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GuardPLC™

SELECTION GUIDE

PROGRAMMABLE CONTROLLERS

1753, 1754, 1755

ALLEN-BRADLEY • ROCKWELL SOFTWARE • DODGE • RELIANCE ELECTRIC

Rockwell Automation

GuardPLC System Overview

Product Design

The GuardPLC system is a state of the art safety system offering the fastest safety PLCs, fastest controller throughput, and fastest safety network available.

Designed in accordance with IEC 61131, the GuardPLC system meets the worldwide standard for programmable controls. It complies with many of the latest global safety standards and the worldwide standard for functional safety in programmable electronic systems. The GuardPLC system can be used without restriction in applications up to Category 4 according to EN-954 and Safety Integrity Level 3 (SIL 3) according to IEC 61508.

The GuardPLC system consists of four main components:

- Packaged or modular controller and associated integrated I/O
- Safety Communication Networks: GuardPLC Ethernet and DeviceNet Safety
- Distributed I/O modules for GuardPLC Ethernet and DeviceNet Safety networks
- Programming and configuration software

Benefits resulting from the use of safety PLCs and safety networks include:

- Greater integration and flexibility of machine controls
- Capability for better and easier diagnostics when intelligence is provided to the standard control level
- Faster and easier maintenance
- Reduction in the cost of installation, commissioning, and reconfiguring
- Reduction in design and hardware costs, compared to using safety relays alone for logic
- Potential for throughput performance improvement in more complex systems

Communication

GuardPLC safety controllers communicate on a Safe Ethernet communications network. The network is TÜV-certified for use in safety applications up to EN954 Category 4 and SIL 3, and can be used for distributed Safety I/O and peer-to-peer communications between GuardPLC controllers, as well as programming using RSLogix Guard PLUS! software. And because it's Ethernet, you use standard category 5 cables, switches and routers.

Using GuardPLC distributed I/O, you can place your safety I/O where your safety field devices are located, reducing wiring costs. Peer-to-peer communications allow GuardPLC controllers running their own programs to interlock with each other for applications that need to link one manufacturing cell to others.

In addition, the GuardPLC controllers support ASCII, Modbus RTU slave, or PROFIBUS DP slave communications to devices such as displays, PCs, or standard PLCs. The GuardPLC 1200 and 2000 controllers have an RS-232 ASCII port only. The GuardPLC 1600 and 1800 controllers have an RS-485 ASCII port and are available with either Modbus RTU slave or PROFIBUS DP slave communications. Using RSLogix Guard PLUS! programming software, select the tags you wish to read from the GuardPLC controller, and the data is sent every time the connected device asks for it.

NetLinx Integration

The ever-increasing demand for both enhanced plant productivity and improved workplace safety has fueled a trend toward integrated safety control and standard control systems. Control system users now expect their safety systems to possess all of the efficiencies and conveniences of their standard controls. Today's modern manufacturing plants will not accept safety systems that compromise productivity. And both machine builders and end users expect that the cost of implementing and maintaining a safety system will continue to drop without reducing the level of protection to the user.

The first level of integrating your GuardPLC controller into your standard control system is at the information network level. The GuardPLC 1600 and 1800 allow you to accomplish this easily with embedded EtherNet/IP. Able to run EtherNet/IP at the same time as safety-rated GuardPLC Ethernet, the GuardPLC controller uses EtherNet/IP to communicate status about the safety control system to other standard devices such as PLCs (ControlLogix, FlexLogix, CompactLogix, SLC500 or PLC-5), HMIs (PanelView, PanelView Plus, and VersaView) and others. The GuardPLC controller can even control standard I/O, like Flex I/O and Point I/O, on EtherNet/IP. This capability allows you to integrate your GuardPLC on the EtherNet/IP network already running in your plant.

For the ultimate in network integration, the GuardPLC 1600 and GuardPLC 1800 controllers can also communicate with devices on the DeviceNet Safety network via the DeviceNet Safety Scanner. The scanner communicates with 1791DS DeviceNet Safety I/O, providing safety I/O data and status information to the GuardPLC controllers. The safety scanner also allows for standard DeviceNet communication to devices such as standard PLCs, HMIs, and standard I/O.

Programming

Use RSLogix Guard PLUS! Software to configure GuardPLC controllers and Distributed Safety I/O Modules for GuardPLC Ethernet and to create GuardPLC safety application programs.

For configuring DeviceNet Safety communications for the DeviceNet Safety Scanner and DeviceNet Safety I/O, use RSNetWorx Software for DeviceNet.

GuardPLC 1200 Controllers

Designed for smaller applications that require functional safety, the GuardPLC 1200 includes a power supply, CPU, watchdog, 20 digital inputs, 8 digital outputs, 2 high-speed counters, and 2 communication ports.

Benefits

- 28 safety digital I/O points – designed specifically for interfaces with safety components such as e-stops, light curtains, etc.
- Small and compact – built-in CPU, power supply, and I/O saves panel space and reduces system cost.
- Embedded high-speed counters – two high-speed counters provide a cost-effective solution for applications that require sensing speed and motion.
- DIN rail or panel mountable – provides flexibility in panel construction, conveniently mounts, and can be used in applications where panel space is limited.
- Ethernet port – communication to other GuardPLC controllers, distributed safety I/O, and other standard devices (HMIs and PLCs).
- ASCII port – communication to standard devices such as HMIs and PLCs.
- Removable terminal blocks – make swapping controllers an efficient task so operations can be up and running again quickly in the event of a failure.

Typical Applications

- Perimeter guarding for robot / weld cells
- Perimeter guarding for packaging machines
- Press controls

GuardPLC 1600 Controllers

GuardPLC 1600 is a mainstream, cost-effective safety PLC that provides 20 digital inputs, 8 digital outputs, a built-in 4-port Ethernet switch, and flexible communication options for connection to HMIs, to standard PLCs, and to DeviceNet Safety via the DeviceNet Safety Scanner.

Benefits

- 28 safety digital I/O points – designed specifically for interfacing with safety components such as e-stops, light curtains, etc.
- Embedded 4-port Ethernet switch – eliminates the need for external networking hardware, reducing system cost.
- EtherNet/IP for easy integration with standard PLCs and HMIs.
- Modbus RTU slave and PROFIBUS DP slave communication options – allow the controller to connect to standard PLCs and HMI devices, and an RS-485 port is available for ASCII communication (read only).
- DeviceNet Safety Network and DeviceNet Safety I/O connectivity – provided via the DeviceNet Safety Scanner.
- Expandability – use GuardPLC Distributed I/O to cost-effectively expand your safety system.
- Removable terminal blocks – make swapping controllers an efficient task so operations can be up and running again quickly in the event of a failure.

Typical Applications

- Perimeter guarding for robot / weld cells
- Perimeter guarding for packaging machines
- Press controls
- Semiconductor tools
- Material handling systems

GuardPLC 1800 Controllers

The GuardPLC 1800 takes all the features of the GuardPLC 1600, then adds analog inputs and high-speed counters for specialized applications such as emergency shut down, flame control, and amusement park ride control.

Benefits

- 32 safety digital I/O points – designed specifically for interfacing with safety components such as e-stops, light curtains, etc.
- 8 safety-rated analog inputs – for sensing temperature, pressure, etc.
- 2 safety-rated high-speed counters – for sensing speed, flow, and motion.
- Embedded 4-port Ethernet switch – eliminates the need for external networking hardware.
- EtherNet/IP for easy integration with standard PLCs and HMIs.
- Modbus RTU slave and PROFIBUS DP slave communication options – allow the controller to connect to standard PLCs and HMI devices, and an RS-485 port is available for ASCII communication (read only).
- DeviceNet Safety Network and DeviceNet Safety I/O connectivity – provided via the DeviceNet Safety Scanner.
- Expandability – Use GuardPLC Distributed I/O to expand your safety system.
- Removable terminal blocks – make swapping controllers an efficient task so operations can be up and running again quickly in the event of a failure.

Typical Applications

- Emergency shutdown
- Burner management systems
- Perimeter guarding for robot / weld cells
- Perimeter guarding for packaging machines

GuardPLC 2000 Controllers

A scalable, high-performance safety system, the GuardPLC 2000 modular safety controller consists of a chassis, power supply, CPU with communication ports and I/O modules. As many as six I/O modules may be added including digital input and output channels, analog input and output channels, and high-speed counters.

Benefits

- Modular – greatest I/O density of the Guard PLC family (up to 144 digital I/O points), which allows for specific configuration to suit individual needs.
- Expandability – widest variety of safety I/O available to expand the safety system.
- Ethernet and ASCII port – allows communication to other GuardPLC controllers, Distributed I/O, and other standard devices (HMIs and standard PLCs).
- Safety analog outputs – for controlling valves, valve positions, and speeds.
- High-speed counters – high-speed counters provide a cost effective solution for applications that require sensing speed and motion.

Typical Applications

- Entertainment industry; ride control and ski lift control
- Press control
- Burner management
- Emergency shutdown
- Material handling systems

Common Specifications

The specifications in the following tables are common to all GuardPLC products unless indicated.

Specification	GuardPLC 1753, 1754, 1755
Operating Temperature	0…60 °C (32…140 °F)
Storage Temperature	-40…85 °C (-40…185 °F) without backup battery
Relative Humidity	95%
Vibration	1 g @ 10…150 Hz
Shock, Operating	15 g
ESD Immunity	4 kV contact discharges 8 kV air discharges
Radiated RF Immunity	10 V/m with 26 MHz…1 GHz, 80% AM
EFT/B Immunity	2 kV power supply 1 kV signal lines
Surge Transient Immunity	1 kV, 0.5 kV
Conducted RF Immunity	10 V from 150 kHz…80 MHz, AM
Radiated and Conducted Emissions	Class A

Certifications (when product is marked)

Certifications	GuardPLC 1200	GuardPLC 1600	GuardPLC 1800	GuardPLC 2000	1753 I/O	1755 I/O	1753-DNSI	1791DS I/O
c-UL-us	UL Listed Industrial Control Equipment, certified for US and Canada.						UL Listed for Class I Division 2 Groups A,B,C,D Hazardous Locations, certified for US and Canada ✶	
CE	Compliant for all applicable directives.							
C-Tick	Compliant for all applicable acts.							
TUV	TÜV Certified for Functional Safety up to SIL 3, Cat. 4							
ODVA	—						ODVA conformance tested to DeviceNet and DeviceNet Safety specifications.	

✶1791DS-IB4XOW4 is not rated for Hazardous Locations.

GuardPLC System Selection Checklist

Use the following Checklist as a guide to completing your own system specification. Skip any sections that do not apply to your application.

✓	Step	See
	1 Select Controller Family: GuardPLC 1200, 1600, 1800, or 2000 • controller family - based on memory, I/O, added functionality, and communication options • consider communications to standard programmable controllers	page 11
	2 Select Network for Safety Communications • GuardPLC Ethernet • DeviceNet Safety DeviceNet Safety Scanner for GuardPLC Controllers, catalog number 1753-DNSI (required) • If you choose DeviceNet Safety, record your scanner selection in the Selection Record (on page 46)	page 12
	3 Select Distributed I/O Modules • GuardPLC Ethernet DIO Modules • DeviceNet Safety DIO Modules • record your selections in the Selection Record (on page 46)	page 16
	4 Select Software • RSLogix Guard PLUS! • RSNetWorx for DeviceNet if your application includes the DeviceNet Safety Scanner for GuardPLC Controllers and 1791DS DeviceNet Safety I/O • GuardPLC OPC Server • Certified Function Blocks for RSLogix Guard PLUS! • record your selections in the Selection Record (on page 46)	page 28
	5 Review Detailed GuardPLC Controller Specifications • GuardPLC 1200 Controller • GuardPLC 1600 controller • GuardPLC 1800 controller • GuardPLC 2000 Controller and Components • record your selections in the Selection Record (on page 46)	page 33
	6 Select Replacement Parts • replacement batteries or cables • record your selections in the Selection Record (on page 46)	page 45
	7 Fill in Your Selection Listing • all catalog numbers required for your system specification	page 46

Step 1 - Select:

- *controller family - based on memory, I/O, added functionality, and communication options*
- *consider communications to standard programmable controllers*

Select Controller Family: GuardPLC 1200, 1600, 1800, or 2000

Review the Features, Controller Specifications, and Communication Options to determine which level of GuardPLC controller is required.

GuardPLC Controller Feature Comparison Chart

Controller	GuardPLC 1200	GuardPLC 1600		GuardPLC 1800		GuardPLC 2000
Catalog Number	1754-L28BBB	1753-L28BBBM	1753-L28BBBP	1753-L32BBBMBA	1753-L32BBBP8A	1755-L1
User Program Memory	500 Kbytes	250 Kbytes	250 Kbytes	250 Kbytes	250 Kbytes	500 Kbytes
Application Data Memory	500 Kbytes	250 Kbytes	250 Kbytes	250 Kbytes	250 Kbytes	500 Kbytes
Available User Memory (Kbytes)	1000 K bytes	500 K bytes	500 K bytes	500 K bytes	500 K bytes	1000 K bytes
Packaged vs. Modular	Packaged	Packaged	Packaged	Packaged	Packaged	Modular
Embedded I/O						
Number of Digital Inputs	20✶	20❄	20❄	24❄	24❄	24 per card
Number of Digital Outputs	8✶	8❄	8❄	8❄	8❄	16 per card
Number of Analog Inputs	—	—	—	8‡	8‡	8 per card
Number of Analog Outputs	—	—	—	—	—	8 per card
Number of Counters (High-Speed)	2	—	—	2❄	2❄	2 per card
Expansion I/O						
Digital Expansion I/O	✓	✓	✓	✓	✓	✓
Analog Expansion I/O	✓	✓	✓	✓	✓	✓
Communications						
Embedded Ethernet	single port	4-port switch	4-port switch	4-port switch	4-port switch	single port
EtherNet/IP✦	—	✓	✓	✓	✓	—
DeviceNet Safety	—	✓	✓	✓	✓	—
RS-232 Ports	(1) 8-pin mini DIN	—	—	—	—	(1) 9-pin mini DIN
RS-485 Ports	—	(2) 9-pin DIN	—	(2) 9-pin DIN	—	—
Modbus RTU Slave	—	✓	—	✓	—	—
PROFIBUS DP Slave	—	—	✓	—	✓	—
ASCII - Read Only	✓	✓	✓	✓	✓	✓
OPC Client	✓	✓	✓	✓	✓	✓

✦Available September 2005.
✶Not electrically isolated from each other; isolated from the backplane.
❄Not electrically isolated.
‡Unipolar, not electrically isolated.

Step 2 - Select:

- *GuardPLC Ethernet*
- *DeviceNet Safety via DeviceNet Safety Scanner for GuardPLC Controllers*
- *If you choose DeviceNet Safety, record your scanner selection in the Selection Record on page 46*

Select Network for Safety Communications

GuardPLC Ethernet Network

GuardPLC Ethernet is a proprietary Ethernet protocol that provides safety communication via Ethernet for distributed I/O and peer-to-peer communications for all GuardPLC controllers. It also provides standard communication from a Windows-based PC to a GuardPLC controller with the OPC Server. Programming and configuration of GuardPLC controllers is accomplished via GuardPLC Ethernet. Various GuardPLC systems can be networked together via GuardPLC Ethernet, using star or daisy-chain configurations. A PC running RSLogix Guard PLUS! can also be connected wherever required.

Choose GuardPLC Ethernet when:

- You have an existing Ethernet network or a preference for Ethernet.
- Your application requires the fastest distributed I/O throughput.
- Your network must span large distances between controllers and distributed I/O modules.
- Communications to standard PLCs or HMIs can be accomplished via EtherNet/IP, ASCII, Modbus, or Profibus.

DeviceNet Safety Network

The addition of safety services to the Common Industrial Protocol (CIP) opened the door for the creation of DeviceNet Safety. This expansion of DeviceNet technology makes it easier to integrate safety and standard control systems by allowing the mixing of safety and standard messages on the same wire and in the same controller. This enables the safety control system to utilize a facility's existing DeviceNet infrastructure. These innovations in safety control help end users and machine builders to simplify their control systems, which helps lower their costs while maintaining the required levels of worker protection.

DeviceNet Safety supports the following communication capabilities:

- Standard controller to standard I/O
- Safety controller to safety I/O
- Safety controller to standard I/O
- Safety controller to standard controllers or HMIs

All of the rules, design guidelines, and tools used for standard DeviceNet also apply to DeviceNet Safety.

Choose DeviceNet Safety when:

- You prefer to integrate safety and standard control on one network.
- You have an existing DeviceNet network or a preference for DeviceNet.
- Your application requires communications to standard PLCs or HMIs via DeviceNet.

When you use GuardPLC 1600 or GuardPLC 1800 controllers, you can reap the benefits of both GuardPLC Ethernet and DeviceNet Safety, which can be used simultaneously with those controllers.

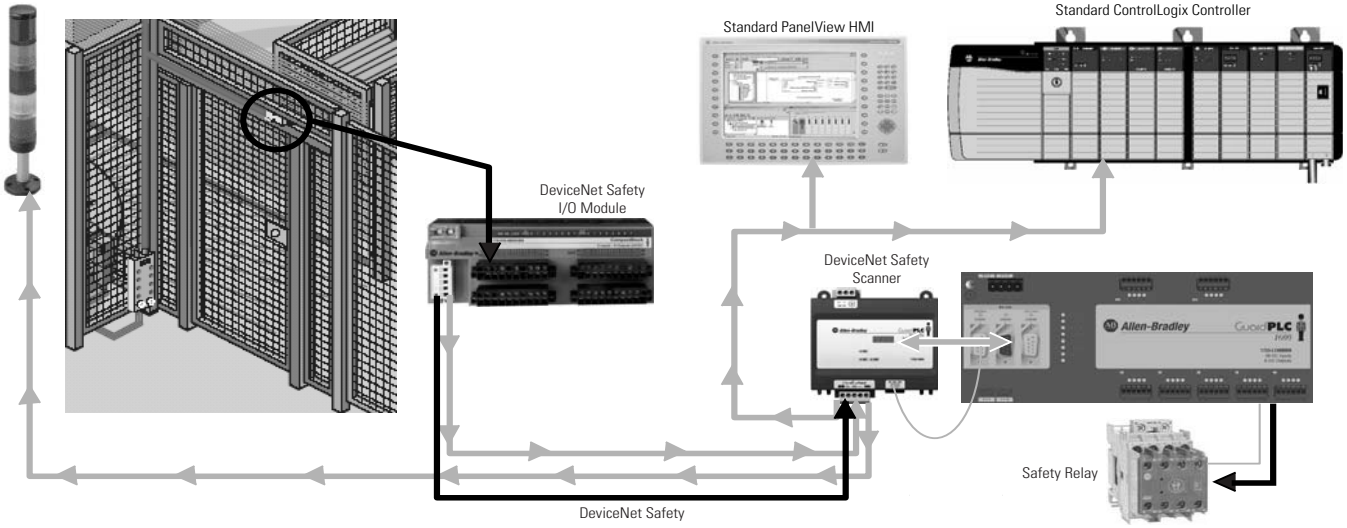
DeviceNet Standard and DeviceNet Safety on the Same Network — Application Example

The network shown below is an example of how you can use DeviceNet and DeviceNet Safety together in the same application.

When an operator opens the gate, an interlock switch wired to the DeviceNet Safety I/O module opens. The status of the switch is sent to the GuardPLC controller via the DeviceNet Safety Scanner.

The GuardPLC controller shuts down the equipment inside the gate and sends standard output data to the Stack Light to annunciate that the gate is open.

The same GuardPLC controller also sends status information to the PanelView and ControlLogix controller over standard DeviceNet. The PanelView shows which gate is open and the ControlLogix controller may perform a cycle stop of adjacent equipment.



DeviceNet Safety Scanner for GuardPLC Controllers

The 1753-DNSI provides DeviceNet access for GuardPLC 1600 and GuardPLC 1800 controllers. The scanner supports both DeviceNet Safety and standard DeviceNet communication to DeviceNet Safety I/O as well as to standard PLCs, standard I/O, and HMIs. The scanner reads and writes data from DeviceNet nodes and exchanges this data and status information with the GuardPLC controller. Using its target mode, the scanner can look like I/O to standard PLCs or HMIs, allowing the GuardPLC controller to send status and diagnostic data to the standard control system.

Benefits

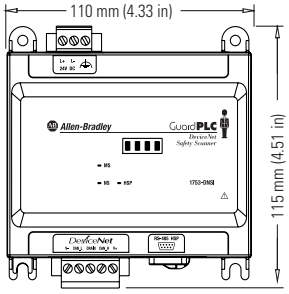
- Supports both DeviceNet Safety and standard DeviceNet.
- Data sharing between up to 63 devices, 32 of which can be DeviceNet Safety I/O modules.
- Peer-to-peer communication between GuardPLC controllers and DeviceNet Safety devices.
- Configuration and monitoring over the DeviceNet network.
- DeviceNet Safety protocol has a higher priority so data is not influenced by standard DeviceNet communications.

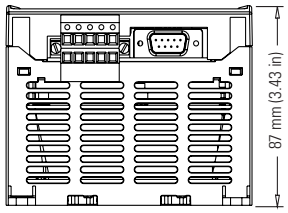
DeviceNet Safety Scanner Specifications

Cat. No.	1753-DNSI
Description	DeviceNet Safety Scanner for GuardPLC
Power Consumption	10 W
DeviceNet Current Load, Max.	90 mA @ 24V dc
Overload Protection	Shutdown of the concerned output with cyclic reconnecting
GuardPLC Cable	1753-CBLDN (ships with the 1753-DNSI)
Isolation Voltage	30V continuous Tested to withstand 710V dc for 60 seconds
Enclosure Type Rating	none (open-style)
Weight, Metric	366 g
Weight, Imperial	0.805 lb
Dimensions (HxWxD), Metric	115 x 110 x 87 mm∗
Dimensions (HxWxD), Imperial	4.51 x 4.33 x 3.43 in∗
Operating Temperature	0…+60°C (+32…140°F)
Storage Temperature	-40…85 °C (-40…185 °F)
Relative Humidity	10…95% non-condensing
Vibration	2 g @ 10…500 Hz
Shock, Operating	30 g
Shock, Non-Operating	50 g
ESD Immunity	6 kV contact discharges 8 kV air discharges
Radiated RF Immunity	10 V/m with 1 kHz sine-wave 80% AM from 30 MHz to 2000 MHz 10 V/m with 200 Hz 50% Pulse 100% AM at 900 MHz 10 V/m with 200 MHz 50% Pulse 100% AM at 1890 MHz 3 V/m with 1 kHz sine-wave 80% AM from 2000 MHz to 2700 MHz
EFT/B Immunity	±2 kV @ 5 kHz on power ports ±2 kV @ 5 kHz on communication ports
Surge Transient Immunity	±1 kV line-line (DM) and ±2 kV line-earth (CM) on power ports ±2 kV line-earth (CM) on communications ports
Conducted RF Immunity	10Vrms with 1 kHz sine-wave 80% AM from 150 kHz to 80 MHz
Emissions	CISPR 11: Group 1, Class A

∗Height includes connectors.

DeviceNet Safety Scanner Dimensions





Step 3 - Select:

- *GuardPLC Ethernet Distributed I/O*
- *1791DS DeviceNet Safety I/O Modules*
- *record your selection in the Selection Record on page 46*

Select Distributed I/O Modules

Distributed Safety I/O for GuardPLC Ethernet

Take advantage of all the benefits of traditional distributed I/O with GuardPLC distributed safety I/O, available for all GuardPLC systems.

GuardPLC distributed I/O modules provide considerable flexibility in configuring the right mix of I/O in the right place. The 16 digital input module offers four pulse test source terminals, allowing users to pulse test all 16 digital inputs from the I/O module and providing Category 4 safety circuitry while retaining all the advantages of distributed I/O. The 16 digital output module is rated for 2A on every other output point, limiting the need for additional interposing safety relays for additional current and therefore saving on machine costs.

The safety relay output module can provide dry contact enable signals as well as high current AC or DC outputs. The 8 input/8 output and 16 input/8 output digital combination modules feature both positive and negative switching outputs, for applications that use diverse outputs. The analog input module enables you to distribute analog inputs for more process-oriented safety applications.

All I/O modules include GuardPLC 100 Mbps Ethernet, which provides the fastest safety network and machine stop times in the industry. The built-in two-port Ethernet switches make connecting I/O modules to the GuardPLC controller as easy as daisy chaining Ethernet cable from I/O module to controller.

Benefits

- Place the I/O where the devices reside.
- Reduce wiring costs and the time necessary to wire the machine or cell.
- Reduce machine or cell start up time.
- Increase machine and cell reliability.

Digital Safety I/O Module Specifications

Cat. No.	1753-IB16	1753-IB8XOB8✦	1753-IB16XOB8✦	1753-IB20XOB8	1753-OB16
Description	GuardPLC Digital Input Module	GuardPLC Digital Combination Module	GuardPLC Digital Combination Module	GuardPLC Digital Combination Module	GuardPLC Digital Output Module
Response Time	≥10 ms	≥10 ms	≥10 ms	≥10 ms	≥10 ms
Ethernet Interface	2 x RJ-45, 10/100BaseT (with 100 Mbps) with integrated switch	2 x RJ-45, 10/100BaseT (with 100 Mbps) with integrated switch	2 x RJ-45, 10/100BaseT (with 100 Mbps) with integrated switch	2 x RJ-45, 10/100BaseT (with 100 Mbps) with integrated switch	2 x RJ-45, 10/100BaseT (with 100 Mbps) with integrated switch
EtherNet/IP Communication Rate	100 Mbps	100 Mbps	100 Mbps	100 Mbps	100 Mbps
Operating Voltage Range	24V dc, -15%…+20%, w_{ss} 15%✶	24V dc, -15%…+20%, w_{ss} 15%✶	24V dc, -15%…+20%, w_{ss} 15%✶	24V dc, -15%…+20%, w_{ss} 15%✶	24V dc, -15%…+20% w_{ss} 15%✶
Current Consumption	0.8 A with maximum load 0.4 A idle current	8.0 A with maximum load 0.4 A @ 24V idle current	14.0 A with maximum load 0.6 A @ 24V idle current	8.0 A with maximum load 0.4 A @ 24V idle current	approx. 0.2 A per group (idle current)
I/O Channel Isolation	Non-isolated	Non-isolated	Non-isolated	Non-isolated	Non-isolated
Digital Inputs					
Number of Digital Inputs	16❄	8❄	16❄	20❄	—
Input Filter Time, Nom.	100 µs	100 µs	100 µs	100 µs	100 µs
Sensor Supply	24V, short-circuit proof‡	2 x 20V / 100 mA @ 24V, short-circuit proof	4 x L+ minus 4/40 mA, short-circuit proof, buffered for 20 ms 2 x L+ minus 2V/1 A in total, short-circuit-proof, not buffered Current: 1 A @ 60 °C (140 °F)	5 x 20V / 100 mA @ 24V, short-circuit proof	—
Current, Off-State Input, Max.	1.5 mA (1 mA @ 5V)	1.5 mA (1.25 mA @ 5V)	1.5 mA (1.0 mA @ 5V)	1.5 mA (1 mA @ 5V)	—
Current, On-State Input, Min.	2 mA @ 15V	2 mA @ 15V	2 mA @ 15V	2 mA @ 15V	—
Voltage, Off-State Input, Max.	5V dc	5V dc	5V dc	5V dc	—
Voltage, On-State Input, Max.	30V dc	30V dc	30V dc	30V dc	—
Voltage, On-State Input, Nom.	24V dc	24V dc	24V dc	24V dc	—
Voltage, On-State Input, Min.	15V dc	15V dc	15V dc	15V dc	—
Input Switching Point	7.5V, typical	7.5V, typical	7.5V, typical	7.5V, typical	—
Input Switching Time	250 µs, typical	—	250 µs, typical	—	—
Digital Outputs					
Number of Digital Outputs	—	8❄	8❄	8❄	16❄
Current, On-State Output, Min.	—	2 mA per channel	10 mA	2 mA	2 mA
Current, On-State Output, per Channel	—	L+ Channels 1…3, 5…7: 0.5 A @ 60 °C (140 °F) L+ Channels 4 and 8: 1 A @ 60 °C (140 °F), 2 A @ 40 °C (104 °F) L- Channels 1 and 2: 1 A @ 60 °C (140 °F), 2 A @ 40 °C (104 °F)	1 A max. @ 60°C (140°F) 2 A max. @ 40°C (104°F)	Channels 1…3, 5…7: 0.5 A @ 60 °C (140 °F) Channels 4 and 8: 1 A @ 60 °C (140 °F), 2 A @ 50 °C (122 °F)	1 A @ 60 °C (140 °F) 2 A @ 40 °C (104 °F)
Current, On-State Output, per Module	—	7 A max.§	9 A max.§ 14A @ 2 ms	7 A max.§	16 A max
Leakage Current, Off-State Output, Max.	—	1 mA @ 2V	1 mA @ 2V	1 mA @ 2V	1 mA @ 2V
Surge Current per Output, Max.	—	—	—	1 A for 10 ms @ 1 Hz (Channels 1…3 and 5…7) 4 A for 10 ms @ 1 Hz (Channels 4 and 8)	4 A for 10 ms @ 1 Hz
Overload Protection	—	Shutdown of the concerned output with cyclic reconnecting	Shutdown of the concerned output with cyclic reconnecting	Shutdown of the concerned output with cyclic reconnecting	Shutdown of concerned output with cyclic reconnecting
Voltage Drop, On-State Output, Max.	—	2V @ 2 A	2V @ 2 A	2V @ 2 A	2V @ 2 A
Voltage, On-State Output, Max.	—	Supply Voltage (L+)	Supply Voltage (L+)	Supply Voltage (L+)	Supply Voltage (L+)
Voltage, On-State Output, Min.	—	Supply Voltage (L+) minus 2V	Supply Voltage (L+) minus voltage Drop	Supply Voltage (L+) minus 2V	Supply Voltage (L+) minus 2V

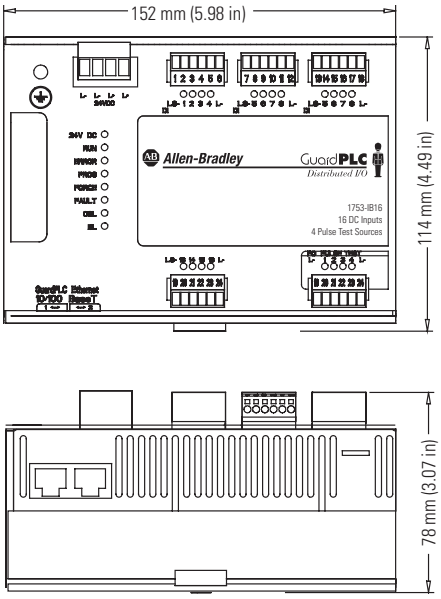
✦ Available November 2005.
✶Requires a power supply with protective separation, conforming to IEC 61131-2 requirements.
❄Not electrically isolated.
‡Current limited to 4 x 40 mA @ 19.2V.
§Exceeding this value causes shutdown of all outputs with cyclic reconnecting.

Cat. No.	1753-IB16	1753-IB8XOB8✦	1753-IB16XOB8✦	1753-IB20XOB8	1753-OB16
Digital Outputs (continued)					
Inductive Load	—	500 mH max.	500 mH	—	500 mH
Lamp Load	—	L+ Channels 1…3 and 5…7: 10 W L+ Channels 4 and 8: 25 W L- Channels 1 and 2: 25W	25 W max.	—	10 W max (for 1A output) 25 W max (for 2A output)
Output Current Rating, per Group, Max.	—	—	—	—	8 A
Output Groups	—	—	—	—	2 groups of 8
Power Dissipation, Outputs, Max.	—	—	—	—	10 W @ 1 A 25 W @ 2 A
Pulse Test Sources					
Number of Pulse Test Sources	4✶	2✶	2✶	—	—
Pulse Test Current Load, Min.	None	None	None	—	—
Pulse Test Output Current	Current limited to 4 x 60 mA @ 19.2V	60 mA	60 mA	—	—
Pulse Test Output Voltage, Nom.	24V	≥L+ minus 4V	L+ minus 4V	—	—
Pulse Test Supply	24V, short circuit proof❄	24V, short circuit proof‡	24V, short circuit proof‡	—	—
General					
Operating Temperature	0…60° C (32…140° F)	0…60°C (32…140°F)	0…60°C (32…140°F)	0…60°C (32…140°F)	0…60 °C (32…140 °F)
Storage Temperature	-40…85° C (-40…185° F)	-40…85°C (-40…185°F)	-40…85°C (-40…185°F)	-40…85°C (-40…185°F)	-40…85 °C (-40…185 °F)
Dimensions (HxWxD), Metric	114 x 152 x 78 mm§	114 x 152 x 78 mm§	114 x 205 x 100 mm§	114 x 207 x 78 mm§	114 x 207 x 78 mm§
Dimensions (HxWxD), Imperial	4.49 x 5 99 x 3.07 in§	4.49 x 6.00 x 3.07 in§	4.49 x 8.08 x 3.94 in§	4.49 x 8.16 x 3.07 in§	4.49 x 8.16 x 3.07 in§
Weight, Metric	0.7 kg	1.0 kg	1.3 kg	1.0 kg	0.85 kg
Weight, Imperial	1.54 lb	2.2 lb	2.9 lb	2.2 lb	1.87 lb

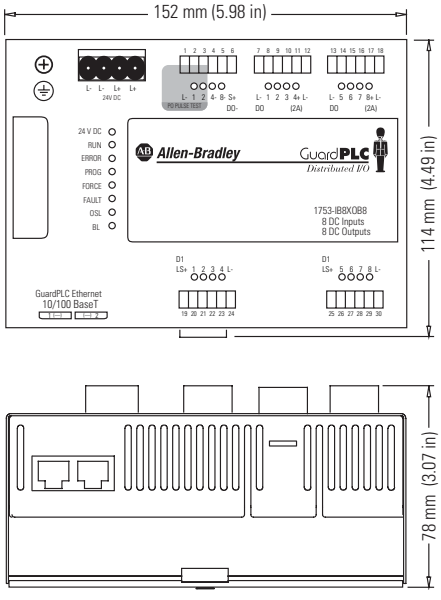
✦ Available November 2005.
✶ Not electrically isolated.
❄ Current limited to 4 x 60 mA @ 19.2V.
‡ Current limited to 2 x 60 mA @ 19.2V.
§ Height including latch; width including housing screws; depth including grounding bolt and connectors.

Digital Safety I/O Module Dimensions

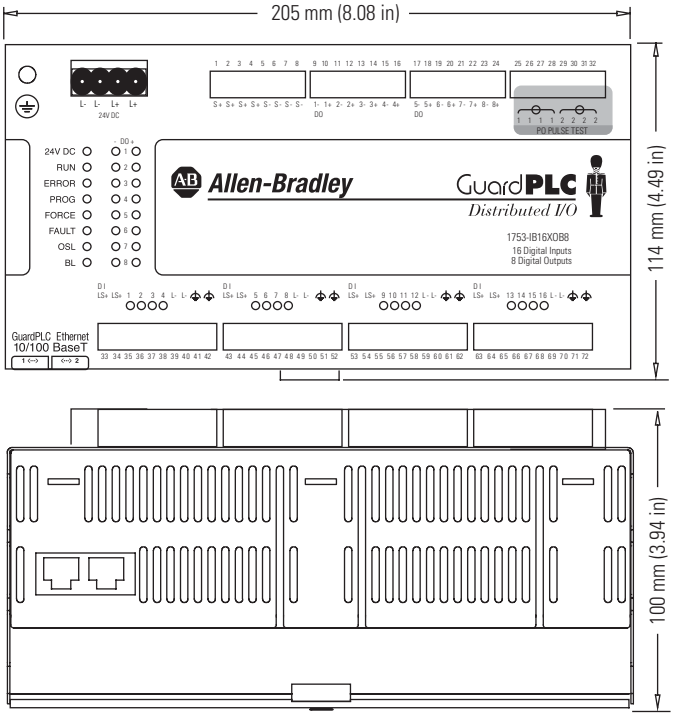
1753-IB16 Module Dimensions



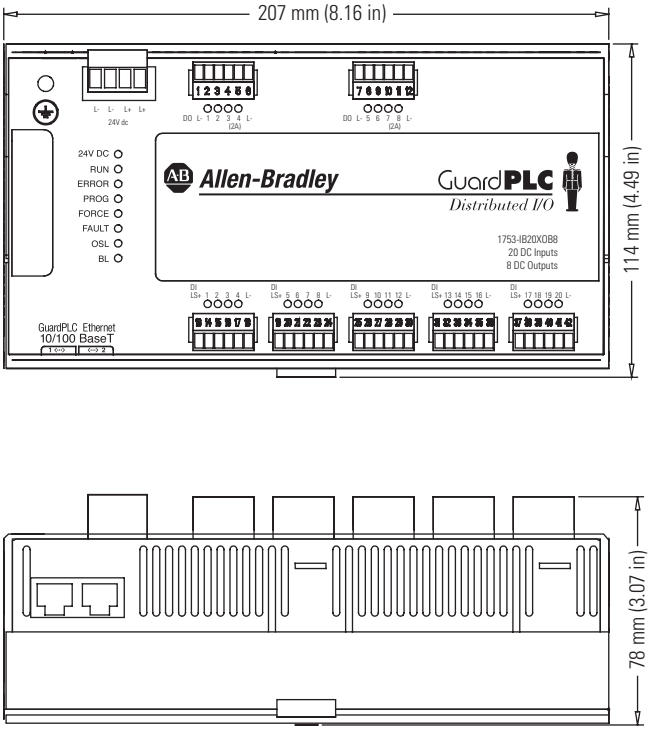
1753-IB8XOB8 Module Dimensions



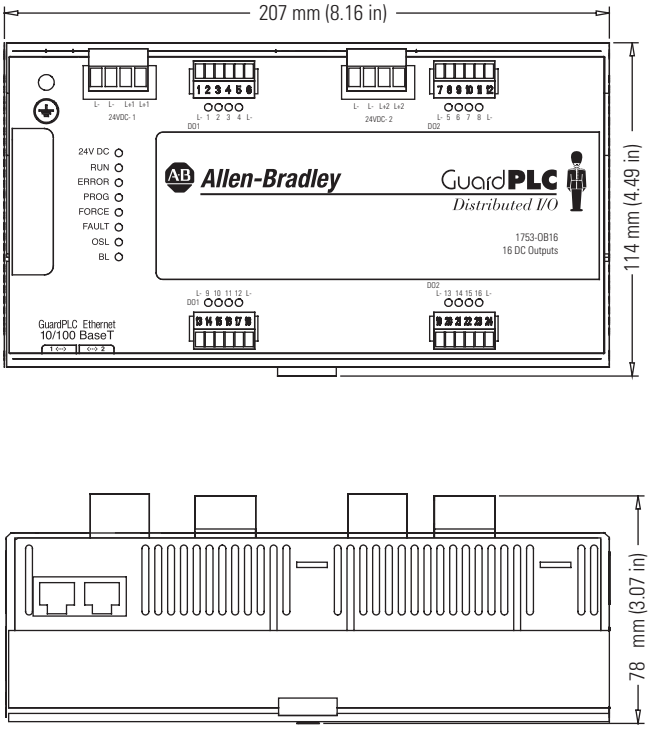
1753-IB16XOB8 Module Dimensions



1753-IB20XOB8 Module Dimensions



1753-OB16
Module Dimensions

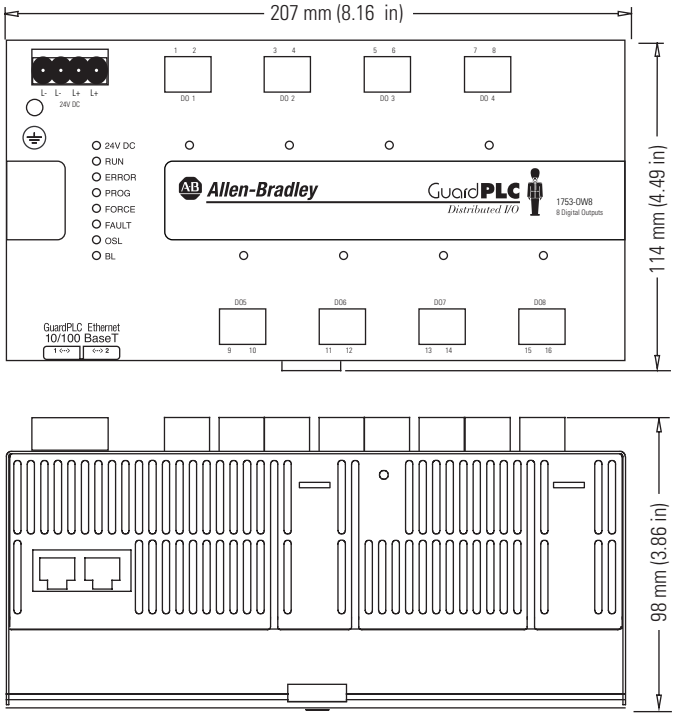


Digital Relay Safety Output Module Specifications

Cat. No.	1753-OW8✦
Description	GuardPLC Digital Relay Output Module
Number of Outputs	8 safety relay
Current Consumption	0.6 A max.
Operating Voltage Range	24V dc, -15%…+20% w_{SS} 15%✶
Ethernet Interface	2 x RJ-45, 10/100BaseT (with 100 Mbps) with integrated switch
EtherNet/IP Communication Rate	100 Mbps
Switching Voltage	≥5 V, I_e250 V ac/250V dc
Switching Current	internally fused with 3.15 A breaking capacity 100 A
Switching Capacity AC	max. 240 VA, cos.>0.5
Switching Capacity DC (non-inductive)‡	up to 30V dc: 90 W (3.15 A) max up to 70V dc: 35 W (0.5 A) max up to 127V dc: 30 W (0.315 A) max
Contact Material	silver alloy
Output Turn On Time, Minimum	30 ms
Output Turn Off Time, Minimum	10 ms
Bounce Time	15 ms
Service Life, Mechanical	≥10^6 switching cycles
Service Life, Electrical	≥2.5 x 10^5 switching cycles with resistive full load and ☆0.1 switching cycles per second
Operating Temperature	0…60 °C (32…140 °F)
Storage Temperature	-40…85 °C (-40…185 °F)
Dimensions (HxWxD), Metric	114 x 207 x 98 mm❄
Dimensions (HxWxD), Imperial	4.49 x 8.16 x 3.86 in❄
Weight, Metric	1.3 kg
Weight, Imperial	2.86 lb

✦Available September 2005.
‡External fusing adapted.
✶Requires a power supply with protective separation, conforming to IEC 61131-2 requirements.
❄Height including latch; width including housing screws; depth including grounding bolt and connectors.

Digital Relay Safety Output Module Dimensions

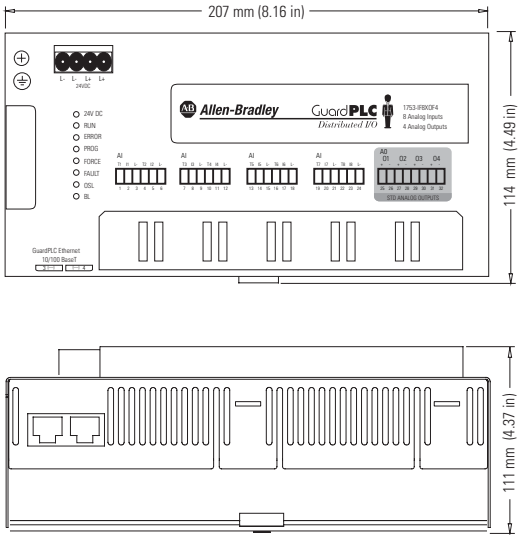


Analog Safety I/O Module Specifications

Cat. No.	1753-IF8XOF4✦
Description	GuardPLC Analog Combination Module
Response Time	≥20 ms
Ethernet Interface	2 x RJ-45, 10/100BaseT (with 100 Mbps) with integrated switch
EtherNet/IP Communication Rate	100 Mbps
Operating Voltage Range	24V dc, -15%…+20%, w_{ss} 15%✶
Current Consumption	0.8 A with maximum load 0.4 A @ 24V idle current
Number of Safety Analog Inputs	8
Input Signal Range	Nominal: 0…+10V dc or 0…20 mA (with shunt) Service: -0.1…+11.5V dc or -0.4…23 mA (with shunt)
Shunt Resistor, External	500 Ω (for current input)
Impedance, Analog Input	>2 MΩ
Analog Input Signal, Source Impedance	≤500 Ω
Input Resolution, Bits	12 bit
Effective Resolution	9 bits @ 10V
Sensor Supply	selectable 26V/8.2V 200 mA, short-circuit-proof
Accuracy	0.5%
Safety Accuracy	2%
Long-term Drift, Input	±0.5%
Number of Safety Analog Outputs	0
Number of Analog Outputs (Standard)	4‡
Output Signal Range	4…20 mA nominal 0…20 mA full range
Impedance, Current Output	600 Ω max.
Calibration Error Zero Point	Input: ±1% Output: ±1%
Calibration Error Terminal Point	Input: ±0.4% Output: ±1%
Channel Error	Input: ±0.5% Output: ±1%
Temperature Error Zero Point	Input: ±0.5%/10 K Output: ±1%/10 K
Temperature Error Terminal Point	Input: ±0.5%/10 K Output: ±1%/10 K
Linearity Error	Input: ±0.5% Output:±1%
Operating Temperature	0…60°C (32…140°F)
Storage Temperature	-40…85°C (-40…185°F)
Dimensions (HxWxD), Metric	114 x 207 x 111 mm❄
Dimensions (HxWxD), Imperial	4.49 x 8.16 x 4.37 in❄
Weight, Metric	0.95 kg
Weight, Imperial	2.09 lb

✦Available September 2005.
‡Non-safety-related with common safety switch-off.
✶Requires a power supply with protective separation, conforming to IEC 61131-2 requirements.
❄Height including latch; width including housing screws; depth including grounding bolt, connectors, and shield plate.

Analog Safety I/O Module Dimensions



1791DS DeviceNet Safety I/O

Use these DeviceNet Safety I/O modules to expand the GuardPLC controller safety system. Distributed I/O communications for safety I/O data and status are performed through safety connections with the DeviceNet Safety Scanner for GuardPLC and safety data is processed in the GuardPLC 1600 or GuardPLC 1800 controller.

Benefits

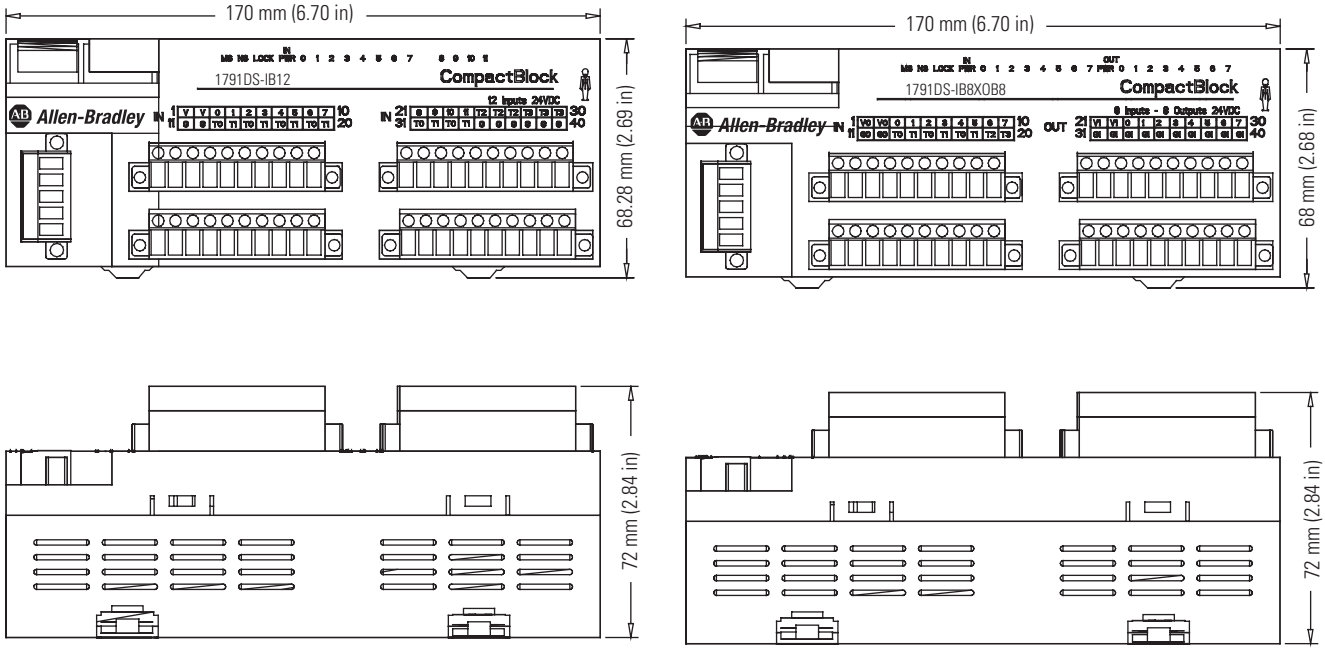
- Dual channel mode evaluates the consistency between two signals, supporting the modules' use in Category 4 applications.
- 4 dedicated, configurable test outputs allow for pulse testing input circuits.
- One test output can be used for current monitoring (for example, for a muting lamp).
- Module status data is accessible via remote DeviceNet Safety Communications.
- Module configuration can be locked and password-protected for added security.
- SIL 3/Cat. 4 certified.
- Device configuration and maintenance is accomplished over the DeviceNet Safety network.
- One DeviceNet Safety node supports up to 12 sensors (1791DS-IB12) or 8 actuators (1791DS-IB8XOB8).

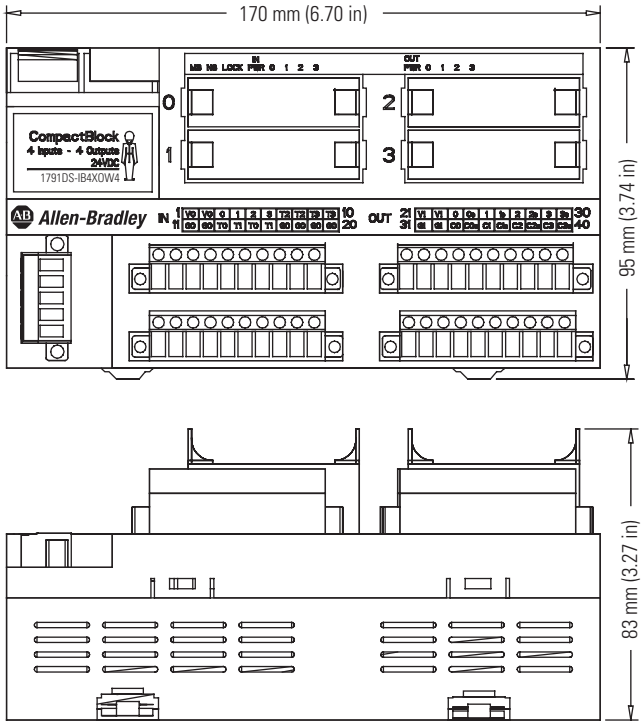
DeviceNet Safety I/O Specifications

Cat. No.	1791DS-IB12	1791DS-IB8XOB8	1791DS-IB4XOW4
Description	DeviceNet Safety Input Module	DeviceNet Safety Input/Solid-State Output Module	DeviceNet Safety Input/Relay Output Module
Current Consumption	110 mA @ 24V dc	110 mA @ 24V dc	110 mA @ 24V dc
DeviceNet Power Supply Voltage, Min.	11V dc	11V dc	11V dc
DeviceNet Power Supply Voltage, Max.	25V dc	25V dc	25V dc
Operating Voltage Range	20.4…26.4V dc (24V dc, -15…+10%)	20.4…26.4V dc (24V dc, -15…+10%)	20.4…26.4V dc (24V dc, -15…+10%)
I/O Channel Isolation	Isolated	Isolated	Isolated
Digital Inputs			
Number of Inputs	12 safety	8 safety	4 safety
Voltage, On-State Input, Min.	11 V dc	11 V dc	11 V dc
Voltage, Off-State Input, Max.	5V dc	5V dc	5V dc
Input Current	6 mA	6 mA	6 mA
Input Delay Time, OFF to ON❄	16.2 ms max.	16.2 ms max.	16.2 ms max.
Input Delay Time, ON to OFF❄	16.2 ms max.	16.2 ms max.	16.2 ms max.
Digital Outputs			
Number of Outputs	—	8 safety solid-state	4 safety relay
Output Type	—	current sourcing	current sourcing
Output Current Rating	—	0.5 A per point	2 A max.
Output Leakage Current, Max.	—	0.1 mA	0.1 mA
Inductive Load	—	—	AC15: 240V ac @ 2 A (cos ϑ = 0.3) DC13: 24V dc @ 1 A
Resistive Load	—	—	240V ac @ 2 A 30V dc @ 2 A
Output Delay Time, OFF to ON, Max.	—	6.2 ms	26.2 ms
Output Delay Time, ON to OFF, Max.	—	6.2 ms	26.2 ms
Service Life, Mechanical	—	—	5 000 000 operations, min.
Service Life, Electrical	—	—	100 000 operations, min.
Short Circuit Protection	—	Yes	—
Overcurrrent Detection	—	Yes	—
Pulse Test Sources			
Number of Pulse Test Sources	4	4	4
Pulse Test Output Current	0.7 A per point	0.7 A per point	0.7 A per point
Pulse Test Output Leakage Current, Max.	0.1 mA	0.1 mA	0.1 mA
Short Circuit Protection	Yes	Yes	Yes
Overcurrrent Detection	Yes	Yes	Yes
General			
Operating Temperature	-10…+55°C (14…131°F)	-10…+55°C (14…131°F)	-10…+55°C (14…131°F)
Storage Temperature	-40…+70°C (-40…158°F)	-40…+70°C (-40…158°F)	-40…+70°C (-40…158°F)
Relative Humidity	10…95% non-condensing	10…95% non-condensing	10…85% non-condensing
Vibration	0.35 mm @ 10…57 Hz 5 g @ 57…150 Hz	0.35 mm @ 10…57 Hz 5 g @ 57…150 Hz	0.35 mm @ 10…57 Hz 5 g @ 57…150 Hz
Shock, Operating	15 g	15 g	10 g
Enclosure Type Rating	none (open-style)	none (open-style)	none (open-style)
Enclosure Protection	IP 20	IP 20	IP 20
Dimensions (HxWxD), Metric	68 x 170 x 72 mm✶	68 x 170 x 72 mm✶	95 x 170 x 83 mm✶
Dimensions (HxWxD), Imperial	2.68 x 6.70 x 2.84 in✶	2.68 x 6.70 x 2.84 in✶	3.74 x 6.70 x 3.27 in✶
Weight, Metric	420 g	420 g	600 g
Weight, Imperial	0.92 lb	0.92 lb	1.32 lb

✶ Includes DIN latch and connectors.
❄Without filter. (With filter up to 126 ms.)

1791DS DeviceNet Safety I/O Module Dimensions





Step 4 - Select:

- *RSLogix Guard PLUS! software for programming your GuardPLC safety application*
- *RSNetWorx for DeviceNet if your application includes the DeviceNet Safety Scanner for GuardPLC Controllers and 1791DS DeviceNet Safety I/O*
- *OPC Server to communicate status from the GuardPLC controller to a Windows-based PC*
- *Certified Function Blocks for RSLogix Guard PLUS!*
- *record your selection in the Selection Record on page 46*

Select Software

RSLogix Guard PLUS! Programming Software

Development and testing of programs for all GuardPLC systems is done with RSLogix Guard PLUS! programming software, an easy to use yet highly powerful programming software. RSLogix Guard PLUS! software is project-based, meaning you can store programs for multiple controllers in one project.

RSLogix Guard PLUS! is based on graphical function blocks. Simply design your logic using predefined elements such as AND-gates, ORgates, numerical functions, etc., then connect inputs and outputs using the mouse.

You also can purchase TÜV certified function blocks from libraries of predefined, application-specific instructions:

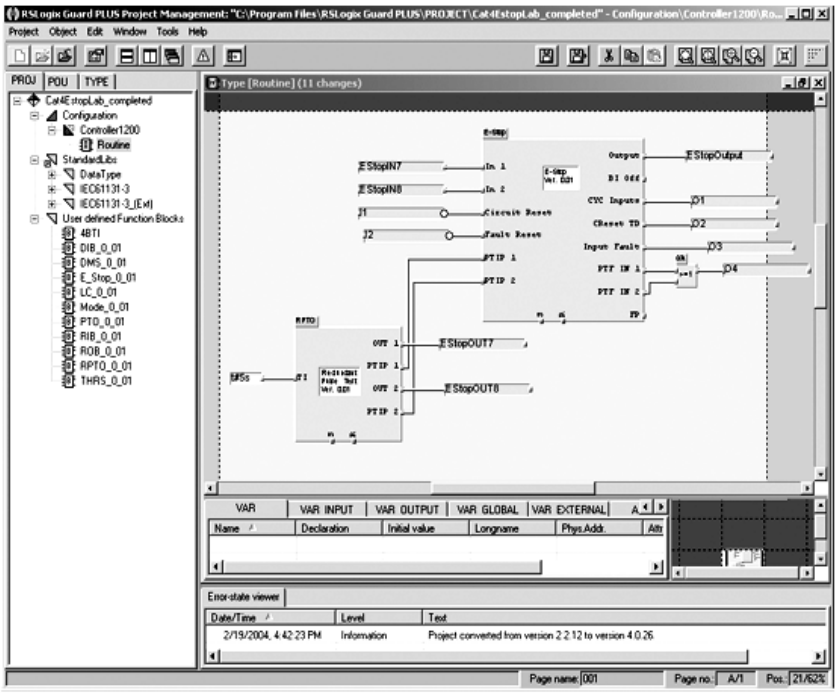
- e-stop
- light curtain
- two-hand run station
- redundant input
- pulse test output

RSLogix Guard PLUS! software offers unlimited data tags, program pages, and function blocks for maximum flexibility.

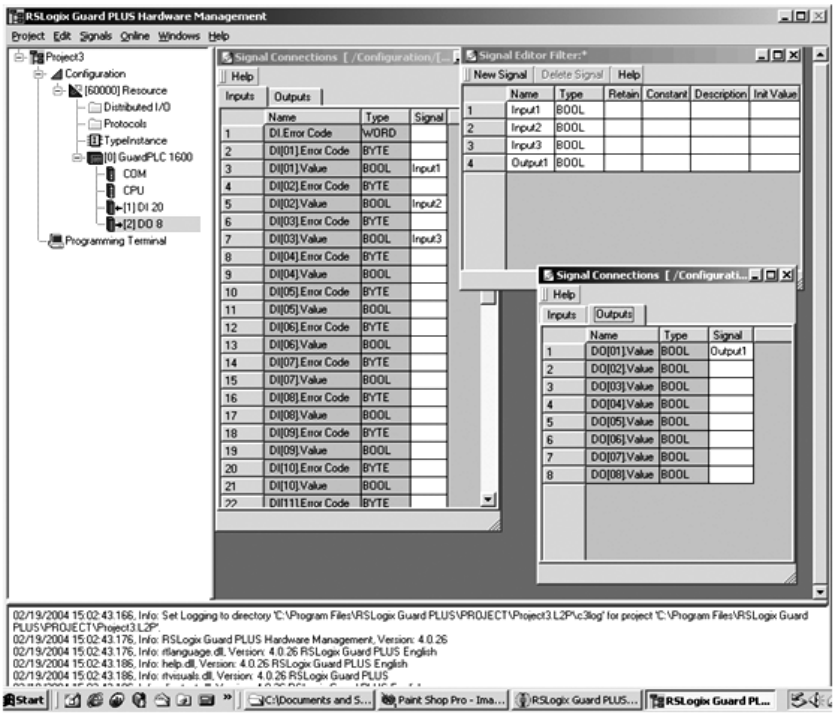
Once RSLogix Guard PLUS! software has been configured for the chosen controller, input and output variables are defined in a tag list to establish the link between hardware and software in a manner similar to that used by ControlLogix controllers and RSLogix 5000 programming software.

To save time and decrease development effort, the offline program simulation allows you to test your program without downloading it to a GuardPLC controller. Online program monitoring allows you to view your logic inside the controller to see which parts are logically true and false and to troubleshoot as necessary.

RSLogix Guard PLUS! Programming Software Examples



Use the project management screen to write a program, perform offline program simulation, and view the program running online.



The hardware management screen within RSLogix Guard PLUS! lets you configure the hardware of your GuardPLC system, create tags, and then drag them into your program.

Benefits

- Ease of use – program your safety control system using pre-defined graphical elements and a "drag and drop" palette.
- Tag-based system – define program variables to suit specific application and use variable names.
- Offline program simulation – test your program without using the controller.
- Online program monitoring – eases troubleshooting by viewing logic inside of GuardPLC controllers.
- Unlimited program pages and unlimited variables – configure program to suit specific needs.
- User-defined function blocks with library function – create your own specific instructions.
- Project-based controller linkage – store programs from multiple controllers in one project; ideal for cells that contain multiple GuardPLC controllers.
- Safety certified function blocks – save programming and configuration time by using function blocks that are already certified for use in safety applications.

System Requirements

Your personal computer must meet the following requirements for installing RSLogix Guard PLUS! programming software.

Requirements	Minimum	Recommended
Personal Computer	Pentium III, 500 MHz	Pentium IV, 1.2 GHz
Operating System	Windows NT/2000	Windows NT/2000/XP
RAM	256 MB	512 MB
Free Hard Disk Space	at least 200 MB plus space for user programs	at least 200 MB plus space for user programs
Resolution	1024 x 768/256 colors	1280 x 1024/true color

RSLogix Guard PLUS! Programming Software

You can install RSLogix Guard PLUS! programming software on a local drive only (not a network).

Cat. No.	Description
1753-PCS-USB	RSLogix Guard PLUS! for all GuardPLC controllers. USB hardlock.
1753-PCS-PAR	RSLogix Guard PLUS! for all GuardPLC controllers. Parallel port hardlock.

RSNetWorx Software for DeviceNet Network

RSNetWorx™ Software for DeviceNet Network is the premier configuration software for your Open DeviceNet Vendor Association DeviceNet network; it provides configuration management and diagnostic features, and it is one of the most advanced DeviceNet network management software packages available today. Designed for the Microsoft Windows XP, Windows NT v4.0, Windows 2000, Windows 98, or Windows 95 platforms, RSNetWorx Software for DeviceNet Network helps you achieve maximum productivity with your DeviceNet installations.

You can quickly define the devices on your DeviceNet network and the input/output exchanges that take place through this simple software interface.

RSNetWorx Software for DeviceNet, version 6.0 and higher, supports configuration of DeviceNet Safety devices. A Safety Device Verification Wizard guides you through the verification and configuration locking process and provides a report listing the configuration information for all of the safety devices on the network.

Cat. No.	Description
9357-DNETL3	RSNetWorx for DeviceNet

Benefits

- Define the devices that are present on your network. You can either manually drag/drop devices/modules or go online to a DeviceNet network and let the software determine the devices/modules that are present.
- Define configuration settings for devices on the DeviceNet network through a convenient property page interface.
- Define the input/output information exchanges that you want to take place on the DeviceNet network.
- Access a comprehensive product tutorial to help you get the most value from the software as quickly as possible.
- Receive troubleshooting hints whenever error messages are presented, making you more productive.
- Configure and exchange data with DeviceNet Safety Scanner and DeviceNet Safety I/O nodes.
- Verify and lock safety devices for use in high-integrity safety systems.

System Requirements

Requirements	
Personal Computer	Pentium recommended
Operating System	Microsoft Windows XP, Windows NT (v4.0 or later), Windows 2000, Windows 98, or Windows 95 with DCOM (Microsoft DCOM is included on the CD)
RAM	32 MB of RAM minimum (48 MB recommended)
Free Hard Disk Space	14 MB of free hard disk space
Drivers	RSLinx Lite communication drivers (included)
Resolution	16-color VGA graphics adapter, 640 x 480 resolution (256-color, 800 x 600 resolution recommended)

GuardPLC OPC Server Software

GuardPLC OPC Server software allows a Windows-based PC to read data from and write data to the GuardPLC controller across the GuardPLC Ethernet network. For example, a VersaView computer could be running the GuardPLC OPC server and RSView software, then could display status information from the GuardPLC controller, such as which e-stop has been pressed, which gate is open, or which light curtain has been interrupted.

Cat. No.	Description
1753-OPC	GuardPLC OPC Server software

Certified Function Blocks for RSLogix Guard PLUS!

GuardPLC Certified Function Blocks are additional, application-specific instructions that can be used in your GuardPLC controller's application program. Certified by TÜV, these function blocks make application development, debugging, and troubleshooting quicker and easier. Certified Function Blocks are sold in suites or libraries that contain several blocks for specific applications.

Cat. No.	Description
1753-CFBBASIC	Basic Suite of Certified Function Blocks. Includes: E-stop. Diverse Input, Light Curtain, Two-hand Run Station, Enable Pendant, Redundant Output, and Pulse Test Output.

Step 5 - Review:

- *controller specifications*
- *select GuardPLC 2000 components, if you are using the GuardPLC 2000 controller*
- *record your selected catalog numbers in the Selection Record on page 46*

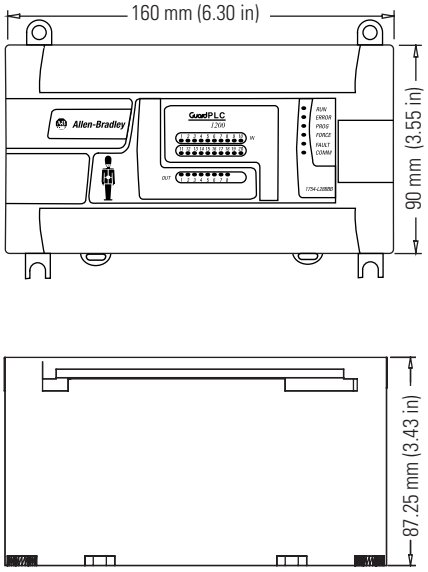
Review GuardPLC Controller Specifications

GuardPLC 1200 Controller Specifications

Cat. No.	1754-L28BBB
Application Data Memory	500 Kbytes
User Program Memory	500 Kbytes
Available User Memory (Kbytes)	1000 K bytes
Communication Ports	ASCII (RS-232)
Ethernet Interface	RJ-45
EtherNet/IP Communication Rate	10/100 Mbps
Current Consumption	8 A (1 A controller, 7 A for I/O)
Operating Voltage Range	20.4…28.8V dc (10 msec buffer), ripple ≤15%
I/O Channel Isolation	Non-isolated
Serial Cable	1761-CBL-PM02
Digital Inputs	
Input Point Density	20
Input Filter Time, Nom.	100 µs
Current, Off-State Input, Max.	1.5 mA (1 mA @ 5V)
Current, On-State Input, Max.	13 mA @ 30V
Current, On-State Input, Min.	2 mA @ 10V
Voltage, On-State Input, Max.	30V dc
Voltage, On-State Input, Nom.	24V dc
Digital Outputs	
Output Point Density	8
Current, On-State Output, Min.	2.5 mA
Current, On-State Output, per Channel	0.5 A per Channel (Channels 1 to 6) 2 A per Channel (Channels 7, 8)
Leakage Current, Off-State Output, Max.	1 mA per channel
Output Surge Current, Max.	1 A for 10 ms at 1 Hz (Channels 1 to 6) 4 A for 10 ms at 1 Hz (Channels 7, 8)
Voltage Drop, On-State Output, Max.	2.0V dc @ 500 mA
Voltage, On-State Output, Max.	26.8V dc
Voltage, On-State Output, Min.	18.4V dc
Voltage, On-State Output, Nom.	24V dc
Overload Protection	Output switches off until overload is eliminated.
Counters	
Number of Counters	2
Counter Input Current, Nom.	15 mA, ±3 mA
Counter Input Voltage Range	4.5…5.5V for 5V input 13…26.4V for 24V input
Counter Input Voltage, Nom.	5V or 24V
Counter Resolution, Bits	24 bits
Counting Frequency (kHz), Max.	100 kHz✶
Counter Trigger	Negative Edge
Edge Steepness	1 V/µs
Inputs per Counter	3 (Input A, Input B, Z/Gate/Reset)
General	
Dimensions (HxWxD), Metric	112 x 160 x 90 mm
Dimensions (HxWxD), Imperial	4.41 x 6.30 x 3.55 in
Weight, Metric	680 g
Weight, Imperial	1.50 lb

✶Input A in counter modes.

GuardPLC 1200 Controller Dimensions

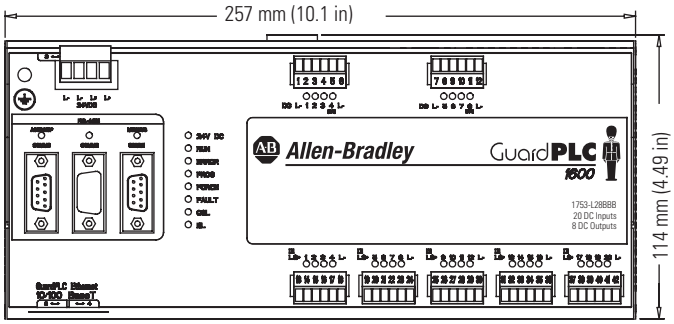


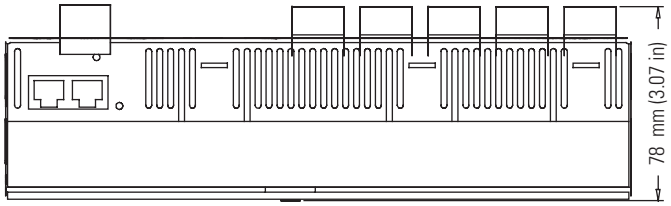
GuardPLC 1600 Controller Specifications

Cat. No.	1753-L28BBBM	1753-L28BBBP
Application Data Memory	250 Kbytes	
User Program Memory	250 Kbytes	
Available User Memory (Kbytes)	500 K bytes	
Safety Time, Min.	20 ms	
Watchdog Timeout, Min.	10 ms	
Current Consumption	8 A with maximum load 0.5 A idle current (controller only)	
Operating Voltage Range	24V dc, -15% to +20%, $w_{ss} \leq 15\%$✶	
Communication Ports	4 Ethernet 10/100BaseT ports 1 9-pin D-shell RS-485 port (Modbus Slave) 1 9-pin D-shell RS-485 port (GuardPLC ASCII/High-Speed Safety Protocol) 1 9-pin D-shell Comm port (unused)	4 Ethernet 10/100BaseT ports 1 9-pin D-shell RS-485 port (PROFIBUS DP Slave) 1 9-pin D-shell RS-485 port (GuardPLC ASCII/High-Speed Safety Protocol) 1 9-pin D-shell Comm port (unused)
Ethernet Interface	4 x RJ-45, 10/100BaseT (with 100 Mbit/s) with integrated switch	
EtherNet/IP Communication Rate	10/100 Mbps	
Enclosure Protection	IP20	
I/O Channel Isolation	Non-isolated	
Digital Inputs		
Number of Digital Inputs	20❄	
Input Filter Time, Nom.	100 µs	
Current, Off-State Input, Max.	1.5 mA (1 mA @ 5V)	
Current, On-State Input, Max.	7.5 mA @ 30V dc	
Current, On-State Input, Min.	2 mA @ 15V dc	
Voltage, On-State Input, Max.	30V dc	
Voltage, On-State Input, Nom.	24V dc	
Input Switching Point	7.5V, typical	
Digital Outputs		
Number of Digital Outputs	8❄	
Current, On-State Output, Min.	2 mA	
Current, On-State Output, per Channel	Channels 1…3; 5…7: 0.5 A @ 60 °C (140 °F) Channels 4 and 8: 1 A @ 60 °C (140 °F); 2 A @ 50 °C (122 °C)	
Leakage Current, Off-State Output, Max.	1 mA @ 2V	
Sensor Supply	5 x 20V / 100 mA @ 24V, short-circuit proof	
Surge Current per Output, Max.	1 A for 10 ms @ 1 Hz (Channels 1…3 and 5…7) 4 A for 10 ms @ 1 Hz (Channels 4 and 8)	
Voltage Drop, On-State Output, Max.	2.0V dc @ 2 A	
Voltage, On-State Output, Max.	26.8V dc	
Voltage, On-State Output, Min.	18.4V dc	
Voltage, On-State Output, Nom.	24V dc	
General		
Dimensions (HxWxD), Metric	114 x 257 x 78 mm‡	
Dimensions (HxWxD), Imperial	4.49 x 10.1 x 3.07 in‡	
Weight, Metric	1.2 kg	
Weight, Imperial	2.64 lb	

✶Requires a power supply with protective separation conforming to IEC 61131-2 requirements.
❄Not electrically isolated.
‡Height includes latch; width includes housing screws; depth includes grounding bolt and connectors.

GuardPLC 1600 Controller Dimensions





GuardPLC 1800 Controller Specifications

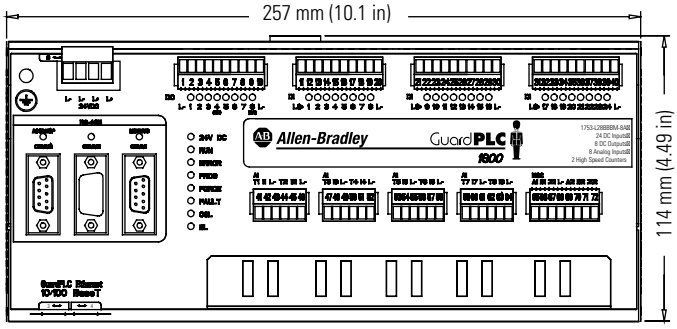
Cat. No.	1753-L32BBBM8A	1753-L32BBBP8A
Application Data Memory	250 Kbytes	
User Program Memory	250 Kbytes	
Available User Memory (Kbytes)	500 K bytes	
Safety Time, Min.	20 ms	
Watchdog Timeout, Min.	10 ms	
Current Consumption	9 A with maximum load 0.75 A idle current (controller only)	
Operating Voltage Range	24V dc, -15% to +20%, $w_{ss} \leq 15\%$✶	
Communication Ports	4 Ethernet 10/100BaseT ports 1 9-pin D-shell RS-485 port (Modbus Slave) 1 9-pin D-shell RS-485 port (GuardPLC ASCII/High-Speed Safety Protocol) 1 9-pin D-shell Comm port (unused)	4 Ethernet 10/100BaseT ports 1 9-pin D-shell RS-485 port (PROFIBUS DP Slave) 1 9-pin D-shell RS-485 port (GuardPLC ASCII/High-Speed Safety Protocol) 1 9-pin D-shell Comm port (unused)
Ethernet Interface	4 RJ-45	
EtherNet/IP Communication Rate	10/100 Mbps	
Enclosure Protection	IP20	
I/O Channel Isolation	Non-isolated	
Digital Inputs		
Number of Digital Inputs	24❄	
Current, Off-State Input, Max.	1.5 mA (1 mA @ 5V)	
Current, On-State Input, Max.	4.5 mA @ 30V dc, approximately	
Sensor Supply	20V / 100 mA, short-circuit proof	
Voltage, Off-State Input, Max.	5V dc	
Voltage, On-State Input, Max.	30V dc	
Voltage, On-State Input, Nom.	24V dc	
Input Resistance	<7 kΩ	
Input Cable Length, Max.	300 m (9.84 ft) for digital inputs	
Digital Outputs		
Number of Digital Outputs	8❄	
Current, On-State Output, Min.	2 mA	
Current, On-State Output, per Channel	Channels 1…3; 5…7: 0.5 A @ 60 °C (140 °F) Channels 4 and 8: 1 A @ 60 °C (140 °F); 2 A @ 50 °C (122 °C)	
Current, On-State Output, per Module	7 A max.	
Leakage Current, Off-State Output, Max.	1 mA @ 2V	
Surge Current per Output, Max.	1 A for 10 ms @ 1 Hz (Channels 1…3 and 5…7) 4 A for 10 ms @ 1 Hz (Channels 4 and 8)	
Voltage Drop, On-State Output, Max.	2.0V dc @ 2 A	
Voltage, On-State Output, Max.	Supply Voltage (L+)	
Voltage, On-State Output, Min.	Supply Voltage (L+) minus 2V	
Voltage, On-State Output, Nom.	24V dc	
Counters		
Number of Counters	2❄	
Counter Input Voltage Range	5V dc High signal: 4…6V 5V dc Low signal: 0…0.5V 24V dc High signal: 13…33V 24V dc Low signal: -3…5V	
Counter Input Voltage, Nom.	5V and 24V dc	
Counter Input Current, Nom.	1.4 mA @ 5V dc 6.5 mA @ 24V dc	
Counter Input Impedance	3.7 kΩ	
Counter Resolution, Bits	24 bits	
Counting Frequency (kHz), Max.	100 kHz	
Counter Trigger	Negative edge	
Edge Steepness	1 V/µs	
Inputs per Counter	3 (A, B, Z)	
Pulse Duty Factor	1:1	

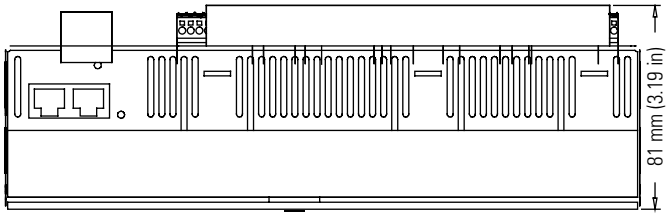
✶From a power supply with protective separation conforming to IEC 61131-2 requirements.

Cat. No.	1753-L32BBBM8A	1753-L32BBBP8A
Analog Inputs		
Number of Analog Inputs	8∗	
Impedance, Analog Input	1 MΩ	
Input Resolution, Bits	12-bit	
Input Signal Range	0…10V dc (nominal); -0.1…11.5V dc (service value) 0…20 mA (nominal); 0.4…23 mA (service value)❄	
Shunt Resistor, External	500 Ω for 0…20 mA current measurement	
Overvoltage Protection, Inputs	Digital Inputs: -10V, +35V Analog Inputs: -4V, +15V	
Analog Input Signal, Source Impedance	≤500 Ω	
Accuracy at 25 °C	0.1% @ 25 °C (77 °F)	
Accuracy at 60° C	0.5% @ 60 °C (140 °F)	
Safety Accuracy	± 2%	
Transmitter Supply Requirements	25.37 to 28.24V / ≤ 46 mA, short-circuit proof	
General		
Dimensions (HxWxD), Metric	114 x 257 x 81 mm‡	
Dimensions (HxWxD), Imperial	4.49 x 10.1 x 3.19 in‡	
Weight, Metric	1.2 kg	
Weight, Imperial	2.64 lb	

∗Unipolar, not electrically isolated.
❄With 500 Ω shunt.
‡Height including latch; width including housing screws; depth including grounding bolt and shield plate.

GuardPLC 1800 Controller Dimensions





GuardPLC 2000 Controller Specifications

Because the GuardPLC 2000 controller is a modular system, you must select a controller, chassis, power supply, and I/O modules. Use the following specification tables to help you decide which components to select for your application.

GuardPLC 2000 Controller

Cat. No.	1755-L1
Application Data Memory	500 Kbytes
User Program Memory	500 Kbytes
Available User Memory (Kbytes)	1000 K bytes
Communication Ports	1 Ethernet connector for RSLogix Guard PLUS! 2 ASCII connectors (RS-232)
Operating Voltage, Nominal	3.3V dc 5V dc
Ethernet Interface	RJ-45
EtherNet/IP Communication Rate	10/100 Mbps
Digital I/O, Max.	240
Analog I/O, Max.	48
I/O Total, Max.	240
Serial Port Connector	2 9-pin standard RS-232 connectors
Weight, Metric	280 g
Weight, Imperial	0.62 lb

Chassis

The GuardPLC chassis houses the GuardPLC 2000 controller, power supply, and up to six safety I/O modules. A filler module is also available for unused slots.

Cat. No.	1755-A6
Description	6-slot GuardPLC 2000 I/O Rack
Expansion Module Slots	6
Dimensions (HxWxD), Metric	255 x 285 x 210 mm
Dimensions (HxWxD), Imperial	10 x 11.2 x 8.3 in
Weight, Metric	3.3 kg
Weight, Imperial	7.3 lb
Mounting Type	Panel

Power Supply

The Power Supply module transforms the system supply voltage from 24V to 3.3V dc/5V dc (used for internal I/O bus). It occupies the left-most slot of the GuardPLC 2000 chassis. The power supply comes with a lithium battery, which has a four-year lifespan, that is used for back-up. Four LEDs indicate the power supply, battery voltage, and faults.

Cat. No.	1755-PB720
Description	GuardPLC 2000 Power Supply Module
Current Capacity (Amps) at 3.3V	10
Current Capacity (Amps) at 5V	2 A
Operating Voltage Range	20.4…28.8V dc (10 ms buffer), ripple ≤15%
Operating Voltage, Nominal	24V dc
Power Supply Output	10 A @ 3.3V dc 2 A @ 5V dc
External Fusing	30 A / IEC✶
Overcurrent Protection	None
Watchdog Timer	Yes
Replacement Battery	1755-BAT
Weight, Metric	820 g
Weight, Imperial	1.80 lb
Operating Temperature	0…60 °C (32…140 °F)
Storage Temperature	-40…60 °C (-40…140 °F) with battery -40…85 °C (-40…185 °F) without battery
TUV	TÜV Certified for Functional Safety.
CE	Compliant for all applicable directives.
C-Tick	Compliant for all applicable acts.
UL	UL Listed Industrial Control Equipment.

✶The supply can provide up to 30 A for I/O modules. Use an appropriate fuse for your system's power requirements.

Chassis-based Safety I/O

Safety-related inputs are automatically subjected to a high-grade, cyclical self-test in GuardPLC 2000 systems during operation. These test routines are TÜV approved and help ensure the safe function of the respective module. When an error is detected, the application is provided with a "0" signal, and a detailed error message is generated optionally. If there are minor failures in the module (no effect on the safety function), no user diagnostic information is generated.

- The GuardPLC 2000 digital I/O module, 1755-IB24XOB16, has 24 inputs and 16 outputs for signals, and the inputs and outputs are electrically isolated. In case of module error, the outputs are switched to the de-energized state.

- The eight channels on the analog input module, 1755-IF8, can be used as eight single-ended or four differential analog inputs for 0 to 10V or 0 to 20 mA signals. No mixing is allowed. The incoming signals are converted into an integer value with a 12-bit resolution. This value then can be used in the user program. In case of module error, the logic outputs of the modules are switched to the de-energized state.

- The analog output module, 1755-OB8, has eight analog outputs with a 12-bit resolution. They are electrically isolated in groups of two outputs with a common ground. The output ranges of the module can be switched to 0 to 21 mA, 0 to 10.25V dc or -10.25 to +10.25V dc. For each channel, the module has a switch placed on the printed circuit board to switch the different output ranges. In case of module error, the outputs are switched to the de-energized state.

- The counter module, 1755-HSC, has two operating modes: counter mode and decoder mode. The module has 24-bit counters with two outputs each. The counters can operate in both directions (up and down) and have a separate reset input. The input signals of 5V can be in a frequency range of 0 to 1 MHz. Use a PC to configure the input voltage, which can be 5V or in a range of 10 to 26.4V. In case of module error, the outputs are switched to the de-energized state. The counter can count pulses with direction and reset inputs up to 1 MHz. The counter module can also be used as an 8-bit gray code encoder.

GuardPLC 2000 24-input / 16-output Digital Combination Module

Cat. No.	1755-IB24XOB16
Number of Digital Inputs	24
Number of Digital Outputs	16
Backplane Current (mA) at 24V	500 mA
Backplane Current (mA) at 3.3V	300 mA
Input Filter Time, Nom.	100 µs
Current, Off-State Input, Max.	1.5 mA @ 5V
Current, On-State Input, Max.	13 mA @ 30V
Current, On-State Input, Min.	2 mA @ 10V
Current, On-State Output, Max.	2 A @ 30 °C
Operating Voltage Range	24V dc (-15%…+20%), ripple ≤5%
Voltage, Off-State Input, Max.	5V dc
Voltage, On-State Input, Max.	30V dc
Voltage, On-State Input, Min.	10V dc
Voltage, On-State Input, Nom.	24V dc
Voltage, On-State Output, Max.	Operating voltage minus 2V (depending on load)
Voltage, On-State Output, Nom.	24V dc
Weight, Metric	260 g
Weight, Imperial	0.57 lb

GuardPLC Safety Analog I/O Modules

Cat. No.	1755-IF8	1755-OF8
Description	GuardPLC 2000 8-input Analog I/O Module	GuardPLC 2000 8-output Analog I/O Module
Number of Analog Inputs	8 single-ended or 4 differential	—
Number of Analog Outputs	—	8
Backplane Current (mA) at 24V	400 mA	400 mA
Backplane Current (mA) at 3.3V	150 mA	150 mA
Operating Voltage Range	24V dc (-15%…+20%), ripple ≤ 15%	24V dc (-15%…+20%), ripple ≤15%
Overvoltage Protection	30V (±15V dc)	24V
Common Mode Voltage	±13V dc	—
Analog Input Signal, Source Impedance	≤500 Ω	—
Impedance, Analog Input	1 MΩ (DC)	—
Input Signal Range	0…±10V dc or 0…20 mA (with shunt) 0…±10.25V dc or 0…20.5 mA (with shunt)	—
Input Resolution, Bits	12 bit	—
Shunt Resistor, External	500 Ω (for current input)	—
Output Load Range	—	load ≤600 Ω (current) limit resistance >5 kΩ (voltage)
Output Signal Range	—	0…±10V or 0…20 mA
Source Value	—	UINT
Accuracy at 0…60 °C	0.5% @ 60 °C (140 °F)	0.5% @ 60 °C (140 °F)
Accuracy at 25 °C	0.1% @ 25 °C (77 °F)	0.3% @ 25 °C (77 °F)
Safety Accuracy	—	1%
Weight, Metric	240 g	280 g
Weight, Imperial	0.53 lb	0.62 lb

GuardPLC 2000 Safety High-Speed Counter Module

Cat. No.	1755-HSC
Number of Counters	2
Counting Frequency (kHz), Max.	1000 kHz
Number of Digital Outputs	4
Output Point Density	4
Backplane Current (mA) at 24V	100 mA✶
Backplane Current (mA) at 3.3V	800 mA
Backplane Current (mA) at 5V	100 mA
Current Consumption	0.1 A @ 24V dc (without load) 0.8 A @ 3.3V dc 0.1 A @ 5V dc
Overload Current, Max.	2 A @ 18V (all four outputs overloaded)❄
Current, On-State Output, Max.	500 mA
Counter Input Current, Nom.	≤3 mA
Counter Input Voltage, Nom.	5V or 24V
Operating Voltage Range	24V dc (-15%…+20%), ripple ≤15%
Voltage Drop, On-State Output, Max.	3V
Counter Trigger	Falling Edge
Edge Steepness	1V/µs
Input Resistance	3.7 kΩ
Input Resolution, Bits	24 bit (value range 0…16,777,215)
Accuracy of Time Base	0.2%
Cable Type	Input cables ≤500 m @ 100 kHz, shielded, twisted pair
Weight, Metric	260 g
Weight, Imperial	0.57 lb

✶Without load.
❄This is the level at which the outputs will switch off. With a supply voltage of 24V, the overload current will be slightly higher than 2A.

Step 6 - Select:

- *replacement batteries or cables*
- *record your selections in the Selection Record on page 46*

Select Replacement Parts

GuardPLC Replacement Parts

Cat. No.	Description
1754-BAT	Battery for GuardPLC 1200
1755-BAT	Battery for GuardPLC 2000
1753-CBLDN	Cable for 1753-DNSI to GuardPLC 1600/1800

Step 9 - Select:

- *all catalog numbers required for your system specification*

Fill in Your Selection Listing

Selection Record

Cat. No.	Description	Quantity Selected

Rockwell Automation Support

Rockwell Automation provides technical information on the web to assist you in using our products. At http://support.rockwellautomation.com, you can find technical manuals, a knowledge base of FAQs, technical and application notes, sample code and links to software service packs, and a MySupport feature that you can customize to make the best use of these tools.

For an additional level of technical phone support for installation, configuration and troubleshooting, we offer TechConnect Support programs. For more information, contact your local distributor or Rockwell Automation representative, or visit http://support.rockwellautomation.com.

Installation Assistance

If you experience a problem with a hardware module within the first 24 hours of installation, please review the information that is contained in this manual. You can also contact a special Customer Support number for initial help in getting your module up and running.

New Product Satisfaction Return

We test all of our products to ensure that they are fully operational when shipped from the manufacturing facility. However, if your product is not functioning and needs to be returned:

United States	1.440.646.3223 Monday - Friday, 8am - 5 pm EST
Outside United States	Please contact your local Rockwell Automation representative for any technical support issues.

www.rockwellautomation.com

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