

Installation Instructions

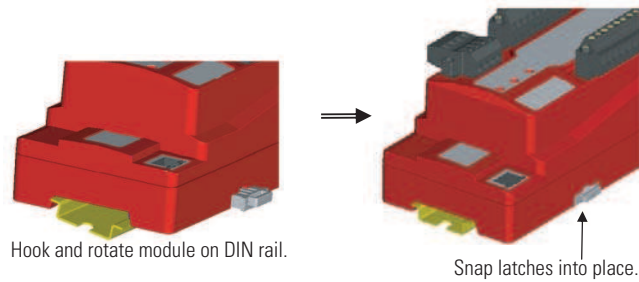
CompactBlock Guard I/O EtherNet/IP Safety Modules

Catalog Numbers 1791ES-IB8XOBV4, 1791ES-IB16

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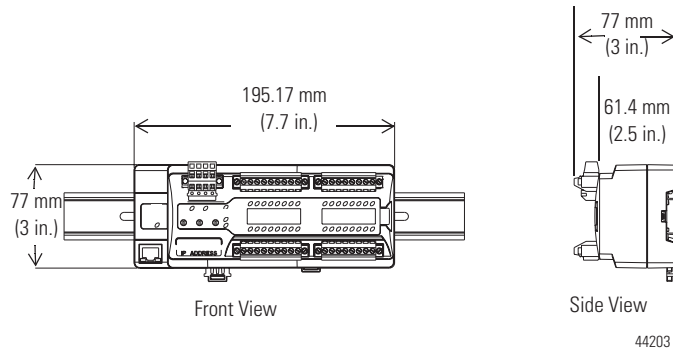
- Pry open the two gray latches to lock them in the open position. Hook the module over the top of the DIN rail. Rotate the module downward until it makes full contact with the DIN rail. Snap the latches back into place to secure the module to the rail. Verify that the module is securely attached to the DIN rail.



Module Identification and Dimensions

See the figure for module identification and dimensions.

Module Identification



Wiring the Module

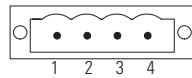
Follow these guidelines when wiring the module:

- Do not route communication, input, or output wiring with conduit containing high voltage, referring to Industrial Automation Wiring and Grounding Guidelines, publication [1770-4.1](#).
- Wire correctly after confirming the signal names of all terminals.
- Note that stranded wire should be processed with insulation-covered ferrule (DIN 46228-4 standard compatible-type) at its ends before using for connection.
- Tighten screws for the power connector correctly at 0.56...0.79 N•m (5...7 lb•in).
- Tighten screws for the I/O connectors correctly at 0.5...0.56 N•m (4.5...5 lb•in).

Working with Connectors

See the figure that shows connectors.

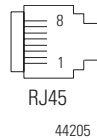
Power and EtherNet/IP Connectors



Power Configuration

Pin	Signal
1	Input +24V DC Power
2	Input Power Common
3	Output +24V DC Power ⁽¹⁾
4	Output Power Common ⁽¹⁾

⁽¹⁾ NC on 1791ES-IB16 modules.

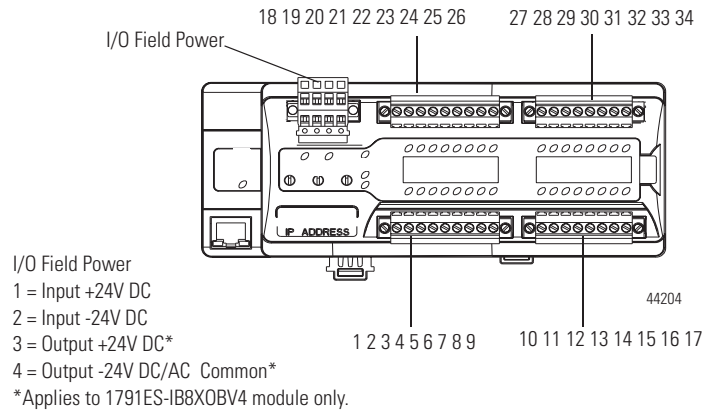


EtherNet/IP Connector

- 8 - No connection
- 7 - No connection
- 6 - Receive data minus
- 5 - No connection
- 4 - No connection
- 3 - Receive data plus
- 2 - Transmit data minus
- 1 - Transmit data plus

Terminal Positions

See the figure and table for terminal positions. For wiring diagrams, see the user manual that covers these modules.



Terminal Positions for Terminal Numbers 1...18

Number	Terminal	Number	Terminal
1	Functional earth	10	Safety input 4
2	Safety input 0	11	Safety input 5
3	Safety input 1	12	Test output 4
4	Test output 0	13	Test output 5
5	Test output 1	14	Safety input 6
6	Safety input 2	15	Safety input 7
7	Safety input 3	16	Test output 6
8	Test output 2	17	Test output 7/muting
9	Test output 3/muting		

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Terminal Positions for Numbers 19...34

Number	Terminal for 1791ES-IB8XOBV4 Module	Terminal for 1791ES-IB16 Module
18	Functional earth	Functional earth
19	Safety output 0 ⁽¹⁾ /switch +24V DC	Safety input 8
20	Safety output 1 ⁽¹⁾ /switch 24V DC common	Safety input 9
21	L-/24V DC common	Test output 8
22	S+/24V DC	Test output 9
23	Safety output 2 ⁽¹⁾ /switch +24V DC	Safety input 10
24	Safety output 3 ⁽¹⁾ /switch 24V DC common	Safety input 11/muting
25	L-/24V DC common	Test output 10
26	S+/24V DC	Test output 11
27	Safety output 4 ⁽¹⁾ /switch +24V DC	Safety input 12
28	Safety output 5 ⁽¹⁾ /switch 24V DC common	Safety input 13
29	L-/24V DC common	Test output 12
30	S+/24V DC	Test output 13
31	Safety output 6 ⁽¹⁾ /switch +24V DC	Safety input 14
32	Safety output 7 ⁽¹⁾ /switch 24V DC common	Safety input 15
33	L-/24V DC common	Test output 14
34	S+/24V DC	Test output 15/muting

⁽¹⁾ Safety outputs can only be used as pairs.
 Safety outputs 0/1 must be controlled as a pair.
 Safety outputs 2/3 must be controlled as a pair.
 Safety outputs 4/5 must be controlled as a pair.
 Safety outputs 6/7 must be controlled as a pair.

Specifications

Guard I/O EtherNet/IP Safety Module - 1791ES-IB8X0BV4, 1791ES-IB16

Attribute	Value
Safety Input	
Input types	Current sinking
Voltage, on-state Input, min	11V DC
Current, on-state Input, min	3.3 mA
Voltage, off-state input, max	5V DC
Current, off-state, max	1.3 mA
IEC 61131-2 (input type)	Type 3
Pulse Test Output	
Output type	Current sourcing
Pulse test output current	0.7 A per output 8 A total module @ 40 °C (104 °F) 6 A total module @ 60 °C (140 °F) for 1791ES-IB8X0BV4 module (see temperature versus current derating) 8 A total module @ 60 °C (140 °F) for 1791ES-IB16 module
Residual voltage, max	1.2V
Output leakage current, max	0.1 mA
Short circuit protection	Yes
Current, max (when used to control muting lamp)	25 mA Current, max (to avoid fault when used as a muted lamp output)
Current, min (when used to control muting lamp)	5 mA Current, min (at which fault indication is generated when used as a muted lamp output)

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Guard I/O EtherNet/IP Safety Module - 1791ES-IB8XOBV4, 1791ES-IB16

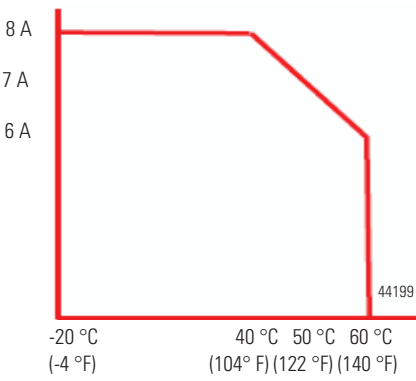
Attribute	Value
Safety Output	
Output types	Current sourcing/current sinking - bipolar pair
Output current rating	2 A max per point 8 A total module @ 40 °C (104 °F) (see temperature versus current derating) 6 A total module @ 60 °C (140 °F)
On-state voltage drop	+/- 0.6V
Leakage current	+/- 1.0 mA ⁽¹⁾
Internal resistance from P to M terminal	3.25 kΩ
Short circuit detection	Yes (short high and low and cross-circuit fault detect)
Short circuit protection	Electronic
Aggregate current of module	8 A @ 40 °C (104 °F) 6 A @ 60 °C (140 °F) (see product temperature versus current derating)
Pilot duty rating	2.5 A inrush for 1791ES-IB8XOBV4 module
Number of outputs	4 dual channel

⁽¹⁾ Includes the presence of a single P stuck-high or M stuck-low short.

General

Attribute	Value
North American temp code	T4A
Enclosure type rating	Meets IP20
Communication current consumption	250 mA at 24V DC
Operating voltage range	19.2...28.8V DC (24V DC, -20...20%)

General

Attribute	Value
Isolation voltage	1791ES-IB16 - 50V (continuous), Basic Insulation - Type tested at 800VDC for 60 s between input channels and network 1791ES-IB8XOBV4 - 50V (continuous), Basic Insulation - Type tested at 800V DC for 60 s between input and output channels and between I/O and network
Product temperature versus current derating (for 1791ES-IB8XOBV4 module only)	 <p>Product Temperature Versus Current Derating (combined current from both input and output supplies)</p>
Wiring category ⁽¹⁾	2 - on signal ports, 2 - on power ports, 2 -on communication ports
Wire size	Power and I/O wiring: 0.34...1.5 mm ² (22...16 AWG) solid or stranded copper wire rated at 75 °C (167 °F) or greater 1.2 mm (3/64 in.) insulation max
Weight, approx.	600 g (1.32 lb)
Dimensions (HxWxD), approx.	80 x 196 x 77 mm (3.2 x 7.7 x 3 in.) with terminal block
	77 x 196 x 62 mm (3 x 7.7 x 2.5 in.) without terminal block

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

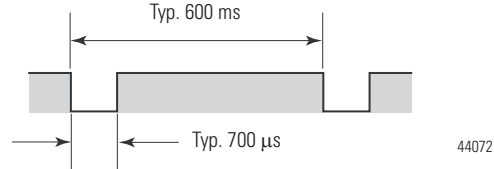
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Environmental Specifications

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...60 °C (-4...140 °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	IEC 60068-2-6 (Test Fc, Operating): 5 g at 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
ESD Immunity	IEC 61000-4-2: 8 kV contact discharges 10 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 at 900 MHz 10V/m with 200 Hz 50% Pulse 100% AM at 1890 MHz 3V/m with 1 kHz sine-wave 80% AM from 2000...2700 MHz
Conducted RF immunity	IEC 61000-4-6: 10V rms with 1 kHz sine-wave 80%AM from 150 kHz...80 MHz
EFT/B immunity	IEC 61000-4-4: ±4 kV at 5 kHz on power ports ±3 kV at 5 kHz on signal ports ±2 kV at 5 kHz on communication ports

Environmental Specifications

Attribute	Value
Surge transient immunity	IEC 61000-4-5: ±1 kV line-line (DM) and ±2 kV line-earth (CM) on power ports ±1 kV line-line (DM) and ±2 kV line-earth (CM) on signal ports ±2 kV line-earth (CM) on communication ports
Reaction Time	
Input reaction time, max	16.2 ms + set values of ON/OFF delays
Output reaction time, max	6.2 ms + (20 ms) relay response time (1791ES-IB8XOBV4 module only)

Signal Sequence

While safety outputs are in an on state, the signal sequence shown in the figure is output continuously for fault diagnosis when pulse testing is enabled. Confirm response time of device connected to safety outputs so the device does not malfunction due to off pulse.

Certifications

Certification	Value	
Certifications (when product is marked) ⁽¹⁾	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.
	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
	Ethernet /IP	ODVA conformance tested to EtherNet/IP specifications
	TÜV	TÜV Certified for Functional Safety up to and including Category 4 and SIL 3 ⁽²⁾

⁽¹⁾ See the Product Certification link at <http://www.ab.com> for Declarations of Conformity, Certificates, and other certification details.

⁽²⁾ When used with specified firmware revisions.

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