Installation Instructions

CompactBlock Guard I/O DeviceNet Safety Modules

Catalog Numbers 1791DS-IB8XOBV4, 1791DS-IB16

Allen-Bradley • Rockwell Software Rockwell Automation

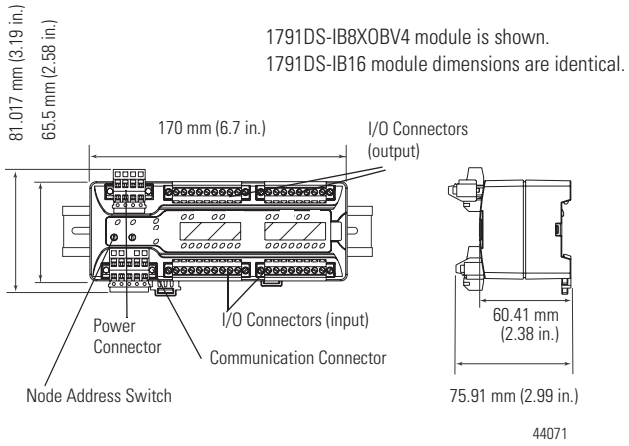
Mount the Module

Use these procedures when mounting the module:

- Use horizontal or vertical mounting with a DIN rail that is 35 mm (1.4 in.) wide for placing the module in the control panel.
- Leave at least 15 mm (0.6 in.) above and below the module for adequate ventilation and room for wiring.
- Place all other heat sources an appropriate distance from the module to maintain the specified ambient temperature around the module.

Module Identification and Dimensions

See the figure for module identification and dimensions.



Wiring the Module

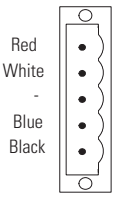
Follow these guidelines when wiring the module:

- 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 communication and I/O connectors correctly at 0.25…0.3 N•m (2.21…2.66 lb•in).

Working with Connectors

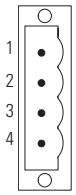
See the figure that shows connectors.

Power and DeviceNet Connectors



DeviceNet Configuration

Color	Signal
Red	V+
White	CAN_H
-	Drain
Blue	CAN-L
Black	V-



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 1791DS-IB16 modules.

ATTENTION

Safety state of the module and its data is defined as the off state.

Serious injury can occur due to breakdown of safety outputs. Do not connect loads beyond the rated value of the safety outputs.

Serious injury can occur due to loss of required safety functions. Wire the module properly so that supply voltages or voltages for loads do not touch the safety outputs accidentally or unintentionally.

As serious injury can occur due to loss of safety functions, use appropriate devices as shown in the Controlling Devices - Sample Requirements table.

Controlling Devices - Sample Requirements

Device	Requirement	Allen-Bradley Bulletin Safety Components
Emergency stop switch	Use approved devices with direct opening mechanism complying with IEC/EN 60947-5-1.	Bulletin 800F, 800T
Door interlocking switch, limit switch	Use approved devices with direct opening mechanism complying with IEC/EN 60947-5-1 and capable of switching microloads of 24V DC 5 mA.	Bulletin 440K, 440G, or 440H for interlock switch, Bulletin 440P or 802T for limit switch
Safety sensor	Use approved devices complying with the relevant product standards, regulations, and rules in the country where used.	Any Allen-Bradley Guardmaster product
Relay with forcibly guided contacts	Use approved devices with forcibly guided contacts complying with EN 50205. For feedback purposes, use devices with contacts capable of switching microloads of 24V DC 5 mA.	Bulletin 700S, 100S
Other devices	Evaluate whether devices used are appropriate to satisfy requirements of safety category levels.	

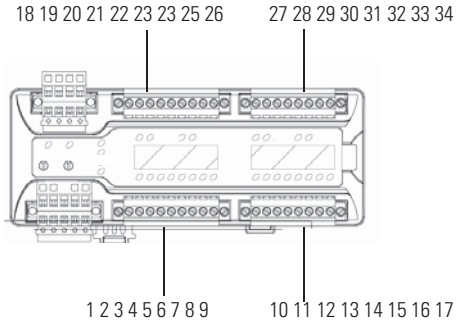
Configuration Lock Indicator[1]

State	Status	Description	Recommended Action
Off	No configuration	Invalid configuration data.	None
Solid yellow	Locked	Valid configuration, locked by a network configuration tool, such as RSNetWorx for DeviceNet software.	None
Flashing yellow	Not locked	Valid configuration, owned by a network configuration tool, such as RSNetWorx for DeviceNet software.	None

(1) Not applicable to GuardLogix software.

Terminal Positions

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



Terminal Positions for Numbers 1…18

Number	Terminal for	Number	Terminal for	Number	Terminal for
1	Functional Earth	7	Safety Input 3	13	Test Output 5
2	Safety Input 0	8	Test Output 2	14	Safety Input 6
3	Safety Input 1	9	Test Output 3	15	Safety Input 7
4	Test Output 0	10	Safety Input 4	16	Test Output 6
5	Test Output 1	11	Safety Input 5	17	Test Output 7
6	Safety Input 2	12	Test Output 4	18	Functional Earth

Terminal Position for Numbers 19…34

Number	Terminal for 1791DS-IB8XOBV4	Terminal for 1791DS-IB16
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
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

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

Specifications

Guard I/O DeviceNet Safety Module - 1791DS-IB8XOBV4, 1791DS-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
Residual voltage, max	1.2V
Output leakage current, max	0.1 mA
Short circuit protection	Yes
Current, max	25 mA Current, max (to avoid fault when used as a muted lamp output)
Current, min	5 mA Current, min (at which fault indication is generated when used as a muted lamp output)
Safety Output (1791DS-IB8XOBV4 module only)	
Output types	Current sourcing/current sinking - bipolar pair
Output current rating	2 A max per point 8 A total module @ 40 °C (104 °F) 6 A total module @ 60 °C (140 °F)
On-state voltage drop	±0.6V

Guard I/O DeviceNet Safety Module - 1791DS-IB8XOBV4, 1791DS-IB16

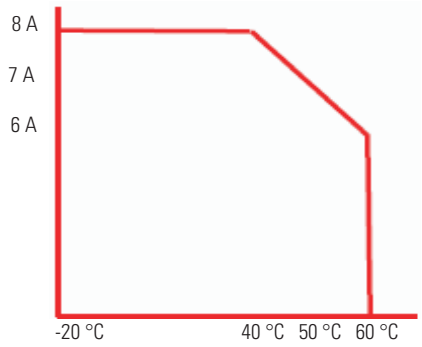
Attribute	Value
Leakage current	±1.0 mA[1]
Internal resistance from P to M terminal	3.25 kΩ
Short circuit detection	Yes (short high and low and cross-circuit fault detect)
Short circuit protection	Electronic
Aggregate current of outputs per module	8 A @ 40 °C 6 A @ 60 °C
Pilot duty rating	2.5 A inrush (1791DS-IB8XOBV4 module only)
Number of outputs	4 dual channel

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

General Specifications

Attribute	Value
North American temp code	T4A
Enclosure type rating	Meets IP20
Communication power supply voltage	11…25V DC (supplied from communication power supply)
Communication current consumption	85 mA at 24V DC
Operating voltage range	19.2…28.8V DC (24V DC, -20…20%)
Isolation voltage	1791DS-I8XOBV4 module - 50V (continuous), basic insulation Tested at 800V DC for 60 s, between input and output channels, and between network and I/O channels 1791DS-IB16 module - 50V (continuous), basic insulation Tested at 800V DC for 60 s, between network and input channels

General Specifications

Attribute	Value
Product temperature versus current derating	 Product Temperature Versus Current Derating (combined current from both input and output supplies)
Wiring category[1]	2 - on signal ports 2 - on power ports 2 - on communication ports
Wire size	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.	81 x 170 x 76 mm (3.1 x 6.7 x 2.9 in.) with terminal block
	66 x 170 x 60 mm (2.6 x 6.7 x 2.4 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.

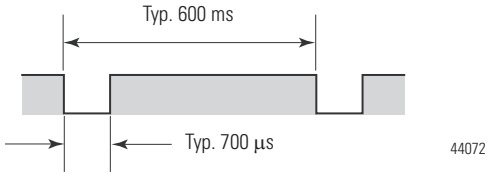
Environmental Specifications

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, storage	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% 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 15 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 1V/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

Environmental Specifications

Attribute	Value
EFT/B immunity	IEC 61000-4-4: ±2 kV at 5 kHz on power ports ±2 kV at 5 kHz on signal ports ±2 kV at 5 kHz on communication ports
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 (1791DS-IB8XOBV4 module only)

Typical Signal Sequence



While safety outputs are in an on state, the signal sequence shown in the figure is output continuously for fault diagnosis when output 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
	ODVA	ODVA conformance tested to DeviceNet 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.