Installation Instructions

Original Instructions

Allen-Bradley
by ROCKWELL AUTOMATION

FLEX I/O Thermocouple/mV Input Module and RTD Input Module

Catalog Numbers 1794-IT8, 1794-IR8

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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Updated template	throughout
Added module descriptions	1
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Updated RTD excitation current specification	10
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Module Descriptions

The 1794-IT8 module is a FLEX™ I/O 8-channel Thermocouple/millivolt input module. The 1794-IR8 module is a FLEX I/O 8-channel Resistance Thermometer Detector (RTD) input module. Both are block transfer modules that interface analog signals with any Allen-Bradley® programmable controller with block transfer capability.

Rockwell Automation

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.

注意：本製品を設置、構成、稼動または保守する前に、本書および本機器の設置、設定、操作についての参考資料の該当箇所に記載されている文書に目を通してください。ユーザは、すべての該当する条例、法律、規格の要件に加えて、設置および配線の手順に習熟している必要があります。
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 유지 보수하기 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, 가동, 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.

DİKKAT: Bu ürünün kurulumu, yapılandırılması, işletilmesi veya bakımı öncesinde bu dokümanı ve bu ekipmanın kurulumu, yapılandırılması ve işletimi ile ilgili İlave 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：在安裝、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, konfigurering 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, bediend of onderhoudt. Gebruikers moeten zich vertrouwd maken met de installatie en de bedradingsinstructies, 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:

- Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1, for more installation requirements.
- NEMA Standard 250 and EN/IEC 60529, as applicable, for explanations of the degrees of protection provided by enclosures.

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: 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 Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1, for more information.

WARNING: For Class I Division 2 applications, use only Class I Division 2 listed or recognized accessories and modules approved for use within the 1794 platform.

WARNING: If you connect or disconnect wiring while the field-side power is on, an electric 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: When used in a Class I, Division 2, hazardous location, this equipment must be mounted in a suitable enclosure with proper wiring method that complies with the governing electrical codes.

European Hazardous Location Approval

The following modules are European Zone 2 approved: 1794-IT8, 1794-IR8

The following applies to products marked CE Ex 3 G:

- Are intended for use in potentially explosive atmospheres as defined by UKEX regulation 2016 No. 1107 and European Union Directive 2014/34/EU and has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of Category 3 equipment that is intended for use in Zone 2 potentially explosive atmospheres, which are given in Schedule 1 of UKEX and Annex II of this Directive.
- Compliance with the Essential Health and Safety Requirements has been assured by compliance with EN IEC 60079-7:2015+A1:2018 and EN IEC 60079-0:2018.
- 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 that is 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 CENELEC 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, CENELEC EN IEC 60079-7:2015+A1:2018 Explosive atmospheres, Equipment protection by increased safety "e", reference certificate number UL 21 ATEX 2599 and UL22UKEX2226X.
- 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 21.0086.

WARNING: Special Conditions for Safe Use:

- This equipment shall be mounted in a 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 that are defined by Rockwell Automation.
- Provision shall be made to prevent the rated voltage from being exceeded by transient disturbances of more than 140% of the peak rated voltage when applied in Zone 2 environments.
- The instructions in the user manual shall be observed.
- 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.
- Devices shall be used in an environment of not more than Pollution Degree 2.

WARNING: When installed in the hazardous or non-hazardous area, the module shall be installed in a suitably certified (for example, Ex e or Ex nA) enclosure providing a minim**um ingress protection of IP54.**

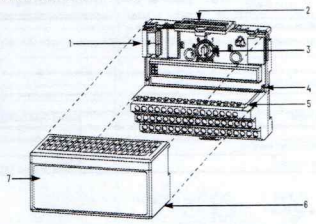
North American Hazardous Location Approval

The 1794-IT8, 1794-IR8module is Hazardous Location approved:

The Following Information Applies When Operating This Equipment In Hazardous Locations.	**Informations sur l'utilisation de cet équipement en environnements dangereux.**
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.	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.
WARNING: **Explosion Hazard –** • 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.	**AVERTISSEMENT:** **Risque d'Explosion –** • 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 inadapté à une utilisation en environnement de Classe I, Division 2.

Overview

FLEX I/O Thermocouple/mV Input Module and RTD Input Module – 1794-IT8, 1794-IR8



Component Identification

	Description		Description
1	Keyswitch	5	Module alignment bar
2	Terminal base	6	Terminal base alignment groove
3	Flexbus connector	7	Latching mechanism
4	Module		

Install the Module

Read this for information about how to install the FLEX I/O module, which mounts on a 1794-TB2, 1794-TB3, 1794-TB3S, 1794-TB3T, or 1794-TB3TS base terminal base.

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.

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.

Mount on Terminal Base

1. Rotate the keyswitch (1) on the terminal base (2) clockwise to position 3 as required for this type of module.
2. Make sure the Flexbus connector (3) is pushed all the way to the left to connect with the neighboring terminal base or adapter. **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.
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.

Wire the Module

To connect wiring for 1794-TB2, 1794-TB3, 1794-TB3S, 1794-TB3T and 1794-TB3TS bases, see the tables and figure and complete the following:

1. Connect individual high and low signal wiring to numbered terminals on the 0 15 row (A) as indicated in the table. Use a Belden 8761 cable for mV signal wiring, or the appropriate thermocouple wire for your thermocouples. For more accurate readings in mV mode, use the 1794-TB3T or 1794-TB3TS terminal base unit.

ATTENTION: Thermocouple/mV and RTD modules do not receive power from the backplane. +24V DC power must be applied to the modules. If power is not applied, the module position appears to the adapter as an empty slot in your chassis.

ATTENTION: You must power this module from the same power supply that supplies the adapter, so they both power up simultaneously. You must cycle power for the adapter to recognize this module.

2. Connect individual channel signal returns to the associated terminal on row (B) as shown in the wiring table.
3. Connect individual channel shield returns to the associated terminal on row (B) for 1794-TB3 or 1794-TB3S or row (C) for the 1794-TB3T or 1794-TB3TS as shown in the wiring table.

IMPORTANT Use recommended Belden cables for connecting the RTD to the terminal base.

RTD Type	Length of Run/Humidity Level	Belden Cable Number
2-wire	Not applicable	9501
3-wire	Less than 30.4 m (100 ft) with normal humidity	9533
	Over 30.5 m (100 ft) or high humidity[1]	83503

(1) Greater than 95% for more than 8 hours.

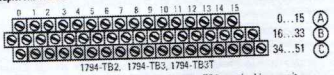
4. Connect +24V DC power to terminal 34 on row 35 51 (C).
5. Connect 24V DC common to terminal 16 on row 16 33 (B).

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

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

6. **1794-IT8 only:** On 1794-TB3T or 1794-TB3TS terminal bases, connect cold junction compensation (CJC) wiring to terminals 36, 37, and 38 for inputs 0 3, and terminals 47, 48, and 49 for inputs 4 7. Connect the tail of the CJC to any of the associated thermocouple input terminals: 0 7 for CJC connected to terminals 36, 37, and 38; or, 8 15 for CJC connected to terminals 47, 48, and 49. **The tail of the CJC shares a terminal with an input.**
7. If daisy chaining power to the next terminal base, connect a jumper from terminal 51 (+V DC) on this base to the +V terminal on the next base.
8. If continuing DC common to the next terminal base, connect a jumper from terminal 33 (common) on this base to the COM (return) terminal on the next base.

Wire Connections for the Thermocouple/TRD Module



1794-TB2, 1794-TB3, 1794-TB3T

Shaded terminals not included on 1794-TB2 terminal base unit.

IMPORTANT Use 1794-TB3T or 1794-TB3TS terminal bases for thermocouple or millivolt inputs.
Use 1794-TB2 or 1794-TB3 terminal bases for millivolt inputs only.

Wire Connections to 1794-TB3, 1794-TB3S, and 1794-TB2 Terminal Bases

RTD or mV Channel	High Signal Terminal (H) or (+)	Low Signal Terminal (L) or (-)	Signal Return[1] 1794-IR8 only	Shield Return
0	A-0	A-1	B-17	B-18
1	A-2	A-3	B-19	B-20
2	A-4	A-5	B-21	B-22
3	A-6	A-7	B-23	B-24
4	A-8	A-9	B-25	B-26
5	A-10	A-11	B-27	B-28
6	A-12	A-13	B-29	B-30
7	A-14	A-15	B-31	B-32
24V DC common	B-16 B-33			
+24V DC power	1794-TB3, 1794-TB3S (C-34 C-51); 1794-TB2 (C-34 and C-51)			

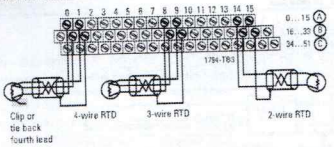
(1) When using a 2-wire RTD, jumper the signal return to the low signal terminal.

Wire Connections to 1794-TB3T, and 1794-TB3TS Terminal Bases

RTD, mV, or TC[1] Channel	High Signal Terminal (H) or (+)	Low Signal Terminal (L) or (-)	Signal Return 1794-IR8 only	Shield Return[2]
0	A-0	A-1	B-18	B-16
1	A-2	A-3	B-19	B-20
2	A-4	A-5	B-21	B-22
3	A-6	A-7	B-23	B-24
4	A-8	A-9	B-25	B-26
5	A-10	A-11	B-27	B-28
6	A-12	A-13	B-29	B-30
7	A-14	A-15	B-31	B-32

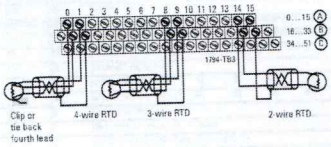
(1) Terminals 36, 37, 38, 47, 48, and 48 are for cold junction compensation **only** (with 38 and 47 chassis GND).
(2) Terminals 39...46 are chassis ground.

2, 3, and 4-wire RTD Wiring to a 1794-TB3 Terminal Base



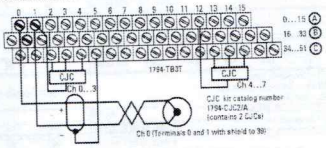
ATTENTION: Keep exposed area of inner conductor as short as possible. When using a 2-wire RTD, jumper the signal return to the low signal terminal.

2, 3, and 4-wire RTD Wiring to a 1794-TB3T Terminal Base

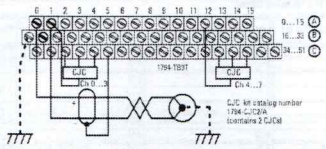


ATTENTION: Keep exposed area of inner conductor as short as possible.

Thermocouple Wiring to a 1794-TB3T Terminal Base

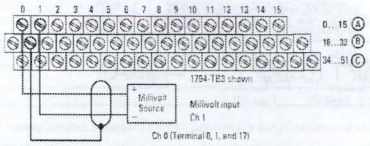


Grounded Thermocouple Wiring to a 1794-TB3T Terminal Base



IMPORTANT When using grounded thermocouples, and the error is off the same amount on each thermocouple, connect terminal 16 to ground, and connect the thermocouple ground to the same ground.

Millivolt Wiring to a 1794-TB3, 1794-TB3S, or 1794-TB3T Terminal Base



For more accurate readings, use the 1794-TB3T for mV measurement.

Block-transfer Read and Write

The following block-transfer read and write word bit information is presented for experienced users only. See publication 1794-UM053x for the RTD module or 1794-UM033 for the thermocouple and millivolt modules for more information on programming and configuring the modules.

Input Map (Read) for 1794-IR8 and 1794-IT8

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
Word 0	Reserved															
1	Channel 0 Input Data															
2	Channel 1 Input Data															
3	Channel 2 Input Data															
4	Channel 3 Input Data															
5	Channel 4 Input Data															
6	Channel 5 Input Data															
7	Channel 6 Input Data															
8	Channel 7 Input Data															
9	Overrange Alarm Bits (CH 0 = bit 8, CH 1 = bit 9, and so on)								Underrange Alarm Bits (CH 0 = bit 0, CH 1 = bit 9, and so on)							
10[1]	0	0	0	0	0	BC	CD	CR	0	DS bits		PU	B S	CJC O	CJC U	
10[2]	0	0	0	0	0	BC	CD	CR	RUP	CE bits		P U	R	0	0	
Where:	BC = Bad Calculation CR = Calculation Range PU = power-up CJCO = CJC Overrange CE bits = Critical Error bits			CD = Calculation Done DS bits = Diagnostic Status bits BS = Bad Structure CJCU = CJC Underrange R = Reserved												

(1) For 1794-IT8 only.
(2) For 1794-IR8 only.

Temperature and resistance data is returned with an implied decimal point. For example, a temperature data of 1779 is 177.9 °C; Resistance data of 2034 is 203.4 Ω.
Millivolt data is returned with an implied decimal point of two decimal points. For example, 7500 is 75 mV.

Output Map (Write) for 1794-IR8 and 1794-IT8

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**
Word 0[1]	8-bit Calibration Mask								CC	CHL	Filter Cutoff			FDF	MDT	
Word 0[2]	8-bit Calibration Mask								CC	CHL	Filter Cutoff			EM	MDT	
1	Thermocouple or RTD Type CH 3				Thermocouple or RTD Type CH 2				Thermocouple or RTD Type CH 1				Thermocouple or RTD Type CH 0			
2	Thermocouple or RTD Type CH 7				Thermocouple or RTD Type CH 6				Thermocouple or RTD Type CH 5				Thermocouple or RTD Type CH 4			
3	Reserved															
Where:	CC = Calculation Clock FDF = Fixed Digital Filter (TC only) MDT = Module Data Type				CHL = Calculation Hi/Lo EM = Enhanced Mode (RTD only)											

(1) For 1794-IT8 only.
(2) For 1794-IR8 only.

Data Format for All Channels – Write Word 0

Bit	01	00	
	0	0	°C
	0	1	°F
	1	0	Bipolar counts scaled between -32767 ... +32767
	1	1	Unipolar counts scaled between 0 ... 65535

0101 ... 1111 not used

RTD Type – Write Word 1 and 2

RTD Type					
Bit	03	02	01	00	Channel 0 (Write word 1)
Bit	07	06	05	04	Channel 1 (Write word 1)
Bit	11	10	09	08	Channel 2 (Write word 1)
Bit	15	14	13	12	Channel 3 (Write word 1)
Bit	03	02	01	00	Channel 4 (Write word 2)
Bit	07	06	05	04	Channel 5 (Write word 2)
Bit	11	10	09	08	Channel 6 (Write word 2)
Bit	15	14	13	12	Channel 7 (Write word 2)
	0	0	0	0	Resistance (default = mV)
	0	0	0	1	No sensor connected. Do not scan.
	0	0	1	0	100 Ω Pt α = 0.00385 Euro (-200 ... +870 °C)
	0	0	1	1	100 Ω Pt α = 0.003916 U.S. (-200 ... +630 °C)
	0	1	0	0	200 Ω Pt α = 0.00385 Euro (-200 ... +630 °C)
	0	1	0	1	500 Ω Pt α = 0.00385 Euro (-200 ... +630 °C)
	0	1	1	0	Reserved
	0	1	1	1	10 Ω Copper (-200 ... +260 °C)
	1	0	0	0	120 Ω Nickel (-60 ... +250 °C)
	1	0	0	1	100 Ω Nickel (-60 ... +250 °C)
	1	0	1	0	200 Ω Nickel (-60 ... +250 °C)
	1	0	1	1	500 Ω Nickel (-60 ... +250 °C)
	1	1	0	0	Reserved

Thermocouple Type – Write Word 1 and 2

Thermocouple Type					Range
Bit	03	02	01	00	Channel 0 (Write word 1)
Bit	07	06	05	04	Channel 1 (Write word 1)
Bit	11	10	09	08	Channel 2 (Write word 1)
Bit	15	14	13	12	Channel 3 (Write word 1)
Bit	03	02	01	00	Channel 4 (Write word 2)

Thermocouple Type – Write Word 1 and 2 (Continued)

Thermocouple Type					Range		
Bit	07	06	05	04	Channel 5 (Write word 2)		
Bit	11	10	09	08	Channel 6 (Write word 2)		
Bit	15	14	13	12	Channel 7 (Write word 2)		
	0	0	0	0	mV (default)		
	0	0	0	1	B	300 1800 °C	(572 3272 °F)
	0	0	1	0	E	-270 +1000 °C	(-454 +1832 °F)
	0	0	1	1	J	-210 +1200 °C	(-346 +2192 °F)
	0	1	0	0	K	-270 +1372 °C	(-454 +2502 °F)
	0	1	0	1	R	-50 +1768 °C	(-58 +3214 °F)
	0	1	1	0	S	-50 +1768 °C	(-58 +3214 °F)
	0	1	1	1	T	-230 +400 °C	(-454 +752 °F)
	1	0	0	0	C	0 2315 °C	(32 4199 °F)
	1	0	0	1	N	-270 +1300 °C	(-450 +2372 °F)
	1	0	1	0	TXK/XKL	-200 +800 °C	(-328 +1472 °F)
	1	0	1	1	Reserved		
	1	1	0	0	Module reports cold junction sensor temperature for channels 00 03		
	1	1	0	1	Module reports cold junction sensor temperature for channels 04 07		
	1	1	1	0	Reserved		
	1	1	1	1	No input device connected - Do not scan.		

Specifications

General Specifications – FLEX I/O Thermocouple/Millivolt, RTC Modules

Attribute	1794-IT8	1794-IR8
Number of inputs	8 channels	
Module location	1794-TB2, 1794-TB3, 1794-TB3S, 1794-TB3T, and 1794-TB3TS Terminal Bases	
Nominal input ranges	-76.5 +76.5 mV	1 433 Ω
RTD excitation current	–	778.36 µA
Resolution	16 bits (2.384 µV typical)	16 bits across 435 Ω
Accuracy	See "Calculating the Accuracy" section in Appendix A of publication 1794-UM052.	Without calibration, at low humidity: Normal mode: 0.05% full-scale (max) Enhanced mode: 0.07% full-scale (typical)
Common mode rejection	-115 db @ 60 Hz -100 db @ 50 Hz	-120 db @ 60 Hz -100 db @ 50 Hz with A/D filter cutoff @ 10 Hz
Common mode input range	±10V max	0V between channels (common return)
Isolation voltage	Tested at 850V DC for 1 s from inputs and user power to logic side	
Data format	16-bit 2's complement or offset binary (unipolar)	
Normal mode noise rejection	-60 db @ 60 Hz	-60 db @ 60 Hz for A/D filter cutoff @ 10 Hz
Input offset drift w/ temp, max	±6 mV / °C	1.5 mΩ / °C
Gain drift w/ temp, max	10 ppm / °C	Normal mode: 20 ppm / °C Enhanced mode: 10 ppm / °C
Channel bandwidth	0 2.62 Hz (-3 db)	
Settling time to 100% of final value	Available at system throughput rate	
System throughput	325 ms (1 CH scanned), programmable to 28 ms 2.6 s (8 CH scanned), programmable to 224 ms	**Normal mode** - 325 ms (1 CH scanned), programmable to 28 ms 2.6 s (8 CH scanned), programmable to 224 ms **Enhanced mode** - programmable from 58 850 ms/ch - 850 ms (1 CH scanned). 2.925 s (8 CH scanned)
Open TC/RTD circuit detection	Out of range reading (upscale)	
Open TC/RTD detection time	Available at system throughput rate	
Overvoltage capability	35V DC, 25V AC continuous at 25 °C	
Overall drift w/ temp, max	50 ppm / °C of span	–
Cold Junction Compensation	Range: 0 70 °C Catalog number 1794-CJC2	–
Channel to channel isolation	±10V	0V
Indicators	1 red/green power status indicator	
Flexbus current	210 mA	
Power dissipation, max	3.0 W @ 31.2V DC	
Thermal dissipation, max	10.2 BTU/hr @ 31.2V DC	

General Specifications – FLEX I/O Thermocouple/Millivolt, RTC Modules (Continued)

Attribute	1794-IT8	1794-IR8
Keyswitch position	3	
External DC power supply voltage range	19.2 31.2V DC (includes 5% AC ripple). See Derating Curve on page 13.	
Supply current	110 mA @ 24V DC	
Dimensions, approx. (HxWxD)	94 x 45.7 x 53.3 mm (3.7 x 1.7 x 2.1 in.)	
Weight, approx.	144 g (5.08 oz.)	
North American temp code	T4A	
UKEX/ATEX temp code	T4	
IECEx temp code	T4	
Enclosure type rating	None (open-style)	
Signal conductor, Thermocouple[1]	Thermocouple - Use appropriate shielded thermocouple wire	2-wire – Belden 9501 3-wire, less than 3.5 m (100 ft) with normal humidity - Belden 9533
Signal conductor, Millivolt	Belden 8761	3-wire, greater than 3.5 m (100 ft) or normal humidity (<55 °C for > 8 hrs) - Belden 83503
Wire size Power	0.34 2.5 mm² (22...12 AWG) solid or stranded copper wire rated at 75 °C (167 °F) or greater 1.2 mm (3/64 in.) insulation max	
Wiring category[2]	2 on power ports	

(1) See thermocouple manufacturer documentation for proper thermocouple extension.
(2) Use this Conductor Category information for planning conductor routing. See Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1.

Supported Thermocouple Types - 1794-IT8

Type	Range °C	Range °F
B	300 1800 °C	(572 3272 °F)
C	0 2315 °C	(32 4199 °F)
E	-270 +1000 °C	(-454 +1832 °F)
J	-210 +1200 °C	(-346 +2192 °F)
K	-270 +1372 °C	(-454 +2502 °F)
TXK/XK(L)	-200 +800 °C	(-328 +1472 °F)
N	-270 +1300 °C	(-454 +2372 °F)
R	-50 +1768 °C	(-58 +3214 °F)
S	-50 +1768 °C	(-58 +3214 °F)
T	-270 +400 °C	(-454 +752 °F)

Supported RTD - 1794-IR8

Resistance
100Ω Pt αx = 0.00385 Euro (-200 +870 °C)
100Ω Pt αx = 0.003916 U.S. (-200 +630 °C)
200Ω Pt αx = 0.00385 Euro (-200 +400 °C)
500Ω Pt αx = 0.00385 Euro (-200 +630 °C)
100Ω Nickel αx = 0.00618 (-60 +250 °C)
120Ω Nickel αx = 0.00672 (-60 +250 °C)
200Ω Nickel αx = 0.00618 (-60 +250 °C)
500Ω Nickel αx = 0.00618 (-60 +250 °C)
10Ω Copper αx = 0.00427 (-200 +260 °C)

Environmental Specifications

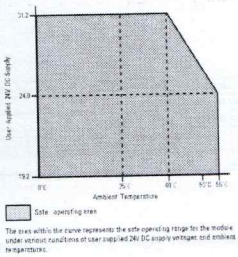
Attribute	Value
Temperature, operating	IEC 60068-2-1 (Test Ad, Operating Cold), IEC 60068-2-2 (Test Bd, Operating Dry Heat), IEC 60068-2-14 (Test Nb, Operating Thermal Shock): 0 55 °C (32 131 °F)
Temperature, nonoperating	IEC 60068-2-1 (Test Ab, Unpackaged Nonoperating Cold), IEC 60068-2-2 (Test Bb, Unpackaged Nonoperating Dry Heat), IEC 60068-2-14 (Test Na, Unpackaged Nonoperating Thermal Shock): -40 +85 °C (-40 +185 °F)
Surrounding air temperature, max	55 °C (131 °F)
Relative humidity	IEC 60068-2-30 (Test Db, Unpackaged Damp Heat): 5 95% noncondensing
Vibration	IEC60068-2-6 (Test Fc, Operating): 5 g @ 10 500 Hz
Shock, operating	IEC60068-2-27 (Test Ea, Unpackaged shock): 30 g
Shock, nonoperating	IEC60068-2-27 (Test Ea, Unpackaged shock): 50 g
Emissions	IEC 61000-6-4
ESD immunity	IEC 61000-4-2: 6 kV contact discharges 8 kV air discharges
Radiated RF immunity	IEC 61000-4-3: 10 V/m with 1 kHz sine wave 80% AM from 80 6000 MHz
EFT/B immunity	IEC 61000-4-4: ±2 kV @ 5 kHz on signal ports
Surge transient immunity	IEC 61000-4-5: ±2 kV line-earth (CM) on shielded ports
Conducted RF immunity	IEC 61000-4-6: 10 V rms with 1 kHz sine wave 80% AM from 150 kHz 80 MHz

Certifications

Certifications (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.
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
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 UL 21 ATEX 2599 ULD21UKEX2269
IECEx	IECEx System, compliant with: IEC 60079-0; General Requirements IEC 60079-7; Explosive Atmospheres, Protection "e" II 3 G Ex ec IIC T4 Gc IECEx UL 21.0086
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-C23-01:2019 CCC implementation Rule Explosion-Proof Electrical Products, compliant with: GB 3836.1-2010 Explosive atmospheres — Part 1: Equipment — General requirements GB 3836.8-2014 Explosive atmospheres - Part 8: Equipment protection by type of protection "n"
UKCA	2016 No. 1091 – Electromagnetic Compatibility Regulations 2016 No. 1107 – Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 2012 No. 3032 – Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations

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

Derating Curve



The area within the curve represents the safe operating range for the module under various conditions of user-supplied 24V DC supply voltages and ambient temperatures.

Additional Resources

These documents contain more information about related products from Rockwell Automation.

Resource	Description
FLEX I/O 8 Input RTD Module User Manual, publication 1794-UM003.	Describes how to configure and use a FLEX I/O RTD module.
FLEX I/O Thermocouple/Millivolt Input Module, publication 1794-UM097.	Describes how to configure and use a FLEX I/O thermocouple/millivolt module.
FLEX I/O and FLEX I/O-XT Selection Guide, publication 1794-SG002.	Provides specifications for selecting FLEX I/O and FLEX I/O-XT™ products.
Industrial Components Preventive Maintenance, Enclosures, and Contact Ratings Specifications, publication IC-TD002.	Provides a quick reference tool for Allen-Bradley industrial automation controls and assemblies.
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Certifications website, rok.auto/certifications.	Provides declarations of conformity, certificates, and other certification details.

You can view or download publications at rok.auto/literature.

Rockwell Automation Support

Use these resources to access support information.

Technical Support Center	Find help with how-to videos, FAQs, chat, user forums, and product notification updates.	rok.auto/support
Knowledgebase	Access Knowledgebase articles.	rok.auto/knowledgebase
Local Technical Support Phone Numbers	Locate the telephone number for your country.	rok.auto/phonesupport
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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