



## **GuardPLC™ 1800 Controllers**

(Catalog Numbers 1753-L32BBBM-8A and 1753-L32BBBBP-8A)

<b>Inside.....</b>	<b>page</b>
Related Documentation .....	3
Description .....	4
European Communities (EC) Directive Compliance .....	4
General Safety .....	5
Mounting.....	5
Connecting the GuardPLC 1800 .....	6
Reset Pushbutton.....	7
Wiring the GuardPLC 1800 .....	8
Controller Tests.....	19
Troubleshooting with LED Indicators .....	20
Specifications .....	22

**Important User Information**

Solid state equipment has operational characteristics differing from those of electromechanical equipment. *Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls* (Publication SGI-1.1 available from your local Rockwell Automation sales office or online at <http://www.ab.com/manuals/gi>) describes some important differences between solid state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.



The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

No patent liability is assumed by Rockwell Automation, Inc. with respect to use of information, circuits, equipment, or software described in this manual.

Reproduction of the contents of this manual, in whole or in part, without written permission of Rockwell Automation, Inc. is prohibited.

Throughout this manual we use notes to make you aware of safety considerations.

---

<p><b>WARNING</b></p> 	<p>Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.</p>
<p><b>IMPORTANT</b></p>	<p>Identifies information that is critical for successful application and understanding of the product.</p>
<p><b>ATTENTION</b></p> 	<p>Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you:</p> <ul style="list-style-type: none"><li>• identify a hazard</li><li>• avoid a hazard</li><li>• recognize the consequence</li></ul>

---

## Related Documentation

The table below provides a listing of publications that contain important information about GuardPLC Controller systems.

For	Read this document	Publication number
Detailed information regarding the safety certification of the GuardPLC System.	<i>GuardPLC Systems Safety Reference Manual</i>	1753-RM001
Detailed information on installing, wiring, configuring, operating, maintaining, and troubleshooting GuardPLC systems.	<i>GuardPLC Systems User Manual</i>	1753-UM001
Information on installing GuardPLC 1600 controllers	<i>GuardPLC 1600 Controller Installation Instructions</i>	1753-IN001
Information on installing GuardPLC 1753-IB20XOB8 Digital I/O Module	<i>GuardPLC Digital I/O Module Installation Instructions</i>	1753-IN003
Information on installing GuardPLC 1753-IB16 Digital Input Module	<i>GuardPLC Digital Input Module Installation Instructions</i>	1753-IN004
Information on installing GuardPLC 1753-OB16 Digital Output Module	<i>GuardPLC Digital Output Module Installation Instructions</i>	1753-IN005

If you would like a manual, you can:

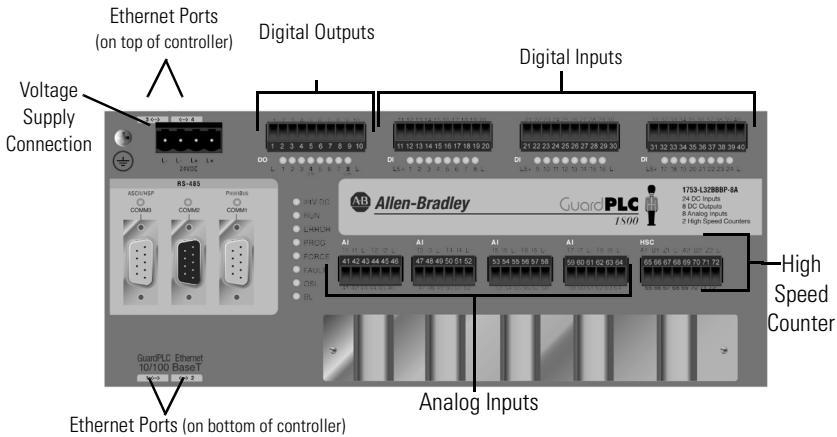
- download a free electronic version from the internet at **www.theautomationbookstore.com**
- purchase a printed manual by:
  - contacting your local distributor or Rockwell Automation representative
  - visiting **www.theautomationbookstore.com** and placing your order
  - calling 1.800.963.9548 (USA/Canada) or 001.330.725.1574 (Outside USA/Canada)

### IMPORTANT

For planning information, see the *Industrial Automation Wiring and Grounding Guidelines*, publication 1770-4.1.

## Description

The GuardPLC 1800 controller is a compact Programmable Electronic system featuring 24 digital inputs, 8 digital outputs, 2 counters, and 8 analog inputs.



## European Communities (EC) Directive Compliance

If this product has the CE mark it is approved for installation within the European Union and EEA regions. It has been designed and tested to meet the following directives.

### EMC Directive

This product is tested to meet the Council Directive 89/336/EEC Electromagnetic Compatibility (EMC) by applying the following standards, in whole or in part:

- EN 50081-2 EMC — Generic Emission Standard, Part 2 — Industrial Environment
- EN 50082-2 EMC — Generic Immunity Standard, Part 2 — Industrial Environment
- EN 61131-2 — Programmable Controllers, Part 2 — Equipment Requirements and Tests
- EN 61000-6-2 EMC — Part 6-2, Generic Standards — Immunity for Industrial Environments

This product is intended for use in an industrial environment.

## Low Voltage Directive

The power supply of the GuardPLC controller must meet Council Directive 73/23/EEC Low Voltage, by applying the requirements of EN 61131-2 Programmable Controllers, Part 2 - Equipment Requirements and Tests, as well as either of the following:

- EN 60950 - SELV (Safety Extra Low Voltage)
- EN 60204 - PELV (Protective Extra Low Voltage)

## General Safety

Open-style devices must be provided with environmental and safety protection by proper mounting in enclosures designed for specific application conditions. See NEMA standards publication 250 and IEC publication 60529, as applicable, for explanations of the degrees of protection provided by different types of enclosure.

## Mounting

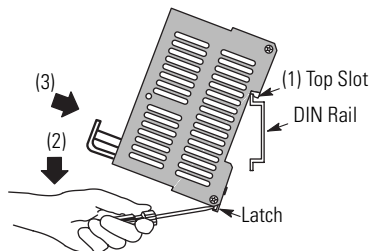
### IMPORTANT

For effective cooling:

- Mount the controller horizontally.
- Provide a gap of at least 100 mm above and below the controller.
- Select a location where air flows freely or use an additional fan.
- Do not mount the controller over a heating device.

The GuardPLC 1800 cannot be panel-mounted. Mount the GuardPLC 1800 controller to a DIN rail by following the four steps below.

1. Hook the top slot over the DIN rail.
2. Insert a flathead screwdriver into the gap between the housing and the latch and pull the latch downward.
3. Hold the latch down as you push the housing back onto the DIN rail.



4. Release the latch to lock the device onto the rail.

**TIP**

To remove the controller from the DIN rail, insert a flathead screwdriver into the gap between the housing and the latch and pull the latch downward as you lift the controller off of the rail.

## Connecting the GuardPLC 1800

The controller has four 10/100BaseT, RJ-45 connectors to provide communications via GuardPLC Ethernet to distributed I/O and other GuardPLC controllers, OLE for Process Control (OPC) servers, and with the programming software. Connectors 1 and 2 are located on the bottom side on the left. Connectors 3 and 4 are located on the top side on the left. All four connectors and the GuardPLC processor are connected together by an internal Ethernet switch. The switches are auto-detect. Either cross-over or straight-through Ethernet cabling can be used.

Star or line configurations are available. Make sure that a network loop is not generated. Data packets must only be able to reach a node via a single path.

### *OPC Server*

The GuardPLC 1800 is an OPC client. An OPC server, catalog number 1753-OPC, is available from Rockwell Automation and allows PC applications to read and write data to and from the GuardPLC.

### *MAC Address*

The Media Access Control (MAC) Address of the controller can be found on the label positioned over both lower RJ-45 connections.

## Connections for Non-Safety-Related Communications

Three 9-pin D-shell connectors are located on the front of the controller, providing the following communications:

Designation	Function
COMM1 (RS-485)	Modbus Slave (1753-L32BBB-M) Profibus-DP-Slave (1753-L32BBB-P)
COMM2	TBD
COMM3 (RS-485)	GuardPLC ASCII Protocol

### Pin Assignments of D-shell Connector

The pin assignments of the D-shell connector are as follows:

Connection	Signal	Function
1	—	—
2	RP	5V, decoupled with diodes
3	RxD/TxD-A	Receive/Transmit data A
4	CNTR-A	Control signal A
5	DGND	Data reference potential
6	VP	5V, positive pole of supply voltage
7	—	—
8	RxD/TxD-B	Receive/Transmit data B
9	CNTR-B	Control signal B

### IP Address and System ID (SRS)

A transparent label provided with the controller can be used to note the IP Address and system ID (SRS). The default value for the IP Address is 192.168.0.99. The default SRS is 60000. Do not cover the ventilation slots when attaching the label to the controller housing.

## Reset Pushbutton

The controller is equipped with a reset pushbutton. Reset via the pushbutton is necessary if you forget the password for connecting the programming software. The pushbutton is accessible through a small round hole at the top of the housing, approximately 4 to 5 cm (1.6 to 2.0 in.) from the left rim and recessed approximately 9.5 mm (0.375 in.).

### **IMPORTANT**

Activate the reset pushbutton using an insulated pin to prevent short-circuits.

To reset, press and hold the pushbutton for 20 seconds while rebooting the controller by cycling power. Pressing the Reset pushbutton during operation has no affect.

During reset:

- all accounts are deleted, except the default “Administrator” account
- IP address and system ID (SRS) are set to their default values

## Wiring the GuardPLC 1800

### Preventing Electrostatic Discharge

---

#### ATTENTION



Electrostatic discharge can damage integrated circuits or semiconductors. Follow these guidelines when you handle the module:

- Touch a grounded object to discharge static potential.
  - Wear an approved wrist-strap grounding device.
  - If available, use a static-safe workstation.
  - When not in use, keep the GuardPLC controller in its static-shield box.
- 

### Grounding

The controller is grounded through its DIN rail connection and through a separate grounding screw, located on the upper left of the housing and marked with the grounding symbol  $\oplus$ . To improve EMC conditions, ground the housing. Keep connection to earth ground as short as possible.

You must also provide an acceptable grounding path for each device in your application. For more information on proper grounding guidelines, refer to the *Industrial Automation Wiring and Grounding Guidelines*, publication number 1770-4.1.

### Connecting the Voltage Supply

The 24V dc voltage supply must feature galvanic isolation (in accordance with EN 60950 or UL 1950) since inputs and outputs are not electrically isolated from the processor. It must also meet the requirements of the Safety Extra Low Voltage (SELV – EN 60950) and Protective Extra Low Voltage (PELV – EN 60204) guidelines.

---

#### IMPORTANT

Protect the controller with a slow-blowing fuse.

---

#### IMPORTANT

The GuardPLC 1800 can draw up to 9A. 1A is needed to operate the controller. Up to 8A can be used to source voltage power for inputs and outputs connected to the 1800.

---



The supply voltage is connected via a 4-pin connector which accommodates wire sizes up to 2.5 mm<sup>2</sup> (14AWG). You only need to connect one wire to L+ and one wire to L-. Both L+ and L- terminals are internally connected, so you can daisy-chain 24V dc power from the GuardPLC to other devices in the panel.

**ATTENTION**

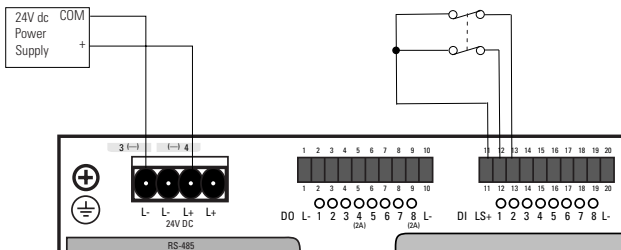
Do not reverse the L+ and L- terminals or damage to the controller will result. There is no reverse polarity protection.



## Safety-Related Digital Inputs

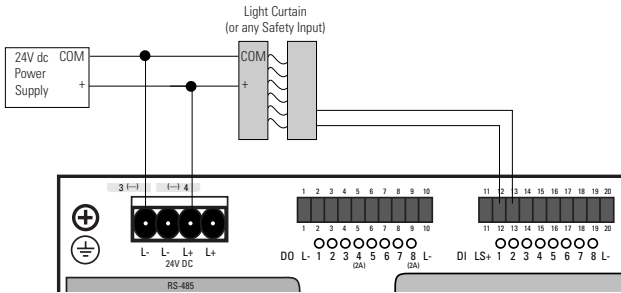
The controller has 24 digital inputs whose status is indicated via LEDs when the controller is in RUN mode.

LS+ is a voltage source that provides 24V dc for a group of eight dry contact inputs. There are three groups on the GuardPLC 1800.



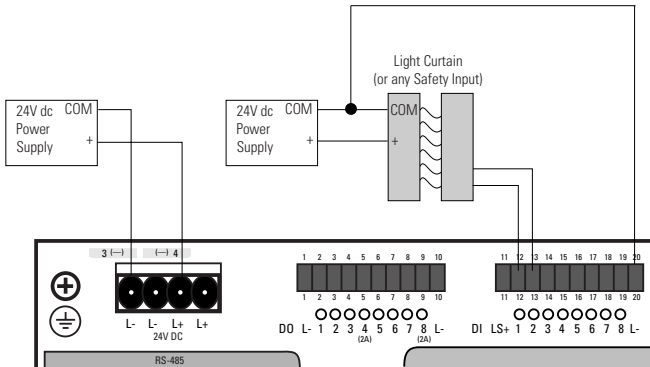
Connection of Voltage Supply to Input Device

If devices require 24V dc to operate and use the same power source as the GuardPLC, then wire the outputs of the device directly to inputs on the GuardPLC.



Connection of Voltage Supply to Input Device

Devices with their own dedicated power supply can also be connected. Connect the reference pole of the external power supply to the L- reference pole of the input.

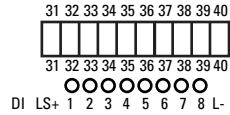
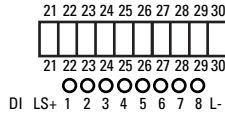
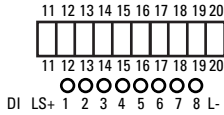


Connection of Devices with Dedicated Power Supplies

The safe state of an input is indicated by a 0 signal being passed to the user program logic. If the test routines detect a fault in the digital inputs, a 0-signal is processed in the user program for the defective channel. When a fault occurs, the inputs are switched off (0).

Follow the closed-circuit principle for external wiring when connecting sensors. To create a safe state in the event of a fault, the input signals revert to the de-energized state (0). The “FAULT” LED activates.

### Digital Input Terminals



Terminals accommodate wires up to 1.5 mm<sup>2</sup> (16 AWG). Digital inputs are connected to the following terminals:

Terminal Number	Designation	Function
11	LS+	Sensor supply for inputs 1 to 8
12	1	Digital input 1
13	2	Digital input 2
14	3	Digital input 3
15	4	Digital input 4
16	5	Digital input 5
17	6	Digital input 6
18	7	Digital input 7
19	8	Digital input 8
20	L-	Reference pole
21	LS+	Sensor supply for inputs 9 to 16
22	9	Digital input 9
23	10	Digital input 10
24	11	Digital input 11
25	12	Digital input 12
26	13	Digital input 13
27	14	Digital input 14
28	15	Digital input 15
29	16	Digital input 16
30	L-	Reference pole
31	LS+	Sensor supply for inputs 17 to 24
32	17	Digital input 17
33	18	Digital input 18
34	19	Digital input 19
35	20	Digital input 20
36	21	Digital input 21
37	22	Digital input 22
38	23	Digital input 23
39	24	Digital input 24
40	L-	Reference pole

LS+, not L+, should be used for short-circuit protection. Each LS+ features individual short-circuit and EMC protection that make it important to use LS+ for only it's eight related inputs.

## Line Control

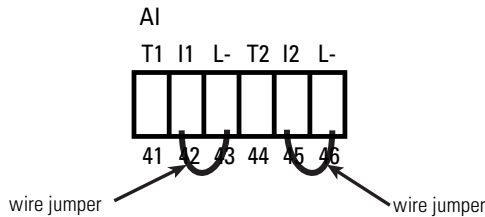
The short-circuit and line break monitoring system (e.g. E-Stop inputs) cannot be configured for the GuardPLC 1800 controller. This is due to the fact that the 24 discrete inputs are actually analog inputs with a resolution of one bit.

## Safety-Related Analog Inputs

The controller has 8 analog inputs with transmitter supplies for the unipolar measurement of voltages from 0 to 10V, referenced to L-. A 10 k $\Omega$  shunt is used for single-ended voltage signals. With a 500  $\Omega$  shunt resistor, currents from 0 to 20 mA can also be measured.

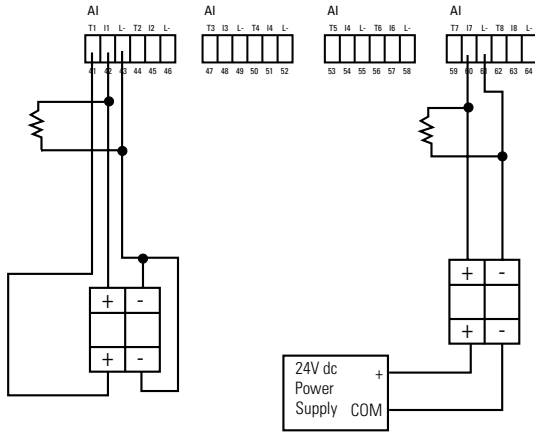
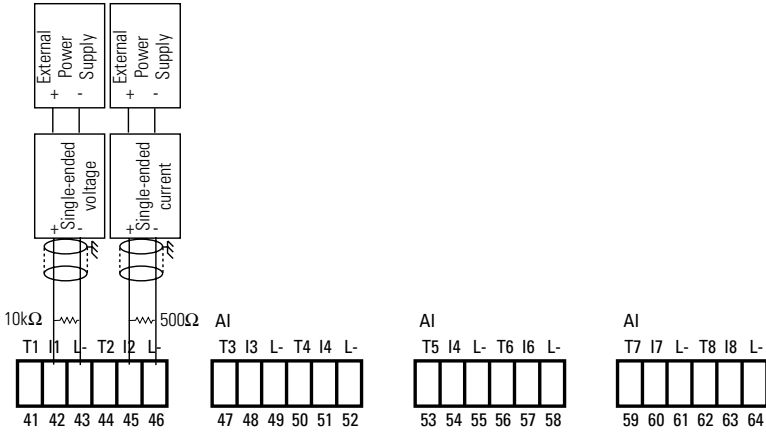
The feeder lines should be no more than 300 m (284 ft.) in length. Use shielded, twisted-pair cables, with the shields connected at both ends, for each measurement input.

Unused analog inputs must be short-circuited. Place wire jumpers into any inputs that are not used.



## Analog Input Terminals

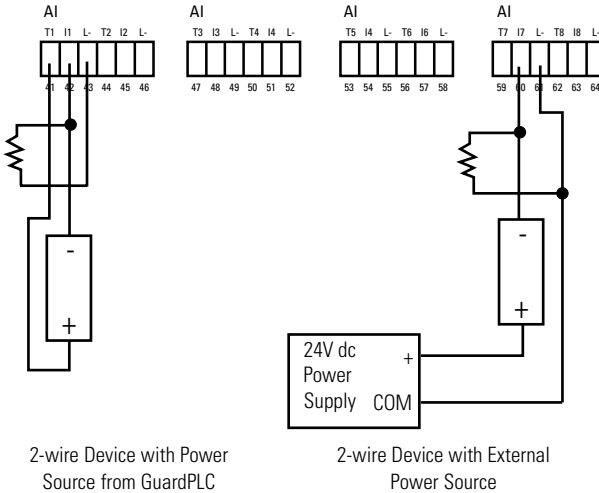
GuardPLC 1800 with a 4-wire device:



4-wire Device with Power Source from GuardPLC

4-wire Device with External Power Source

GuardPLC 1800 with a 2-Wire Device:



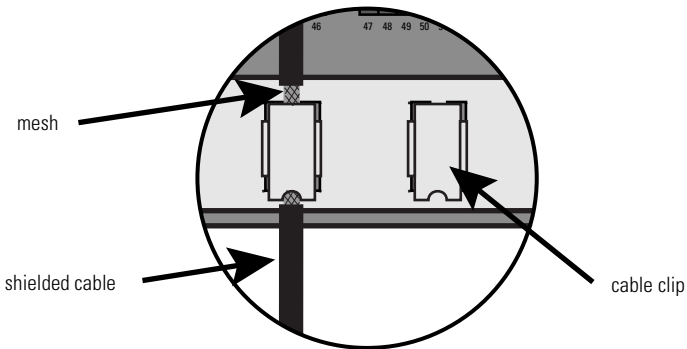
Terminals accommodate wires up to 1.5 mm<sup>2</sup> (16 AWG). The analog inputs are connected to the following terminals:

Terminal Number	Designation	Function
41	T1	Transmitter supply 1
42	I1	Analog input 1
43	L-	Reference pole
44	T2	Transmitter supply 2
45	I2	Analog input 2
46	L-	Reference pole
47	T3	Transmitter supply 3
48	I3	Analog input 3
49	L-	Reference pole
50	T4	Transmitter supply 4
51	I4	Analog input 4
52	L-	Reference pole
53	T5	Transmitter supply 5
54	I5	Analog input 5
55	L-	Reference pole
56	T6	Transmitter supply 6
57	I6	Analog input 6
58	L-	Reference pole

Terminal Number	Designation	Function
59	T7	Transmitter supply 7
60	I7	Analog input 7
61	L-	Reference pole
62	T8	Transmitter supply 8
63	I8	Analog input 8
64	L-	Reference pole

### Connecting the I/O Circuits

The I/O circuits are connected to the front plate of the controller using pluggable terminals. For controls with analog inputs, shielded cabling is fed in from below so that the shielding can be connected to the shield contact plate using a clip. Remove about 2 cm of the outer cable insulation so that the mesh is exposed at the point where the cable is clipped to the plate. Position the clip over the uninsulated cable shielding and push it into the slots of the shield contact plate until it fits firmly in place, as shown below.



#### **IMPORTANT**

Make sure that the mesh comes in direct contact with the shield contact plate. If the mesh does not touch the plate, the cable is not grounded.

### Safety-Related Digital Outputs

The controller has 8 digital outputs (DO1 to DO8) whose status is indicated via LEDs.

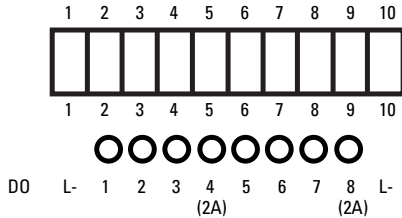
An output is in a safe state when it is de-energized. When a fault occurs, all outputs are switched off.

Outputs 1 to 3 and 5 to 7 can have a load of 0.5A at an ambient temperature of 60°C (140°F). Outputs 4 and 8 can each have a load of 1A or up to 2A at an ambient temperature of 50°C (122°F).

With an overload, one or all of the outputs are turned off. When the overload is eliminated, the outputs are activated again according to the specified value.

Although the external line of an output is not monitored, a short-circuit will be indicated.

*Digital Output Terminals*



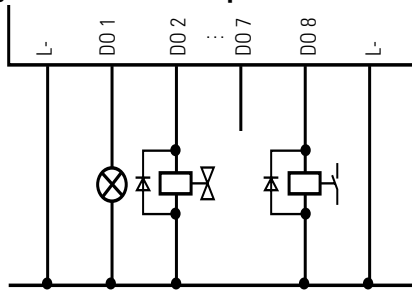
Terminals accommodate wires up to 1.5 mm<sup>2</sup> (16 AWG). Digital outputs are connected to the following terminals:

Terminal Number	Designation	Function	Current
1	L-	Reference pole	—
2	1	Digital output 1	0.5A
3	2	Digital output 2	0.5A
4	3	Digital output 3	0.5A
5	4	Digital output 4 (for increased load)	2.0A
6	5	Digital output 5	0.5A
7	6	Digital output 6	0.5A
8	7	Digital output 7	0.5A
9	8	Digital output 8 (for increased load)	2.0A
10	L-	Reference pole	—

For connection of a load, the reference pole L- of the concerned channel group must be used (2-pole connection). Although L- at terminals 1/6, 7/12 is connected internally to L- on the power supply input, it is strictly recommended to use 1 and 6 for outputs 1 through 4 only and 7 and 12 for outputs 5 through 8 only. EMC testing was performed in this manner.



### Example: Connecting Actuators to the Outputs



#### TIP

Inductive loads can be connected without a protection diode on the load. However, Rockwell Automation strongly recommends that a protection diode be fitted directly to the load to suppress any interference voltage. A 1N4004 diode is recommended.

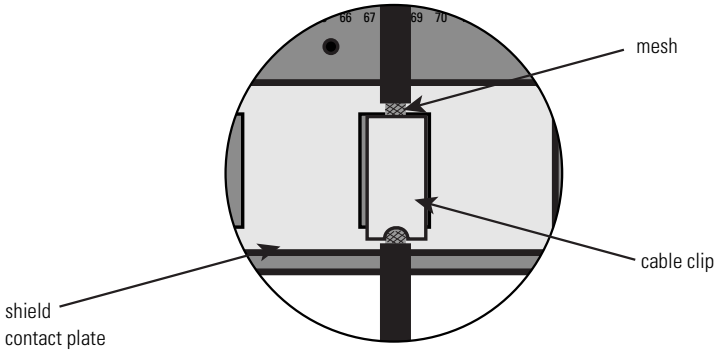
### High-Speed Counter Connections

The controller features 2 independent high-speed counters. Both counters are 24-bit, are configured for either 5V or 24V dc, and have a maximum input frequency of 100 KHz.

The counters can be used as a counter or as a decoder for 3-bit Gray Code inputs. As a counter, input A is the counter input, input B is the counter direction input, and input Z is used for a reset.

The counter inputs must be connected using shielded, twisted-pair cables for each measurement input. The shields must be connected at both ends. The input lines should be no more than 500 m in length. All L- connections are internally connected on the controller.

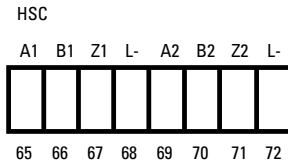
Cables are clipped to the shield contact plate when connecting counter inputs. Remove about 2 cm (0.78 in.) of the outer cable insulation so that the mesh is exposed at the point where the cable is clipped to the plate.



**IMPORTANT**

Make sure that the mesh comes in direct contact with the shield contact plate. If the mesh does not touch the plate, the cable is not grounded.

*High Speed Counter Terminals*



Terminals accommodate wires up to 1.5 mm<sup>2</sup> (16 AWG). Counters are connected to the following terminals:

Terminal Number	Designation	Counter Function	Gray Code Function
65	A1	Input A1	bit 0 (LSB)
66	B1	Input B1	bit 1
67	Z1	Input Z1	bit 2 (MSB)
68	L-	Common reference pole	
69	A2	Input A2	bit 0 (LSB)
70	B2	Input B2	bit 1
71	Z2	Input Z2	bit 2 (MSB)
72	L-	Common reference pole	

**IMPORTANT**

Do not terminate unused inputs.

**TIP**

For more information on GuardPLC system wiring and counter configuration, see the *GuardPLC™ System User Manual*, publication 1753-UM001.

## Controller Tests

In addition to the tests for safety, the controller tests the supply voltage and controller temperature.

### Supply Voltage Tests

The supply voltage (24V dc) is monitored and the alarm and system shutdown are controlled according to the voltage levels listed below.

Voltage Level	System Condition
19.3 to 28.8V	Normal
< 19.3V	alarm state 1 (internal variables are written)
< 15.4V	alarm state 2 (prepares for shutdown)
< 13.0V	switched off

### Temperature Tests

The temperature of the controller is automatically and continuously monitored. The alarm is triggered by the temperature conditions described in the table below.

Operating Temperature	Alarm
< 60°C (140°F)	None (normal)
60° C to 70°C (140°F to 158°F)	Warning ON
> 70°C (158°F)	Main Alarm ON
return to 64°C to 54°C (147.2°F to 129.2°F)	Main Alarm OFF, Warning ON
return to < 54°C (129.2°F)	None (return to normal)

## Troubleshooting with LED Indicators

Indicator	State	Condition
24V dc	On	24V dc operating voltage present.
	Off	No operating voltage.
RUN	On	This is the normal status of the controller. A routine, which has been loaded into the controller, is executed. The controller processes input and output signals, carries out communication and performs hardware and software tests.
	Flashing	The controller is in STOP mode and is not executing a routine. All system outputs are reset. STOP mode can be triggered by setting the <i>Emergency stop</i> system variable to TRUE in the routine, or by direct command from the programming software.
	Off	The controller is in ERROR_STOP (see ERROR).
ERROR	On	<ul style="list-style-type: none"> <li>A hardware error has been detected by the controller. The controller goes to ERROR_STOP and the execution of the routine is halted. Hardware errors are errors in the controller, errors in one or more of the digital input and output modules, or errors in the counters.</li> <li>A software error in the operating system has been detected by the controller.</li> <li>The watchdog has reported an error due to exceeded cycle time.</li> </ul> All system outputs will be reset and the controller ceases all hardware and software tests. The controller can only be restarted by a command from the programming software.
	Off	No errors are detected.
PROGRESS	On	The upload of a new controller configuration is in progress.
	Flashing	The upload of a new operating system into the Flash ROM is in progress.
	Off	No upload of controller configuration or operating system in progress.
FORCE	On	The controller is executing a routine (RUN) and FORCE mode is activated by the user.
	Flashing	The controller is in STOP, but Forcing has been initiated and will be activated when the controller is started.
	Off	Forcing is OFF.
FAULT	On	<ul style="list-style-type: none"> <li>The routine (logic) has caused an error.</li> <li>The controller configuration is faulty.</li> <li>The upload of a new operating system was not successful and the operating system is corrupted.</li> </ul>
	Flashing	An error has occurred during a Flash ROM write cycle. One or more I/O errors have occurred.
	Off	None of the above errors has occurred.
OSL	Flashing	Emergency Operating System Loader is active.
BL	Flashing	Boot Loader unable to load operating system or unable to start COMM operating system loader.

Controller status can be interrogated through the programming software. For more information, refer to the *GuardPLC™ System User Manual* (1753-UM001).

## Communication Display

Communication via GuardPLC Ethernet is indicated by two small LEDs integrated into all connecting sockets.

LED	Status	Condition
Green	On	Full-duplex operation
	Flashing	Collision
	Off	Half-duplex operation, no collision
Yellow	On	Connection established
	Flashing	Interface activity

Additional non-safety related communication occurs on the field buses and is indicated by the LEDs.

LED	Connection	Condition
Green	COMM 1	RS485 interface, field bus active
	COMM 2	Unassigned
	COMM 3	Unassigned

## Specifications

<b>Controller</b>	
User Memory	max. 250 KB user program memory max. 250 KB application data memory
Minimum Watchdog Time	10 ms
Minimum Safety Time	20 ms
Current Consumption	max. 9 A (with max. load) 0.75 A idle current
Operating Voltage	24V dc, -15% to +20%, $w_{ss} \leq 15\%$ (from a power supply with protective separation conforming to IEC 61131-2 requirements)
Protection	IP 20
<b>Digital Inputs</b>	
No. of Inputs	24 (not electrically isolated)
On State	Voltage: 15V to 30V dc Current Consumption: approximately 3.5 mA @ 24V dc Current Consumption: approximately 4.5 mA @ 30V dc
Off State	Voltage: max. 5V dc Current Consumption: max. 1.5 mA (1 mA @ 5V dc)
Input Resistance	< 7k $\Omega$
Overvoltage Protection	-10V, +35V
Max. line length	300 m (9.8 ft.)
Supply	20V / 100 mA, short-circuit proof
<b>Digital Outputs</b>	
No. of Outputs	8 (not electrically isolated)
Output Voltage Range	$\geq L+$ minus 2V
Output Current	Channels 1 to 3 and 5 to 7: 0.5 A @ 60°C (140°F) Channels 4 and 8: 1A @ 60°C (140°F); 2A @ 50°C (122°C)
Surge Current per Channel	1A for 10ms @ 1Hz (Channels 1 to 3 and 5 to 7) 4A for 10ms @ 1Hz (Channels 4 and 8)
Minimum Current Load	2 mA per Channel
Internal Voltage Drop	max. 2.0V dc @ 2 A
Off-State Leakage Current	max. 1mA @ 2V
Total Output Current	max. 7 A

## Specifications (continued)

### Counters

Number of Counters	2 (not electrically isolated)
Inputs	3 per counter (A, B, Z)
Input Voltages	5V and 24V dc  High signal (5V dc): 4V to 6V High signal (24V dc): 13V to 33V Low signal (5V dc): 0V to 0.5V Low signal (24V dc): -3V to 5V
Input Currents	1.4 mA @ 5V dc 6.5 ma @ 24V dc
Input Impedance	3.7 k $\Omega$
Counter Resolution	24-bit
Max. Input Frequency	100 kHz
Triggered	on negative edge
Edge Steepness	1 V/ $\mu$ s
Pulse Duty Factor	1:1

### Analog Inputs

Number of Inputs	8 (unipolar, not electrically isolated)
External Shunt (for current measurement)	500 $\Omega$ for 0 to 20 mA
Input values related to L-	Nominal Value: 0 to +10V dc or 0 to +20 mA with 500 $\Omega$ shunt Service Value: -0.1 to +11.5V dc or -0.4 to +23 mA with 500 $\Omega$ shunt
Input Impedance	1 M $\Omega$
Internal Resistance of the Signal Source	$\leq$ 500 $\Omega$
Overvoltage Protection	+15V, -4V
Resolution (A/D Converter)	12-bit
Accuracy	0.1% @ 25°C (77°F) 0.5% @ 60°C (140°F)
Transmitter Supplies	25.37 to 28.24V / $\leq$ 46 mA, short-circuit proof
Safety Accuracy	$\pm$ 2%

### Environmental Conditions

Storage Temperature:	-40° C to +85° C (-40°F to +185°F)
Operating Temperature:	0° C to +60° C (+32°F to 140°F)

# Specifications (continued)

## Mechanical Dimensions

Width	257 mm (10.1 in.) including housing screws
Height	114 mm (4.49 in.) including latch
Depth	66 mm (2.60 in.) including grounding bolt
Weight	1.2 kg (2.64 lbs.)

## Agency Certifications (when product is marked)



C-UL Listed Industrial Control Equipment



Marked for all applicable directives



Marked for all applicable acts

N223



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

Allen-Bradley is a registered trademark of Rockwell Automation, Inc.

GuardPLC is a trademark of Rockwell Automation, Inc.

C-UL is a registered trademark of Underwriters Laboratories, Inc.

[www.rockwellautomation.com](http://www.rockwellautomation.com)

### Corporate Headquarters

Rockwell Automation, 777 East Wisconsin Avenue, Suite 1400, Milwaukee, WI, 53202-5302 USA, Tel: (1) 414,212,5200, Fax: (1) 414,212,5201

### Headquarters for Allen-Bradley Products, Rockwell Software Products and Global Manufacturing Solutions

Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414,382,2000, Fax: (1) 414,382,4444

Europe: Rockwell Automation SA/NV, Vorstlaan/Boulevard du Souverain 36-BP 3A/B, 1170 Brussels, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640

Asia Pacific: Rockwell Automation, 27/F Citicorp Centre, 18 Whitfield Road, Causeway Bay, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846

### Headquarters for Dodge and Reliance Electric Products

Americas: Rockwell Automation, 6040 Ponders Court, Greenville, SC 29615-4617 USA, Tel: (1) 864,297,4900, Fax: (1) 864,281,2433

Europe: Rockwell Automation, Brühlstraße 22, D-74834 Elztal-Dallau, Germany, Tel: (49) 6261 9410, Fax: (49) 6261 17741

Asia Pacific: Rockwell Automation, 55 Newton Road, #11-01/02 Revenue House, Singapore 307987, Tel: (65) 351 6723, Fax: (65) 355 1733

Publication 1753-IN002B-EN-P - March 2004

PN 40071-163-01(2)

Supersedes publication 1753-IN002A-EN-P - January 2004

Copyright © 2004 Rockwell Automation, Inc. All rights reserved. Printed in the U.S.A.