inny niż określony przez producenta, zabezpieczenie zapewniane przez urządzenie może zostać ograniczone.

Obs! Läs detta dokument samt dokumentet, som står listat i avsnittet Övriga resurser, om installation, konfiguration och drift av denna utrustning innan du installerar, konfigurerar eller börjar använda eller utföra underhållsarbete på produkten. Användare måste bekanta sig med instruktioner för installation och kabeldragning, förutom krav enligt gällande koder, lagar och standarder.

Åtgärder som installation, justering, service, användning, montering, demontering och underhållsarbete måste utföras av personal med lämplig utbildning enligt lämpligt bruk.

Om denna utrustning används på ett sätt som inte anges av tillverkaren kan det hända att utrustningens skyddsanordningar försätts ur funktion.

LET OP: Lees dit document en de documenten die genoemd worden in de paragraaf Aanvullende informatie over de installatie, configuratie en bediening van deze apparatuur voordat u dit product installeert, configureert, bedient of onderhoudt. Gebruikers moeten zich vertrouwd maken met de installatie en de bedringsinstructies, naast de vereisten van alle toepasselijke regels, wetten en normen.

Activiteiten zoals het installeren, afstellen, in gebruik stellen, gebruiken, monteren, demonteren en het uitvoeren van onderhoud mogen uitsluitend worden uitgevoerd door hiervoor opgeleid personeel en in overeenstemming met de geldende praktijkregels.

Indien de apparatuur wordt gebruikt op een wijze die niet is gespecificeerd door de fabrikant, dan bestaat het gevaar dat de beveiliging van de apparatuur niet goed werkt.

Environment and Enclosure

**ATTENTION:**

This equipment is intended for use in a Pollution Degree 2 industrial environment, in overvoltage Category II applications (as defined in EN/IEC 60664-1), at altitudes up to 2000 m (6562 ft) without derating.

This equipment is not intended for use in residential environments and may not provide adequate protection to radio communication services in such environments.

This equipment is supplied as open-type equipment for indoor use. 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 enclosure must have suitable flame-retardant properties to prevent or minimize the spread of flame, complying with a flame spread rating of 5VA or be approved for the application if nonmetallic. The interior of the enclosure must be accessible only by the use of a tool. Subsequent sections of this publication may contain more information regarding specific enclosure type ratings that are required to comply with certain product safety certifications.

In addition to this publication, see the following:

- Industrial Automation Wiring and Grounding Guidelines, publication [1770-4.1](#), for additional installation requirements.
 - NEMA Standard 250 and IEC 60529, as applicable, for explanations of the degrees of protection provided by enclosures.
-



WARNING: If 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.



WARNING: If you connect or disconnect wiring while the field-side 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: Personnel responsible for the application of safety-related Programmable Electronic Systems (PES) shall be aware of the safety requirements in the application of the system and shall be trained in using the system.



ATTENTION: Do not remove or replace a Terminal Base unit while power is applied. Interruption of the backplane can result in unintentional operation or machine motion.



ATTENTION: This product is grounded through the DIN rail to chassis ground. Use zinc-plated chromate-passivated steel DIN rail to assure proper grounding. The use of other DIN rail materials (for example, aluminum or plastic) that can corrode, oxidize, or are poor conductors, can result in improper or intermittent grounding. Secure DIN rail to mounting surface approximately every 200 mm (7.8 in.) and use end-anchors appropriately. Be sure to ground the DIN rail properly. See the Industrial Automation Wiring and Grounding Guidelines, Rockwell Automation publication [1770-4.1](#), for more information.

Prevent Electrostatic Discharge



ATTENTION: 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.
 - Use a static-safe workstation, if available.
 - Store the equipment in appropriate static-safe packaging when not in use.
-



ATTENTION: To reduce susceptibility to noise, power analog modules and digital modules from separate power supplies. Do not exceed a total length of 9.8 ft (3 m) for DC power cabling.

UK and European Hazardous Location Approval

The following applies to products marked  II 3 G:

- Are Equipment Group II, Equipment Category 3, and comply with the Essential Health and Safety Requirements relating to the design and construction of such equipment given in Schedule 1 of UKEX and Annex II of EU Directive 2014/34/EU. See the UKEx and EU Declaration of Conformity at rok.auto/certifications for details.
- The type of protection is Ex ec IIC T4 Gc according to EN IEC 60079-0:2018, EXPLOSIVE ATMOSPHERES - PART 0: EQUIPMENT - GENERAL REQUIREMENTS, Issue Date 07/2018 and EN IEC 60079-7:2015+A1:2018, Explosive atmospheres. Equipment protection by increased safety "e".
- Comply to Standard EN IEC 60079-0:2018, EXPLOSIVE ATMOSPHERES - PART 0: EQUIPMENT - GENERAL REQUIREMENTS, Issue Date 07/2018, EN IEC 60079-7:2015+A1:2018 Explosive atmospheres. Equipment protection by increased safety "e", reference certificate number DEMKO 14 ATEX 1342501X and UL22UKEX2378X.
- Are intended for use in areas in which explosive atmospheres caused by gases, vapors, mists, or air are unlikely to occur, or are likely to occur only infrequently and for short periods. Such locations correspond to Zone 2 classification according to UKEX regulation 2016 No. 1107 and ATEX directive 2014/34/EU.

IEC Hazardous Location Approval

The following applies to products marked with IECEx certification:



- Are intended for use in areas in which explosive atmospheres caused by gases, vapors, mists, or air are unlikely to occur, or are likely to occur only infrequently and for short periods. Such locations correspond to Zone 2 classification to IEC 60079-0.
- The type of protection is Ex ec IIC T4 Gc according to IEC 60079-0 and IEC 60079-7.
- Comply to Standards IEC 60079-0, Explosive atmospheres Part 0: Equipment - General requirements, Edition 7, Revision Date 2017, IEC 60079-7, 5.1 Edition revision date 2017, Explosive atmospheres - Part 7: Equipment protection by increased safety "e", reference IECEx certificate number IECEx UL 14.0066X.



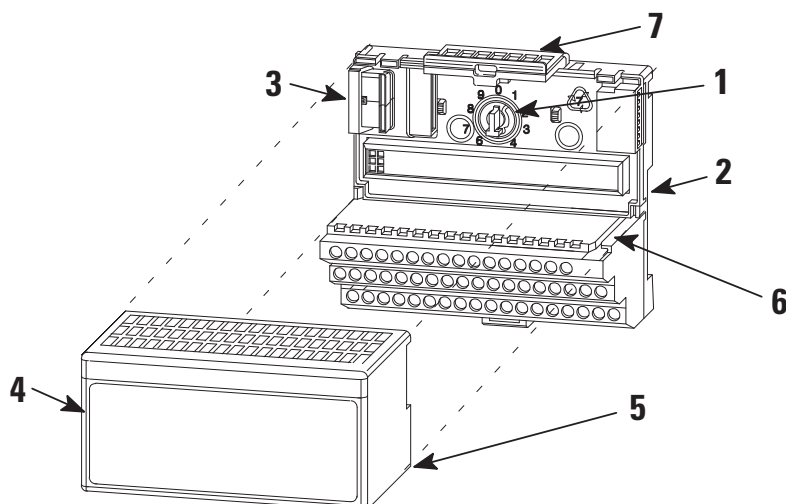
WARNING: Special Conditions for Safe Use:

- This equipment is not resistant to sunlight or other sources of UV radiation.
- This equipment shall be mounted in an UKEX/ATEX/IECEx Zone 2 certified enclosure with a minimum ingress protection rating of at least IP54 (in accordance with EN/IEC 60079-0) and used in an environment of not more than Pollution Degree 2 (as defined in EN/IEC 60664-1) when applied in Zone 2 environments. The enclosure must be accessible only by the use of a tool.
- This equipment shall be used within its specified ratings defined by Rockwell Automation.
- Transient protection shall be provided that is set at a level not exceeding 140% of the peak rated voltage value at the supply terminals to the equipment.
- This equipment must be used only with UKEX/ATEX/IECEx certified Rockwell Automation backplanes.
- Secure any external connections that mate to this equipment by using screws, sliding latches, threaded connectors, or other means provided with this product.
- Do not disconnect equipment unless power has been removed or the area is known to be nonhazardous.
- Earthing is accomplished through mounting of modules on rail.

North American Hazardous Location Approval

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 I, 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 I, 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>
<div style="display: flex; align-items: center;">  <div> <p>WARNING: Explosion Hazard -</p> <ul style="list-style-type: none"> • Do not disconnect equipment unless power has been removed or the area is known to be nonhazardous. • 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. • Substitution of components may impair suitability for Class I, Division 2. </div> </div>	<div style="display: flex; align-items: center;">  <div> <p>AVERTISSEMENT: Risque d'Explosion -</p> <ul style="list-style-type: none"> • Couper le courant ou s'assurer que l'environnement est classé non dangereux avant de débrancher l'équipement. • 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. • La substitution de composants peut rendre cet équipement inadapte à une utilisation en environnement de Classe I, Division 2. </div> </div>

Install Your Frequency Input Module



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

The FLEX™ I/O 2-input frequency modules mounts on a 1794-TB3G or 1794-TB3G-TB3GS terminal base.

1. Rotate the keyswitch (1) on the terminal base (2) clockwise to position 1 as required for this type of module.
2. Make sure that 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 that they 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-TB3G and 1794-TB3GS Terminal Base Unit

Connect wiring as shown in [Figure 1 on page 6](#).

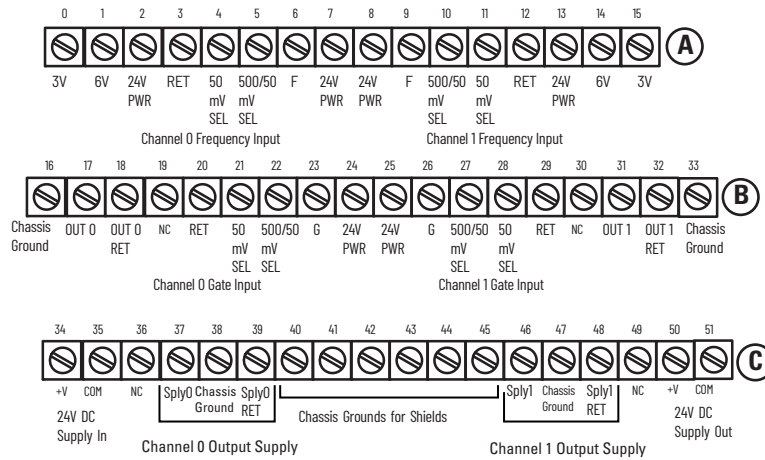


ATTENTION: To reduce susceptibility to noise, power analog modules and digital modules from separate power supplies. Do not exceed a length of 3 m (9.8 ft) for DC power cabling.



ATTENTION: Do not daisy chain power or ground from this terminal base unit **to any AC or DC digital module terminal base units.**

Figure 1 - Wiring Connections using 1794-TB3G or 1794-TB3GS Terminal Base Unit



+24V DC = Terminals C-34 and C-50 (1794-TB3G shown)
 COM = C-35 and C-51
 Chassis Ground = Terminals B-16, B-33, C-38, C-40...45, and C-47
 NC = No connection
 For daisy chaining: Supply In - C-34 (+) and C-35 (-)
 Supply Out - C-50 (+) and C-51 (-)

Output Alarm Connections	Channel 0 Terminals ⁽¹⁾				Channel 1 Terminals ⁽¹⁾			
	Sply +	Sply RET	Out +	Out RET	Sply +	Sply RET	Out +	Out RET
Supply	C-37	C-39			C-46	C-48		
Output			B-17	B-18			B-31	B-32

(1) Connect cable shields to GND connections.

Types of Inputs	Channel 0 Terminals ⁽¹⁾			Channel 1 Terminals ⁽¹⁾			GND ⁽¹⁾
	Power	Input	RET ⁽²⁾	Power	Input	RET ⁽²⁾	
Frequency							
24V DC IEC 1+ Proximity ^{(3), (4)}	A-7	A-6	A-3	A-8	A-9	A-12	
24V DC Contact Switch ⁽⁵⁾	A-7	A-6	A-3	A-8	A-9	A-12	
500 mV AC Magnetic Pickup	A-7	A-5	A-3	A-8	A-10	A-12	
50 mV AC Magnetic Pickup ⁽⁶⁾	A-7	A-5	A-3	A-8	A-10	A-12	
6V AC Vortex	A-2	A-1	A-3	A-13	A-14	A-12	
3V AC Vortex	A-2	A-0	A-3	A-13	A-15	A-12	
Gate							
24V DC IEC 1+ Proximity ^{(3),(4)}	B-24	B-23	B-20	B-25	B-26	B-29	
24V DC Contact Switch ⁽⁵⁾	B-24	B-23	B-20	B-25	B-26	B-29	
500 mV DC Magnetic Pickup	B-24	B-22	B-20	B-25	B-27	B-29	
50 mV DC Magnetic Pickup ⁽⁶⁾	B-24	B-22	B-20	B-25	B-27	B-29	

- (1) Connect cable shields to GND terminals.
- (2) All four RET terminals (Ch 0 and 1, Freq. and Gate) are internally connected together.
- (3) As defined by standard IEC 1131-2.
- (4) RET not used on 2-wire devices.
- (5) Add external resistor from 24V to F (A-6) or G (A-9) for wire-off detection (0.4 mA).
- (6) Add jumper between 50 mV and RET (frequency - channel 0 = A-4...A-3; channel 1 = A-11...A-12).

Resolution and Accuracy

±1 Hz or ±0.1 Hz (depending on frequency range bit setting), or ± accuracy specification listed in [Table 1](#), whichever is greater.

Resolution % is defined as:

$$\% \text{ Resolution} = \frac{100}{\text{count frequency} \times \text{minimum frequency sample time}}$$

Accuracy % is defined as:

$$\% \text{ Accuracy} = 100 \left[1 - \frac{\frac{\text{Minimum frequency sample time}}{2}}{\frac{\text{Minimum frequency sample time}}{2} + \frac{1}{\text{count frequency}}} \right]$$

Table 1 - Accuracy Specifications

Min. Freq. Sample Time (ms)	Accuracy					Resolution
	Sampling Accuracy	Time Base Accuracy	Worst Case Total Accuracy	Deviation in Hz Due to Total Accuracy		
				1.0...3276.7 Freq. Range (in Hz)	1...32767 Freq. Range (in Hz)	
2	±0.02%	±0.0225%	±0.0425	±0.1...1.4	±1...1.4	0.01%
4	±0.01%	±0.0225%	±0.0325	±0.1...1.1	±1...1.1	0.005%
5	±0.008%	±0.0225%	±0.0305	±0.1...1.0	±1...1.0	0.004%
10	±0.004%	±0.0225%	±0.0265	±0.1...0.9	±1...0.9	0.002%
20	±0.002%	±0.0225%	±0.0245	±0.1...0.8	±1...0.8	0.001%
50	±0.0008%	±0.0225%	±0.0233	±0.1...0.8	±1...0.8	0.0004%
100	±0.0004%	±0.0225%	±0.0229	±0.1...0.8	±1...0.8	0.0002%
200	±0.0002%	±0.0225%	±0.0227	±0.1...0.7	±1...0.7	0.0001%
500	±0.00008%	±0.0225%	±0.02258	±0.1...0.7	±1...0.7	0.00004%
1000	±0.00004%	±0.0225%	±0.02254	±0.1...0.7	±1...0.7	0.00002%

Table 2 - Input Map

Bit →	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
Word ↓	Read															
0	Frequency 0...32,767 or 0.0...3,276.7 Channel 0															
1	% Full Scale 0.0...3,276.7% Channel 0 or Acceleration -32,768...32,767 Channel 0															
2	Frequency 0...32,767 or 0.0...3,276.7 Channel 1															
3	% Full Scale 0.0...3,276.7% Channel 1 or Acceleration -32,768...32,767 Channel 1															
4	R	R	Direction CH 0		GS CH 0	F/A CH 0	WO CH 0	MPA CH 0	R	R	Direction CH 1		GS CH 1	F/A CH 1	WO CH 1	MPA CH 1
5	Reserved				Diagnostic Status Channel 0				Reserved				Diagnostic Status Channel 1			
6	Reserved															

Where:

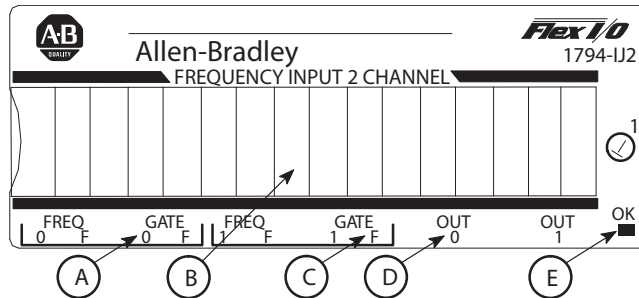
- GS = Gate state
- F/A = Frequency/Accel alarm
- WO = Wire-off alarm
- MPA = Missing pulse alarm
- R = Reserved

Table 3 - Output Map

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
0	CF	SSM	FR CH 0	Number of pulses to terminate sampling 0...7 CH 0			MPM 0...3 CH 0		R	LF	FR CH 1	Number of pulses to terminate sampling 0...7 CH 1			MPM 0...3 CH 1	
1	Maximum Frequency 0...32,767 or 0.0...3,276.7 or Absolute Value of Acceleration - 0...32767 Channel 0															
2	Frequency Scaling Divisor 0...255 Channel 0								Frequency Scaling Multiplier 0...255 Channel 0							
3	W0FG CH 0	W0FF CH 0	IGI CH 0	IFI CH 0	Minimum Frequency Sample Time 0...15 CH 0			Init St Up CH 0	ACT 0...3 CH 0		F/AAS CH 0	MPDM 0...3 CH 0		W0FM 0...3 CH 0		
4	Maximum Frequency 0...32,767 or 0.0...3,276.7 or Absolute Value of Acceleration - 0...32767 Channel 1															
5	Frequency Scaling Divisor 0...255 Channel 1								Frequency Scaling Multiplier 0...255 Channel 1							
6	W0FG CH 1	W0FF CH 1	IGI CH 1	IFI CH 1	Minimum Frequency Sample Time 0...15 CH 1			Init St Up CH 1	ACT 0...3 CH 1		F/AAS CH 1	MPDM 0...3 CH 1		W0FM 0...3 CH 1		
7	Reserved															

Where: CF = Communication fault
 SSM = Safe state mode
 FR = Frequency range
 MPM = Missing pulse multiplier
 LF = Local fault mode
 F/AAS = Frequency/Accel alarm select
 W0FF = Wire-off fault frequency
 W0FG = Wire-off fault gate
 W0FM = Wire-off fault mode
 IGI = Invert gate input
 IFI = Invert frequency input
 ACT = Acceleration calculation time
 MPDM = Missing pulse delay multiplier
 R = Reserved

Interpret Status Indicators



1794-IJ2 shown

- A = Input indicator
- B = Insertable label for writing individual I/O assignments
- C = Wire-off Fault indicator
- D = Output indicator
- E = Power/status indicator - indicates power applied to module and status of module

When an input indicator (yellow) is lighted, it indicates that a valid signal (active high or active low) is present at one of the Input terminals.

When wire-off detection is enabled, and a wire-off fault is detected (24V DC IEC 1+ input terminal only), a fault indicator (red) is blinked/flushed at a rate of 1 Hz to signal a fault condition. A wire-off fault signal is sent to the backplane. A flashing red fault indication means a valid wire-off condition for a 24V DC IEC 1+ Input or a 24V DC contact switch input with a shunt resistor.

When an output indicator is yellow, the logic is driving an output alarm On. After detecting a fault, the internal circuitry will set the output data to the appropriate safe state, as defined by the module data table. Safe state control may be adapter-dependent. The input and output indicators are on the field side of the isolation path, and display the logic state of the actual micro controller input and output.

The status indicator initially powers up as solid green, indicating the power supply is operating and internal diagnostic tests are being performed. After a successful power-up test, the indicator remains green. The indicator turns red in about 1.5 s if there is an internal diagnostics error. The module is operating correctly when the green OK indicator is on.

A red OK indicator shows that the module is in a faulted condition (internal error).

Table 4 - Status Indicators Description

Indicator	Condition	Operating Description
Input (0, 1) (Freq, or Gate)	Off (Dark)	Input Turned Off, Input Not Used, or Wire Disconnected
	On (Yellow)	Input Turned On (Active High or Active Low if Inverted)
Fault (F) (Freq, or Gate)	Off (Dark)	Wire Connected, Normal Operation or Detection Disabled
	On (Red Flashing)	Wire Disconnected, Fault Condition (for IEC 1+ Proximity switch or switch contacts with shunt resistor)
Output Alarm (0, 1)	Off (Dark)	Output Alarm Turned Off
	On (Yellow)	Output Alarm Turned On (Logic Drive On)
Status (OK)	Off (Dark)	24V Power Turned Off, or 5V Logic Power Problem
	Solid Green	Module OK, Normal Operating Mode
	Solid Red	Module Fault, Outputs Disabled

Diagnostics

The frequency input module returns diagnostics to the controller processor in word 5 of the BTR file. These diagnostics give you information on the status or condition of the module.

BTR Word 5

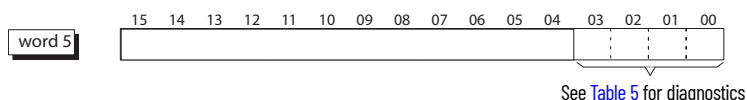


Table 5 - Diagnostic Bit Definition

Input Word	Bit	03	02	01	00	Definition
Word 5	Bits 00...03	0	0	0	0	0 = Normal Operation (No Failure)
		0	0	0	1	1 = Calibration Failure
		0	0	1	0	2 = Configuration Failure A Minimum Frequency Sample Time value other than 0...9 was selected.
		0	0	1	1	3 = Message Failure
		0	1	0	0	4 = Lead Break Detection Hardware Failure
		0	1	0	1	5 = Major Hardware Failure
		0	1	1	0	6 = EEPROM Failure
		0	1	1	1	7 = RAM Failure
		1	0	0	0	8 = ROM Failure
		1	0	0	1	9 = Calculation Failure The actual Frequency is greater than 32,767 Hz or 3,276.7 Hz (overrange). The scaled Frequency is greater than 32,767 Hz or 3,276.7 Hz (overrange). The % Full Scale calculation (based on Max Frequency) is > 3,276.7%.
1010...1111					10...15 = Not used	
Diagnostic Status - indicates the response from the module; a normal or non-normal operating condition.						

Specifications

Input Specifications

Attribute	Value
Number of input channels	2
Number of inputs per channel	2 - Frequency and Gate (gate used to establish direction)
Input frequency, max	1...32 kHz w/sine wave; 1...32 kHz w/square wave input
Frequency value, max	32,767 or 3,276.7 (Dependent on range)
Input pulse width	20 µs
Resolution/Accuracy	See Resolution and Accuracy on page 7
On-stage voltage, min	10V (24V IEC+1 proximity, encoder input or switch inputs)
On-state voltage, nom (selected by terminal base connections)	50 mV AC, 28V AC peak - Extended Magnetic Pickup 500 mV AC, 28V AC peak - Magnetic Pickup ≤ 3V - Vortex Flowmeter low range ≥ 6V - Vortex Flowmeter high range 24V DC IEC+1 proximity or encoder input 24V DC Contact Switch input
On-state voltage, max	Limited to isolated 24V DC power supply
On-state current min nom max	2.0 mA 9.0 mA 10.0 mA
Off-state current, min	1.5 mA into 24V DC IEC+ terminal
Off-state voltage, max	5.0V DC on 24V DC IEC+1 terminal
Wire-off detection	0.4 mA for proximity, encoder, or contact switch with 50 kΩ shunt resistor
Frequency input impedance	> 5 kΩ for 50 mV Extended Magnetic Pickup > 5 kΩ for 500 mV Magnetic Pickup > 10 kΩ for 3V Vortex Flowmeter low range > 10 kΩ for 6V Vortex Flowmeter high range > 2.5 kΩ for 24V DC IEC+1 proximity or encoder input > 2.5 kΩ for 24V DC Contact Switch input
Gate input impedance	> 5 kΩ for 50 mV Extended Magnetic Pickup > 5 kΩ for 500 mV Magnetic Pickup > 2.5 kΩ for 24V DC IEC+1 proximity or encoder input > 2.5 kΩ for 24V DC Contact Switch input

Output Specifications

(Meets IEC 1A 24V DC output specifications)

Attribute	Value
Number of outputs	2 isolated
Output voltage source	Customer supplied
Output voltage min nom max	10V DC 24V DC 31.2V DC
Off-state voltage, max	31.2V DC
On-state current	1 mA per output min 1.0 A per channel sourced out of module max Current Limited - All outputs can be on simultaneously without derating
Surge current	2 A for 50 ms, repeatable every 2 s
Off-state leakage, max	Less than 300 µA at 31.2V DC
On-state voltage drop	0.9V DC at 1 A
Output control	Outputs individually assignable to: Frequency, % Full Scale, or Acceleration Alarm
Output switching time	Triggered by frequency alarm or acceleration alarm Turn on: Less than 0.5 ms Turn off: Less than 1 ms

General Specifications

Attribute	Value
Module location	1794-TB3G and 1794-TB3GS Terminal Base Units
External DC power	(Input for +5V logic and 24V DC/DC converters)
Voltage range	19.2...31.2V DC (includes 5% AC ripple)
Supply voltage, nom	24V DC
Supply current	120 mA
Isolated DC power	(Output to sensors and encoders)
Voltage range	21.6...26.4V DC
Supply voltage, nom	24V DC
Supply current, max	0...60 mA @ 24V DC (4 devices @ 15 mA = 60 mA)
Peak AC ripple, max	100 mV
Dimensions (with module installed in base), (H x W x D)	94 x 94 x 69 mm (3.7 x 3.7 x 2.7 in.)
Isolation voltage	50V (continuous), Basic Insulation Type Type tested at 1365V AC for 60 s, between field side and system and individual channels
Processing time	≤ 4 ms
Flexbus current	30 mA at 5V DC
Power dissipation, max	4.6 W at 31.2V DC
Thermal dissipation, max	15.6 BTU/hr at 31.2V DC
Indicators (field side driven, logic side indication)	1 green/red power/status indicator 4 yellow status indicators (Freq 0, 1, Gate 0, 1) 4 red wire-off indicators (Freq 0, 1, Gate 0, 1) 2 yellow status indicators (Out 0, Out 1) - logic side
Keyswitch position	1
Wire size	Determined by installed terminal base
Wiring category ⁽¹⁾	2 - on signal ports 3 - on power ports
Wire type	Shielded on signal ports
Terminal screw torque	Determined by installed terminal base
Enclosure type rating	None (open-style)
North American temp code	T4A
IECEX temp code	T4
UKEX/ATEX temp code	T4

(1) Use this conductor category information for planning conductor routing. See the Industrial Automation Wiring and Grounding Guidelines, publication [1770-4.1](#).

Environmental Specifications

Attribute	Value
Temperature, operating	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...55 °C (32...131 °F) (1794-IJ2) -20...+70 °C (-4...+158 °F) (1794-IJ2XT)
Temperature, surrounding air, max	55 °C (131 °F) (1794-IJ2) 70 °C (158 °F) (1794-IJXT)
Temperature, nonoperating	IEC 60068-2-1 (Test Ab, Unpackaged nonoperating Cold), IEC 60068-2-2 (Test Bb, Unpackaged nonoperating Dry Heat), IEC 60068-2-14 (Test Na, Unpackaged nonoperating Thermal Shock): -40...+85 °C (-40...+185 °F)
Relative humidity	IEC 60068-2-30 (Test Db, Unpackaged Damp Heat): 5...95% noncondensing
Vibration	IEC 60068-2-6 (Test Fc, Operating): 5 g @ 10...500 Hz
Shock, operating	IEC 60068-2-27 (Test Ea, Unpackaged Shock): 30 g
Shock, nonoperating	IEC 60068-2-27 (Test Ea, Unpackaged Shock): 50 g
Emissions	IEC 61000-6-4

Environmental Specifications (Continued)

Attribute	Value
ESD immunity	IEC 61000-4-2: 4 kV contact discharges (I794-IJ2) 6 kV contact discharges (I794-IJ2XT) 8 kV air discharges
Radiated RF immunity	IEC 61000-4-3: 10V/m with 1 kHz sine-wave 80% AM from 80...6000 MHz
EFT/B immunity	IEC 61000-4-4: ±2 kV at 5 kHz on power ports ±2 kV at 5 kHz on signal ports
Surge transient immunity	IEC 61000-4-5: ±2 kV line-earth(CM) on shielded signal ports
Conducted RF immunity	IEC 61000-4-6: 10V rms with 1 kHz sine-wave 80% AM from 150 kHz...80 MHz on shielded signal ports

Certifications

Attribute (when product is marked) ⁽¹⁾	Value
c-UL-us	UL Listed Industrial Control Equipment, certified for US and Canada. See UL File E65584. UL Listed for Class I, Division 2 Group A,B,C,D Hazardous Locations, certified for U.S. and Canada. See UL File E194810.
Ex	UK Statutory Instrument 2016 No. 1107 and European Union 2014/34/EU ATEX Directive, compliant with: EN IEC 60079-0; General Requirements EN IEC 60079-7; Explosive Atmospheres, Protection "e" II 3 G Ex ec IIC T4 Gc DEMKO 14 ATEX 1342501X UL22UKEX2378X
IECEX	IECEX System, compliant with: IEC 60079-0; General Requirements IEC 60079-7; Explosive Atmospheres, Protection "e" Ex ec IIC T4 Gc IECEX UL 14.0066X
UK and CE	UK Statutory Instrument 2016 No. 1091 and European Union 2014/30/EU EMC Directive, compliant with: EN 61326-1; Meas./Control/Lab., Industrial Requirements EN 61000-6-2; Industrial Immunity EN 61131-2; Programmable Controllers EN 61000-6-4; Industrial Emissions UK Statutory Instrument 2012 No. 3032 and European Union 2011/65/EU RoHS, compliant with: EN 63000; Technical documentation
RCM	Australian Radiocommunications Act, compliant with: EN 61000-6-4; Industrial Emissions
TÜV	TÜV Certified for Functional Safety: up to and including SIL 2
KC	Korean Registration of Broadcasting and Communications Equipment, compliant with: Article 58-2 of Radio Waves Act, Clause 3
EAC	Russian Customs Union TR CU 020/2011 EMC Technical Regulation
Morocco	Arrêté ministériel n° 6404-15 du 29 ramadan 1436
CCC	CNCA-C23-01 强制性产品认证实施规则 防爆电气 CNCA-C23-01 CCC Implementation Rule Explosion-Proof Electrical Products

(1) See the Product Certification link at rok.auto/certifications for Declarations of Conformity, Certificates, and other certification details.

Notes:

Rockwell Automation Support

Use these resources to access support information.

Technical Support Center	Find help with how-to videos, FAQs, chat, user forums, Knowledgebase, and product notification updates.	rok.auto/support
Local Technical Support Phone Numbers	Locate the telephone number for your country.	rok.auto/phonesupport
Technical Documentation Center	Quickly access and download technical specifications, installation instructions, and user manuals.	rok.auto/techdocs
Literature Library	Find installation instructions, manuals, brochures, and technical data publications.	rok.auto/literature
Product Compatibility and Download Center (PCDC)	Download firmware, associated files (such as AOP, EDS, and DTM), and access product release notes.	rok.auto/pcdc

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Waste Electrical and Electronic Equipment (WEEE)



At the end of life, this equipment should be collected separately from any unsorted municipal waste.

Rockwell Automation maintains current product environmental compliance information on its website at rok.auto/pec.

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