Guard I/O™ Modules

Overview

Guard I/O™ Modules Overview

Control and monitor your safety devices with Guard I/O. When used with Rockwell Automation safety controllers, Guard I/O communicates on EtherNet/IP or DeviceNet using CIP Safety protocol. As an effective technology, Guard I/O detects failures at the I/O and field device level, while helping enhance operator protection.

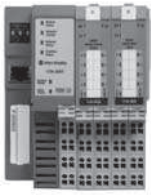
CompactBlock Guard I/O modules are available in IP20 (in-cabinet) form factor. ArmorBlock Guard I/O modules are IP64, IP65, or IP67 (on-machine) form factor (as marked on the product label) . POINT Guard I/O provides maximum I/O density in minimal panel space.

Guard I/O modules offer the following advantages when implementing a safety control system:

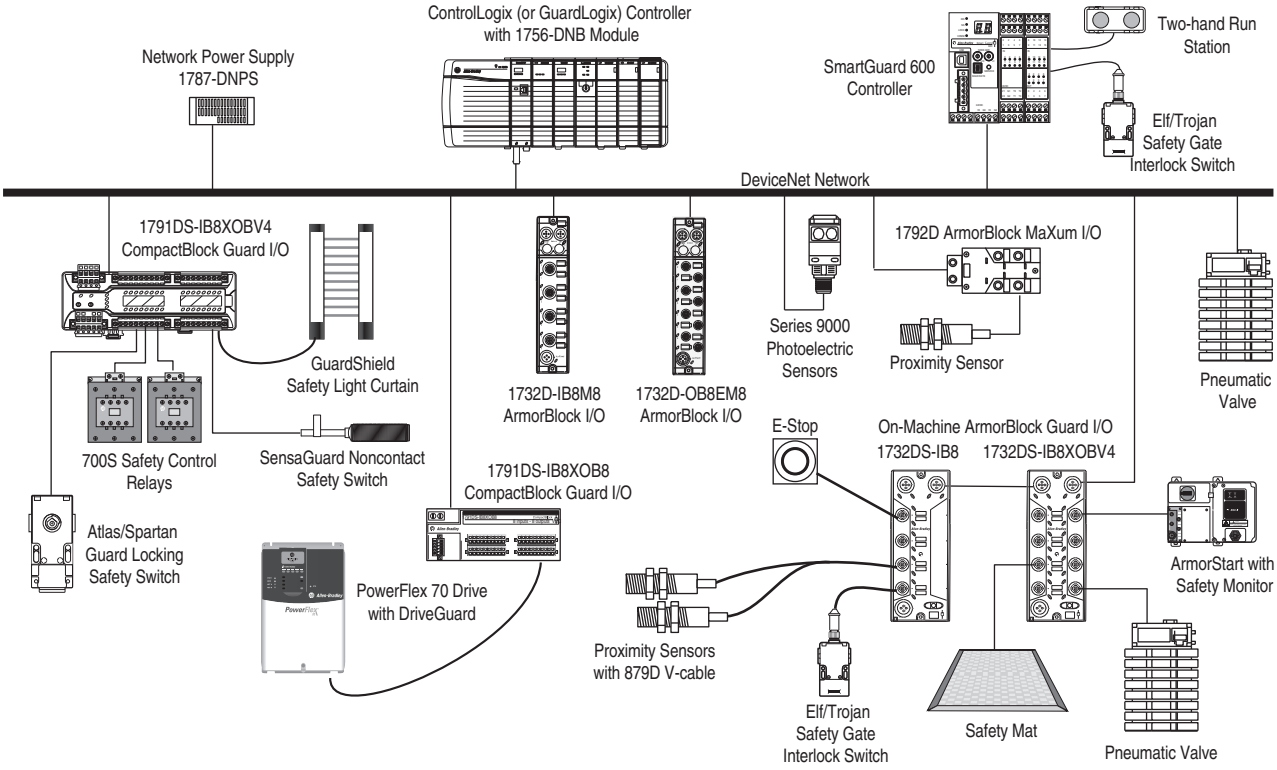
- **Reduced engineering** — Onboard, Guard I/O has self-diagnostics, hardware testing, and field circuit testing (short-circuit, wire break, discrepancy) with no additional programming required.
- **Cost-reduced hardware options** — Helps increase ability to safely shutdown an application without additional safety relays.
- **Space-savings** — Monitor and control more safety devices using less panel space.
- **Use of existing network infrastructures** — Connect to standard and safety I/O over one DeviceNet or EtherNet/IP network.
- **Flexibility and easy migration to EtherNet/IP** — The same Guard I/O modules for both DeviceNet and EtherNet/IP networks lets you re-use engineering designs.
- **High safety level** — certified by TÜV for Functional Safety up to SIL 3 and PLe/Category 4.

Common Guard I/O Module features:

- Integrated pulse test outputs for testing safety circuitry like e-stops and gate switches, for use in applications up to Performance Level e/Category 4. These outputs can also be used independently for standard output control or voltage source to sensors.
- Safety outputs, with integrated pulse testing for use in applications up to PLe, Cat.4.
- Ability to detect at each I/O point:
  - short-circuit to 24V DC or 0V
  - wire breakage
  - discrepancy of dual channel circuitry, due to mechanical alignment or a failure
- All Guard I/O modules have common circuit functionality, operation, programming, troubleshooting, and diagnostics.
- Built in diagnostic LEDs for I/O circuitry and power status.
- I/O point status available to any controller.
- EDS file or Logix 5000 profile compatible.
- Removable and keyed terminal blocks.
- Common power and I/O wiring across Guard I/O modules on DeviceNet and EtherNet/IP networks (1791DS-IB16/1791ES-IB16 and 1791DS-IB8XOBV4/1791ES-IB8XOBV4).
- Safety input power source separate from safety output power source.
- Removable and insertable under power, when following appropriate safety practices.
- Electronic overcurrent protection of all outputs.

	 CompactBlock Guard I/O Modules	 ArmorBlock Guard I/O Modules	 POINT Guard I/O Modules
Description	Cost-effective block I/O for use in an enclosure.	Cost-effective block I/O with IP64, IP65, or IP67 protection (as indicated on the product label) for use on the machine.	Cost-effective I/O modules provide maximum I/O density in minimum panel space.
Digital Safety Inputs	Up to 16 channels	Up to 8 channels	Up to 8 channels
Digital Safety Outputs	Up to 8 channels	Up to 4 channels	Up to 8 channels
Safety Relays	Up to 4 channels (1791DS)	No	No
High Current Capacity Outputs	Up to 2 amps per channel	Up to 2 amps per channel	Up to 1 amp per channel
Use in Hazardous Areas	UL Listed for Class I, Division 2 Group A,B,C,D	No	UL Listed for Class I, Division 2 Group A,B,C,D; ATEX
DeviceNet			
Interface Module	1756-DNB, 1753-DNSI, 1752	1756-DNB, 1753-DNSI, 1752	1734-PDN
Bulletin Number	1791DS	1732DS	1734
EtherNet/IP			
Interface Module	1756-ENBT, 1756-EN2T, 1756-EN2F	Not available	1734-AENT, 1734-AENTR
Bulletin Number	1791ES	Not available	1734

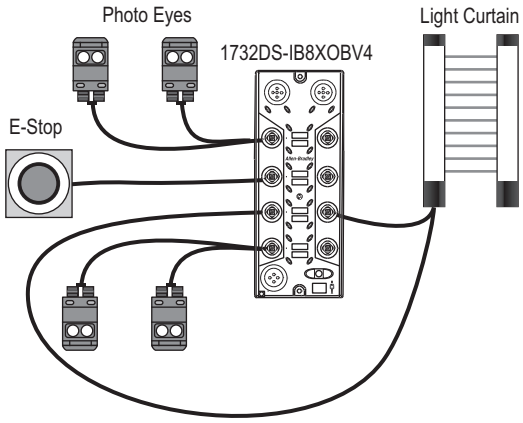
Typical Configurations

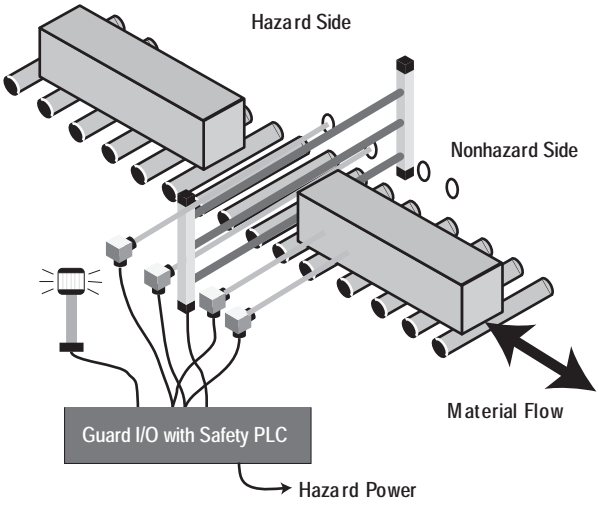


The above example network shows how almost any 24V DC safety-rated or standard sensor can be wired to any Guard I/O module to monitor the machine's status.

Choosing Your I/O Hardware

Guard I/O module options are available to minimize associated safety hardware. Additionally, installation costs, wiring time, and commissioning time can be further reduced when using ArmorBlock Guard I/O, as shown in the example below with a light curtain muting application.





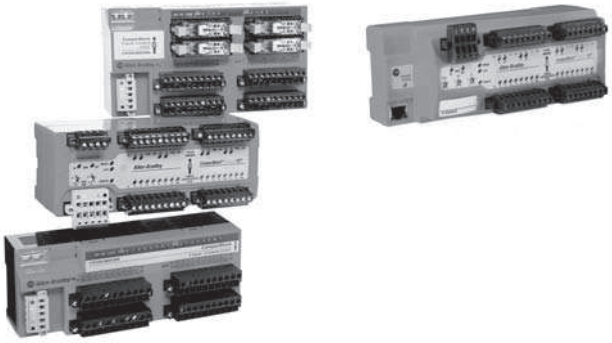
Guard I/O™ Modules

Overview/CompactBlock Guard I/O

A variety of CompactBlock Guard I/O is available to suit most every need.

- **1791DS-IB8XOB8 Module.** This module has up to 8 single channel safety inputs and 8 single channel safety outputs. It is often the universally chosen Guard I/O hardware for almost every application. Whether you need single or dual channel safety input or safety output circuits, the 1791DS–IB8XOB8 module is a good choice.
- **1791DS-IB4XOW4 Module.** This module has up to 4 single channel safety inputs and 4 single channel (replaceable) safety relay outputs. This module is often chosen for AC actuators or specialty safety interface applications. Whether you need single or dual-channel safety input or safety output circuits, the 1791DS-IB4XOW4 module is a good choice.
- **1791DS-IB8XOBV4 or 1791ES-IB8XOBV4 Modules.** These modules have up to 8 single channel safety inputs and 4 dual channel sink/source safety outputs, also know as bipolar or two-pole switching. They are often chosen for safety actuators that require more than 0.5 amps. For example, the control of press safety valves or control of the solenoid on a guard-locking switch like the Atlas or Trojan safety products. Whether you need single or dual channel safety input circuits and dual channel safety outputs, the 1791DS-IB8XOBV4 or 1791ES-IB8XOBV4 module will suit most any application.
- **1791DS-IB16 or 1791ES-IB16 Modules.** These modules have up to 16 single channel safety inputs. They are the universal choice of Guard I/O hardware when an application calls for the monitoring of many safety devices in one central location. When your safety application requires 2 safety mats, 2 run stations with 2 e-stops, or any similar configuration, these modules are an excellent and economical choice for every programmable safety system.

CompactBlock™ Guard I/O™



Description

CompactBlock Guard I/O provides all the advantages of traditional distributed I/O for safety systems. Distributed safety I/O reduces wiring costs and startup time for machines and cells, as compared to in-chassis I/O. You can use Guard I/O with any safety controller that communicates on DeviceNet or EtherNet/IP networks using CIP Safety, for the control and monitoring of safety circuits. Guard I/O detects circuit failures at each I/O point while providing detailed diagnostics directly to the controller. With CIP Safety you can easily integrate safety and standard control systems by using safety and standard messages on the same wire.

Several Guard I/O blocks are available with a variety of features:

- The 1791DS CompactBlock Guard I/O family consists of 24V DC digital I/O modules that communicate on DeviceNet networks.
- The 1791ES CompactBlock Guard I/O family consists of 24V DC digital I/O modules that communicate on EtherNet/IP networks.

Benefits

- TÜV Certified as a system with GuardLogix, GuardPLC 1600 and 1800, and SmartGuard 600 controllers
- Supports both standard and safety control
- I/O point-level and other detailed fault diagnostics are available to the PLC or HMI, with the self testing inputs and outputs
- EDS (RSNetWorx for DeviceNet) or RSLogix 5000 profile configuration
- Certified by TÜV for Functional Safety up to SIL 3 according to IEC 61508, and Category 4, PLe according to ISO 13849-1
- Supports single and dual channel devices on inputs and outputs
- Additional standard solid-state outputs that can be configured as pulse test sources, outputs for standard PLC control, 24V DC sources, or for muting lamp control and monitoring
- DIN Rail mounting for easy installation
- Compatible with Guardmaster and similar safety devices

CompactBlock Guard I/O DeviceNet Safety Module Specifications

Cat. No.	1791DS-IB12	1791DS-IB16	1791DS-IB8XOB8	1791DS-IB8XOBV4	1791DS-IB4XOW4
Description	24V DC Input Module on DeviceNet Networks	24V DC Input Module on DeviceNet Networks	24V DC Input/Solid-State Output Module on DeviceNet Networks	24V DC Input/Output Module on DeviceNet Networks	24V DC Input / Relay Output Module for DeviceNet Networks
Current Consumption	110 mA @ 24V DC	85 mA @ 24V DC	110 mA @ 24V DC	85 mA @ 24V DC	110 mA @ 24V DC
Operating Voltage Range	20.4…26.4V DC (24V DC, -15…+10%)	19.2…28.8V DC (24V DC, -20…+20%)	20.4…26.4V DC (24V DC, -15…+10%)	19.2…28.8V DC (24V DC, -20…+20%)	20.4…26.4V DC (24V DC, -15…+10%)
Digital Inputs					
Number of Inputs (single-channel)	12 safety	16 safety	8 safety	8 safety	4 safety
Input Type	current sinking	current sinking	current sinking	current sinking	current sinking
Voltage, On-State Input, Min.	11 V DC	11 V DC	11 V DC	11V DC	11V DC
Voltage, Off-State Input, Max.	5V DC	5V DC	5V DC	5V DC	5V DC
Current, On-State Input, Min.	6 mA	3.3 mA	6 mA	3.3 mA	6 mA
Digital Outputs					
Number of Outputs	—	—	8 single-channel, safety solid-state	4 dual channel, safety solid-state	4 single-channel, safety relay
Output Type	—	—	current sourcing	current sourcing/current sinking	relay
Output Current Rating	—	—	0.5 A per point	2.0 A continuous	2 A max. per contact
Output Leakage Current, Max.	—	—	0.1 mA	± 1.0 mA	—
Service Life, Electrical	—	—	—	—	100 000 operations, min.
Short Circuit Protection	—	—	Yes	Yes	No
Standard Pulse Test Outputs					
Number of Pulse Test Sources	4	16	4	8	4
Pulse Test Output Current	0.7 A per point	0.7 A per point	0.7 A per point	0.7 A per point	0.7 A per point
Short Circuit Protection	Yes	Yes	Yes	Yes	Yes
General					
Temperature, operating	-10…55° C (14…131 °F)	-20°C…+60°C (-4°F…+140°F)	-10…55° C (14…131 °F)	-20°C…+60°C (-4°F…+140°F)	-10…55° C (14…131 °F)
Relative Humidity	5…95% noncondensing	5…95% noncondensing	10…95% noncondensing	5…95% noncondensing	10…85% noncondensing
Vibration	5 g @ 57…150 Hz	5 g @ 10…500 Hz	5 g @ 57…150 Hz	5 g @ 10…500 Hz	5 g @ 57…150 Hz
Shock, operating	15 g	30 g	15 g	30 g	10 g
Enclosure Protection	IP20	IP20	IP20	IP20	IP20
Dimensions (HxWxD), Metric	68 x 170 x 72 mm∗	81 x 170 x 76 mm∗	68 x 170 x 72 mm∗	81 x 170 x 76 mm∗	95 x 170 x 83 mm∗
Certifications‡	UL, CE, C-Tick, CSA, UL Class I Div 2 Hazardous, UL NRGF, ODVA Conformance, certified by TÜV for Functional Safety up to SIL 3 and Cat. 4, PLe	UL, CE, C-Tick, CSA, UL Class I Div 2 Hazardous, ODVA Conformance, certified by TÜV for Functional Safety up to SIL 3 and Cat. 4, PLe	UL, CE, C-Tick, CSA, UL Class I Div 2 Hazardous, UL NRGF, ODVA Conformance, certified by TÜV for Functional Safety up to SIL 3 and Cat. 4, PLe	UL, CE, C-Tick, CSA, UL Class I Div 2 Hazardous, ODVA Conformance, certified by TÜV for Functional Safety up to SIL 3 and Cat. 4, PLe	UL, CE, C-Tick, CSA, UL NRGF, ODVA Conformance, TÜV certified for functional safety up to SIL 3 and Cat. 4, PLe

∗ Includes DIN latch and connectors.
‡ When product is marked. See the Product Certification link at http://www.ab.com/certification for Declarations of Conformity, Certificates, and other certification details.
All specifications are subject to change. Refer to product installations instructions.

CompactBlock Guard I/O EtherNet/IP Safety Module Specifications

Cat. No.	1791ES-IB16	1791ES-IB8XOBV4
Description	24V DC Input Module on EtherNet/IP	24V DC Input/Output Module on EtherNet/IP
Current Consumption	250 mA @ 24V DC	250 mA @ 24V DC
Operating Voltage Range	19.2…28.8V DC (24V DC, -20…+20%)	19.2…28.8V DC (24V DC, -20…+20%)
Digital Inputs		
Number of Inputs	16 single channel; 8 dual channel	8 single channel; 4 dual channel
Input Type	current sinking	current sinking
Voltage, On-State Input, Min.	11 V DC	11 V DC
Voltage, Off-State Input, Max.	5V DC	5V DC
Current, On-State Input, Min.	3.3 mA	3.3 mA
Digital Outputs		
Number of Outputs	0	4 dual channel
Output Type	—	Current sourcing/current sinking - bipolar pair
Output Current Rating	—	2.0 A continuous
Short Circuit Protection	Yes	Yes
Standard Pulse Test Outputs		
Number of Pulse Test Sources	16 current sourcing	8 current sourcing
Pulse Test Output Current	0.7 A per point	0.7 A per point
Short Circuit Protection	Yes	Yes
General		
Temperature, operating	-20…60° C (-4…140° F)	-20…60° C (-4…140° F)
Relative Humidity	5…95% noncondensing	5…95% noncondensing
Vibration	5 g at 10…500 Hz	5 g at 10…500 Hz
Shock, operating	30 g	30 g
Enclosure Protection	IP20	IP20
Dimensions (HxWxD), Metric	80 x 196 x 77 mm∗	80 x 196 x 77 mm∗
Certifications‡	cULus, CE, C-Tick, CSA, UL Class I Div 2 Hazardous, UL NRGF, ODVA Conformance, certified by TÜV and UL for Functional Safety up to SIL 3 and Cat. 4, PLe	cULus, CE, C-Tick, CSA, UL Class I Div 2 Hazardous, UL NRGF, ODVA Conformance, certified by TÜV and UL for Functional Safety up to SIL 3 and Cat. 4, PLe

∗ Includes terminal block.
‡ When product is marked. See the Product Certification link at http://www.ab.com/certification for Declarations of Conformity, Certificates, and other certification details.
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