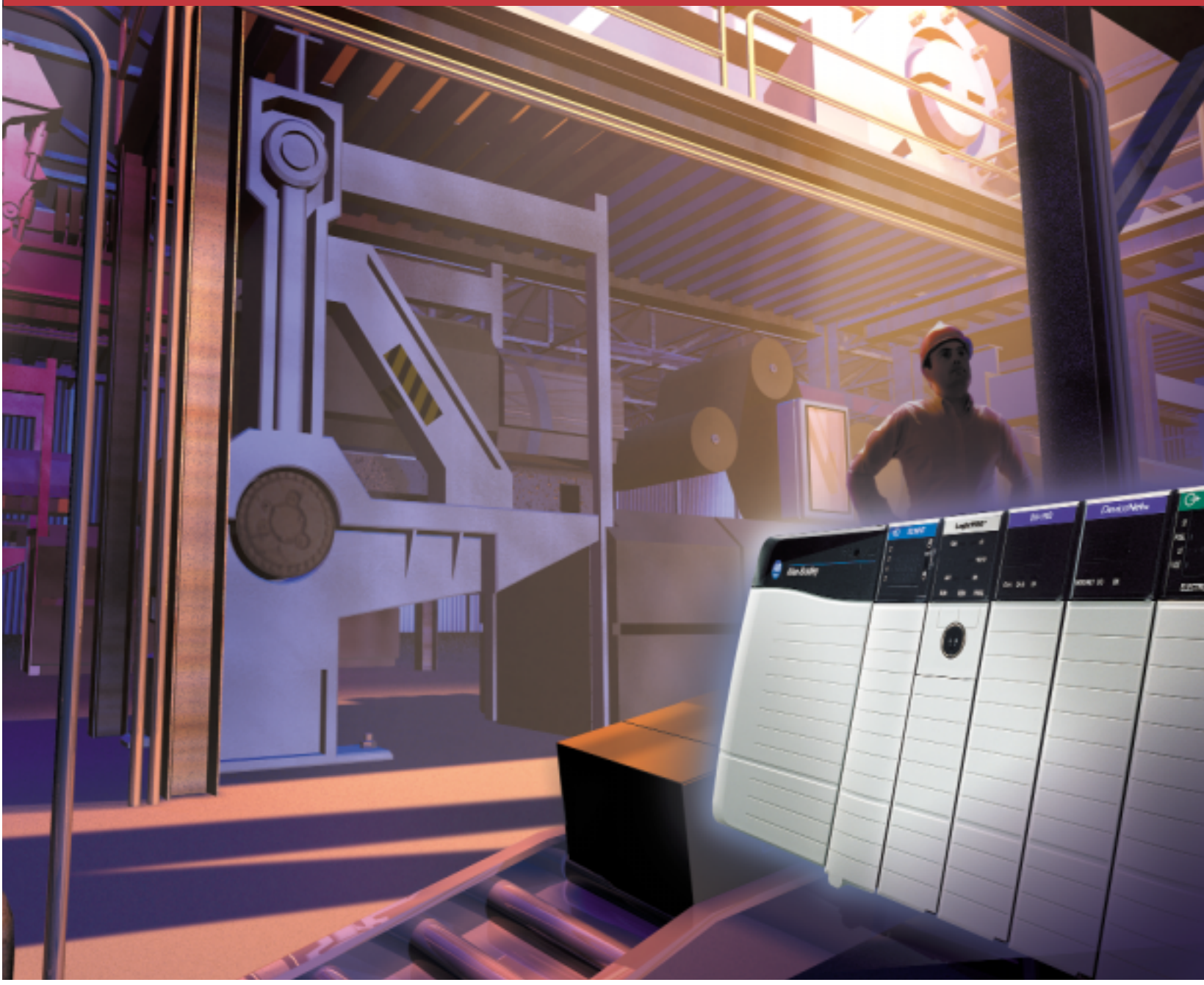


Allen-Bradley

ControlLogix

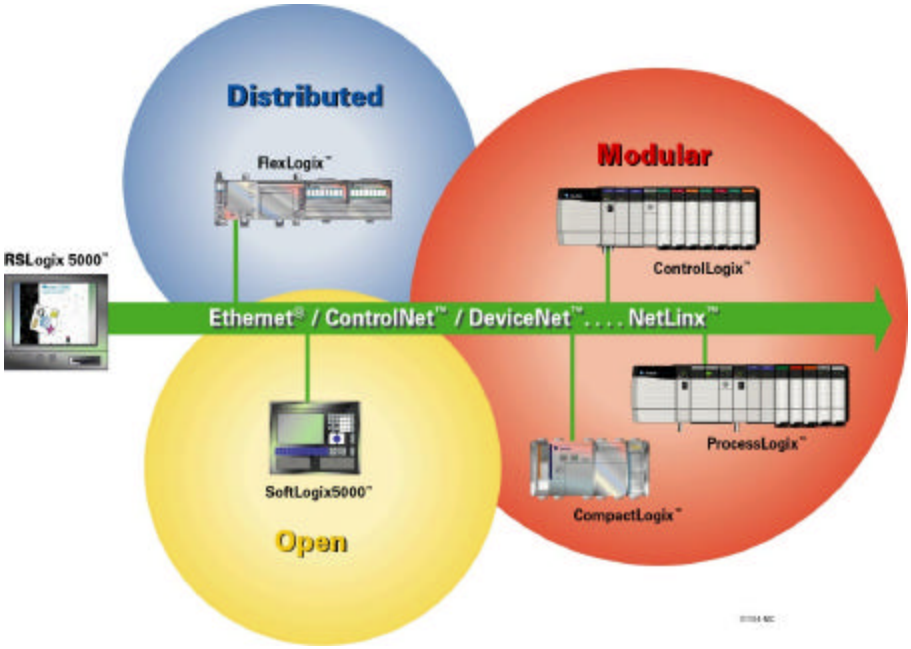
Selection Guide

Rockwell Automation

Bringing Together Leading Brands in Industrial Automation

Introducing ControlLogix for High Performance Control

ControlLogix provides a high performance control platform for multiple types of control. You can perform sequential, process, drive or motion control - in any combination - with this single platform. Because the platform is modular, you can design, build, and modify it efficiently - with significant training and engineering savings. Engineering Productivity is increased with advanced configuration tools, memory structure and symbolic programming that requires less programming and memory. And your investment in ControlLogix is assured through with such features as flash-upgradable firmware. The flexible ControlLogix platform permits multiple processors, networks, and I/O to be mixed without restrictions. As your application grows, you can use the NetLinx architecture for control and configuration of devices and collection of information across Ethernet, ControlNet, DeviceNet and Foundation Fieldbus networks.

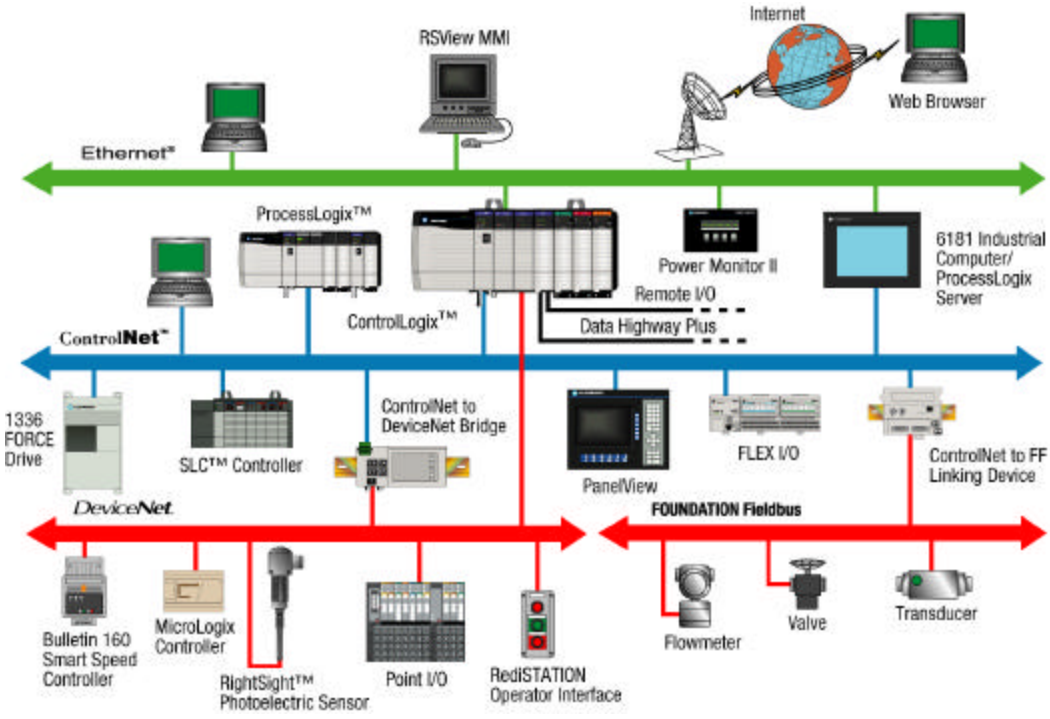


Rockwell Automation's Logix Platforms offer users compatibility of control in a variety of formats within the NetLinx open network architecture for Ethernet, ControlNet and DeviceNet.

Take Control with Logix

Rockwell Automation's Logix offer users compatibility of control in a variety of platforms, including:

- *ControlLogix™, a high-performance, multi-processing platform*
- *ProcessLogix™, a cost-effective distributed control system (DCS) for process applications*
- *SoftLogix™, PC-based control from the PLC leader*
- *FlexLogix™, FLEX I/O expanded to include distributed control*
- *CompactLogix™, value-focused compact modular I/O coupled with machine control.*



The RSLogix 5000 programming environment and/or NetLinx open network architecture are common to these Logix platforms. The RSLogix 5000 environment offers an easy-to-use IEC 1131-3 compliant interface, symbolic programming with structures and arrays for increased productivity, and an instruction set that serves sequential, motion, process and drives applications. The NetLinx open network architecture offers common communication tools for use with a variety of networks such as Ethernet, ControlNet and DeviceNet.

The ControlLogix control platform is:

seamless	enables easy integration with existing PLC-based systems. Users on existing networks can send or receive messages to/from program controllers on other networks transparently.
fast	the ControlLogix platform provides high-speed data-transfers across the backplane and the ControlLogix5550 controller provides a high-speed control platform.
scalable	provides a modular approach to control. Add as many or as few controllers and communication modules as you need. You can have multiple controllers in the same chassis. Select the controller memory size that meets your application.
industrial	offers a hardware platform designed to withstand the vibrations, thermal extremes, and electrical noise associated with harsh industrial settings.
integrated	establishes a platform that integrates multiple technologies, including sequential, motion, drive, and process applications.
compact	meets the needs of many applications where control is highly distributed and panel

As one of the next generation of Allen-Bradley control systems, ControlLogix integrates sequential, process, drive and motion control together with communications and state-of-the-art I/O in a small, cost-competitive platform. Because ControlLogix is modular, you can design, build, and modify it efficiently - with significant training and engineering savings.

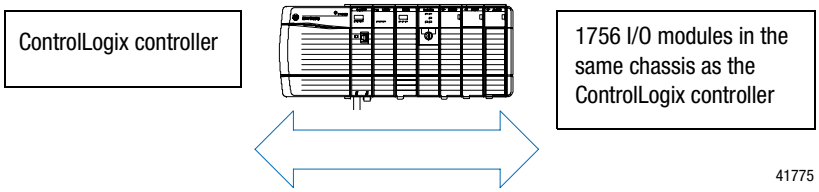
Table of Contents

Selecting a ControlLogix System

The ControlLogix system architecture provides sequential, process, and motion control together with communications 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.

A ControlLogix system can be anything from a simple chassis to a highly-distributed system consisting of multiple chassis and networks working together.

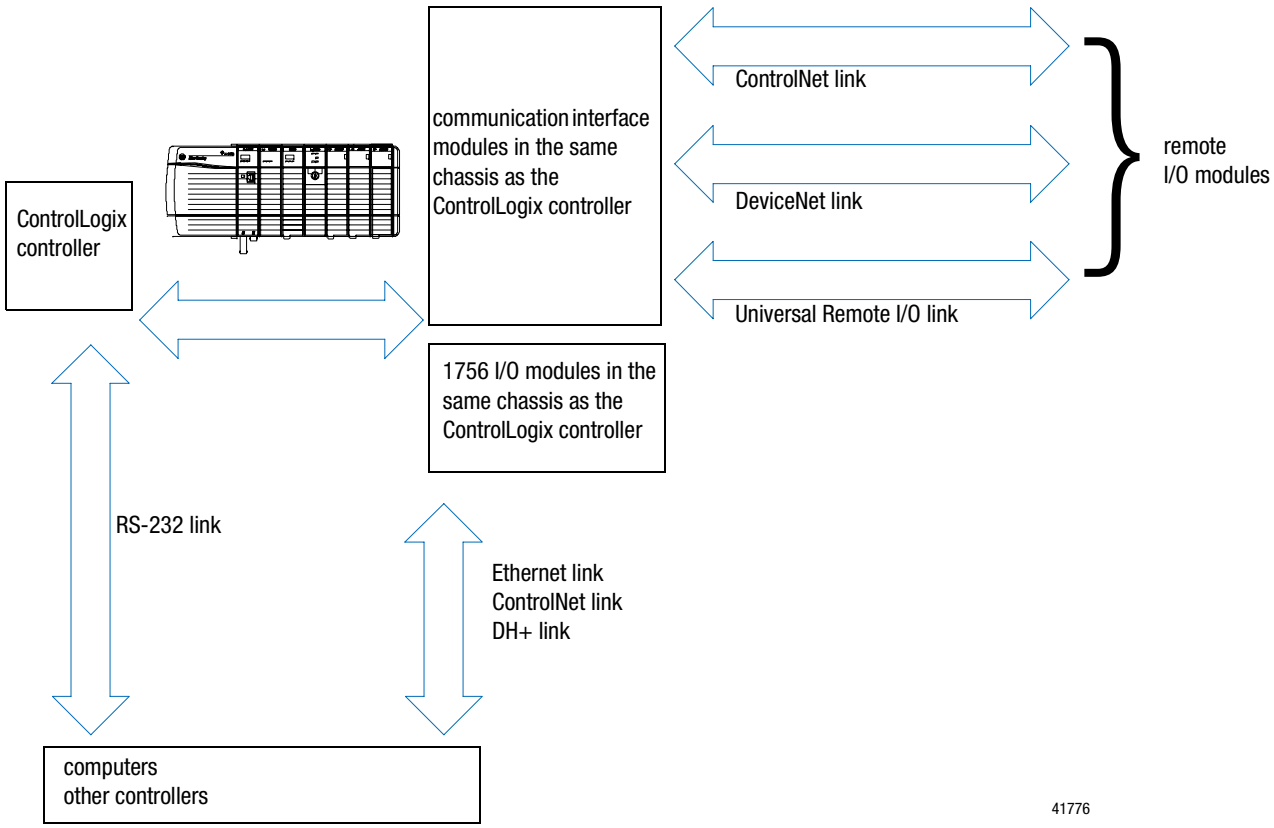
A simple ControlLogix system consists of a stand-alone controller and I/O modules in a single chassis.



Or you can use the ControlLogix system as a gateway. Include the communication modules you need for connectivity to other networks. For this use, a controller is not required. The ControlLogix Gateway integrates into existing PLC-based systems so that users with existing networks can send or receive messages to or from other networks.

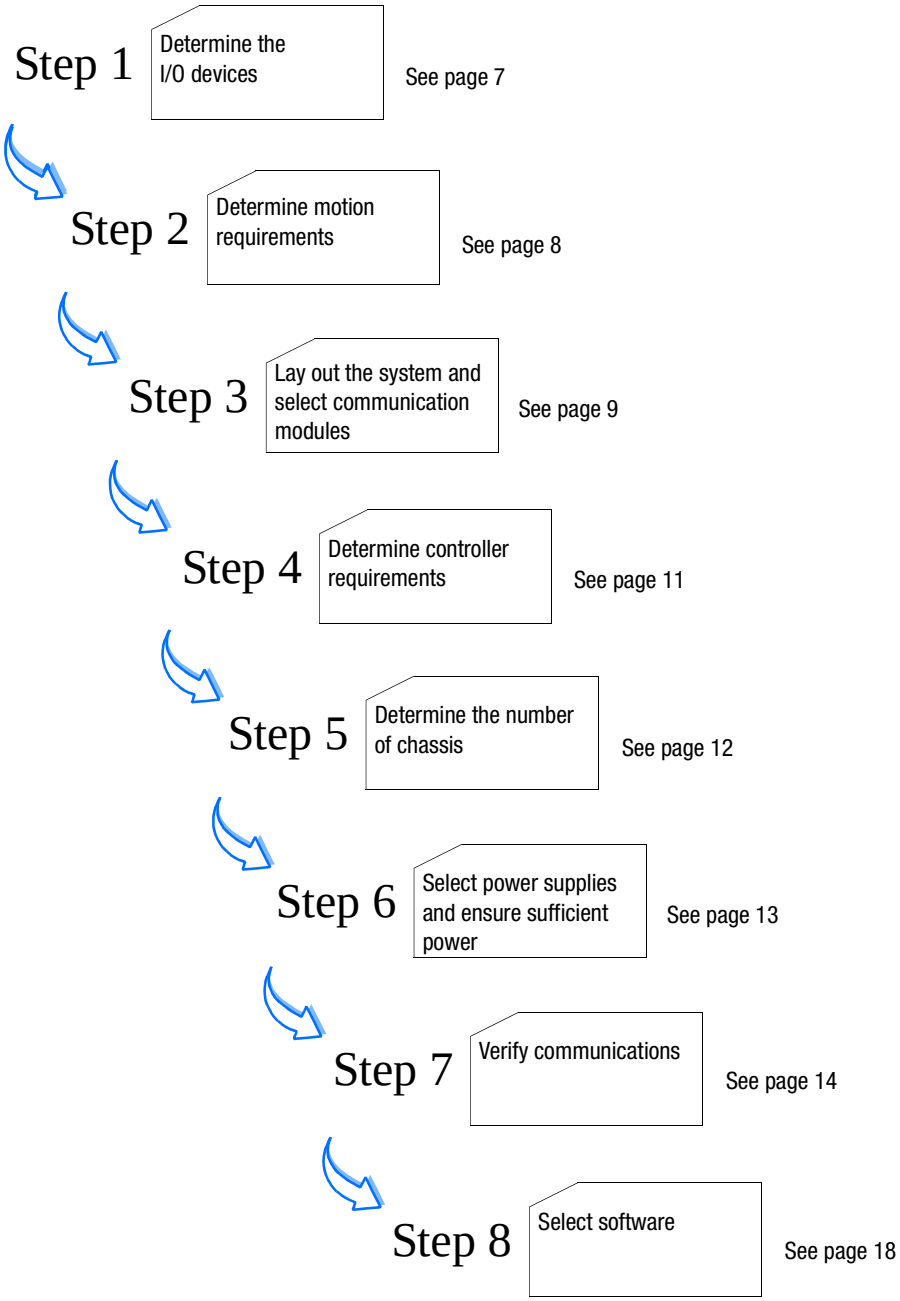
For a more robust system, use:

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



Use the following example as a guide to completing your own system specification. The inside of the back cover of this selection guide is a worksheet you can use to record your selections. Complete one worksheet for each chassis.

Follow these steps as you specify your ControlLogix system:



Step 1: Determine the I/O Devices

Use a spreadsheet to record the amount and type of I/O devices the ControlLogix system needs. Record the:

- location of the device
- number of points needed
- appropriate 1756 catalog number
- number of points available per module
- number of modules

To determine the number of modules you need, divide the "number of points needed" by the "I/O points per module." For example:

I/O device:	Location:	Number of points needed:	Catalog number:	I/O points per module:	Number of modules:
120V ac digital inputs	A	73	1756-IA8D	8	10
120V ac digital outputs	A	25	1756-OA8D	8	4
24V dc digital inputs	A	43	1756-IB16D	16	3
24V dc digital outputs	A	17	1756-OB16D	16	2
contact digital outputs	A	11	1756-OX8I	8	2
4-20mA analog inputs	A	7	1756-IF6I	6	2
0-10V dc analog inputs	A	2	1756-IF6I	6	0 *(use the remaining points from the above 1756-IF6I module)*
4-20mA analog outputs	A	4	1756-OF6CI	6	1
PanelView terminal	A	na	2711 series	na	na
				Location A subtotal	24
120V ac digital inputs	B	35	1756-IA8D	8	5
120V ac digital outputs	B	15	1756-OA8D	8	2
24V dc digital inputs	B	23	1756-IB16D	16	2
24V dc digital outputs	B	13	1756-OB16D	16	1
contact digital outputs	B	5	1756-OX8I	8	1
4-20mA analog inputs	B	3	1756-IF6I	6	3
0-10V dc analog inputs	B	1	1756-IF6I	6	0
4-20mA analog outputs	B	2	1756-OF6CI	6	1
PanelView terminal	B	na	2711 series	na	na
				Location B subtotal	15
RSView on a personal computer	C	na	9301 series	na	na
				Location C subtotal	0

For more information about ControlLogix I/O modules and how they operate, see page 19.

Step 2: Determine the Motion Requirements

The ControlLogix controller executes ladder motion commands and generates position and velocity profile information. Each controller and chassis can control up to 16 1756-M02AE servo modules (for a total of 32 axes). Each 1756-M02AE servo module must be in the same local chassis as its ControlLogix controller.

The 1756-M02AE servo module connects to a servo drive and closes a high-speed position and velocity loop. Each 1756-M02AE module can control up to two axes.

Use the same spreadsheet to record motion servo modules. For example:

I/O device:	Location:	Number of points needed:	Catalog number:	I/O points per module:	Number of modules:
120V ac digital inputs	A	73	1756-IA8D	8	10
120V ac digital outputs	A	25	1756-OA8D	8	4
24V dc digital inputs	A	43	1756-IB16D	16	3
24V dc digital outputs	A	17	1756-OB16D	16	2
contact digital outputs	A	11	1756-OX8I	8	2
4-20mA analog inputs	A	7	1756-IF6I	6	2
0-10V dc analog inputs	A	2	1756-IF6I	6	0
4-20mA analog outputs	A	4	1756-OF6CI	6	1
analog servo module	**A**	**2 axis**	**1756-M02AE**	**na**	**1**
PanelView terminal	A	na	2711 series	na	na
				Location A subtotal	25
120V ac digital inputs	B	35	1756-IA8D	8	5
120V ac digital outputs	B	15	1756-OA8D	8	2
24V dc digital inputs	B	23	1756-IB16D	16	2
24V dc digital outputs	B	13	1756-OB16D	16	1
contact digital outputs	B	5	1756-OX8I	8	1
4-20mA analog inputs	B	3	1756-IF6I	6	3
0-10V dc analog inputs	B	1	1756-IF6I	6	0
4-20mA analog outputs	B	2	1756-OF6CI	6	1
PanelView terminal	B	na	2711 series	na	na
				Location B subtotal	15
RSView on a personal computer	C	na	9301 series	na	na
				Location C subtotal	0

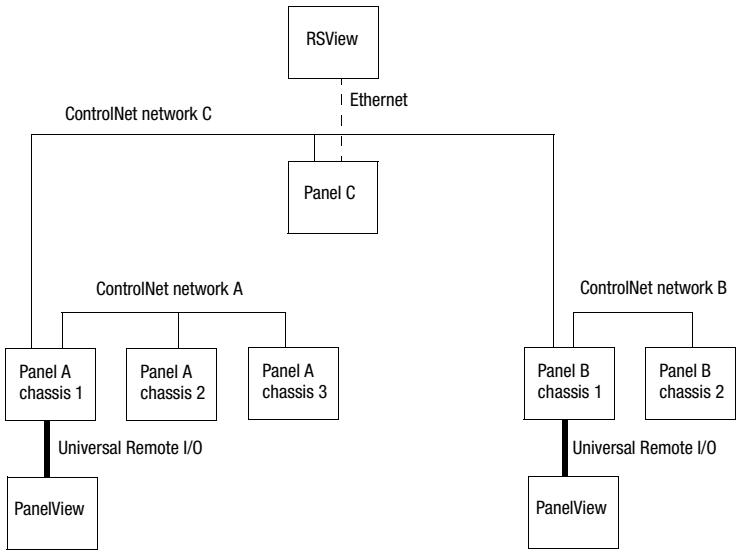
For more information about planning for motion, see page 33.

Step 3: Lay Out the System

Lay out the system by determining the network configuration and the placement of components in each location. Decide at this time whether each location will have its own controller.

Place each controller's I/O on an isolated network to maximize the performance and to more easily accommodate future network or system configuration changes. If you plan to share I/O, make sure the I/O is on a network that each controller can access.

For example, assume that Location A and Location B both require a controller. Each controller's I/O is isolated on its own network. Both controllers must interact with time critical information. Panel C does not require a controller and can be a ControlLogix gateway.



For a ControlLogix controller to control I/O modules, both the controller and the I/O modules must be directly attached to the same ControlNet network. This table lists which controllers in the above example can control which I/O modules.

I/O location:	Controller in Panel A, chassis 1	Controller in Panel B, chassis 1
Panel A, chassis 1	yes	yes
Panel A, chassis 2	yes	no
Panel A, chassis 3	yes	no
Panel B, chassis 1	yes	yes
Panel B, chassis 2	no	yes
Panel C, chassis 1	yes	yes

For more information about placing I/O modules, see page 30.

You also need to evaluate what communications need to occur between the controllers. If there is sporadic information that is not time critical, use a message-based network such as an Ethernet, Data Highway Plus, or the unscheduled portion of a ControlNet network. If the information is time critical, such as produced/consumed tags between controllers, use a ControlNet network.

Placing communication modules

Determine the number of communication modules. You can use multiple communication modules in a chassis and divide communications between those modules. Some communication modules have multiple channels, so you don't necessarily need one communication module for each link. This example assumes one communication module for each link.

Add the communication modules to the spreadsheet:

I/O device:	Location:	Number of points needed:	Catalog number:	I/O points per module:	Number of modules:
120V ac digital inputs	A	73	1756-IA8D	8	10
120V ac digital outputs	A	25	1756-OA8D	8	4
24V dc digital inputs	A	43	1756-IB16D	16	3
24V dc digital outputs	A	17	1756-OB16D	16	2
contact digital outputs	A	11	1756-OX8I	8	2
4-20mA analog inputs	A	7	1756-IF6I	6	2
0-10V dc analog inputs	A	2	1756-IF6I	6	0
4-20mA analog outputs	A	4	1756-OF6CI	6	1
analog servo module	A	2 axis	1756-M02AE	na	1
PanelView terminal	A	1	2711 series	na	na
ControlNet communication module	**A**	**na**	**1756-CNB**	**na**	**4**
Remote I/O communication module	**A**	**na**	**1756-DHRIO**	**na**	**1**
				Location A subtotal	30

For more information about networks and communication modules, see page 39.

Step 4: Determine the Controller Requirements

The following equations provide an estimate of the memory needed for a controller. Each of these numbers includes a rough estimate of the associated user programming. Depending on the complexity of your application, you might need more or less memory.

Controller tasks	_____	* 4000 =	_____	bytes (minimum 1 needed)
Discrete I/O points	_____	* 400 =	_____	bytes
Analog I/O points	_____	* 2600 =	_____	bytes
Communication modules	_____	* 2000 =	_____	bytes
Motion axis	_____	* 8000 =	_____	bytes
		Total =	_____	bytes

For example, the following table lists the configurations for Location A and Location B:

	Location A:	Location B:
Controller tasks:	1 continuous 1 periodic (STI)	1 continuous 2 periodic (STI)
Digital I/O points	73 + 25 + 43 + 17 + 11 = 169	35 + 15 + 23 + 13 + 5 = 91
Analog I/O points:	7 + 2 + 4 = 13	3 + 1 + 2 = 6
Communication modules:	4 1756-CNB modules 1 1756-DHRIO module	3 1756-CNB modules 1 1756-DHRIO module
Motion axis:	2 axis	none

Then estimate memory to help choose the controller:

	Location A (bytes):	Location B (bytes):
Controller tasks:	(2 x 4000) = 8000	(3 x 4000) = 12,000
Digital I/O points:	(169 x 400) = 67,600	(91 x 400) = 36,400
Analog I/O points:	(13 x 2600) = 33,800	(6 x 2600) = 15,600
Communication modules:	(5 x 2000) = 10,000	(4 x 2000) = 8000
Motion axis:	(2 x 8000) = 16,000	(0 x 8000) = 0
Total bytes:	135,400	72,000
Selected controller:	1756-L1M1	1756-L1M1

If an estimate is close to the next memory size, select the larger memory. For example, Location B uses 83% of the 160K bytes in a 1756-L1 controller. Use a 1756-L1M1 controller instead.

For more information about selecting a controller, see page 57.

Step 5: Determine the Number of Chassis

Use another spread sheet to determine the number of chassis you need for each location in your system. Include additional space in each chassis to accommodate future growth. For example:

Location:	Module slots used:	Spare slots (20% of slots used)	Total slots needed:	Chassis catalog number:	Chassis quantity:
A	25	5	31	1756-A13	3
B	17	4	21	1756-A13	2
C	2	1	3	1756-A4	1

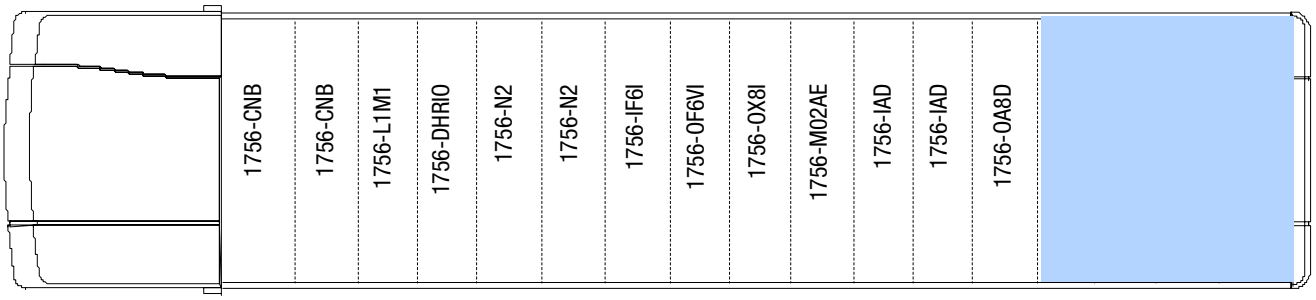
Important: Use the slot filler module 1756-N2 to fill empty slots. Two slot filler modules are included in each 1756-N2 catalog number.

For more information about selecting a chassis, see page 73.

Step 6: Select Power Supplies and Ensure Sufficient Power

Use the worksheet on the inside of the back cover of this selection guide to record your module selections and calculate power requirements. Complete one worksheet for each chassis.

For example:



Chassis: A1	Catalog Number:	Backplane current 3.3V (amps):	Backplane current 5.1V (amps):	Backplane current 24V (amps):	Module power (watts):	I/O termination: 20-pin	I/O termination: 36-pin	Connections: Direct	Connections: Rack
rack	1756-A13								
power	1756-PA72	400mA maximum	10,000mA maximum	2800mA maximum	can't exceed 75W @ 60°C)				
0	1756-CNB	0mA	970mA	1.7mA	4.98W				
1	1756-CNB	0mA	970mA	1.7mA	4.98W				
2	1756-L1M1	0mA	950mA	20mA	5.33W				
3	1756-DHRIO	0mA	850mA	1.7mA	4.38W				
4	spare (1756-N2)								
5	spare (1756-N2)								
6	1756-IF6I	0mA	250mA	100mA	3.7W	1			
7	1756-OF6VI	0mA	250mA	175mA	5.5W	1			
8	1756-OX8I	0mA	100mA	100mA	2.91W		1		
9	1756-M02AE	0mA	700mA	2.5mA	3.63W		1		
10	1756-IA8D	0mA	100mA	3mA	0.58W	1			
11	1756-IA8D	0mA	100mA	3mA	0.58W	1			
12	1756-OA8D	0mA	175mA	250mA	6.89W	1			
	totals:	0mA	5415mA	658.6mA	43.46W	5	2		

If your power consumption exceeds the maximum, move some modules to another chassis and recalculate the power requirements.

For more information about selecting a power supply, see page 77.

Step 7: Verify Communications

The ControlLogix controller supports 250 connections. The following table shows how many connections the controller uses for these different communication configurations

ControlLogix Connection to:	Connections Used by the Controller per Module:
local I/O module	1
remote I/O module (direct connection only)	1
1756-MO2AE servo module	3
local 1756-CNB module	0
remote ControlNet communication module configured as a direct (none) connection configured as a rack-optimized connection	 0 **or** 1
1756-DHRIO module	1
1756-ENET module	0
1756-DNB module	2
Universal Remote I/O adapter module	1
produced tag produced tag and one consumer each additional consumer of the tag	 1 1
consumed tag	1
block-transfer message	1
other message	1

For example, to calculate the connections for the controller in Panel A, Chassis 1 in the configuration example, add the connections:

- for data transfer
- in Panel A, Chassis 1
- to remote 1756-CNB in Panel A, Chassis 2
- to remote 1756-CNB in Panel A, Chassis 3

Data transfer connections

For example, the controller in Panel A, Chassis 1 can use these communication methods for transferring data:

Connection Type:	Quantity:	Total Connections:
produced tags produced tag each consumer of the tag	 2 4	 6
consumed tags	4	4
block-transfer messages	2	2
other messages	12	12
	total	24

Connections for Panel A, Chassis 1

Chassis: A1	Catalog Number:	Backplane current 3.3V (amps):	Backplane current 5.1V (amps):	Backplane current 24V (amps):	Module power (watts):	I/O termination:		Connections:	
						20-pin	36-pin	Direct	Rack
rack	1756-A13								
power	1756-PA72	400mA maximum	10,000mA maximum	2800mA maximum	can't exceed 75W @ 60°C)				
0	1756-CNB	0mA	970mA	1.7mA	4.98W			0	0
1	1756-CNB	0mA	970mA	1.7mA	4.98W			0	0
2	1756-L1M1	0mA	950mA	20mA	5.33W				
3	1756-DHRIO[a]	0mA	850mA	1.7mA	4.38W			0	2
4	spare (1756-N2)								
5	spare (1756-N2)								
6	1756-IF6I	0mA	250mA	100mA	3.7W	1		1	
7	1756-OF6VI	0mA	250mA	175mA	5.5W	1		1	
8	1756-OX8I	0mA	100mA	100mA	2.91W		1	1	
9	1756-M02AE	0mA	700mA	2.5mA	3.63W		1	3	
10	1756-IA8D	0mA	100mA	3mA	0.58W	1		1	
11	1756-IA8D	0mA	100mA	3mA	0.58W	1		1	
12	1756-OA8D	0mA	175mA	250mA	6.89W	1		1	
	totals:	0mA	5415mA	658.6mA	43.46W	5	2	9	2

a. The controller uses 1 connection for the 1756-DHRIO module and 1 additional connection for each logical rack connected to the 1756-DHRIO module. In this example, a PanelView terminal is connected to the 1756-DHRIO module, using only 1 logical rack.

The controller always uses one direct connection for each I/O module in its local chassis. The controller does not use any connection for a 1756-CNB module in its local chassis.

For more information about how the controller uses connections for I/O modules, see page 62.

Connections for Panel A, Chassis 2

The controller in Panel A, Chassis 1 has a direct connection to every I/O module in Panel A, Chassis 2.

Chassis: A2	Catalog Number:	Backplane current 3.3V (amps):	Backplane current 5.1V (amps):	Backplane current 24V (amps):	Module power (watts):	I/O termination:		Connections:	
						20-pin	36-pin	Direct	Rack
rack	1756-A13								
power	1756-PA72	400mA maximum	10,000mA maximum	2800mA maximum	can't exceed 75W @ 60°C)				
0	1756-CNB	0mA	970mA	1.7mA	4.99W			1	
1	1756-IF6I	0mA	250mA	100mA	3.7W	1		1	
2	1756-OX8I	0mA	100mA	100mA	2.91W		1	1	
3	1756-OB16D	0mA	250mA	140mA	4.64W		1	1	
4	1756-IB16D	0mA	150mA	3mA	0.84W		1	1	
5	1756-IB16D	0mA	150mA	3mA	0.84W		1	1	
6	1756-OA8D	0mA	175mA	250mA	6.89W	1		1	
7	1756-OA8D	0mA	175mA	250mA	6.89W	1		1	
8	1756-OA8D	0mA	175mA	250mA	6.89W	1	1	1	
9	1756-IA8D	0mA	100mA	3mA	0.58W		1	1	
10	1756-IA8D	0mA	100mA	3mA	0.58W	1		1	
11	1756-IA8D	0mA	100mA	3mA	0.58W	1		1	
12	spare (1756-N2)								
	totals:	0mA	2695mA	1106.7mA	40.33W	6	6	12	0

The controller always uses a direct connection for an analog I/O module, regardless of whether the analog I/O module is local or remote to the controller.

The digital I/O modules in this chassis are remote to the controller, so you can select a direct connection or a rack-optimized connection. However, to take advantage of the diagnostic capabilities of the digital I/O modules in this chassis (note the "D" at the end of the catalog number), you must configure a direct connection between the controller and the I/O module.

Connections for Panel A, Chassis 3

The controller in Panel A, Chassis 1 has a rack connection to the 1756-IA8D and 1756-OA8D I/O modules. The controller has a direct connection to the remaining I/O modules.

Chassis: A3	Catalog Number:	Backplane current 3.3V (amps):	Backplane current 5.1V (amps):	Backplane current 24V (amps):	Module power (watts):	I/O termination:		Connections:	
						20-pin	36-pin	Direct	Rack
rack	1756-A13								
power	1756-PA72	400mA maximum	10,000mA maximum	2800mA maximum	can't exceed 75W @ 60°C)				
0	1756-CNB	0mA	970mA	1.7mA	4.99W			1	1
1	spare (1756-N2)								
2	spare (1756-N2)								
3	1756-OB16D	0mA	250mA	140mA	4.64W		1	1	
4	1756-IB16D	0mA	150mA	3mA	0.84W		1	1	
5	spare (1756-N2)								
6	1756-OA8D	0mA	175mA	250mA	6.89W	1		0	0
7	1756-IA8D	0mA	100mA	3mA	0.58W		1		0
8	1756-IA8D	0mA	100mA	3mA	0.58W	1			0
9	1756-IA8D	0mA	100mA	3mA	0.58W		1		0
10	1756-IA8D	0mA	100mA	3mA	0.58W	1			0
11	1756-IA8D	0mA	100mA	3mA	0.58W	1			0
12	spare (1756-N2)								
	totals:	0mA	2045mA	409.7mA	20.26W	4	4	3	1

The digital I/O modules in this chassis are configured for a rack-optimized connection, which consolidates connection use between the controller and the I/O modules. However, a rack-optimized connection reduces the diagnostic information that is available to the controller, which does not take advantage of the diagnostic capabilities of the discrete modules.

Total connections

Based on the example worksheets, the controller in Panel A, Chassis 1 needs these connections:

Location:	Total Connections:
Panel A, Chassis 1	11
Panel A, Chassis 2	12
Panel A, Chassis 3	4
Data transfer	24
total	51

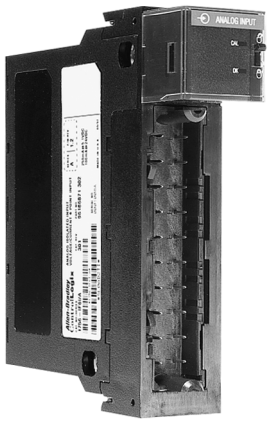
Step 8: Select Software

Your selection of modules and network configuration determines what software packages you need to configure and program your system.

If you have:	You need:	Order this catalog number:
1756 ControlLogix controller 1756-M02AE motion module	RSLogix 5000 programming software	9324 series (RSLogix 5000 programming software)
1756-CNB, -CNBR ControlNet communication module	RSNetWorx for ControlNet (comes with RSLogix 5000 programming software and RSNetWorx for ControlNet bundle)	9324-RLD300NXENE (RSLogix 5000 programming software plus RSNetWorx option) **or** 9357-CNETL3 (RSNetWorx for ControlNet)
1756-DNB DeviceNet communication module	RSNetWorx for DeviceNet	9324-RLD300NXENE (RSLogix 5000 programming software plus RSNetWorx option) **or** 9357-DNETL3 (RSNetWorx for DeviceNet)
1756-ENET Ethernet communication module (set the IP address) 1756-DHRIO communication module (define the DH+ routing table)	RSLinx software (RSLinx Lite comes with RSLogix 5000 programming software) **or** ControlLogix Gateway software (comes with RSLogix 5000 programming software)	9324 series (RSLogix 5000 programming software) **or** 1756-GTWY (ControlLogix Gateway Configuration software)
1788-CN2FF Foundation Fieldbus linking device	Foundation Fieldbus Configuration Software **and** RSLinx or RSLinx OEM software (RSLinx Lite is not sufficient)	1788-FFCT and 9355-WABENE or 9355-WABOEMENE
communication card in a workstation	RSLinx software (RSLinx Lite comes with RSLogix 5000 programming software)	9324 series (RSLogix 5000 programming software)
workstation dedicated for operator interface	RSView32 software	9301 series
PanelView terminal	PanelBuilder software	2711-ND3 for PanelBuilder 900 **or** 2711E-ND1 for PanelBuilder 1400e

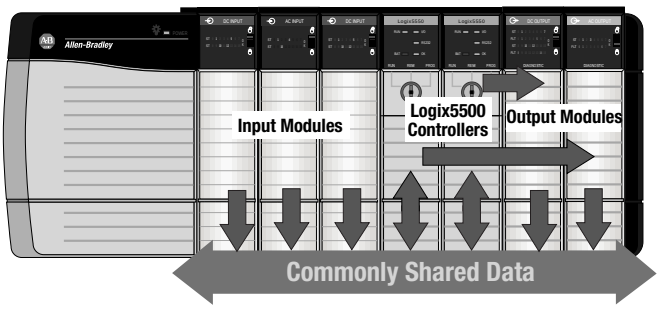
For more information about selecting software packages, see page 79.

Selecting ControlLogix I/O Modules



The ControlLogix architecture provides a wide range of input and output modules to span many applications, from high-speed discrete to process control. The ControlLogix architecture uses producer/consumer technology, which allows input information and output status to be shared among multiple ControlLogix controllers.

Producer/Consumer I/O Model



When planning I/O communications, consider:

Considerations when planning I/O:	See page:
which ControlLogix I/O modules to use	20
where to place ControlLogix I/O modules	30
how ControlLogix I/O modules operate	31
selecting controller ownership	32

The ControlLogix I/O modules offer a rich set of features, including:

- built-in module and wire diagnostics
- alarming
- scaling of values
- electronic fusing
- time stamping
- electronic module identification

Each ControlLogix I/O module mounts in a ControlLogix chassis and requires either a removable terminal block (RTB) or a 1492 interface module (IFM) to connect all field-side wiring. RTBs and IFMs are not included with the I/O modules. They must be ordered separately.

The ControlLogix family of I/O modules includes:

Product:	See page:
1756 digital I/O modules	20
1756 analog I/O modules	23
1756 specialty I/O modules	24
1756 removable terminal blocks	25
1492 wiring systems	25

1756 Digital I/O Modules

The 1756 digital I/O modules support:

- removal and insertion under power (RIUP)
- producer/consumer based communications
- module-level fault reporting and field side diagnostics
- time stamping of data
- choice of direct-connect or rack-optimized communications

In addition, you can select these type of digital I/O modules:

Digital I/O Type:	Description:
diagnostic	These modules provide diagnostic features to the point level. These modules have a “D” at the end of the catalog number.
electronic fusing	These modules have internal electronic fusing to prevent too much current from flowing through the module. These modules have an “E” at the end of the catalog number.
individually isolated	These modules have individually isolated inputs or outputs. These modules have an “I” at the end of the catalog number.

Digital ac input modules

Catalog number:	Number of inputs:	Voltage category:	Operating voltage:	Maximum signal delay (programmable):	Removable terminal block:	Maximum on state current:	Maximum off state current:	Backplane current:
1756-IA8D	8 (2 sets of 4)	120V ac	79-132V ac	on=11 or 12 ms off=17 or 26ms	1756-TBNH 1756-TBSH (20 pins)	79V ac 5mA 132V ac 16mA	2.5mA	100mA @ 5V 3mA @ 24V 0.58W
1756-IA16	16 (2 sets of 8)	120V ac	74-132V ac	on=11 or 12 ms off=17 or 26ms	1756-TBNH 1756-TBSH (20 pins)	74V ac 5mA 132V ac 13mA	2.5mA	105mA @ 5V 2mA @ 24V 0.58W
1756-IA16I	16 (individually isolated)	120V ac	79-132V ac	on=11 or 12 ms off=17 or 26ms	1756-TBCH 1756-TBS6H (36 pins)	79V ac 5mA 132V ac 15mA	2.5mA	125mA @ 5V 3mA @ 24 V 0.71W
1756-IM16I	16 (individually isolated)	240V ac	159-265V ac	on=11 or 12 ms off=17 or 26ms	1756-TBCH 1756-TBS6H (36 pins)	159V ac 5mA 265V ac 13mA	2.5mA	100mA @ 5V 3mA @ 24V 0.58W
1756-IN16	16 (2 sets of 8)	24V ac	10-30V ac	on=10, 11, or 12ms off=19 or 28ms	1756-TBNH 1756-TBSH (20 pins)	10V ac 5mA 30V ac 1.2mA	2.75mA	100mA @ 5V 2mA @ 24 V 0.56W

Digital dc input modules

Catalog number:	Number of inputs:	Voltage category:	Operating voltage:	Maximum signal delay (programmable):	Removable terminal block:	Maximum on state current:	Maximum off state current:	Backplane current:
1756-IB16	16 (2 sets of 8)	24V dc sink	10-31.2V dc	on=1, 2, or 3ms off=2, 3, 4, 11, or 20ms	1756-TBNH 1756-TBSH (20 pins)	10V dc 2mA 31.2V dc 10mA	1.5mA	100mA @ 5V 2mA @ 24V 0.56W
1756-IB16D	16 (4 sets of 4)	24V dc sink	10-30V dc	on=1, 2, or 3ms off=4, 5, 13, or 22ms	1756-TBCH 1756-TBS6H (36 pins)	10V dc 2mA 30V dc 13mA	1.5mA	150mA @ 5V 3mA @ 24V 0.84W
1756-IB16I	16 (individually isolated)	24V dc source or sink	10-30V dc	on=1, 2, or 3ms off=4, 5, 6, 13, or 22ms	1756-TBCH 1756-TBS6H (36 pins)	10V dc 2mA 30V dc 10mA	1.5mA	100mA @ 5V 3mA @ 24V 0.45W
1756-IB32	32 (2 sets of 16)	24V dc sink	10-31.2V dc	on=1, 2, or 3ms off=2,3,4,11, or 20ms	1756-TBCH 1756-TBS6H (36 pins)	10V dc 2mA 31.2V dc 5.5mA	1.5mA	150mA @ 5V 2mA @ 24V 0.81W
1756-IC16	16 (2 sets of 8)	48V dc sink	30-60V dc	on=1, 2, or 3ms off=4, 5, 6, 13, or 22ms	1756-TBNH 1756-TBSH (20 pins)	30V dc 2mA 60V dc 7mA	1.5mA	100mA @ 5V 3mA @ 24V 0.58W
1756-IH16I	16 (individually isolated)	125V dc source or sink	90-146V dc	on=2, 3, or 4 ms off=6, 7, 8,15, or 24ms	1756-TBCH 1756-TBS6H (36 pins)	90V dc 1mA 146V dc 3mA	0.8mA	125mA @ 5V 3mA @ 24V 0.71W

Digital ac output modules

Catalog number:	Number of outputs:	Voltage category:	Operating voltage:	Removable terminal block:	Maximum current per point:	Maximum current per module:	Backplane current:
1756-OA8	8 (2 sets of 4)	120/240V ac	74-265V ac	1756-TBNH 1756-TBSH (20 pins)	2A @ 60°C	5A @ 30°C 4A @ 60°C	200mA @ 5V 2mA @ 24V 1.07W
1756-OA8D	8 (2 sets of 4)	120V ac	74-132V ac	1756-TBNH 1756-TBSH (20 pins)	1.0A @ 30°C 0.5A @ 60°C	8A @ 30°C 4A @ 60°C	175mA @ 5V 250mA @ 24V 6.89W
1756-OA8E	8 (2 sets of 4)	120V ac	74-132V ac	1756-TBNH 1756-TBSH (20 pins)	2A @ 60°C (4A/set @ 30°C 2A/set @ 60°C)	8A @ 30°C 4A @ 60°C	200mA @ 5V 250mA @ 24V 7.02W
1756-OA16	16 (2 sets of 8)	120/240V ac	74-265V ac	1756-TBNH 1756-TBSH (20 pins)	0.5A @ 60°C (2A/set @ 60°C)	4A @ 60°C	400mA @ 5V 2mA @ 24V 2.09W
1756-OA16I	16 (individually isolated)	120/240V ac	74-265V ac	1756-TBCH 1756-TBS6H (36 pins)	2A @ 30°C 1A @ 60°C	5A @ 30°C 4A @ 60°C	300mA @ 5V 2.5mA @ 24V 1.6W
1756-ON8	8 (2 sets of 4)	24V ac	10-30V ac	1756-TBNH 1756-TBSH (20 pins)	2A @ 60°C	5A @ 30°C 4A @ 60°C	200mA @ 5V 2mA at 24V 1.07W

Digital dc output modules

Catalog number:	Number of outputs:	Voltage category:	Operating voltage:	Removable terminal block:	Maximum current per point:	Maximum current per module:	Backplane current:
1756-OB8	8 (2 sets of 4)	12/24V dc source	10-30V dc	1756-TBNH 1756-TBSH (20 pins)	2A @ 60°C	8A @ 60°C	165mA @ 5V 2mA @ 24V 0.89W
1756-OB8EI	8 (individually isolated)	12/24V dc source or sink	10-30V dc	1756-TBCH 1756-TBS6H (36 pins)	2A @ 60°C	16A @ 55°C 10A @ 60°C	250mA @ 5V 2mA @ 24V 1.32W
1756-OB16D	16 (2 sets of 8)	24V dc source	19.2-30V dc	1756-TBCH 1756-TBS6H (36 pins)	2A @ 30°C 1A @ 60°C	8A @ 30°C 4A @ 60°C	250mA @ 5V 140mA @ 24V 4.64W
1756-OB16E	16 (2 sets of 8)	12/24V dc source	10-31.2V dc	1756-TBNH 1756-TBSH (20 pins)	1A @ 60°C	8A @ 60°C	250mA @ 5V 2mA @ 24V 1.32W
1756-OB16I	16 (individually isolated)	12/24V dc source or sink	10-30V dc	1756-TBCH 1756-TBS6H (36 pins)	resistive: 2A @ 30°C 1A @ 60°C inductive: 1A @ 60°C	8A @ 30°C 4A @ 60°C	350mA @ 5V 2.5mA @ 24V 1.85W
1756-OB32	32 (2 sets of 16)	12/24V dc source	10-31.2V dc	1756-TBCH 1756-TBS6H (36 pins)	0.5A @ 50°C 0.35A @ 60°C	16A @ 50°C 10A @ 60°C	300mA @ 5V 2.5mA @ 24V 1.58W
1756-OC8	8 (2 sets of 4)	48V dc source	30-60V dc	1756-TBNH 1756-TBSH (20 pins)	2A @ 60°C	8A @ 60°C	165mA @ 5V 2mA @ 24V 0.89W
1756-OH8I	8 (individually isolated)	120V dc source or sink	90-146V dc	1756-TBCH 1756-TBS6H (36 pins)	2A @ 60°C	8A @ 60°C	250mA @ 5V 2mA @ 24V 1.12W

Digital contact output modules

Catalog number:	Number of outputs:	Type of contact outputs:	Removable terminal block:	Operating voltage:	Output current:	Backplane current:
1756-OW16I	16 (individually isolated)	16 N.O.	1756-TBCH 1756-TBS6H (36 pins)	10-265V ac 5-150V dc	2A @ 125/240V ac 2A @ 5-30V dc 0.5A @ 48V dc 0.25A @ 125V dc	150mA @ 5V 150mA @ 24V 4.37W
1756-OX8I	8 (individually isolated)	1 set of form-C contacts for each output	1756-TBCH 1756-TBS6H (36 pins)	10-265V ac 5-150V dc	2A @ 125/240V ac 2A @ 5-30V dc 0.5A @ 48V dc 0.25A @ 125V dc	100mA @ 5V 100mA @ 24V 2.91W

1756 Analog I/O Modules

The 1756 analog I/O modules support:

- removal and insertion under power (RIUP)
- producer/consumer based communications
- rolling time stamp of data
- system time stamp of data
- IEEE 32-bit floating point or 16-bit integer data formats
- direct-connect communications

Catalog number:	Number of inputs:	Number of outputs:	Voltage range:	Current range:	Removable terminal block:	Backplane current:
1756-IF8	8 single-ended, 4 differential, or 2 high-speed differential	none	user configurable • ±10.25V • 0-5.125V • 0-10.25V	0-20.5mA	1756-TBCH 1756-TBS6H (36 pins)	150mA @ 5V 40mA @ 24V 2.33W
1756-IF6I	6 isolated	none	user configurable • ±10.5V • 0-5.25V • 0-10.5V	0-21mA	1756-TBNH 1756-TBSH (20 pins)	250mA @ 5V 100mA @ 24V 3.7W
1756-IF16	16 single-ended, 8 differential, or 4 high-speed differential	none	user configurable • ±10.25V • 0-5.125V • 0-10.25V	0-20.5mA	1756-TBCH 1756-TBS6H (36 pins)	150mA @ 5V 65mA @ 24V 2.33W
1756-IR6I	6 isolated RTD	none	RTD sensors supported: • 100, 200, 500, 1000Ω Platinum, alpha=385 • 100, 200, 500, 1000Ω Platinum, alpha=3916 • 120Ω Nickel, alpha=672 • 100, 120, 200, 500Ω Nickel, alpha=618 • 10Ω Copper		1756-TBNH 1756-TBSH (20 pins)	250mA @ 5V 125mA @ 24V 4.25W
1756-IT6I	6 isolated thermocouple 1 cold junction temperature	none	• -12mV to 78mV • -12mV to 30mV Thermocouples supported: • Type B: 250 to 1820°C (482 to 3308°F) • Type C: 0 to 2315°C (23 to 4199°F) • Type E: -270 to 1000°C (-454 to 1832°F) • Type J: -210 to 1200°C (-346 to 2192°F) • Type K: -270 to 1372°C (-454 to 2502°F) • Type N: -270 to 1300°C (-454 to 2372°F) • Type R: -50 to 1768°C (-58 to 3214°F) • Type S: -50 to 1768°C (-58 to 3214°F) • Type T: -270 to 400°C (-454 to 752°F)		1756-TBNH 1756-TBSH (20 pins)	250mA @ 5V 125mA @ 24V 4.3W
1756-OF4	none	4 voltage or current	±10.4V	0-21mA	1756-TBNH 1756-TBSH (20 pins)	150mA @ 5V 120mA @ 24V 3.65W
1756-OF6CI	none	6 isolated	na	0-21mA	1756-TBNH 1756-TBSH (20 pins)	250mA @ 5V 225mA @ 24V 6.7W (0-550Ωloads) or 250mA @ 5V 300mA @ 24V 8.5W (>550Ωloads)
1756-OF6VI	none	6 isolated	±10.5	na	1756-TBNH 1756-TBSH (20 pins)	250mA @ 5V 175mA @ 24V 5.5W
1756-OF8	none	8 voltage or current	±10.4	0-21mA	1756-TBNH 1756-TBSH (20 pins)	150mA @ 5V 210mA @ 24V 5.8W

1756 Specialty I/O Modules

The 1756 series of I/O modules includes these specialty I/O modules:

1756-HSC high speed counter

The 1756-HSC module provides 4 high-speed, output-switching, ON-OFF windows. The module uses pulses for counting and frequency. The module interfaces with pulse devices and encoders, such as:

- photoswitch series 10,000 photoelectric sensors
- bulletin 872 3-wire DC proximity sensors
- bulletin 845 incremental encoders

The 1756-HSC module can update data every 2ms. The module is most effective when you use a single sensor for each of the two channels on the module. If necessary, you can connect a single sensor to multiple channels or modules.

Mode of operation:		Input data:	Output data:	Backplane current:
counter rate measurement encoder debounce filter	1 MHz maximum 500KHz maximum 250KHz maximum 70Hz maximum	2 counters, each with A, B, and Z inputs 5V dc and 12-24V dc 16,777,216 maximum counts	4 outputs (2 outputs/common) 2 on/off preset values per output 20mA @4.5-5.5V dc 1A @10-31.2V dc	300mA @ 5V 3mA @ 24V 1.6W

1756-PLS programmable limit switch

The 1756-PLS module supports enhanced packaging applications where you require:

- deterministic module operation for operations up to 1500 parts per minute (PPM)
- detection of 1.08 degrees of rotation at 1800 RPM
- fast switching of ON-OFF windows
- multi-turn capabilities using resolvers
- direct drive on most pneumatic solenoid or glue guns

The module accepts any R3-style resolver, such as the bulletin 846 resolvers. The module provides excitation to the resolver at 5K Hz @ 7.0V ac and directly connects to the sine and cosine outputs of the resolver.

Module configuration:	Input/Output data:	Removable terminal block:	Backplane current:
requires 3 contiguous slots in chassis	left section: 2 groups of 4 outputs and 4 inputs each center section: resolver interface and I/O control right section: 2 groups of 4 outputs and 4 inputs each	requires 3 RTBs 1756-TBNH or 1756-TBSH (20 pins)	1A @ 5V 1A @ 125V 130W

1756 Removable Terminal Blocks

Removable terminal blocks (RTBs) provide a flexible interconnection between your plant wiring and 1756 I/O modules. The RTB plugs into the front of the I/O module. The type of I/O module determines which RTB you need. You choose screw-clamp or spring-clamp RTBs.

RTBs are not shipped with I/O modules. You must order them separately. The standard housing on the front of the wiring arm is not deep enough for 14 AWG wiring. If you plan to use 14 AWG wiring, also order the extended housing.

Catalog number:	Description:	Weight:
1756-TBNH	screw-clamp with 20-pin connection	0.1 kg (0.3lb)
1756-TBSH	spring-clamp with 20-pin connection	0.1 kg (0.2lb)
1756-TBCH	screw-clamp with 36-pin connection	0.1 kg (0.3lb)
1756-TBS6H	spring-clamp with 36-pin connection	0.1 kg (0.2lb)
1756-TBE	extended housing; required for additional wiring space if using 14 AWG wiring	0.05 kg (0.1 lb)

1492 Wiring Systems

As an alternative to buying RTBs and connecting the wires yourself, you can buy a wiring system of:

- interface modules (IFMs) that mount on DIN rails and have pre-wired cables. One end of the cable assembly plugs into the IFM. The other end is an RTB that plugs into the front of the I/O module.

- I/O-module-ready cables. One end of the cable assembly is an RTB that plugs into the front of the I/O module. The other end has individually color-coded conductors that connect to a standard terminal block.

See the following tables for the available IFMs and cables.

IFMs for 20-pin 1756 digital I/O modules

Catalog number:	Type of IFM:	Description:	IA8D	IA16	IB16	IC16	IN16	OA8	OA8D	OA8E	OA16	OB8	OB16E	OC8	ON8
1492-IFM20F	feed through	standard	U	X	X	X	X	U	U	U	X	U	X	U	U
1492-IFM20FN	feed through	narrow standard	U	X	X	X	X	U	U	U	X	U	X	U	U
1492-IFM20F-2	feed through	extra terminals	U	X	X	X	X	U	U	U	X	U	X	U	U
1492-IFM20F-3	feed through	3-wire sensor type input devices		X	X	X	X								
1492-IFM20D24	LED indicating	standard with 24V ac/dc LEDs			X		X						X		
1492-IFM20D24N	LED indicating	narrow standard with 24V ac/dc LEDs			X		X						X		
1492-IFM20D120	LED indicating	standard with 120V ac LEDs	U	X											
1492-IFM20D24-2	LED indicating	24V ac/dc LEDS and extra terminals for outputs											X		
1492-IFM20D24A-2	LED indicating	24V ac/dc LEDS and extra terminals for inputs			X		X								
1492-IFM20D120-2	LED indicating	120V ac LEDs and extra terminals for outputs									X				
1492-IFM20D120A-2	LED indicating	120V ac LEDs and extra terminals for inputs	U	X											
1492-IFM20D24-3	LED indicating	3-wire sensor with 24V ac/dc LEDs			X		X								
1492-IFM20DS24-4	LED indicating	isolated with 24/48V ac/dc LEDs and 4 terminals for outputs										W		W	W
1492-IFM20DS120-4	LED indicating	isolated with 120V ac LEDs and 4 terminals for outputs						W	V	V					
1492-IFM20F-F-2	fusible	extra terminals for outputs									X		X		
1492-IFM20F-F24-2	fusible	extra terminals with 24V ac/dc blown fuse indicators for outputs											X		
1492-IFM20F-F120-2	fusible	extra terminals with 120V ac blown fuse indicators for outputs									X				
1492-IFM20F-F240-2	fusible	extra terminals with 240V ac blown fuse indicators for outputs									X				
1492-IFM20F-F24A-2	fusible	extra terminals with 24V ac/dc blown fuse indicators for inputs			X		X								
1492-IFM20F-F120A-2	fusible	extra terminals with 120V ac blown fuse indicators for inputs		X											
1492-IFM20F-FS-2	fusible	isolated with extra terminals for outputs						W	V	V		W		W	W
1492-IFM20F-FS24-2	fusible	isolated with extra terminals and 24V ac/dc blown fuse indicators for outputs										W		W	W
1492-IFM20F-FS24A-4	fusible	isolated with 4 terminals and 24V ac/dc blown fuse indicators for inputs	U												
1492-IFM20F-FS120-2	fusible	isolated with extra terminals with 120V ac blown fuse indicators for outputs						W	V	V					
1492-IFM20F-FS120-4	fusible	isolated with 4 terminals with 120V ac blown fuse indicators for outputs						W	V	V					
1492-IFM20F-FS120A-4	fusible	isolated with 4 terminals with 120V ac blown fuse indicators for inputs	U												
1492-IFM20F-FS240-4	fusible	isolated with 4 terminals with 240V ac blown fuse indicators for outputs						W							

Find the column for the digital I/O module. Follow the column down to see what digital IFMs are compatible with the I/O module as indicated by a letter code. When you select the IFM, use the letter code from this chart to find the compatible cable in the following table for digital pre-wired cabled. The letter code must match the last character of the catalog number for the cable.

IFMs for 36-pin 1756 digital I/O modules

Catalog number:	Type of IFM:	Description:	IA6I	IB16D	IB16I	IB32	IH16I	IM16I	OA16I	OB8EI	OB16D	OB16I	OB32	OH8I	OW16I	OX8I
1492-IFM40F	feed through	standard	Y	Y	Y	Z	Y		Y	Y	Y	Y	Z	Y	Y	Y
1492-IFM40F-2	feed through	extra terminals		Y		Z					Y		Z			
1492-IFM40F-3	feed through	3-wire sensor type input devices				Z										
1492-IFM40D24	LED indicating	standard with 24V ac/dc LEDs				Z							Z			
1492-IFM40D24-2	LED indicating	24V ac/dc LEDs and extra terminals for outputs											Z			
1492-IFM40D24A-2	LED indicating	24V ac/dc LEDs and extra terminals for inputs				Z										
1492-IFM40D120-2	LED indicating	120V ac LEDs and extra terminals for outputs														
1492-IFM40D120A-2	LED indicating	120V ac LEDs and extra terminals for inputs														
1492-IFM40D24-3	LED indicating	3-wire sensor with 24V ac/dc LEDs for inputs				Z										
1492-IFM40DS24-4	LED indicating	isolated with 24/48V ac/dc LEDs and 4 terminals per output								Y	Y	Y			Y	Y
1492-IFM40DS24A-4	LED indicating	isolated with 24/48V ac/dc LEDs and 4 terminals per input		Y	Y											
1492-IFM40DS120-4	LED indicating	isolated with 120V ac LEDs and 4 terminals per output							Y						Y	Y
1492-IFM40DS120A-4	LED indicating	isolated with 120V ac LEDs and 4 terminals per input	Y													
1492-IFM40DS240A-4	LED indicating	isolated with 240V ac LEDs and 4 terminals per output						Y								
1492-IFM40F-F-2	fusible	extra terminals for outputs											Z			
1492-IFM40F-F24-2	fusible	extra terminals with 24V ac/dc blown fuse indicators for outputs											Z			
1492-IFM40F-F120-2	fusible	extra terminals with 120V ac blown fuse indicators for outputs														
1492-IFM40F-FS-2	fusible	isolated with extra terminals for outputs							Y	Y	Y	Y		Y	Y	Y
1492-IFM40F-FS24-2	fusible	isolated with extra terminals and 24V ac/dc blown fuse indicators for outputs								Y	Y	Y			Y	Y
1492-IFM40F-FS24-4	fusible	isolated with 24V ac/dc blown fuse indicators and 4 terminals per output								Y	Y	Y			Y	Y
1492-IFM40F-FS120-2	fusible	isolated with extra terminals and 120V ac blown fuse indicators for outputs							Y					Y	Y	Y
1492-IFM40F-FS120-4	fusible	isolated with 120V ac blown fuse indicators and 4 terminals per output							Y						Y	Y
1492-IFM40F-FS240-4	fusible	isolated with 240V ac blown fuse indicators and 4 terminals per output							Y						Y	Y
1492-IFM40F-FS24A-4	fusible	isolated with 24V ac/dc blown fuse indicators and 4 terminals per input		Y	Y											
1492-IFM40F-FS120A-4	fusible	isolated with 120V ac blown fuse indicators and 4 terminals per input	Y				Y									

Find the column for the digital I/O module. Follow the column down to see what digital IFMs are compatible with the I/O module as indicated by a letter code. When you select the IFM, use the letter code from this chart to find the compatible cable in the following table for digital pre-wired cabled. The letter code must match the last character of the catalog number for the cable.

Pre-wired cables for digital I/O modules

Catalog number:[1]	Number of conductors:	Conductor size:	Nominal outer diameter:	RTB at the I/O module end:
1492-CABLE*x*U	20	22 AWG	9.0 mm (0.36 in)	1756-TBNH
1492-CABLE*x*V	20	22 AWG	9.0 mm (0.36 in)	1756-TBNH
1492-CABLE*x*W	20	22 AWG	9.0 mm (0.36 in)	1756-TBNH
1492-CABLE*x*X	20	22 AWG	9.0 mm (0.36 in)	1756-TBNH
1492-CABLE*x*Y	40	22 AWG	11.7 mm (0.46 in)	1756-TBCH
1492-CABLE*x*Z	40	22 AWG	11.7 mm (0.46 in)	1756-TBCH

1. Cables are available in lengths of 0.5m, 1.0m, 2.5m, and 5.0m. To order, insert the code for the desired cable length into the catalog number in place of the *x*: 005=0.5m, 010=1.0m, 025=2.5m, 050=5m.

I/O-module-ready cables for digital I/O modules

Catalog number:[1]	Number of conductors:	Conductor size:	Nominal outer diameter:	RTB at the I/O module end:
1492-CABLE*x*TBNH	20	18 AWG	9.0 mm (0.36 in)	1756-TBNH
1492-CABLE*x*TBCH	40[2]	18 AWG	11.7 mm (0.46 in)	1756-TBCH

1. Cables are available in lengths of 0.5m, 1.0m, 2.5m, and 5.0m. To order, insert the code for the desired cable length into the catalog number in place of the *x*: 005=0.5m, 010=1.0m, 025=2.5m, 050=5m.
2. Four conductors are not connected to the RTB.

For example, a 1756-OB32 that requires LEDs and extra terminals uses:

- 1492-IFM40D24-2 interface module
- 1492-ACABLE*x*Z cable (replace *x* with the appropriate length)

IFMs for 1756 analog I/O modules

Catalog number:	Type of IFM:	Description:	IF6I (current)	IF6I (voltage)	IF8 (single-end voltage)	IF8 (single-end current)	IF8 (differential voltage)	IF8 (differential current)	IF16 (single-end voltage)	IF16 (single-end current)	IF16 (differential voltage)	IF16 (differential current)	IR6I	IT6I	OF4 (voltage)	OF4 (current)	OF6CI	OF6VI	OF8 (voltage)	OF8 (current)
1492-AIFM4-3	feed through	4 channel with 3 terminals/channel													VA	VB				
1492-AIFM6S-3	feed through	6 channel isolated with 3-4 terminals/channel	X	Y									Z				Y	Y		
1492-AIFM8-3	feed through	8 channel with 3 terminals/channel			TA	TB	TC	TD	UA	UB	UC	UD							WA	WB
1492-AIFM6TC-3	thermo couple	6 channel with 3 terminals/channel												Y						
1492-AIFM8-F-5	fusible	8 channel with 5 terminals/channel			TA	TB	TC	TC												
1492-AIFM16-F-3	fusible	16 channel with 3 terminals/channel							UA	UB	UC	UD								
1492-AIFM16-F-5	fusible	16 channel with 5 terminals/channel							UA	UB	UC	UD								

Find the column for the analog I/O module. Follow the column down to see what analog IFMs are compatible with the I/O module as indicated by a letter code. When you select the IFM, use the letter code from this chart to find the compatible cable in the following table for analog pre-wired cabled. The letter code must match the last character of the catalog number for the cable.

Pre-wired cables for analog I/O modules

Catalog number:[1]	Number of conductors:[2]	Conductor size:	Nominal outer diameter:	RTB at the I/O module end:
1492-ACABLE*x*X	9 twisted pair[3]	24 AWG	6.8 mm (0.27 in)	1756-TBNH
1492-ACABLE*x*Y	9 twisted pair[4]	24 AWG	6.8 mm (0,27 in)	1756-TBNH
1492-ACABLE*x*Z	20 conductors[5]	22 AWG	8.4 mm (0.33 in)	1756-TBNH
1492-ACABLE*x*TA	20 conductors	22 AWG	8.4 mm (0.33 in)	1756-TBCH
1492-ACABLE*x*TB	20 conductors	22 AWG	8.4 mm (0.33 in)	1756-TBCH
1492-ACABLE*x*TC	5 twisted pair	22 AWG	8.4 mm (0.33 in)	1756-TBCH
1492-ACABLE*x*TD	5 twisted pair	22 AWG	8.4 mm (0.33 in)	1756-TBCH
1492-ACABLE*x*UA	20 conductors	22 AWG	8.4 mm (0.33 in)	1756-TBCH
1492-ACABLE*x*UB	20 conductors	22 AWG	8.4 mm (0.33 in)	1756-TBCH
1492-ACABLE*x*UC	9 twisted pair	24 AWG	6.8 mm (0.27 in)	1756-TBCH
1492-ACABLE*x*UD	9 twisted pair	24 AWG	6.8 mm (0.27 in)	1756-TBCH
1492-ACABLE*x*VA	20 conductors	22 AWG	8.4 mm (0.33 in)	1756-TBNH
1492-ACABLE*x*VB	20 conductors	22 AWG	8.4 mm (0.33 in)	1756-TBNH
1492-ACABLE*x*WA	9 twisted pair	24 AWG	6.8 mm (0.27 in)	1756-TBNH
1492-ACABLE*x*WB	9 twisted pair	24 AWG	6.8 mm (0.27 in)	1756-TBNH

1. Cables are available in lengths of 0.5m, 1.0m, 2.5m, and 5.0m. To order, insert the code for the desired cable length into the catalog number in place of the *x*: 005=0.5m, 010=1.0m, 025=2.5m, 050=5m.
2. Each cable for analog I/O has an overall shield with a ring lug on a 200mm (8.87 in) exposed drain wire at the I/O module end of the cable.
3. One pair is not connected to the I/O module connector; two additional pairs are not used.
4. Two pairs are not used.
5. One conductor is not connected to the I/O module connector; one additional conductor is not used.

For example, a 1756-IF6I in voltage mode uses:

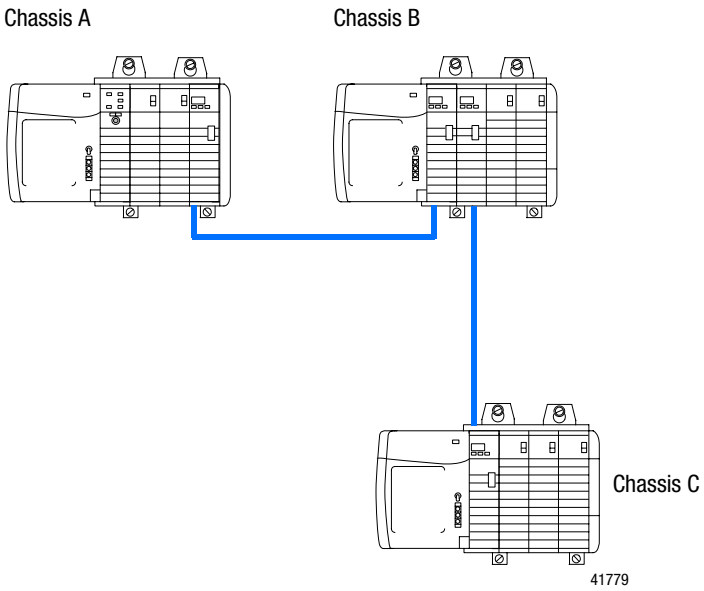
- 1492-AIFM6S-3 interface module
- 1492-ACABLE*x*Y cable (replace *x* with the appropriate length)

Placing ControlLogix I/O Modules

The producer/consumer model multicasts messages. This means that multiple nodes can consume the same data at the same time from a single device. Where you place I/O modules in the control system determines how the modules exchange data.

If the I/O module is:	And you place the module here:	The data exchange method is based on:
digital	local chassis	change of state **and / or** requested packet interval (cyclic)
	remote chassis	requested packet interval
analog	local chassis	real time sample **and / or** requested packet interval
	remote chassis	requested packet interval

For a ControlLogix controller to control 1756 I/O, it must be either in the same chassis as the controller or on a ControlNet network that is local to that controller. Scheduled communication cannot be bridged between two 1756-CNB modules over a ControlLogix backplane. For example:



The ControlLogix controller in Chassis A can control the 1756 I/O modules in Chassis A and in Chassis B, but not in Chassis C. The ControlLogix controller in Chassis A can only send messages to the devices in Chassis C.

How ControlLogix I/O Modules Operate

The type of module and where you place the module determines how the module operates:

Module Type:	Placement:	Operation:
digital input	local chassis	The RPI specifies the rate at which a module multicasts its data. The time ranges from 200 microseconds to 750 milliseconds. When the specified time frame elapses, the module will multicast data (also called cyclic data exchange). If a change of state (COS) does not occur within the RPI timeframe, the module multicasts data at the rate specified by the RPI. Because the RPI and COS functions are asynchronous to the logic scan, it is possible for an input to change state during program scan execution. If this is a concern, buffer input data so your logic has a stable copy of data during its scan. Copy the input data from your input tags to another structure and use the data from that structure.
	remote chassis	The RPI and COS values still define when the module multicasts data **within its own chassis**, but only the value of the RPI determines when the owner controller receives the data over the network. When an RPI value is specified for an input module in a remote chassis, in addition to instructing the module to multicast data within its own chassis, the RPI also "reserves" a spot in the stream of data flowing across the ControlNet network. The timing of this "reserved" spot may or may not coincide with the exact value of the RPI, but the owner-controller will receive data **at least as often** as the specified RPI.
digital output	local chassis	If the module resides in the same chassis as the owner-controller, the module receives the data almost immediately after the owner-controller sends it. Data is sent at the end of each program scan.
	remote chassis	If an output module resides in a chassis other than that of the owner-controller (i.e. a remote chassis connected via ControlNet), the owner-controller sends data to the output module **only** at the RPI rate. The RPI also "reserves" a spot in the stream of data flowing across the ControlNet network. The timing of this "reserved" spot may or may not coincide with the exact value of the RPI, but the output module receives data **at least as often** as the specified RPI.

Module Type:	Placement:	Operation:
analog input	local chassis	The RTS value specifies when the module scans its channels and multicasts the data (update the input data buffer then multicast). The RPI value specifies when the module multicasts the current contents of the input data buffer without scanning (updating) the channels. The module resets the RPI timer each time an RTS transfer occurs. If the RTS value is less than or equal to the RPI value, each multicast of data from the module has newly updated channel data. The module only multicasts at the RTS rate. If the RTS value is greater than the RPI, the module multicasts at both the RTS rate and the RPI rate.
	remote chassis	The RPI and RTS rates still define when the module multicasts data **within its own chassis**, but only the RPI value determines when the owner-controller receives the data over the network. The RPI also "reserves" a spot in the stream of data flowing across the ControlNet network. The timing of this "reserved" spot may or may not coincide with the exact value of the RPI, but the controller receives data **at least as often** as the specified RPI.
analog output	local chassis	The RPI value specifies when the owner-controller broadcasts output data to the module. If the module resides in the same chassis as the owner-controller, the module receives the data almost immediately after the owner-controller sends it.
	remote chassis	If an output module resides in a chassis other than that of the owner-controller (i.e. a remote chassis connected via ControlNet), the owner-controller sends data to the output module **only** at the RPI rate. The RPI also "reserves" a spot in the stream of data flowing across the ControlNet network. The timing of this "reserved" spot may or may not coincide with the exact value of the RPI, but the output module receives data **at least as often** as the specified RPI.

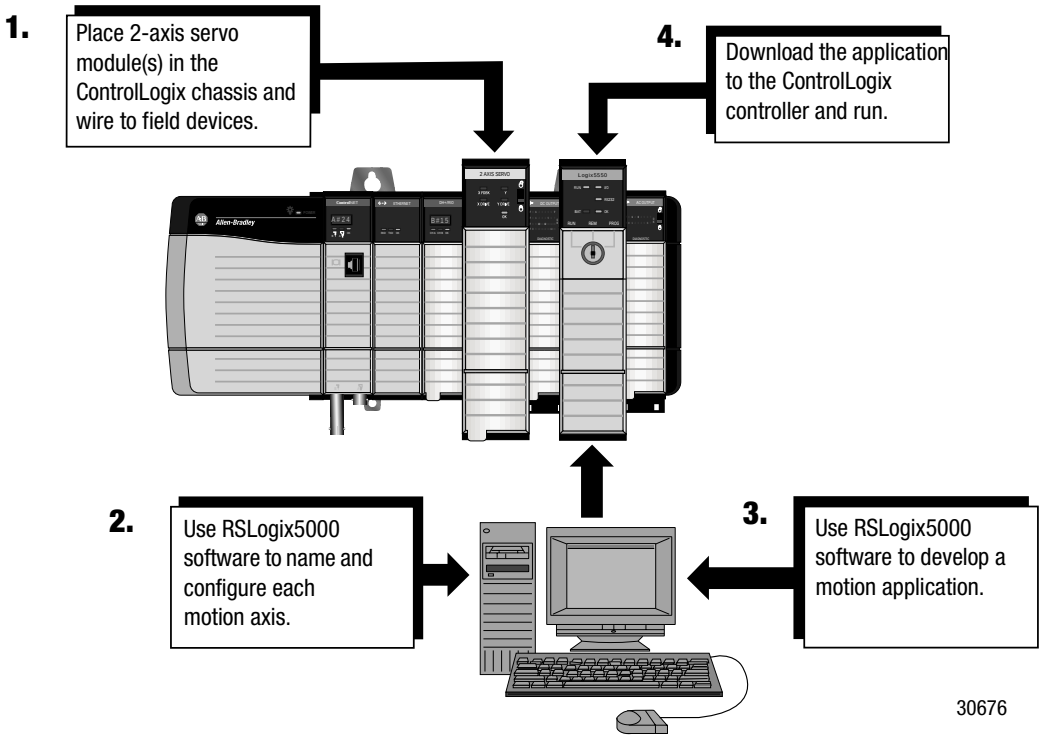
Selecting Controller Ownership

Every I/O module in the ControlLogix system must be owned by a ControlLogix controller. The owner controller stores configuration data for every I/O module that it owns and can be local or remote in regard to the I/O module's position. The owner controller sends the I/O configuration data to define the I/O module's behavior and to start the I/O module's operation within the control system. Each ControlLogix I/O module must continuously maintain communication with its owner controller to operate normally.

Typically, each I/O module has only one owner. Because listen-only controllers lose their connections to modules when communications with the owner controller stop, you can define more than one owner for an input module. If multiple controllers own the same input module, each controller must maintain identical configuration for that input module. An output module is limited to one owner.

Planning Motion

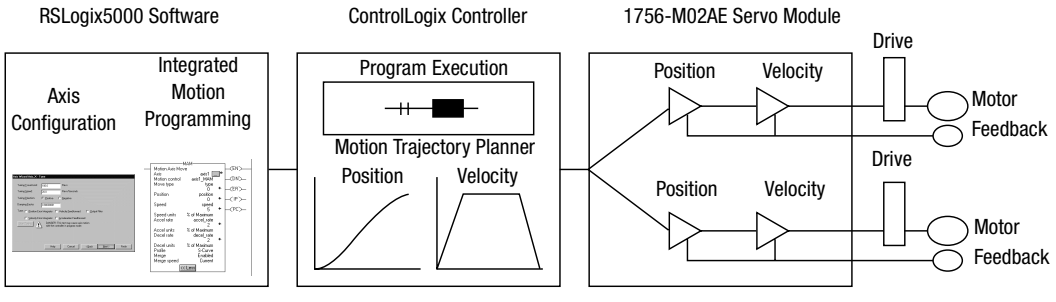
The ControlLogix system takes a new approach to integrating motion and sequential control. The ControlLogix system performs both these functions within the ControlLogix controller.



The ControlLogix controller executes the ladder motion commands. Each controller and chassis can control up to 16 1756-M02AE servo modules (for a total of 32 axes). The 1756-M02AE servo modules must be in the same local chassis as its ControlLogix controller.

The 1756-M02AE servo module connects to a servo drive and closes a high-speed position and velocity loop. Each 1756-M02AE module can control up to two axes.

RSLogix 5000 programming software provides complete axis configuration and motion programming support.



1756-M02AE Servo Module

The servo module is a 2-axis, closed-loop servo module that receives profile information from the ControlLogix controller. The servo module makes sure that the actuator (motor) follows the profile by monitoring the position feedback via the quadrature encoder input and generating an analog command reference for the drive. A position and velocity loop is closed every 200 µs using position feedback as the input and ±10V analog output.

Important: The servo module must be in the same chassis as the ControlLogix controller that controls the servo module. If you distribute motion control across different locations, place a ControlLogix controller in each chassis that has a servo module.

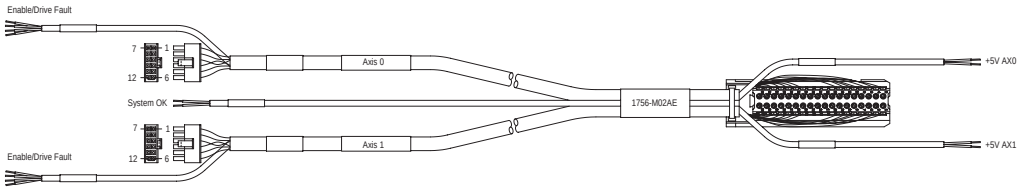
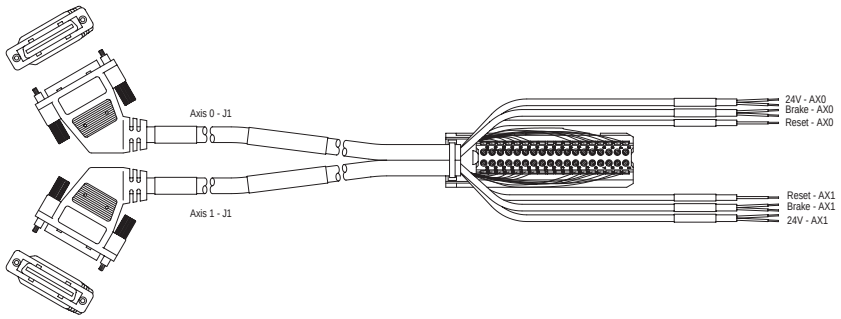
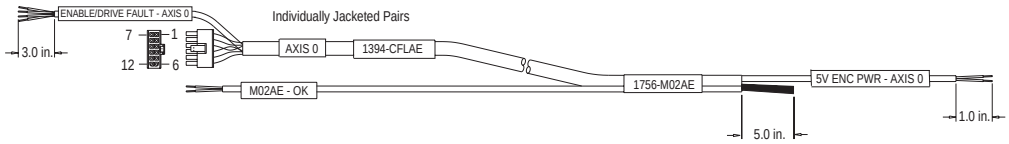
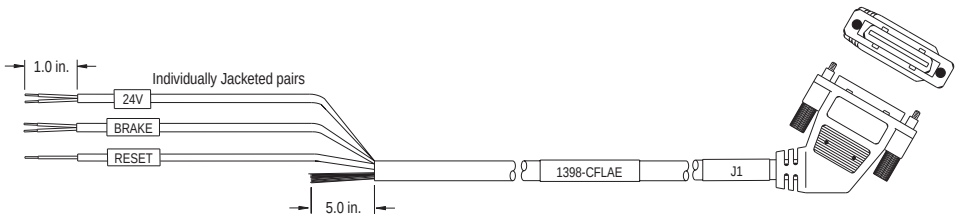
Description:	Value:
number of axes per ControlLogix controller	32 axes maximum
number of axes per module	2 axes maximum
power dissipation	5.5W maximum
backplane current	700 mA @ 5V dc 2.5 mA @ 24V dc 3.56W
operating temperature	0° to 60° C (32 to 140° F)
storage temperature	-40° to 85° C (-40 to 185° F)
relative humidity	5% to 95% noncondensing
maximum number of axes per coarse update rate The coarse update rates assume that the servo is on for each axis and that each axis has an active trapezoidal move.	coarse update rate: — maximum number of axes: 2 ms — 2 3 ms — 3 4 ms — 4 5 ms — 6 6 ms — 7 7 ms — 8 8 ms — 10 9 ms — 11 10 ms — 13 11 ms — 14 12 ms — 15 13 ms — 17 14 ms — 18 15 ms — 20 16 ms — 21 17 ms — 22 18 ms — 24 19 ms — 25 20 ms — 26 21 ms — 28 22 ms — 29 23 ms — 30 24 ms — 32
servo loop type gain resolution absolute position range rate	 nested PI digital position and velocity servo 32-bit floating point ±1,000,000,000 encoder counts 5 kHz
encoder input type mode rate electrical interface voltage range input impedance	 incremental AB quadrature with marker 4X quadrature 4 MHz counts per second maximum optically isolated 5V differential 3.4V to 5.0V differential 531 Ohms differential

Description:	Value:
registration inputs type 24V input voltage maximum minimum on maximum off 5V input voltage maximum minimum on maximum off input impedance 24V input 5V input response time	 optically isolated, current sourcing input +24V dc nominal 26.4V 18.5V 3.5 +5V dc nominal 5.5V 3.7V 1.5V 1.2 kOhms 9.5 kOhms 1µs
all other inputs type input voltage maximum minimum on maximum off input impedance	 optically isolated, current sinking input +24V dc nominal 26.4V 17.0V 8.5V 7.5 kOhms
servo output type isolation voltage range voltage resolution load maximum offset gain error	 analog voltage 200 kOhms ±10V 16 bits 5.6 kOhms resistive minimum 25 mV ±4%
all other outputs type operating voltage maximum operating current	 solid-state isolated relay contacts +24V dc nominal (Class 2 source) 26.4V 75 mA
removable terminal block (RTB)	1756-TBCH 1756-TBSH6
RTB screw torque (cage clamp)	5lb-in. (0.5 Nm) maximum
conductors wire size category	 14 gauge ($2mm^2$) stranded maximum[2] 3/64 inch (1.2 mm) insulation maximum 2[3]
agency certification (when product or packaging is marked)[1]	CE marked for all applicable directives FM approved

1. CSA certification - Class I Division 2, Group A, B, C, D or nonhazardous locations.
2. Maximum wire size will require the extended depth RTB housing (1756-TBE).
3. Use this conductor category information for planning conductor routing as described in the system level installation manual. See the *Programmable Controller Wiring and Grounding Guidelines*, publication number 1770-4.1.

Motion Cables

If you connect the 1756-M02AE module to a 1394 or 1398 series servo drive, choose one of these cables:

Catalog Number:	Description:
1394-CCAE*xx* *xx* = 01 for 1 meter 03 for 3 meter 08 for 8 meter 15 for 15 meter	1756-M02AE to a 1394 two-axis, analog servo module 
1398-CCAE*xx* *xx* = 01 for 1 meter 03 for 3 meter 08 for 8 meter 15 for 15 meter	1756-M02AE to a 1398 two-axis, analog servo module 
1394-CFLAE*xx* *xx* = 01 for 1 meter 03 for 3 meter 08 for 8 meter 15 for 15 meter	1756-M02AE to a 1394 single-axis, analog servo module 
1398-CFLAE*xx* *xx* = 01 for 1 meter 03 for 3 meter 08 for 8 meter 15 for 15 meter	1756-M02AE to a 1398 single-axis, analog servo module 

Developing a Motion Application

The ControlLogix system combines the controller, servo module, and programming software into a working motion application. You need only one programming software package to develop sequential and motion logic.

The ControlLogix controller executes the motion functions. The dedicated servo modules perform the position and velocity loop closure. The ControlLogix backplane feature of coordinated system time (CST) synchronizes the controllers and the servo modules and facilitates passing command and status information. To develop a motion application:

Task:	Description:
Specify the coordinated system time	You must configure one ControlLogix controller, in the same chassis as the motion module, to be the master controller for coordinated system time. You can compare CST data from modules within a single chassis to determine the relative time between data samples.
Add a motion module	Add the motion modules you need to the configuration of the master ControlLogix controller. The motion module must reside in the same chassis as the controller to be synchronized with that controller's coordinated system time.
Name and configure each axis	For each motion module you add, name each axis you configure for the module. Each module can support as many as 2 axes. You specify the type of axis and the axis positioning. You can also assign axes to a motion group.
Run hookup diagnostics and auto tuning	After you add all the motion modules and configure all the axes, run the hookup diagnostics and auto tuning utilities to make sure the motion modules are ready to operate.
Develop the motion control logic	The ControlLogix system includes a common programming software package that you can use to program your motion logic, as well as your sequential logic.

Calculating Coarse Update Rates

To calculate the coarse update rate for the number of motion modules and axes in your ControlLogix system, use this formula (see below for definitions of the variables):

Baseline task time + [(Actions for axis 1) + (Actions for axis 2) + (Actions for axis n)] = Execution time

Defining baseline task time

The baseline task time is the time it takes to update the motion modules. The task time increases as the number of modules increases:

Number of modules:	Baseline task time in µs:	Number of modules:	Baseline task time in µs:
1 (2 axes maximum)	415	9 (18 axes maximum)	1815
2 (4 axes maximum)	590	10 (20 axes maximum)	1960
3 (6 axes maximum)	765	11 (22 axes maximum)	2165
4 (8 axes maximum)	940	12 (24 axes maximum)	2340
5 (10 axes maximum)	1115	13 (26 axes maximum)	2515
6 (12 axes maximum)	1290	14 (28 axes maximum)	2690
7 (14 axes maximum)	1465	15 (30 axes maximum)	2865
8 (16 axes maximum)	1640	16 (32 axes maximum)	3040

Defining action timing

An axis can perform these actions:

Action:	Action execution time in µs:
Turning the module on	60
Performing a trapezoidal move	440
Performing an S-curve move	180
Performing a trapezoidal jog	70
Performing an S-curve jog	80
Performing an actual position gear	440
Performing a command position gear	320

Planning Network Communications

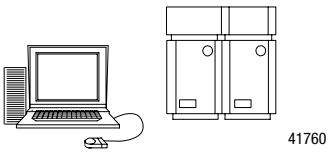
Interfacing with communication networks is modular, except for the RS-232 serial (DF1 protocol) port built into the front of the ControlLogix controller. Separate communication interface modules are available for interfacing the backplane with Ethernet, ControlNet, DeviceNet, DH+, and Universal Remote I/O networks. If you place multiple communication interface modules in a ControlLogix backplane, you can configure a gateway to bridge and route control and information data between networks.

A ControlLogix controller communicates across the backplane with 1756 I/O modules in the local chassis. A ControlLogix controller can also communicate across the backplane with communication interface modules to monitor and control I/O on ControlNet, DeviceNet, and the Universal Remote I/O networks and to monitor Foundation Fieldbus data. General communication messages can be sent from or received by ControlLogix controllers across Ethernet, ControlNet, DeviceNet, DH+, Universal Remote I/O, and RS-232 serial (DF1 protocol) networks.

Messages are sent directly from one communication interface module to another across the backplane. You can route a message through a maximum of 4 chassis (8 communication hops).

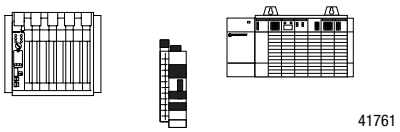
You determine your communication architecture based on your networking needs. There are three main types of networks:

Information networks



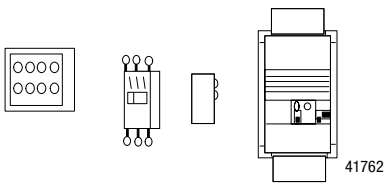
An information network:
- provides a link between the plant floor and manufacturing systems
- connects to multiple vendor's host computers
- has the capacity to transfer large data files
- supports standard network management and troubleshooting tools

Control networks



A control network:
- offers real-time performance
- is deterministic and repeatable
- supports peer-to-peer messaging
- connects to programmable controllers, personal computers, man-machine interface devices, drives, motion devices, etc.
- support programming and device configuration

Device networks



A device network:
- reduces wiring costs because devices do not need to be directly wired to a programmable controller
- supports device-level diagnostics
- connects to multiple vendors' devices

You can configure your system for information exchange between a range of devices and computing platforms and operating systems. You select the communication interface module(s) for the network(s) that meet your needs:

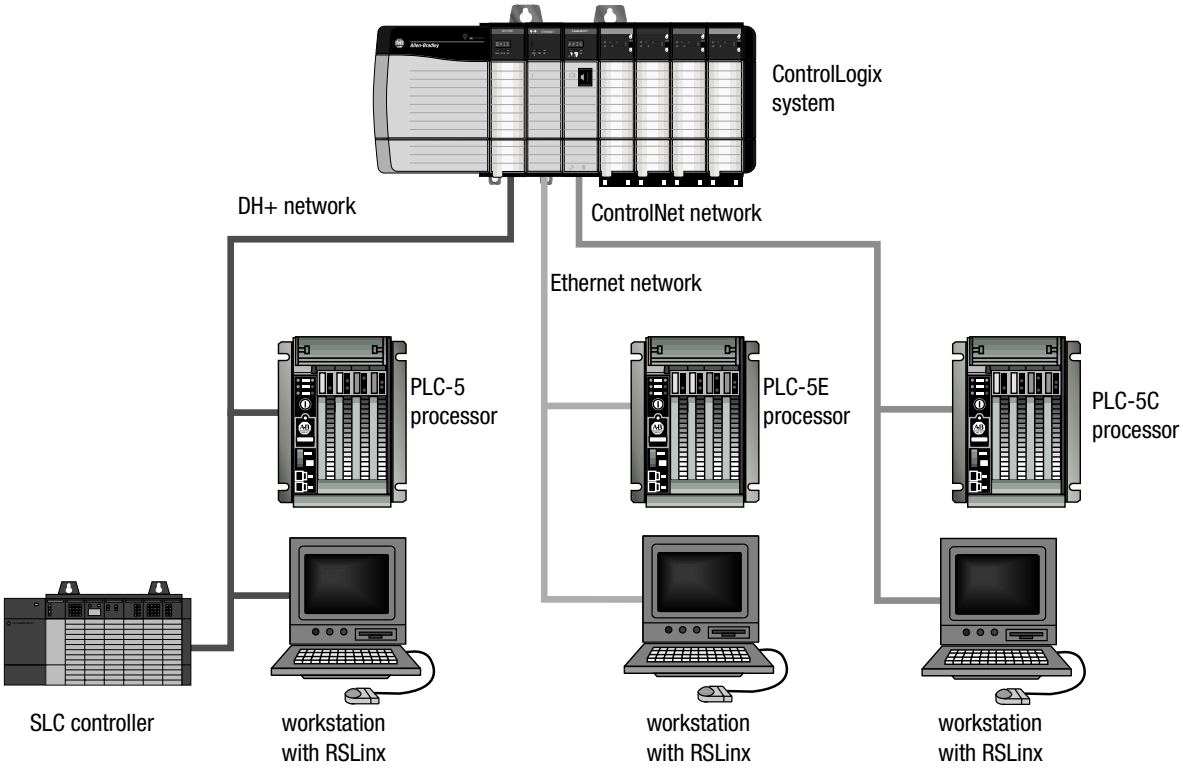
If your application requires:	Use this network:	Type:
• high-speed transfer of time-critical data between controllers and I/O devices • deterministic and repeatable data delivery • program maintenance • media redundancy or intrinsic safety options	ControlNet network *see page 43*	*control and information network*
• connections between controllers and I/O adapters • distributed controllers so that each controller has its own I/O and communicates with a supervisory controller	Universal Remote I/O network *see page 52*	*control network*
• connections of low-level devices directly to plant floor controllers, without the need to interface them through I/O modules • more diagnostics for improved data collection and fault detection • less wiring and reduced start-up time than a traditional, hard-wired system	DeviceNet network *see page 47*	*device network*
• Fieldbus transmitters and actuators • closed-loop control • process automation	Fieldbus network *see page* 49	*device network*
• recommended medium for plant-wide sharing of data • high-speed data transfer between information systems and/or a large quantity of controllers • Internet/Intranet connection • program maintenance	Ethernet network *see page 45*	*information network*
• plantwide and cell-level data sharing with program maintenance	Data Highway Plus *see page 51*	*information network*
• modems • supervisory control and data acquisition (SCADA)	serial network *see page 54*	*serial network*

Connecting Devices Across Multiple Platforms

You can use your ControlLogix system to bridge and route control and information data. Communication does not depend on a controller in the chassis. You can bridge across these networks:

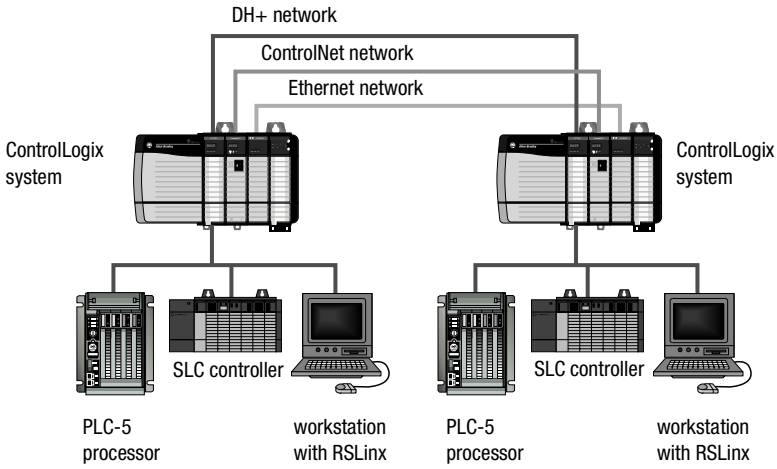
- DH+ network
- Ethernet network
- ControlNet network

Bridging between devices



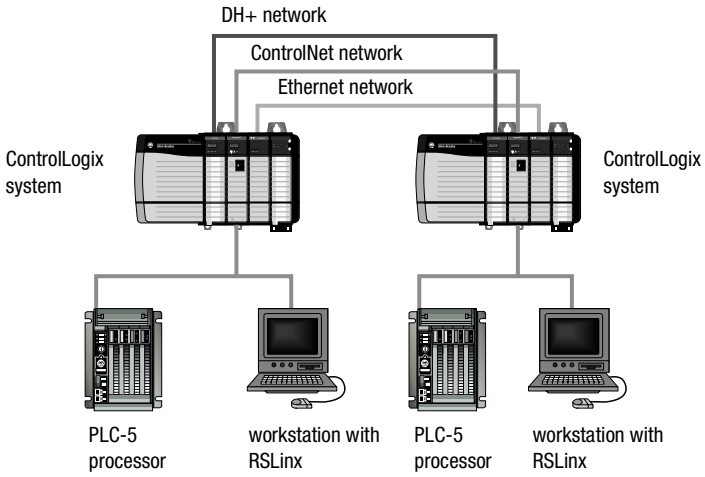
Origin \ Reply		DH+ network			Ethernet network		ControlNet network	
		PLC-5 processor	SLC 5/04 processor	RSLinx software	PLC-5E processor	RSLinx software	PLC-5C processor	RSLinx processor
DH+ network	PLC-5 processor	yes	yes	yes	yes	yes	yes	yes
	SLC-5/04 processor	yes	yes	yes	yes	yes	yes	yes
	RSLinx software	yes	yes	na	yes	na	yes	na
Ethernet network	PLC-5E processor	yes	yes	yes	yes	yes	yes	yes
	RSLinx software	yes	yes	na	yes	na	yes	na
ControlNet network	PLC-5C processor	yes	yes	yes	yes	yes	yes	yes
	RSLinx software	yes	yes	na	yes	na	yes	na

Distributed DH+ bridging



Origin \ Reply		DH+ network		
		PLC-5 processor	SLC 5/04 processor	RSLinx software
DH+ network	PLC-5 processor	yes	yes	yes
	SLC-5/04 processor	yes	yes	yes
	RSLinx software	yes	yes	na

Distributed ControlNet bridging

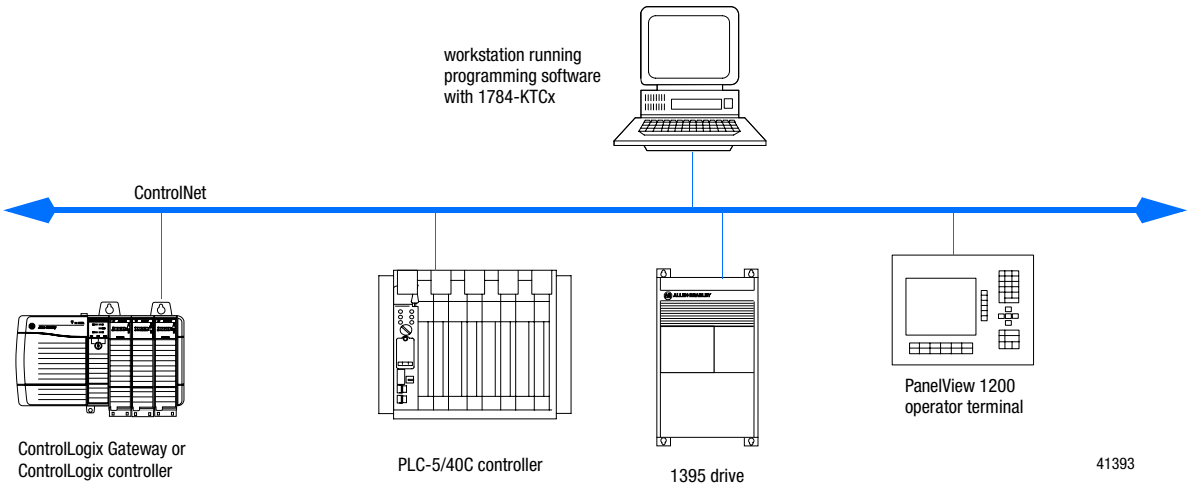


Origin \ Reply		ControlNet network	
		PLC-5 processor	RSLinx software
ControlNet network	PLC-5 processor	yes	yes
	RSLinx software	yes	na

ControlNet Network

The ControlNet network is an open, high-speed, and deterministic network used for transmitting time-critical information. It provides real-time control and messaging services for peer-to-peer communication. As a high-speed link between controllers and I/O devices, a ControlNet network combines the capabilities of existing Universal Remote I/O and DH+ networks. You can connect a variety of devices to a ControlNet network, including personal computers, controllers, operator interface devices, drives, I/O modules, and other devices with ControlNet connections.

At the control layer, a ControlNet network combines the functionality of an I/O network and a peer-to-peer messaging network. This open network provides the performance required for critical control data, such as I/O updates and controller-to-controller interlocking. ControlNet also supports transfers of non-critical data, such as program uploads, downloads, and messaging.



1756-CNET ControlNet statistics

Rates:	Cable lengths:	Maximum number of nodes:
transmission: 5 Mbps network update time: 2-100ms	1000m (3,280 ft.) with 2 devices 250m (820 ft.) with a maximum of 48 devices tap drop cable length fixed at 1m (3 ft.) maximum distance 6km with repeaters	99

1756-CNB, -CNBR ControlNet communication interface module

The ControlNet communication module bridges ControlNet links to route messages to devices on other networks, such as Ethernet, ControlNet, and Data Highway Plus networks. The ControlNet communication module also monitors and controls 1756 I/O modules located remotely from the ControlLogix controller.

You can use the ControlNet communication module with a ControlLogix controller in the same chassis or in a ControlLogix Gateway (without a controller).

Description:	Value:
communication rate	5 Mbps
connections	64 connections per module
cable	RG-6 coaxial cable 1786-RG6 (shield high flex cable) 1786-RG6F (quad shield high flex coax cable)
termination resistor	1786-XT
tap	Choose: • 1786-TPR (T-tap right angle) • 1786-TPS (T-tap straight) • 1786-TPYR (Y-tap right angle) • 1786-TPYS (Y-tap straight)
backplane current	**1756-CNB** 970mA @ 5V dc 1.7mA @ 24V dc 4.98W **1756-CNBR** 1000mA @ 5V dc 1.7mA @ 24V dc 5.14W
conductor category	2
operating temperature	0° to 60° C (32 to 140° F)
storage temperature	-40° to 85° C (-40 to 185° F)
relative humidity	5% to 95% noncondensing
vibration	10 to 150 Hz 5.0 G maximum peak acceleration
operating shock	30G peak for 11ms
storage shock	50G peak for 11ms
weight	1756-CNB 0.3 kg (0.6 lb) 1756-CNBR 0.3 kg (0.7 lb)
agency certification[1]	Class I Division 2 Hazardous marked for all applicable directives

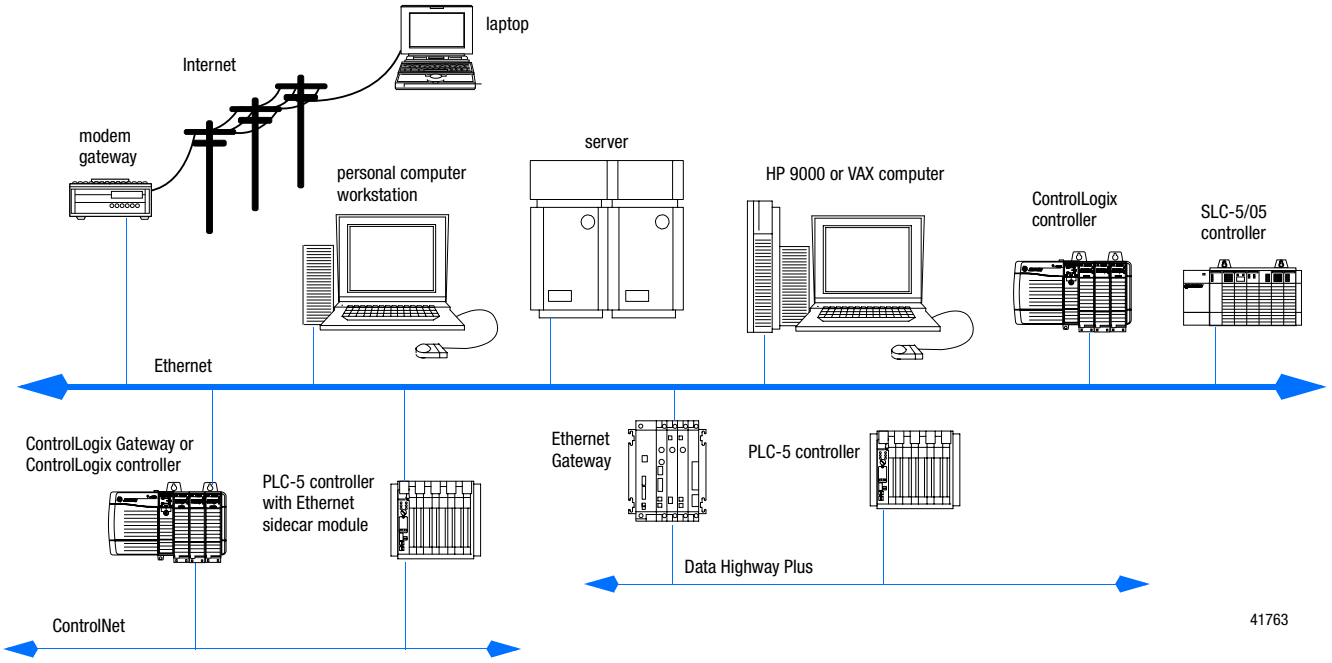
1. CSA certification - Class I Division 2, Group A, B, C, D or nonhazardous locations.

Ethernet Network

The TCP/IP Ethernet network is a local area network designed for the high-speed exchange of information between computers and related devices. With its high bandwidth (10Mbps), an Ethernet network allows many computers, controllers, and other devices to communicate over vast distances.

At the information layer, an Ethernet network provides enterprise-wide systems access to plant-floor data.

With an Ethernet network you have many possibilities because you can maximize communication between the great variety of equipment available from many vendors. TCP/IP is the protocol used by the Internet.



1756-ENET Ethernet statistics

Cable options:	Data transmission rate:	Maximum cable length:	Maximum drop cable length:	Maximum number of nodes:	Maximum length with repeaters:
10Base5	10 Mbps	500m	50m	100	2.5km
10Base2		185m	50m	30	925m
10BaseT		100m	na	2 peer-to-peer	na
10BaseFL		2000m	na	2 peer-to-peer	na

1756-ENET Ethernet communication interface module

The Ethernet communication module bridges Ethernet links to route messages to devices on other networks, such as ControlNet, DeviceNet, and Data Highway Plus networks.

Description:	Value:
communication rate	10 Mbps
connections	64 TCP/IP connections 48 ControlLogix connections maximum per 1 TCP/IP connection 128 ControlLogix connections maximum per module The Ethernet module also supports 128 in and 128 out unscheduled ControlLogix connections. Unscheduled connections within a TCP/IP connection do not count to the total of 48 possible ControlLogix connections.
cable	Choose: • 1756-TC02 (low-profile 2-meter transceiver cable) • 1756-TC15 (low-profile 15-meter transceiver cable)
transceiver	Choose: • 1785-TR10B2 (thin wire) • 1785-TR10B5 (thick wire) • 1785-TR10BF (fiber optic) • 1785-TR10BT (twisted pair)
backplane current	900mA @ 5V dc 350mA @ 24V dc 12.99W
conductor category	2
operating temperature	0° to 60° C (32 to 140° F)
storage temperature	-40° to 85° C (-40 to 185° F)
relative humidity	5% to 95% noncondensing
vibration	10 to 150 Hz 5.0 G maximum peak acceleration
operating shock	30G peak for 11ms
storage shock	50G peak for 11ms
weight	0.3 kg (0.6 lb)
agency certification[1]	UL, CSA CSA Class I Division 2 Hazardous CE marked for all applicable directives

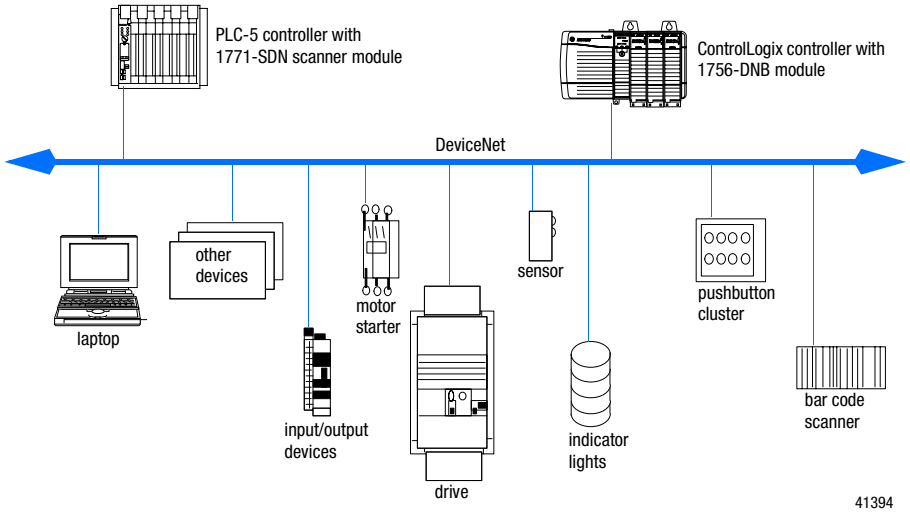
1. CSA certification - Class I Division 2, Group A, B, C, D or nonhazardous locations.

DeviceNet Network

A DeviceNet network is an open, low-level communication link that provides connections between simple, industrial devices (such as sensors and actuators) and high-level devices (such as controllers). Based on standard Controller Area Network (CAN) technology, this open network offers interoperability between devices from multiple vendors. A DeviceNet network provides:

Feature:	Benefit:
interoperability	simple devices from multiple vendors that meet DeviceNet standards are interchangeable, giving you flexibility and choice
common network	an open network provides common, end-user solutions, and reduces the need to support a wide variety of device networks
lower maintenance costs	you can remove and replace devices without disrupting other devices
cost-effective wiring	a networked device installation is more cost-effective than traditional I/O wiring because one wire supplies both communications and 24V power

At the device layer, a DeviceNet network can connect low-level devices directly to plant-floor controllers.



1756-DNET DeviceNet statistics

Data transmission rate:	Cable trunk length:	Cumulative drop length:	Maximum drop length:	Maximum number of nodes:
125 Kbps	500m (1,640 ft.)	125m (512 ft.)	6 m (20 ft.)	64
250 Kbps	250m (820 ft.)	78m (256 ft.)		
500 Kbps	100m (328 ft.)	39m (128 ft.)		

1756-DNB DeviceNet scanner interface module

The DeviceNet scanner module acts as an interface between DeviceNet devices and a ControlLogix chassis. The scanner module communicates with DeviceNet devices over the network to:

- read and write inputs and outputs to and from a device
- download configuration data to a device
- monitor operational status of a device

The scanner module communicates with a ControlLogix controller in a ControlLogix chassis to provide I/O data, status information and configuration data.

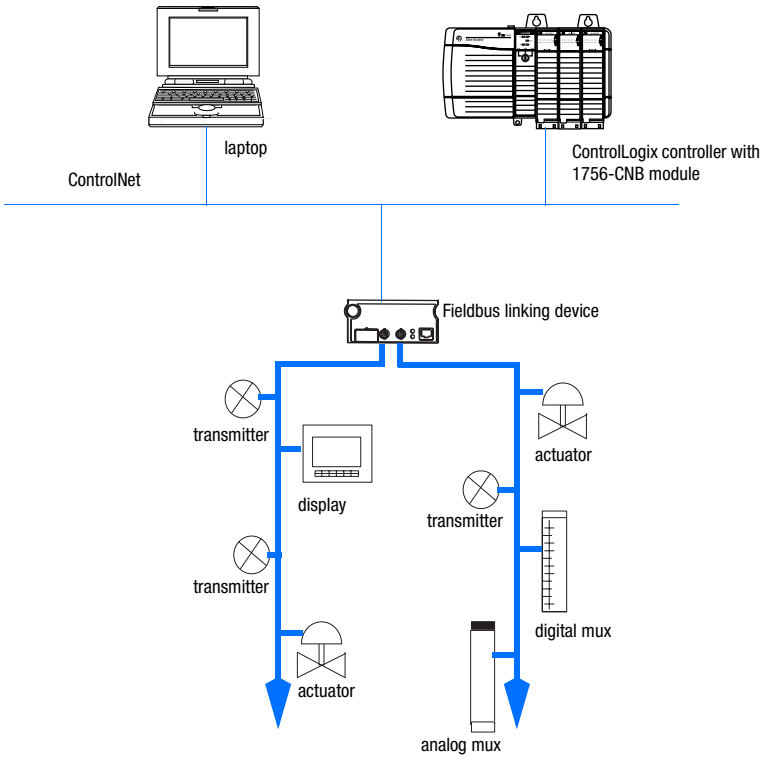
Description:	Value:
communication rate	125 Kbps, 250 Kbps, or 500 Kbps
connections	2 connections to a dedicated ControlLogix controller
cable	Choose: • 1485C-P1-C50 (thin, yellow, chemical resist, 50 meters) • 1485C-P1-C150 (thin, yellow, chemical resist, 150 meters) • 1485C-P1-C300 (thin, yellow, chemical resist, 300 meters) • 1485C-P1-C600 (thin, yellow, chemical resist, 600 meters) • 1485C-P1-A50 (thick, grey, 50 meters) • 1485C-P1-A150 (thick, grey, 150 meters) • 1485C-P1-A300 (thick, grey, 300 meters) • 1485C-P1-A500 (thick, grey, 500 meters)
termination resistor	1485A-C2
tap	Choose: • 1485P-P2T5-T5 (2 ports) • 1485P-P4T5-T5 (4 ports) • 1485P-P8T5-T5 (8 ports)
backplane current	600mA @ 5V dc 3mA @ 24V dc 3.13W
conductor category	2
operating temperature	0° to 60° C (32 to 140° F)
storage temperature	-40° to 85° C (-40 to 185° F)
relative humidity	5% to 95% noncondensing
vibration	10 to 150 Hz 5.0 G maximum peak acceleration
operating shock	30G peak for 11ms
storage shock	50G peak for 11ms
weight	0.3 kg (0.6 lb)
agency certification[1]	Class I Division 2 Hazardous marked for all applicable directives

1. CSA certification - Class I Division 2, Group A, B, C, D or nonhazardous locations.

Fieldbus Network

A Foundation Fieldbus network is a standard-based network designed to handle process automation applications. Fieldbus interconnects measurement and control equipment, such as sensors, actuators, and controllers. The Fieldbus environment is the base level network in the hierarchy of plant networks.

At the device layer, a Fieldbus network can connect low-level devices directly to plant-floor controllers.



1788-CN2FF Foundation Fieldbus Linking Device

The Foundation Fieldbus linking device facilitates distributed control by adding Foundation Fieldbus support to your ControlLogix system. You can have one linking device per ControlNet tap. The linking device:

- connects to two, independent Fieldbus H1 networks
- mounts on a 35mm DIN rail
- supports closed-loop control

Process variables published on Foundation Fieldbus are subscribed by the linking device and then produced on the ControlNet network at the network update time. Scheduled data from a linking device can go to a ControlLogix controller every 2 milliseconds. Conversely, process variables produced by a ControlNet device can be consumed by the linking device and subscribed by other Foundation Fieldbus devices.

Description:	Value:
communication rate	2 ms over ControlNet 31.25 Kbps over Fieldbus
connections	to redundant ControlNet media for each H1 network each linking device supports two H1 networks
cable	9-pin FieldBus cable pins 6 and 7 handle Fieldbus signals
power requirements	11-30V dc 270 mA @ 24V dc (typical)
conductor category	2
operating temperature	0° to 60° C (32 to 140° F)
storage temperature	-40° to 85° C (-40 to 185° F)
relative humidity	5% to 90% noncondensing
vibration	10-500Hz per IEC 68-2-6 2.0 G maximum peak acceleration
operating shock	30G peak for 11ms
storage shock	50G peak for 11ms
weight	0.4 kg (13.5 oz.)
agency certification[1]	Class I Division 2 Hazardous marked for all applicable directives

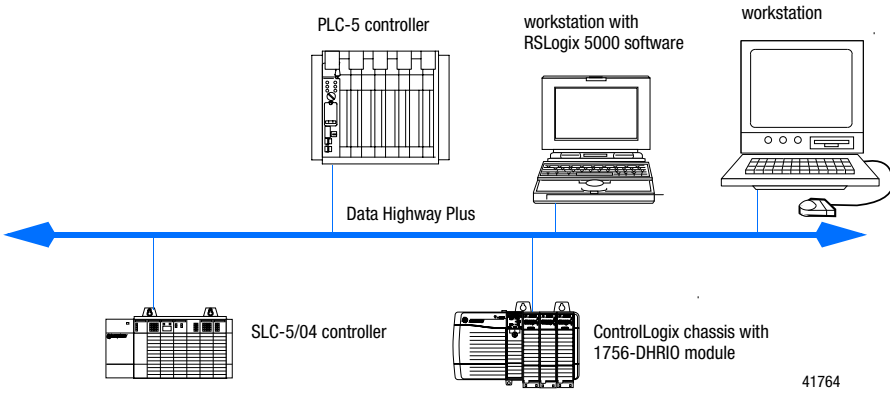
1. CSA certification - Class I Division 2, Group A, B, C, D or nonhazardous locations.

DH+ Network

The Data Highway Plus network is a local area network designed to support remote programming and data acquisition for factory-floor applications. You can also use DH+ communication modules to implement a small peer-to-peer network.

You can use a DH+ network for data transfer to other controllers or high-level computers and as a link for programming multiple controllers. A ControlLogix controller can communicate over a DH+ network with other controllers and with a workstation.

The DH+ network supports daisy chain and trunkline-dropline configurations.



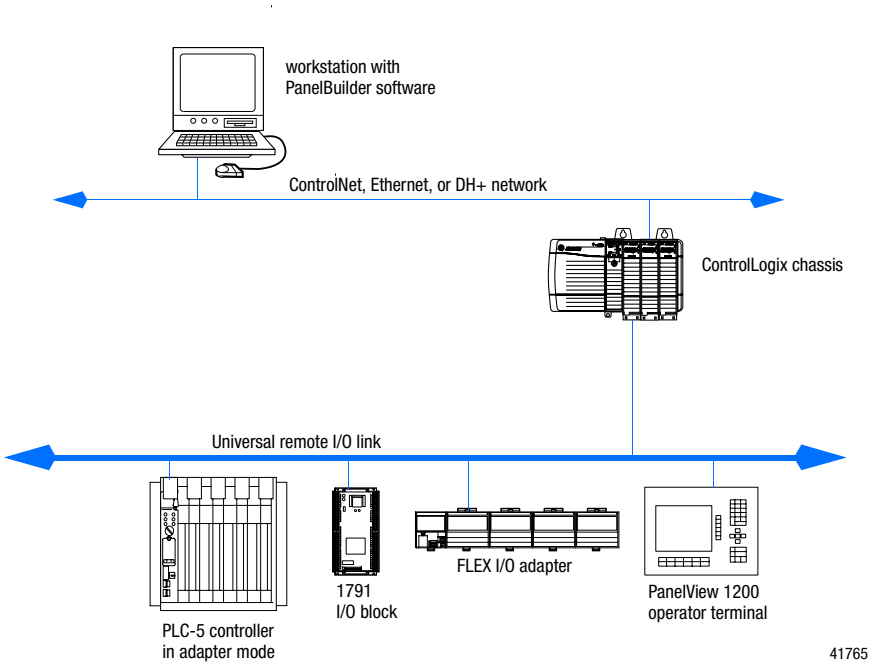
1756-DHRIO DH+ statistics

Data transmission rate:	Maximum cable length:	Maximum number of nodes:
57.6 Kbps	3,048m (10,000 ft.)	64 per link

Universal Remote I/O Network

The strength and versatility of the Universal Remote I/O network comes from the breadth of products it supports. In addition to 1771 I/O, the Universal Remote I/O network supports many Allen-Bradley and third-party devices.

Typical applications range from simple I/O links with controllers and I/O modules, to links with a variety of other devices. You connect devices through remote I/O adapter modules or built-in remote I/O adapters.



Universal remote I/O statistics

Data transmission rate:	Maximum cable length:	Maximum number of nodes:
57.6 Kbps	3,048m (10,000 ft.)	1 scanner 32 adapters
115.2 Kbps	1,524m (5,000 ft.)	
230.4 Kbps	762m (2,500 ft.)	

1756-DHRIO Data Highway Plus and remote I/O communication interface module

The Data Highway Plus and remote I/O module supports messaging between devices on Data Highway Plus networks and devices on other networks, such as Ethernet, ControlNet, and DeviceNet networks. The remote I/O functionality enables the module to act as a scanner for transferring discrete and block-transfer data to and from remote I/O devices.

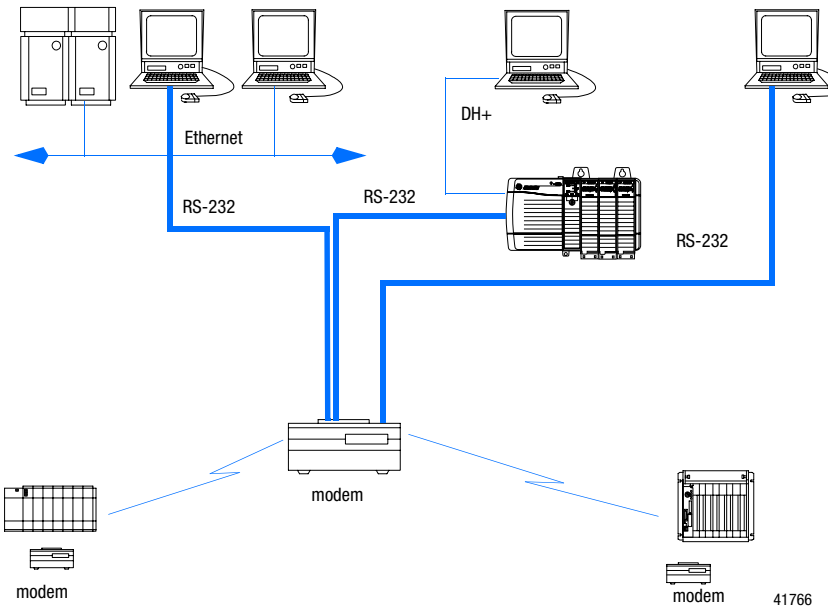
Description:	Value:
communication rate	DH+: 57.6 Kbps Universal Remote I/O: 57.6 Kbps, 115 Kbps, or 230 Kbps
connections	32 connections per DH+ channel 32 logical rack connections per remote I/O channel 16 block-transfer connections per remote I/O channel
cable	1770-CD Belden 9463
termination resistor	150 Ohm and 82 Ohm resistors ship with the 1756-DHRIO module
backplane current	850mA @ 5V dc 1.7mA @ 24V dc 4.38W
conductor category	2
operating temperature	0° to 60° C (32 to 140° F)
storage temperature	-40° to 85° C (-40 to 185° F)
relative humidity	5% to 95% noncondensing
vibration	10 to 150 Hz 5.0 G maximum peak acceleration
operating shock	30G peak for 11ms
storage shock	50G peak for 11ms
weight	0.3 kg (0.6 lb)
agency certification[1]	UL, CSA CSA Class I Division 2 Hazardous CE marked for all applicable directives

1. CSA certification - Class I Division 2, Group A, B, C, D or nonhazardous locations.

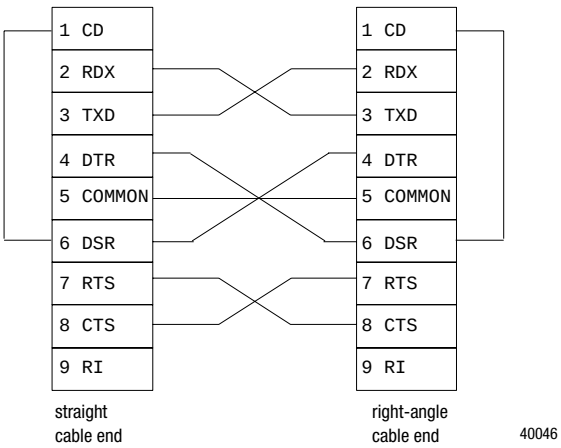
Serial Network

The ControlLogix serial port is compatible with RS-232 serial communication. The serial port supports the DF1 protocol to communicate with others devices on the serial link. You can select a DF1 mode:

Use this DF1 mode:	For:
point to point	communication between a controller and other DF1-compatible devices using DF1 full-duplex protocol
DF1 master	control of polling and message transmission between the master and each slave using DF1 half-duplex polled protocol.
DF1 slave	using the controller as a slave station in a master/slave serial network using DF1 half-duplex protocol.
user mode (ASCII)	communication between a controller and an ASCII device, such as a bar code reader



The ControlLogix controller uses a 1756-CP3 cable to connect to the serial port. Or you can make a 9-pin cable using these pinouts:



The cable is shielded and tied to the connector housing at both ends.

1756-MVI, -MVID multi-vendor interface module

The multi-vendor interface module provides additional access to serial devices. The module is user programmable to accommodate devices with unique serial protocols. The module has three ports:

Port:	Description:
PRT1 (console)	Connect a programming device via a RS-232 interface.
PRT2	Connect to other devices via a RS-232, RS-422, or RS-485 interface.
PRT3	

Use the application programming interface (API) software to access the ControlLogix backplane and module serial ports. Develop applications for the module using industry-standard DOS programming tools and the appropriate API components.

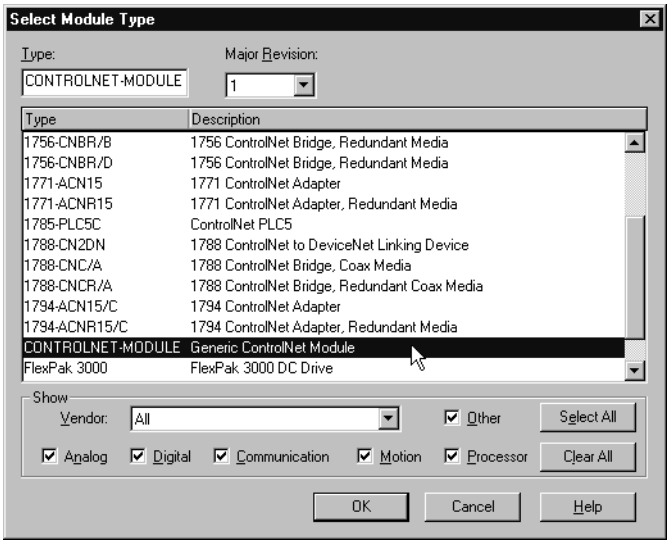
Description:	Value:
options	1756-MVI module by itself 1756-MVID module and API software
communication rate	configurable, depending on serial protocol
connections	1
cable	3 serial adapter cables ship with the module the locking-type RJ45 connector installs in the module; the other end is a DB-9 male connector
backplane current	800mA @ 5V dc 3mA @ 24V dc 4W
conductor category	2
operating temperature	0° to 60° C (32 to 140° F)
storage temperature	-40° to 85° C (-40 to 185° F)
relative humidity	5% to 95% noncondensing
vibration	10 to 150 Hz 5.0 G maximum peak acceleration
operating shock	30G peak for 11ms
storage shock	50G peak for 11ms
agency certification[1]	Class I Division 2 Hazardous marked for all applicable directives

1. CSA certification - Class I Division 2, Group A, B, C, D or nonhazardous locations.

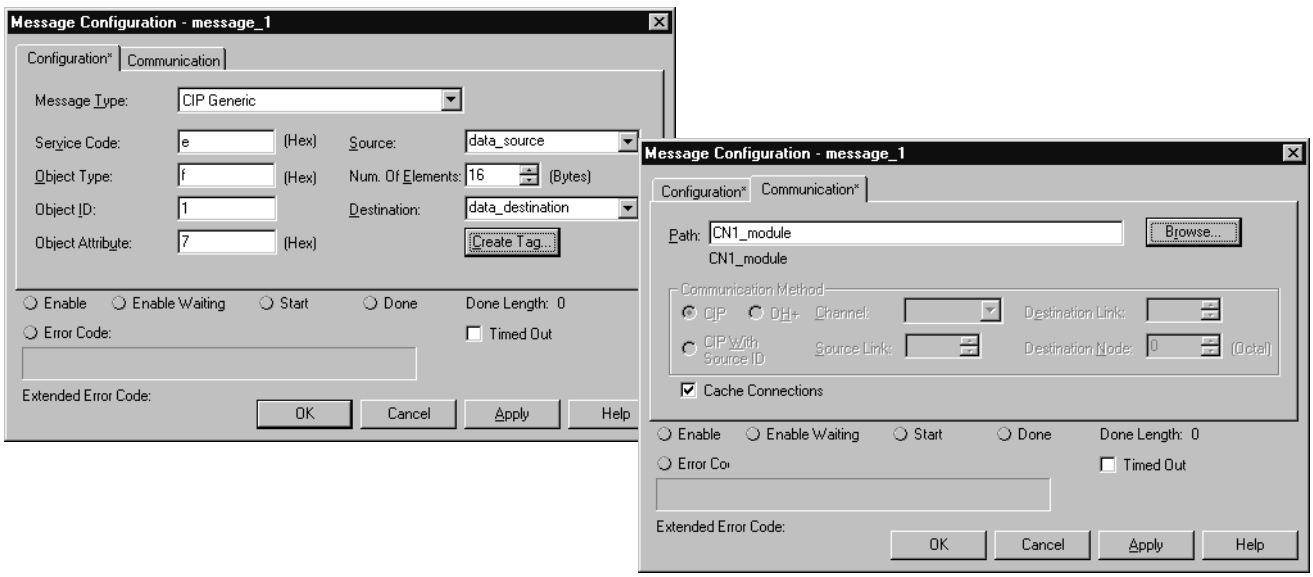
Other Networks

The RSLogix 5000 programming software supports a generic ControlNet module that allows connections to ControlNet nodes for which there is no specific support currently available in the programming software. A module configured as a generic ControlNet module communicates with the controller in the form of input, output, status, and configuration tags. These tags and their characteristics vary depending on the type of module.

For example, use the generic module configuration to set up communications between a ControlLogix controller and a 1203-CN1 ControlNet communications module.



Then use the CIP generic MSG instruction type to send and receive messages from the 1203-CN1 module.



The screens above show the connection parameters for the 1203-CN1 module. These parameters differ depending on the module. See the module's vendor for module's characteristics.

Selecting a Controller

The ControlLogix controller provides a scalable controller solution that is capable of addressing a large amount of I/O points (128,000 digital maximum / 4000 analog maximum). The controller can control local I/O as well as remote I/O across ControlNet, DeviceNet, and Universal Remote I/O networks.

You can place multiple ControlLogix controllers in a single ControlLogix chassis. Multiple controllers can read input values from all inputs. A single controller can communicate over multiple communication modules and multiple controllers can share the same communication module.

1756 ControlLogix Controller

Description:	Value:						
	1756-L1	1756-L1M1	1756-L1M2	1756-L1M3	1756-L55M13[4]	1756-L55M14[3]	1756-L55M16[3]
user available memory[1]	64 Kbytes	512 Kbytes	1 Mbyte	2 Mbytes	1.5 Mbytes	3.5 Mbytes	7.5 Mbytes
backplane current +5V dc +24V dc	 0.65A 0.02A	 0.95A 0.02A	 1.05A 0.02A	 1.20A 0.02A	 1.15A 0.02A	 1.25A 0.02A	 1.40A 0.02A
average power dissipation	3.0W	3.75W	4.0W	4.25W	4.50W	4.75W	5.0W
average thermal dissipation	10.2 BTU/hr	12.8 BTU/hr	13.7 BTU/hr	14.5 BTU/hr	15.4 BTU/hr	16.2 BTU/hr	17.1 BTU/hr
operating temperature	0° to 60° C (32 to 140° F)						
storage temperature	-40° to 85° C (-40 to 185° F)						
relative humidity	5% to 95% noncondensing						
vibration	10 to 500 Hz 2.0 G maximum peak acceleration						
operating shock	30G peak for 11ms						
storage shock	50G peak for 11ms						
weight	10.0 oz.	12.5 oz.	12.5 oz.	12.7 oz.	12.5 oz.	12.8 oz.	13.4 oz.
programming cable	1756-CP3 or 1747-CP3 serial cable category 3[3]						
battery	1756-BA1 (PROMARK Electronics 94194801) 0.59g lithium						
agency certification[2]	Class I Division 2 Hazardous marked for all applicable directives marked for applicable acts N223						

1. Available user memory is the amount of memory available to the user after RSLogix 5000 programming software is connected and a null program is loaded.
2. CSA certification - Class I Division 2, Group A, B, C, D or nonhazardous locations.
3. See the *Programmable Controller Wiring and Grounding Guidelines*, publication 1770-4.1.
4. The Logix5555 controller will be available fall/winter 2000. These specifications are planned characteristics for the controllers and are subject to change.

The following equations provide an estimate of the memory needed for a controller. Each of these numbers includes a rough estimate of the associated user programming. Depending on the complexity of your application, you might need additional memory.

Controller tasks	_____	* 4000 =	_____	bytes (minimum 1 needed)
Discrete I/O points	_____	* 400 =	_____	bytes
Analog I/O points	_____	* 2600 =	_____	bytes
Communication modules	_____	* 2000 =	_____	bytes
Motion axis	_____	* 8000 =	_____	bytes
		Total =	_____	bytes

Logix5550 Memory Boards

If you have a 1756-L1 controller, you can install one of these memory boards in the Logix5550 controller:

- 1756-M1 (512 Kbytes expansion memory)
- 1756-M2 (1 Mbytes expansion memory)
- 1756-M3 (2 Mbytes expansion memory)

The 1756-L55 controller does not operate stand-alone. Choose one of these memory boards to come already assembled with the Logix5555 controller:

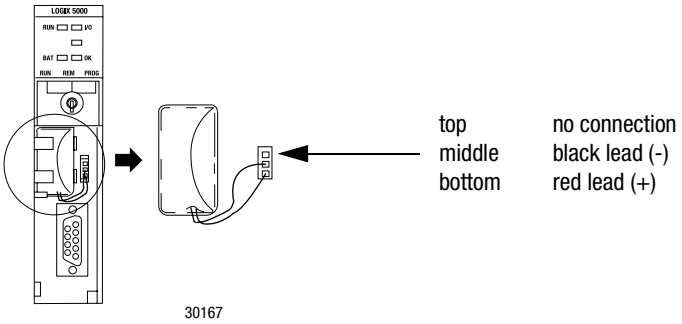
- 1756-M13 (1.5 Mbytes memory)
- 1756-M14 (3.5 Mbytes memory)
- 1756-M16 (7.5 Mbytes memory)

1756-BA1 Battery

The ControlLogix controller comes with one 1756-BA1 battery:

Description:	Value:
battery	1756-BA1 0.59g lithium

Important: Only order a battery if you need a replacement.



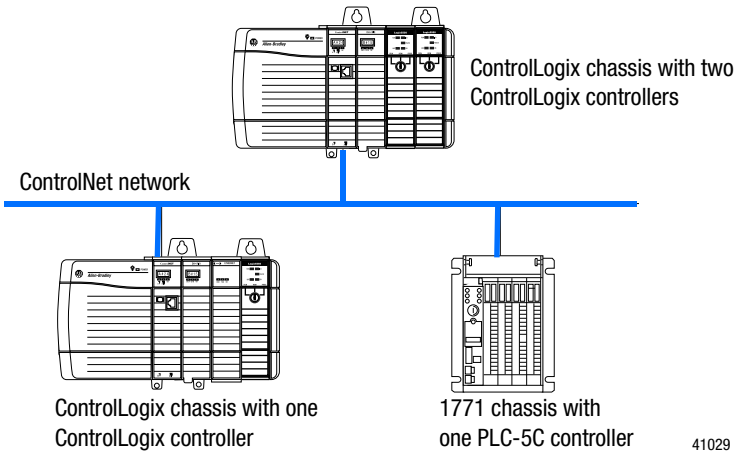
ControlLogix Controller Connections

The ControlLogix controller supports 250 connections. The following table shows how many connections the controller uses for these different communication configurations

ControlLogix Connection Type to:	Connections Used by the Controller per Module:
local I/O module	1
remote I/O module (direct connection only)	1
1756-MO2AE servo module	3
local 1756-CNB module	0
remote ControlNet communication module	1
remote 1756-CNB module through local 1756-CNB configured as a direct (none) connection configured as a rack-optimized connection	 0 **or** 1
1756-DHRIO module	1
1756-ENET module	0
1756-DNB module	2
Universal Remote I/O adapter module	1
produced tag produced tag number of consumers	 1 1
consumed tag	1
block-transfer message	1
other message	1

Determining Connections for Produced and Consumed Tags

The ControlLogix controller supports the ability to produce (broadcast) and consume (receive) system-shared tags. System-shared data is accessible by multiple controllers over the ControlLogix backplane or over a ControlNet network. Produced and consumed tags each require connections.



Maximum number of produced and consumed tags

The following table shows the total number of produced and consumed tags a controller supports:

As a:	The controller supports:
producer	*(number of produced tags)* ≤ 127
consumer	*(number of consumed tags)* ≤ 250 If your controller consumes 250 tags, these tags must come from more than one controller. A controller can only produce as many as 127 tags.

Each produced tag uses one connection for the tag and the first consumer. The produced tag uses and additional connection for each additional consumer. The total combined consumed and produced tags that a controller supports is (this is also the maximum number of connections):

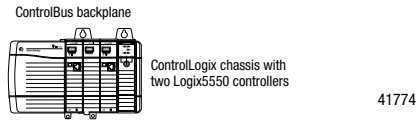
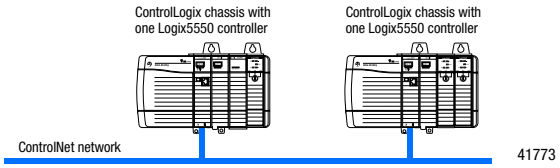
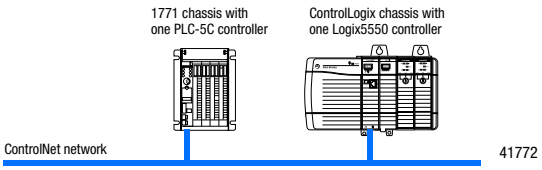
(number of produced tags) + *(number of consumed tags)* ≤ 250

As the number of consumed tags increases, the number of available produced tags decreases. You increase the number of consumed tags either by creating consumed tags or by adding additional consumers to a produced tag.

Important: The total number of tags that can be produced or consumed is limited by the number of available connections. If the controller uses all of its connections for I/O and communication devices, no connections are left for produced and consumed tags.

Planning your system to support produced and consumed tags

Before the ControlLogix controller can share produced or consumed tags, the producing controller must be configured as part of the system for the consuming controller.

You can share data between:	Over this network:
ControlLogix controller and local ControlLogix controller 	ControlLogix backplane
ControlLogix controller and remote ControlLogix controller 	ControlNet network
ControlLogix controller and PLC-5 ControlNet processor 	ControlNet network

Important: For two controllers that share produced or consumed tags, both controllers must be attached to the same ControlNet network. You cannot bridge produced and consumed tags between two networks.

Connections for produced tags

By default, a produced tag allows two other controllers to consume the tag, which means that each consumer simultaneously receives the tag data. The local controller (producing) must have one connection for the produced tag and the first consumer and one more connection for each additional consumer. The default produced tag requires two connections.

As you increase the number of controllers that can consume a produced tag, you also reduce the number of connections the controller has available for other operations, such as communications and I/O.

Connections for consumed tags

Each consumed tag requires one connection for the controller that is consuming the tag.

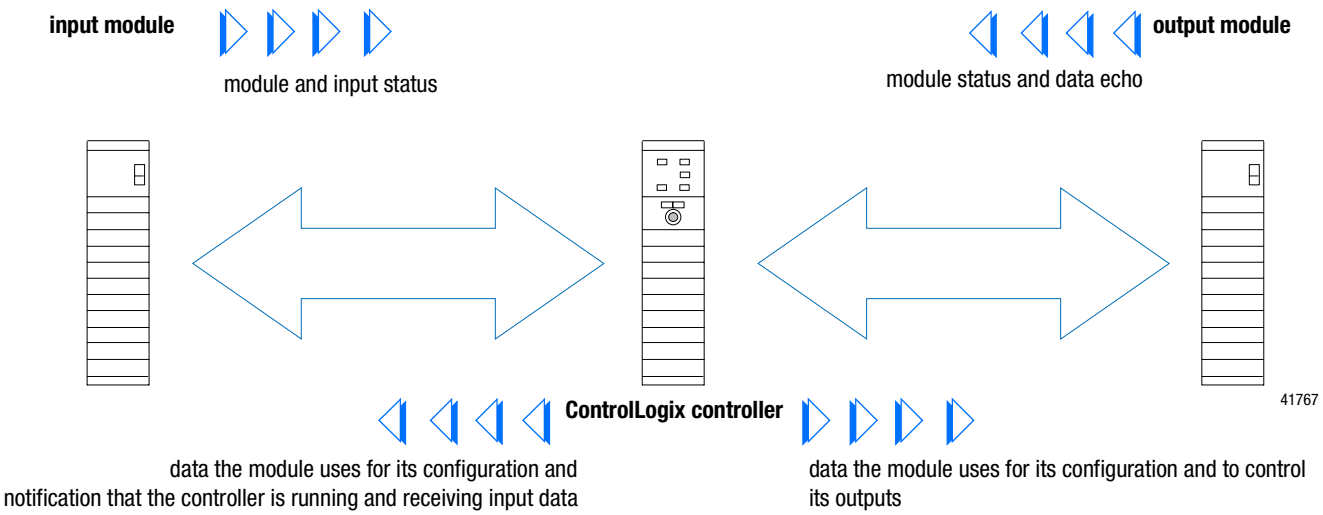
Determining Connections for Messaging

The ControlLogix controller uses connections to perform messaging, including block-transfers. When your logic uses a message instruction to read or write information to or from another module, that instruction requires one connection for the duration of the transmission. Depending on how you configure the message instruction, the connection remains open (cached) until the controller stops executing the logic or the connection is closed (uncached) after the message transmission.

Message instructions that execute repeatedly should keep the connection open (cache the connection) to optimize execution time. Opening a connection each time to execute an instruction would increase execution time. Message instructions that operate infrequently can close connections upon completion to free up connections for other uses.

Determining Connections for I/O Modules

The information passed between the ControlLogix controller and an I/O module varies depending on the type of I/O module. The following diagram illustrates the general types of data that I/O modules and controllers pass between themselves. The size and content of the data passed between an I/O module and the ControlLogix controller helps determine the type of communications that can be used.



For the ControlLogix controller to send or receive information from I/O modules, a communication link, or connection, must be established from the ControlLogix controller to the module. The ControlLogix controller establishes a communication connection to an I/O module either directly or indirectly by communicating to a communication module in the system. A *direct connection* occurs when the ControlLogix controller establishes a real-time, data-transfer link directly with the module. A direct connection lets you tailor the system to meet specific timing or information needs of certain modules. Direct connections provide the greatest system flexibility, but require extra system bandwidth and capacity.

In addition to direct connections, the 1756-CNB module can consolidate the data for multiple, digital I/O modules, in the same chassis as the communication module, into a single, *rack-optimized connection*. With a rack-optimized connection, the ControlLogix controller establishes a single connection to a communication module. The communication module then establishes a connection to each of the appropriate modules. The communication module gathers the data from the digital I/O modules and packs it together to send over the network. By doing this, the communication module reduces the:

- number of message packets that must be sent on the network
- amount of processing time required by each communication module and ControlLogix controller receiving the information
- system communications overhead and capacity needs
- number of connections used by the ControlLogix controller

Depending on the type of I/O modules in the ControlLogix system, both direct connections and rack-optimized connections can be used. The following table lists several of the I/O systems and the available connections types.

I/O System:	Supported Connection Type(s):
1756 basic digital I/O in a local chassis	direct connection
1756 digital I/O in a remote chassis via a ControlNet network	direct connection or rack-optimized connection[1]
1756 analog I/O either in a local chassis or via a ControlNet network in a remote chassis	direct connection
FLEX digital I/O via a ControlNet network	direct connection or rack-optimized connection
FLEX analog I/O either in a local chassis or via a ControlNet network in a remote chassis	direct connection
digital I/O via a Universal Remote I/O network	rack-optimized connection
analog I/O via a Universal Remote I/O network	direct connection via messaging
all DeviceNet I/O	rack-optimized connection

1. Rack-optimized connections for diagnostic and E-fuse modules do not send diagnostic or fuse data to controller.

Direct connections for 1756 I/O modules

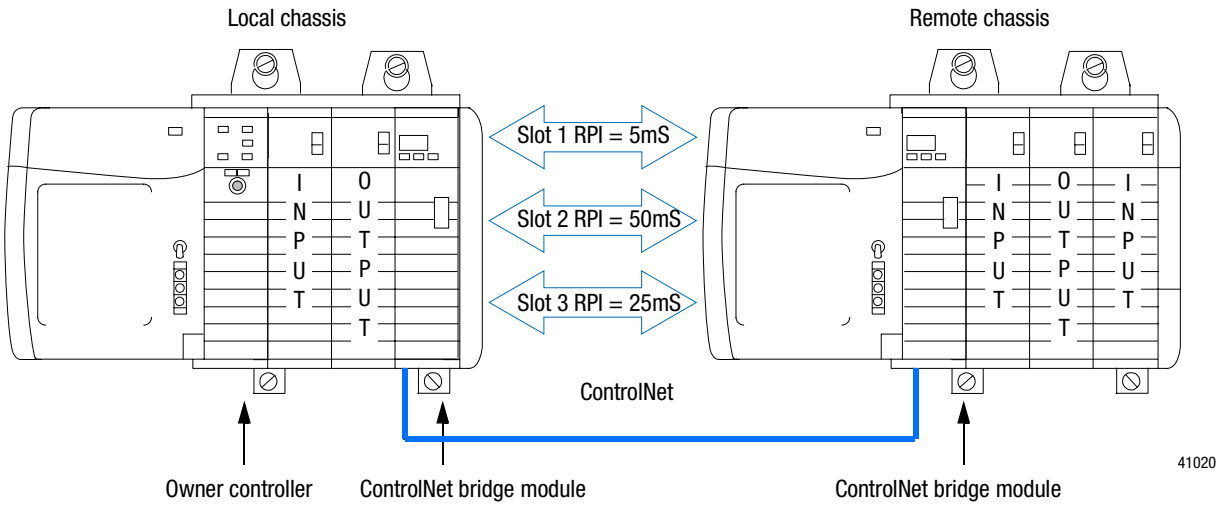
A direct connection is a real-time, data-transfer link between the controller and an I/O module. The controller maintains and monitors the connection between the controller and the I/O module. Any break in the connection, such as a module fault or the removal of a module from the chassis while under power, causes the controller to set fault status bits in the data area associated with the module.

If a controller has a module configuration that references a slot in the control system, the controller periodically checks for the presence of a device in that slot. When a device's presence is detected there, the controller automatically sends the module configuration.

If the module configuration is appropriate for the I/O module found in the slot, a connection is made and operation begins. If the module configuration is not appropriate, the connection is rejected. Module configuration can be inappropriate for any of a number of reasons. For example, a mismatch in electronic keying that prevents normal operation.

In this example, the owner controller has three direct connections with the 1756 I/O modules in the remote chassis.

Using Direct Connections with ControlLogix I/O in a Remote Chassis



The local controller in this example uses these connections:

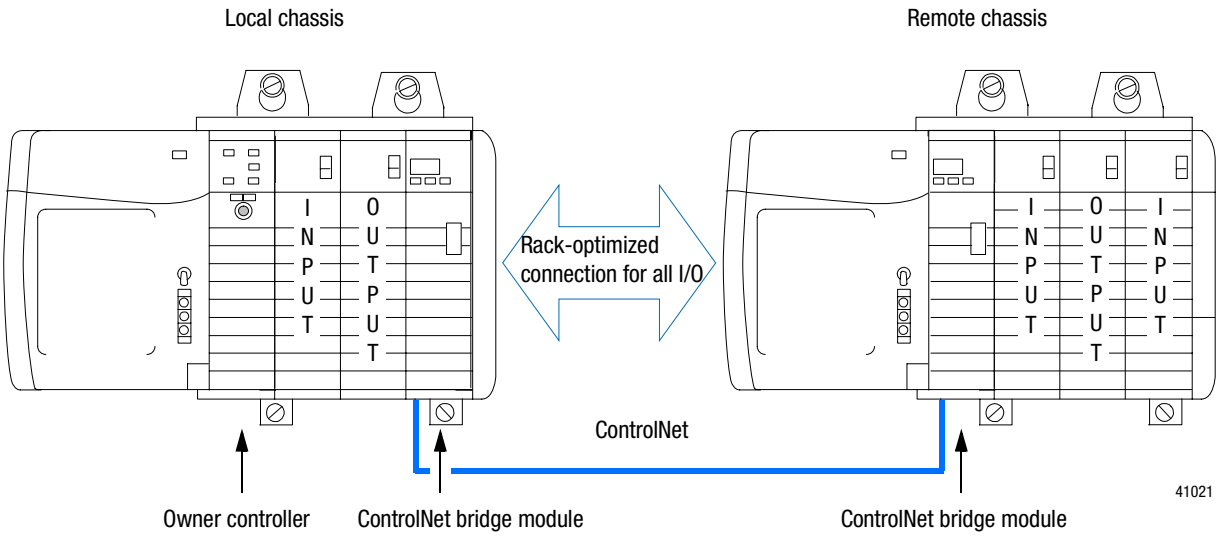
Connection Type:	Module Quantity:	Connections per Module:	Total Connections:
controller to local I/O module	2	1	2
controller to remote I/O module	3	1	3
controller to remote 1756-CNB module	1	1	1
		total	6

Rack-optimized connections for 1756 I/O modules

When a 1756 digital I/O module is located in a remote chassis (with respect to its owner), you can select rack-optimized communication. A rack-optimized connection consolidates connection usage between the owner and the digital I/O in the remote chassis. Rather than having individual, direct connections for each I/O module, there is one connection for the entire chassis.

In this example, the owner controller communicates with all the digital I/O in the remote chassis but uses only one connection. The data from all three modules is sent together simultaneously at a rate specified by the 1756-CNB connection. This option eliminates the need for the three separate connections shown in the previous example.

Using a Rack-Optimized Connection with ControlLogix I/O in a Remote Chassis



The local controller in this example uses these connections:

Connection Type:	Module Quantity:	Connections per Module:	Total Connections:
controller to local I/O module	2	1	2
controller to remote 1756-CNB module	1	1	1
		total	3

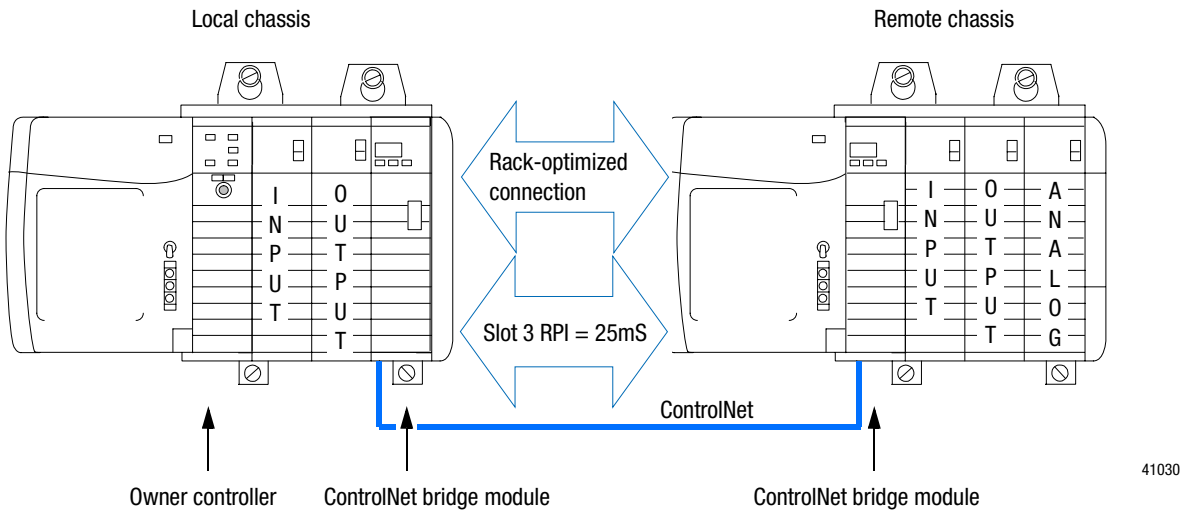
The rack-optimized connection conserves ControlNet connections and bandwidth. However, because the connections are condensed into one rack connection, the optimized digital I/O can no longer send all of its status and diagnostic data.

To configure an I/O module for a rack-optimized connection, you select the Rack Optimization communication format when you configure the I/O module through the programming software. Most of the digital I/O modules support a rack-optimized connection. If this option does not appear when you are selecting communication format for an I/O module, the module does not support a rack-optimized connection.

Combining direct and rack-optimized connections

A remote ControlLogix chassis can have both a rack-optimized connection and direct connections. In this example, the owner controller uses a rack-optimized connection to communicate with two digital I/O modules. The owner controller also uses a direct connection to communicate with an analog module in the same chassis.

Using a Rack-Optimized Connection and a Direct Connection with I/O in a Remote ControlLogix Chassis



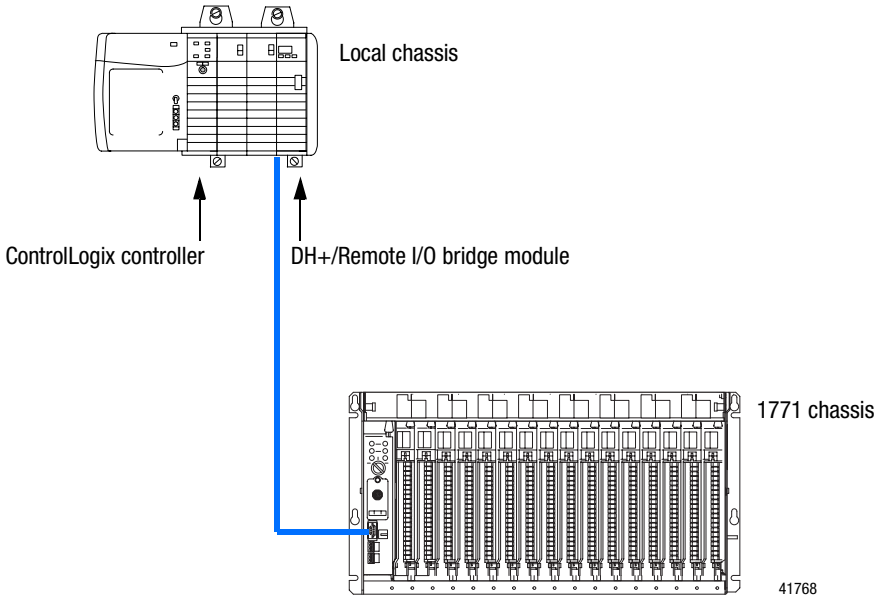
The local controller in this example uses these connections:

Connection Type:	Module Quantity:	Connections per Module:	Total Connections:
controller to local I/O module	2	1	2
controller to remote analog I/O module	1	1	1
controller to remote 1756-CNB module (includes the remote, digital I/O)	1	1	1
		total	4

Connections to 1771 I/O

In this example the controller has a direct connection to each digital I/O module in the local chassis. The controller also communicates with the 1771 chassis, through the 1756-DHRIO module, using one connection (a rack-optimized connection).

Connections for 1771 I/O with a 1756-DHRIO Module in a Local ControlLogix Chassis



The local controller in this example uses these connections:

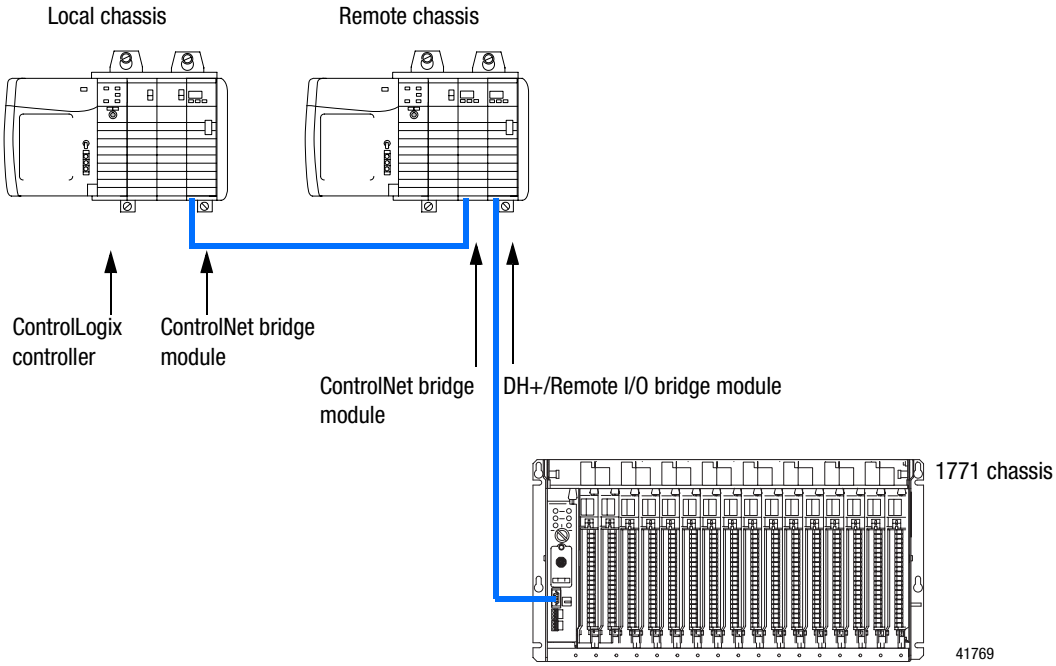
Connection Type:	Module Quantity:	Connections per Module:	Total Connections:
controller to local I/O module	2	1	2
controller to 1771 I/O through 1756-DHRIO module	1	1	1
		total	3

The controller makes the connection through the 1756-DHRIO module to the adapter module in the 1771 chassis. The controller requires one connection for each logical rack. The addressing mode (1/2 slot, 1 slot, or 2 slot) of the 1771 chassis determines the number of logical racks, which determines the total number of connections.

In addition, the controller uses one connection for each message to a 1771 block-transfer module.

In this example the controller has a direct connection to each digital I/O module in the local chassis. The controller also communicates with the 1771 chassis, through the remote 1756-DHRIO module, using one connection (a rack-optimized connection).

Connections for 1771 I/O with a 1756-DHRIO Module in a Remote ControlLogix Chassis



The local controller in this example uses these connections:

Connection Type:	Module Quantity:	Connections per Module:	Total Connections:
controller to local I/O module	2	1	2
controller to remote 1756-CNB module	1	1	1
controller to remote 1756-DHRIO module	1	1	1
		total	4

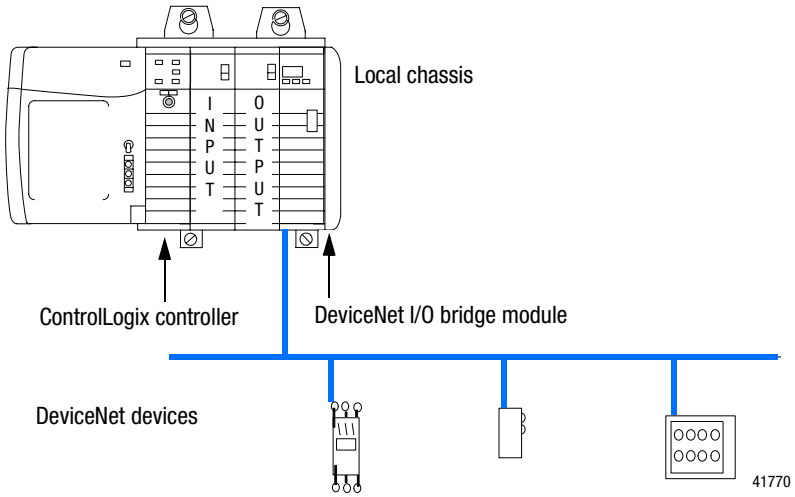
The controller makes the connection through the remote 1756-DHRIO module to the adapter module in the 1771 chassis. The controller requires one connection for each logical rack.

In addition, the controller uses one connection for each message to a 1771 block-transfer module.

Connections to DeviceNet I/O

In this example the controller has a direct connection to each digital I/O module in the local chassis. The controller also communicates with the DeviceNet devices, through the 1756-DNB module, using two connections. The 1756-DNB module supports only a rack-optimized connection to its DeviceNet devices.

Connections to Devices with a 1756-DNB Module in a Local ControlLogix Chassis



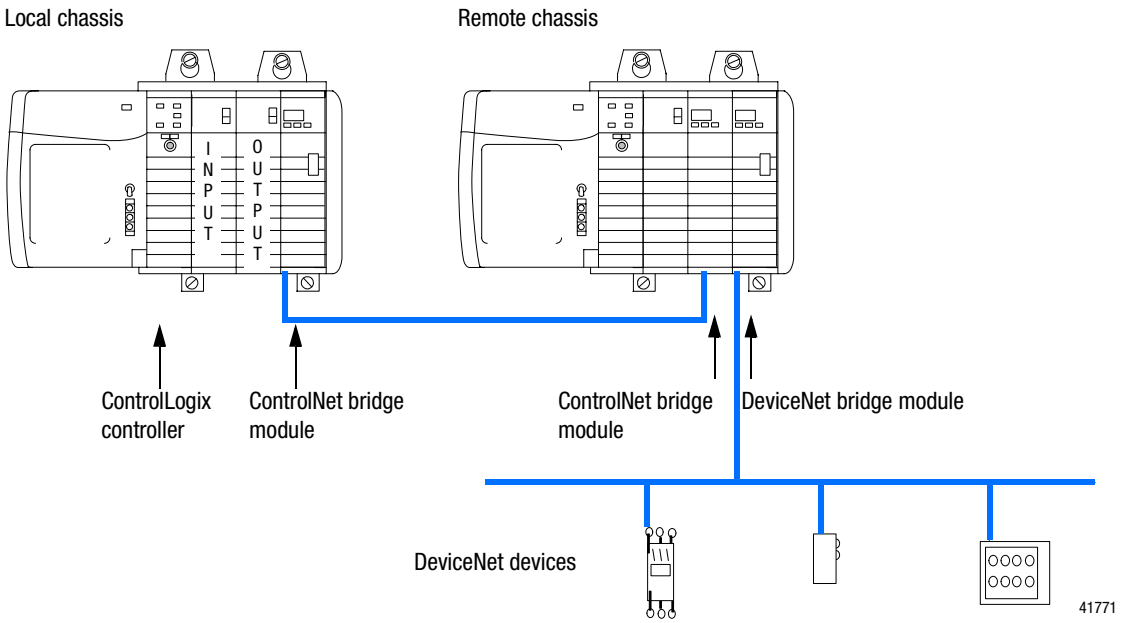
The local controller in this example uses these connections:

Connection Type:	Module Quantity:	Connections per Module:	Total Connections:
controller to local I/O module	2	1	2
controller to local 1756-DNB module (includes DeviceNet devices)	1	2	2
		total	4

The 1756-DNB module does not establish connections to its DeviceNet I/O modules; and therefore, the controller doesn't establish connections with DeviceNet I/O modules. The 1756-DNB module acts as a scanner that gathers all the data from its devices and packs that data together into one image that is passed to the controller. However, the controller can use a MSG instruction to get information directly to or from a DeviceNet module.

In this example the controller has a direct connection to each digital I/O module in the local chassis. The controller also communicates with the DeviceNet devices through a remote 1756-DNB module, using two connections. The 1756-DNB module supports only a rack-optimized connection to its devices.

Connections to Devices I/O with a 1756-DNB Module in a Remote ControlLogix Chassis



The local controller in this example uses these connections:

Connection Type:	Module Quantity:	Connections per Module:	Total Connections:
controller to local I/O module	2	1	2
controller to remote 1756-CNB module	1	1	1
controller to remote 1756-DNB module (includes DeviceNet devices)	1	2	2
		total	5

Communicating with I/O Products

In addition to 1756 I/O modules, the ControlLogix controller can communicate with and control other types of I/O products. The following table lists the I/O products the ControlLogix controller can control over which networks:

I/O Product:	ControlNet network:	DeviceNet network:	Universal Remote I/O link:	RS-232 (DF1) serial link:	DH-485 network:
ControlLogix I/O (1756 series)	yes	no	no	no	no
SLC I/O (1746 series)	no	no	yes	limited	no
FLEX Integra I/O (1793 series)	limited[1,2]	yes	yes	no	no
FLEX I/O (1794 series)	yes[1]	yes	yes	no	no
FLEX Ex I/O (1797 series)	yes	no	no	no	no
1734 POINT I/O	no	yes	no	no	no
Compact I/O (1769 series)	no	yes	no	no	no
Block I/O (1791 series)	no	no	yes	no	no
ArmorBlock I/O (1792 series)	no	yes	no	no	no
1771 I/O	yes[3]	no	yes	no	no
PanelView terminals (2711 series)	yes	no	yes	no	no
RediPANEL modules (2705 series)	no	no	yes	no	no
Dataliners (2706 series)	no	no	yes	no	no
DTAM (2707 series)	no	yes	yes	yes	no
1336T FORCE ac drives	yes[4]	yes[5]	yes[6]	yes[7]	no
1395 digital dc drives	yes[8]	no	yes[4]	no	no
FlexPak 3000 dc drives	yes[9]	yes[10]	no	yes	no
GV3000 ac drives	yes[11]	yes[12]	no	yes	no
1394 ac servo drives	no	yes	yes	no	no
1398 ULTRA series ac drives	no	yes	no	no	no

1. Use a 1794-ACN15, -ACNR15 adapter module. Check with your Rockwell Automation representative for availability of support for the 1794-VHSC module. RSLogix 5000 programming software does not currently support the 1794-IR8, 1794-IT8, 1794-ID2, or 1794-IP4 modules. See the next footnote for how to configure FLEX Integra modules.
2. Configure the ControlLogix controller for the comparable FLEX I/O module (1794) and disable electronic keying.
3. Use a 1771-ACN15, -ACNR15 adapter module.
4. Use a 1336T drive with a direct connection to ControlNet (option board 1336T-3TGEN).
5. You need the DeviceNet module (catalog number 1203-GU6).
6. You need the remote I/O module (catalog number 1203-GD1).
7. Your need the serial adapter (catalog number 1203-GD2 or 1203-SSS AnaCANda).
8. Use a 1395 drive with a direct connection to ControlNet. (option board 1395-KP54EN)
9. You need the ControlNet communication card (model 915FK2101).
10. You need the DeviceNet communication card (model 915FK1100).
11. You need the ControlNet network board (model 2CN3000).
12. You need the DeviceNet network board (model 2DV3000).

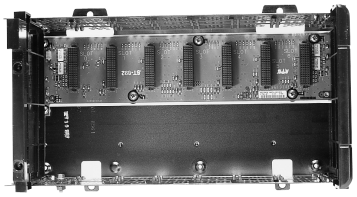
Communicating with Other Controllers and Devices

The ControlLogix system takes advantage of several networks to allow communications with many different controllers and devices. The following table lists which products the ControlLogix controller can communicate with over which networks.

The ControlLogix controller can communicate with a:	Ethernet network (1756-ENET):	ControlNet network (1756-CNB):	DeviceNet network (1756-DNB):	DH+ network (1756-DHRIO):	RS-232 (DF1) network:	DH-485 network:
1756 ControlLogix controller	yes	yes	no	yes	yes	no
1794 FlexLogix controller	no	yes	no	no	yes	no
1785 PLC-5 controller	yes[1,2]	yes	no	yes	yes	n/a
1747 SLC controller	yes[3]	yes	no	yes[4]	yes	no
1761 MicroLogix 1000 controller	n/a	n/a	yes[5]	n/a	yes	no
1762 MicroLogix 1200 controller	n/a	n/a	yes[5]	n/a	yes	no
1769 MicroLogix 1500 controller	n/a	n/a	yes[5]	n/a	yes	no
1772 PLC-2 controller	n/a	n/a	n/a	yes[6]	yes[7]	n/a
1775 PLC-3 controller	n/a	n/a	n/a	yes[8]	yes[9]	n/a
5250 PLC-5/250 controller	no	n/a	no	yes	yes	n/a
2711 PanelView	no	limited	no	yes	no	no
9355 RSLinx software	yes	yes	no	yes	yes	no
1784-KTC, -KTCx	n/a	yes	n/a	n/a	n/a	n/a
1784-KT, -KTx	n/a	n/a	n/a	yes	n/a	n/a
1784-PCD	n/a	n/a	yes	n/a	n/a	n/a
1784-PCMK	n/a	n/a	n/a	yes	n/a	n/a
1788-CN2DN	n/a	yes	yes	n/a	n/a	n/a
1788-CN2FF	n/a	yes	n/a	n/a	n/a	n/a

1. The Ethernet PLC-5 processor must be one of these:
   - series C, revision N.1 or later
   - series D, revision E.1 or later
   - series E, revision D.1 or later
2. The 1785-ENET Ethernet communication interface module must be series A, revision D or later.
3. Use a 1747-L55x controller with OS501 or greater
4. Use a 1747-L54x controller.
5. The MicroLogix controller appears as I/O points to the ControlLogix controller. Requires 1761-NET-DNI DeviceNet interface.
6. The PLC-2 controller requires a 1785-KA module for DH+ communications.
7. The PLC-2 controller requires a 1771-KG module for serial (DF1) communications.
8. The PLC-3 controller requires a 1775-S5 module for DH+ communications
9. The PLC-3 controller requires a 1775-KA module for serial (DF1) communications.

Selecting a Chassis



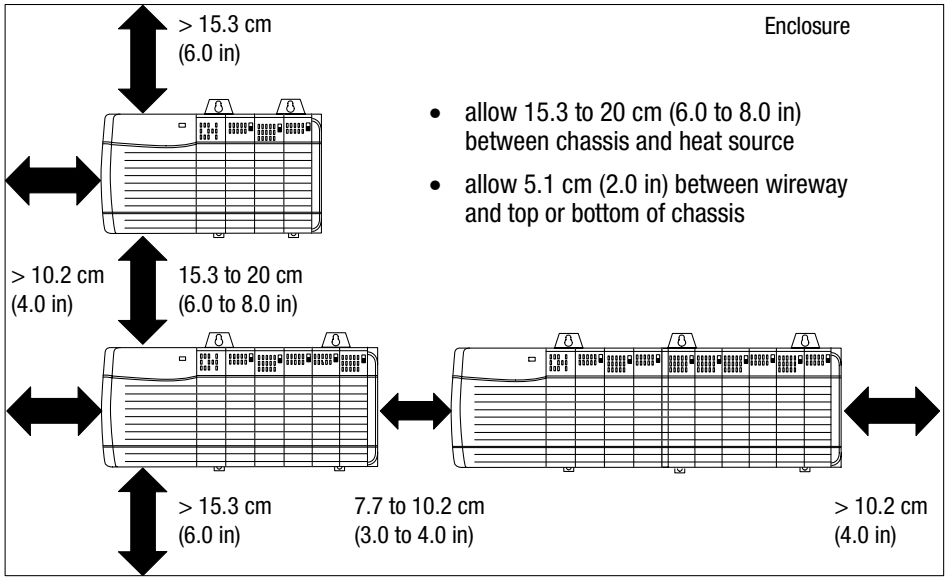
The ControlLogix system is a modular system that requires a 1756 I/O chassis. You can place any 1756 module in any slot.

The backplane provides a high-speed communication path between modules. Multiple controllers on the backplane can pass messages between each other. With multiple communication interface modules on the backplane, a message can be sent from across a link into a port on one module, routed across the backplane out another module's port, and sent across another link to its ultimate destination.

Catalog number:	Number of slots:	Weight:	Minimum cabinet size: (H x W x D)	Type of mounting:	Environmental conditions:
1756-A4	4	0.75 kg (1.7 lb)	507 x 507 x 203 mm (20 x 20 x 8 in)	backpanel mounting	operating temperature: 0° to 60° C (32 to 140° F) storage temperature: -40° to 85° C (-40 to 185° F) relative humidity 5 to 95% (without condensation)
1756-A7	7	1.10 kg (2.0 lb)	700 x 507 x 203 mm (24 x 20 x 8 in)		
1756-A10	10	1.45 kg (3.2 lb)	507 x 761 x 203 mm (20 x 30 x 8 in)		
1756-A13	13	1.90 kg (3.2 lb)	700 x 761 x 203 mm (24 x 30 x 8 in)		
1756-A17	17	2.20 kg (4.8 lb)	507 x 822 x 203 mm (30 x 36 x 8 in)		

Important: Use the slot filler module 1756-N2 to fill empty slots. Two slot filler modules are included in each 1756-N2 catalog number.

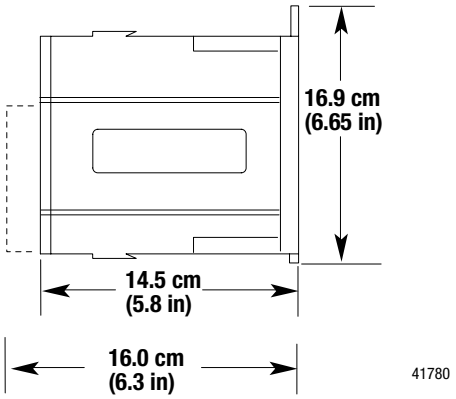
When you mount a chassis in an enclosure, make sure to meet these minimum spacing requirements:



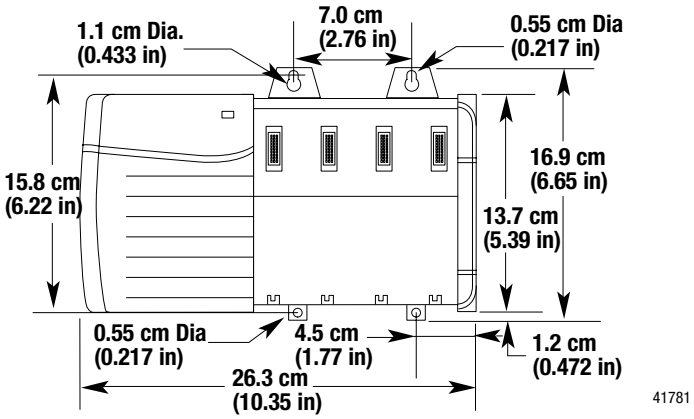
Mounting dimensions

right-side view of all chassis

with extended depth housing (1756-TBE)

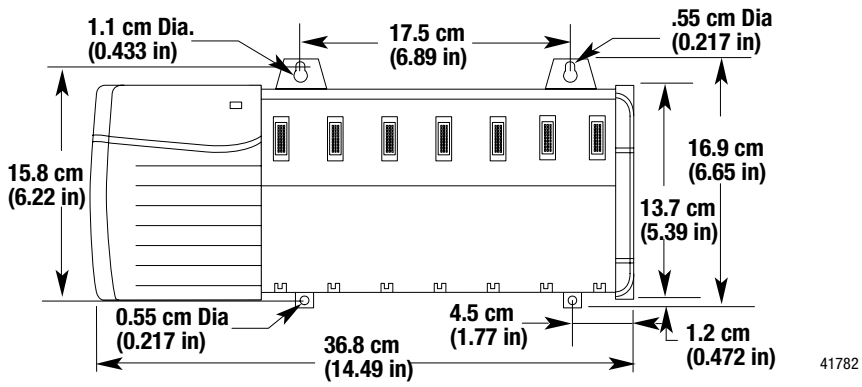


1756-A4 with power supply

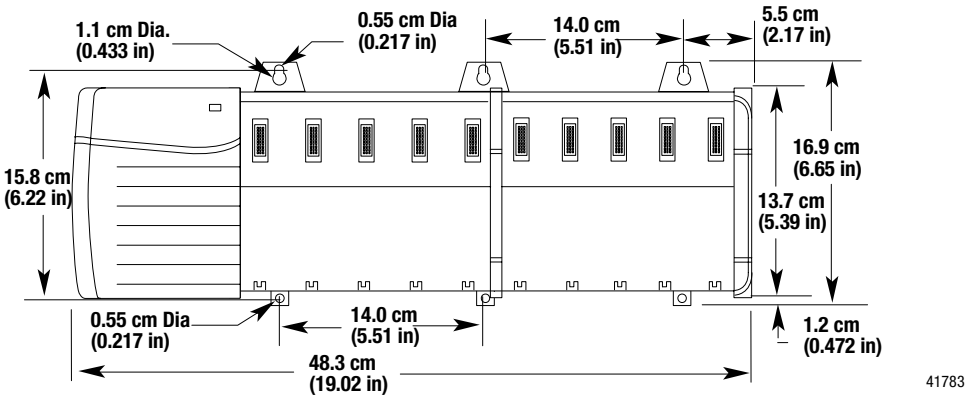


Mounting dimensions *(continued)*

1756-A7 with power supply

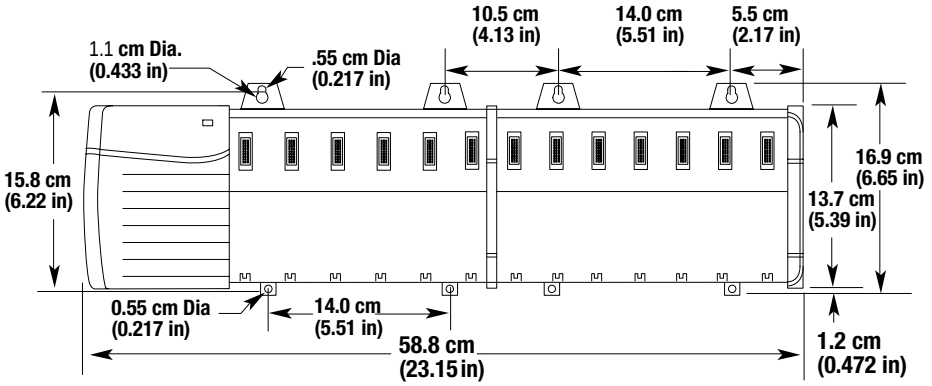


1756-A10 with power supply

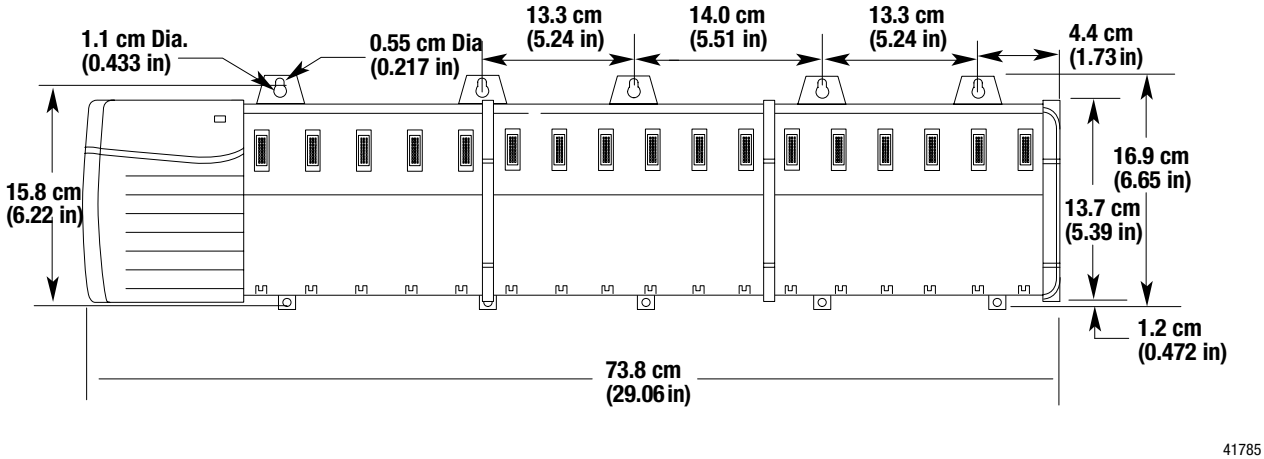


Mounting dimensions *(continued)*

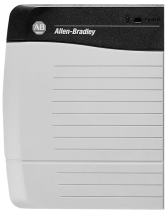
1756-A13 with power supply



1756-A17 with power supply



Selecting a Power Supply



The ControlLogix power supplies are used with the 1756 chassis to provide 1.2V, 3.3V, 5V, and 24V dc power directly to the chassis backplane. The power supply attaches to the left end of the chassis.

Description:	1756-PA72	1756-PA75	1756-PB72	1756-PB75
normal input voltage	120V ac or 220V ac	120V ac or 220V ac	24V dc	24V dc
input voltage range	85-265V ac	85-265V ac	19.2-32V dc	19.2-32V dc
maximum real input power	95W	95W	97W	97W
maximum apparent input power	240VA	240VA	na	na
maximum transformer load	238VA	238VA	na	na
frequency	47-63Hz	47-63Hz	dc	dc
maximum output power	series A power supply: 70W @ 40° C 55W @ 60° C series B power supply 75W @ 60° C	series B power supply 75W @ 60° C	series A power supply: 70W @ 40° C 55W @ 60° C series B power supply 75W @ 60° C	series B power supply 75W @ 60° C
maximum backplane output current	• 1.5A @ 1.2V dc • 4A @ 3.3V dc • 10A @ 5V dc • 2.8A @ 24V dc	• 1.5A @ 1.2V dc • 4A @ 3.3V dc • 13A @ 5V dc • 2.8A @ 24V dc	• 1.5A @ 1.2V dc • 4A @ 3.3V dc • 10A @ 5V dc • 2.8A @ 24V dc	• 1.5A @ 1.2V dc • 4A @ 3.3V dc • 13A @ 5V dc • 2.8A @ 24V dc
fuse	none			
dimension (H x W x D)	140 x 112 x 145 mm (5.5 x 4.4 x 5.7 in)			
weight	1.0 kg (2.5 lb)			
operating temperature	0° to 60° C (32 to 140° F)			
storage temperature	-40° to 85° C (-40 to 185° F)			
relative humidity	5 to 95% (without condensation)			

Power requirements and transformer sizing

Each power supply generates a shutdown signal on the backplane whenever the ac line voltage drops below its lower voltage limit. It removes the shutdown signal when the line voltage comes back up to the lower voltage limit. This shutdown is necessary to ensure that only valid data is stored in memory.

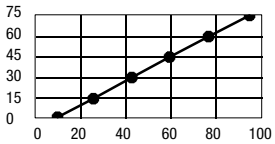
The external transformer rating (in VA) of each power supply is greater than its real input power (in Watts) because a capacitor-input ac/dc supply draws power only from the peak of the ac voltage wave form. If the transformer is too small, it clips the peak of the sine wave. When the voltage is still above the lower voltage limit, the power supply senses this clipped wave form as low voltage and could prematurely shut down modules in the chassis.

The graphs that follow display backplane power load.

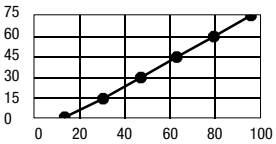
- Use the real power value to determine the amount of heat dissipation you have inside the enclosure.
- Use the apparent power value to estimate power cost.
- Use the transformer load value plus all other loads on a transformer to determine the required transformer size.

1756-PA72
1756-PA75
ac

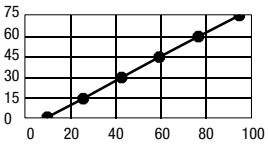
backplane power load (Watts)



real power (Watts)



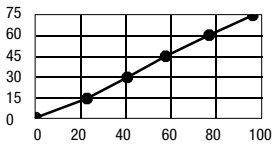
apparent power (Watts)



transformer load (VA) = real power (Watts) x 2.5

1756-PB72
1756-PB75
dc

backplane power load (Watts)



real power (Watts)

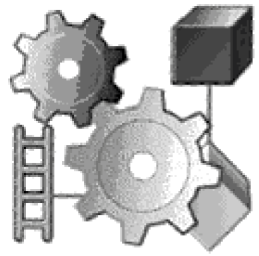
41777

Selecting Software

Your selection of modules and network configuration determines what software packages you need to configure and program your system.

If you have:	You need:	Order this catalog number:
1756 ControlLogix controller	RSLogix 5000 programming software	9324 series (RSLogix 5000 programming software)
1756-M02AE motion module		
1756-CNB, -CNBR ControlNet communication module	RSNetWorx for ControlNet (comes with RSLogix 5000 programming software and RSNetWorx for ControlNet bundle)	9324-RLD300NXENE (RSLogix 5000 programming software plus RSNetWorx option) **or** 9357-CNETL3 (RSNetWorx for ControlNet)
1756-DNB DeviceNet communication module	RSNetWorx for DeviceNet	9324-RLD300NXENE (RSLogix 5000 programming software plus RSNetWorx option) **or** 9357-DNETL3 (RSNetWorx for DeviceNet)
1756-ENET Ethernet communication module (set the IP address)	RSLinx software (RSLinx Lite comes with RSLogix 5000 programming software) **or** ControlLogix Gateway software (comes with RSLogix 5000 programming software)	9324 series (RSLogix 5000 programming software) **or** 1756-GTWY (ControlLogix Gateway Configuration software)
1756-DHRIO communication module (define the DH+ routing table)		
1788-CN2FF Foundation Fieldbus linking device	Foundation Fieldbus Configuration Software **and** RSLinx or RSLinx OEM software (RSLinx Lite is not sufficient)	1788-FFCT and 9355-WABENE or 9355-WABOEMENE
communication card in a workstation	RSLinx software (RSLinx Lite comes with RSLogix 5000 programming software)	9324 series (RSLogix 5000 programming software)
workstation dedicated for operator interface	RSView32 software	9301 series
PanelView terminal	PanelBuilder software	2711-ND3 for PanelBuilder 900 **or** 2711E-ND1 for PanelBuilder 1400e

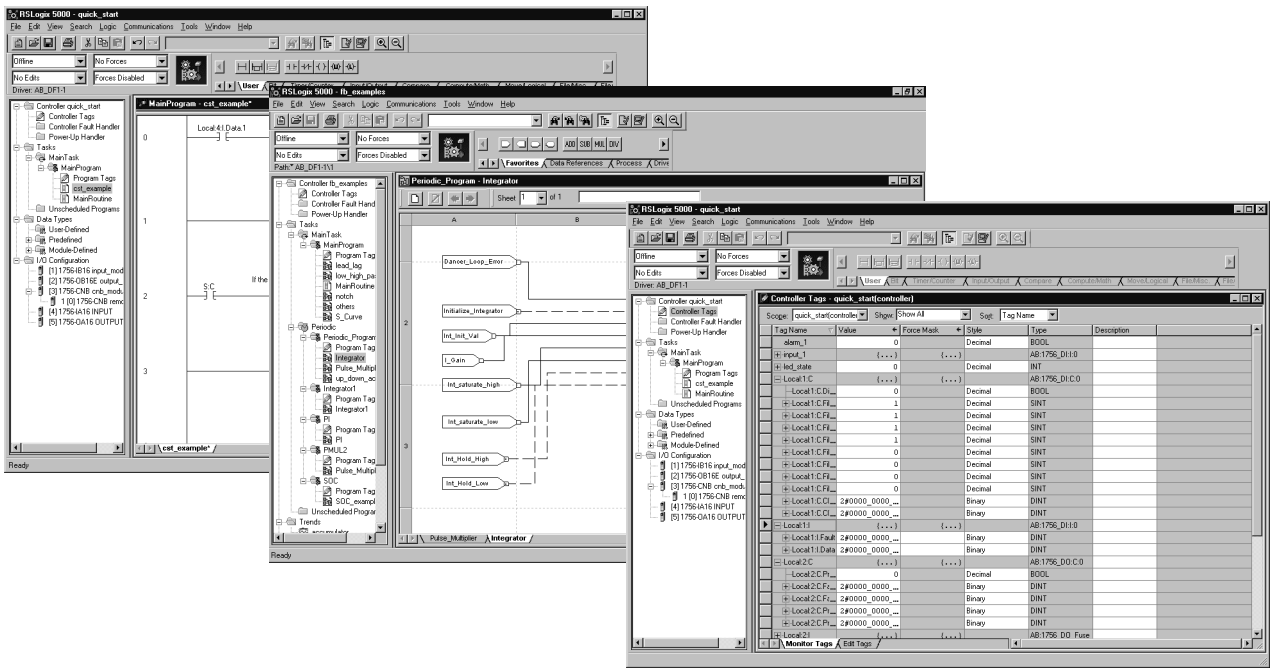
Programming Software



RSLogix 5000 programming software is IEC 1131-3 compliant software that supports the ControlLogix controller. Operating on Microsoft's Windows NT 32-bit operating system, the software maximizes performance, saves development time, and improves productivity. RSLogix 5000 is part of the RSLogix family of software products, offering the same reliable functionality. RSLogix 5000 programming software also includes axis configuration and programming support for motion control. One hardware and software platform is all you need for your combined sequential and motion needs.

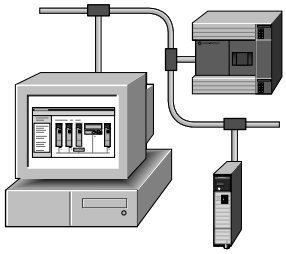
Select the programming package based on the functionality you need:

This catalog number:	Includes this functionality
9324-RLD300	• standard programming software (relay ladder logic)
9324-RLD300NXENE	• standard programming software (relay ladder logic) • RSNetWorx for ControlNet and DeviceNet software
9324-RLD700	• standard programming software (relay ladder logic) • support for function block programming • RSNetWorx for ControlNet and DeviceNet software



Description:	Value:
personal computer	IBM-compatible Pentium 90 MHz or greater
software requirements	Microsoft Windows NT version 4.0 with Service Pack 4 RSLinx software must be installed
RAM	32 Mbytes of RAM minimum 64 Mbytes of RAM recommended
hard disk space	40 Mbytes of free hard disk space (or more based on application requirements)
video requirements	16-color VGA graphics adapter 640 x 480 or greater resolution (256-color 800 x 600 minimum for optimal resolution)

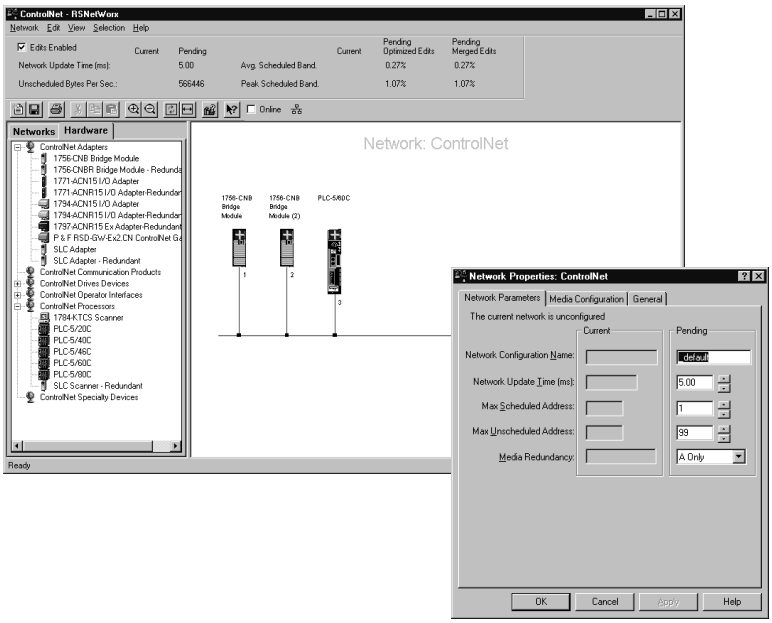
Network Configuration Software



RSNetWorx software for ControlNet (9357-CNETL3) and RSNetWorx software for DeviceNet (9357-DNETL3) are the configuration and scheduling tools for your ControlNet or DeviceNet networks. RSNetWorx software lets you create a graphical representation of your network configuration and configure the parameters that define your network.

RSNetWorx software also performs a scheduling function for all network components. For example, each network scanner has its own scan list and memory mapping. This information is stored in the configurations files in the scanner. When changes are made to the scan lists, RSNetWorx software automatically calculates network bandwidth for the entire network, as well as the bandwidth used by each network component.

Important: You must have RSNetWorx software to configure and schedule the ControlNet networks in your ControlLogix system.



Description:	Value:
personal computer	IBM-compatible 120MHz minimum (Pentium recommended)
operating system	Microsoft Windows 95, Windows 98, or Windows NT version 4.0 (with Service Pack 2 or later)
RAM	32 Mbytes of RAM minimum 48 Mbytes or more of RAM recommended
hard disk space	14 Mbytes of free hard disk space (or more based on application requirements)
video requirements	16-color VGA graphics adapter 640 x 480 or greater resolution (256-color 800 x 600 minimum for optimal resolution)

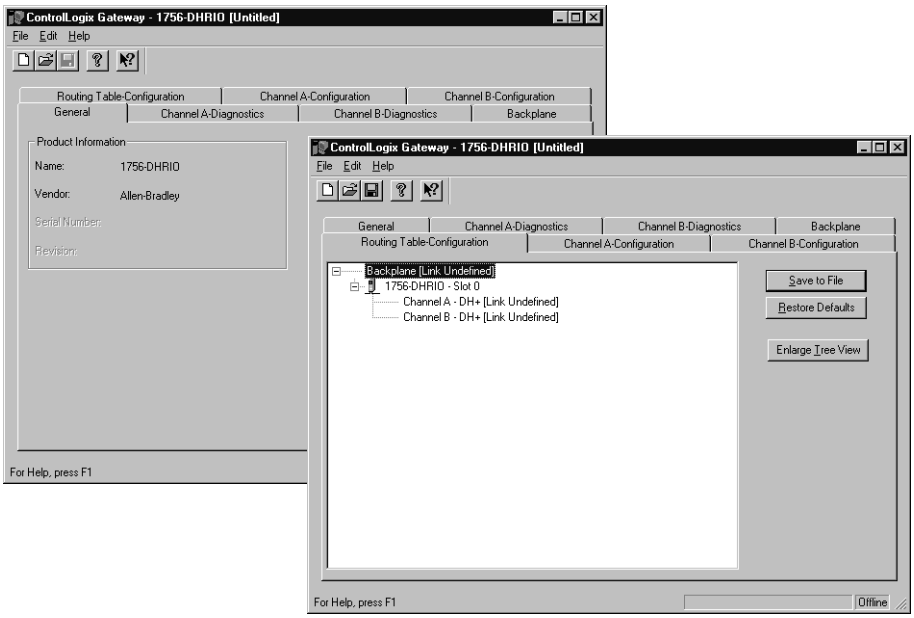
Gateway Configuration Software

Use a ControlLogix Gateway to bridge and route control and information data through:

- ControlNet networks
- Ethernet networks
- DH+ networks

With the ControlLogix Gateway configuration software (1756-GTWY), you can:

- configure IP and network addresses for a 1756-ENET module.
- configure a routing table in the 1756-DHRIO module to allow communications with devices on ControlNet, Ethernet, and DH+ networks.
- configure the default processor slot for a 1756-DHRIO to forward DH+ messages sent to the module.
- monitor module diagnostics for 1756-CNB, -CNBR, 1756-ENET, and 1756-DHRIO modules.
- monitor ControlLogix backplane status and diagnostics.



Description:	Value:
personal computer	IBM-compatible 66MHz minimum (Pentium recommended)
operating system	Microsoft Windows NT version 4.0 or later
RAM	16 Mbytes of RAM minimum
hard disk space	10 Mbytes of free hard disk space
video requirements	16-color VGA graphics adapter 640 x 480 or greater resolution

Converting PLC-5 or SLC 500 Logic to Logix5550 Logic

The RSLogix5000 programming software includes a translation tool that converts a PLC-5 or SLC 500 import/export file (.PC5 or .SLC extension) into a complete Logix5550 import/export file (.L5K extension). Currently, the translation tool converts only ladder instructions. SFC and structured text files are not converted.

Comparing PLC-5 and SLC 500 architecture to Logix5550 architecture

Because of the architectural differences between a PLC-5 or SLC 500 processor and a Logix5550 controller, you must rework a converted Logix5550 project to make sure it operates properly. Some of the most significant differences in architecture are:

Architectural issue:	Comparison:
CPU	The PLC-5 and SLC 500 processor is based on 16-bit operations. The Logix5550 controllers uses 32-bit operations. The translation tool converts the legacy logic into its 32-bit equivalent.
operating system	The PLC-5 and SLC 500 processors support individual program files that can be configured as selectable timed interrupts (STIs) or input interrupts (DIIs/PIIs). In addition, the PLC-5 processor supports multiple main control programs (MCPs). The Logix5550 controller combines these into it's task, program, and routine organization. The translation tool converts the legacy program types into appropriate Logix5550 tasks. The PLC-5 and SLC 500 processors use an S data file to store processor status. The Logix5550 controller stores data differently. Instead of accessing different locations within a file, use Get System Value (GSV) and Set System Value (SSV) instructions to specify the status information you want. This is a significant difference that requires rework once the converted logic is imported into the Logix5550 controller. The PLC-5 and SLC 500 processors also use bits in S:0 for the arithmetic status flags. For example, S:0/03 stores sign status. The Logx5550 controller uses keywords to reference these flags. For example, instead of referencing a bit address to monitor a sign operation, you use the keyword S:N.
input and outputs	The PLC-5 and SLC 500 processor map I/O memory into I and O data table files. The I/O data is updated synchronously to the program scan so you know you have current values each time the processor begins a scan. The Logix5550 controller references I/O which is updated asynchronously to the logic scan. For the Logix5550 controller, you might consider creating an I/O data buffer to use for static values during logic execution and update the buffer as needed. After the conversion is complete, you must add instructions to copy the I/O data into the I and O arrays. Do this at the beginning or ending of a program to buffer the data so that it is presented synchronously to the program scan.
data	The PLC-5 and SLC 500 processors store all data in global data tables. You access this data by specifying the address of the data you want. The Logix5550 controller supports data that is local to a program and data that is global to all the tasks within the controller. The Logix5550 controller can also share data with other controllers, and instead of addresses, you use tags to access the data you want. Each PLC-5 and SLC 500 data table file can store several words of related data. The Logix5550 controller uses arrays to store related data. The translation tool converts the PLC-5 and SLC 500 data table files into Logix5550 arrays.

Architectural issue:	Comparison:
timers	The PLC-5 and SLC 500 timers are based on 16-bit architecture and can have different time bases. The Logix5550 controller is based on 32-bit architecture and only supports a 1 msec time base. The translation tools converts the legacy timers as they best fit into the Logix5550 architecture. Converted timers require rework to operate properly.
communications	The PLC-5 processor supports block-transfer read and write (BTR and BTW) instructions, ControlNet I/O (CIO), and message (MSG) instructions. The SLC 500 processor supports MSG instructions. The Logix5550 controller supports MSG instructions. The translation tool converts the legacy BTR, BTW, and MSG instructions into Logix5550 MSG instructions. Any CIO instructions are not converted. Once you import the converted logic, you must configure the MSG instructions so that they work properly and rework any CIO instructions.

Reworking converted logic

You must rework a converted Logix5550 project file to make sure it operates properly.

Task:	Description:
Rework PCE instructions	The translation tool process inserts a PCE (Possible Conversion Error) instruction to identify possible errors. Delete each PCE instruction and replace it with the appropriate logic.
Rework UNK instructions	The translation tool converts some PLC-5 and SLC 500 instructions that have no equivalent in the RSLogix5000 architecture. Once you import these instructions into a Logix5550 project, they appear as UNK instructions. Delete each UNK instructions and replace it with the appropriate logic.
Configure the controller and the chassis	Use the Controller Properties dialog to assign the chassis size and slot number of the controller. Then use the Controller Organizer to specify I/O modules and other devices.
Map I/O	The file structure in the Logix5550 controller is tag-based. The translation tool creates tags and arrays of tags to align and map the PLC-5 files. The tags created for physical I/O are empty at the end of the conversion process. Use the programming software to add the I/O modules to the tree structure for the Logix5550 controller. Then, program instructions to map the Logix5550 I/O tags to the converted tags.
Complete MSG configuration	The translation tool only partially converts MSG instructions. You must use the programming software to configure each MSG instruction by completing the information on the Communications tab.

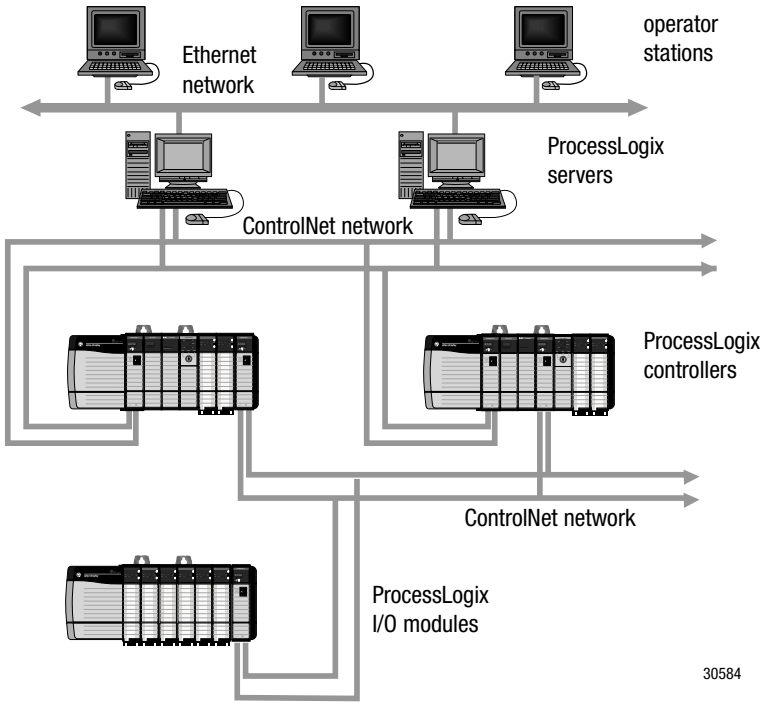
Implementing a DCS Control System Using the ControlLogix Architecture

The ProcessLogix Process Control System is a fully-integrated, server-based, process control solution designed to provide process engineers with the features and functions they require from a state-of-the-art distributed control system (DCS). And since the ProcessLogix system is based on economical ControlLogix and ControlNet components, it is also a cost-effective solution.

Meeting Your Process Control Requirements

Because the ProcessLogix system comes with an extensive library of functions and has the ability to communicate with ControlLogix controllers, it can help automate a broad range of batch and continuous process applications across several industries, including consumer products, pulp and paper, petroleum, metals, and pharmaceuticals.

ControlNet communications provide the primary link between ProcessLogix servers, controllers, and I/O. Ethernet communications support connections between operator workstations and ProcessLogix servers.

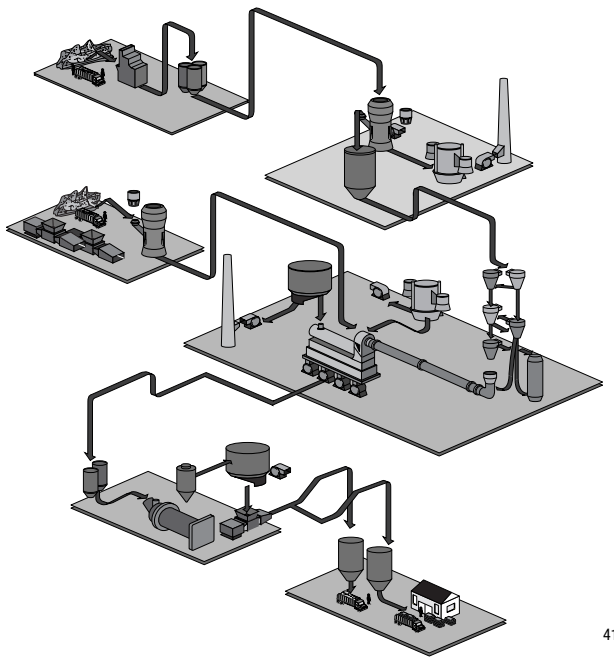


Developing a ProcessLogix Application

The ProcessLogix development environment offers control functions that you access and link using a function block editor. A library of templates, called function blocks, provide the logic for continuous, logic, sequence, and basic batch functions. The ProcessLogix system supports:

- regulatory, computational, and compensation requirements with continuous functions
- boolean, selection, and comparison requirements with logic functions
- action handling and conditional logic with sequential functions, including sequential function charts
- basic batch requirements with Batch Level 1 and 2 type control functions

The ProcessLogix system software includes configuration and runtime components. Once you develop and test your application, the ProcessLogix system provides operators with smart displays, including operational procedures and built-in documentation. You can also implement a comprehensive set of alarms to help provide timely notification of any deviation in your process. And while it controls your process, the ProcessLogix system is constantly accumulating data in the ProcessLogix system server, which you can analyze using the system's trending and historian capabilities. Or you can export the data to external programs or systems for more detailed analysis.



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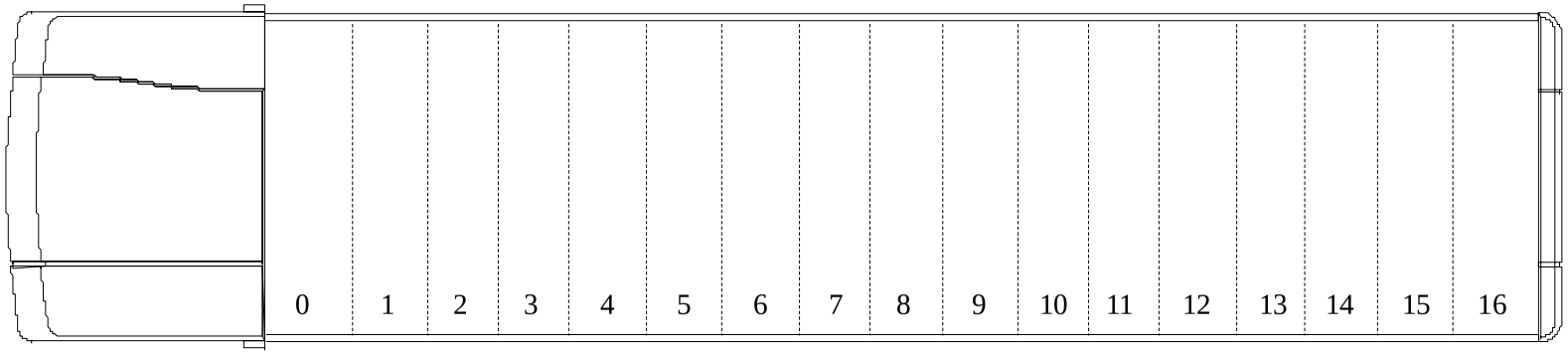

Chassis:	Catalog Number:	Backplane current 3.3V (amps):	Backplane current 5.1V (amps):	Backplane current 24V (amps):	Module power (watts):	I/O termination:		Connections:	
						20-pin	36-pin	Direct	Rack
rack									
power									
0									
1									
2									
3									
4									
5									
6									
7									
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	totals:								

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