ControlLogix
Selection
Guide

1756-Lx

Rockwell Automation
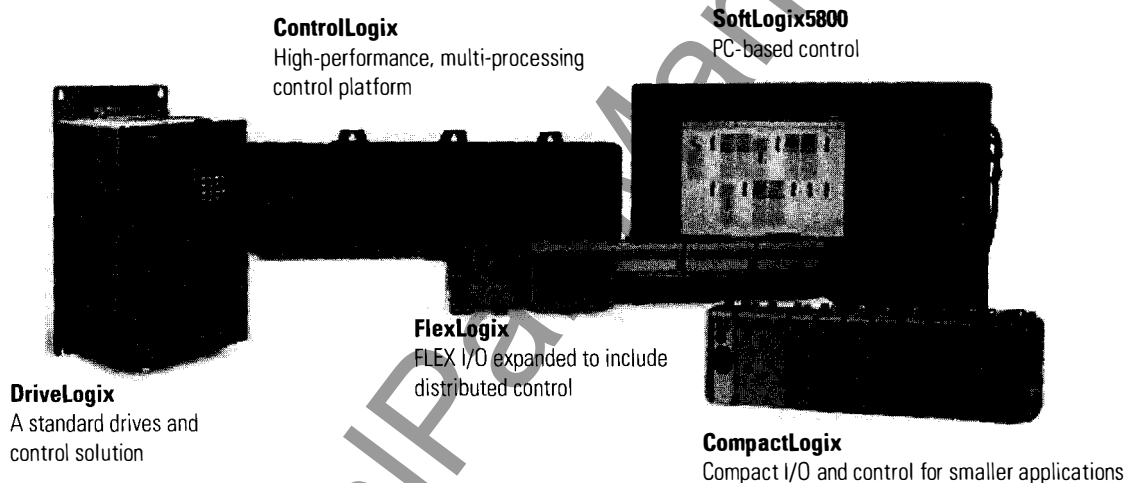
Common Characteristic:	1756 ControlLogix	1769 CompactLogix	1789 SoftLogix5800	1794 FlexLogix	PowerFlex 700S DriveLogix
controller tasks	1 continuous and 31 periodic or 32 periodic	1 continuous and 3 periodic or 4 periodic	1 continuous and 31 periodic or 32 periodic	1 continuous and 7 periodic or 8 periodic	1 continuous and 7 periodic or 8 periodic
user memory	1756-L55M12 750 Kbytes 1756-L55M13 1.5 Mbytes 1756-L55M15 3.5 Mbytes 1756-L55M16 7.5 Mbytes 1756-L55M22 750 Kbytes 1756-L55M23 1.5 Mbytes 1756-L55M24 3.5Mbytes 1756-L63 8 Mbytes	1769-L20 64 Kbytes 1769-L30 256 Kbytes	depends on personal computer 1789-L10 2 Mbytes 2 slot, no motion 1789-L30 limited by PC 5 slots 1789-L60 limited by PC 16 slots	1794-L33 64 Kbytes 1794-L34 512 Kbytes	256 Kbytes 768 Kbytes with memory expansion
nonvolatile user memory	1756-L55M12 none 1756-L55M13 none 1756-L55M15 none 1756-L55M16 none 1756-L55M22 750 Kbytes 1756-L55M23 1.5 Mbytes 1756-L55M24 3.5Mbytes 1756-L63 CompactFlash	1769-L20 64 Kbytes 1769-L30 256 Kbytes	none	1794-L33 64 Kbytes 1794-L34/B 512 Kbytes	768 Kbytes with memory expansion
built-in communication ports	1 port RS-232 serial (DF1 or ASCII)	• 1769-L20 has 1 port RS-232 serial (DF1 or ASCII) • 1769-L30 has 2 ports RS-232 (one DF1 only, other DF1 or ASCII)	depends on personal computer	• 1 port RS-232 serial (DF1 or ASCII) • 2 slots for 1788 communication cards	• 1 port RS-232 serial (DF1 or ASCII) • 1 slot for 1788 communication cards
communication options (these options have specific products and profiles for their platform - other options are available via 3rd party products and generic profiles)	EtherNet/IP ControlNet DeviceNet Data Highway Plus Universal Remote I/O serial DH-485 SynchLink	EtherNet/IP (messaging only) DeviceNet serial DH-485	EtherNet/IP ControlNet DeviceNet serial	EtherNet/IP ControlNet DeviceNet serial DH-485	EtherNet/IP ControlNet DeviceNet serial
redundancy	ControlNet media power supplies controller	none	ControlNet media	ControlNet media	ControlNet media
native I/O	1756 ControlLogix I/O	1769 Compact I/O	none	1793 FLEX Integra I/O 1794 FLEX I/O 1797 FLEX Ex I/O	1793 FLEX Integra I/O 1794 FLEX I/O 1797 FLEX Ex I/O
motion support	SERCOS interface analog interface	virtual	analog interface	virtual	virtual
mounting and /or installation options	1756 chassis	panel mount DIN rail	none	panel mount DIN rail	embedded in PowerFlex 700S
programming languages	• relay ladder • structured text • function block • sequential function chart	• relay ladder • structured text • function block • sequential function chart	• relay ladder • function block • external routines (runs Windows DLLs developed using C/C++))	• relay ladder • structured text • function block • sequential function chart	• relay ladder • structured text • function block • sequential function chart

Integrated Logix Architecture

Rockwell Automation Logix Platforms provide a single integrated control architecture for discrete, drives, motion, and process control.

The integrated Logix architecture provides a common control engine, programming software environment, and communication support across multiple hardware platforms. All Logix controllers operate with a multitasking, multiprocessing operating system and support the same set of instructions in multiple programming languages. One RSLogix 5000 programming software package programs all Logix controllers. And all Logix controllers incorporate the NetLinx architecture to communicate via EtherNet/IP, ControlNet, and DeviceNet networks.

ControlLogix
High-performance, multi-processing control platform

SoftLogix5800
PC-based control

FlexLogix
FLEX I/O expanded to include distributed control

DriveLogix
A standard drives and control solution

CompactLogix
Compact I/O and control for smaller applications

ControlLogix System Overview

The ControlLogix system provides sequential, process, motion, and drive 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 simple ControlLogix system consists of a stand-alone controller and I/O modules in a single chassis.

ControlLogix controller

1756 I/O modules in the same chassis as the ControlLogix controller
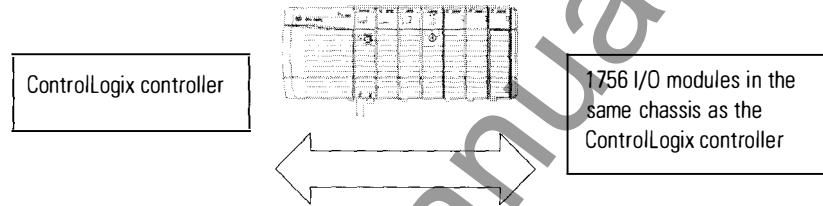
Or use the ControlLogix system as a gateway. Include the communication modules you need for connectivity to other networks. For this use, a controller is not required. The ControlLogix Gateway integrates into existing PLC-based systems so that users with existing networks can send or receive messages 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

communication interface modules in the same chassis as the ControlLogix controller

EtherNet/IP link

ControlNet link

DeviceNet link

Universal Remote I/O link

remote I/O modules

ControlLogix controller

1756 I/O modules in the same chassis as the ControlLogix controller

RS-232 link

EtherNet/IP link
ControlNet link
DH+ link

computers
other controllers
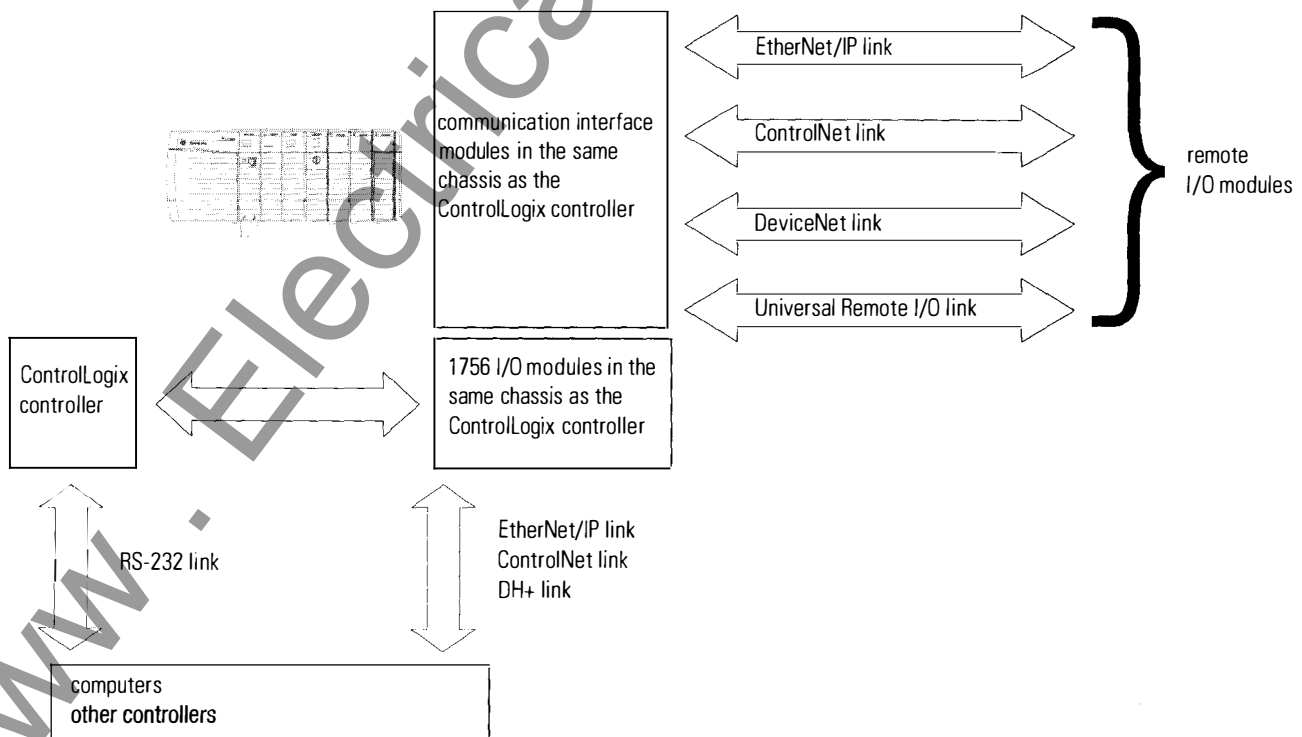
Layout the System

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 netwo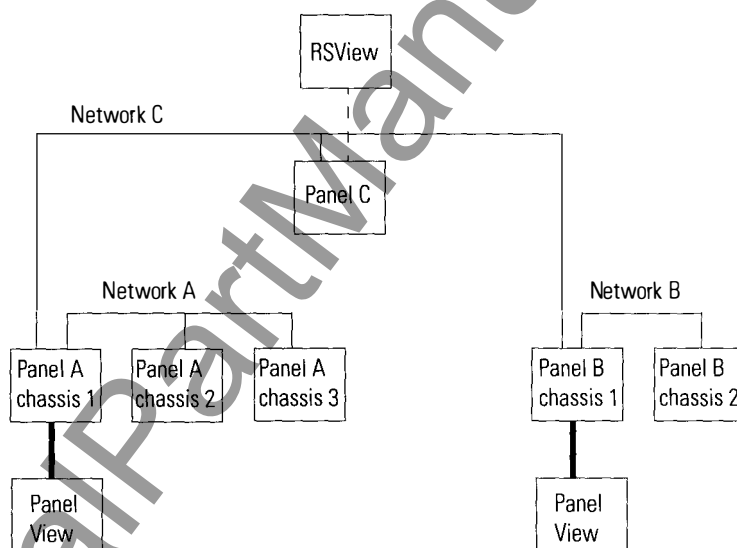rk or system configuration changes. If you plan to share I/O, make sure the I/O is on a network that each controller can access.

Assume that Location A and Location B both require a controller and its own I/O. Both controllers interact with time critical information. Panel C does not need a controller and can be a 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 network.

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

Evaluate what communications need to occur between controllers. If there is sporadic information that is not time critical, use a message-based network such as an EtherNet/IP (the information portion), 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 or EtherNet/IP network.

4

Laying out a redundant system

The ControlLogix environment offers different levels of redundancy that you can design into your system. These systems require additional hardware, so plan accordingly. You can design redundant:

- media for ControlNet
- power supplies
- 1756-L55 controller chassis

Redundant ControlNet media

ControlLogix chassis with 1756-CNBR module

ControlNet node

redundant media
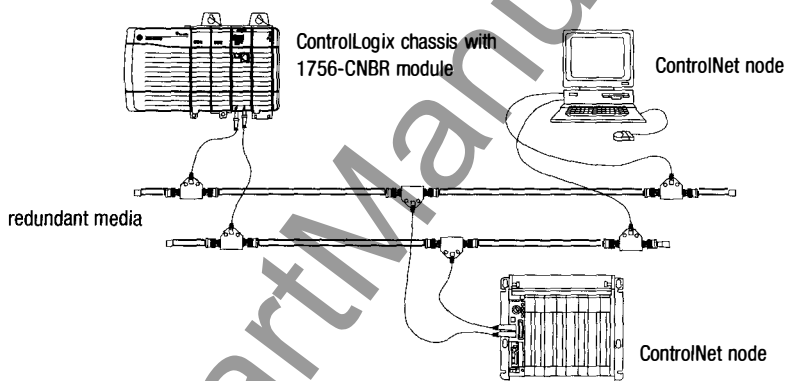
ControlNet node

Requires:

- 1756-CNBR ControlNet modules
- two identical ControlNet links

Redundant power supplies

1756-PA75R or 1756-PB75R

1756-PA75R or 1756-PB75R

1756-CPR cable

annunicator wiring

ControlLogix chassis with 1756-PSCA module

1756 input module
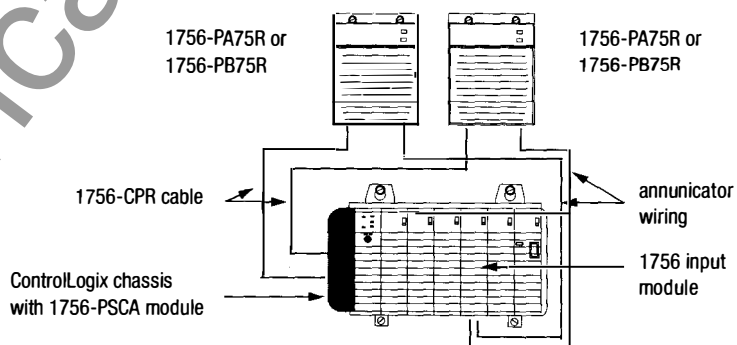
Requires:

- two redundant power supplies, any combination of 1756-PA75R and 1756-PB75R
- 1756-PSCA chassis adapter module, in place of the standard power supply
- two 1756-CPR cables to connect the power supplies to the 1756-PSCA adapter
- user-supplied annunicator wiring to connect the power supplies to the input modules, if needed

Redundant 1756-L55 controller chassis

primary chassis

ControlNet network

1757-SRCx cable

secondary chassis

remote I/O modules
redundant power supplies
another ControlLogix controller
other communication networks
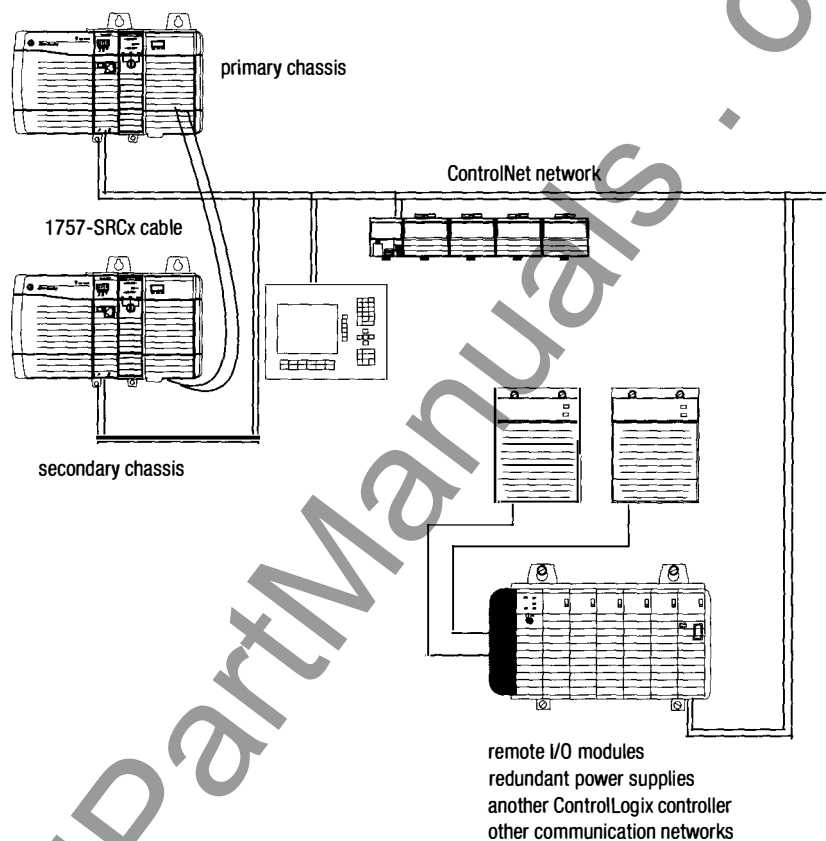
Requires:

- one 1756-L55 controller in each redundant chassis
- at least one, but no more than five, 1756-CNB(R) series D, version 5.23 (or greater) communication modules in each redundant chassis
- one 1757-SRM module in each redundant chassis
- no other I/O or communication modules can be in the redundant chassis

All I/O must be remote from the redundant controllers. ControlLogix redundancy works with remote 1756 I/O, FLEX I/O, drives, operator interfaces, or any other devices that can communicate with a ControlLogix controller over a ControlNet link. To connect to other networks, bridge through another ControlLogix chassis (not one of the redundant controller chassis)

Use the following checklist 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.

✓	Step:	For more information, see page:
☐	**1 Determine the I/O devices** Use a spreadsheet to record: • location of the device • number of points needed • appropriate catalog number • number of points available per module • number of modules	I/O module specifications .... page 7 Wiring systems .... page 14 Placing I/O modules .... page 23 How I/O modules operate .... page 24
☐	**2 Determine motion requirements** To the I/O spreadsheet, add the number of required motion modules.	Motion overview .... page 27 SERCOS interface modules .... page 29 Analog interface module .... page 31
☐	**3 Select communication modules** To the I/O spreadsheet, add the number of required communication modules.	Network overview .... page 33 EtherNet/IP specifications .... page 36 ControlNet specifications .... page 38 DeviceNet specifications .... page 41 DH+/RIO specifications .... page 42 Fieldbus specifications .... page 43 Serial specifications .... page 44 DH-485 specifications .... page 45 Connecting to other networks .... page 50 SynchLink specifications .... page 46
☐	**4 Determine controller requirements** Select the appropriate controller based on: • required controller tasks • number of I/O points needed • number of communication cards needed • required controller memory	Controller specifications .... page 51 Determining memory requirements .... page 53 Controlling devices .... page 55 Communicating with other devices .... page 58
☐	**5 Determine the number of chassis** Based on the system design, determine the number of chassis you need.	Chassis specifications .... page 67
☐	**6 Select power supplies and ensure sufficient power** On the module spreadsheet, calculate power requirements.	Power supply specifications .... page 71
☐	**7 Select software** Based on the system design, determine the software products you need to configure and program your application.	Available software products .... page 75 Programming software .... page 76 Network configuration software .... page 78

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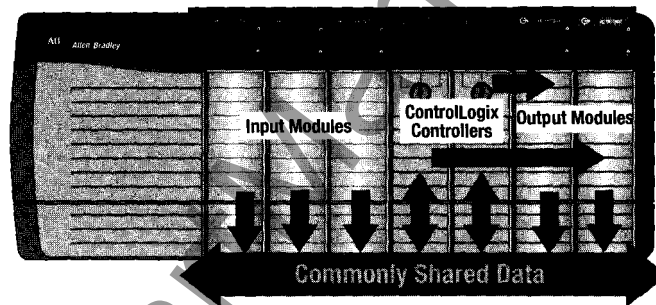
Each ControlLogix I/O module mounts in a ControlLogix chassis and **requires** either a removable terminal block (RTB) or a 1492 interface module (IFM) to connect all field-side wiring. RTBs and IFMs are not included with the I/O modules. They must be ordered separately.

The ControlLogix family of I/O modules includes:

Product:	See page:
1756 digital I/O modules	8
1756 analog I/O modules	11
1756 specialty I/O modules	12
1756 removable terminal blocks	14
1492 wiring systems	14

1756 Digital I/O Modules
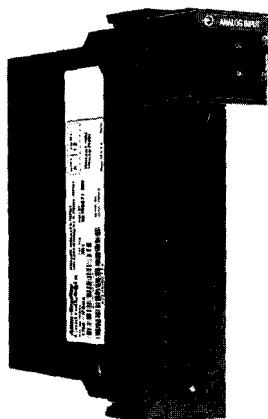
The 1756 digital I/O modules support:

- wide variety of voltage interface capabilities
- isolated and non-isolated module types
- point-level output fault states
- choice of direct-connect or rack-optimized communications
- field-side diagnostics on select modules

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):	Maximum on state current:	Maximum off state current:	Removable terminal block:	Backplane current:
1756-IA8D	8 (2 sets of 4)	120V ac	79-132V ac	on=11 or 12 ms off=17 or 26ms	79V ac 5mA 132V ac 16mA	2.5mA	1756-TBNH 1756-TBSH (20 pins)	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	74V ac 5mA 132V ac 13mA	2.5mA	1756-TBNH 1756-TBSH (20 pins)	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	79V ac 5mA 132V ac 15mA	2.5mA	1756-TBCH 1756-TBS6H (36 pins)	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	159V ac 5mA 265V ac 13mA	2.5mA	1756-TBCH 1756-TBS6H (36 pins)	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	10V ac 5mA 30V ac 1.2mA	2.75mA	1756-TBNH 1756-TBSH (20 pins)	100mA @ 5V 2mA @ 24 V 0.56W

Digital ac output modules

Catalog number:	Number of outputs:	Voltage category:	Operating voltage:	Maximum current per point:	Maximum current per module:	Removable terminal block:	Backplane current:
1756-OA8	8 (2 sets of 4)	120/240V ac	74-265V ac	2A @ 60°C	5A @ 30°C 4A @ 60°C	1756-TBNH 1756-TBSH (20 pins)	200mA @ 5V 2mA @ 24V 1.07W
1756-OA8D	8 (2 sets of 4)	120V ac	74-132V ac	1.0A @ 30°C 0.5A @ 60°C	8A @ 30°C 4A @ 60°C	1756-TBNH 1756-TBSH (20 pins)	175mA @ 5V 250mA @ 24V 6.89W
1756-OA8E	8 (2 sets of 4)	120V ac	74-132V ac	2A @ 60°C (4A/set @ 30°C 2A/set @ 60°C)	8A @ 30°C 4A @ 60°C	1756-TBNH 1756-TBSH (20 pins)	200mA @ 5V 250mA @ 24V 7 02W
1756-OA16	16 (2 sets of 8)	120/240V ac	74-265V ac	0.5A @ 60°C (2A/set @ 60°C)	4A @ 60°C	1756-TBNH 1756-TBSH (20 pins)	400mA @ 5V 2mA @ 24V 2.09W
1756-OA16I	16 (individually isolated)	120/240V ac	74-265V ac	2A @ 30°C 1A @ 60°C	5A @ 30°C 4A @ 60°C	1756-TBCH 1756-TBS6H (36 pins)	300mA @ 5V 2.5mA @ 24V 1.6W
1756-ON8	8 (2 sets of 4)	24V ac	10-30V ac	2A @ 60°C	5A @ 30°C 4A @ 60°C	1756-TBNH 1756-TBSH (20 pins)	200mA @ 5V 2mA at 24V 1.07W

Digital dc input modules

Catalog number:	Number of inputs:	Voltage category:	Operating voltage:	Maximum signal delay (programmable):	Maximum on state current:	Maximum off state current:	Removable terminal block:	Backplane current:
1756-IB16	16 (2 sets of 8)	12/24V dc sink	10-31.2V dc	on=1, 2, or 3ms off=2, 3, 4, 11, or 20ms	10V dc 2mA 31.2V dc 10mA	1.5mA	1756-TBNH 1756-TBSH (20 pins)	100mA @ 5V 2mA @ 24V 0.56W
1756-IB16D	16 (4 sets of 4)	12/24V dc sink	10-30V dc	on=1, 2, or 3ms off=4, 5, 13, or 22ms	10V dc 2mA 30V dc 13mA	1.5mA	1756-TBCH 1756-TBS6H (36 pins)	150mA @ 5V 3mA @ 24V 0.84W
1756-IB16I	16 (individually isolated)	12/24V dc source or sink	10-30V dc	on=1, 2, or 3ms off=4, 5, 6, 13, or 22ms	10V dc 2mA 30V dc 10mA	1.5mA	1756-TBCH 1756-TBS6H (36 pins)	100mA @ 5V 3mA @ 24V 0.45W
1756-IB32	32 (2 sets of 16)	12/24V dc sink	10-31.2V dc	on=1, 2, or 3ms off=2,3,4,11, or 20ms	10V dc 2mA 31.2V dc 5.5mA	1.5mA	1756-TBCH 1756-TBS6H (36 pins)	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	30V dc 2mA 60V dc 7mA	1.5mA	1756-TBNH 1756-TBSH (20 pins)	100mA @ 5V 3mA @ 24V 0.58W
1756-IH16I	16 (individually isolated)	125V dc source or sink	90-146V dc	on=2, 3, or 4ms off=6, 7, 8,15, or 24ms	90V dc 1mA 146V dc 3mA	0.8mA	1756-TBCH 1756-TBS6H (36 pins)	125mA @ 5V 3mA @ 24V 0.71W
1756-IV16	16 (2 sets of 8)	12/24V dc source	10-30V dc	on=1, 2, or 3ms off=2, 3, 4, 11, or 20ms	10V dc 2mA 30V dc 10mA	1.5mA	1756-TBNH 1756-TBSH (20 pins)	110mA @ 5V 2mA @ 24V 0.61W
1756-IV32	32 (2 sets of 16)	12/24V dc source	10-30V dc	on=1, 2, or 3ms off=2, 3, 4, 11, or 20ms	10V dc 2mA 30V dc 3.5mA	1.5mA	1756-TBCH 1756-TBS6H (36 pins)	120mA @ 5V 2mA @ 24V 0.66W

Digital dc output modules

Catalog number:	Number of outputs:	Voltage category:	Operating voltage:	Maximum current per point:	Maximum current per module:	Removable terminal block:	Backplane current:
1756-OB8	8 (2 sets of 4)	12/24V dc source	10-30V dc	2A @ 60°C	8A @ 60°C	1756-TBNH 1756-TBSH (20 pins)	165mA @ 5V 2mA @ 24V 0.89W
1756-OB8EI	8 (individually isolated)	12/24V dc source or sink	10-30V dc	2A @ 60°C	16A @ 55°C 10A @ 60°C	1756-TBCH 1756-TBS6H (36 pins)	250mA @ 5V 2mA @ 24V 1.32W
1756-OB16D	16 (2 sets of 8)	24V dc source	19.2-30V dc	2A @ 30°C 1A @ 60°C	8A @ 30°C 4A @ 60°C	1756-TBCH 1756-TBS6H (36 pins)	250mA @ 5V 140mA @ 24V 4.64W
1756-OB16E	16 (2 sets of 8)	12/24V dc source	10-31.2V dc	1A @ 60°C	8A @ 60°C	1756-TBNH 1756-TBSH (20 pins)	250mA @ 5V 2mA @ 24V 1.32W
1756-OB16I	16 (individually isolated)	12/24V dc source or sink	10-30V dc	resistive: 2A @ 30°C 1A @ 60°C inductive: 1A @ 60°C	8A @ 30°C 4A @ 60°C	1756-TBCH 1756-TBS6H (36 pins)	350mA @ 5V 2.5mA @ 24V 1.85W
1756-OB32	32 (2 sets of 16)	12/24V dc source	10-31.2V dc	0.5A @ 50°C 0.35A @ 60°C	16A @ 50°C 10A @ 60°C	1756-TBCH 1756-TBS6H (36 pins)	300mA @ 5V 2.5mA @ 24V 1.58W
1756-OC8	8 (2 sets of 4)	48V dc source	30-60V dc	2A @ 60°C	8A @ 60°C	1756-TBNH 1756-TBSH (20 pins)	165mA @ 5V 2mA @ 24V 0.89W
1756-OH8I	8 (individually isolated)	120V dc source or sink	90-146V dc	2A @ 60°C	8A @ 60°C	1756-TBCH 1756-TBS6H (36 pins)	250mA @ 5V 2mA @ 24V 1.12W
1756-OV16E	16 (2 sets of 8)	12/24V dc sink	10-30V dc	1A @ 60°C	8A @ 60°C	1756-TBNH 1756-TBSH (20 pins)	210mA @ 5V 2mA @ 24V 1.12W

Digital contact output modules

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

1756 Analog I/O Modules

The 1756 analog I/O modules support:

- on-board data alarming
- scaling to engineering units
- real-time channel sampling
- IEEE 32-bit floating point or 16-bit integer data formats

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-IF4FxOF2F	4 high-speed differential (400μs update)	2 high-speed voltage or current (1ms update)	Inputs (user configurable) ±10.5V 0-10.5V 0-5.25V Outputs ±10.5V	Inputs: 0-21mA Outputs: 0-21mA	1756-TBCH 1756-TBS6H (36 pins)	375mA @ 5.1V 100mA @ 24V 4.3W
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 (0-550Ω loads) or 250mA @ 5V 300mA @ 24V 8.5W (>550Ω loads)
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

1756-CFM configurable flow meter

The 1756-CFM module provides totalizer mode for metering applications, or high-speed frequency measurements for speed or rate control applications, on two channels connected to flowmeters. Both Fill and Prover functions are supported within resettable or nonresettable totalizer mode. A 12-segment K-factor correction table makes it easy to scale any turbine flowmeter and AGA 7 compensation is available.

The module supports two configurable outputs that can be connected to one or both channels and can be triggered on:

- flow or frequency
- acceleration
- full flow state
- trickle flow state
- prover run state
- prover range state

The module interfaces devices such as:

- magnetic pickup flow meters
- 4-40V dc pulses (TTL compatible)
- proximity probes

Mode of Operation:	Input/Output data:	Removable terminal block:	Backplane current:

Totalizer   fill
              prover
High-Resolution100KHz max
Frequency0.0005 Hz resolution
	2 input channels50mV, mag pickup
	              1.3V, TTL
	              4V, Preamp
	2 outputs 20mA @ 4.5-5.5V dc
	              1A @ 10-31.2V dc
		1756-TBNH or 1756-TBSH
		(20 pins)
			300mA @ 5V
			6mA @ 24V
			1.7W

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:	Removable terminal block:	Backplane current:
counter 1 MHz maximum rate measurement 500KHz maximum encoder 250KHz maximum debounce filter 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	1756-TBCH or 1756-TBS6H (36 pins)	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
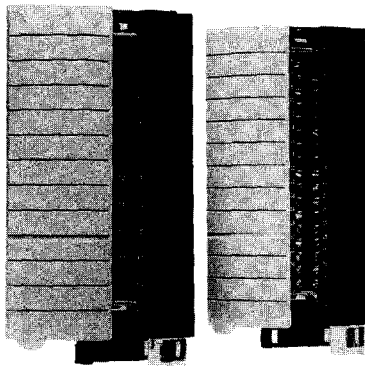
Removable terminal blocks (RTBs) provide a flexible interconnection between your plant wiring and 1756 I/O modules. The RTB plugs into the front of the I/O module. The type of module determines which RTB you need. You choose screw-clamp or spring-clamp RTBs.

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 provide the output terminal blocks for the I/O module. Use the IFMs with the pre-wired cables that match the I/O module to the interface 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.

IFMs for 20-pin 1756 digital I/O modules

Catalog number:	Type of IFM:	Description:	IA80	IA16	IB16	IC16	IN16	OA8	OA80	OA8E	OA16	OA16E	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-IFM20D120N	LED indicating	narrow standard with 120V ac LEDs	U	X							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-IFM20D240-2	LED indicating	240V ac LEDs and extra terminals for outputs														
1492-IFM20D240A-2	LED indicating	240V ac LEDs and extra terminals for inputs														
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/dc 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														

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.

Catalog number:	Type of IFM:	Description:	IA80	IA16	IB16	IC16	IN16	OA8	OA80	OA8E	OA16	OA16E	OB8	OB16E	OC8	ON8
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								
1492-XIM2024-8R	relay master	20-pin master with eight 24V dc relays												X		
1492-XIM20120-8R	relay master	20-pin master with eight 24V ac relays										X				
1492-XIM24-8R	relay expander	expander with eight 24V dc relays[1]												X		
1492-XIM120-8R	relay expander	expander with eight 120V ac relays[1]									X					
1492-XIMF-F24-2	fusible expander	expander with eight 24V dc channels with blown fuse indicators[1]												X		
1492-XIMF-F120-2	fusible expander	expander with eight 120V ac channels with blown fuse indicators[1]									X					
1492-XIMF-2	feed-through expander	expander with eight feed-through channels[1]									X			X		

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.

[1] One expander module is connected to a master to provide a total of 16 outputs. An extender cable is included with each expander to connect it to the master.

IFMs for 36-pin 1756 digital I/O modules

Catalog number:	Type of IFM:	Description:	IA16I	IB16O	IB16I	IB32	IH16I	IM16I	OA16I	OB8EI	OB16D	OB16E	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

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.

Catalog number:	Type of IFM:	Description:	IA16I	IB16D	IB16I	IB32	IH16I	IM16I	OA16I	OB8EI	OB16D	OB16E	OB16I	OB32	OH8I	OW16I	OX8I
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										
1492-XIM4024-8R	relay master	40-pin master with eight 24V dc relays												Z			
1492-XIM40120-16R	relay master	40-pin master with sixteen 24V dc relays												Z			
1492-XIM24-8R	relay expander	expander with eight 24V dc relays[1]										X					
1492-XIM120-8R	relay expander	expander with eight 120V ac relays[1]															
1492-XIMF-F24-2	fusible expander	expander with eight 24V dc channels with blown fuse indicators[1]												X			
1492-XIMF-F120-2	fusible expander	expander with eight 120V ac channels with blown fuse indicators[1]															
1492-XIMF-2	feed-through expander	expander with eight feed-through channels[1]												X			

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.

[1]   One expander module is connected to a master to provide a total of 16 outputs. An extender cable is included with each expander to connect it to the master.

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	11.4 mm (0.45 in)	1756-TBNH
1492-CABLE*x*TBCH	40[2]	18 AWG	14.1 mm (0.55 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. Build-to-order cable lengths are also available.

[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)

AIFMs 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	TO	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 cable. The letter code must match the last character of the catalog number for the cable.

AIFMs for 1757 modules

Catalog number:	Type of IFM:	Description:
1492-AIFMPI-3	fusible	8 input/output channels

The letter code for this AIFM is M. Use the letter code M to find the compatible cable in the following table for analog pre-wired cable. 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-ACABLExM	11 twisted pairs	22 AWG	11.5 mm (0.45 in)	1757-PIM
1492-ACABLExX	9 twisted pairs[3]	22 AWG	6.8 mm (0 27 in)	1756-TBNH
1492-ACABLExY	9 twisted pairs[4]	22 AWG	6.8 mm (0,27 in)	1756-TBNH
1492-ACABLExZ	20 conductors[5]	22 AWG	8.4 mm (0.33 in)	1756-TBNH
1492-ACABLExTA	20 conductors	22 AWG	8.4 mm (0.33 in)	1756-TBCH
1492-ACABLExTB	20 conductors	22 AWG	8.4 mm (0 33 in)	1756-TBCH
1492-ACABLExTC	5 twisted pairs	22 AWG	8.4 mm (0.33 in)	1756-TBCH
1492-ACABLExTD	5 twisted pairs	22 AWG	8.4 mm (0.33 in)	1756-TBCH
1492-ACABLExUA	20 conductors	22 AWG	8.4 mm (0.33 in)	1756-TBCH
1492-ACABLExUB	20 conductors	22 AWG	8.4 mm (0 33 in)	1756-TBCH
1492-ACABLExUC	9 twisted pairs	22 AWG	6.8 mm (0.27 in)	1756-TBCH
1492-ACABLExUD	9 twisted pairs	22 AWG	6.8 mm (0,27 in)	1756-TBCH
1492-ACABLExVA	20 conductors	22 AWG	8.4 mm (0.33 in)	1756-TBNH
1492-ACABLExVB	20 conductors	22 AWG	8.4 mm (0.33 in)	1756-TBNH
1492-ACABLExWA	9 twisted pairs	22 AWG	6.8 mm (0.27 in)	1756-TBNH
1492-ACABLExWB	9 twisted pairs	22 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. Build-to-order cable lengths are also available.

[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-ACABLExY cable (replace x with the appropriate length)

PanelConnect Modules for Connecting Sensors
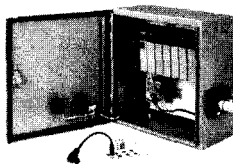
A PanelConnect module and its sensor connection systems lets you connect as many as 16 sensors directly to 16-point input modules using convenient pre-built cables and connectors.

The PanelConnect module mounts on the enclosure and creates the correct seal for the entry of the sensor connections. You do not need to seal the opening where the sensor cables enter the enclosure, create custom connectors, or wire to those custom connectors.

Catalog number:	System voltage:	Connects to these distribution boxes:	Connector style:	Connectors:	LEDs:
1492-TPMA1008		Allen-Bradley, Brad Harrison (Daniel Woodhead), Crouse-Hinds, and Lumberg	mini-plus (1 1/8 in.)	10 pin	without
1492-TPMA1207	ac	Allen-Bradley, Brad Harrison (Daniel Woodhead), Crouse-Hinds, and Lumberg		12 pin	with
1492-TPMA2209		Turck	metric M23	12 pin	either with or without
1492-TPMD1004		Allen-Bradley, Brad Harrison (Daniel Woodhead), and Crouse-Hinds		10 pin	without
1492-TPMD1201		Allen-Bradley	mini-plus (1 1/8 in.)	12 pin	with
1492-TPMD1202	dc	Brad Harrison (Daniel Woodhead)		12 pin	with
1492-TPMD1203		Lumberg		12 pin	with
1492-TPMD2205		Turck	metric M23	12 pin	either with or without
1492-TPMD2206		Turck		12 pin	either with or without

You can select these PanelConnect modules and cables, depending on the 16-point input modules in your system:

I/O Module:[1]	1492-TPMA1008	1492-TPMA1207	1492-TPMA2209	1492-TPMD1004	1492-TPMD1201	1492-TPMD1202	1492-TPMD1203	1492-TPMD2205	1492-TPMD2206
1756-IA16	1492-CABLExX	1492-CABLExX	1492-CABLExX						
1756-IB16				1492-CABLExX	1492-CABLExX	1492-CABLExX	1492-CABLExX	1492-CABLExX	1492-CABLExX
1756-IC16				1492-CABLExX				1492-CABLExX	1492-CABLExX
1756-IN16	1492-CABLExX			1492-CABLExX					1492-CABLExX

[1] Cables are available in lengths of 0.5m, 1.0m, 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, 050=5m.

Select a patchcord to connect the PanelConnect module to the sensor distribution box, depending on the type of connector:

Catalog number:[1]	Diameter - mm (in)	Wire rating:	Connector type:
889N-F10AFNU-*x*	17 (0.67)		10 pin Mini-Plus (1 18"), straight male
889N-F12AFNU-*x*	18 (0.71)	16 AWG 600V 7A	12 pin Mini-Plus (1 18"), straight male
889N-F10AFNV-*x*	17 (0.67)		10 pin Mini-Plus (1 18"), right-angle male
889N-F12AFNV-*x*	18 (0.71)		12 pin Mini-Plus (1 18"), right-angle male
889N-F10ACNU-x	9 (0.36)		10 pin Mini-Plus (1 18"), straight male
889N-F12ACNU-x	9 (0.36)	18/22 AWG 300V 3A	12 pin Mini-Plus (1 18"), straight male
889N-F10ACNV-x	9 (0.36)		10 pin Mini-Plus (1 18"), right-angle male
889N-F12ACNV-x	9 (0.36)		12 pin Mini-Plus (1 18"), right-angle male

[1]   Cables are available in lengths of 2m, 3m, 5m, and 10m. To order, insert the code for the desired cable length into the catalog number in place of the *x*: 2=2m, 3=3m, 5=5m, 10=10m.

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, the I/O must be:

- in the same chassis as the controller **or**
- on a ControlNet network that is local to that controller **or**
- on an Ethernet/IP network that is local to that controller

For example:

Chassis A   Chassis B
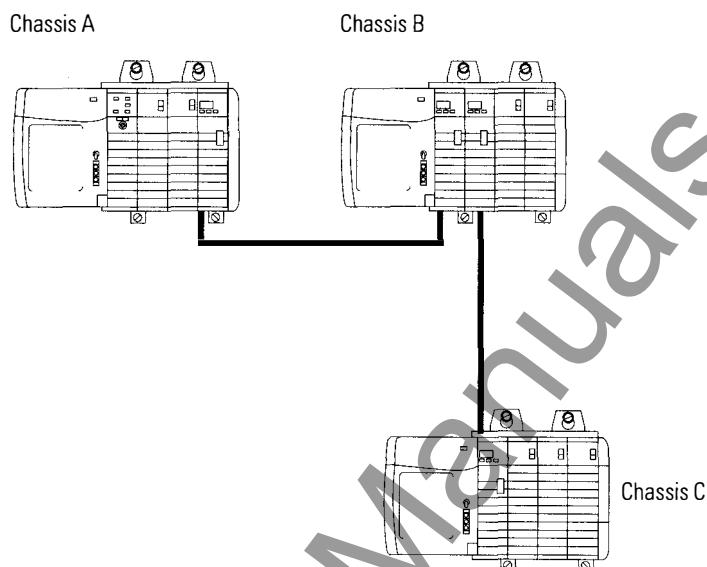
Chassis C

Assume that the network links in this example are either ControlNet or Ethernet/IP links. Both links can be the same, or one link can be a ControlNet link and the other can be an Ethernet/IP link. 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

In a ControlLogix system, I/O updates occur asynchronous to the execution of logic. This lets your application receive updated data as soon as possible. If your application needs synchronous I/O updates, use the synchronous copy (CPS) instruction to buffer I/O data at the beginning of each scan.

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. Use the Synchronous Copy (CPS) instruction to 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 control 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 after all the programs within each task have completed executing.
	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 or Ethernet/IP), 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 control 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 control 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 or Ethernet/IP), 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 control 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.

Selecting Motion Control Requirements

Step 2 - Select:

- *interface between controller and servo drives*
- *appropriate motion module*
- *associated cable(s)*
- *a remote terminal block (RTB) - only needed for 1756-M02AE modules*

The Logix approach to motion control employs synchronized, distributed processing and provides a highly-integrated motion solution. Logix integrates sequential and motion control. RSLogix 5000 Enterprise series software supports 31 embedded motion instructions that can be programmed using the relay ladder, structured text, or sequential function chart editors.

The Logix architecture supports motion components that work in a wide variety of machine architectures:

- The Kinetix 6000 integrated motion solution uses a SERCOS interface to perform complex, multi-axis, synchronized motion. With a Kinetix system, you reap the full benefit of the integrated architecture because the integration doesn't stop at the controller. This system integrates the drive, the motor, and even the actuator at a lower cost per axis of motion.

- Motion using an analog interface integrates to the control level and lets you connect third-party and non-servo drives

- Networked motion provides the ability to connect via DeviceNet to a single-axis drive to perform simple, point to point indexing. For networked motion using the Ultra family of drives, you also need Ultraware software, a separate configuration tool.

Selecting an Interface to Connect to Servo Drives

You can configure your motion control system using a range of motion products. Some servo drives require motion interface modules. Other servo drives require communication interface modules.

The ControlLogix controller can control these servo drives through these motion interface modules:

Drives[1]	SERCOS interface (1756-M16SE or 1756-M08SE):	Analog interface (1756-M02AE):
2094 Kinetix 6000 servo drive	yes	no
2098 Ultra3000 SERCOS servo drive	yes	no
2098 Ultra3000 analog servo drive	no	yes
1394C SERCOS servo drive	yes	no
1394C analog servo drive	no	yes
1398 ULTRA 100/200 series drive	no	yes
8720MC spindle	yes	yes

[1] Each drive has different options you order for its supported communication networks. See the appropriate catalog or selection information for a drive to make sure you select the appropriate option when specifying a drive for a specific network.

Some servo drives are supported through communication interface modules. The ControlLogix controller can communicate with these servo drives over these networks:

Drives[1]	Ethernet/IP:	ControlNet:	DeviceNet:	Universal Remote I/O:	RS-232 serial:	DH-485:
1394 GMC drive and control	no	no	no	yes	yes	yes
1398 ULTRA 100 series drive	no	no	yes	no	no	no
2098 Ultra3000 DeviceNet servo drive	no	no	yes	no	no	no
2098 Ultra5000 intelligent positioning	no	no	yes	no	yes	no

[1] Each drive has different options you order for its supported communication networks. See the appropriate catalog or selection information for a drive to make sure you select the appropriate option when specifying a drive for a specific network.

For more information on selecting servo drives, see the *Motion Control Selection Guide*, publication GMC-SG001.

SERCOS Interface Modules

The 8-axis (1756-M08SE) or 16-axis (1756-M16SE) SERCOS interface servo module serves as a link between the ControlLogix platform and intelligent, servo drives. SERCOS is an IEC 61491 SErial Real-time COmmunication System protocol over a fiber optic medium. The SERCOS interface is an open, controller-to-digital drive interface designed for high-speed, real time, serial communications using noise-immune, fiber-optic cables.

The SERCOS interface module uses a single, digital fiber optic link, which eliminates up to 18 discrete wires per axis. Detailed drive status information can be sent from drive to controller and from controller to drive.

CSA· Class I, Division 2, Group A, B, C, D   **UL®**   **CE**

Catalog number:	Maximum number of axes per module:	Maximum number of axes per ControlLogix controller:	Maximum power dissipation:	Backplane current:	SERCOS interface:	
1756-M08SE	8	32	5.0W	900 mA @ 5V dc 2.5 mA @ 24V dc	class data rate operating cycle	Class B (position or velocity) 4 Mbits per second 0.5 ms cycle for up to 2 axes 1 ms cycle for up to 4 axes 2 ms cycle for up to 8 axes
1756-M16SE	16				class data rate operating cycle	Class B (position or velocity) 8 Mbits per second 0.5 ms cycle for up to 4 axes 1 ms cycle for up to 8 axes 2 ms cycle for up to 16 axes

ControlLogix controller programming network

workstation with RSLogix 5000 software

1756-MxxSE module

Kinetix 6000 multi-axis servo drive

SERCOS fiber-optic ring

three-phase input power

Shunt module

8-axis power rail

Line Interface module

Slot Filler module

Integrated Axis module

Axis modules (5)

motor   motor feedback
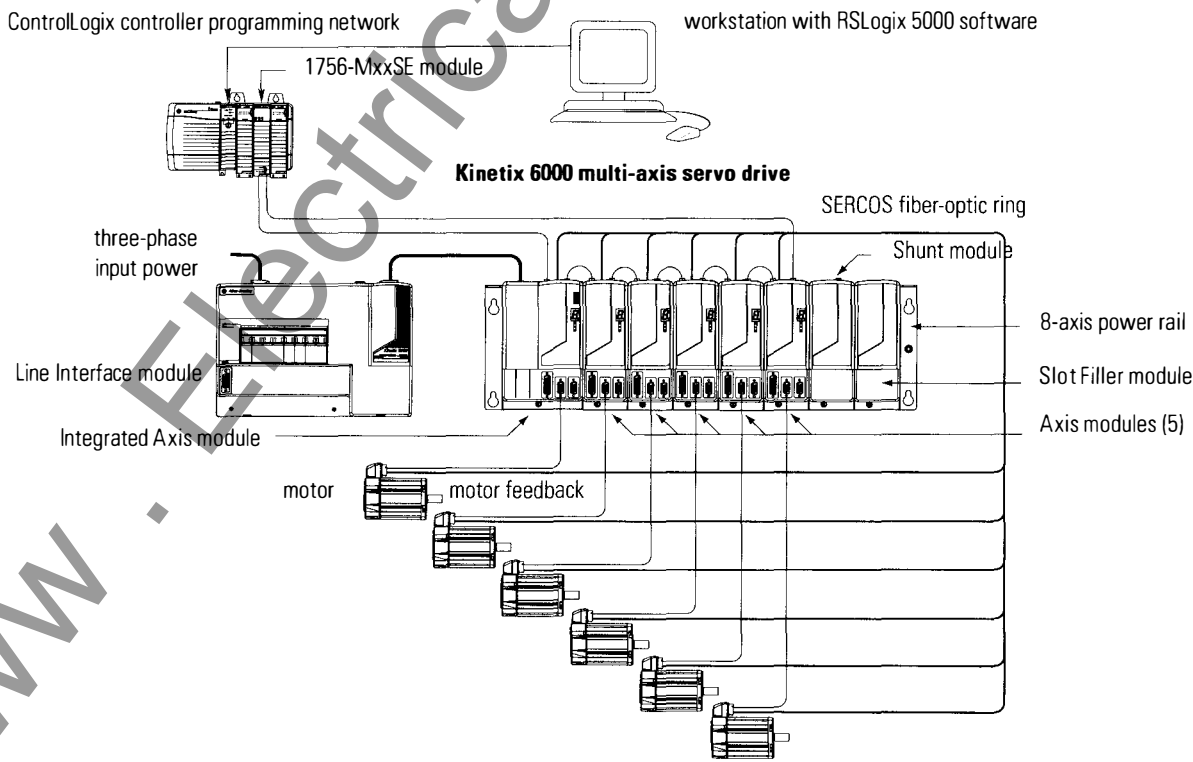
Cables for Use with the Analog Interface Module

If you connect the 1756-M02AE module to an Ultra3000, 1394, or 1398 servo drive, choose one of these cables:

Ultra3000 Cables:	**Description:**
2090-U3CC-D44*xx* *xx* = 01 for 1m 03 for 3m 09 for 9m 15 for 15m 30 for 30m	1756-M02AE to an Ultra3000 single-axis, analog servo drive
2090-U3AE-D44*xx* *xx* = 01 for 1m 03 for 3m 09 for 9m 15 for 15m 30 for 30m	1756-M02AE to an Ultra3000 two-axis, analog servo drive
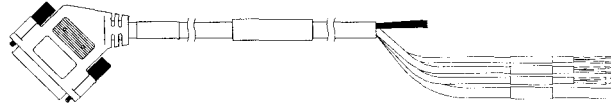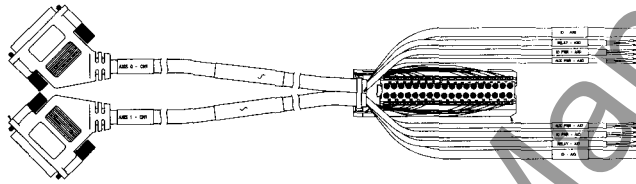
1394 Cable:	**Description:**
1394-CFLAE*xx* *xx* = 01 for 1m 03 for 3m 08 for 8m 15 for 15m	1756-M02AE to a 1394 single-axis, analog servo drive
1394-CCAE*xx* *xx* = 01 for 1m 03 for 3m 08 for 8m 15 for 15m	1756-M02AE to a 1394 two-axis, analog servo drive
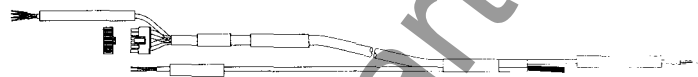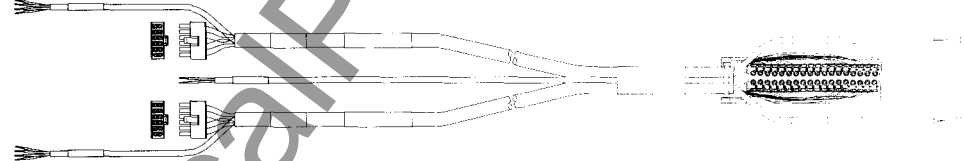
1398 Cables:	**Description:**
1398-CFLAE*xx* *xx* = 01 for 1 meter 03 for 3 meter 08 for 8 meter 15 for 15 meter	1756-M02AE to a 1398 single-axis, analog servo drive
1398-CCAE*xx* *xx* = 01 for 1m 03 for 3m 08 for 8m 15 for 15m	1756-M02AE to a 1398 two-axis, analog servo drive
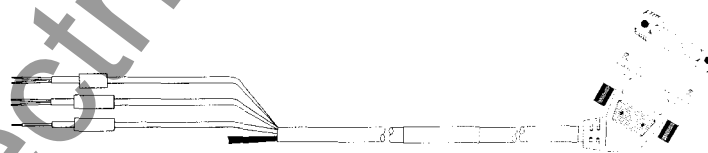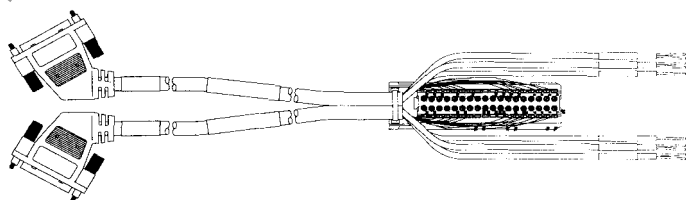
Planning Network Communications

Separate communication interface modules are available for different networks. Install multiple communication interface modules into the ControlLogix backplane to configure a gateway to *bridge* or *route* control and information data between the different networks.

Messages are sent directly from one communication interface module across the backplane to another. You can route a message through a maximum of 4 chassis (8 communication hops). You do not need a ControlLogix controller in the chassis.

NetLinx architecture

NetLinx open network architecture is the Rockwell Automation strategy of using open networking technology for seamless, top-floor to shop-floor integration. The networks in the NetLinx architecture – DeviceNet, ControlNet, and EtherNet/IP – speak a common language and share a universal set of communication services. NetLinx architecture, part of the Integrated Architecture, seamlessly integrates all the components in an automation system from the simplest device to the Internet – helping you to improve flexibility, reduce installation costs, and increase productivity.

- EtherNet/IP is an open industrial networking standard that supports implicit and explicit messaging and uses commercial, off-the-shelf Ethernet equipment and physical media.

- ControlNet allows intelligent, high-speed control devices to share the information required for supervisory control, work-cell coordination, operator interface, remote device configuration, programming, and troubleshooting.

- DeviceNet offers high-speed access to plant-floor data from a broad range of plant-floor devices and a significant reduction in wiring.
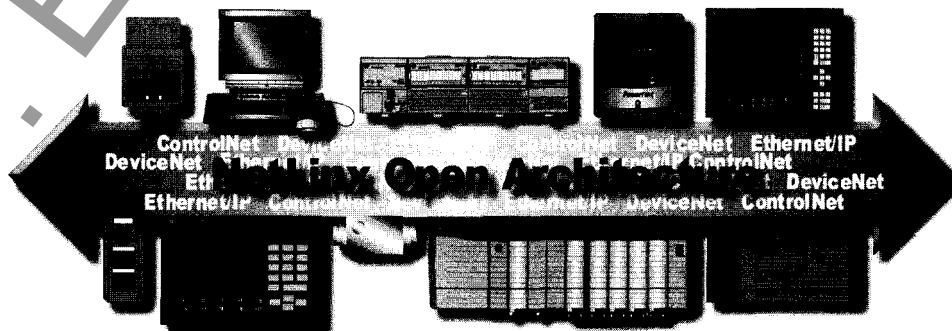
Selecting a network

You can configure your system for information exchange between a range of devices and computing platforms and operating systems.

If your application requires:	Use this network:	Select:
• plant management (material handling) • configuration, data collection, and control on a single, high-speed network • time-critical applications with no established schedule • data sent regularly • Internet/Intranet connection	EtherNet/IP network	1756-ENBT see page 36
• high-speed transfer of time-critical data between controllers and I/O devices • deterministic and repeatable data delivery • media redundancy • controller redundancy • intrinsic safety • redundant controller systems	ControlNet network	1756-CNB, -CNBR see page 38
• connections of low-level devices directly to plant floor controllers, without interfacing them through I/O modules • data sent as needed • more diagnostics for improved data collection and fault detection • less wiring and reduced start-up time than a traditional, hard-wired system	DeviceNet network	1756-DNB see page 41
• plantwide and cell-level data sharing with program maintenance • data sent regularly • transfer of information between controllers	Data Highway Plus	1756-DHRIO see page 42
• connections between controllers and I/O adapters • data sent regularly • distributed control so that each controller has its own I/O and communicates with a supervisory controller	Universal Remote I/O network	1756-DHRIO see page 42
• Fieldbus transmitters and actuators • closed-loop control • process automation	Fieldbus network	1788-CN2FF see page 43
• modems • supervisory control and data acquisition (SCADA)	serial network	built-in serial port 1756-MVI, -MVID see page 44
• connections to existing DH-485 networks	DH-485 network	built-in serial port see page 42

For more specialized communication requirements, select:

If your application requires:	See:
connections to other networks via ControlNet	page 50
SynchLink fiber optic communications to: • controllers • power distribution systems • PowerFlex 700S DriveLogix	page 46

Bridging between devices
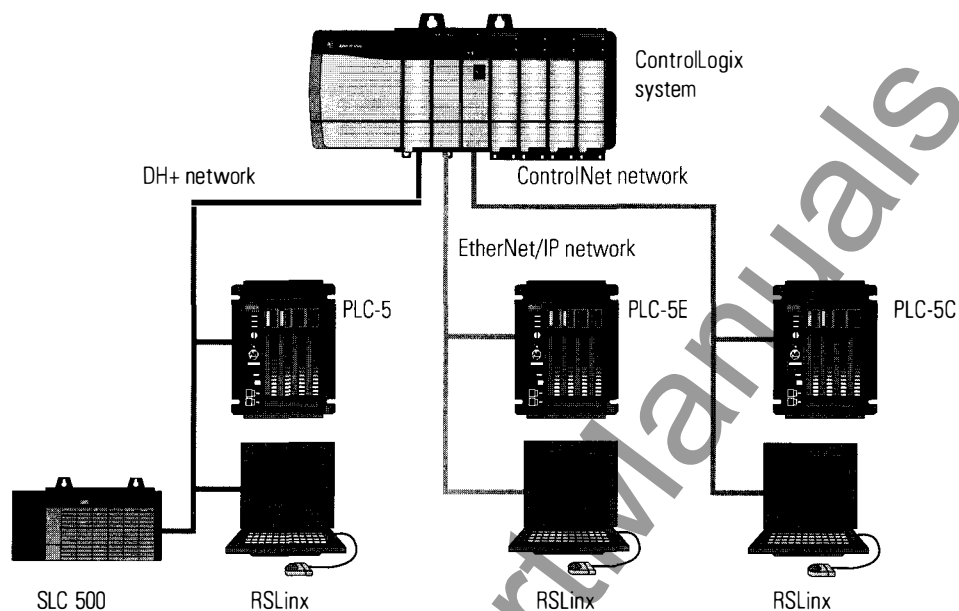
	Reply	DH+ network			EtherNet/IP network		ControlNet network	
Origin		PLC-5 processor	SLC 5/04 processor	RSLinx software	PLC-5E processor	RSLinx software	PLC-5C processor	RSLinx software
DH+ network	PLC-5 processor	yes	yes	yes	yes	yes	yes	yes
	SLC-5/04 processor	yes	yes	yes	yes	yes	yes	yes
	RSLinx software	yes	yes	na	yes	na	yes	na
EtherNet/IP 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

EtherNet/IP Network

Ethernet Industrial Protocol (EtherNet/IP) is an open industrial networking standard that supports implicit messaging (real-time I/O messaging), explicit messaging (messaging exchange), or both and uses commercial off-the-shelf Ethernet communication chips and physical media.

EtherNet/IP product capability

Originator	Recipient								
	EtherNet/IP PLC-5 or SLC 5/05 processor	PLC-5 processor via 1785-ENET	ControlLogix with 1756-ENBT[1]	1756-ENBT[1] adapter	FlexLogix with 1788-ENBT	1794-AENT FLEX I/O adapter	PanelView EtherNet/IP terminal	RSLinx software	1761-NET-ENI interface
EtherNet/IP PLC-5 or SLC 5/05 processor	information	information	information	na	information	not supported	information	information	information
PLC-5 processor via 1785-ENET	information	information	information	na	information	not supported	information	information	information
ControlLogix with 1756-ENBT[1]	information	information	information I/O data interlocking	I/O data	information I/O data interlocking	I/O data	information I/O data	information	information
FlexLogix with 1788-ENBT	information	information	information I/O data interlocking	I/O data	information I/O data interlocking	I/O data	information I/O data	information	information
PanelView EtherNet/IP terminal	information	information	information I/O data	na	information I/O data	na	na	na	information
RSLinx software	information	information	information	na	information	not supported	na	information	information
1761-NET-ENI interface[2]	information	information	information	na	information	not supported	information	information	information

[1] The 1756-ENET series B or later also supports this feature.

[2] 'To be an originator, the 1761-NET-ENI interface must connect to the other device through that device's RS-232 port.
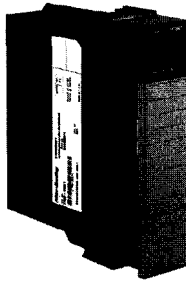
1756-ENBT EtherNet/IP communication interface module

The EtherNet/IP communication modules control I/O over an EtherNet/IP network. The modules also bridge EtherNet/IP links to route messages to devices on other networks.
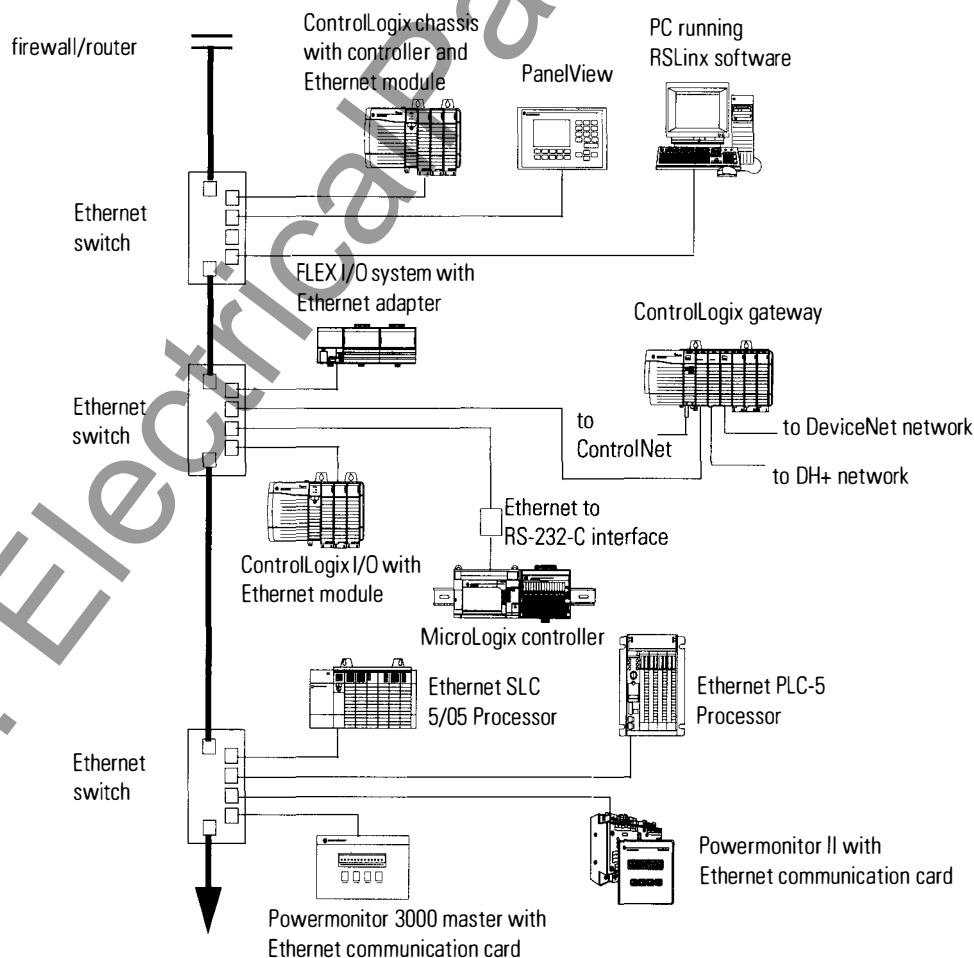
CSP · Class I, Division 2, Group A, B, C, D   **UL**®   CE   **FM**   Class I, Division 2, Group A, B, C, D   **C** N223

Catalog number:	Communication rate:	Connections:	Cable:	Backplane current:
1756-ENBT	10/100 Mbps	Each module allows a maximum of: • 64 TCP/IP connections • 128 ControlLogix connections (I/O and information)	twisted pair RJ-45	700mA @ 5V dc 10mA @ 24V dc 4W

Note: The 1756-ENBT module is the most current EtherNet/IP communication module. While the original 1756-ENET module is still available until the end of the 2002 year, the 1756-ENBT module offers higher communication rates and greater bandwidth.

firewall/router

ControlLogix chassis with controller and Ethernet module

PanelView

PC running RSLinx software

Ethernet switch

FLEX I/O system with Ethernet adapter

ControlLogix gateway

Ethernet switch

to ControlNet

to DeviceNet network

to DH+ network

ControlLogix I/O with Ethernet module

Ethernet to RS-232-C interface

MicroLogix controller

Ethernet SLC 5/05 Processor

Ethernet PLC-5 Processor

Ethernet switch

Powermonitor II with Ethernet communication card

Powermonitor 3000 master with Ethernet communication card

ControlNet Network

1756-CNB, -CNBR ControlNet communication interface modules

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

Class I, Division 2, Group A, B, C, D   Class I, Division 2, Group A, B, C, D   N223

Catalog number:	Communication rate:	Connections:	Cable:	Backplane current:
1756-CNB			RG-6 coaxial cable 1786-RG6 (shield high flex cable) 1786-RG6F (quad shield high flex coax cable)	970mA @ 5V dc 1.7mA @ 24V dc 4.98W
1756-CNBR (for redundant media)	5 Mbps	64 connections per module	1786-XT termination resistor Choose taps: • 1786-TPR (T-tap right angle) • 1786-TPS (T-tap straight) • 1786-TPYR (Y-tap right angle) • 1786-TPYS (Y-tap straight)	1000mA @ 5V dc 1.7mA @ 24V dc 5.14W

workstation running programming software with 1784-KTCx

FlexLogix controller with 1788-CNCR card

ControlNet network

ControlLogix chassis

PLC-5/40C controller

PowerFlex 700S drive

PanelView terminal

1788-CN2DN module

DeviceNet network
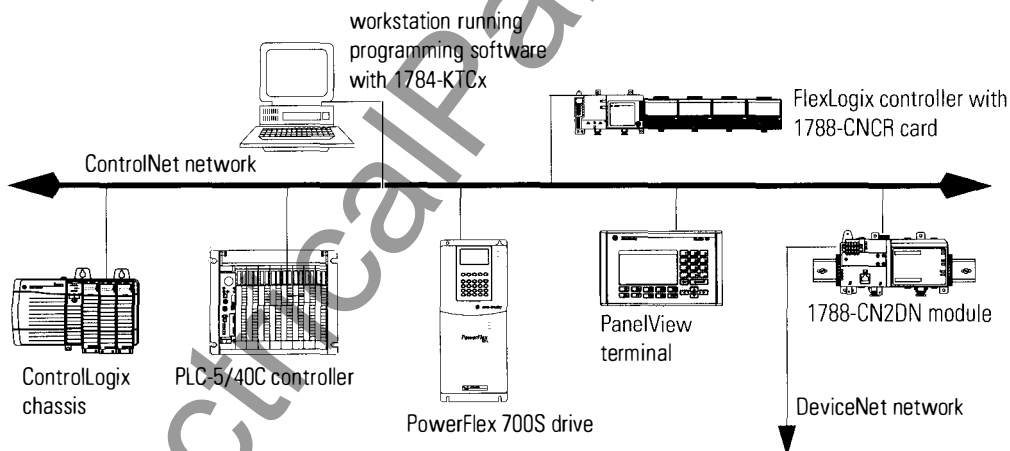
Redundant controller systems via ControlNet

You can build a redundant controller system around a ControlNet network. In each redundant controller chassis, you can have:

- one 1756-L55 controller.
- at least one, but no more than five, 1756-CNB series D, version 5.23 (or greater) ControlNet communication modules.
- one 1757-SRM redundancy module.
- no other I/O or communication modules can be in the redundant chassis

All I/O must be remote from the redundant controllers. ControlLogix redundancy works with 1756 I/O, FLEX I/O, drives, operator interfaces, and any other devices that can communicate with a ControlLogix controller over a ControlNet link. To connect to other networks, bridge through another ControlLogix chassis (not one of the redundant controller chassis).

primary redundant chassis with:
- one 1756-L55 controller
- one series D 1756-CNB module
- one 1757-SRM redundancy module

ControlNet network

1757-SRCx cable

secondary redundant chassis with:
- one 1756-L55 controller
- one series D 1756-CNB module
- one 1757-SRM redundancy module

remote I/O modules
another ControlLogix controller
other communication networks
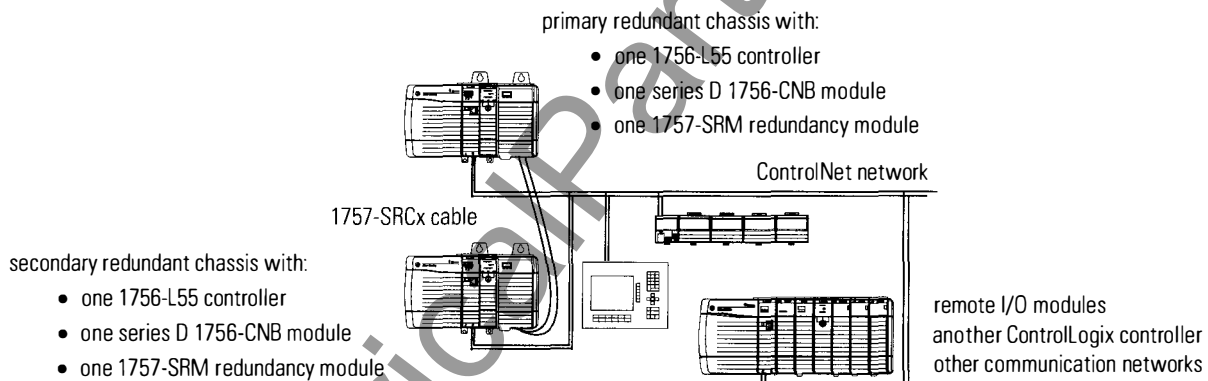
The secondary controller is synchronized with the primary controller to provide a bumpless switchover for any outputs controlled by logic in the highest priority task. Switchover occurs within 100msec.

Make sure that your ControlNet network contains at least two nodes in addition to the redundant chassis pair. And additional node can be:

- a second 1756-CNBR module in the same remote chassis or in a different remote chassis
- any ControlNet device
- a workstation running RSLinx software

1757-SRM redundancy module

The 1757-SRM redundancy module provides high-speed data transfers between the primary and secondary chassis. You need one 1757-SRM module per chassis. The module supports as many as four controllers and five 1756-CNB modules per chassis.

Class I, Division 2, Group A, B, C, D   (UL)®   CE   FM   Class I, Division 2, Group A, B, C, D   N223

Catalog number:	Cable:		Status contact cable interface:		Backplane current:
1757-SRM	connectors type channels ground isolation	SC-type 62.5/125 micron multi-mode fiber optic one (transmit and receive fiber) n/a (fiber-optic interface) Choose: • 1757-SRC1 (1m) • 1757-SRC3 (3m) • 1757-SRC10 (10m)	connectors cable type voltage/current channels ground isolation	3-terminal Weidmuller #150191 supplied with module for use on user cable shielded pair; AWG #14-22 30 v ac/dc maximum 100mA maximum one 1500V ac	0.75A @ 3.3V dc 1.0A @ 5.1V dc 0.09A @ 24V dc 9.6W

DeviceNet Network

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

CSA Class I, Division 2, Group A, B, C, D   **UL**®   **CE**   **FM** Class I, Division 2, Group A, B, C, D   **C** N223

Catalog numbar:	Communication rate:	Connections:	Cable:	Backplane current:
1756-DNB	• 125 Kbps • 250 Kbps • 500 Kbps	2 connections to a dedicated ControlLogix controller	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) 1485A-C2 termination resistor Choose taps: • 1485P-P2T5-T5 (2 ports) • 1485P-P4T5-T5 (4 ports) • 1485P-P8T5-T5 (8 ports)	600mA @ 5V dc 3mA @ 24V dc 3.13W

PLC-5 controller with 1771-SDN scanner module

ControlLogix controller with 1756-DNB module

DeviceNet network

Ultra 3000 servo drive

PanelView terminal

laptop

Ultra 5000 servo drive

input/output devices

motor starter

PowerFlex ac drive

sensor

indicator lights

pushbutton cluster

bar code scanner
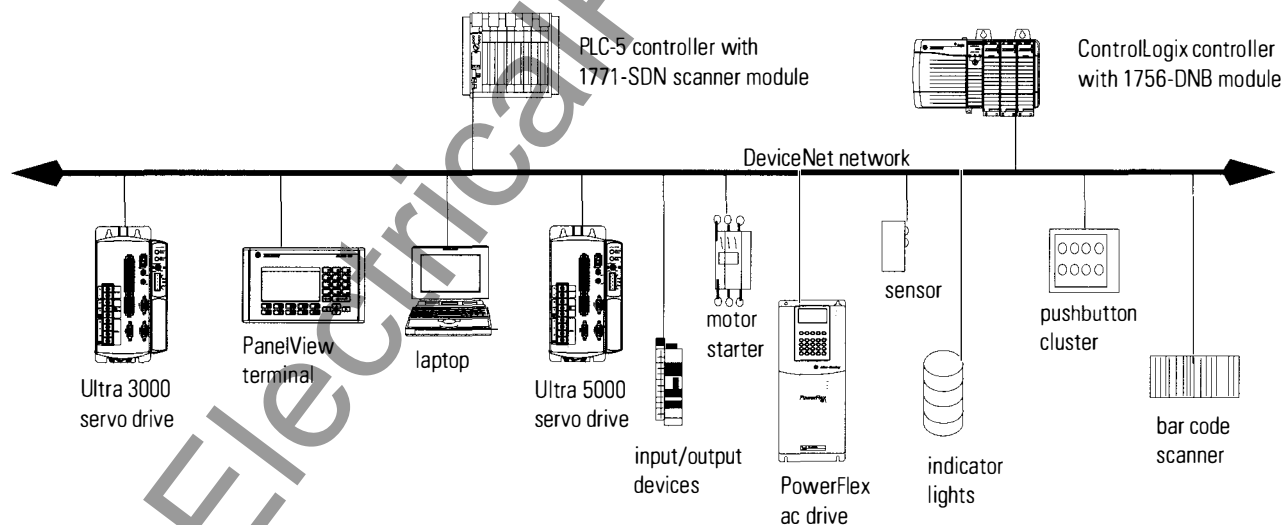
DH+ and Universal Remote I/O Networks
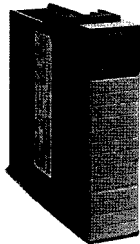
1756-DHRIO DH+ and remote I/O communication interface module

The DH+ and remote I/O module supports messaging between devices on DH+ 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.

CSA Class I, Division 2, Group A, B, C, D   **UL®**   **CE**   **FM** Class I, Division 2, Group A, B, C, D   **C** N223

Catalog number:	Communication rate:	Connections:	Cable:	Backplane current:
1756-DHRIO	• 57.6 Kbps • 115.2 Kbps • 230.4 Kbps	32 connections per DH+ channel 32 logical rack connections per remote I/O channel 16 block-transfer connections per remote I/O channel	1770-CD Belden 9463 150 Ohm and 82 Ohm termination resistors ship with the module	850mA @ 5V dc 1.7mA @ 24V dc 4.38W

Network:	Typical Configuration:
DH+	 PanelView terminal, PLC-5 controller, workstation with RSLogix 5000 software, workstation, DH+ network, SLC-5/04 controller, ControlLogix chassis with 1756-DHRIO module
Universal remote I/O	 workstation with PanelBuilder software, ControlNet, EtherNet/IP, or DH+ network, ControlLogix chassis, Universal remote I/O link, PLC-5 controller in adapter mode, 1791 I/O block, FLEX I/O adapter, PanelView terminal
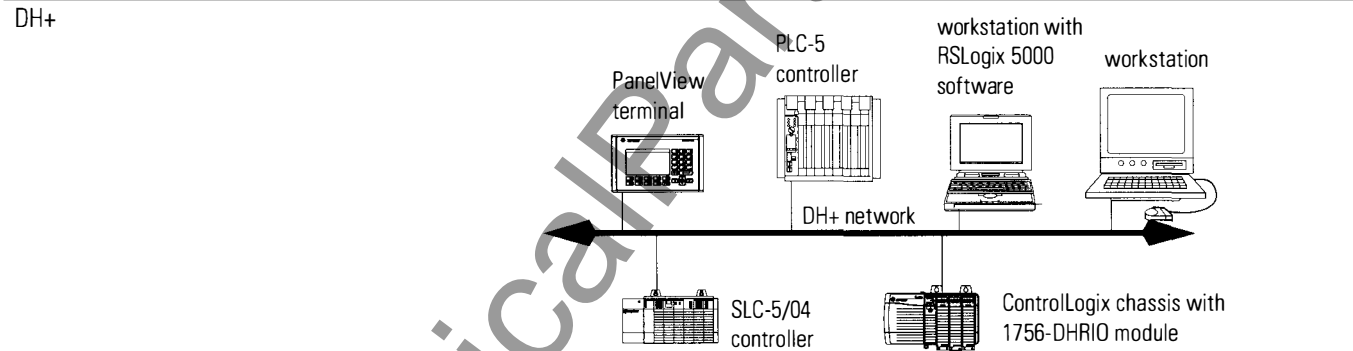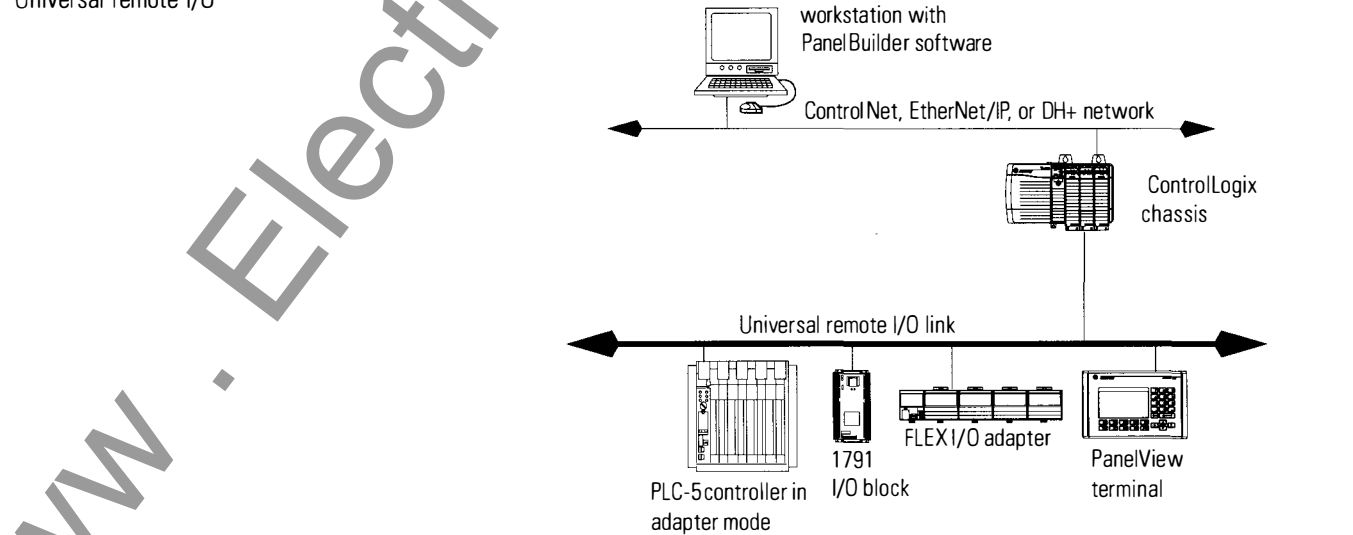
Fieldbus Network

1788-CN2FF Foundation Fieldbus Linking Device

The Foundation Fieldbus linking device adds Foundation Fieldbus support to your ControlLogix system. You can have one linking device per ControlNet tap. The device connects to two, independent Fieldbus H1 networks.

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 msecs. Conversely, process variables produced by a ControlNet device can be consumed by the linking device and subscribed by other Foundation Fieldbus devices.

Class I, Division 2, Group A, B, C, D   Class I, Division 2, Group A, B, C, D   N223

Catalog number:	Communication rate:	Connections:	Cable:	Power requirements:
1788-CN2FF	2 ms over ControlNet 31.25 Kbps over Fieldbus	to redundant ControlNet media for each H1 network each linking device supports two H1 networks	9-pin FieldBus cable pins 6 and 7 handle Fieldbus signals	11-30V dc 270 mA @ 24V dc
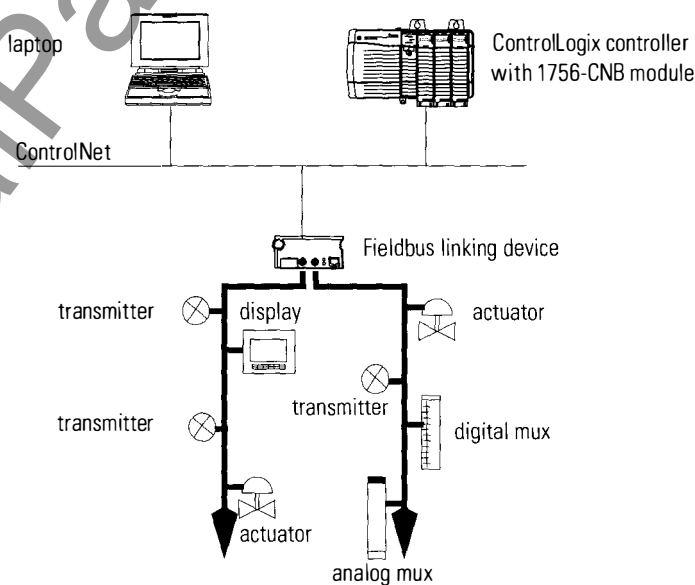
Serial Network

The built-in, 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:

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

Use a 1756-CP3 cable to connect to the serial port.
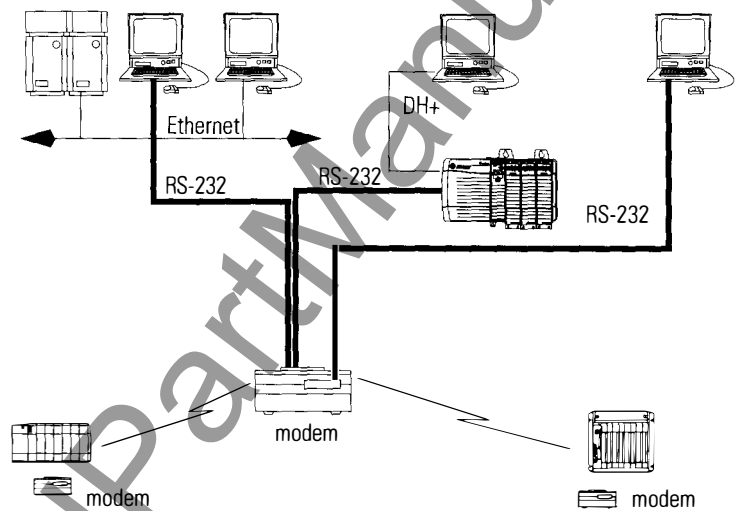
Over the serial port, the ControlLogix controller supports 12 message buffers. At most, you can have 4 simultaneous connected messages and 8 simultaneous unconnected messages. Or if all the messages are unconnected, you can have 12 simultaneous messages. If a message is greater than 250 bytes, it is divided across enough buffers to carry the message, which reduces the number of buffers remaining for other simultaneous messages.

1756-MVI, -MVID multi-vendor interface module

The multi-vendor interface module provides additional access to serial devices. The module is programmable to accommodate devices with unique serial protocols.

CSA Class I, Division 2, Group A, B, C, D UL® CE FM Class I, Division 2, Group A, B, C, D N223

Catalog number:	Communication rate:	Ports:		Cable:	Backplane current:
1756-MVI	configurable, depending on serial protocol	PRT1	RS-232	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	800mA @ 5V dc
1756-MVID (module and API software)		PRT2 PRT3	RS-232, RS-422, RS-485 RS-232, RS-422, RS-485		3mA @ 24V dc 4W

DH-485 Network

On the DH-485 network, the ControlLogix controller can send and receive messages to and from other controllers on the network. Currently, the DH-485 support does not include remote programming or monitoring through RSLogix 5000 Enterprise Series software.

IMPORTANT   Only use Logix controllers on DH-485 networks when you want to add controllers to an existing DH-485 network. For new applications with Logix controllers, networks in the NetLinx architecture are the recommended networks.

You need a 1761-NET-AIC+ converter for each controller you want to put on the DH-485 network. You can have two controllers per one 1761-NET-AIC+ converter, but you need a different cable for each controller. Connect one controller to port 1 (9-pin connector) and one controller to port 2 (mini-DIN connector).

If you connect to this port:	Use this cable:
port 1 DB-9 RS-232, DTE connection	1747-CP3 or 1761-CBL-AC00
port 2 mini-DIN 8 RS-232 connection	1761-CBL-AP00 or 1761-CBL-PM02
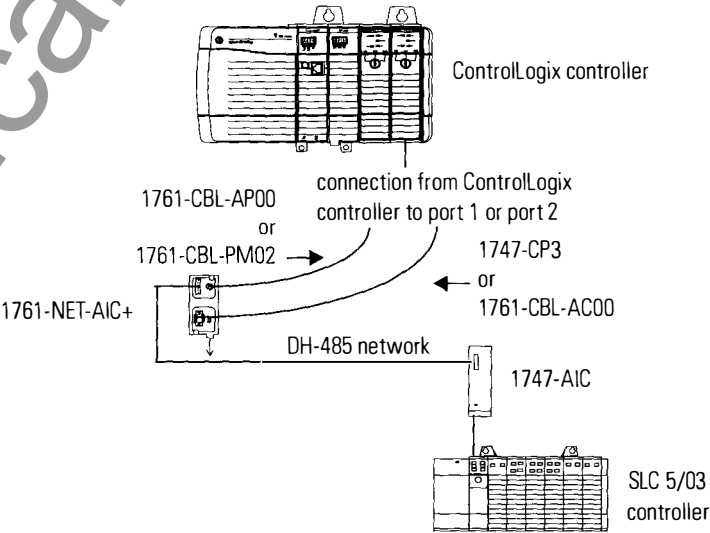
SynchLink Network

SynchLink provides time synchronization and data broadcasting capabilities for distributed motion and coordinated drive control.

1756-SYNCH SynchLink Module

The 1756-SYNCH SynchLink module connects a ControlLogix chassis to a SynchLink fiber optic communications link. The module:

- coordinates CST time across multiple ControlLogix chassis
- moves limited amount of data from one chassis to another at a high speed
- lets one controller consume motion axes data from a controller in another chassis

Class I, Division 2, Group A, B, C, D

Catalog number:	Communication rate:		Cable:	Power requirements:
1756-SYNCH	operating wavelength data rate baud rate	650nm (red) 5Mbps 5Mbaud	200/230 micron Hard Clad Silica (HCS) VersaLink V-system	1200mA @ 5.1V dc 3mA @ 24V dc 6.19W
			Order 1403-CF*xxx* cable[1] or from Lucent Technologies, Specialty Fiber Technologies division	
			maximum length 300; minimum length 1m	

[1] The *xxx* determines the length. Select 001, 003, 005, 010, 020, 050, 100, or 250 meters.

Topology:	Example:
Star **Requires:** 1751-SLBA base block 1751-SL4SP 4-port splitter block **Supports:** 2 layers of hubs 16 end nodes per hub 257 nodes (including master node) per star network	
Daisy Chain **Optional:** 1751-SLBP bypass switch block **Supports:** 10 nodes (including master and end nodes) per daisy chain network	
Ring **Optional:** 1751-SLBP bypass switch block **Supports:** 10 nodes (including master and end nodes) per daisy chain network	
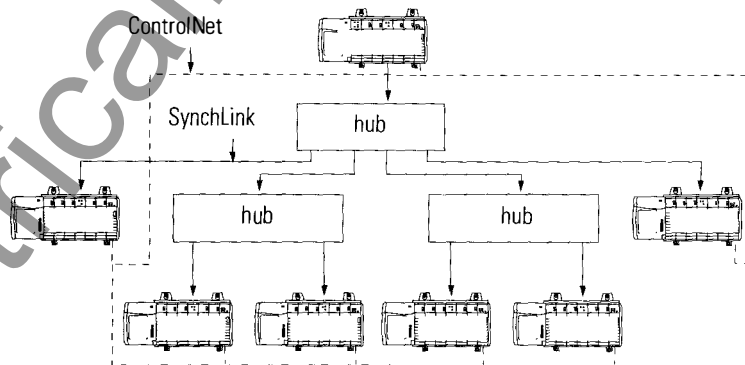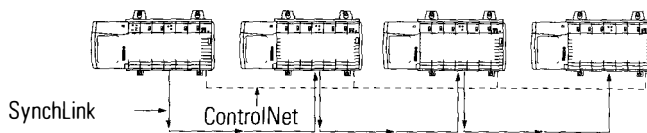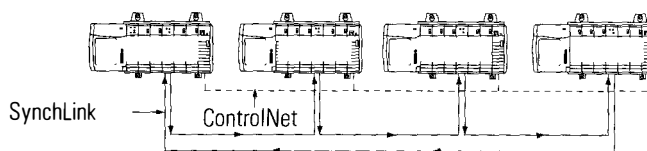
1756-DMxxx Module

The 1756-DM drive module lets you update and retrofit Reliance distributed power system (DPS) installations to ControlLogix-based systems. Each drive module interfaces with an individual Power Module Interface (PMI) chassis. You can also use the 1756-DM to modernize existing power bridges from analog to digital control.

Catalog Number:[1]	Communicates with:
1756-DMD30	SD3000 dc drive
1756-DMF30	SF3000 Regen field control
1756-DMA30[2]	SA3000 ac drive
1756-DMA31[2]	SA3100 ac drive

[1]   The 1756-DM modules are only available through Drive Systems.

[2]   Check with Drive Systems for product availability.

Class I, Division 2, Group A, B, C, D   (UL)®   CE

Specification:	SynchLink Value:	Drive Communications Value:
operating wavelength	650 nM (red)	820 nM (infrared)
data rate	5 Mbps	10 Mbps
connecting cable	200/230 micron Hard Clad Silica (HCS); VersaLink V-system Order 1403-CFxxx power monitoring cable[1] or from Lucent Technologies, Specialty Fiber Technologies division maximum length 300m; minimum length 1m	62.5/125 micron glass; one pair SC Style and one pair ST Style Order 1756-DMCFxxx drive communications fiber optic cable[2] or breakout cable from Belden 225362 or Mohawk M92021 maximum length 300m; minimum length 1m
maximum node count	10 daisy chain configuration 256 star configuration with multiplexing blocks	1 PMI chassis
backplane current	1.35A @ 5V dc 3.0mA @ 24V dc	

[1]   The *xxx* determines the length. Select 001, 003, 005, 010, 020, 050, 100, or 250 meters.

[2]   The *xxx* determines the length. Select 001, 003, 010, or 030 meters.

Existing power systems

existing power bridge

retrofit assembly

PMI chassis

pulse gate amplifier

ControlLogix chassis with two 1756-DM modules
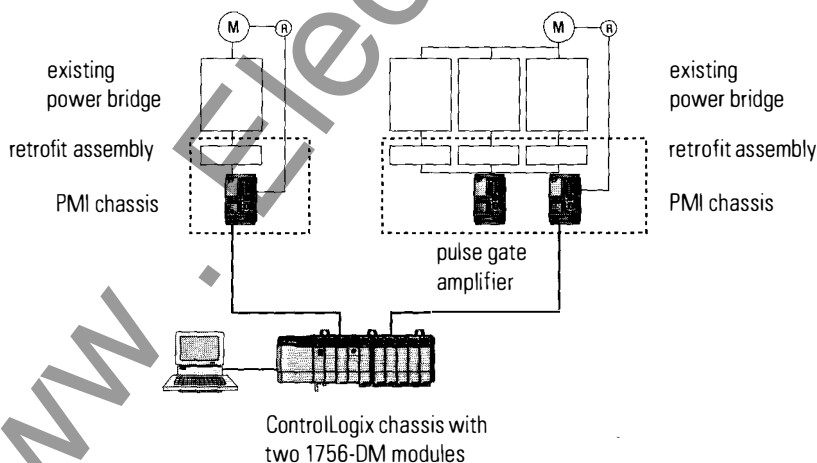
Distributed power systems

power module

PMI chassis

ControlLogix chassis with two 1756-DM modules
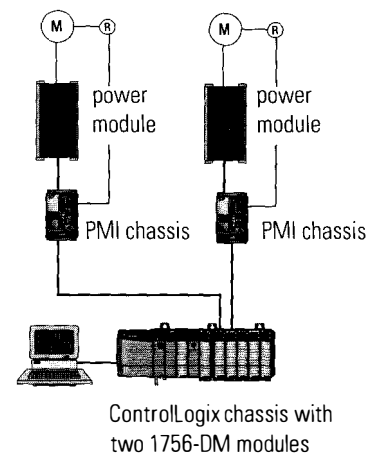
PowerFlex 700S DriveLogix AC Drive

The Allen-Bradley PowerFlex 700S DriveLogix ac drive, a version of PowerFlex 700 with embedded Logix, offers optimized integration for the most demanding drive control and drive system applications.

Class I, Division 2, Group A, B, C, D   CE

Catalog number:	Input specifications:		Output specifications:		Power requirements:
20D	3-Phase Voltage:	200-240V 400-480V 500-600V 690V + 10%	Voltage: Frequency Range: Intermittent Current:	adjustable from 0V to rated motor voltage 0-400Hz To 110% for 60 seconds 150% for 3 seconds	1200mA @ 5.1V dc 3mA @ 24V dc 6.19W
	Common DC Voltage:	325V 650V 810V 930V			
	Frequency:	47 - 63 Hz			

Centralized Control System
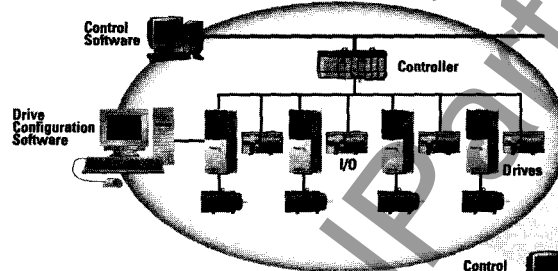
Distributed Control System
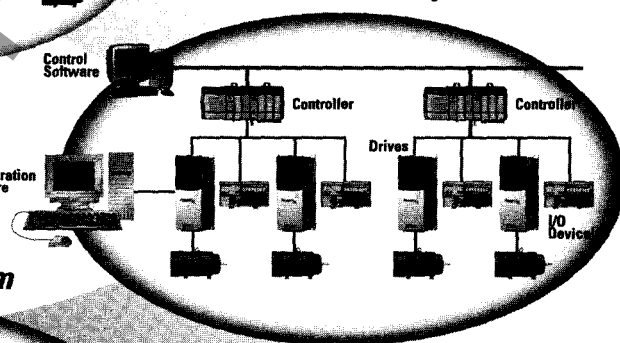
Next generation control system architectures must be flexible enough for users to derive the benefits of Centralized, Distributed and Embedded Control

Embedded Control System
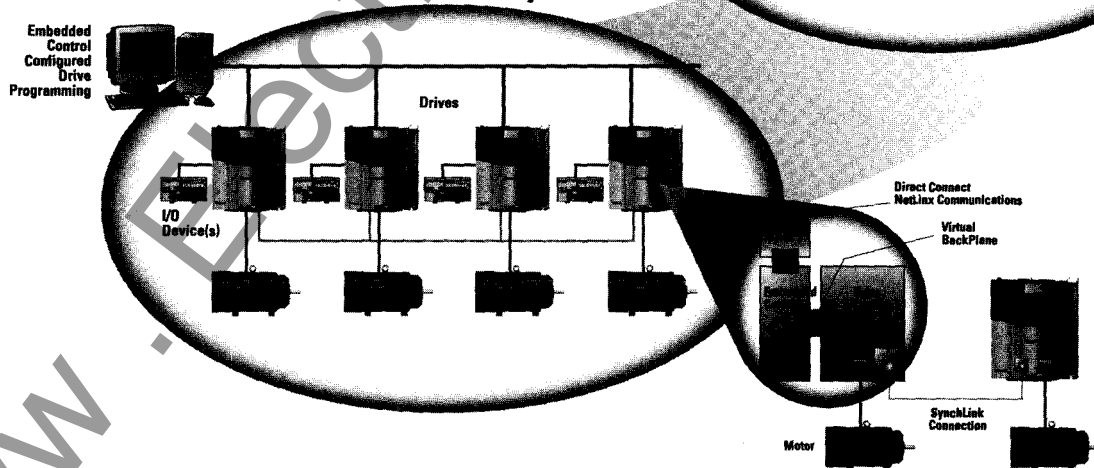
Accessing the Controller Remotely
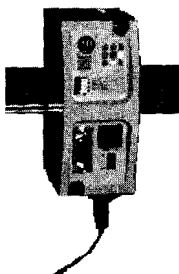
A remote access dial-in kit (9300-RADKIT) lets you connect via modem to a remote site's network and controller. Once connected, you can monitor the process, collect data, and make program changes remotely. Each remote access dial-in kit includes:

- pre-configured modem
- DH+ communication module (9300-KF2RAD)
- DH-485 communication module (9300-KERAD)
- DIN rail mounting hardware
- associated cables

Each kit also includes a CD-ROM-based installation guide and tutorial that takes you step-by-step through establishing a remote dial-in connection.

Catalog number:	Communication rate:	Supported controllers:	Power requirements:
9300-RADKIT	phone lines speeds up to 56K	• ControlLogix, FlexLogix, CompactLogix controllers • MicroLogix controllers • Enhanced PLC-5 processors • SLC 5/03, 5/04, 5/05 processors • 1203-SSS	8-48V dc 100mA at 12V dc alternative external 100V ac power supply included with each modem

The modem supports remote configuration, so you can modify the remote network modem's command settings through a dial-up connection. This helps you recover modem communication if a change occurs in the controller's channel configuration

The remote access modem also has call-back security which is authenticated with a password

Connecting to Other Devices via ControlNet

The RSLogix 5000 Enterprise Series 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 communication module.
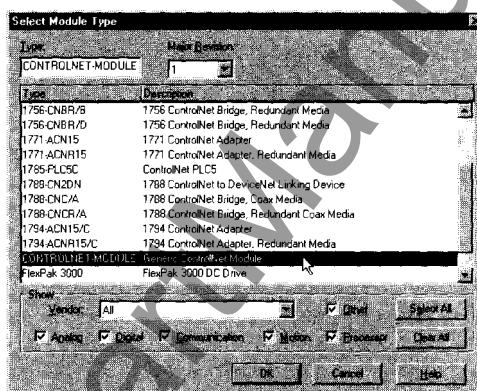
Then use the CIP generic MSG instruction type to send and receive messages from the 1203-CN1 module.
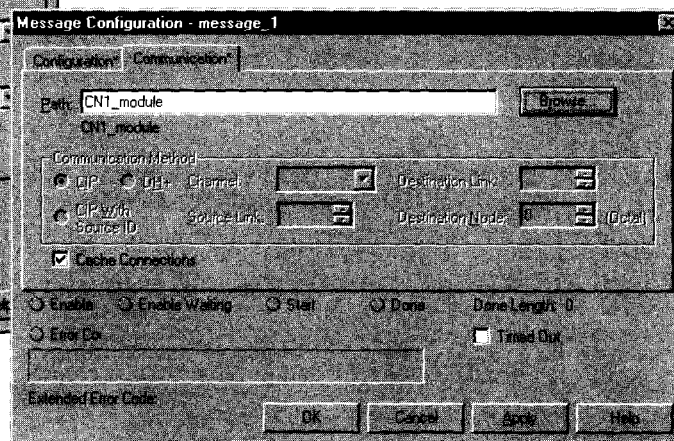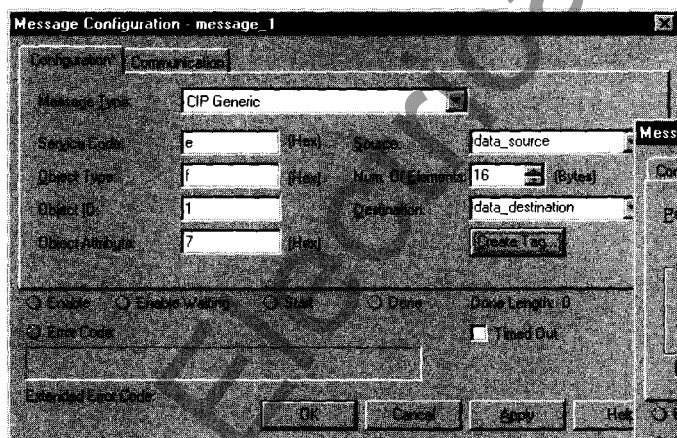
The screens above show the connection parameters for the 1203-CN1 module. These parameters differ depending on the module. See the module's vendor for module's characteristics.

Selecting a Controller

Step 4 - Select:

- *a controller with sufficient memory*
- *memory board for each 1756-L55 controller*
- *1756-BATM for larger memory size controllers*
- *replacement batteries*
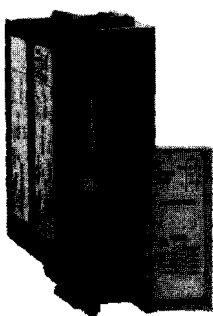
The ControlLogix controller provides a scalable controller solution that is capable of addressing a large amount of I/O points (128,000 digital maximum / 4000 analog maximum).

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

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

The multi-tasking operating system supports 32 configurable tasks that can be prioritized. One task can be continuous. The others must be periodic. Each task can have as many as 32 programs, each with its own local data and logic, allowing virtual machines to operate independently within the same controller.

Class I, Division 2, Group A, B, C, D   (UL)®   CE   N223

Specification:	Value:
battery	1756-BA1 (94194801) - comes with the controller or 1756-BATM (containing a 1756-BATA battery assembly)[1]
programming cable	1756-CP3 or 1747-CP3 serial cable category 3[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 500 Hz 2.0 G maximum peak acceleration
operating shock	30G peak for 11ms
storage shock	50G peak for 11ms

[1] Can be used with all 1756-L55 and 1756-L63 controllers. The battery module is highly recommended for the 1756-L55M14, 1756-L55M16, 1756-L55M24, and 1756-L63 controllers.

[2] See the *Programmable Controller Wiring and Grounding Guidelines*, publication 1770-4.1.

ControlLogix Controllers

Controller:	User Memory[1]		Peak Backplane Current Load:	Average Power Dissipation:	Average Thermal Dissipation:
	Battery-Backed Static RAM:	Nonvolatile Memory:			
1756-L55M12	750 Kbytes	none	1.15A @ 5V dc 0.02A @ 24V dc	4.50W	15.4 BTU/hr
1756-L55M13	1.5 Mbytes	none	1.15A @ 5V dc 0.02A @ 24V dc	4.50W	15.4 BTU/hr
1756-L55M14	3.5 Mbytes	none	1.25A @ 5V dc 0.02A @ 24V dc	4.75W	16.2 BTU/hr
1756-L55M16[2]	7.5 Mbytes 3.5 Mbytes for tag data	none	1.40A @ 5V dc 0.02A @ 24V dc	5.0W	17.1 BTU/hr
1756-L55M22	750 Kbytes	750 Kbytes	1.15A @ 5V dc 0.02A @ 24V dc	4.50W	15.4 BTU/hr
1756-L55M23	1.5 Mbytes	1.5 Mbytes	1.15A @ 5V dc 0.02A @ 24V dc	4.50W	15.4 BTU/hr
1756-L55M24	3.5 Mbytes	3.5 Mbytes	1.25A @ 5V dc 0.02A @ 24V dc	4.75W	16.2 BTU/hr
1756-L63	8 Mbytes	CompactFlash card[3]	1.2A @ 5V dc 0.041A @ 24V dc	3.5W	11.9 BTU/hr

[1] Available user memory is the amount of memory available to the user after RSLogix 5000 Enterprise Series software is connected and a null program is loaded.

[2] Check with your Rockwell Automation representative for details on the memory restrictions of the 1756-L55M16 controller

[3] The CompactFlash card is available separately as 1784-CF64.

Note: The 1756-L55 and 1756-L63 controllers are the most current ControlLogix controllers. While the original 1756-L1 controllers are still available, the 1756-L55 controllers execute motion instructions and function blocks approximately 30% faster than 1756-L1 controllers. The 1756-L63 controller executes ladder scans almost twice as fast as the 1756-L55 controllers and executes function block, REAL data type math, and motion instructions 4-5 times faster than the 1756-L55 controllers.

Selecting a controller for a redundant controller system

If you are designing a redundant controller system, consider:

- Redundant controller systems require a Logix5555 controller. (The Logix5563 controller will support redundancy at a later release.)
- Data is buffered in the secondary controller, so twice as much data memory space is required in the controller.
- The redundant controllers must be on a ControlNet network.

For more information on designing a redundant controller system, see Redundant Systems on page 39.

Determining Memory Requirements

The following equations provide an estimate of the memory needed for a controller. These numbers are rough estimates.

Controller tasks   _____ * 4000 = _____ bytes (minimum 1 needed)

Discrete I/O points   _____ * 400 = _____ bytes

Analog I/O points   _____ * 2600 = _____ bytes

Communication modules[1] _____ * 2000 = _____ bytes

Motion axis   _____ * 8000 = _____ bytes

                              Total = _____ bytes

[1] When estimating memory use by communication modules, count all the communication modules in the system, not just those in the local chassis. This includes device connection modules, adapter modules, and ports on PanelView terminals

Controller memory boards

The 1756-L55 controllers do not operate stand-alone. Choose one of these memory boards to come already assembled with the controller. You can also order additional memory boards either for spare parts or to upgrade existing 1756-L55 controllers.

The 1756-L63 controller has a fixed RAM size and does not use a memory board. Use a CompactFlash card for nonvolatile storage. You must remove the controller from the chassis to access the CompactFlash card.

Catalog Number:	Supported Controller:	Battery-Backed Static RAM:	Nonvolatile RAM:
1756-M12[1]	1756-L55	750 Kbytes	none
1756-M13	1756-L55	1.5 Mbytes	none
1756-M14	1756-L55	3.5 Mbytes	none
1756-M16	1756-L55	7.5 Mbytes / 3.5 Mbytes for tag data	none
1756-M22[1]	1756-L55	750 Kbytes	750 Kbytes
1756-M23[2]	1756-L55	1.5 Mbytes	1.5 Mbytes
1756-M24[1]	1756-L55	3.5 Mbytes	3,.5 Mbytes
1784-CF64	1756-L63[3]	none	8 Mbytes

[1] The 1756-L55 controller must have firmware revision 10 or higher.

[2] The 1756-L55 controller must have firmware revision 8 or higher.
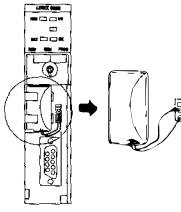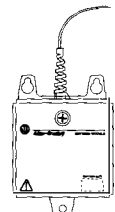
[3] The 1756-L63 controller must have firmware revision 11 or higher.

The nonvolatile memory (flash) lets you permanently store a program on a controller. You can:

- manually trigger the controller to save to or load from nonvolatile memory

- configure the controller to load from nonvolatile memory on power up

Determining Battery Requirements

Each controller ships with a 1756-BA1 battery installed. An externally mounted, higher capacity battery assembly is also available (catalog number 1756-BATM).

Catalog Number:	Description:	Estimated Worst Case Battery Life @ 25°C:
1756-BA1	Lithium battery (0.59g) installed in each ControlLogix controller. Order only if you need a replacement.	• with 1756-L55M12: 63 days • with 1756-L55M13: 63 days • with 1756-L55M14: 30 days • with 1756-L55M16: 13 days
1756-BATM	Externally mounted battery assembly. Provides longer battery life than the 1756-BA1. Contains: • one 1756-BATA assembly • 1m cable to connect housing to controller Highly recommended for higher-memory controllers (see chart below).	• with 1756-L55M12: 299 days • with 1756-L55M13: 299 days • with 1756-L55M14: 213 days • with 1756-L55M16: 133 days
1756-BATA	Lithium battery assembly (maximum of 5g lithium per each D cell; assembly contains 2 D cells) included with the 1756-BATM. Order only if you need a replacement.	

The 1756-BATM battery assembly can be used with any Logix5555 or Logix5563 controller, and is highly recommended for use with the higher-memory controllers:

If you order this controller:	Order a 1756-BATM	Order a 1756-BATA	Order a 1756-BA1
1756-L55M12	not required, but supported	not required, but supported	for a replacement
1756-L55M13	not required, but supported	not required, but supported	for a replacement
1756-L55M14	highly recommended	not required, but supported	for a replacement
1756-L55M16	highly recommended	for a replacement	not recommended for long-term use
1756-L55M22[1]	recommended	for a replacement	not recommended for long-term use
1756-L55M23[1]	recommended	for a replacement	not recommended for long-term use
1756-L55M24[1]	highly recommended	for a replacement	not recommended for long-term use
1756-L63[2]	highly recommended	for a replacement	not recommended for long-term use

[1] These controllers have nonvolatile memory and can be used without a battery.

[2] The 1756-L63 controller has nonvolatile memory if you install a 1784-CF64 CompactFlash card. With nonvolatile memory, the controller can be used without a battery.

Controlling Devices

The ControlLogix controller can control these devices:

I/O Modules:	EtherNet/IP:	ControlNet:	DeviceNet:	Universal Remote I/O:
1756 ControlLogix I/O	yes	yes	yes	no
1794 FLEX I/O	yes	yes	yes	yes
1793 FLEX Integra I/O	yes[1]	yes[1]	yes	yes
1797 FLEX Ex I/O	no	yes	no	no
1734 POINT I/O	yes	yes	yes	no
1734D POINT Block I/O	no	no	yes	no
1769 Compact I/O	no	no	yes	no
1790 Compact-LDX I/O	no	no	yes	no
1791 Block I/O	no	no	no	yes
1791D CompactBlock I/O	no	no	yes	no
1792 ArmorBlock I/O	no	no	yes	no
1798 FlexArmor I/O	no	no	yes	no
1799 Machine-Embedded I/O	no	no	yes	no
1747 SLC I/O	no	no	no	yes
1771 I/O	no	yes[2]	no	yes

[1] Requires RSLogix 5000 programming software version 11 or greater. Use the generic FLEX profile.

[2] Use a 1771-ACN15, -ACNR15 adapter module. Version 10 and later of RSLogix 5000 Enterprise Series software supports 1771 digital, analog, and specialty I/O modules. Previous versions of the software support only 1771 digital I/O modules.

Display Devices:	EtherNet/IP:	ControlNet:	DeviceNet:	Universal Remote I/O:	RS-232 (DF1):	DH-485:
2711 PanelView terminal	yes	yes	yes	yes	yes[1]	yes[1]
2711 e PanelView terminal	no	yes	no	yes	no	no
2705 RediSTATION operator module	no	no	yes	yes	no	no
2706 InView message display	yes	no	no	no	yes	no
2706 DL40 Dataliner message display	no	no	no	yes	yes	no
2706 DL, DL50 Dataliner message display	no	no	no	no	yes	no
2707 DTAM Plus operator interface	no	no	yes	yes	yes[1]	yes[1]

[1] Use PLC/SLC mapping.

Communicating with Other Controllers and Communication 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.

Controller:	EtherNet/IP:	ControlNet:	DeviceNet:	DH+:	RS-232 (DF1):	DH-485:
1756 ControlLogix controller	yes	yes	yes	yes	yes	yes
1769 CompactLogix controller	yes	no	yes	no	yes	yes
1789 SoftLogix5800 controller	yes	yes	yes	no	yes	no
1794 FlexLogix controller	yes	yes	yes	no	yes	yes
5720 PowerFlex 700S DriveLogix controller	yes	yes	yes	no	yes	no
1785 PLC-5 controller	yes[1],[2]	yes	yes[3]	yes	yes	n/a
1747 SLC controller	yes[4]	yes	yes[5]	yes[5]	yes	no
1761 MicroLogix 1000 controller	yes	no	yes[5]	no	yes	no
1762 MicroLogix 1200 controller	yes	no	yes[5]	no	yes	no
1769 MicroLogix 1500 controller	yes	no	yes[5]	no	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
Communication Device:	**EtherNet/IP:**	**ControlNet:**	**DeviceNet:**	**DH+:**	**RS-232 (DF1):**	**DH-485:**
9355 RSLinx software	yes	yes	no	yes	yes	no
1784-KTC, -KTCx, -KTCx15, -PCIC(S), -PCC	n/a	yes	n/a	n/a	n/a	n/a
1784-PCIDS, -PCD	n/a	n/a	yes	n/a	n/a	n/a
1784-KTX, -KTXD, -PCMK	n/a	n/a	yes	n/a	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
1203-CN1 ControlNet module	n/a	yes[10]	n/a	n/a	n/a	n/a
1203-FM1/FB1 SCANport	n/a	yes[11]	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] The PLC-5, SLC, and MicroLogix processors appear as I/O points to the Logix controller. Requires 1761-NET-DNI DeviceNet interface.

[4] Use a 1747-L55x controller with OS501 or greater

[5] Use a 1747-L54x controller.

[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.

[10] Use the generic module configuration to configure the 1203-CN1 module and a CIP generic MSG instruction to communicate with the module.

[11] Use a CIP generic MSG instruction to communicate with the 1203-FM1 SCANport module on a DIN rail that is remote to the controller. The remote DIN rail also requires a 1794-ACN(R)15 ControlNet adapter module.

Communicating with Drives

The ControlLogix system takes advantage of several networks to allow communications with many different drives, both motion (servo) drives and standard drives. The following table lists which drives the ControlLogix controller can communicate with over which networks.

Motion (Servo) Drives:[1]	EtherNet/IP:	ControlNet:	DeviceNet:	DH+:	RS-232:	DH-485:
1394 GMC drive and control	no	no	no	yes	yes	yes
1398 ULTRA 100 series drive	no	no	yes	no	no	no
2098 Ultra3000 DeviceNet servo drive	no	no	yes	no	no	no
2098 Ultra5000 intelligent positioning	no	no	yes	no	yes	no
Standard Drives:[1]	EtherNet/IP:	ControlNet:	DeviceNet:	DH+:	RS-232:	DH-485:
1305 adjustable frequency ac drive	no	yes	yes	yes	yes	yes
1336 adjustable frequency ac drive	no	yes	yes	yes	yes	yes
1395 digital dc drive	no	yes	no	yes	yes	no
FlexPak 3000 dc drive	no	yes	yes	no	yes	no
WebPak 3000 dc winder	no	yes	no	no	yes	no
GV3000 ac drive	no	yes	yes	no	yes	no
PowerFlex 700S DriveLogix ac drive	yes	yes	yes	yes	yes	yes
PowerFlex 70, 700, and 7000 ac drive	yes	yes	yes	yes	yes	no

[1] Each drive has different options you order for its supported communication networks. See the appropriate catalog or selection information for a drive to make sure you select the appropriate option when specifying a drive for a specific network.

How the ControlLogix System Uses Connections

The ControlLogix system uses a connection to establish a communication link between two devices. Connections can be:

- controller to local I/O modules or local communication modules
- controller to remote I/O or remote communication modules
- controller to remote I/O (rack optimized) modules
- produced and consumed tags
- messages

You indirectly determine the number of connections the controller uses by configuring the controller to communicate with other devices in the system. Connections are allocations of resources that provide more reliable communications between devices that unconnected messages. The ControlLogix system supports both scheduled and unscheduled connections and unconnected messages.

Method:	Description:
scheduled connection • highest level of determinism • unique to ControlNet	A scheduled connection is unique to ControlNet communications. A scheduled connection lets you send and receive data repeatedly at a predetermined rate, which is the requested packet interval (RPI). For example, a connection to an I/O module is a scheduled connection because you repeatedly receive data from the module at a specified rate. Other scheduled connections include connections to: • communication devices • produced/consumed tags On a ControlNet network, you must use RSNetWorx for ControlNet to enable all scheduled connections and establish a network update time (NUT).
unscheduled connection • deterministic • used by both ControlNet and EtherNet/IP	An unscheduled connection is a message transfer between controllers that is triggered by the requested packet interval (RPI) or the program (such as a MSG instruction). Unscheduled messaging lets you send and receive data when needed. All EtherNet/IP connections are unscheduled.
unconnected message • least deterministic	An unconnected message is a message that does not require connection resources. An unconnected message is sent as a single request/response.

The communication module you select determines the number of connections you have available for I/O and messages.

This communication module:	Supports this number of connections:
1756-CNB	64 (any combination of scheduled and unscheduled)
1756-ENBT	128 (any combination of scheduled and unscheduled) The EtherNet/IP module does not distinguish between scheduled and unscheduled connections.

How you configure connections determines how many remote devices a communication card can support.

Determining Connections for Produced and Consumed Tags

The ControlLogix controller supports the ability to produce (broadcast) and consume (receive) system-shared tags. Produced and consumed tags each require connections. Over ControlNet, produced and consumed tags are scheduled connections.

This type of tag:	Requires these connections:
produced	By default, a produced tag allows two other controllers to consume the tag, which means that as many as two controllers can simultaneously receive 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 (heartbeat). 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, like communications and I/O.
consumed	Each consumed tag requires one connection for the controller that is consuming the tag.

ControlLogix controllers can produce and consume tags over:

- the ControlLogix backplane
- a ControlNet network
- an EtherNet/IP network.

For two controllers to share produced or consumed tags, both controllers must be attached to the same control network (such as a ControlNet or Ethernet/IP network). You cannot bridge produced and consumed tags over two networks.

Maximum number of produced and consumed tags

The controller supports:

As a:	The controller supports:
producer	*(number of produced tags)* ≤ 127
consumer	*(number of consumed tags)* ≤ 250

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

Determining Connections for Messages

Messages transfer data to other devices, such as other controllers or operator interfaces. Some messages use unscheduled connections to send or receive data. These connected messages can leave the connection open (cache) or close the connection when the message is done transmitting. The following table shows which messages use a connection and whether or not you can cache the connection:

This type of message:	Using this communication method:	Uses a connection:	Which you can cache:
CIP data table read or write	CIP	✓	✓
PLC2, PLC3, PLC5, or SLC (all types)	CIP		
	CIP with Source ID		
	DH+	✓	✓
CIP generic	CIP	✓[1]	✓
block-transfer read or write	na	✓	✓

[1] You can connect CIP generic messages, but for most applications we recommend you leave CIP generic messages unconnected.

Connected messages are unscheduled connections on both ControlNet and EtherNet/IP networks.

If a message executes repeatedly, cache the connection. This keeps the connection open and optimizes execution time. Opening a connection each time the message executes increases execution time.

If a message executes infrequently, do not cache the connection. This closes the connection upon completion of the message, which frees up that connection for other uses.

Each message uses one connection, regardless of how many devices are in the message path. To conserve connections, you can configure one message to read from or write to multiple devices.

Determining Connections for I/O Modules

The ControlLogix system uses connections to transmit I/O data. These connections can be direct connections or rack-optimized connections. Over ControlNet, I/O connections are scheduled connections:

Connection:	Description:
direct	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 while under power, causes the controller to set fault status bits in the data area associated with the module.
rack-optimized	For digital I/O modules, you can select rack optimized communication. A rack optimized connection consolidates connection usage between the controller and all the digital I/O modules on a rack (or DIN rail). Rather than having individual, direct connections for each I/O module, there is one connection for the entire rack (or DIN rail).

Depending on the type of I/O modules in the ControlLogix system, both direct connections and rack-optimized connections can be used.

I/O System:	Supported Connection Type(s):
1756 basic digital I/O in a local chassis	direct connection
digital I/O in a remote chassis via ControlNet	direct connection or rack-optimized connection[1]
analog I/O either in a local chassis or in a remote chassis via ControlNet	direct connection
digital I/O in a remote chassis via EtherNet/IP	direct connection or rack-optimized connection
analog I/O in a remote chassis via EtherNet/IP	direct connection
digital I/O via Universal Remote I/O	rack-optimized connection
analog I/O via Universal Remote I/O	direct connection via messaging
1771 analog I/O via ControlNet	direct connection via messaging
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

In this example, the owner controller (local chassis) has three direct connections with the 1756 I/O modules in the remote chassis. The control network can be either an EtherNet/IP or ControlNet network.
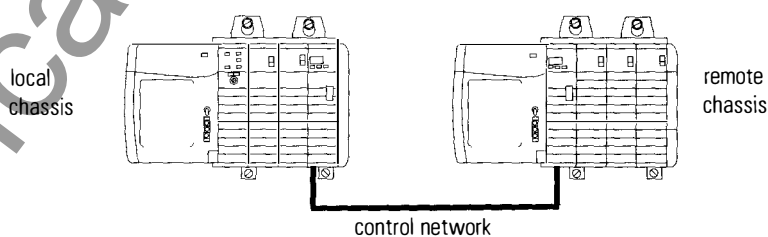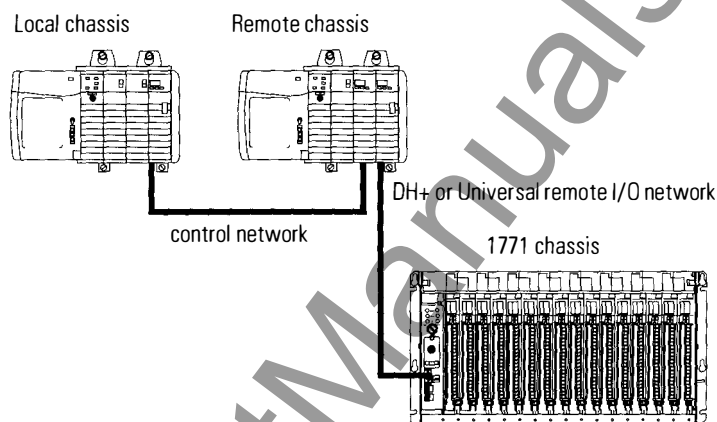

local
chassis

remote
chassis

control network

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 communication module[1]	1	0	0
		total	5

[1] The control network can be an Ethernet/IP or ControlNet network.

Because all the remote I/O modules are configured for direct connections, configure the remote communication module for "none," which results in no connection.

Rack-optimized connections for 1756 I/O modules

Using the same configuration as in the first example, the owner controller (local chassis) uses one connection to communicate with all the digital I/O in the remote chassis. The data from all three modules is sent simultaneously at a rate specified by the remote connection (EtherNet/IP or ControlNet communication module). This option eliminates the need for the three separate connections shown in the previous example.

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 communication module[1]	1	1	1
		total	3

[1] The control network can be an Ethernet/IP or ControlNet network.

The rack-optimized connection conserves 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.

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 (local chassis) uses one rack-optimized connection to communicate with two digital I/O modules and uses one direct connection to communicate with an analog module in the remote chassis.
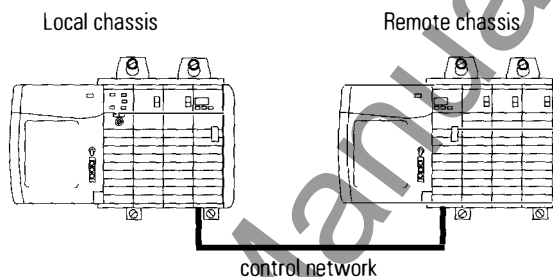
Local chassis   Remote chassis

control network

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 communication module[1] (rack-optimized connection for the digital I/O)	1	1	1
		total	4

[1] The control network can be an Ethernet/IP or ControlNet network.

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 remote 1756-DHRIO module, using a rack-optimized connection.

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 communication module	1	1	1
controller to remote 1756-DHRIO module	1	1	1
		total	4

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.

Connections to DeviceNet devices

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

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 communication module	1	1	1
controller to remote 1756-DNB module (rack-optimized connection for DeviceNet devices)	1	2	2
		total	5

The 1756-DNB module does not establish connections to its devices; and therefore, the controller doesn't establish connections with DeviceNet devices. 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 device.

Determining Total Connection Requirements

The ControlLogix controller supports 250 connections. To calculate the total connections for a controller, consider the connections to local I/O modules and the connections to remote modules.

Use the following table to tally **local** connections:

Connection Type:	Device Quantity:	Connections per Device:	Total Connections:
local I/O module (always a direct connection)		1	
1756-M16SE, -M08SE, -M02AE servo module		3	
1756-CNB, -CNBR communication module		0	
1756-ENBT communication module		0	
1756-DNET communication module		2	
1756-DHRIO communication module		1	
		total	

Regardless of how you configure local I/O modules (rack-optimized or direct connect), the controller establishes a direct connection for each local I/O module.

Remote connections depend on the communication module. The number of connections the module itself supports determines how many connections the controller can access through that module. Use the following table to tally **remote** connections:

Connection Type:	Device Quantity:	Connections per Device:	Total Connections:

remote 1756-CNB, -CNBR ControlNet communication module
    configured as a direct (none) connection
    configured as a rack-optimized connection
		0 **or**
		1	

remote I/O module over ControlNet (direct connection)		1	

remote 1756-ENBT Ethernet communication module
    configured as a direct (none) connection
    configured as a rack-optimized connection
		0 **or**
		1	

remote I/O module over EtherNet/IP (direct connection)		1	
remote device over DeviceNet (accounted for in rack-optimized connection for local 1756-DNB module)		0	
other remote communication adapter		1	
produced and consumed tag produced tag and one consumer each additional consumer		1 1	
consumed tag		1	
cached message		1	
block-transfer message		1	
		total	

- *a chassis with sufficient slots*
- *1756-N2 filler strips for empty slots*
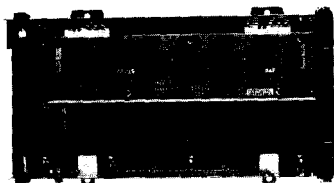
Selecting a Chassis

The ControlLogix system is a modular system that requires a 1756 I/O chassis to contain the various modules. Chassis are available in sizes of 4, 7, 10, 13, and 17 module slots. You can place any module into any slot.

The backplane provides a high-speed communication path between modules. Multiple controller modules on the backplane can pass messages between one another. 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 and out another module's port, and sent across another link to its ultimate destination.

(SR) Class 1, Division 2, Group A, B, C, D   (UL)®   CE   ◇FM◇   Class 1, Division 2, Group A, B, C, D

Catalog Number	Slots	Weight	Dimensions with Power Supply (HxWxD)	Minimum Cabinet Size (HxWxD)	Environmental Conditions	Maximum Backplane Current Load
1756-A4	4	0.75 kg (1.7 lb)	137 x 263 x 145 mm (5.4 x 10.4 x 5.8 in)	508 x 508 x 203 mm (20 x 20 x 8 in)	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)	Series A 4.0A @ 3.3V dc 10.0A @ 5V dc 2.8A @ 24V dc
1756-A7	7	1.10 kg (2.4 lb)	137 x 368 x 145 mm (5.4 x 14.5 x 5.8 in)	508 x 610 x 203 mm (20 x 24 x 8 in)		
1756-A10	10	1.45 kg (3.2 lb)	137 x 483 x 145 mm (5.4 x 19.0 x 5.8 in)	508 x 762 x 203 mm (20 x 30 x 8 in)		Series B 4.0A @ 3.3V dc 15.0A @ 5V dc 2.8A @ 24V dc
1756-A13	13	1.90 kg (4.2 lb)	137 x 588 x 145 mm (5.4 x 23.2 x 5.8 in)	610 x 762 x 203 mm (24 x 30 x 8 in)		
1756-A17	17	2.20 kg (4.8 lb)	137 x 738 x 145 mm (5.4 x 29.1 x 5.8 in)	762 x 914 x 203 mm (30 x 36 x 8 in)		

All the chassis are designed for back-panel mounting. Use the slot filler module 1756-N2 to fill empty slots.

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

> 15.3 cm
(6.0 in)

Enclosure

- allow 15.3 to 20 cm (6.0 to 8.0 in) between chassis and heat source

- allow 5.1 cm (2.0 in) between wireway and top or bottom of chassis

> 10.2 cm
(4.0 in)

15.3 to 20 cm
(6.0 to 8.0 in)

> 15.3 cm
(6.0 in)

7.7 to 10.2 cm
(3.0 to 4.0 in)

> 10.2 cm
(4.0 in)
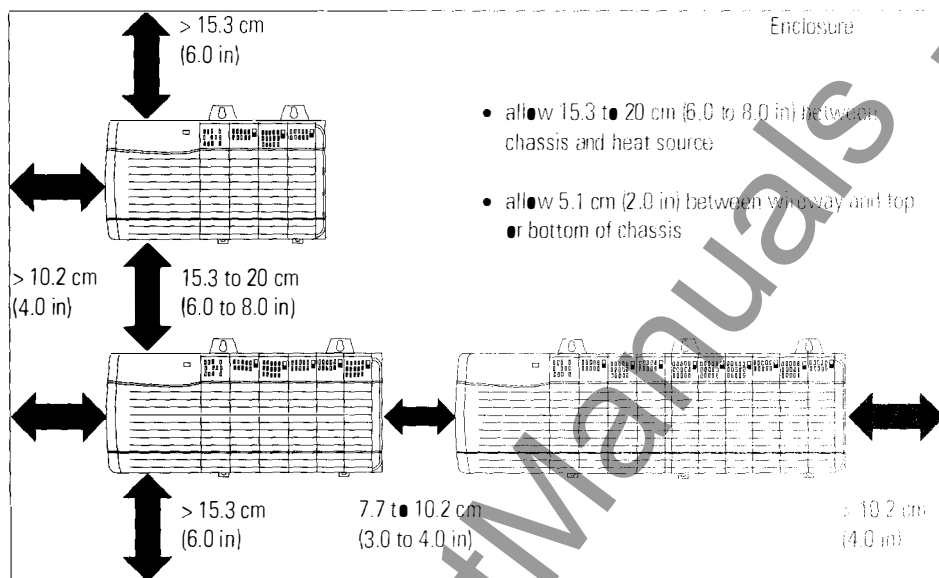
Mounting dimensions

right-side view of all chassis

with extended depth
housing (1756-TBE)

16.9 cm
(6.65 in)

14.5 cm
(5.8 in)

16.0 cm
(6.3 in)
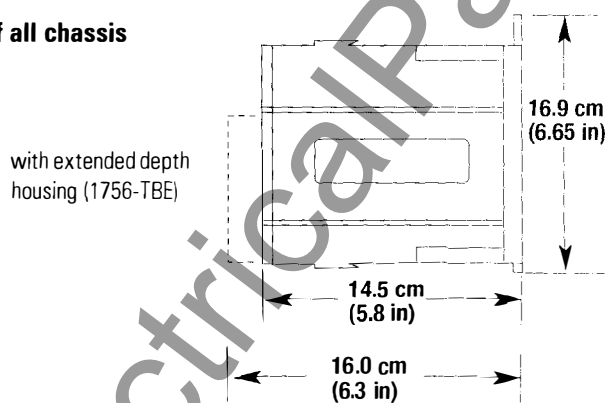
1756-A4 with power supply

1.1 cm dia.
(0.433 in)

7.0 cm
(2.76 in)

0.55 cm dia
(0.217 in)

15.8 cm
(6.22 in)

16.9 cm
(6.65 in)

14.5 cm
(5.71 in)

0.55 cm dia
(0.217 in)

4.5 cm
(1.77 in)

0.78 cm
(0.31 in)

26.3 cm
(10.35 in)

18.54 cm
(7.30 in)

dimension with a 1756-PSCA chassis adapter
installed, rather than a power supply
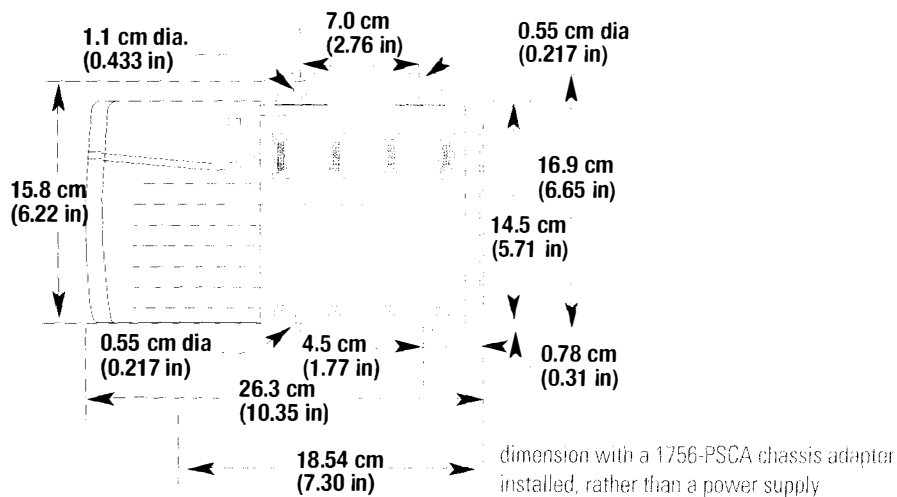
Mounting dimensions *(continued)*

1756-A7 with power supply

1.1 cm dia.
(0.433 in)

0.55 cm dia
(0.217 in)

17.5 cm
(6.89 in)

16.9 cm
(6.65 in)

15.8 cm
(6.22 in)

14.5 cm
(5.71 in)

0.55 cm dia
(0.217 in)

4.71 cm
(1.85 in)

0.78 cm
(0.31 in)

36.8 cm
(14.49 in)

29.04 cm
(11.44 in)

dimension with a 1756-PSCA chassis adapter
installed, rather than a power supply
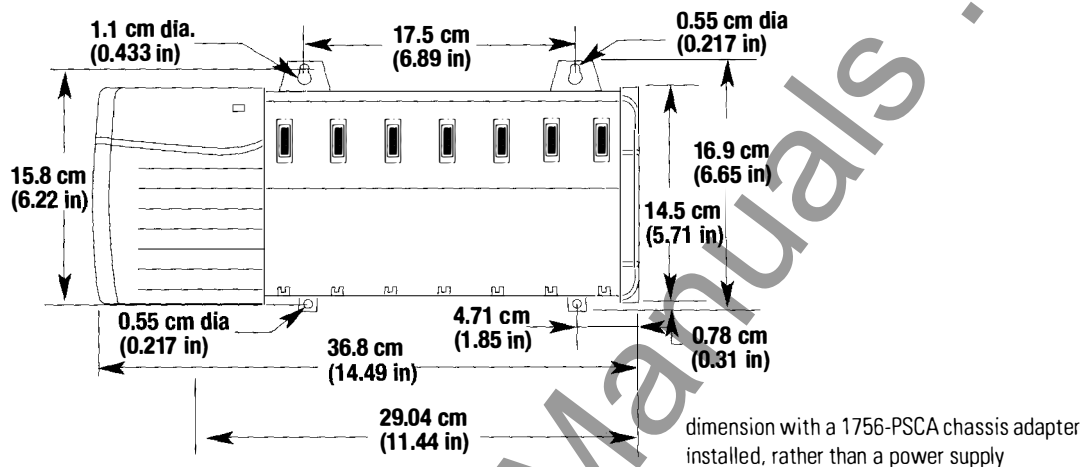
1756-A10 with power supply

0.55 cm dia
(0.217 in)

1.1 cm dia.
(0.433 in)

14.0 cm
(5.51 in)

14.0 cm
(5.51 in)

5.71 cm
(2.25 in)

16.9 cm
(6.65 in)

15.8 cm
(6.22 in)

14.5 cm
(5.71 in)

0.55 cm dia
(0.217 in)

0.78 cm
(0.31 in)

48.3 cm
(19.02 in)

40.54 cm
(15.96 in)

dimension with a 1756-PSCA chassis adapter
installed, rather than a power supply
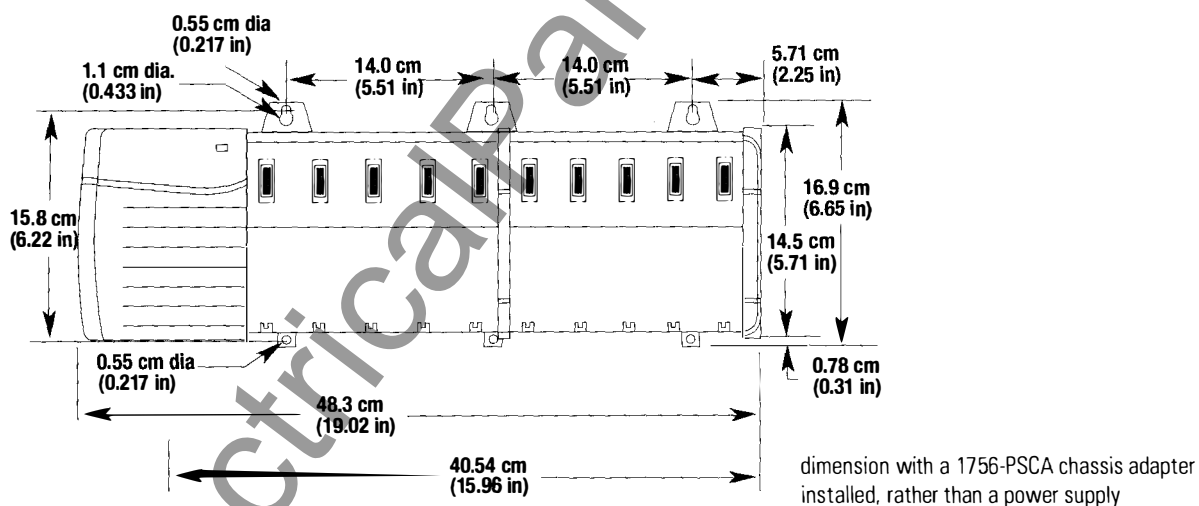
Mounting dimensions *(continued)*

1756-A13 with power supply

0.55 cm dia
(0.217 in)

1.1 cm Dia.
(0.433 in)

14.0 cm
(5.51 in)

10.5 cm
(4.13 in)

14.0 cm
(5.51 in)

5.71 cm
(2.25 in)

15.8 cm
(6.22 in)

16.9 cm
(6.65 in)

14.5 cm
(5.71 in)

0.55 cm dia
(0.217 in)

0.78 cm
(0.31 in)

58.8 cm
(23.15 in)

51.04 cm
(20.10 in)

dimension with a 1756-PSCA chassis adapter
installed, rather than a power supply
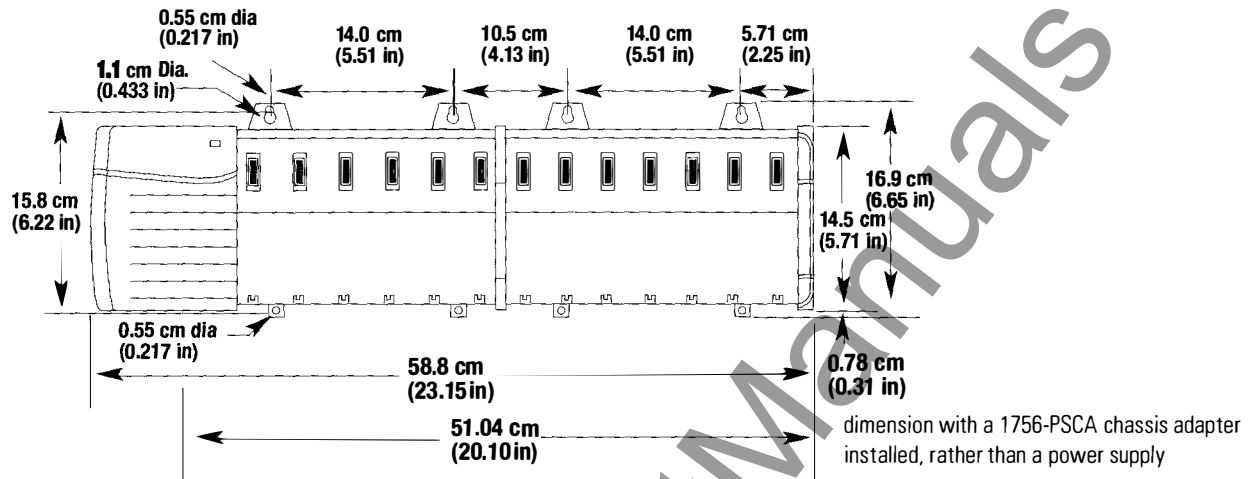
1756-A17 with power supply

0.55 cm dia
(0.217 in)

1.1 cm dia.
(0.433 in)

14.0 cm
(5.51 in)

13.3 cm
(5.24 in)

14.0 cm
(5.51 in)

13.3 cm
(5.24 in)

4.7 cm
(1.85 in)

15.8 cm
(6.22 in)

16.9 cm
(6.65 in)

14.5 cm
(5.71 in)

0.78 cm
(0.31 in)

73.8 cm
(29.06 in)

66.04 cm
(26.0 in)

dimension with a 1756-PSCA chassis adapter
installed, rather than a power supply
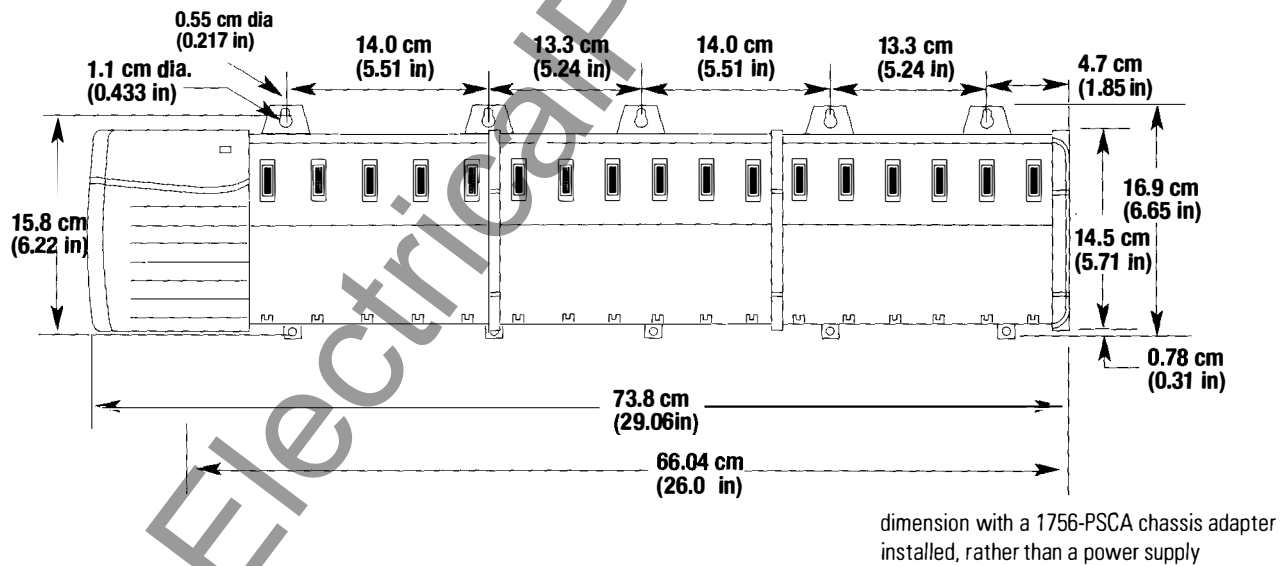
Selecting a Power Supply

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. Non-redundant (1756-PA72, -PB72, -PA75, -PB75) and redundant (1756-PA75R, -PB75R) power supplies are available.

Class I, Division 2, Group A, B, C, D   Class I, Division 2, Group A, B, C, D   N223

| Specification | Power Supplies | | | | | | Adapter |
	1756-PA72	1756-PA75	1756-PA75R	1756-PB72	1756-PB75	1756-PB75R	1756-PSCA
nominal input voltage	120V ac or 220V ac			24V dc			na
input voltage range	85-265V ac			19.2-32V dc			
maximum real input power	95W		115W	97W		110W	
maximum apparent input power	240VA		120VA	na			
maximum transformer load	238VA		120VA	na			
frequency	47-63Hz			dc			
maximum backplane output current	1.5A @ 1.2V dc 4A @ 3.3V dc 10A @ 5V dc 2.8A @ 24V dc 75W total	1.5A @ 1.2V dc 4A @ 3.3V dc 13A @ 5V dc 2.8A @ 24V dc 75W total		1.5A @ 1.2V dc 4A @ 3.3V dc 10A @ 5V dc 2.8A @ 24V dc 75W total	1.5A @ 1.2V dc 4A @ 3.3V dc 13A @ 5V dc 2.8A @ 24V dc 75W total		
hold up time[1]	@60 Hz: 85V ac: 2 cycles 120V ac: 6 cycles 200V ac: 20 cycles			19V dc: 20 mS 24V dc: 70 mS			
chassis compatibility	series A series B	series B	series B	series A series B	series B	series B	series B
location	left side of chassis		panel mounted[2]	left side of chassis		panel mounted[2]	left side of chassis

[1]   The hold up time is the time between input voltage removal and dc power failure.

[2]   Can be a maximum of 0.91 cable-metered (3 cable feet) from ControlLogix chassis.

Selecting a non-redundant power supply

You mount a non-redundant power supply directly on the left end of the chassis, where it plugs directly into the backplane. The power supply you select can determine which chassis you can use. For more information on selecting chassis, see page 67.

Selecting a redundant power supply

To build a redundant power supply system, you need:

- two redundant power supplies (both 1756-PA75R or 1756-PB75R)
- one 1756-PSCA chassis adapter module
- two 1756-CPR cables to connect the power supplies to the 1756-PSCA chassis adapter module (3ft maximum length)
- user-supplied annunicator wiring to connect the power supplies to the input modules, as needed

The 1756-PSCA chassis adapter module is a passive device that funnels power from the redundant power supplies to the single power connector on the ControlLogix series B chassis backplane.
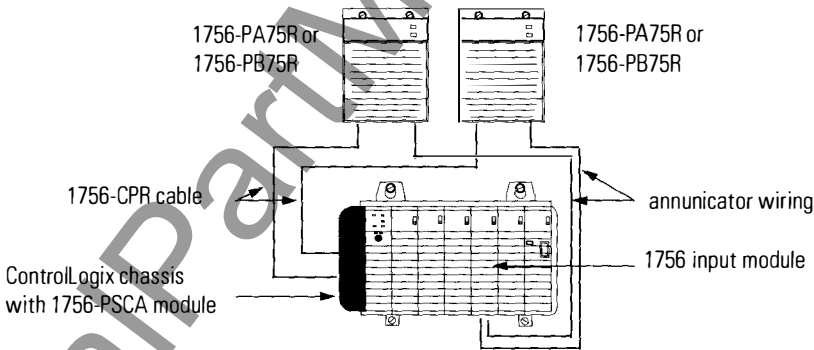
The redundant power supplies are available in ac (1756-PA75R) and dc (1756-PB75R) versions. They are also available in bundled systems:

Redundant Power Supply Bundle:	Contents:
1756-PAR	• two 1756-PA75R power supplies • two 1756-CPR cables • one 1756-PSCA chassis adapter module
1756-PBR	• two 1756-PB75R power supplies • two 1756-CPR cables • one 1756-PSCA chassis adapter module

Power Requirements and Transformer Sizing

Each ac-input 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 help 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 will sense this clipped wave form as low voltage and could prematurely shut down modules in the chassis.

The following graphs display the backplane power load on the vertical axis. Since these supplies have multiple outputs, the backplane power load is given in watts.

- Use the real power value in watts for determining the amount of heat dissipation you will have inside the enclosure.

- Use the apparent power value in VA for estimating power distribution sizing.

- Use the transformer load value in VA of each power supply plus all other loads on a transformer to determine the required transformer size.

Power load and transformer sizing

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-PA75R
ac

backplane
power load
(Watts)

| real power (Watts) | apparent power (Watts) | transformer load (VA) = real power (Watts)[1] |

[1] Power factor circuitry reduces transformer sizing requirements.
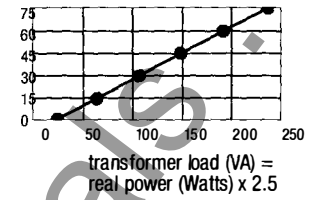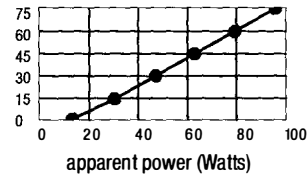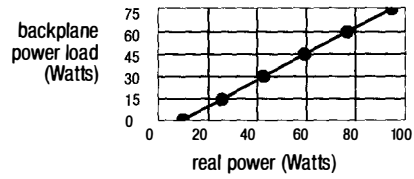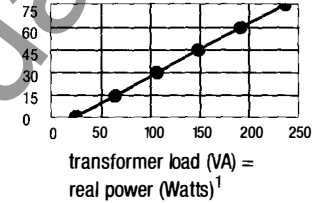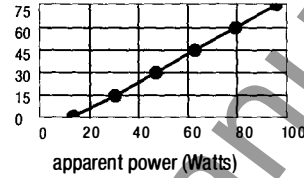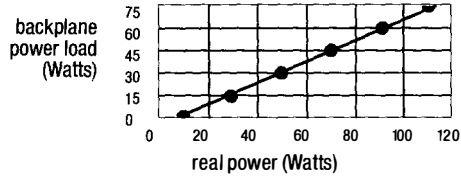
1756-PB72
1756-PB75
dc

backplane
power load
(Watts)

real power (Watts)

1756-PB75R
dc

backplane
power load
(Watts)

real power (Watts)
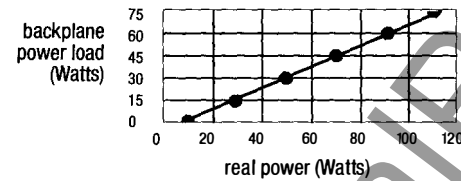
Step 7 - Select:

- *the appropriate package of RSLogix 5000 Enterprise Series software and any options*

- *other software packages for your application*

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 Enterprise Series software	9324 series (RSLogix 5000 Enterprise Series software)
1756-M16SE, -M08SE, -M02AE motion module		
1756-CNB, -CNBR ControlNet communication module	RSNetWorx for ControlNet (comes with the standard/NetWorx option of RSLogix 5000 Enterprise Series software)	9324-RLD300NXENE (RSLogix 5000 Enterprise Series software plus RSNetWorx option) **or** 9357-CNETL3 (RSNetWorx for ControlNet)
1756-DNB DeviceNet communication module	RSNetWorx for DeviceNet (comes with the standard/NetWorx option of RSLogix 5000 Enterprise Series software)	9324-RLD300NXENE (RSLogix 5000 Enterprise Series software plus RSNetWorx option) **or** 9357-DNETL3 (RSNetWorx for DeviceNet)
1756-ENBT, -ENET EtherNet/IP communication module (set the IP address)	RSLinx software (RSLinx Lite and Bootp server come with RSLogix 5000 Enterprise Series software)	9324 series (RSLogix 5000 Enterprise Series 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 Enterprise Series software)	9324 series (RSLogix 5000 Enterprise Series software)
workstation dedicated for operator interface	RSView32 software	9301 series
PanelView terminal	PanelBuilder software	2711-ND3 for PanelView Standard **or** 2711E-ND1 for PanelView Enhanced

Programming Software
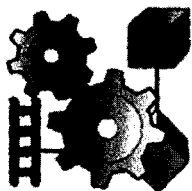
RSLogix 5000 Enterprise Series software is designed to work with Rockwell Automation's Logix Platforms and the Logix5000 family of controllers. RSLogix 5000 Enterprise Series software is an IEC 61131-3 compliant software package that offers relay ladder, structured text, function block diagram, and sequential function chart editors for you to develop application programs. RSLogix 5000 Enterprise Series software also includes axis configuration and programming support for motion control.
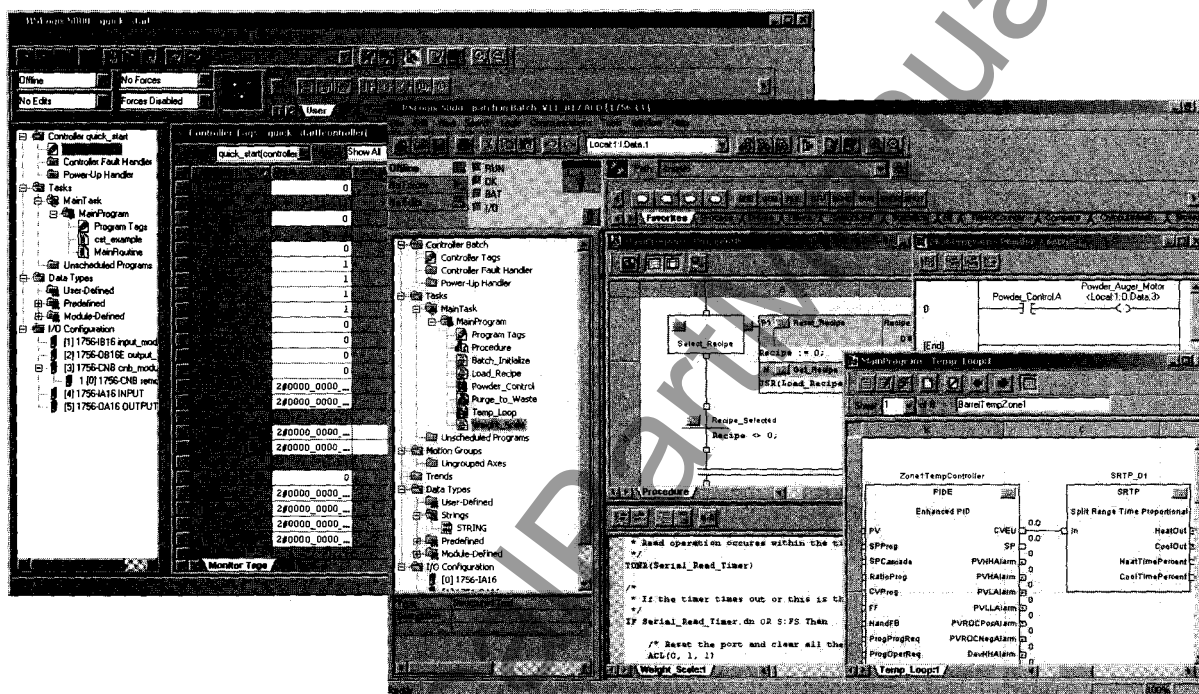
RSLogix 5000 Enterprise Series software requirements

Description:	Value:
personal computer	Pentium II 450 MHz minimum 733 MHz recommended
software requirements	Supported operating systems: • Microsoft Windows NT version 4.0 with Service Pack 6A or greater • Microsoft Windows 2000 with Service Pack 1 (recommended) • Microsoft Windows XP
RAM	128 Mbytes of RAM minimum 256 Mbytes of RAM recommended
hard disk space	100 Mbytes of free hard disk space (or more based on application requirements)
video requirements	256-color VGA graphics adapter 800 x 600 minimum resolution (1024 x 768 recommended)

Selecting the programming package

Select the RSLogix 5000 Enterprise Series software package and options you need:

Available Features	Mini 9324-RLD200xxE[1]	Standard 9324-RLD300xxE[1]	Standard/NetWorx 9324-RLD300NXxxE[1]	Full 9324-RLD600ENE	Professional 9324-RLD700xxE[1]
Logix5000 controllers supported[2]	CompactLogix5300 FlexLogix5400	CompactLogix5300 FlexLogix5400 ControlLogix5500 DriveLogix5700 SoftLogix5800	CompactLogix5300 FlexLogix5400 ControlLogix5500 DriveLogix5700 SoftLogix5800	CompactLogix5300 FlexLogix5400 ControlLogix5500 DriveLogix5700 SoftLogix5800	CompactLogix5300 FlexLogix5400 ControlLogix5500 DriveLogix5700 SoftLogix5800
Relay ladder editor	fully supported	fully supported	fully supported	fully supported	fully supported
Function block diagram editor (includes ActiveX faceplates)	upload/download only available separately[3] [4]	upload/download only available separately[3] [4]	upload/download only available separately[3] [4]	fully supported	fully supported
Sequential function chart editor	upload/download only available separately[4] [5]	upload/download only available separately[4] [5]	upload/download only available separately[4] [5]	fully supported	fully supported
Structured text editor	upload/download only available separately[4] [6]	upload/download only available separately[4] [6]	upload/download only available separately[4] [6]	fully supported	fully supported
Highly-integrated motion	upload/download only	fully supported	fully supported	upload/download only	fully supported
Graphical trending	na	fully supported	fully supported	fully supported	fully supported
Drives Executive Lite	available separately[7]	included	included	available separately[7]	included
RSView demo (50 tags/2 hours)	available separately	available separately	available separately	available separately	included
PIDE autotuner	available separately[8]	available separately[8]	available separately[8]	available separately[8]	available separately[8]
1756-MVI development toolkit	na	available separately[9]	available separately[9]	available separately[9]	included
RSLinx	Lite included	Lite included	Lite included	Lite included	Professional included
RSNetWorx for ControlNet and RSNetWorx for DeviceNet	available separately[10]	available separately[10]	included	available separately[10]	included
Upgrades	Mini to Standard: 9324-RLD2U3xxE Mini to Full: 9324-RLD2U6xxE Mini to Professional 9324-RLD2U7xxE	Standard to Professional: 9324-RLD3U7xxE	Standard /NetWorx to Professional: 9324-RLD3NXU7xxE	Full to Professional: 9324-RLD6U7xxE	na

[1] Replace "xx" in the catalog number with the appropriate language designation: EN=English, FR=French, DE=German, IT=Italian, PT=Portuguese, and ES=Spanish.

[2] The 1756-L55 controller requires RSLogix 5000 software version 6 or greater. The 1756-L63 controller requires RSLogix 5000 software version 10 or greater.

[3] The function block editor is available as 9324-RLDFBDxxE.

[4] A multiple language editor package is available as 9324-RLDMLPE. It contains the function block, sequential function chart, and structured text editors at a reduced price.

[5] The sequential function chart (SFC) editor is available as 9324-RLDSFCE.

[6] The structured text editor is available as 9324-RLDSTXE.

[7] DriveLogix Executive Lite is available as 9303-4DTE01ENE.

[8] The loop tuner for the PIDE function block is available as 9323-ATUNEENE.

[9] The 1756-MVI development toolkit is available as 1756-MVID, which includes the module and toolkit.

[10] RSNetWorx for ControlNet is available as 9357-CNETL3. RSNetWorx for DeviceNet is separately as 9357-DNETL3. They are available together as 9357-ANETL3.

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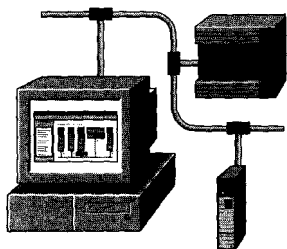
RSNetWorx software for ControlNet (9357-CNETL3) and RSNetWorx software for DeviceNet (9357-DNETL3) are the configuration and scheduling tools for your ControlNet or DeviceNet networks. RSNetWorx software lets you create a graphical representation of your network configuration and configure the parameters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

RSNetWorx for ControlNet software schedules network components. The software automatically calculates network bandwidth for the entire network, as well as the bandwidth used by each network component. You must have RSNetWorx software to configure and schedule the ControlNet networks in your ControlLogix system.
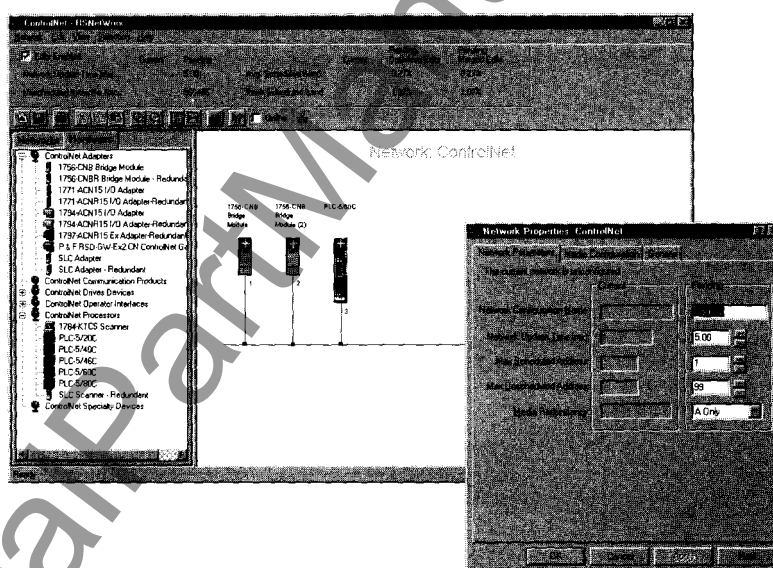
RSNetWorx for DeviceNet software configures the DeviceNet I/O devices and creates the scan list. The DeviceNet scanner stores the configuration information and scan list.

RSNetWorx system requirements
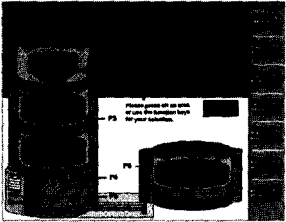
Description:	Value:
personal computer	IBM-compatible 120MHz minimum (Pentium recommended)
operating system	Microsoft Windows 95, Windows 98, or Windows NT version 4.0 with Service Pack 2 or greater, or Microsoft Windows 2000 with Service Pack 1 or greater
RAM	32 Mbytes of RAM minimum 48 Mbytes or more 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)

Monitoring and Controlling Automation Machines and Processes

Integrating the ViewAnyWare Strategy

The ViewAnyWare strategy, together with Logix for control and NetLinx architecture for communication, make up Rockwell Automation's Integrated Architecture strategy. The ViewAnyWare strategy combines Rockwell Automation's expertise in Allen-Bradley electronic operator interface and industrialized PC hardware with Rockwell Software's supervisory control software.

Current ViewAnyWare products include:

ViewAnyWare product:	Description:
RSView Enterprise Series software 	RSView Enterprise Series software is a new line of HMI software products that support the ViewAnyWare strategy. This series of products provides a scalable suite of monitoring and control solutions. RSView Enterprise Series software includes: • RSView Studio lets you create graphic displays that give a visual representation of your process. These displays also allow operators to interact directly with your process. • RSView Machine Edition (ME) is a machine-level HMI that supports both open and embedded operator interface solutions for monitoring and controlling individual machines or small processes. Runtime devices include Allen-Bradley RAC6182 Windows CE-based industrial computers and Windows 2000 platforms. • RSView Supervisory Edition RSView Supervisory Edition (SE) is an HMI for supervisory-level monitoring and control applications. It has a distributed and scalable architecture that supports distributed-server/multi-user applications, giving maximum control over information everywhere you want it.
RAC6182 Windows CE computer 	The RAC6182 family of industrial computers combines the Windows CE platform with a rugged, full-featured industrial computer to deliver a computing solution that supports HMI, soft control, programming, information management, and remote terminal applications. The RAC6182 is a 100% solid state computer (no moving parts) specifically designed for the Windows CE operating system. Use the RAC6182 with RSView Machine Edition or with OEM applications developed in-house using the Software Development Kit (6189-SDK).

RSView Enterprise Series products

The available RSView Enterprise Series products are:

RSView Enterprise Series Product Line:	Catalog Number:	Description:
RSView Studio	9701-VWSTENE	RSView Studio for RSView Enterprise Series
	9701-VWSTMENE	RSView Studio for Machine Edition
RSView Machine Edition	9701-VWMR015AENE	RSView ME Station runtime for Windows 2000, 15 displays
	9701-VWMR030AENE	RSView ME Station runtime for Windows 2000, 30 displays
	9701-VWMR075AENE	RSView ME Station runtime for Windows 2000, 75 displays
	6182-xxxxxC	RSView ME Station runtime for RAC6182 computers
RSView Supervisory Edition	9701-VWSCWAENE	RSView SE client
	9701-VWSCRAE	RSView SE view client
	9701-VWSS025AENE	RSView SE server 25 displays
	9701-VWSS100AENE	RSView SE server 100 displays
	9701-VWSS250AENE	RSView SE server 250 displays
	9701-VWSS000AENE	RSView SE server unlimited display

Future ViewAnyWare products

Future ViewAnyWare products include PanelView Plus, the next generation of PanelView products. The family includes the PanelView Plus 700, 1000, 1250, and 1500 terminals with display sizes from 6.4" to 15" and in both keypad and touch versions.

Integrating HMI Products
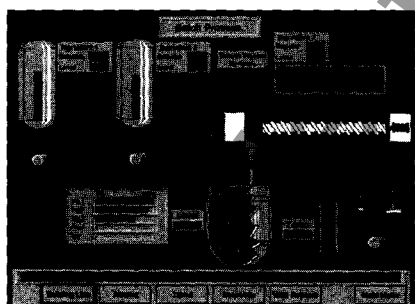
RSView32™ software is an integrated, component-based HMI for monitoring and controlling automation machines and processes. RSView32 offers preferred compatibility to the Logix family of products. Use RSView32 software with RSLinx software to capture, control, and convey plant floor data.

With RSView32 software, build your own customized suite, choosing only those products that best serve the needs of your unique applications. For example, select RSLogix 5000 ladder tags right from within RSView32. You can also share data with Microsoft products. RSView32 tag configuration, alarm configuration, and logged data are all ODBC compliant. Log data directly to an ODBC data source such as Microsoft SQL Server, Oracle, or SyBase, and graphically view the data in a trend.

RSView32 expands your view with open technologies that provide unprecedented connectivity to other Rockwell Software products, Microsoft products, and third-party applications.

Meeting Your Process Control Requirements

Consider ControlLogix to meet your batch and continuous process applications. Function block programming with both offline and online editing suits continuous and web process. Both sequential function chart programming and structured text programming suit batch process. In addition, ProcessLogix incorporates ControlLogix to solve distributed process applications.

ProcessLogix distributed process control

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.

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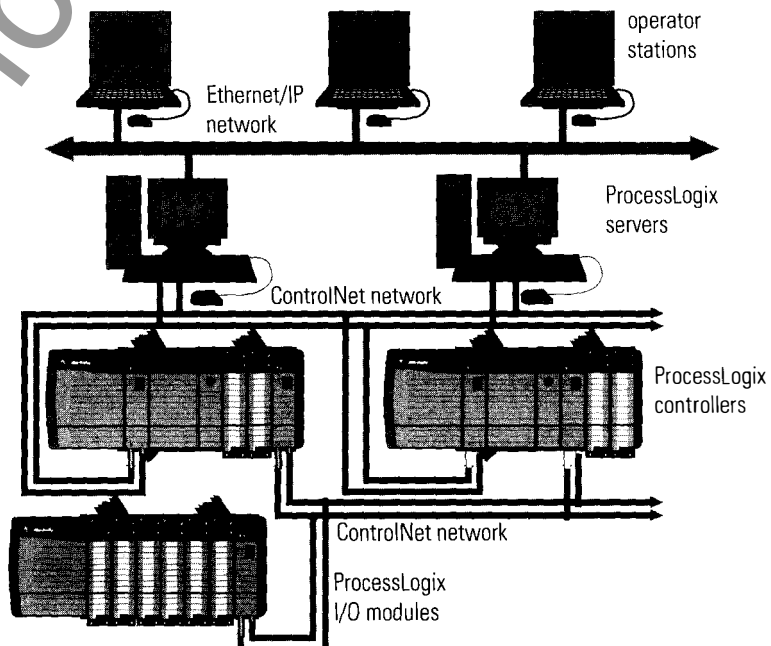
The ProcessLogix development environment offers control functions that you access and link using a function block editor. A library of templates, called function blocks, provide the logic for continuous, logic, sequence, and basic batch functions. The ProcessLogix system supports:

- 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.
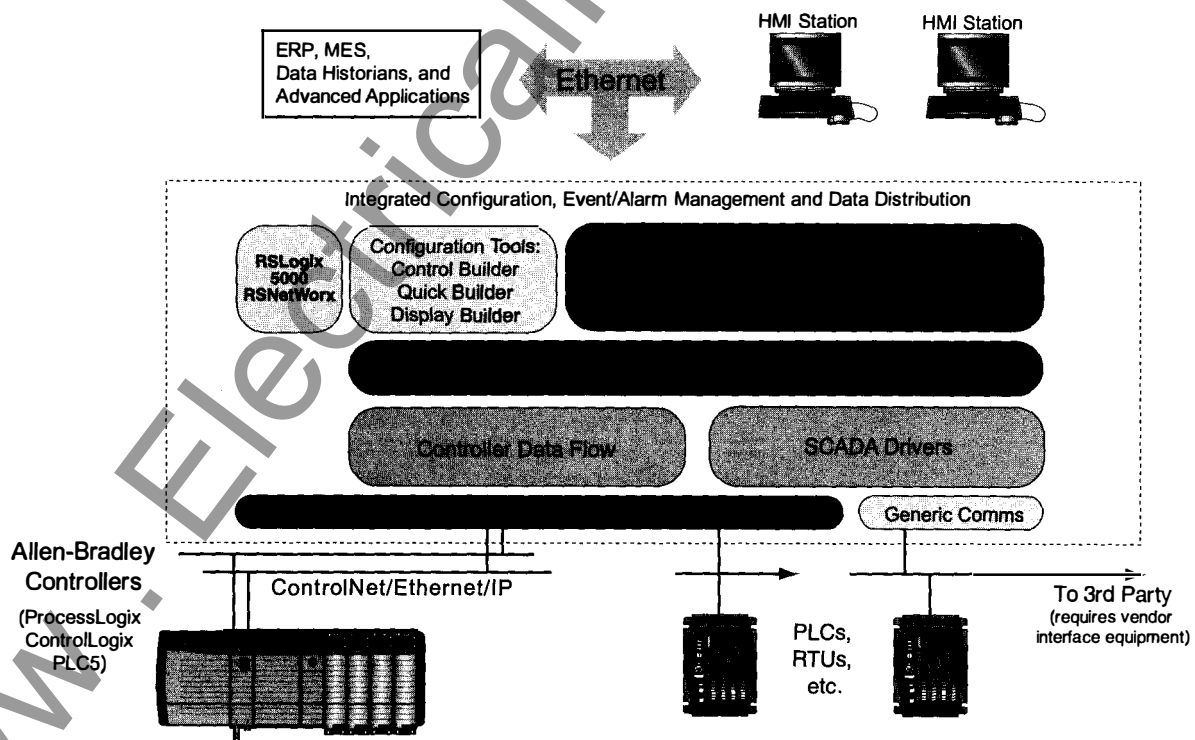
Summary

Use a spreadsheet to record the amount and type of devices your ControlLogix system needs. For example, this sample system:
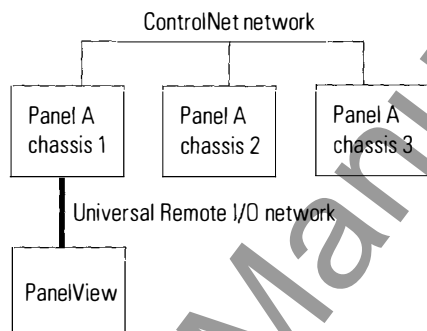
could result in this spreadsheet:

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
ControlNet communication module	A	na	1756-CNB	na	3
Remote I/O communication module	A	na	1756-DHRIO	na	1
				Location A subtotal	29

As you select devices for your ControlLogix system, keep in mind:

✓	Step:	Remember to select:
☐	**1 Select I/O devices**	• I/O modules - some modules have diagnostic features, electronic fusing, or individually isolated inputs/outputs • a remote terminal block (RTB) or wiring system for each I/O module • PanelConnect modules and cables if connecting input modules to sensors
☐	**2 Select motion control and drives requirements**	• how you want to interface the controller and drives • appropriate motion module • associated cable(s) • a remote terminal block (RTB) - only needed for 1756-M02AE modules
☐	**3 Select communication modules**	• networks • communication modules • associated cable(s) and network equipment • sufficient modules and cables if you are planning a redundant system Some networks have companion documents to help in selecting appropriate network equipment. See your Rockwell Automation representative for information.
☐	**4 Select a controller**	• a controller with sufficient memory • memory board for each 1756-L55 controller • 1756-BATM for larger memory size controllers • replacement batteries
☐	**5 Select a chassis**	• a chassis with enough slots for the modules you need, with room to spare for additional growth • 1756-N2 filler strips for empty slots
☐	**6 Select power supplies**	• a power supply with sufficient power for the modules you need, with room to spare for additional growth • the power supply bundles if you are planning a redundant power supply system
☐	**7 Select software**	• the appropriate package of RSLogix 5000 Enterprise Series software and any options • other software packages for your application

As you determine placement of the modules you selected, use the worksheet on the inside of the back cover to record your choices.
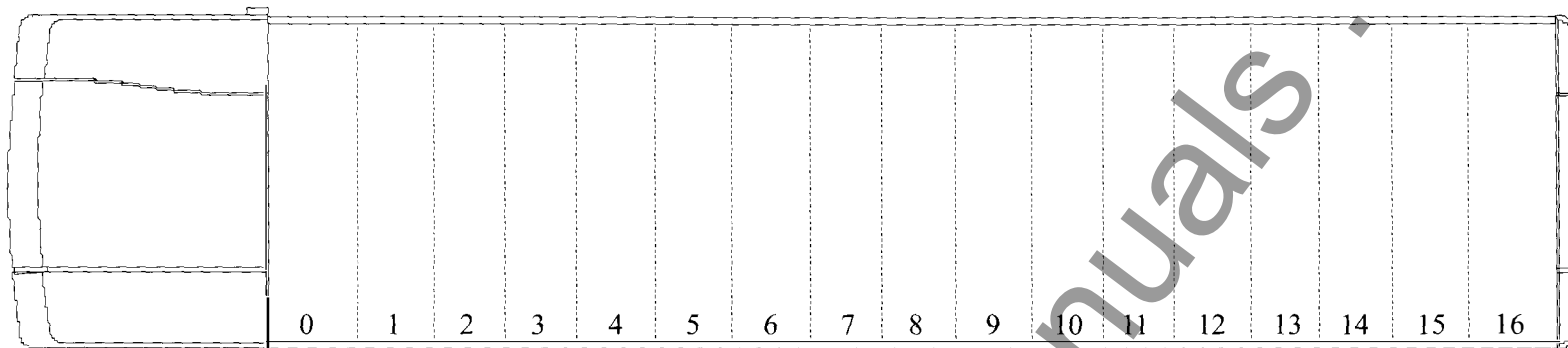Make a copy of this worksheet for each chassis.

Chassis slots: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

Chassis:	Catalog Number:	Backplane current 3.3V (amps): 400mA maximum	Backplane current 5.1V (amps): maximums: 1756-PA/PB72 ≤10,000mA 1756-PA/PB75 ≤ 13,000mA 1756-PA/PB75R ≤ 13,000mA	Backplane current 24V (amps): 2800mA maximum	Module power (watts):	I/O termination: 20-pin	36-pin	Connections: Direct	Rack
rack									
power									
0									
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
totals:									

Publication 1756-SG001E-EN-P - June 2002

PN 957657-58