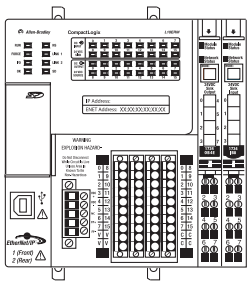
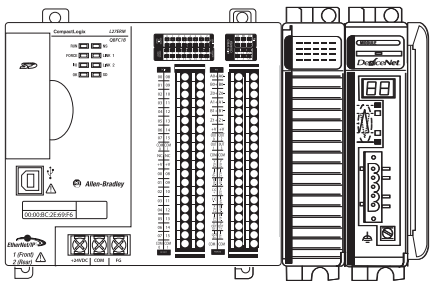
CompactLogix 5370 Controllers

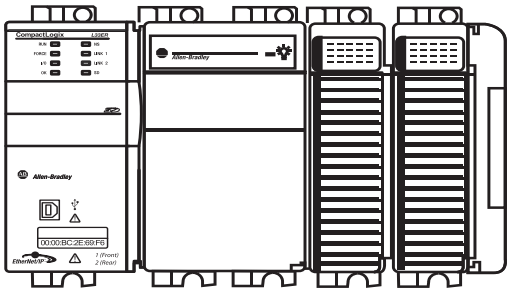
CompactLogix 5370 L1 Control System



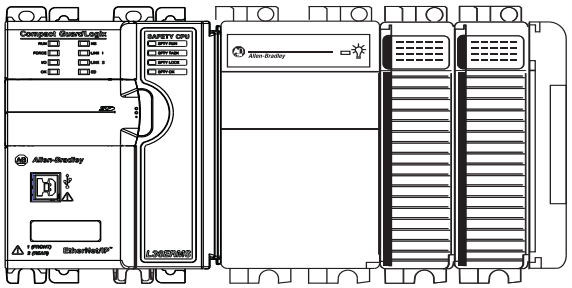
CompactLogix 5370 L2 Control System



CompactLogix 5370 L3 Control System



Compact GuardLogix® 5370 Control System



CompactLogix 5370 controllers provide scalable controller solutions to address a wide variety of applications. All CompactLogix 5370 controllers provide the following functionality:

- Two Ethernet ports
- One USB port
- Support for local expansion modules
- Control of local and distributed I/O modules
- Use of 1784-SD1 or 1784-SD2 Secure Digital (SD) card for nonvolatile memory
- A battery is no longer necessary because of the internal energy-storage solution

Some CompactLogix 5370 controllers provide the following functionality:

- Built-in power supply
- Some combination of embedded digital, analog, and high-speed counter modules
- Support for Integrated Motion over an EtherNet/IP network
- Access to DeviceNet™ networks

The Compact GuardLogix controller is a 1769-L3 CompactLogix controller that provides safety control to achieve SIL CL3 according to EN62061 / EN 61511-1 / IEC 61508 and PLe according to EN ISO 13849-1. A major benefit of this system is that it is still one project, safety and standard together.

Application	Description
SIL 1, 2, 3	The Compact GuardLogix controller system is type-approved and certified for use in safety applications up to and including SIL 3 according to IEC 61508, and applications up to and including PLe/Cat.4 according to ISO 13849-1. For more information, see the following: • GuardLogix 5570 and Compact GuardLogix 5370 Controllers Systems Safety Reference Manual, publication 1756-RM099 • Compact GuardLogix 5370 Controllers User Manual, publication 1769-UM002 • GuardLogix Safety Application Instruction Set Reference Manual, publication 1756-RM095

During development, safety and standard have the same rules. The following are allowed:

- Multiple programmers
- Online editing
- Forcing

Once the project is tested and ready for final validation, you apply the safety application signature and safety-lock the application. This process sets the safety task to a SIL 3 integrity level. The Compact GuardLogix enforces the SIL 3 integrity level. When safety memory is locked and protected, the safety logic cannot be modified and all safety functions operate with SIL 3 integrity. On the standard side of the Compact GuardLogix controller, all functions operate like a regular Logix controller. Thus online editing, forcing, and other activities are all allowed.

Standard logic and external devices, like HMIs or other controllers, can read safety memory with this level of integration. This level of integration removes the need to condition safety memory for use elsewhere. The result is easy systemwide integration and the ability to display safety status on displays or marquees. Use Guard I/O™ modules for field device connectivity. For safety interlocking between Compact GuardLogix controllers, use Ethernet or ControlNet™ networks. Multiple Compact GuardLogix controllers can share safety data for zone to zone interlocking, or one Compact GuardLogix controller can use remote distributed safety I/O between different cells/areas.

Features - CompactLogix 5370 Controllers and Compact GuardLogix 5370 Controllers

Feature	1769-L16ER-BB1B, 1769-L18ER-BB1B, 1769-L18ERM-BB1B, 1769-L19ER-BB1B	1769-L24ER-QB1B, 1769-L24ER-QBFC1B, 1769-L24ER-QBFC1BK 1769-L27ERM-QBFC1B	1769-L30ER, 1769-L30ER-NSE, 1769-L30ERM, 1769-L30ERMK, 1769-L33ER, 1769-L33ERM, 1769-L33ERMK, 1769-L36ERM, 1769-L37ERM, 1769-L37ERMK, 1769-L38ERM, 1769-L38ERMK	1769-L30ERMS, 1769-L33ERMS, 1769-L33ERMSK, 1769-L36ERMS, 1769-L37ERMOS, 1769-L37ERMS, 1769-L37ERMSK, 1769-L38ERMS, 1769-L38ERMSK
Controller tasks: • Continuous • Periodic	• 32 tasks • 100 programs/task			
Built-in communication ports	• Two Ethernet ports - CompactLogix 5370 controllers have two Ethernet ports to connect to an EtherNet/IP network. The ports carry the same network traffic as part of the embedded switch of the controller. However, the controller uses only one IP address. • One USB port (only for temporary connection)			
Communication options	EtherNet/IP	• EtherNet/IP • DeviceNet via 1769-SDN scanner		
EtherNet/IP node, max	• 1769-L16ER-BB1B: Up to 4nodes • 1769-L18ER-BB1B, 1769-L18ERM-BB1B, 1769-L19ER-BB1B: Up to 8 nodes	• 1769-L24ER-QB1B, 1769-L24ER-QBFC1B, 1769-L24ER-QBFC1BK: Up to 8 nodes • 1769-L27ERM-QBFC1B: Up to 16 nodes	• 1769-L30ER, 1769-L30ER-NSE, 1769-L30ERM, 769-L30ERMK, 1769-L30ERMS: Up to 16 nodes • 1769-L33ER, 1769-L33ERM, 1769-L33ERMK, 1769-L33ERMS, 1769-L33ERMSK: Up to 32 nodes • 1769-L36ERM, 1769-L36ERMS: Up to 48 nodes • 1769-L37ERM, 1769-L37ERMK, 1769-L37ERMS, 1769-L37ERMSK: Up to 64 nodes • 1769-L38ERM, 1769-L38ERMK, 1769-L38ERMS, 1769-L38ERMSK: Up to 80 nodes	
Controller connections	256			
Embedded I/O modules	• 16 DC digital inputs • 16 DC digital outputs	All controllers: • 16 DC digital inputs • 16 DC digital outputs Only 1769-L24ER-QBFC1B and 1769-L27ERM-QBFC1B: • 4 high-speed counter modules • 4 high-speed counter module outputs • 4 universal analog inputs • 2 analog output points	–	
Sockets, max	32			
Integrated Motion over an EtherNet/IP network	1769-L18ERM-BB1B - 1 or 2 axes	1769-L27ERM-QBFC1B - As many as 4 axes	• 1769-L30ERM, 1769-L30ERMS - As many as 4 axes • 1769-L33ERM, 1769-L33ERMS - As many as 8 axes • 1769-L36ERM, 1769-L36ERMS - As many as 16 axes • 1769-L37ERM, 1769-L37ERMS - As many as 16 axes • 1769-L38ERM and 1769-L38ERMS - As many as 16 axes	

Features - CompactLogix 5370 Controllers and Compact GuardLogix 5370 Controllers

Feature	1769-L16ER-BB1B, 1769-L18ER-BB1B, 1769-L18ERM-BB1B, 1769-L19ER-BB1B	1769-L24ER-QB1B, 1769-L24ER-QBFC1B, 1769-L24ER-QBFC1BK 1769-L27ERM-QBFC1B	1769-L30ER, 1769-L30ER-NSE, 1769-L30ERM, 1769-L30ERMK, 1769-L33ER, 1769-L33ERM, 1769-L33ERMK, 1769-L36ERM, 1769-L37ERM, 1769-L37ERMK, 1769-L38ERM, 1769-L38ERMK	1769-L30ERMS, 1769-L33ERMS, 1769-L33ERMSK, 1769-L36ERMS, 1769-L37ERMOS, 1769-L37ERMS, 1769-L37ERMSK, 1769-L38ERMS, 1769-L38ERMSK
Programming languages	• Relay ladder[1] • Structured Text • Function block • SFC			
Integrated safety	–			Yes

(1) The Compact GuardLogix 5370 controllers support only the relay ladder programming language in the safety task. The Compact GuardLogix 5370 controllers support all listed programming languages in the standard task.

Technical Specifications - CompactLogix 5370 Controllers and Compact GuardLogix 5370 Controllers

Attribute	1769-L16ER-BB1B, 1769-L18ER-BB1B, 1769-L18ERM-BB1B, 1769-L19ER-BB1B	1769-L24ER-QB1B, 1769-L24ER-QBFC1B, 1769-L24ER-QBFC1BK 1769-L27ERM-QBFC1B	1769-L30ER, 1769-L30ER-NSE, 1769-L30ERM, 1769-L30ERMK, 1769-L33ER, 1769-L33ERM, 1769-L33ERMK, 1769-L36ERM, 1769-L37ERM, 1769-L37ERMK, 1769-L38ERM, 1769-L38ERMK	1769-L30ERMS, 1769-L33ERMS, 1769-L33ERMSK, 1769-L36ERMS, 1769-L37ERMS, 1769-L37ERMSK, 1769-L38ERMS, 1769-L38ERMSK
User memory	• 1769-L16ER: 384 KB • 1769-L18ER, 1769-L18ERM: 512 KB • 1769-L19ER-BB1B: 1 MB	• 1769-L24ER-QB1B, 1769-L24ER-QBFC1B, 1769-L24ER-QBFC1BK: 750 KB • 1769-L27ERM-QBFC1B: 1 MB	• 1769-L30ER, 1769-L30ER-NSE, 1769-L30ERM, 1769-L30ERM: 1 MB • 1769-L33ER, 1769-L33ERM, 1769-L33ERM: 2 MB • 1769-L36ERM: 3 MB • 1769-L37ERM, 1769-L37ERMK: 4 MB • 1769-L38ERM, 1769-L38ERMK: 5 MB	• 1769-L30ERMS: 1 MB standard + 0.5 MB safety • 1769-L33ERMS, 1769-L33ERMSK: 2 MB standard + 1 MB safety • 1769-L36ERMS: 3 MB standard + 1.5 MB safety • 1769-L37ERMS, 1769-L37ERMSK: 4 MB standard + 1.5 MB safety • 1769-L38ERMS, 1769-L38ERMSK: 5 MB standard + 1.5 MB safety
Optional nonvolatile memory	1784-SD1 card with 1 Gb of available memory (shipped with controller) 1784-SD2 card with 2 Gb of available memory (available for separate ordering)			
Number of local expansion modules, max[1]	• 1769-L16ER-BB1B: 6 - 1734 POINT I/O™ modules • 1769-L18ER-BB1B, 1769-L18ERM-BB1B, 1769-L19ER-BB1B: 8 - 1734 POINT I/O™ modules	4 - 1769 Compact I/O™ modules	• 1769-L30ER, 1769-L30ER-NSE, 1769-L30ERM, 1769-L30ERMK, 1769-L30ERMS, 1769-L30ERMSK: 8 -1769 Compact I/O™ modules • 1769-L33ER, 1769-L33ERM, 1769-L33ERMK, 1769-L33ERMS, 1769-L33ERMSK: 16 -1769 Compact I/O modules • 1769-L36ERM, 1769-L36ERMS: 30 -1769 Compact I/O modules • 1769-L37ERM, 1769-L37ERMK, 1769-L37ERMS, 1769-L37ERMSK: 31 -1769 Compact I/O modules • 1769-L38ERM, 1769-L38ERMK, 1769-L38ERMS, 1769-L38ERMSK: 31 -1769 Compact I/O modules	
Number of I/O module banks, max	–	1	3	
Current draw @ 5V DC, controller power	1 A	• 1769-L24ER-QB1B: 1.54 A Value rated at the following ambient temperatures: 40 °C (104 °F), 55 °C (131 °F), 60 °C (140 °F). • 1769-L24ER-QBFC1B and 1769-L27ERM-QBFC1B: 1 A Value rated at the following ambient temperatures: 40 °C (104 °F), 55 °C (131 °F), 60 °C (140 °F).	500 mA	850 mA
Current draw @ 24V DC, controller power	–	• 1769-L24ER-QB1B: 0.95 A Value rated at the following ambient temperatures: 40 °C (104 °F), 55 °C (131 °F), 60 °C (140 °F). • 1769-L24ER-QBFC1B and 1769-L27ERM-QBFC1B: 0.8 A Value rated at the following ambient temperatures: 40 °C (104 °F), 55 °C (131 °F), 60 °C (140 °F).	225 mA	700 mA

Technical Specifications - CompactLogix 5370 Controllers and Compact GuardLogix 5370 Controllers (continued)

Attribute	1769-L16ER-BB1B, 1769-L18ER-BB1B, 1769-L18ERM-BB1B, 1769-L19ER-BB1B	1769-L24ER-QB1B, 1769-L24ER-QBFC1B, 1769-L24ER-QBFC1BK 1769-L27ERM-QBFC1B	1769-L30ER, 1769-L30ER-NSE, 1769-L30ERM, 1769-L30ERMK, 1769-L33ER, 1769-L33ERM, 1769-L33ERMK, 1769-L36ERM, 1769-L37ERM, 1769-L37ERMK, 1769-L38ERM, 1769-L38ERMK	1769-L30ERMS, 1769-L33ERMS, 1769-L33ERMSK, 1769-L36ERMS, 1769-L37ERMS, 1769-L37ERMSK, 1769-L38ERMS, 1769-L38ERMSK
Current draw @ 24V DC, field power, max	3 A - Combined total for all devices that draw current from field power connections Input: 5 mA Output: 500 mA	–		
Power dissipation, max	11.5 W	• 1769-L24ER-QB1B: 12 W • 1769-L24ER-QBFC1B, L27ERM-QBFC1B: 21 W	4.5 W	6.5 W
Isolation voltage	50V (continuous), Basic Insulation Type Tested at 500V AC for 60 s, System to Field	30V (continuous), Basic Insulation Type, USB to system, Ethernet to system and Ethernet to Ethernet Type tested at 500V AC for 60 s		50V, Basic Insulation Type Tested at 500V AC for 60 s, System to Communication ports.
Short circuit protection, field power	Internal fuse, Non-replaceable	–		
Recommended external short circuit protection, field power	User-provided 4…5 A @ 3.15…5.5 A^2t fuse	–		
Weight, approx	0.66 kg (1.5 lb)	• 1769-L24ER-QB1B = 0.63 kg (1.39 lb) • 1769-L24ER-QBFC1B and 1769-L27ERM-QBFC1B = 0.9 kg (1.9 lb)	0.31 kg (0.68 lb)	0.54 kg (1.18 lb)
Module width	100.00 mm (3.94 in.)	1769-L24ER-QB1B = 115.00 mm (4.53 in.) 1769-L24ER-QBFC1B and 1769-L27ERM-QBFC1B = 140 mm (5.51 in.)	55.00 mm (2.17 in.)	89.00 mm (3.50 in.)
Module location	DIN rail mount	DIN rail or panel mount		
Panel-mounting screw torque	—	1.1…1.8 N•m (10…16 lb•in) - use M4 or #8 screws		
Embedded power supply	24V DC input, isolated	24V DC Input, isolated	1769-PA2, 1769-PB2, 1769-PA4, 1769-PB4	
Power supply distance rating	–		• Controller and 1769-SDN: 4 • 1769 Compact I/O modules: 4…8, depending on module	4 (3 I/O modules between controller and power supply)
Wire category[2]	1 - signal ports 1 - power ports 2 - communication ports		2 - communication ports	
Wire type, Ethernet	RJ45 connector according to IEC 60603-7, 2 or 4 pair Category 5e minimum cable according to TIA 568 B.1 or Category 5 cable according to ISO/IEC 24702			
Wire type, power terminals, and embedded I/O connections	Copper		–	
Wire size, power terminals[3]	0.051…3.31 mm^2 (30…12 AWG) solid or stranded copper wire rated at 75 °C (167 °F), or greater, 1.2 mm (3/64 in.) insulation, max Each terminal accepts 1 or 2 wires	0.25…2.50 mm^2 (22…14 AWG) solid copper wire rated at 75 °C (167 °F), or greater 1.2 mm (3/64 in.) insulation, max Each terminal accepts only 1 wire	–	
Wire stripping length, power terminals[3]	10 mm (0.39 in)	8 mm (0.31 in)	–	
Screw torque, power terminals[3]	0.5…0.6 N•m (4.4…5.3 lb•in)	1.0…1.2 N•m (8.9…10.6 lb•in)	–	
Wire size, embedded I/O connections	0.205…1.31 mm^2 (24…16 AWG) solid or stranded copper wire rated at 75 °C (167 °F), or greater 1.2 mm (3/64 in.) insulation, max or 90 °C (194 °F) Each terminal accepts only 1 wire		–	
Wire stripping length, embedded I/O connections	10 mm (0.39 in)		–	

Technical Specifications - CompactLogix 5370 Controllers and Compact GuardLogix 5370 Controllers (continued)

Attribute	1769-L16ER-BB1B, 1769-L18ER-BB1B, 1769-L18ERM-BB1B, 1769-L19ER-BB1B	1769-L24ER-QB1B, 1769-L24ER-QBFC1B, 1769-L24ER-QBFC1BK 1769-L27ERM-QBFC1B	1769-L30ER, 1769-L30ER-NSE, 1769-L30ERM, 1769-L30ERMK, 1769-L33ER, 1769-L33ERM, 1769-L33ERMK, 1769-L36ERM, 1769-L37ERM, 1769-L37ERMK, 1769-L38ERM, 1769-L38ERMK	1769-L30ERMS, 1769-L33ERMS, 1769-L33ERMSK, 1769-L36ERMS, 1769-L37ERMS, 1769-L37ERMSK, 1769-L38ERMS, 1769-L38ERMSK
North American temperature code	T4A	T3C	T5	
IEC temperature code	T4		T5	
Enclosure type rating	None (open-style)			

(1) You can use up to the maximum number of local expansion modules with the CompactLogix 5370 L1 controllers that are listed. This condition applies if only the total current drawn by the embedded I/O and local expansion modules does not exceed both the available POINTBus™ backplane current of 1 A and the field power current of 3 A. For more information on POINTBus™ backplane current and field-power current considerations when installing local expansion modules, see page 12.

(2) Use this Conductor Category information for planning conductor routing. See the Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1 and the appropriate system-level installation manual.

(3) In regard to the CompactLogix 5370 L1 controllers, this specification applies to connecting wires to the power connector that is inserted in the controller. In regard to the CompactLogix 5370 L2 controllers, this specification applies to connecting wires to power terminals built into the controller.

Real-time Clock Accuracy

This table lists the real-time clock accuracy specifications for the CompactLogix 5370 controllers.

Ambient Temperature	Accuracy
0 °C (32 °F)	-143…+42 s/mo
25 °C (77 °F)	-78…+91 s/mo
40 °C (104 °F)	-101…+73 s/mo
60 °C (140 °F)	-204…-4.50 s/mo

Real-time Clock Hold-up Times

This table lists the typical real-time clock hold-up specifications for the CompactLogix 5370 controllers.

IMPORTANT The values in this table are typical and can vary with some CompactLogix 5370 control systems.

Ambient Temperature	Holdup Time, Typical
0 °C (32 °F)	40 days
25 °C (77 °F)	35 days
40 °C (104 °F)	28 days
60 °C (140 °F)	16 days

The I/O module support for CompactLogix 5370 controller systems varies by controller.

I/O Module Support - CompactLogix 5370 L1 Controllers

The CompactLogix 5370 L1 controllers offer an embedded I/O module and the option to use 1734 POINT I/O modules as local expansion modules.

The embedded I/O module provides the following:

- 16 sinking 24V DC digital input points
- 16 sourcing 24V DC digital output points

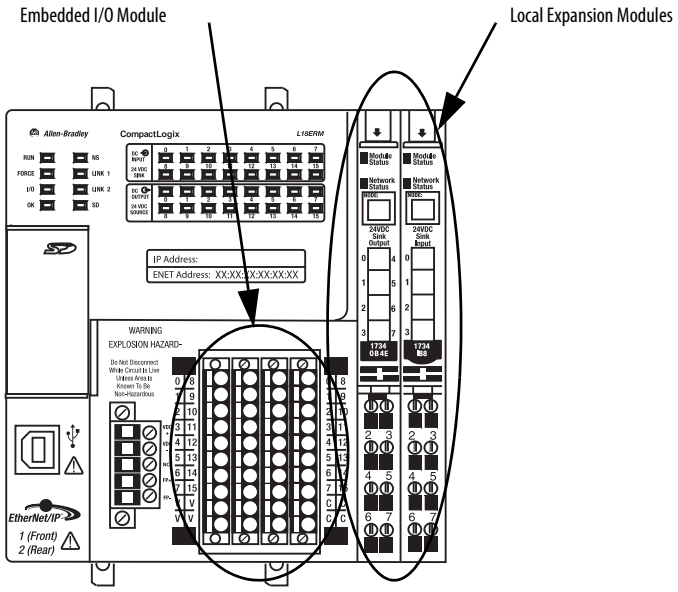
To use 1734 POINT I/O modules as local expansion modules, keep in mind the following:

- Local expansion modules must be installed in the same system as the CompactLogix 5370 L1 controller.
- The modules are installed to the right of the controller.
- The maximum number of local expansion modules available depends on the controller catalog of that system.

This table lists the number of 1734 POINT I/O modules the CompactLogix 5370 L1 controllers support. The minimum RPI of each I/O module is 1.0 ms and can be changed by 0.5 ms increments.

1769-L16ER-BB1B, 1769-L18ER-BB1B, 1769-L18ERM-BB1B, 1769-L19ER-BB1B Controllers - Local I/O Module Support

Cat. No.	Local 1734 POINT I/O Modules Supported, max
1769-L16ER-BB1B	6
1769-L18ER-BB1B	8
1769-L18ERM-BB1B	
1769-L19ER-BB1B	



Embedded DC Input Specifications

Attribute	1769-L16ER-BB1B, 1769-L18ER-BB1B, 1769-L18ERM-BB1B, 1769-L19ER-BB1B
Inputs	16
Voltage category	24V DC sink
Operating voltage range	10…28.8V DC 24V DC nom
Digital filter, off to on	0.5 ms hardware plus 0…65 ms (selectable)
Input delay, off to on	
Digital filter, on to off	0.5 ms hardware plus 0…65 ms (selectable)
Input delay, on to off	
Off-state voltage, max	5V DC
Off-state current, max	1 mA
On-state current, min	2 mA @ 24V DC
Input impedance, max	5.4 kΩ
Cyclic update time	1…750 ms
Isolation voltage	50V DC (continuous), Basic Insulation Type Tested at 500V AC for 60 s, system to field No isolation between individual channels
IEC input compatibility	Type 3
Isolated groups	None

Embedded DC Output Specifications

Attribute	1769-L16ER-BB1B, 1769-L18ER-BB1B, 1769-L18ERM-BB1B, 1769-L19ER-BB1B
Outputs	16
Voltage category	24V DC source
Operating voltage range	10…28.8V DC 24V DC nom
Output delay, off to on	0.1 ms
Output delay, on to off	0.1 ms
Off-state leakage current, max	0.5 mA @ 24V DC
On-state current, min	1 mA per channel
On-state voltage drop, max	0.6V DC
Current per point, max	0.5 A
Current per module, max	3 A
Surge current per point, max	1 A for 100 ms per point, repeatable every 2 s
Isolation voltage	50V DC (continuous), Basic Insulation Type Tested at 500V AC for 60 s, system to field No isolation between individual channels
Isolated groups	None
Pilot duty rating	0.5 A

Embedded Power Supply

Attribute	1769-L16ER-BB1B, 1769-L18ER-BB1B, 1769-L18ERM-BB1B, 1769-L19ER-BB1B
Input voltage range	10…28.8V DC
Input voltage, nom	24V DC
Line requirement (VDC), min	30VA