

Analog I/O Module Summary

Catalog Number	Inputs	Outputs	Terminal Base Unit	Module Type	
1794-IE8	8	—	1794-TB2, 1794-TB3, 1794-TB3S, 1794-TB3T, 1794-TB3TS, 1794-TB3K, 1794-TB3SK, 1794-TB3TK, 1794-TB3TSK	Selectable, non-isolated inputs	
1794-IE8XT				Selectable, non-isolated inputs, Extended temperatures	
1794-IE8H			1794-TB3G, 1794-TB3GS, 1794-TB3GK, 1794-TB3GSK	Single-ended, non-isolated, HART-enabled inputs	
1794-IE12	12			Single-ended inputs	
1794-IF4I	4	—	1794-TBN, 1794-TB2, 1794-TB3, 1794-TB3S, 1794-TB3T, 1794-TB3TS, 1794-TBNK, 1794-TB3K, 1794-TB3SK, 1794-TB3TK, 1794-TB3TSK	Single-ended, isolated inputs	
1794-IF4IXT				Single-ended inputs, Isolated, Extended temperatures	
1794-IF8IH	8	—	1794-TB3, 1794-TB3S, 1794-TB3K, 1794-TB3SK	Single-ended, isolated, HART-enabled inputs	
1794-IR8				1794-TB2, 1794-TB3, 1794-TB3S, 1794-TB3T, 1794-TB3TS, 1794-TBKD, 1794-TB3K, 1794-TB3SK, 1794-TB3TK, 1794-TB3TSK	Non-isolated relay inputs
1794-IRT8				1794-TB3G, 1794-TB3GS, 1794-TB3GK, 1794-TB3GSK	Non-isolated RTD/Thermocouple inputs
1794-IRT8XT					Non-isolated RTD/Thermocouple inputs, Extended temperatures
1794-IT8				1794-TB2, 1794-TB3, 1794-TB3S, 1794-TB3T, 1794-TB3TS, 1794-TB3K, 1794-TB3SK, 1794-TB3TK, 1794-TB3TSK ⁽³⁾	Non-isolated, Thermocouple, Millivolt inputs
1794-IE4XOE2	4	2		Single-ended, non-isolated I/O	
1794-IE4XOE2XT				Single-ended, non-isolated I/O, Extended temperatures	
1794-IE8XOE4	8	4	1794-TB3G, 1794-TB3GS, 1794-TB3GK, 1794-TB3GSK	Single-ended, non-isolated I/O	
1794-IF2XOF2I				2	2
1794-IF2XOF2IXT					
1794-OE4	—	4		Selectable, non-isolated outputs	
1794-OE4XT				Selectable, non-isolated outputs, Extended temperatures	
1794-OE8H ⁽¹⁾		8	1794-TB3G, 1794-TB3GS, 1794-TB3GK, 1794-TB3GSK	Single-ended, non-isolated, HART-enabled outputs	
1794-OE12 ⁽²⁾		12		Single-ended, non-isolated outputs	
1794-OF4I		4	4	1794-TBN, 1794-TB2, 1794-TB3, 1794-TB3S, 1794-TB3T, 1794-TB3TS, 1794-TBNK, 1794-TB3K, 1794-TB3SK, 1794-TB3TK, 1794-TB3TSK	Source isolated outputs
1794-OF4IXT	Source isolated outputs, Extended temperatures				
1794-OF8IH	8				1794-TB3, 1794-TB3S, 1794-TB3K, 1794-TB3SK

(1) Do not exceed length of 30 m (100 ft) for signal cabling.

(2) Not supported by 1747-SN or 1747-BSN for use on RIO with SLC controllers.

(3) 1794-TB2, 1794-TB3, 1794-TB3S for mV inputs only.

Modules Specifications

The following section shows more detailed module specifications in comparative groups to facilitate your selection based on your requirements.

FLEX I/O Analog Input Modules

Analog Input Comparison

Catalog Number	Input Signal Range	Accuracy Drift with Temperature	External DC Supply Current, Nom	Power Dissipation, Max	Thermal Dissipation, Max
1794-IE8 ⁽¹⁾	4...20 mA 0...20 mA ±10V 0...10V	Current Input: 0.0407% Full Scale/°C Voltage Input: 0.0428% Full Scale/°C	60 mA @ 24V DC	3 W @ 31.2V DC	10.2 BTU/hr @ 31.2V DC
1794-IE8XT					
1794-IE8H	4...20 mA	0.05%/°C of output signal range	295 mA @ 24V DC	3.9 W	13.5 BTU/hr
1794-IE12	4...20 mA (user configurable) 0...20 mA (user configurable)	Current Input: 0.004% Full Scale/°C Voltage Input: 0.004% Full Scale/°C	30 mA @ 24V DC; 45 mA @ 10.0V DC	1.2 W @ 31.2V DC; 1.1 W @ 24V DC; 0.9 W @ 10.0V DC	4.1 BTU/hr @ 31.2V DC
1794-IF4 ⁽¹⁾	4...20 mA 0...20 mA ±20 mA ±10V 0...10V ±5V 0...5V	Current Input: 0.0038% Full Scale/°C Voltage Input: 0.0028% Full Scale/°C	80 mA @ 24V DC	2.0 W @ 31.2V DC	6.9 BTU/hr @ 31.2V DC
1794-IF4IXT					6.8 BTU/hr @ 31.2V DC
1794-IF4CFXT					
1794-IF8IH	4...20 mA (user configurable) 0...20 mA (user configurable)	0.4% Full Scale for 0 °C...55 °C	190 mA @ 24V DC	4.8 W @ 31.2V DC	6.8 BTU/hr @ 31.2V DC
1794-IR8 ⁽¹⁾⁽²⁾	1...433 Ω	Normal mode: 0.05% Full Scale (max) Enhanced mode: 0.01% Full Scale (typical)	140 mA @ 24V DC	3 W @ 31.2V DC	10.2 BTU/hr @ 31.2V DC
1794-IRT8 ⁽¹⁾⁽²⁾	-40...100 mV DC for thermocouples 0...325 mV DC for RTDs 0...500 Ω for resistance range	Hardware only in mV mode: 0.10% Full Scale mV mode with filtering: 0.05% Full Scale	85 mA @ 24V DC	3 W @ 31.2V DC	10.2 BTU/hr @ 31.2V DC
1794-IRT8XT			95 mA @ 24V DC		
1794-IT8 ⁽¹⁾⁽²⁾	±76.5 mV		150 mA @ 24V DC		
1794-IE8XOE4	4...20 mA (user configurable) 0...20 mA (user configurable)	Current Input or Output: 0.004% Full Scale @ 25 °C Voltage Input or Output: 0.004% Full Scale @ 25 °C	140 mA @ 24V DC; 280 mA @ 10.0V DC	3.0 W @ 31.2V DC; 2.3 W @ 24V DC; 2.0 W @ 10.0V DC	10.3 BTU/hr @ 31.2V DC
1794-IE4XOE2 ⁽¹⁾	4...20 mA 0...20 mA ±10V 0...10V	Current Input: 0.0407% Full Scale/°C Voltage Input: 0.0428% Full Scale/°C Current Output: 0.0069% Full Scale/°C Voltage Output: 0.0045% Full Scale/°C	70 mA @ 24V DC	4.0 W @ 31.2V DC	13.6 BTU/hr @ 31.2V DC
1794-IE4XOE2XT			164 mA @ 10.5V DC		15.3 BTU/hr @ 31.2V DC
1794-IF2XOF2 ⁽¹⁾	4...20 mA 0...20 mA ±20 mA ±10V 0...10V ±5V 0...5V	Current Input: 0.0038% Full Scale/°C Voltage Input: 0.0028% Full Scale/°C Current Output: 0.0025% Full Scale/°C Voltage Output: 0.0012% Full Scale/°C	150 mA @ 24V DC	3.3 W @ 31.2V DC	11 BTU/hr @ 31.2V DC
1794-IF2XOF2IXT				2.0 W @ 31.2V DC	6.8 BTU/hr @ 31.2V DC

(1) Each module's channel is individually selectable or as a group of four.

(2) For the accuracy calculation, refer to the module's user manual.

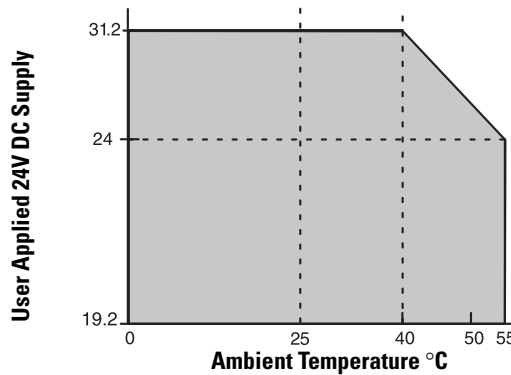
1794-IR8 RTD Input Module

The 1794-IR8 is a temperature-measuring module that accepts 2- and 3-wire RTDs. Use the 1794-IR8 in applications where channel fast-update rate is not required. If you need channel fast-update rates, use the 1794-IRT8 module described on page 44.


RTD Input Module

Specification	1794-IR8
Input resolution	16 bits across 435 Ω
Sensors supported	Resistance: 100 Ω Pt μ = 0.00385 Euro (-200...870 °C) 100 Ω Pt μ = 0.003916 U.S. (-200...630 °C) 200 Ω Pt μ = 0.00385 Euro (-200...630 °C) 500 Ω Pt μ = 0.00385 U.S. (-200...630 °C) 100 Ω Nickel μ = 0.00618 (-60...250 °C) 120 Ω Nickel μ = 0.00672 (-60...250 °C) 200 Ω Nickel μ = 0.00618 (-60...250 °C) 500 Ω Nickel μ = 0.00618 (-60...250 °C) 10 Ω Copper μ = 0.00427 (-200...260 °C)
Data format	16 bits, 2's complement, left justified; Offset binary
Settling time	100% of final value available at system throughput rate
Normal mode rejection ratio	60 dB @ 60 Hz for A/D filter cutoff @ 15 Hz
Common mode rejection ratio	-120 dB @ 60 Hz -100 dB @ 50 Hz with A/D filter cutoff @ 10 Hz
Common mode voltage	0V between channels (common return)
Accuracy, normal mode (max) ⁽¹⁾	0.05% Full Scale (low humidity) without calibration
Accuracy, enhanced mode (typical)	0.01% Full Scale (low humidity) without calibration
System throughput, normal mode	Programmable from 28...325 ms/channel 325 ms (1 channel scanned) 2.6 s (8 channels scanned)
System throughput, enhanced mode	Programmable from 56...650 ms/channel 650 ms (1 channel scanned) 2.925 s (8 channels scanned)
Open RTD detection	Out of range upscale reading
Open circuit detection type	Available at system throughput rate
Overvoltage capability	35V DC, 25V AC continuous @ 25 °C 250V peak transient
Channel bandwidth	DC to 2.62 Hz (-3 dB)
RTD excitation current	718.39 μ A
RFI immunity	Error of <1% of range @ 10V/m, 27...1000 MHz
Gain drift with temperature	Normal mode: 20 ppm/ °C max Enhanced mode: 10 ppm/ °C max
Dimensions (HxWxD), approx	46 x 94 x 53 mm (1.8 x 3.7 x 2.1 in.) 94 x 94 x 69 mm (3.7 x 3.7 x 2.7 in.) installed
Temperature, operating	0...55 °C (32...131 °F)

(1) The number is based on the hardware of the module only. Additional errors are introduced depending on the sensor used, environment, and other factors. Contact technical support for more information.

1794-IR8 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.

 = Safe operating area

1794-IRT8 and 1794-IRT8XT Thermocouple/RTD Input Module

The 1794-IRT8 is a high-speed, high-accuracy temperature/mV measuring module that accepts thermocouple inputs, 2-, 3-, and 4-wire RTD inputs, and mV source inputs.

The 1794-IRT8 offers the following:

- wire-off, over-range, and under-range detection
- good common mode rejection
- usage with long thermocouple wiring
- effective in noisy environments
- usage with grounded or ungrounded thermocouples
- more stability with ambient temperature changes than with the 1794-IR8 and the 1794-IT8

Release of Series B version provides capability to work with grounded thermocouples.

Use cold junction compensators 1794-CJC2 in thermocouple mode. Two cold junction compensators are shipped with the 1794-IRT8.

The 1794-IRT8XT is the extended temperature version of the 1794-IRT8 module. The module is conformal coated.

Thermocouple/RTD Input Module

Specification	1794-IRT8 and 1794-IRT8XT
Input resolution	14 bits
Supported RTD types	Resistance: 100 Ω Pt μ = 0.00385 Euro (-200...870 °C) 100 Ω Pt μ = 0.003916 U.S. (-200...630 °C) 200 Ω Pt μ = 0.00385 Euro (-200...400 °C) 200 Ω Pt μ = 0.003916 U.S. (-200...400 °C) 100 Ω Nickel μ = 0.00618 (-60...250 °C) 120 Ω Nickel μ = 0.00672 (-60...320 °C) 200 Ω Nickel μ = 0.00618 (-60...200 °C) 10 Ω Copper μ = 0.00427 (-200...260 °C)
Supported Thermocouple types	Type B: 300...1800 °C (572...3272 °F) Type E: -270...1000 °C (-454...1832 °F) Type J: -210...1200 °C (-346...2192 °F) Type K: -270...1372 °C (-454...2502 °F) Type N: -270...1300 °C (-454...2372 °F) Type R: -50...1768 °C (-58...3214 °F) Type S: -50...1768 °C (-58...3214 °F) Type T: -270...400 °C (-454...752 °F) Type TXK/XK (L): -200...800 °C (-328...1472 °F)
Accuracy	0.05% of full range in mV mode with filtering selected Hardware only = 0.10% of full range in mV mode
Common mode rejection ratio	-80 dB @ 5V peak-to-peak 50...60 Hz
Common mode input range	Series A – \pm 4V Series B – \pm 15V
System throughput	7.4 ms – mV 8.0 ms – Ω – 2-wire 10.0 ms – Ω – 3-wire 10.4 ms – Ω – 4-wire 8.0 ms – Ω – 2-wire RTD (°F) 10.4 ms – Ω – 4-wire RDT (°F) 8.8 ms – Ω – 2-wire RDT (°C), (°K) 10.8 ms – Ω – 4-wire RDT (°C), (°K) 9.8 ms – Ω – 3-wire RDT (°F) 10.0 ms – Ω – 3-wire RDT (°C), (°K) 8.0 ms – Thermocouples (°F) 8.8 ms – Thermocouples (°C), (°K) ⁽¹⁾
Open circuit detection type	Series A: RTD and TC modes – open input – module defaults to max value Series B: RTD mode – open input – module defaults to max value Series B: TC mode – open input – module defaults to min value
Excitation current	630 μ A
Overvoltage capability	Series A: 7V DC continuous @ 25 °C Series B: 15V DC continuous @ 25 °C
Open input detection time	0...3.8 s for Series A, revision D or earlier Immediate detection (max 2 scans) for Series A, revision E or later Immediate detection (max 2 scans) for Series B
Cold junction compensation range	0...70 °C for firmware Series A, revision D or earlier -20...100 °C for firmware Series A, revision E or later -20...100 °C for firmware Series B
Cold junction compensation	A-B Cold Junction Compensation Kit, 1794-CJC ⁽²⁾

Thermocouple/RTD Input Module

Specification	1794-IRT8 and 1794-IRT8XT
Data format	°C (implied decimal point XXX.X) °F (implied decimal point XXX.X) °K (implied decimal point XXX.X) -32767...32767 0...65535 0...5000 (Ω mode) (implied decimal point XXX.X) -4000...10000 (mV mode) (implied decimal point XXX.XX)
Overall drift with temperature, max	Series A: 150 ppm/°C of span Series B: 50 ppm/°C of span
Dimensions (HxWxD), approx	46 x 94 x 53 mm (1.8 x 3.7 x 2.1 in.) 94 x 94 x 69 mm (3.7 x 3.7 x 2.7 in.) installed
Temperature, operating	1794-IRT8: -20...55 °C (-4...131 °F) 1794-IRT8XT: -20...70 °C (-4...185 °F)

(1) For maximum throughput, short circuit all unused channels.

(2) Kit supplied with the module and contains 2 compensators.

1794-IT8 Thermocouple/mV Input Module

The 1794-IT8 module is a temperature/mV measuring module that accepts inputs from a variety of thermocouples and from the mV source in the range of ± 76.5 mV. Choose the 1794-IT8 module when you need the following:

- A cost effective module.
- Applications that don't require high accuracy or high speed.
- Support for grounded or ungrounded thermocouples.

Use cold junction compensators (cat. no. 1794-CJC2) in thermocouple mode. Two cold junction compensators are shipped with the 1794-IT8 module. This module is suitable to work with grounded thermocouples, if certain guidelines are followed. Refer to the module's user manual for more information.

The FLEX I/O cold junction compensator kit, containing two compensators, is included with the 1794-IT8 module. You can order additional compensators using the above catalog number.

Thermocouple/mV Input Module

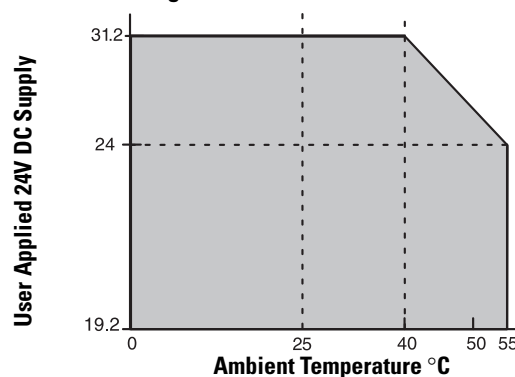
Specification	1794-IT8
Input resolution	16 bits (2.384 μ V typical)
Supported Thermocouple types	Type B: 300...1800 °C (572...3272 °F) Type C: 0...2315 °C (32...4199 °F) Type E: -270...1000 °C (-454...1832 °F) Type J: -210...1200 °C (-346...2192 °F) Type K: -270...1372 °C (-454...2502 °F) Type N: -270...1300 °C (-454...2372 °F) Type R: -50...1768 °C (-58...3214 °F) Type S: -50...1768 °C (-58...3214 °F) Type T: -270...400 °C (-454...752 °F) Type TXK/XK (L): -200...800 °C (-328...1472 °F)

Thermocouple/mV Input Module


Specification	1794-IT8
Data format	16 bits, 2's complement; Offset binary (unipolar)
Settling time	100% of final value available at system throughput rate
Normal mode rejection ratio	60 dB @ 60 Hz
Common mode rejection ratio	-115 dB @ 60 Hz -100 dB @ 50 Hz
Common mode input range	$\pm 10V$
Accuracy ⁽¹⁾	With filter (max): 0.025% Full Scale @ 24 °C (± 0.5 °C) Without filter (max): 0.05% Full Scale @ 24 °C (± 0.5 °C)
System throughput	325 ms (1 channel scanned), programmable to 28 ms 2.6 s (8 channels scanned), programmable to 224 ms
Open input detection	Available at system throughput rate
Open circuit detection type	Out of range reading (upscale)
Overvoltage capability	35V DC, 25V AC continuous @ 25 °C 250V peak transient
Channel bandwidth	0...2.62 Hz (-3 dB)
RFI immunity	Error of <1% of range @ 10V/m, 27...1000 MHz
Input offset drift with temperature	+6 $\mu V/^\circ C$ max
Gain drift with temperature, max	10 ppm/ °C
Overall drift with temperature, max	50 ppm/ °C of span
Cold junction compensation range	0...70 °C
Cold junction compensation	A-B Cold Junction Compensation Kit, 1794-CJC ⁽²⁾
Dimensions (HxWxD), approx	46 x 94 x 53 mm (1.8 x 3.7 x 2.1 in.) 94 x 94 x 69 mm (3.7 x 3.7 x 2.7 in.) installed

(1) The number is based on the hardware of the module only. Refer to the user manual for the complete error calculation procedure.

(2) Kit supplied with the module and contains 2 compensators.

1794-IRT8 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.

 = Safe operating area

General Specification Comparison

Catalog ⁽¹⁾	Termination Type	Connections	Used in Applications	Current Capacity, max	Wiring Category	Purpose
1794-TB3T	Cage clamp, temperature	16 I/O; 10 common; 4 +V; 8 chassis ground; 2 sets of CJC for temperature modules	Up to 132V AC/156V DC	10	Module dependent	A cage clamp terminal base to be used with the 1794-IT8 or 1794-IRT8 module (when used in thermocouple mode) – also provides chassis ground connections for the 1794-IR8 and analog modules.
1794-TB3TS, 1794-TB3TSK ⁽²⁾	Spring clamp, temperature	16 I/O; 10 common; 4 +V; 8 chassis ground; 2 sets of CJC for temperature modules	Up to 132V AC/156V DC	10	2	A spring clamp version of the 1794-TB3T.
1794-TBKD	Cage clamp, knife disconnect	16 I/O; 18 common; 2 +V	—		Module dependent	A cage clamp terminal base with 16 knife disconnects.
1794-TBKDS						A spring clamp version of the 1794-TBKD.
1794-TBN, 1794-TBNK ⁽²⁾	Screw clamp, NEMA-style	16 I/O; 2 common; 2 +V	264V AC/DC			A NEMA-style screw clamp terminal base for larger gauge wires with a cover for I/O wiring.
1794-TBNF	Screw clamp, fused NEMA-style					Provides eight 5 x 20 mm fused, screw terminals with a cover for I/O wiring – shipped with fuses for the 1794-OA8 module; can be used to fuse the 1794-OM8 and 1794-OW8 modules with a replacement fuse. ⁽³⁾
1794-TB37DS	D-shell	37 Pin; digital and analog	—		Module dependent	A 37-pin D-shell termination for both digital and analog modules.
1794-TB62DS		62 Point;				A 62-pin D-shell termination for both digital and analog modules.
1794-TB62DSG	Grounded D-shell	62 Point; chassis ground				A grounded version of the 1794-TB62DS – for use with analog modules.
1794-TB62DST	D-shell	16 I/O; 18 common; 2 +V; 2 sets of CJC for temperature modules				A 62-pin D-shell termination to be used with the 1794-IT8 or 1794-IRT8 module (when used in thermocouple mode) – also provides chassis ground connections for analog modules.

- (1) Isolation voltage, channel to channel, is determined by the insert module. Use this conductor category information for planning conductor routing. Refer to Industrial Automation Wiring and Grounding Guidelines, publication [1770-4.1](#).
- (2) The letter K in the last position of the catalog number, before the series designation, indicates a conformal coated versions of standard modules and can be used with extended temperature modules (modules ending in -XT).
- (3) Contains eight 5 x 20 mm fuses (one for each even-numbered terminal – 0...14 on row B). Shipped with 1.6 A, 250V AC Slow Blow fuse suitable for the 1794-OA8 AC output module. Refer to individual installation instructions for fusing recommendations for other modules. Littlefuse PN23901.6 A-B PN94171304, SAN-O PNSD6-1.6A.