Selection Guide

Allen-Bradley

ControlLogix System

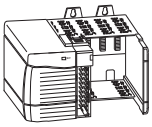
Catalog Numbers 1756 Series

Logix Controllers Comparison

Characteristic	1756 ControlLogix	1756 GuardLogix	1768 CompactLogix	1768 Compact GuardLogix	1769-L3*x* CompactLogix	1769-L23*x* CompactLogix	1789 SoftLogix5800
Controller tasks: • Continuous • Periodic • Event	• 32 tasks • 100 programs/task • Event tasks: all event triggers	• 32 tasks • 100 programs/task • Event tasks: all event triggers	• 16 tasks • Event tasks: consumed tag, EVENT instruction, axis, and motion event triggers	• 16 tasks • Event tasks: consumed tag, EVENT instruction, axis, and motion event triggers	• 1769-L35*x*: 8 tasks • 1769-L32*x*: 6 tasks • 1769-L31: 4 tasks • Event tasks: consumed tag and EVENT instruction triggers	• 3 tasks • 16 programs/task • Event tasks: consumed tag and EVENT instruction triggers	• 32 tasks • 100 programs/task • Event tasks: all event triggers, plus outbound and Windows events
User memory	1756-L61: 2 MB 1756-L62: 4 MB 1756-L63: 8 MB 1756-L64: 16 MB 1756-L65: 32 MB 1756-L72: 4 MB 1756-L73: 8 MB 1756-L74: 16 MB 1756-L75: 32 MB	1756-L61S: 2 MB Standard 1 MB Safety 1756-L62S: 4 MB Standard 1 MB Safety 1756-L63S: 8 MB Standard 3.75 MB Safety	1768-L43: 2 MB 1768-L45: 3 MB	1768-L43S: 2 MB Standard 0.5 MB Safety 1768-L45S: 3 MB Standard 1 MB Safety	1769-L31: 512 KB 1769-L32*x*: 750 KB 1769-L35*x*: 1.5 MB	512 KB	1789-L10: 2 MB; 1 controller; no motion 1789-L30: 64 MB; 3 controllers 1789-L60: 64 MB; 6 controllers
Nonvolatile user memory	1756-L6*x*: CompactFlash 1756-L7*x*: Secure Digital card	CompactFlash	CompactFlash	CompactFlash	CompactFlash	None	None
Built-in communication ports	1756-L6*x*: 1 port RS-232 serial 1756-L7*x*: 1 port USB	1 port RS-232 serial	1 port RS-232 serial	1 port RS-232 serial	• 1769-L31: 2 RS-232 ports • 1769-L32C, 1769-L35CR: 1 ControlNet port and 1 RS-232 serial port • 1769-L32E, 1769-L35E: 1 EtherNet/IP port and 1 RS-232 serial port	• 1769-L23E-QB1B: 1 EtherNet/IP port and 1 RS-232 serial port • 1769-L23E-QBFC1B: 1 EtherNet/IP port and 1 RS-232 serial port • 1769-L23-QBFC1B: 2 RS-232 serial ports	Depends on personal computer
Communication options	• EtherNet/IP • ControlNet • DeviceNet • Data Highway Plus • Remote I/O • SynchLink	• EtherNet/IP (standard and safety) • ControlNet (standard and safety) • DeviceNet (standard and safety) • Data Highway Plus • Remote I/O • SynchLink	• EtherNet/IP • ControlNet • DeviceNet	• EtherNet/IP (standard and safety) • ControlNet (standard and safety) • DeviceNet (standard)	• EtherNet/IP • ControlNet • DeviceNet	• EtherNet/IP • DeviceNet	• EtherNet/IP • ControlNet • DeviceNet
Controller connections	1756-L6*x*: 250 1756-L7*x*: 500	250	250	250	100	100	250
Network connections	Per network module: • 100 ControlNet (CN2/A) • 40 ControlNet (CNB) • 256 EtherNet/IP; 128 TCP (EN2*x*) • 128 EtherNet/IP; 64 TCP (ENBT)	Per network module: • 100 ControlNet (CN2/A) • 40 ControlNet (CNB) • 256 EtherNet/IP; 128 TCP (EN2*x*) • 128 EtherNet/IP; 64 TCP (ENBT)	Per network module: • 48 ControlNet • 128 EtherNet/IP; 64 TCP	Per network module: • 48 ControlNet • 128 EtherNet/IP; 64 TCP	Per controller: • 32 ControlNet • 32 EtherNet/IP; 32 TCP	Per controller: • 32 EtherNet/IP; 8 TCP	Per network module: • 48 ControlNet • 128 EtherNet/IP; 64 TCP
Controller redundancy	Full support	None	Backup via DeviceNet	Backup via DeviceNet	Backup via DeviceNet	Backup via DeviceNet	N/A
Simple motion	• Stepper • Servo via DeviceNet • Analog or networked AC drive	• Stepper • Servo via DeviceNet • Analog or networked AC drive	• Stepper • Servo via DeviceNet • Analog or networked AC drive	• Stepper • Servo via DeviceNet • Analog or networked AC drive	• Stepper • Servo via DeviceNet • Analog or networked AC drive	• Stepper • Servo via DeviceNet • Analog or networked AC drive	• Stepper • Servo via DeviceNet • Analog or networked AC drive
Integrated motion	EtherNet/IP SERCOS interface Analog options: • Encoder input • LDT input • SSI input	EtherNet/IP SERCOS interface Analog options: • Encoder input • LDT input • SSI input	SERCOS interface	SERCOS interface	N/A	N/A	SERCOS interface Analog encoder input
Programming languages	• Relay ladder • Structured text • Function block • Sequential function chart	• Standard task: all languages • Safety task: relay ladder, safety application instructions	• Relay ladder • Structured text • Function block • Sequential function chart	• Standard task: all languages • Safety task: relay ladder, safety application instructions	• Relay ladder • Structured text • Function block • Sequential function chart	• Relay ladder • Structured text • Function block • Sequential function chart	• Relay ladder • Structured text • Function block • Sequential function chart • External routines (developed in C/C++)

1756 ControlLogix System

Step 1
ControlLogix I/O Modules



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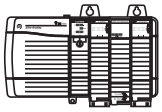
Select:
- I/O modules - some modules have field-side diagnostics, electronic fusing, or individually isolated inputs/outputs
- A remote terminal block (RTB) or wiring system for each I/O module

Step 2
ControlLogix Integrated Motion



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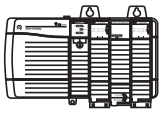
Select:
- A SERCOS or analog interface module
- Associated cables
- A removable terminal block (RTB) - only for analog interface modules
- Select drives, motors, and accessories (use the Motion Analyzer software)

Step 3
ControlLogix Communication Modules



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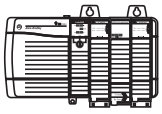
Select:
- Networks
- Communication modules
- Associated cables and network equipment
- Sufficient modules and cables if you are planning a redundant system

Step 4
ControlLogix Controllers



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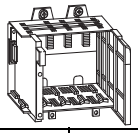
Select:
- A controller with sufficient memory
- Secure Digital or CompactFlash card
- Replacement batteries, if needed

Step 5
ControlLogix Chassis



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Select:
- A chassis with sufficient slots
- Slot fillers for empty slots

Step 6
ControlLogix Power Supplies

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Select:
- One power supply for each chassis, if you are using standard power supplies
- A power supply bundle if you are planning a redundant power supply system

Optional Step
Visualization Products

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Optional Step
Programming Software

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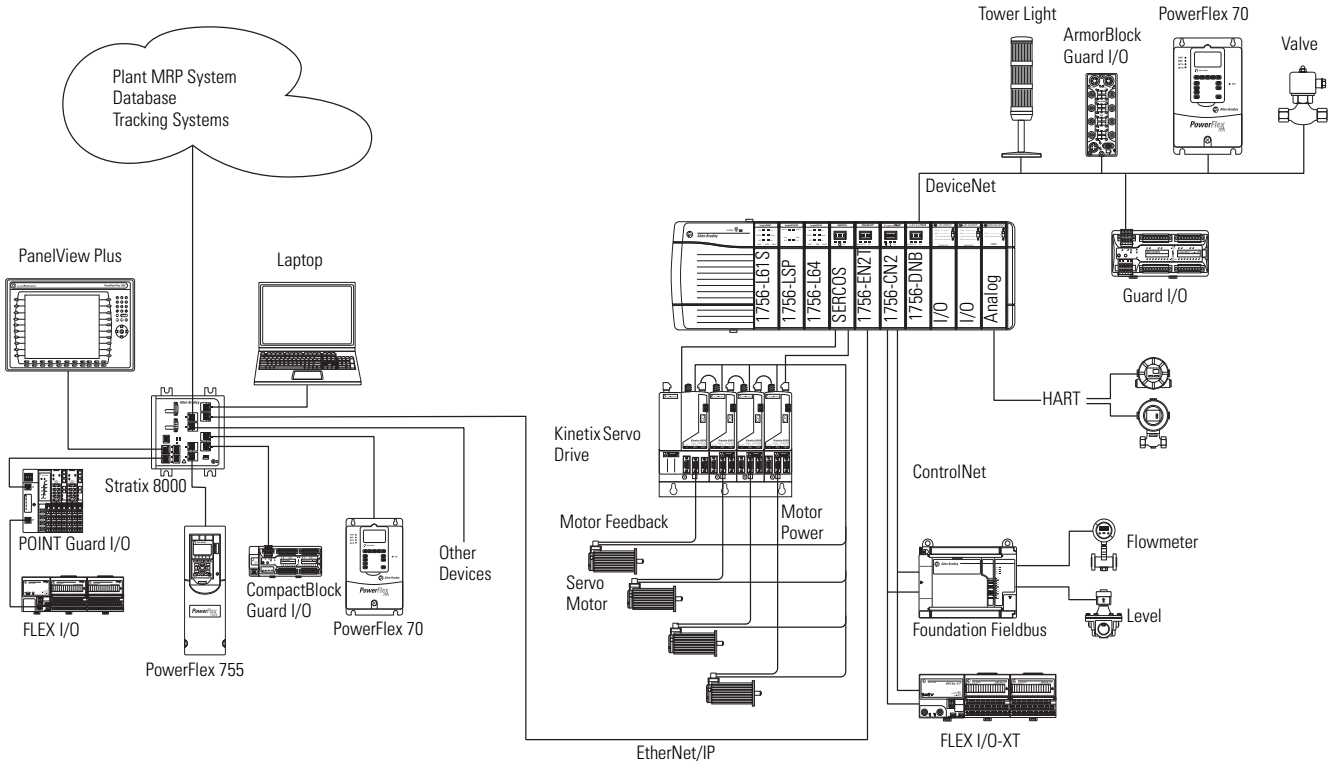
ControlLogix System Overview

The ControlLogix system provides discrete, drives, motion, process, and safety control together with communication and state-of-the-art I/O in a small, cost-competitive package. The system is modular, so you can design, build, and modify it efficiently with significant savings in training and engineering.

Example Configuration - ControlLogix System

A simple ControlLogix system consists of a standalone controller and I/O modules in a single chassis. For a more comprehensive system, use the following:

- Multiple controllers in a single chassis
- Multiple controllers joined across networks
- I/O in multiple platforms that are distributed in many locations and connected over multiple I/O links



ControlLogix-XT System

The ControlLogix-XT controllers function in the same way as the traditional ControlLogix controllers. The ControlLogix-XT products include control and communication system components that are conformally coated to extend product life in harsh, corrosive environments.

- When used with FLEX I/O-XT products, the ControlLogix-XT system can withstand temperatures range from -20...70 °C (-4...158 °F).
- When used independently, the ControlLogix-XT system can withstand temperature ranges from -25...70 °C (-13...158 °F).

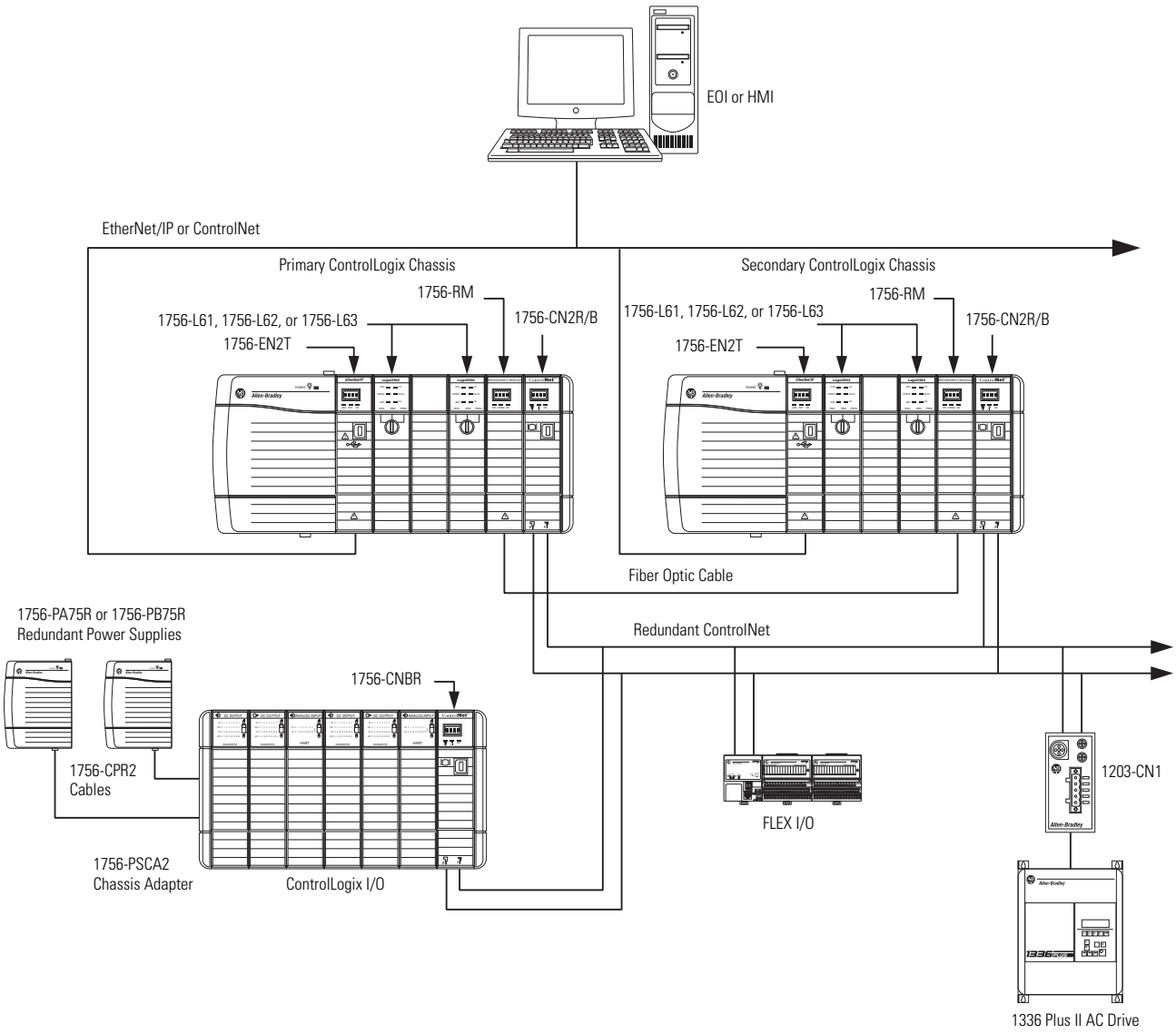
GuardLogix Safety System

A GuardLogix controller is a ControlLogix controller that also provides safety control. The GuardLogix system is a dual controller solution — you must use a 1756-L6*x*S primary controller and a 1756-LSP safety partner to achieve SIL 3/CAT. 4. A major benefit of this system is that it's still a single project, safety and standard together. The safety partner controller is a part of the system, is automatically configured, and requires no user setup.

Application	Description
SIL 3	The 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 category (CAT) 4, according to EN954-1. For more information, see the following: • GuardLogix Controllers Systems Safety Reference Manual, publication 1756-RM093 • GuardLogix Controllers User Manual, publication 1756-UM020 • GuardLogix Safety Application Instruction Set Reference Manual, publication 1756-RM095
SIL 2	Components of the ControlLogix system are type-approved and certified for use in SIL 2 applications, according to IEC 61508, and AK4 applications according to DIN V19250. For a list of ControlLogix system components that meet SIL 2 requirements, see Using ControlLogix in SIL 2 Applications Safety Reference Manual, publication 1756-RM001

Example Configuration - Redundant ControlLogix System

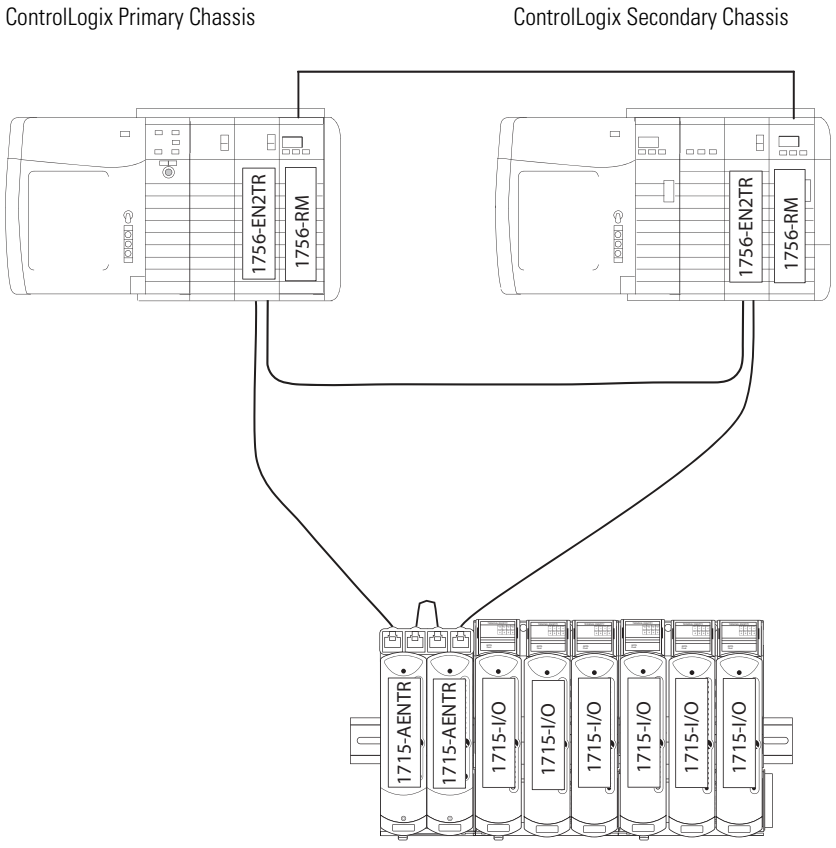
The ControlLogix controller supports controller redundancy.



Example Configuration - Redundant I/O System

The 1715 redundant I/O system lets a ControlLogix controller communicate to a remote, redundant I/O chassis over an EtherNet/IP network. The 1715 redundant I/O system provides fault tolerance and redundancy for critical processes by using a redundant adapter pair and multiple I/O modules that have diagnostics.

The redundant I/O system must be connected to a ControlLogix system via an EtherNet/IP network. All connections are established via the Ethernet network by using the topologies supported by the 1756-EN2TR communication bridge.



1715 Redundant I/O System

For detailed specifications, see the 1715 Redundant I/O System Specifications Technical Data, publication 1715-TD001A-EN-P.

ControlLogix Controllers

The ControlLogix controller provides a scalable controller solution that is capable of addressing a large amount of I/O points.

The controller can be placed into any slot of a ControlLogix chassis and multiple controllers can be installed in the same chassis. Multiple controllers in the same chassis communicate with each other over the backplane (just as controllers can communicate over networks) but operate independently.

ControlLogix controllers can monitor and control I/O across the ControlLogix backplane, as well as over I/O links. ControlLogix controllers can communicate over EtherNet/IP, ControlNet, DeviceNet, DH+, Remote I/O, and RS-232-C (DF1/DH-485 protocol) networks and many third party process and device networks. To provide communication for a ControlLogix controller, install the appropriate communication interface module into the chassis.

Cat. No.	Description	User Memory
1756-L72	ControlLogix controller, 1 built-in USB port	4 MB
1756-L73		8 MB
1756-L74		16 MB
1756-L75		32 MB
1756-L61	ControlLogix controller, 1 built-in RS-232 port	2 MB
1756-L62		4 MB
1756-L63		8 MB
1756-L64		16 MB
1756-L65		32 MB
1756-L61S	GuardLogix safety controller	2 MB standard 1 MB safety
1756-L62S		4 MB standard 1 MB safety
1756-L63S		8 MB standard 3.75 MB safety
1756-LSP	GuardLogix safety partner (one is required for each GuardLogix controller)	—
1756-L63XT	ControlLogix-XT controller, extreme environment	8 MB

For detailed specifications, see 1756 ControlLogix Controllers Specifications, publication 1756-TD001.

IMPORTANT Scan time for a project loaded in a 1756-L64 or 1756-L65 controller may be slower than for the same project loaded in one of the other 1756-L6*x* controllers. See the Logix5000 Controllers Instruction Execution Time and Memory Use Reference Manual, publication 1756-RM087, for instruction execution times.

Standard ControlLogix Controllers

The ControlLogix controller is part of the Logix5000 family of controllers. A ControlLogix system includes the following:

- The ControlLogix controller, available in different combinations of user memory
- RSLogix 5000 programming software
- 1756 ControlLogix I/O modules that reside in a 1756 chassis
- Separate communication modules for network communication

Features - Standard ControlLogix Controllers

Feature	1756-L61, 1756-L62, 1756-L63, 1756-L64, 1756-L65	1756-L72, 1756-L73, 1756-L74, 1756-L75
Controller tasks	• 32 tasks • 100 programs/task • Event tasks: all event triggers	
Built-in communication ports	1 port RS-232 serial	1 port USB
Communication options	• EtherNet/IP • ControlNet • DeviceNet • Data Highway Plus • Remote I/O • SynchLink • Third-party process and device networks	
Built-in port	Serial	USB
Controller connections supported, max	250	500
Network connections, per network module	• 100 ControlNet (1756-CN2/A) • 40 ControlNet (1756-CNB) • 256 EtherNet/IP; 128 TCP (1756-EN2*x*) • 128 EtherNet/IP; 64 TCP (1756-ENBT)	
Controller redundancy	Full support	
Integrated motion	• EtherNet/IP connection • SERCOS interface • Analog options (encoder input, LDT input, SSI input)	
Programming languages	• Relay ladder • Structured text • Function block • SFC	

GuardLogix Controllers

A GuardLogix controller is a ControlLogix controller that also provides safety control. The GuardLogix system is a dual controller solution—you must use a 1756-L6*x*S primary controller and a 1756-LSP safety partner to achieve SIL 3/CAT. 4.

Application	Description
SIL 1, 2, 3	The 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: • GuardLogix Controllers Systems Safety Reference Manual, publication 1756-RM093. • GuardLogix Controllers User Manual, publication 1756-UM020. • GuardLogix Safety Application Instruction Set Reference Manual, publication 1756-RM095.

During development, safety and standard have the same rules, multiple programmers, online editing, and forcing are all allowed. Once the project is tested and ready for final validation, you set the Safety Task to a SIL 3 integrity level, which is then enforced by the GuardLogix controller. When safety memory is locked and protected, the safety logic can't be modified and all safety functions operate with SIL 3 integrity. On the standard side of the GuardLogix controller, all functions operate like a regular Logix controller.

Use Guard I/O modules for field device connectivity on Ethernet or DeviceNet networks, and for safety interlocking between GuardLogix controllers use Ethernet or ControlNet networks. Multiple GuardLogix controllers can share safety data for zone to zone interlocking, or a single GuardLogix controller can use remote distributed safety I/O between different cells/areas.

In addition to the standard features of a ControlLogix controller, the GuardLogix controller has these safety-related features.

Features - GuardLogix Controllers

Feature	1756-L61S, 1756-L62S, 1756-L63S, 1756-LSP
Safety communication options	Standard and safety • EtherNet/IP • ControlNet • DeviceNet
Network connections, per network module	• 100 ControlNet (1756-CN2/A) • 40 ControlNet (1756-CNB) • 256 EtherNet/IP; 128 TCP (1756-EN2*x*) • 128 EtherNet/IP; 64 TCP (1756-ENBT)
Controller redundancy	Not supported
Programming languages	Relay ladder

ControlLogix-XT Controllers

The ControlLogix-XT controllers function in the same way as the traditional ControlLogix controllers. The ControlLogix-XT products include control and communication system components that are conformally coated to extend product life in harsh, corrosive environments.

- When used with FLEX I/O-XT products, the ControlLogix-XT system can withstand temperatures range from -20...70 °C (-4...158 °F).
- When used independently, the ControlLogix-XT system can withstand temperature ranges from -25...70 °C (-13...158 °F).

Redundant ControlLogix Controllers

The ControlLogix controller supports controller redundancy. In a redundant controller system, you need these components:

- Two 1756 chassis each with the following the same:
  - Number of slots
  - Modules in the same slots
  - Redundancy firmware revisions in each module
  - Two additional ControlNet nodes outside the redundant chassis pair.

  You need **one** of these redundancy modules:

- One 1756-RM module per chassis that supports the following:
  - Two 1756-L61, 1756-L62, 1761-L63 controllers or one 1756-L64 controller
  - Maximum of seven communication modules, which can be 1756-CN2 series B, 1756-CN2R series B, and 1756-EN2T modules
  - One 1756-RMC*x* cable
- One 1757-SRM module per chassis that supports the following:
  - One 1756-L61, 1756-L62, 1756-L63, 1756-L64 controller
  - Maximum of seven communication modules, which can be 1756-CNB series D or E, 1756-CNBR series D or E, 1756-ENBT, and 1756-EWEB modules
  - One 1757-SRC*x* cable

Accessories - Controllers

Memory Cards

Memory cards offer nonvolatile memory to permanently store a user program and tag data on a controller. The 1756-L7*x* ControlLogix controller comes with 1784-SD1 Secure Digital (SD) card already installed. The 1756-L6*x* controllers support optional CompactFlash cards that you purchase separately. The memory card installs in a socket on the controller. Through RSLogix 5000 software, you can manually trigger the controller to save to or load from nonvolatile memory or configure the controller to load from nonvolatile memory on powerup.

The GuardLogix controller does not support user program storage or retrieval by using a CompactFlash card.

Attribute	1784-CF64	1784-CF128	1784-SD1	1784-SD2
Memory	64 MB	128 MB	1 GB	2 GB
Supported controllers	1756-L6*x*		1756-L7*x*	
Weight, approx.	14.2 g (0.5 oz)		1.76 g (0.062 oz)	

1756 Energy Storage Modules

Instead of a battery, the 1756-L7*x* controller ships with a 1756-ESMCAP energy storage module (ESM) already installed.

Cat No.	Description
1756-ESMCAP	Capacitor-based energy-storage module. Comes with the controller.
1756-EMNSE	ESM without WallClockTime backup power. Additionally, you can use this ESM with a 1756-L73 (8 MB) or smaller memory-sized controller only. Use this ESM if your application requires that the installed ESM deplete its residual energy to 40 µJoule or less before transporting it into or out of your application.
1756-ESMNRM	Energy-storage module that secures the controller by preventing the USB connection and SD card use. This ESM provides your application an enhanced degree of security.

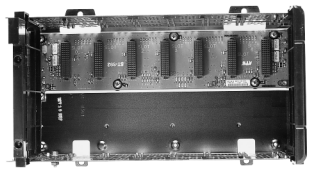
1756 ControlLogix Batteries

Each 1756-L6*x* controller ships with a battery. With a memory card installed, the controller can be used without a battery. If you do not use a battery, current tag data will be at the state it was when the memory card was saved.

Attribute	1756-BA1	1756-BA2	1756-BATM[1]	1756-BATA
Description	Lithium battery (0.59 g)	Lithium battery (0.59 g)	Externally mounted battery assembly	Replacement lithium battery for 1756-BATM (5 g max lithium per each D cell; contains 2 D cells)
ControlLogix controllers	1756-L61, 1756-L62, 1756-L63 series A	1756-L61, 1756-L62, 1756-L63 series B 1756-L64, 1756-L65	1756-L61, 1756-L62, 1756-L63 series A	1756-BATM battery module
GuardLogix controllers	—	1756-L61S, 1756-L62S, 1756-L63S	—	—
ControlLogix-XT controllers	—	1756-L63XT	—	—

[1] The 1756-BATM externally mounted battery assembly is highly recommended for use with all series A 1756-L6*x* controllers and provides longer battery life than the 1756-BA1 battery. The 1756-BATM includes one 1756-BATA lithium battery assembly and a 1 m (3.28 ft) cable to connect housing to controller.

ControlLogix Chassis



The ControlLogix system is a modular system that requires a 1756 I/O chassis. Place any module into any slot. The backplane provides a high-speed communication path between modules.

All of the chassis are designed for horizontal-only, back-panel mounting. The chassis are available in these configurations:

- Standard chassis
- ControlLogix-XT chassis

For detailed specifications, see 1756 ControlLogix Chassis Specifications Specifications, publication 1756-TD006.

Features - Chassis

- Slot guides and snap-in retention for easy and secure module fit for any type of 1756 module.
- Direct mounting accommodates any 1756 power supply.