Installation Instructions

Original Instructions

Allen-Bradley
by **ROCKWELL AUTOMATION**

FLEX I/O Digital Input Modules

Catalog Numbers 1794-IB8, 1794-IB16, 1794-IB32, 1794-IB32K

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.

RA Rockwell Automation

North American Hazardous Location Approval

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.

ATTENTION:
- If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.
- 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 the requirements of all applicable codes, laws, and standards.
- Installation, adjustments, putting into service, use, assembly, disassembly, and maintenance are required to be carried out by suitably trained personnel in accordance with the applicable code of practice.
- In case of malfunction or damage, no attempts at repair should be made. The module should be returned to the manufacturer for repair. Do not dismantle the module.
- This equipment is certified for use only within the surrounding air temperature range of -20...+55 °C (-4...+131 °F) (**1794-IB8 and 1794-IB16**) or 0...55 °C (32...131 °F) (**1794-IB32, 1794-IB32K**). The equipment must not be used outside of this range.
- Use only a soft dry anti-static cloth to wipe down equipment. Do not use any cleaning agents.

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 the mounting surface approximately every 200 mm (7.8 in.) and use end-anchors appropriately. Be sure to ground the DIN rail properly. See the Industrial Automation Wiring and Grounding Guidelines, Rockwell Automation publication 1770-4.1, for more information.

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.

ATTENTION: : 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.

Compatibility

The following communication adapters are required to ensure compatibility with the 1794-IB32 and 1794-IB32K:

Remote I/O	1794-ASB Series E or later 1794-ASB2 Series D or later
ControlNet®	1794-ACN15 Series C, firmware revision 4.1 or later 1794-ACNR15 Series C, firmware revision 4.1 or later
DeviceNet®	1794-ADN Series B, firmware revision 2.4 or later for out-of-box compatibility
EtherNet/IP™	1794-AENT Series A, firmware revision 2.4 or later
PROFIBUS	1794-APBDPV1 Series B of the GSD file You can download the GSD file at rok.auto/pcdc
ControlLogix® Family	Studio 5000 Logix Designer® application[1] version 20 or later

(1) The Studio 5000 Logix Designer application is the rebranding of RSLogix 5000® software and will continue to be the product to program Logix 5000® controllers for discrete, process, batch, motion, safety, and drive-based solutions.

Connect Wiring for 1794-IB32 and 1794-IB32K

⚠️ **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.

1. Connect individual input wiring (Input 0…15) to numbered terminals on the 0…15 row (A) as indicated in Table 2.
2. Connect the associated power to the +V1 terminal (35, 37, 39, or 41) on the 34…51 row (C) as indicated in Table 2.
3. Connect the associated common for Input 0…15 to COM1 (terminal 36, 38, 40, or 42) on the 34…51 row (C) as indicated in Table 2.
4. Connect individual input wiring (Input 16…31) to numbered terminals on the 16…33 row (B) as indicated in Table 2. **Do not connect to terminals 16 or 33.**
5. Connect the associated power to the +V2 terminal (43, 45, 47, or 49) on the 34…51 row (C) as indicated in Table 2.
6. Connect the associated common for Input 16…31 to COM2 (terminal 44, 46, 48, or 50) on the 34…51 row (C).
7. If continuing input wiring power for Input 0…15 to the next terminal base, connect a jumper from terminal 41 (+V1) on this base unit to the power terminal on the next base unit. See the installation instructions for the specific terminal base.
8. If continuing input wiring common for Input 0…15 to the next terminal base, connect a jumper from terminal 42 (COM1) on this base unit to the common terminal on the next base unit.
9. If continuing input wiring power for Input 16…31 to the next terminal base, connect a jumper from terminal 49 (+V2) on this base unit to the power terminal on the next base unit. See the installation instructions for the specific terminal base.
10. If continuing input wiring common Input 16…31 to the next terminal base, connect a jumper from terminal 50 (COM2) on this base unit to the common terminal on the next base unit.

Figure 3 - Connect Wiring for 1794-TB32 and 1794-TB32S

+V1 = Terminals 35, 37, 39, and 41
+V2 = Terminals 43, 45, 47, and 49
COM1 = Terminals 36, 38, 40, and 42
COM2 = Terminals 44, 46, 48, and 50
NC = No connections (terminals 16, 33, 34, and 51)
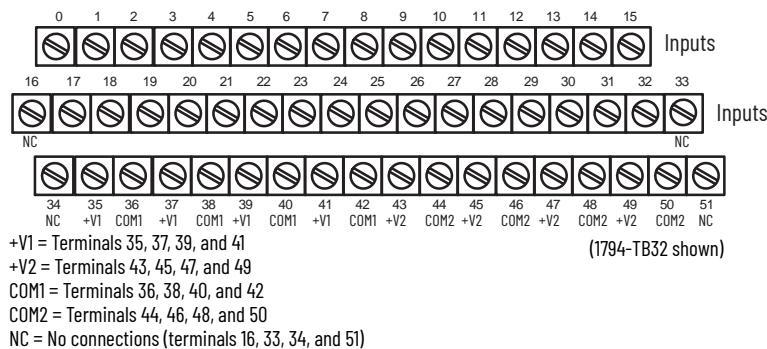
(1794-TB32 shown)

Table 2 - Wiring Connections for the 1794-IB32 and 1794-IB32K Modules
(Use with a 1794-TB32 or 1794-TB32S Terminal Base)

| Input[1]	Signal	Input	Signal
Input 0	A-0	Input 16	B-17
Input 1	A-1	Input 17	B-18
Input 2	A-2	Input 18	B-19
Input 3	A-3	Input 19	B-20
Input 4	A-4	Input 20	B-21
Input 5	A-5	Input 21	B-22
Input 6	A-6	Input 22	B-23
Input 7	A-7	Input 23	B-24
Input 8	A-8	Input 24	B-25
Input 9	A-9	Input 25	B-26
Input 10	A-10	Input 26	B-27
Input 11	A-11	Input 27	B-28
Input 12	A-12	Input 28	B-29
Input 13	A-13	Input 29	B-30
Input 14	A-14	Input 30	B-31
Input 15	A-15	Input 31	B-32
+V1 DC power (input 0…15)	Power terminals 35, 37, 39, and 41 for Input 0…15. +V1 connected to terminals 35, 37, 39, and 41.		

Table 2 - Wiring Connections for the 1794-IB32 and 1794-IB32K Modules (Continued)
(Use with a 1794-TB32 or 1794-TB32S Terminal Base)

Input[1]	Signal	Input	Signal
COM1 DC Return (input 0...15)	Common terminals 36, 38, 40, and 42 for Input 0...15. V1 Return connected to terminals 36, 38, 40, and 42.		
+V2 DC power (input 16...31)	Power terminals 43, 45, 47, and 49 for Input 16...31. +V2 connected to terminals 43, 45, 47, and 49.		
COM2 DC Return (input 16...31)	Common terminals 44, 46, 48, and 50 for Input 16...31. V2 Return connected to terminals 44, 46, 48, and 50.		

(1)   3-wire devices use signal, return, and supply. 2-wire devices use signal and supply.

Configure Your Module

Configure your input module by setting bits in the configuration word (write word).

Table 3 - Image Table Memory Map for 1794-IB8

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**
Read 1	Not used								I7	I6	I5	I4	I3	I2	I1	I0
Write 1	Not used												Input Filter 0...7			
Where:	I = Input															

Table 4 - Image Table Memory Map for 1794-IB16

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**
Read 1	I15	I14	I13	I12	I11	I10	I9	I8	I7	I6	I5	I4	I3	I2	I1	I0
Read 2	C = Counter Input value of input 15															
Write 1	Not used		CF	CR							Input Filter 12...15			Input Filter 0...11		
Where:	I = Input C = Counter value for input 15 CF = Counter fast – where 1 = fast input (raw data), 0 standard input filtered data CR = Counter reset Note: C, CR, and CF not available when used with any series 1794-ASB or 1794-ASB2 remote I/O adapters.															

Table 5 - Image Table Memory Map for 1794-IB32 and 1794-IB32K

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**
Read 1	I15	I14	I13	I12	I11	I10	I9	I8	I7	I6	I5	I4	I3	I2	I1	I0
Read 2	I31	I30	I29	I28	I27	I26	I25	I24	I23	I22	I21	I20	I19	I18	I17	I16
Write 1	Not used					Input Filter FT 0...31			Not used							
Where:	I = Input status FT = Input filter time															

Set the Input Filter Time

To set the input filter time, set the associated bits in the output image table (complementary word) for the module.
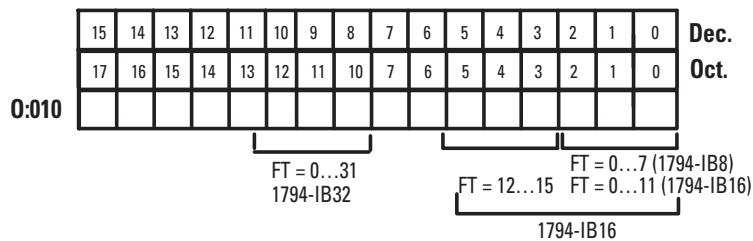
For example, to increase the Off-to-On filter time to 4 ms for all inputs at address rack 1, module group 0 (using 1794-IB32, 1794-IB32K as an example), set the following bits and program.
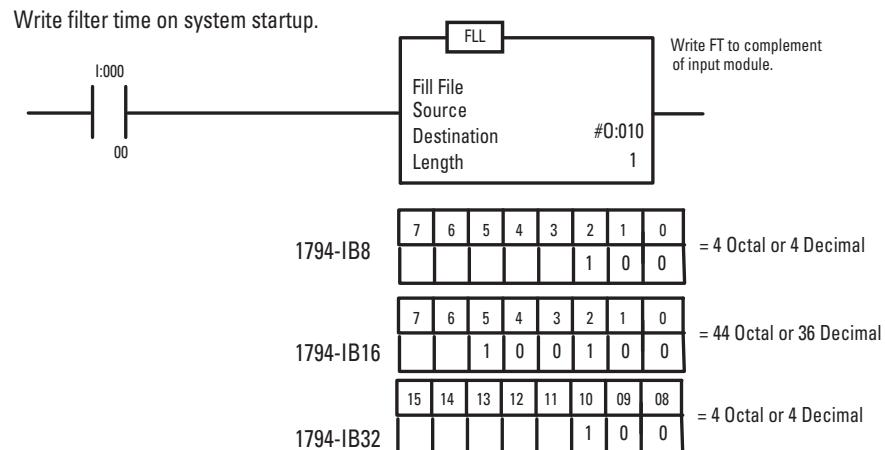
See Table 6 for additional filter times.

Table 6 - Input Filter Time

Bits			Description	Selected Filter Time
02	01	00	**Filter Time for inputs 0…7 (1794-IB8)**	
02	01	00	**Filter Time for inputs 0…11 (1794-IB16)**	
05	04	03	**Filter Time for inputs 12…15 (1794-IB16)**	
10	09	08	**Filter Time for inputs 0…32 (1794-IB32, 1794-IB32K)**	
0	0	0	Filter Time 0 (Default)	0.25 ms
0	0	1	Filter Time 1	0.5 ms
0	1	0	Filter Time 2	1 ms
0	1	1	Filter Time 3	2 ms
1	0	1	Filter Time 4	4 ms
1	0	1	Filter Time 5	8 ms
1	1	0	Filter Time 6	16 ms
1	1	1	Filter Time 7	32 ms

Specifications

Specifications – 1794-IB8

Attribute	Value
Number of inputs	8, current, sinking
On-state voltage, min	10V DC
On-state voltage, nom	24V DC
On-state voltage, max	31.2V DC
On-state current, min	2.0 mA
On-state current, nom	8.0 mA
On-state current, max	12.0 mA
Off-state voltage, max	5.0V DC
Off-state current, max	1.5 mA
Nominal input impedance	4.6 kΩ
Isolation voltage	50V (continuous), Basic Insulation Type Type tested @ 850V DC for 60 s, between field side and system No isolation between individual channels
Flexbus current	20 mA @ 5V DC
Power dissipation, max	3.5 W @ 31.2V DC
Thermal dissipation, max	11.9 BTU/hr @ 31.2V DC

Specifications – 1794-IB16

Attribute	Value
Number of inputs	16, current, sinking
On-state voltage, min	10V DC
On-state voltage, nom	24V DC
On-state voltage, max	31.2V DC
On-state current, min	2.0 mA
On-state current, nom	8.0 mA
On-state current, max	12.0 mA
Off-state voltage, max	5.0V DC
Off-state current, max	1.5 mA
Nominal input impedance	4.6 kΩ
Isolation voltage	50V (continuous), Basic Insulation Type Type tested @ 707V DC for 60 s, between field side and system No isolation between individual channels
Flexbus current	30 mA @ 5V DC
Power dissipation, max	6.1 W @ 31.2V DC
Thermal dissipation, max	20.8 BTU/hr @ 31.2V DC

Specifications – 1794-IB32 and 1794-IB32K

Attribute	Value
Number of inputs	32, current, sinking
On-state voltage, min	19.2V DC
On-state voltage, nom	24V DC
On-state voltage, max	31.2V DC
On-state current, min	2.0 mA
On-state current, nom	4.1 mA
On-state current, max	6.0 mA
Off-state voltage, max	5.0V DC
Off-state current, max	1.5 mA
Nominal input impedance	22.2 kΩ
Isolation voltage	50V (continuous), Basic Insulation Type Type tested @ 2121V DC for 2 s, between field side and system No isolation between individual channels
Flexbus current	25 mA @ 5V DC
Power dissipation, max	6.0 W @ 31.2V DC
Thermal dissipation, max	20.47 BTU/hr @ 31.2V DC

General Specifications

Attribute	1794-IB8	1794-IB16	1794-IB32, 1794-IB32K
Input filter time	See Table 6		
Recommended terminal base unit	1794-TB3, 1794-TB3S, 1794-TB3K, 1794-TB3SK, 1794-TBKD, 1794-TB37DS		
Terminal base screw torque	Determined by the installed terminal base		
Keyswitch position	2		
Indicators (field side indication)	8 yellow status indicators	16 yellow status indicators	32 yellow status indicators
External DC power supply voltage, nom	24V DC		
External DC power supply voltage range	10...31.2V DC (includes 5% AC ripple)		19.2...31.2V DC (includes 5% AC ripple)
Wiring category[(1)](2)	2 – on signal ports		
Wire size	Determined by the installed terminal base		
Dimensions, approx. (H x W x D) (with module installed)	94 x 94 x 69 mm (3.7 x 3.7 x 2.7 in.)		
Weight, approx.	71 g (2.50 oz.)	74 g (2.61 oz.)	79 g (2.79 oz.)
Enclosure type rating	None (open-style)		
North American temp code	T3C	T4A	T3C
IECEx temp code	T3	T4	-
UKEX/ATEX temp code	T3	T4	-

(1)   Use this Conductor Category information for planning conductor routing. See the Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1.
(2)   Use this Conductor Category information for planning conductor routing as described in the appropriate System Level Installation Manual.

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) – **1794-IB8, 1794-IB16** 0...55 °C (32...131 °F) – **1794-IB32, 1794-IB32K**
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 signal ports
Surge transient immunity	IEC 61000-4-5: ±1 kV line-line(DM) and ±2 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

Certifications (when product is marked)[1]	Value
c-UL-us	**For 1794-IB8, 1794-IB16** 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. **For 1794-IB32, 1794-IB32K** UL Listed Industrial Control Equipment, certified for US and Canada. See UL File E322657. UL Listed for Class I, Division 2, Group A, B, C, D Hazardous Locations, certified for US and Canada. See UL File E334470.
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
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 – **1794-IB16** II 3 G Ex ec IIC T3 Gc – **1794-IB8** DEMKO 14 ATEX 1342501X UL22UKEX2378X
IECEx	IECEx System, compliant with: IEC 60079-0; General Requirements IEC 60079-7; Explosive Atmospheres, Protection "e" Ex ec IIC T4 Gc – **1794-IB16** Ex ec IIC T3 Gc – **1794-IB8** IECEx UL 14.0066X
TÜV	**For 1794-IB16 only** TÜV Certified for Functional Safety: Up to and including SIL 2
RCM	Australian Radiocommunications Act, compliant with: EN 61000-6-4; Industrial Emissions
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 2020122309111829

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

Figure 4 - Derating Curve for 1794-IB16
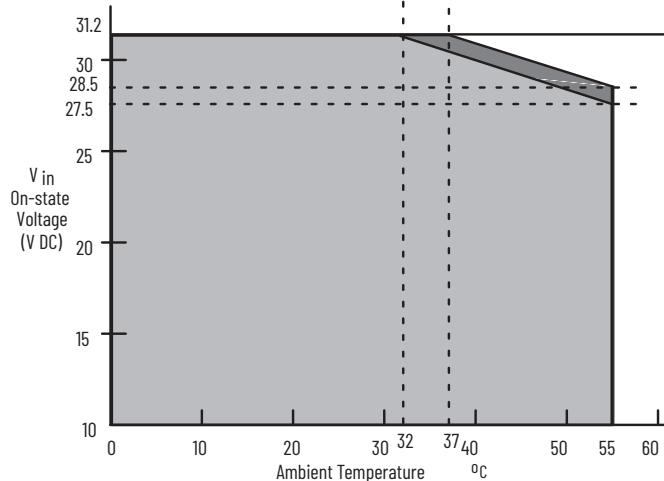
The area within the curve represents the safe operating range for the module under various conditions of user supplied 24V DC supply voltages and ambient temperature.

■ = Normal mounting safe operating range (includes ▫)

▫ = Other mounting positions (including inverted horizontal) safe operating range