

Installation Instructions

Original Instructions



Allen-Bradley
by ROCKWELL AUTOMATION

FLEX I/O Isolated Analog Output Module

Catalog Number 1794-OF4I

Topic	Page
Summary of Changes	1
Install the Isolated Analog Output Module	4
Connect Wiring for 1794-TB2, 1794-TB3, 1794-TB3S, 1794-TB3T, and 1794-TB3TS	5
Connect Wiring for the 1794-TBN	5
Status Indicator	8
Specifications	8
Additional Resources	10

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.

Topic	Page
Updated Certifications	10
Added Additional Resources	10

The FLEX™ I/O isolated analog output module mounts on a 1794 terminal base.

1. Rotate the keyswitch (3) on the terminal base (4) clockwise to position 4 as required for this type of module.
2. Make sure that the Flexbus connector (1) is pushed all the way to the left to connect with the neighboring terminal base/adaptor. **You cannot install the module unless the connector is fully extended.**
3. Make sure that the pins on the bottom of the module are straight so they align properly with the connector in the terminal base.
4. Position the module (7) with its alignment bar (6) aligned with the groove (5) 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 (2) is locked into the module.



ATTENTION: If multiple power sources are used, do not exceed the specified isolation voltage.



WARNING: For Class I Division 2 applications, use only Class I Division 2 listed or recognized accessories and modules that are approved for use within the FLEX I/O platform.

Connect Wiring for 1794-TB2, 1794-TB3, 1794-TB3S, 1794-TB3T, and 1794-TB3TS

1. Connect individual high and low signal wiring to numbered terminals on the 0...15 row (A) as indicated in [Table 1 on page 5](#). Use Belden 8761 cable for signal.
2. Connect channel common/return to the associated terminal on row A.
3. Connect the +V DC power to terminal 34 on the 34...51 row (C) and -V common/return to terminal 16 on the 16...33 row (B).
4. If daisy chaining +V power to the next terminal base, connect a jumper from terminal 51 (+V DC) on this base unit to terminal 34 on the next base unit.
5. If continuing DC common (-V) to the next base unit, connect a jumper from terminal 33 (common) on this base unit to terminal 16 on the next base unit.
6. Connect the shield to functional earth ground as near as possible to the module. **1794-TB3T, 1794-TB3TS only:** Connect the shield to terminals 39...46 (earth ground).



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



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



ATTENTION: To reduce susceptibility to noise, power analog modules and digital modules from separate power supplies.

Connect Wiring for the 1794-TBN

1. Connect individual output wiring to the even-numbered terminals on row B for each output as indicated in the following table. Use Belden 8761 cable for signal wiring.
2. Connect the associated common/return to the corresponding odd-numbered terminal on row C for each output as indicated in [Table 1](#).
3. Connect the +V DC power to terminal 34 on the 34...51 row (C) and -V common/return to terminal 16 on the 16...33 row (B).
4. If daisy chaining +V power to the next terminal base, connect a jumper from terminal 51 (+V DC) on this base unit to terminal 34 on the next base unit.
5. If continuing DC common (-V) to the next base unit, connect a jumper from terminal 33 (common) on this base unit to terminal 16 on the next base unit.
6. Connect the shield to functional earth ground as near as possible to the module.

Table 1 - Wiring Connections for the 1794-0F4I Output Module

Channel	Signal Type	Label Markings	1794-TB2, 1794-TB3, 1794-TB3S, 1794-TB3T, 1794-TB3TS		1794-TBN
			Terminal	Shield (1794-TB3T, 1794-TB3TS)	Terminal
0	Current	I0	A-0	C-39	B-0
	Current	I0 ret	A-1		C-1
	Voltage	V0	A-2	C-40	B-2
	Voltage	V0 ret	A-3		C-3
1	Current	I1	A-4	C-41	B-4
	Current	I1 ret	A-5		C-5
	Voltage	V1	A-6	C-42	B-6
	Voltage	V1 ret	A-7		C-7

FLEX I/O Isolated Analog Output Module Installation Instructions

Table 1 - Wiring Connections for the 1794-OF4I Output Module

Channel	Signal Type	Label Markings	1794-TB2, 1794-TB3, 1794-TB3S, 1794-TB3T, 1794-TB3TS		1794-TBN
			Terminal	Shield (1794-TB3T, 1794-TB3TS)	Terminal
2	Current	I2	A-8	C-43	B-8
	Current	I2 ret	A-9		C-9
	Voltage	V2	A-10	C-44	B-10
	Voltage	V2 ret	A-11		C-11
3	Current	I3	A-12	C-45	B-12
	Current	I3 ret	A-13		C-13
	Voltage	V3	A-14	C-46	B-14
	Voltage	V3 ret	A-15		C-15
-V DC common	1794-TB2, 1794-TB3, 1794-TB3S: Terminals B-16...B-33 are internally connected in the terminal base unit. 1794-TBN: Terminals B-16 and B-33 are internally connected in the terminal base unit. 1794-TB3T, 1794-TB3TS: Terminals 16, 17, 19, 21, 23, 25, 27, 29, 31, and 33 are internally connected in the terminal base unit.				
+V DC power	1794-TB3, 1794-TB3S: Terminals 34...51 are internally connected in the terminal base unit. 1794-TB3T, 1794-TB3TS: Terminals 34, 35, 50, and 51 are internally connected in the terminal base unit. 1794-TB2, 1794-TBN: Terminals 34 and 51 are internally connected in the terminal base unit.				
Chassis ground (shield)	1794-TB3T, 1794-TB3TS: Terminals 39...46 are internally connected to chassis ground.				



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.

Figure 1 - 1794-TB2, 1794-TB3, 1794-TB3S, 1794-TB3T, and 1794-TB3TS Terminal Base Wiring

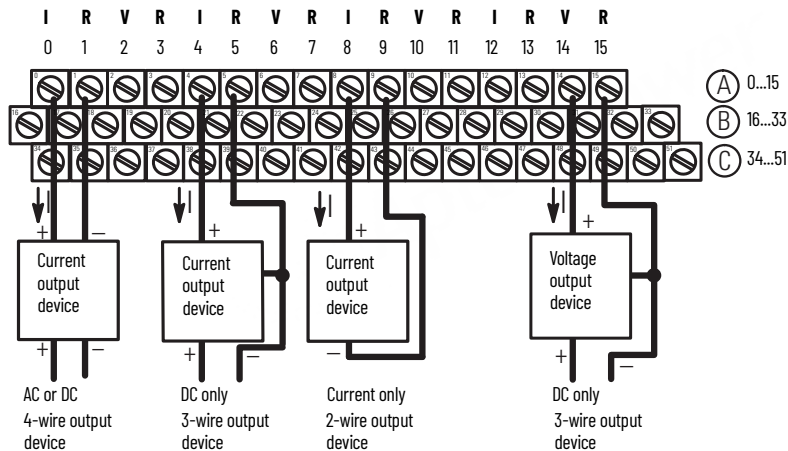


Figure 2 - 1794-TBN Terminal Base Wiring

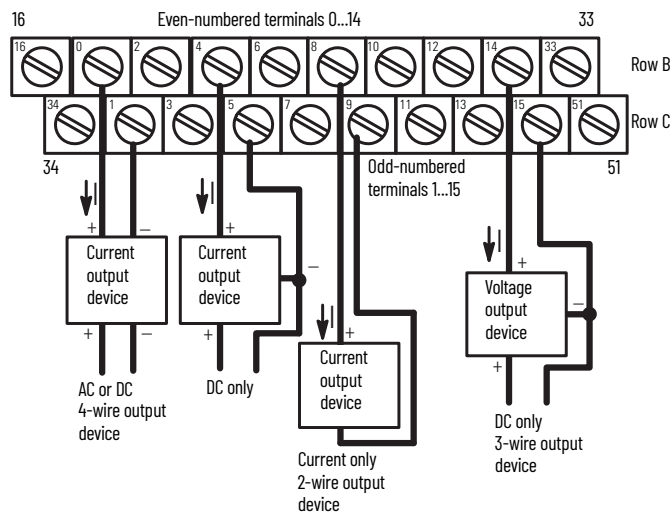


Table 2 - Input Map

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
Word 0	Readback channel 0															
Word 1	Readback channel 1															
Word 2	Readback channel 2															
Word 3	Readback channel 3															
Word 4	PU	FP	CF	0	Reserved				0	0	0	0	0	BD	DN	0
Word 5	0	0	0	0	P3	P2	P1	P0	0	0	0	0	W3	W2	W1	W0

Where:

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

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
Word 0	EN	S1	S0	0	0	0	0	0	0	0	0	0	0	0	0	0
Word 1	Output data channel 0															
Word 2	Output data channel 1															
Word 3	Output data channel 2															
Word 4	Output data channel 3															
Word 5	Ch 3 configuration				Ch 2 configuration				Ch 1 configuration				Ch 0 configuration			
Word 6	IC	1	TR	IT	Q3	Q2	Q1	Q0	RV	QK	CK	GO	Channel number			

Where:

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

Table 4 - Configure the Output Channels

Configuration Bits				Nominal Range	Data Type	Output Values	Channel Update Rate
MSD			LSD				
0	0	0	1	4...20 mA	Signed 2's complement	<0000...7878>	5.0 ms
0	0	1	0	±10V		<831F...7CE1>	2.5 ms
0	0	1	1	±5V		<8618...79E8>	2.5 ms
0	1	0	0	0...20 mA	Signed 2's complement %	<0...2710>	5.0 ms
0	1	0	1	4...20 mA		<0...2710>	5.0 ms
0	1	1	0	0...10V		<0...2710>	5.0 ms
0	1	1	1	±10V		<D8F0...2710>	5.0 ms
1	0	0	0	0...20 mA	Binary	0000...F3CF	2.5 ms
1	0	0	1	4...20 mA		0000...F0F1	5.0 ms
1	0	1	0	0...10V		0000...F9C2	2.5 ms
1	0	1	1	0...5V		0000...F3CF	2.5 ms
1	1	0	0	0...20 mA	Offset binary	<0618...F9E8>	2.5 ms
1	1	0	1	4...20 mA		<8000...F878>	5.0 ms
1	1	1	0	±10V		<031F...FCE1>	2.5 ms
1	1	1	1	±5V		<0618...F9E8>	2.5 ms

FLEX I/O Isolated Analog Output Module Installation Instructions

Status Indicator

The OK status indicator is bi-colored: Red and green. The indicator flashes green for one of three reasons:

1. The module configuration word is zero (for example, power-up reset condition).
2. The 24V DC user power is off.
3. The module is in configuration mode.

The indicator displays red to indicate that the module did not pass the initial hardware test. Cycle power again.

After power-up, if the status indicator is not flashing green or steady green, cycle the module power again to verify a proper reset of the bus interface.

Specifications

General Specifications

Attribute	Value
Number of outputs	4 isolated
Module location	1794-TB2, 1794-TB3, 1794-TB3S, 1794-TB3T, 1794-TB3TS, 1794-TBN terminal base
Flexbus voltage	5V DC
Flexbus current	55 mA
External DC power supply, nom voltage range	24V DC 19.2...31.2V DC (includes 5% AC ripple)
External DC power supply current	210 mA @ 24V DC
Thermal dissipation, max	16 BTU/hr @ 31.2V DC
Power dissipation, max	4.7 W @ 31.2V DC
Isolation voltage	120V (continuous), Basic Insulation Type, channel to channel, channel to user, channel to system, and user power to system when used with 1794-TB2, 1794-TB3, 1794-TB3S, 1794-TB3T, or 1794-TB3TS. 250V (continuous), Basic Insulation Type, channel to channel, channel to user, channel to system, and user power to system when used with 1794-TBN. Type tested at 1000V AC for 60 s.
Data format	2's complement 2's complement % Binary Offset binary
Indicators	1 red/green power/status indicator
Keyswitch position	4
Dimensions, with module installed in base, approx. (H x W x D)	94.0 x 94.0 x 66.0 mm (3.7 x 3.7 x 2.6 in.)
Conductor category ⁽¹⁾	2 - on signal ports 2 - on power ports
Conductor wire size	Determined by the installed terminal base
Wire type	Shielded on signal ports
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](#).

Module Specifications – 1794-OF4I

Attribute	Value
Resolution	15 bits plus sign
Voltage	0.320 mV/cnt
Current	0.656 mA/cnt
Conversion type	Digital-to-analog converter
Update rate	2.5/5.0 ms all channels (see Table 4 on page 7 .)
Output current terminal	0 mA output until module is configured 4...20 mA (configurable) 0...20 mA (configurable)
Output voltage terminal	0V output until module is configured ±10V (configurable) 0...10V (configurable) ±5V (configurable) 0...5V (configurable)
Step response to 63% of full-scale	< 25 µs
Current load on voltage output, max	3 mA
Resistive load on voltage output	0...750 Ω
Absolute accuracy	
Voltage terminal	0.1% full-scale @ 25 °C (77 °F)
Current terminal	0.1% full-scale @ 25 °C (77 °F)
Accuracy drift with temperature	
Voltage terminal	0.0012% full scale/°C
Current terminal	0.0025% full scale/°C
Calibration	Factory-calibrated; recalibrate when necessary.
Maximum overload	30V continuous or 32 mA continuous, one channel at a time.

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): -20...+55 °C (-4...+131 °F)
Temperature, surrounding air, max	55 °C (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)
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: 10V/m with 1 kHz sine wave 80% AM from 80...6000 MHz
EFT/B immunity	IEC 61000-4-4: ±2 kV @ 5 kHz on power ports ±2 kV @ 5 kHz on shielded signal ports
Surge transient immunity	IEC 61000-4-5: ±1 kV line-line(DM) and ±2 kV line-earth(CM) on power ports ±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
Enclosure type rating	None (open-style)

FLEX I/O Isolated Analog Output Module Installation Instructions

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 I342501X 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 ⁽²⁾ . Capable of SIL 2
KC	Korean Registration of Broadcasting and Communications Equipment, compliant with: Article 58-2 of Radio Waves Act, Clause 3
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.

(2) When used with specified firmware revisions.

Additional Resources

For more information on the products that are described in this publication, use these resources. You can view or download publications at rok.auto/literature.

Resource	Description
FLEX I/O and FLEX I/O-XT Selection Guide, publication 1794-SG002	Provides information on how to select FLEX I/O and FLEX I/O-XT™ adapters, terminal bases, I/O modules, and accessories.
FLEX I/O Isolated Analog Modules User Manual, publication 1794-UM008	A detailed description of module functionality, configuration, and information on how to use FLEX I/O isolated analog modules.
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	More information on proper wiring and grounding techniques.
Product Certifications website, rok.auto/certifications	Provides declarations of conformity, certificates, and other certification details.