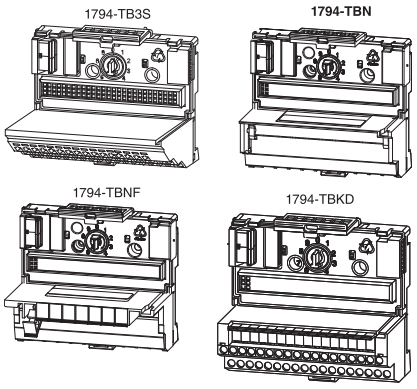
Select a FLEX I/O Terminal Base Unit

Step 3 – Select:

the appropriate terminal base unit for your module and system



Each FLEX I/O module requires a terminal base unit that snaps onto the DIN rail to the right of the I/O adapter. The terminal bases provide terminal connection points for the I/O wiring and plug together to form the backplane. They are available with screw, clamp, or spring terminations.

Common Terminal Base Characteristics

Current Capacity, max	Wire Size	Dimensions (HxWxD)
10	0.34…2.1 mm^2 (22…14 AWG) solid or stranded copper wire rated at 75 °C (167 °F) or greater, 1.2 mm (3/64 in.) insulation max	94 x 94 x 69 mm 3.7 x 3.7 x 2.7 in. **1794-TB37DS and 1794-TB62DS*** (1) 127 x 94 x 69 mm 5.0 x 3.7 x 2.7 in

(1) Measured with expansion module installed.

The following table is a comparison of general specifications for each FLEX I/O terminal base unit. For compatibility with FLEX I/O modules, see Table Digital I/O Module Summary on page 16.

General Specification Comparison

Catalog(1)	Termination Type	Connections	Used in Applications	Current Capacity, max	Wiring Category	Purpose
1794-TB2	Cage clamp	16 I/O; 18 common; 2 +V	Up to 132V AC/156V DC	10	2	A generic 2-wire version of the 1794-TB3.
1794-TB3, 1794-TB3K(2)		16 I/O; 18 common; 18 +V			Module dependent	Primarily intended for use with input modules when using 3-wire input proximity switches – can also be used with output modules.
1794-TB3S, 1794-TB3SK	Spring clamp					A spring clamp version of the 1794-TB3 – provides faster, simpler wire installation.
1794-TB32	Cage clamp	32 I/O; 8 common; 8 +V	Up to 31.2V DC			A 32-point version of the 1794-TB3 to be used with 32-point digital modules and the 1794-IB16D module.
1794-TB32S	Spring clamp					A spring clamp version of the 1794-TB32.
1794-TB3G, 1794-TB3GK(2)	Grounded screw clamp	36 I/O; 2 common; 2 +V; 10 chassis ground				A screw clamp terminal base unit with individual grounding used with certain analog modules.
1794-TB3GS, 1794-TB3GSK(2)	Grounded spring clamp				2	A spring clamp version of the 1794-TB3G.

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.

Digital I/O Module Summary

Catalog Number	Inputs	Outputs	Terminal Base Unit	Electrical Range	Module Type
DC Modules					
1794-IB8	8	—	1794-TB3, 1794-TB3S, 1794-TB3K, 1794-TB3SK	24V DC	Nonisolated inputs
1794-IB16	16	—			
1794-IB16D			1794-TB32, 1794-TB32S		Group isolated inputs Diagnostics
1794-IB16XT			1794-TB3, 1794-TB3S, 1794-TB3K, 1794-TB3SK		Nonisolated inputs Extended temperatures
1794-IB10XOB6	10	6	1794-TB2, 1794-TB3, 1794-TB3S, 1794-TB3K, 1794-TB3SK		Nonisolated I/O
1794-IB10XOB6XT					Nonisolated I/O Extended temperatures
1794-IB16XOB16P	16	16	1794-TB32, 1794-TB32S		Nonisolated I/O Protected outputs
1794-IC16		—	1794-TB3, 1794-TB3S, 1794-TB3K, 1794-TB3SK	48V DC	Nonisolated inputs
1794-IG16				5V DC	
1794-IH16				125V DC	
1794-IV16				24V DC	
1794-IB32	32		1794-TB32, 1794-TB32S		
1794-IV32					Nonisolated inputs with groups
1794-OB8	—	8	1794-TB2, 1794-TB3, 1794-TB3S, 1794-TB3K, 1794-TB3SK	24V DC	Nonisolated outputs
1794-OB8EP			1794-TB2, 1794-TB3, 1794-TB3S, 1794-TBN, 1794-TB3K, 1794-TB3SK, 1794-TBNK		Nonisolated, protected outputs
1794-OB8EPXT					Nonisolated, protected outputs Extended temperatures
1794-OB16	—	16	1794-TB2, 1794-TB3, 1794-TB3S, 1794-TB3K, 1794-TB3SK	24V DC	Nonisolated outputs
1794-OB16D					Group isolated inputs Diagnostics
1794-OB16P			1794-TB2, 1794-TB3, 1794-TB3S, 1794-TBN, 1794-TB3K, 1794-TB3SK, 1794-TBNK		Nonisolated, protected outputs Conformal coated
1794-OB16PXT					Nonisolated, protected outputs Extended temperatures
1794-OB32P		32	1794-TB32, 1794-TB32S		Nonisolated, protected outputs with groups

Digital I/O Module Summary

Catalog Number	Inputs	Outputs	Terminal Base Unit	Electrical Range	Module Type
1794-OC16	—	16	1794-TB3, 1794-TB3S, 1794-TB3K, 1794-TB3SK	48V DC	Nonisolated outputs
1794-OG16				5V DC	
1794-OV16				24V DC	
1794-OV16P					Nonisolated, protected outputs
1794-OV32		32	1794-TB32, 1794-TB32S		Nonisolated inputs in groups
Relay Modules					
1794-OW8	—	8	1794-TB2, 1794-TB3, 1794-TB3S, 1794-TBN, 1794-TBNF, 1794-TB3K, 1794-TB3SK, 1794-TBNK, 1794-TBNFK	24V DC	Isolated outputs Electromagnetic relays
1794-OW8XT					Isolated outputs Electromagnetic relays Extended temperatures

(1) Auxiliary terminal strips are required when using the 1794-TBN.

Select Input Filter Times for Digital Modules

Input filter times can be set to the following values (EtherNet/IP, ControlNet, and DeviceNet only).

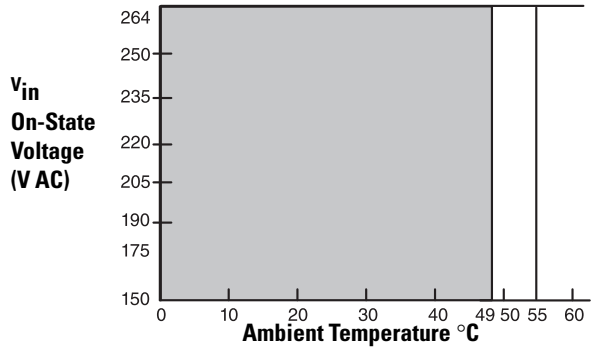
Input Filter Times – AC Modules

Filter Times for Inputs	Maximum Times (ms)			
	OFF to ON		ON to OFF	
	1794-IA8, 1794-IA8I	1794-IA16, 1794-IM8	1794-IA8, 1794-IA8I	1794-IA16, 1794-IM8
Filter time 0 (default)	8.4(1)	7.5	26.4(2)	26.5
1	8.6	8	26.6	27
2	9	9	27	28
3	10	10	28	29
4	12	12	30	31
5	16	16	34	35
6	24	24.5	42	44
7	40	42	58	60.5

(1) OFF to ON filter is 8 ms.

(2) ON to OFF filter is 26 ms.

1794-OM8 Derating Curve



The area within the curve represents the safe operating range for the module under various conditions of user supplied 220V AC supply voltages and ambient temperatures.

= Normal mounting safe operating range included
= Other mounting positions (including inverted horizontal, vertical) safe operating range

FLEX I/O Digital DC Input Modules

Digital DC Input Comparison

Specification	1794-IB8, 1794-IB16, 1794-IB16XT	1794-IV16	1794-IB32	1794-IV32	1794-IC16	1794-IG16	1794-IH16
Voltage, on-state input, min	10V DC, sinking	10V DC, sourcing	19.2V DC, sinking	19.2V DC, sourcing	30V DC, sinking	-0.2V DC, TTL	90V DC, sinking
Voltage, on-state input, nom	24V DC				48V DC	0V DC	125V DC
Voltage, on-state input, max	31.2V DC				60V DC	0.8V DC	146V DC
Voltage, off-state input, max	5V DC				10V DC	2.0...5.5V DC	20V DC
Terminal base unit	1794-TB3, 1794-TB3S, 1794-TB3K, 1794-TB3SK	1794-TB3, 1794-TB3S, 1794-TB3K, 1794-TB3SK	1794-TB32, 1794-TB32S		1794-TB3, 1794-TB3S, 1794-TB3K, 1794-TB3SK		
Current, on-state input, min	2.0 mA					—	1.0 mA
Current, on-state input, nom	8 mA @ 24V DC		4.1 mA @ 24V DC	4.1 mA	5 mA @ 48V DC	—	2 mA @ 125V DC
Current, on-state input, max	**1794-IB16:**12 mA **1794-IB8, 1794-IV16:** 11 mA **1794-IB16XT:** 5.0 mA		6 mA	6 mA	11 mA	—	3 mA
Current, off-state input, max	1.5 mA					4.1 mA	0.8 mA
Input impedance, max	4.6 kΩ	4.7 kΩ	6 kΩ		11 kΩ	—	60 kΩ
Power dissipation, max	3.5 W @ 31.2V DC(1)	5.7 W @ 31.2V DC	6.0 W @ 31.2V DC		6.4 W @ 60V DC	1.4 W @ 5.5V DC	6 W @ 146V DC
Thermal dissipation, max	11.9 BTU/hr @ 31.2V DC(2)	19.4 BTU/hr @ 31.2V DC	20.5 BTU/hr @ 31.2V DC		21.9 BTU/hr @ 60V DC	4.78 BTU/hr @ 5.5V DC	20.47 BTU/hr @ 146V DC

Digital DC Output Comparison

Specification	1794-OB8	1794-OB16	1794-OV16	1794-OV32	1794-OG16	1794-OC16
Thermal dissipation, max	11.2 BTU/hr @31.2V DC	18.1 BTU/hr @31.2V DC	14.3 BTU/hr @ 31.2V DC	8.53 BTU/hr @ 31.2V DC	3.41 BTU/hr @ 5.5V DC	12.6 BTU/hr @ 60V DC
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					
Isolation voltage	50V continuous, I/O to system Tested to 850V DC for 1 s, I/O to system No isolation between individual channels		50V continuous Tested 1770V DC for 60 s, I/O to system No isolation between individual channels	50V (continuous), Basic Insulation Type, between field side and system Type tested at 707V DC for 60 s, between field side and system No isolation between individual channels		75V continuous, I/O to system Tested to 1900V DC for 1 s, I/O to system (No isolation between individual channels)

(1) OFF to ON delay is the time from a valid output ON signal to output energization. ON to OFF delay is the time from a valid output OFF signal to output de-energization.

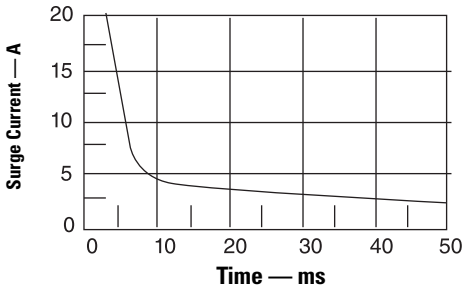
FLEX I/O Digital DC Protected Output Modules

- 1794-OB16P provides 16 sourcing 1/2 Amp outputs self-protected against shorts, overloads, and over temperature. The faulted output will automatically return when the fault is removed. No feedback to the processor is provided.
- 1794-OB16PXT is the extended temperature version of the 1794-OB16P module. The module is conformal coated.
- 1794-OB8EP provides 8 sourcing 2 Amp outputs with electronic fuse type of overload protection, which opens when overloaded. The fuse can be 'reset' several ways. Fault status is provided to the processor.
- 1794-OB8EPXT is the extended temperature version of the 1794-OB8EP module. The module is conformal coated.
- 1794-OB32P provides 32 self-protected sourcing 1/2 Amp outputs in 2 groups of 16 outputs. Separate voltage sources can be used with each group.
- 1794-OV16P is the sinking version of the 1794-OB16P.

Digital DC Protected Output Comparison

Specification	1794-OB16P, 1794-OB16PXT	1794-OB8EP, 1794-OB8EPXT	1794-OB32P	1794-OV16P
Voltage, on-state output, nom	24V DC, sourcing			24V DC, sinking
Voltage, on-state output, min	10V DC	19V.2 DC	10V DC	
Voltage, on-state output, max	31.2V DC(1)	31.2V DC		
Voltage drop, on-state output, max	0.5V DC	0.2V DC	0.5V DC	0.2V DC
Terminal base unit	1794-TB2, 1794-TB3, 1794-TB3S, 1794-TB3K, 1794-TB3SK	1794-TB2, 1794-TB3, 1794-TB3S, 1794-TBN, 1794-TB3K, 1794-TB3SK, 1794-TBNK	1794-TB32, 1794-TB32S	1794-TB3, 1794-TB3S, 1794-TB3K, 1794-TB3SK
Current on-state output, min	1.0 mA per channel			

1794-OB8EP Output Minimum Surge



FLEX I/O Digital DC Diagnostic Modules

1794-IB16D is the diagnostic version of the 1794-IB16.

1794-OB16D is the diagnostic version of the 1794-OB16.

The modules can detect open wire, short circuit, and reverse polarity of external power. When the module detects a fault, the module fault LED status indicator lights up, the corresponding red channel LED status indicator lights up, and the corresponding module error bit (open wire, short circuit, or reverse power bit) is set. The reporting function provides results of the diagnostics as bits in its data table.

The modules have 16-bi-color channel LED status indicators and one red module status indicator. These indicators are driven from the customer field side power.

Digital DC Diagnostic Input Module

Specification	1794-IB16D
Voltage, on-state input, min	10V DC, sinking
Voltage, on-state input, nom	24V DC
Voltage, on-state input, max	31.2 DC(1)
Voltage, off-state input, max	5.0V DC
Current, on-state input, nom	8.2 mA @ 24V DC
Current, on-state input, max	12.1 mA @ 31.2V DC
Terminal base unit	1794-TB32, 1794-TB32S
Input impedance, max.	3.1 kΩ
Current, on-state input, min	2.0 mA @ 10V DC
Current, off-state input, max	1.5 mA
Power dissipation, max	8.5 W @ 31.2V DC
Thermal dissipation, max	29 BTU/hr @ 31.2V DC
Detected reverse polarity voltage	10V min(2)
Sensor voltage drop, max	2.2V DC

FLEX I/O Digital DC Combination Modules

The 1794-IB16XOB16P module has outputs that are self-protected against shorts, overload, and over temperature similar to the 1794-OB16P module.

The 1794-IB10XOB6 module requires the use of external fusing for individual outputs.

The 1794-IB10XOB6XT module is the extended temperature version of the 1794-IB10XOB6 module.

Digital DC Combination Modules

Specification	1794-IB10XOB6, 1794-IB10XOB6XT[2]	1794-IB16XOB16P[3]
Terminal base unit	1794-TB2, 1794-TB3, 1794-TB3S, 1794-TB3K, 1794-TB3SK	1794-TB32, 1794-TB32S
Isolation voltage	50V (continuous), Basic Insulation Type Type tested at 1250V AC for 60 s, between field side and system Routine tested at 2121V DC for 1 s, between field side and system No isolation between individual channels	50V (continuous), Basic Insulation Type Tested at 2121V DC for 1 s, system to I/O and inputs to outputs
Power dissipation, max	6.0 W @ 31.2V DC	7.0 W @ 31.2V DC
Thermal dissipation, max	20.3 BTU/hr @ 31.2V DC	23.9 BTU/hr @ 31.2V DC
Number of inputs	10	16
Voltage, on-state input, min	10V DC	
Voltage, on-state input, nom	24V DC	
Voltage, on-state input, max	31.2V DC	
Current, on-state input, min	2.0 mA	
Current, on-state input, nom	8.0 mA @ 24V DC	
Current, on-state input, max	11.0 mA	12.1 mA
Voltage, off-state input, max	5V DC	
Current, off-state input, max	1.5 mA	
Input impedance, max	4.8 kΩ	2.5 kΩ
Number of outputs	6	16
Voltage, on-state output, min	10V DC	
Voltage, on-state output, nom	24V DC	
Voltage, on-state output, max	31.2V DC	
Voltage drop, on-state output, max	1V DC @ 2 A 0.5V DC @ 1 A	0.5V DC @ 0.5 A
Current, on-state output, min	1.0 mA per channel	
Current, on-state output, max	2.0 A per channel 10 A per module	0.5 A per channel 8 A per module