



# GuardPLC™



**Distributed safety is here.**



**Rockwell  
Automation**

# Safety Is Good Business



Manufacturers and machine builders are constantly challenged with maintaining personnel safety while at the same time increasing productivity. Historically one has come at the price of the other. But, with today's evolution in safety solutions, it is now possible to balance the equation cost-effectively.

To achieve the balance, you need to work with a partner who understands your control and information challenges and has the breadth of safety solutions to solve them. Rockwell Automation has more than 100 years of experience in industrial automation and what is arguably the broadest range of safety products, systems, and services on the market today.

## Broad Range of Safety Solutions

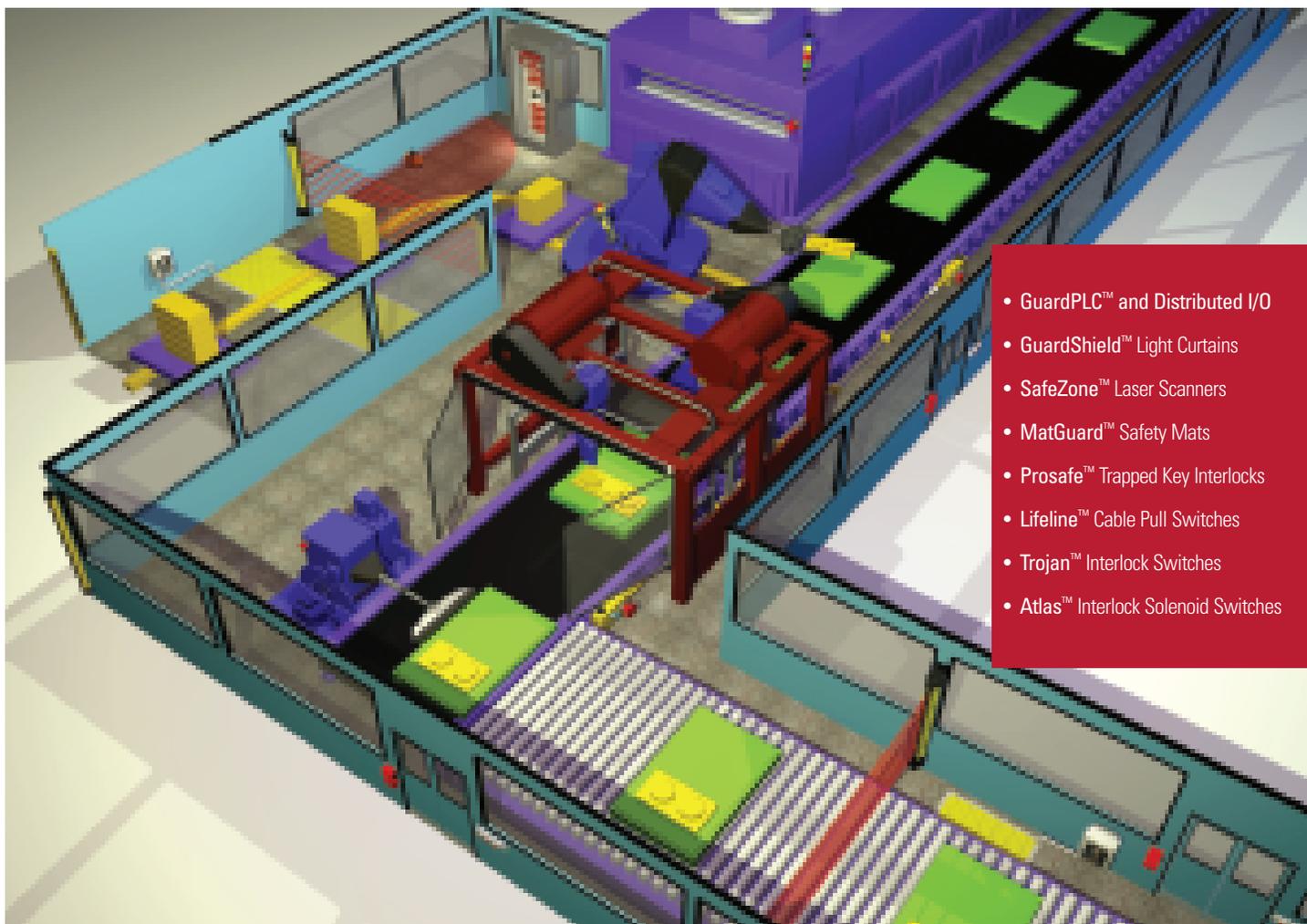
Rockwell Automation can offer you the full range of machine guarding solutions—from safety mats to light curtains, from two hand controls to laser scanners. All these are combined with a flexible set of logic control options, including safety relays, modular safety relays, and now

a world-class distributed safety control solution through the expanded GuardPLC family of safety PLCs.

GuardPLC controllers have the fastest throughput in the industry, and GuardPLC Ethernet is the fastest safety network available. This combination yields faster machine stop times, allowing you to mount your safety devices (light curtains, safety mats, etc.) closer to the point of operation, providing faster machine cycles, and allowing the machine to make more parts per shift.

## Primary Applications

Allen-Bradley safety solutions address a wide range of applications where safety is paramount, including robot weld/cell control, mechanical stamping press control, material handling systems, and packaging machines. In addition, Rockwell Automation can fulfill safety requirements for amusement rides, ski lifts, burner management, and safety/emergency shutdown systems.



*Manufacturing cell featuring the wide breadth of Rockwell Automation safety products.*

# GuardPLC 1600 and 1800



## GuardPLC 1600 and 1800



### GuardPLC 1600

Distributed safety is here with the arrival of the GuardPLC 1600. GuardPLC 1600 is a mainstream, cost-effective safety PLC offering a built-in 4 port Ethernet switch and digital I/O (20 safety rated inputs and 8 Category 4 outputs). 100M GuardPLC Ethernet comes standard, plus the GuardPLC 1600 offers additional communication options for flexibility in connecting to HMI devices and standard PLCs.

At 10 ms throughput, the GuardPLC 1600 is the fastest safety PLC in the industry. Its exceptionally high mean time between failures ensures your system is not only safe but also reliable. Removable terminal blocks make swapping controllers a quick task so operations can be up and running again quickly in the event of failure.

### GuardPLC 1800

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. Its eight safety rated analog inputs and two safety rated high speed counters allow the GuardPLC 1800 to expand beyond digital safety devices and sense field temperatures, pressure, speed, and motion. Like the GuardPLC 1600, 100M GuardPLC Ethernet comes standard, plus the GuardPLC 1800 offers additional communication options for flexibility in connecting to HMI devices and standard PLCs.

## Protecting Productivity with GuardPLC

GuardPLC

The GuardPLC system is a state of the art safety system that combines flexible safety-based programmable controllers and distributed I/O designed to meet a wide variety of safety applications with graphically oriented programming software certified to operate with Microsoft Windows® NT 4.0 or Windows 2000 Professional.

The GuardPLC system was designed in accordance with IEC 61131, the worldwide standard for programmable controls. It complies with many of the latest global safety standards and is certified by TÜV Rheinland in accordance with IEC 61508, the worldwide standard for functional safety in programmable electronic systems. GuardPLC 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
- distributed I/O modules
- GuardPLC Ethernet, a safe Ethernet communications network
- programming and configuration software

# Distributed I/O

## Distributed I/O



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

- 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

GuardPLC 100M Ethernet offers the fastest safety network and machine stop times in the industry. The built-in two-port Ethernet switches make connecting I/O blocks to the GuardPLC controller as easy as daisy chaining Category 5 cable from I/O block to controller. Three distributed I/O blocks (16 digital IN, 16 digital OUT, and 20/8 digital IN/OUT) provide considerable flexibility in configuring the right mix of I/O in the right place. The 16 digital input block offers four pulse test source terminals, allowing users to pulse test all 16 digital inputs right from the I/O block and providing Category 4 safety circuitry while retaining all the advantages of traditional distributed I/O. The 16 digital output block 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.

### Robotic Zone Control and Perimeter Guarding Applications

GuardPLC

A P P L I C A T I O N S

A manufacturing cell for welding automotive parts consists of 33 material handling and welding robots. Each of the 33 robots has an emergency stop push button, and there are 24 light curtains in the cell to detect the presence of operators and maintenance personnel.

Traditionally, if a person entered the cell during production, every robot in the cell would shut down. While safe, plant management became concerned about productivity because the manufacturing cell was not able to produce the required number of parts per week. Therefore, operators began to bypass the safety devices and enter the cell without the safety equipment in use.

Operators needed the ability to shut down only the parts of the cell where personnel were actually present, allowing other parts of the cell to continue to operate. Complex safety logic was needed. Enter the GuardPLC.

All 33 robots have a GuardPLC controller or distributed I/O block in their control panels, and the GuardPLCs and DIO communicate over GuardPLC Ethernet. Now, when a light curtain is interrupted, only the robots in the immediate vicinity of the operator are shut down, allowing the rest of the cell to continue to operate. But when an e-stop is pressed, all robots are shut down. The productivity gain allows the manufacturer to produce more parts while keeping workers safe.

# GuardPLC 1200 and 2000



## GuardPLC 1200

The GuardPLC 1200 is a safety rated, high performance compact programmable electronic system (PES) that, despite its small size, complies with the requirements for Category 4 and SIL 3 safety applications according to EN954 and IEC 61508.

The GuardPLC 1200 includes a power supply, CPU, watchdog, 20 digital inputs, 8 digital outputs, 2 high speed counters, and communication ports, all incorporated in a rugged plastic housing.

GuardPLC 1200 is designed for smaller applications that require functional safety and that can be served by a fixed number of I/O points. The compact size of the GuardPLC 1200 combined with DIN rail mounting allows it to be used even in applications where panel space is limited.

## GuardPLC 2000

The GuardPLC 2000 is a modular, safety rated, high performance programmable electronic system (PES) that is easily expanded and provides the ultimate in scaleable safety control systems. The GuardPLC 2000 system is also simple to program.

It complies with the requirements for Category 4 and SIL 3 safety applications according to EN954 and IEC 61508. Self-testing inputs and outputs together with a watchdog guarantee failsafe operation.

The GuardPLC 2000 controller consists of a rack, power supply, CPU with communication ports, and I/O modules. As many as six I/O modules may be added to the basic GuardPLC 2000, including digital input and output channels, analog input and output channels, and high speed counters. All I/O can be tested by the CPU to ensure system integrity. The GuardPLC 2000 can provide as many as 144 digital inputs and 96 digital outputs.



# GuardPLC Ethernet

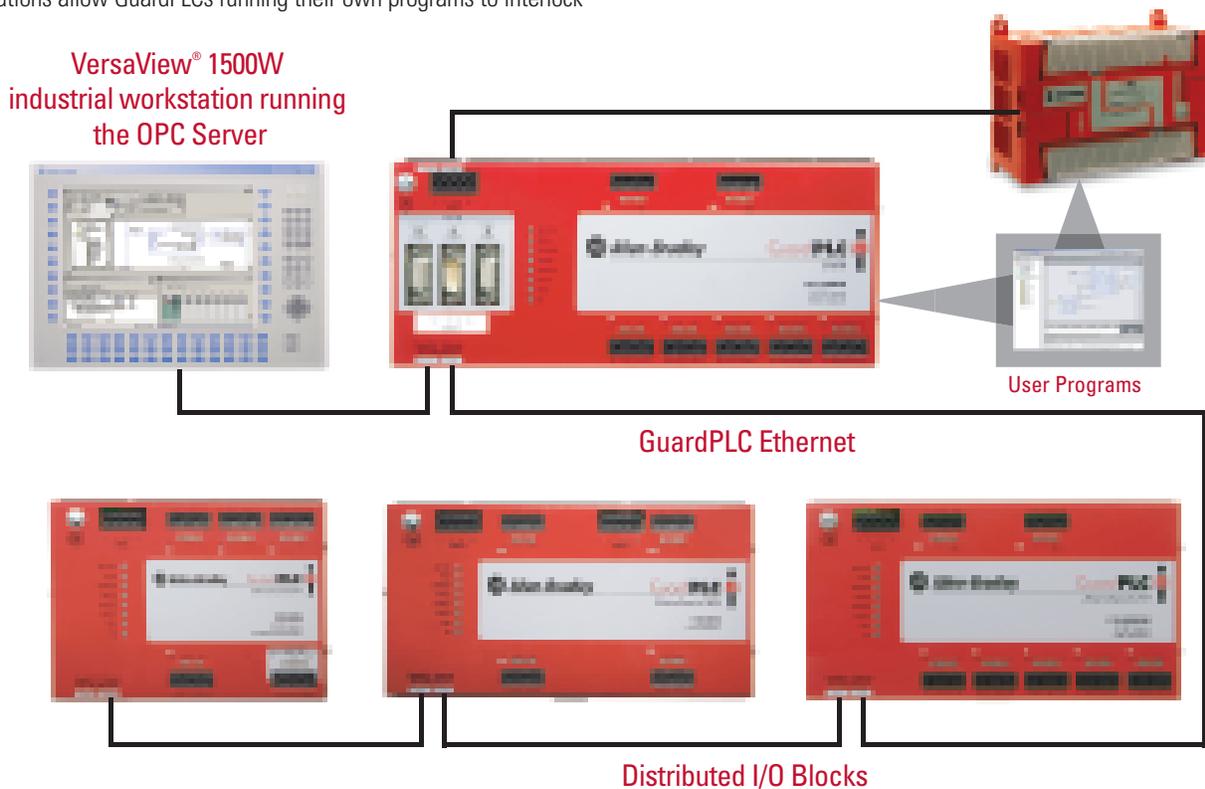


All GuardPLCs have the ability to communicate on a safe Ethernet communications network. The network is TÜV certified for use in safety applications up to EN954 Category 4 and IEC 61508 SIL 3 and is used for distributed I/O, peer-to-peer communications between GuardPLCs, and programming using RSLogix GuardPLUS! 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 GuardPLCs running their own programs to interlock

with each other for applications that need to link one manufacturing cell to others.

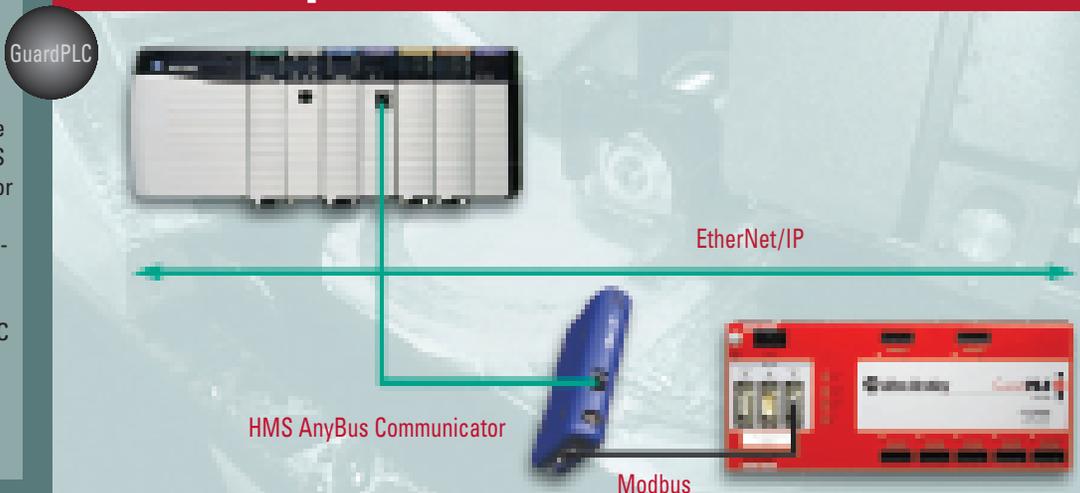
OPC server software allows a Windows-based PC to read data from and write data to the GuardPLC across the GuardPLC Ethernet network. For example, a VersaView computer could be running the GuardPLC OPC server and RSView, then could display status information from the GuardPLC, such as which e-stop has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



## GuardPLC Connection to NetLinX-Based Networks

Effective communication between safety and standard PLCs is essential. One simple way to accomplish this is by using an HMS AnyBus® Communicator. The Communicator acts as a communication bridge between Modbus on the GuardPLC and any NetLinX-based network (EtherNet/IP,™ DeviceNet,™ or ControlNet™). In this case, the ControlLogix processor can read data from the GuardPLC (such as which e-stop was pressed or which gate is open) and write non-safety data to the GuardPLC (circuit reset, fault reset, etc.).

## NetLinX Open Network Architecture



# RSLogix Guard™ PLUS!



Development and testing of programs for all GuardPLCs is done with RSLogix Guard PLUS!, an easy to use yet highly powerful programming software. RSLogix Guard PLUS! 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, OR-gates, 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:

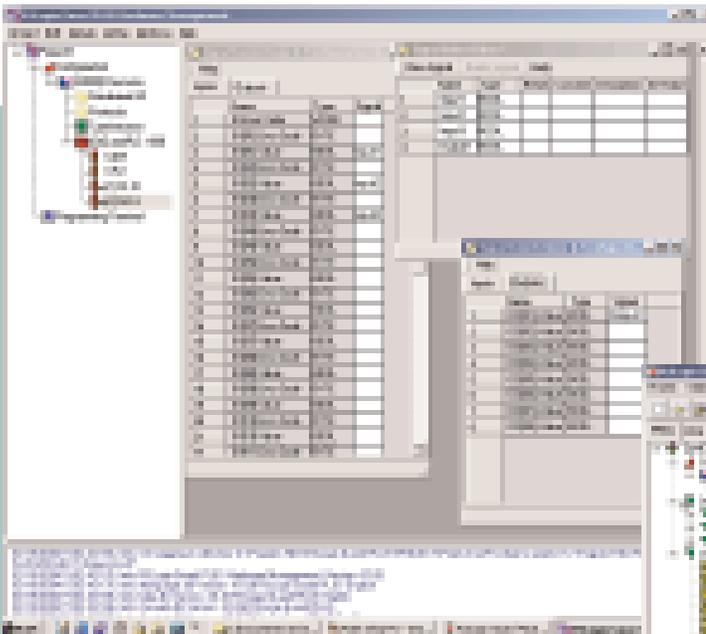
- e-stop
- light curtain
- two-hand run station
- redundant input
- pulse test output

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

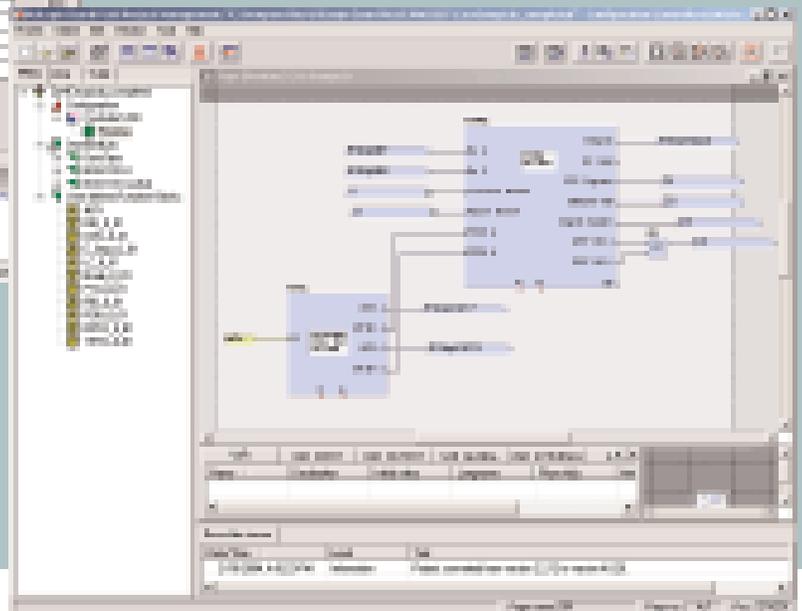
- Offline program simulation
- Online program monitoring
- Unlimited program pages
- Unlimited variables
- User-defined function blocks with library function
- Project-based controller linkage

Once RSLogix Guard PLUS! 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 and RSLogix 5000.

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



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



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



## Technical Specifications

<b>GuardPLC 1600</b> —Bulletin 1753	
Communications	100Mbaud GuardPLC Ethernet, Modbus RTU Slave, PROFIBUS Slave, ASCII
No. of Safety Inputs	20 (not electrically isolated)
Nominal Input Voltage	24VDC (15V-30V)
No. of Safety Outputs	8 (not electrically isolated)
Output Voltage Range	18.4V to 26.8V
Output Current	Channels 1 to 3 and 5 to 7: 0.5 A @ 60°C (140°F) Channels 4 and 8: 1 A @ 60°C (140°F); 2 A @ 50°C (122°C)
Width/Height/Depth	114Hx257Wx66D (mm) 4.49 x 10.1 x 2.6 in

<b>GuardPLC 1800</b> —Bulletin 1753	
Communications	100Mbaud GuardPLC Ethernet, Modbus RTU Slave, PROFIBUS Slave, ASCII
No. of Safety Inputs	24 (not electrically isolated)
Nominal Input Voltage	24VDC (15V-30V)
No. of Safety Outputs	8 (not electrically isolated)
Output Voltage Range	18.4V - 26.8V
Output Current	Channels 1 to 3 and 5 to 7: 0.5 A @ 60°C (140°F) Channels 4 and 8: 1 A @ 60°C (140°F); 2A @ 50°C (122°C)
Number of Safety Analog Inputs	8 (unipolar, not electrically isolated)
Input Signal	0 to +10V dc or 0 to +20 mA with 500 w/ shunt
Impedance	1 MOhm
Resolution	12-bit
Accuracy	0.1% @ 25°C (77°F)
Number of Safety Counters	2 (not electrically isolated)
Counter Resolution	24-bit
Max. Input Frequency	100 kHz
Resolution (A/D Converter)	12-bit
Accuracy	0.1% @ 25°C (77°F)
Width/Height/Depth	114Hx257Wx66D (mm) 4.49 x 10.1 x 2.6 in

<b>GuardPLC 1200</b> —Bulletin 1754	
Communications	100Mbaud GuardPLC Ethernet, ASCII
No. of Safety Digital Inputs	20 (not electrically isolated)
Nominal Input Voltage	24VDC (10V - 30V)
No. of Safety Digital Outputs	8 (not electrically isolated)
Output Voltage Range	18.4V to 26.8V
Output Current	0.5A per Channel (Channels 1 to 6) 2A per Channel (Channels 7, 8)
No. of Safety Counters	2

Counter Resolution	24 bit
Input Frequency	Max. 100kHz
Width/Height/Depth	90Hx160Wx87D (mm) 4.41 x 6.3 x 3.55 in

<b>GuardPLC 2000</b> —Bulletin 1755	
Communications	100Mbaud GuardPLC Ethernet, ASCII
No. of Safety Digital Inputs per Module	24 (electrically isolated)
Nominal Input Voltage	24VDC (10V - 30V)
No. of Safety Digital Outputs per Module	16 (electrically isolated with output signal read-back)
Output Voltage Range	18.4V to 26.8V
Output Current	2A per Channel max. 8A per Plug-in Module
No. of Safety Analog Inputs per Module	8 single ended or 4 differential (electrically isolated)
Input	0 – 10.25VDC, – 10.25VDC to +10.25DCV 0 – 20.5mA (with shunt)
Resolution	12 bit
Impedance	> 5kOhms
Accuracy	1%
No. of Safety Analog Outputs per Module	8 (electrically isolated; combined in four groups)
Output	0 – 10.25VDC, – 10.25VDC to +10.25VDC 0 – 21mA @ 600 Ohms
Resolution	12 bit
Impedance	< 600 Ohms
Accuracy	1%
No. of Safety Counters Per Module	2
Inputs per Counter	3 (Input A, Input B, Gate/Reset)
Counter Resolution	24 bit
Input Frequency	Max. 1MHz
No. of Digital Outputs	4
Output	18.4VDC – 26.8VDC @ 0.5A
Supply Voltage (L+)	24 V DC (+20/-15)%, < 15% ripple
Power Rating	30 A max.
Width/Height/Depth including mount tabs	278Hx208.5Wx202.75D (mm) 340H 11.2 x 10.0 x 8.3 in

<b>Common Specifications</b>	
Operating Voltage	20.4Vdc -28.8Vdc
Storage Temperature	-40°C to +85°C (-40°F to +185°F)
Operating Temperature	0°C to +60°C (+32°F to 140°F)

<b>Certifications</b>	
C-UL US; CE marked; C-Tick; TÜV functional safety 1002D (AK 1 to 6, SIL 1 to 3, according to DIN V 19250 and IEC 61508 respectively); Category 1 to 4, according to EN954-1	

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