FLEX I/O Specialty Modules

Standard FLEX I/O Catalog Numbers 1794-ID2, 1794-IJ2, 1794-IP4, 1794-VHSC

FLEX I/O XT Catalog Number 1794-IJ2XT

FLEX I/O™ Specialty Modules are intelligent modules designed to perform high speed frequency algorithms, high-speed scaling and counting mostly used in industrial applications. These modules are interaced with a FLEX I/O adapter, which then communicates with a programmable controller processor that has block transfer capability and external I/O devices.

Additional Resources

These documents contain additional information concerning related products from Rockwell Automation.

Resource	Description
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Certifications website, http://www.rockwellautomation.com/products/certification/	Provides declarations of conformity, certificates, and other certification details.

You can view or download publications at http://www.rockwellautomation.com/literature/. To order paper copies of technical documentation, contact your local Allen-Bradley® distributor or Rockwell Automation sales representative.

Available 1794 Specialty I/O Modules

Usage and Applications

Type	Description
Input Frequency Modules	A tachometer with the capability of reporting frequency, acceleration, and direction. Outputs are activated by alarms. Input devices range from magnetic pickup to flowmeters, to incremental encoders to proximity detectors. This intelligent I/O module is designed to perform high-speed frequency algorithms. The module provides 2 frequency inputs, 2 gate inputs, and 2 outputs. The frequency inputs are capable of accepting frequencies up to 32 kHz. The module accepts and returns binary data.
2 Channel Very High Speed Counter Module	A counter module has two incremental quadrature encoder interfaces each with three inputs (A, B, and Z). Each input module has ± inputs for connection to pulse transmitters with complementary or non-complementary signals.
2 Input Pulse Counter Module	This module is a 2-channel counter that performs high-speed scaling, calculation operations for various industrial applications including quantity counting, speed calculation, and flow monitoring. All input devices for the pulse counter module should be able to provide the input signal of 6V amplitude. Typical input devices include quadrature incremental encoders with or without reference and/or gate function and pulse transmitters. You can use one or two pulse trains.
4 Input Pulse Counter Module	The 4-input pulse counter modules performs high-speed scaling, calculation operations for various industrial applications. Typical applications include quantity counting, speed calculation, and flow monitoring. All the input devices for the pulse counter module should be able to provide the input signal of 6V amplitude. The 1794-IP4 has a 6V minimum threshold for an input On condition and a maximum 3V threshold for an input Off condition. The region between 3V and 6V is a transitional one and therefore requires input signals to pass cleanly through that region, otherwise module operation cannot be guaranteed.

FLEX I/O Specialty Modules

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1794-IJ2, 1794-IJ2XT

FLEX I/O 24V DC Input Frequency Module

Input Specifications

Attribute	1794-IJ2	1794-IJ2XT
Number of input	2	
Number of inputs per channel	2 - frequency and gate (gate used to establish direction)	
Processing time	≤ 4 ms	
Input frequency, max	1…32 kHz with sine wave 1…32 kHz with square wave input	
Frequency value, max	32,767 or 3,276.7 (dependent on frequency range bit)	
Input pulse width, min	20 µs	
Input resolution, min	0.01 %	
Input accuracy	0.425 %	
Voltage, on-state input, min	10V (24V IEC +1 proximity, encoder input or 24V DC contact switch inputs)	
Voltage, on-state input, nom (selected by terminal base connections)	50 mV AC input - extended magnetic pickup 500 mV AC input - magnetic pickup (50 or 500 mV mag input - 28V AC, 20 mA, 560 mW max) VORTEX flowmeter input - low range ≤ 3V VORTEX flowmeter input - high range ≥ 6V 24V DC IEC +1 proximity or encoder input 24V DC contact switch input	
Voltage, on-state input, max	Limited to isolated 24V DC power supply	
Current, on-state input, min	2.0 mA	
Current, on-state input, nom	9.0 mA	
Current, on-state input, max	10.0 mA	
Voltage, off-state input, max	5.0V DC on 24V DC IEC + 1 terminal	
Current, off-state input, max	1.5 mA into 24V DC IEC + 1 terminal	
Wire-off detect current, min (Only on 24V DC IEC+1 terminal)	0.4 mA (~50 KW shunt resistance @ 24V DC) proximity, encoder, or contact switch with shunt resistor	
Impedence, frequency input	>5 kΩ for 50 mV extended magnetic pickup >5 kΩ for 500 mV magnetic pickup (50 or 500 mV mag input - 28 V AC, 20 mA, 560 mW max) >10 kΩ for 3V vortex flowmeter >10 kΩ for 6V vortex flowmeter >2.5 kΩ for 24V DC IEC + 1 proximity or encoder input >2.5 kΩ for 24V DC contact switch input	
Impedence, gate input	>5 kΩ for 50 mV extended magnetic pickup >5 kΩ for 500 mV magnetic pickup (50 or 500 mV mag input - 28V AC, 20 mA, 560 mW max) >2.5 kΩ for 24V DC IEC + 1 proximity or encoder input >2.5 kΩ for 24V DC contact switch input	
Input filter selection	None selectable by user.	

Output Specifications

Attributes	1794-IJ2	1794-IJ2XT
Number of outputs	2 (2 isolated groups of 1)	
Output voltage source	Customer Supplied via 1794-TB3G or 1794-TB3GS terminal base (2 isolated groups, range 10…31.2 V DC)	
Voltage, on-state output, min	10V DC	

Output Specifications

Voltage, on-state output, nom	24V DC
Voltage, on-state output, max	31.2V DC
Current, on-state output, min	1.0 mA per output
Current , on-state output, max	1.0 A per channel sourced out of module, current limited[2]
Output surge current, max	2 A for 50 ms, repeatable every 2 s
Off-state leakage, max	Less than 300 µA @ 31.2V DC
Voltage drop, on-state output, max	0.9V DC @ 1 A
Output control	Outputs are individually assignable for 1 value of either: frequency/% full scale alarm or acceleration alarm
Output switching time[1] Off to On On to Off	Triggered by Alarm Value (Frequency or Acceleration): 0.5 ms max 1.0 ms max

(1) Output Off-to-On or On-to-Off delay is the time from the module issuing an output on or off until the output actually turns on or off.

(2) All outputs can be ON simultaneously without derating.

General Specifications

Attribute	1794-IJ2	1794-IJ2XT
Indicators	1 red/green 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	
Power supply Voltage range Supply voltage Supply current	(Input for +5V logic and 24V DC/DC converters) 19.2…31.2V DC (includes 5% AC ripple) 24V DC nom 220mA @ 24V DC nom	(Input for +5V logic and 24V DC/DC converters) 19.2…31.2V DC (includes 5% AC ripple) 24V DC nom 100mA @24V DC nom
Isolated DC power Voltage range Supply voltage Supply current Peak AC ripple	(Output to sensors and encoders) 21.6…26.4V DC 24V DC nom 0…60 mA max @ 24V DC (4 devices @ 15 mA = 60 mA) 100 mV max	
Flexbus current, 5V DC	30 mA	
Isolation voltage	50V (continuous), Basic Insulation Type Type tested at 1365V AC for 60 s, between field side and system and channels	
Power dissipation	4.6 W @ 31.2V DC	
Thermal dissipation	15.6 BTU/hr @ 31.2V DC	
Keyswitch position	1	
Input/output conductors Wire size Wiring category	 Belden 8761 2[1]	
Recommended terminal base	1794-TB3G and 1794-TB3GS	
Terminal screw torque	0.8 Nm (7 lb-in.)	
North American temp code	T4A	
IEC temp code	T4	
Dimensions (HxWxD)	46 x 94 x 53 mm (1.8 x 3.7 x 2.1 in.)	
Enclosure type rating	None (open style)	
Publication, installation instructions	1794-IN049	

(1) Use this Conductor Category information for planning conductor routing. Refer to Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1.

Environmental Specifications

Attribute	1794-IJ2	1794-IJ2XT
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)	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…70 °C (-4…158 °F)
Temperature, nonoperating	IEC 60068-2-1 (Test Ab, Unpackaged Non-operating Cold), IEC 60068-2-2 (Test Bb, Unpackaged Non-operating Dry Heat), IEC 60068-2-14 (Test Na, Unpackaged Non-operating 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	CISPR 11: Group 1, Class A (with appropriate enclosure)	
ESD immunity	IEC 61000-4-2: 4 kV contact discharges 8 kV air discharges	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…2000 MHz 10V/m with 200 Hz 50% Pulse 100% AM @ 900 MHz 10V/m with 200 Hz 50% Pulse 100% AM @ 1890 MHz 3V/m with 1 kHz sine-wave 80% AM from 2000…2700 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: ±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

Certification[1] (When marked on product)	1794-IJ2	1794-IJ2XT
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.	
CSA	CSA Certified Process Control Equipment. See CSA File LR54689C. CSA Certified Process Control Equipment for Class I, Division 2 Group A,B,C,D Hazardous Locations. See CSA File LR69960C.	
CE	European Union 2004/108/EC EMC Directive, compliant with: EN 61326-1; Meas./Control/Lab., Industrial Requirements EN 61000-6-2; Industrial Immunity EN 61000-6-4; Industrial Emissions EN 61131-2; Programmable Controllers (Clause 8, Zone A & B)	

Certifications

Certification[1] (When marked on product)	1794-IJ2	1794-IJ2XT
C-Tick	Australian Radiocommunications Act, compliant with: AS/NZS CISPR 11; Industrial Emissions	
Ex	European Union 94/9/EC ATEX Directive, compliant with: EN 60079-15; Potentially Explosive Atmospheres, Protection "n" EN 60079-0; General Requirements (Zone 2) II 3 G Ex nA IIC T4 Gc	
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	

(1) See the Product Certification link at http://www.rockwellautomation.com/products/certification/ for Declaration of Conformity, Certificates, and other certification details.

1794-VHSC

FLEX I/O 2 Channel Very High Speed Counter Module

Input Specifications

Attribute	1794-VHSC
Number of inputs	2
Maximum count value	16,777,215 (24-bit counter)
Input groups	2 groups of A/A_{return}, B/B_{return} and Z/Z_{return} pairs with 5V DC and 15…24V DC terminations at the terminal base
Input frequency, max	1.0 MHz counter and encoder X1 (no filters) 500 kHz encoder X2 (no filters) 250 kHz encoder X4 (no filters)
Input voltage	5V DC or 15…24V DC (Determined by terminal base terminations)
Input current	5V DC terminations: 19.1 mA @ 5V DC 25.7 mA @ 6V DC 15…24V DC terminations: 6.1 mA @ 15V DC 10.2 mA @ 24V DC
Voltage, on-state input	5V DC terminations: ≥2.6V DC 15…24V DC terminations: ≥12.5V DC
Voltage, on-state input, max	5V DC terminations: ±6V 15…24V DC terminations (Refer to installation publication, 1794-IN067 for derating curve)
Voltage, off-state input	5V DC terminations: ≤1.25V DC 15…24V DC terminations: ≤1.8V DC
Current, on-state input	≥ 5 mA
Current, off-state input	≤ 0.25 mA
Input filter selections	Off, 10 µs, 100 µs, 1.0 ms, 10.0 ms per A/B/Z group

Output Specifications

Attribute	1794-VHSC
Number of outputs	2 isolated groups of 2: 0.5 A @ 5V DC, max; 1.0 A @ 12…24V DC, max
Output control	Outputs can be tied to 8 compare windows
Output voltage range	5…7V DC; 10…31V DC
Leakage current, off-state	≤ 300 µA
Voltage, on-state	5V DC terminations: 0.9V DC @ 0.5 A 12…24V DC terminations: 0.9V DC @ 1.0 A
Current, on-state	5V DC terminations: 0.5 A 12…24V DC terminations: 1.0 A
Current per output pair, max	5V DC terminations: 0.5 A 12…24V DC terminations: 1.0 A
Short circuit current	5V DC terminations: 0.9 A 12…24V DC terminations: 4.0 A Outputs are short-circuit protected and turned off until power is cycled.
Surge current	2 A for 50 ms, repeatable every 2 s
Delay time Off to On On to Off	 25 µs (load dependent) 150 µs (load dependent)

General Specifications

Attribute	1794-VHSC
Indicators	1 red/green power/status indicator 6 yellow input status indicators – logic side 4 yellow output tatus indicators – logic side
Power supply Voltage range Supply voltage Supply current	 24V DC 19.2…31.2V DC (includes 5% AC ripple) 100 mA @ 24V DC
Flexbus current, 5V DC	75 mA
Isolation voltage	50V (continuous), Basic Insulation Type, between groups, input/output groups and system. Tested @ 850V DC for 1 s
Power dissipation	5.0 W @ 31.2V DC
Thermal dissipation	17.1 BTU/hr @ 31.2V DC
Terminal base screw torque	0.8 Nm (7 lb-in.) 1 Nm (9 lb-in.) for 1794-TBN
Conductors: Wire size Wire category[1]	 Determined by installed terminal base 2 – on signal ports 2 – on power ports
Recommended terminal base	1794-TB3G and 1794-TB3GS
Enclosure type rating	None (Open style)
Dimensions, approx. (HxWxD)	46 x 94 x 53 mm (1.8 x 3.7 x 2.1 in.)
Publication, Installation Instructions	1794-IN067

(1) Use this category information for planning conductor routing as described in Allen-Bradley publication 1770-4.1, Industrial Automation Wiring and Grounding Guidelines.

Environmental Specifications

Attribute	1794-VHSC
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, Un-packaged Non-operating Cold), IEC 60068-2-2 (Test Bb, Un-packaged Non-operating Dry Heat), IEC 60068-2-14 (Test Na, Un-packaged Non-operating Thermal Shock): -40…85 °C (-40…185 °F)
Relative humidity	IEC 60068-2-30 (Test Db, Unpackaged Damp Heat): 5…95% non-condensing
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	EC60068-2-27 (Test Ea, Unpackaged shock): 50 g
Emissions	CISPR 11: Group 1, Class A (with appropriate enclosure)
ESD immunity	IEC 61000-4-2: 6 kV contact discharges 8 kV air discharges
Related RF immunity	IEC 61000-4-3: 10V/m with 1 kHz sine-wave 80% AM from 80…2000 MHz 10V/m with 200 Hz 50% Pulse 100% AM @ 900 MHz 10V/m with 200 Hz 50% Pulse 100% AM @ 1890 MHz 1V/m with 1 kHz sine-wave 80% AM from 2000…2700 MHz
EFT/B immunity	IEC 61000-4-4: ±1 kV at 5 kHz on signal ports
Surge transient immunity	IEC 61000-4-5: ±500V line-line(DM) and ±1 kV line-earth(CM) on signal ports
Conducted RF immunity	IEC 61000-4-6: 10V rms with 1 kHz sine-wave 80%AM from 150 kHz…80 MHz

Certifications

Certification (when product is marked)(1)	1794-VHSC
CE	European Union 2004/108/EC EMC Directive, compliant with: EN 61326-1; Meas./Control/Lab., Industrial Requirements EN 61000-6-2; Industrial Immunity EN 61000-6-4; Industrial Emissions EN 61131-2; Programmable Controllers (Clause 8, Zone A & B)
C-Tick	Australian Radiocommunications Act, compliant with: AS/NZS CISPR 11; Industrial Emissions
KC	Korean Registration of Broadcasting and Communications Equipment, compliant with: Article 58-2 of Radio Waves Act, Clause 3

(1) See the Product Certification link at http://www.rockwellautomation.com/products/certification/ for Declaration of Conformity, Certificates, and other certification details

1794-ID2, 1794-IP4

FLEX I/O 2 Input Pulse Counter Module, FLEX I/O 4 Input Pulse Counter Module

Technical Specifications

Attributes	1794-ID2	1794-IP4
Number of inputs	2	4
Number of inputs per counter	4 inputs (A, B, Z and G)	2 groups of 2
Indicators	1 red/green power/status indicator 12 yellow status indicators	1 red/green power/status indicator 8 yellow status indicators
Flexbus current, 5V DC	5 mA	
Counting frequency	100 kHz	
Power supply Supply voltage Supply current	 12…24V DC (±10%) 150 mA @ 12V DC; 75 mA @ 24V DC	
Input pulse width	Each signal condition must be stable for at least 2 µs to be recognized	
Voltage, on-state input, min	6V DC	
Voltage, on-state input, max	26.4V DC (24V DC +10%)	
Voltage, off-state input, min	-26.4V DC	
Voltage, off-state input, max	3V DC	
Current, on-state input, min	3 mA @ 6V DC	
Current, on-state input, nom	9 mA @ 12V DC	
Current, on-state input, max	15 mA @ 24V DC	
Isolation voltage	Tested at 500V AC for 60 s	
Power dissipation	5 W maximum @ 26.4V DC	
Thermal dissipation	17.1 BTU/hr (maximum) @ 26.4V DC	
Input Conductors Wire Category Length (maximum)	 Belden 8761 2(1) 304.8 m (1000 ft)	
Power Conductors Wire Size Category	 0.33…3.31 mm^2 (22…12AWG) solid or stranded copper wire rated at 75 °C or higher 1.2 mm (3/64 in.) insulation maximum 2(1)	
Recommended terminal base	1794-TB3, 1794-TB3S, 1794-TBN, 1794-TBKD, 1794-TB37DS	1794-TB2, 1794-TB3, 1794-TB3S, 1794-TBN, 1794-TBKD
Enclosure type rating	None (open-style)	
Terminal base screw torque	1794-TB3, 1794-TB3S - 0.8 Nm (7 lb-in.) 1794-TBN - 1.0 Nm (9 lb-in.)	
North American temperature code	T4	
Dimensions, (HxWxD)	46 x 94 x 53 mm (1.8 x 3.7 x 2.1 in.)	
Publication, installation instructions	1794-IN063	1794-IN064

(1) Use this category information for planning conductor routing as described in Allen-Bradley publication 1770-4.1, Industrial Automation Wiring and Grounding Guidelines.

Environmental Specifications

Attribute	1794-ID2	1794-IP4
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)	
Relative humidity	IEC 60068-2-30 (Test Db, Unpackaged Nonoperating Damp Heat): 5…95% non-condensing	
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	CISPR 11: Group 1, Class A (with appropriate enclosure)	
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 30…1000 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	IEC 61000-4-5: ±1 kV line-earth(CM) on shielded ports
Conducted RF immunity	IEC 61000-4-6: 10V rms with 1 kHz sine-wave 80%AM from 150 kHz…80 MHz	

Certifications

Certification (when product is marked)(1)	1794-ID2	1794-IP4
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 E193170.	
CE	European Union 89/336/EEC EMC Directive, compliant with: EN 50082-2; Industrial Immunity EN 61000-6-2; Industrial Immunity EN 61000-6-4; Industrial Emissions EN 61326; Meas./Control/Lab., Industrial Requirements	
C-Tick	Australian Radiocommunications Act, compliant with: AS/NZS CISPR 11; Industrial Emissions	

(1) See the Product Certification link at http://www.rockwellautomation.com/products/certification/ for Declaration of Conformity, Certificates, and other certification details

Notes:

Important User Information

Solid-state equipment has operational characteristics differing from those of electromechanical equipment. Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls (publication SGI-1.1 available from your local Rockwell Automation sales office or online at http://www.rockwellautomation.com/literature/) describes some important differences between solid-state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid-state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

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