February 2009

PLC, I/O & Communications Products

Contents

ELC and IT. Products

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ELC Product Family Overview

ELC Controller and Expansion Modules

The Eaton Logic Controller (ELC) is Eaton's latest offering into the PLC (Programmable Logic Controller) marketplace. This small sized device, with its abundant module selection, provides all of the big PLC features you need at a micro PLC price.

- **Size** – Large PLC features with controllers as small as 1-inch in width. Half the size of competitive offerings. ELC can fit more I/O in the same space and allow cost savings by reducing cabinet size.
- **Flexibility** – ELC controllers expand to over 500 points of I/O on the PV models and over 230 on all other models.
  - ❏ Add only the amount of I/O you need. Choose I/O counts as small as 2 points and as large as 16 points per module.
  - ❏ DIN-rail mounting lets you add as many modules as needed by snapping them into mating connectors.
- **Large PLC Features** – Multiple communications ports, distributed I/O capability, high-speed counters, high-speed pulse outputs, interrupts, timer resolution to 1ms, PIDs, plus much more.
- **Software** – ELCSoft programs in standard ladder or sequential function chart programming.
  - ❏ Display registers "in use" and modules attached to the ELC.
  - ❏ Monitor runtime applications. Force (except PB model), and enter/modify register values.
  - ❏ Wizards aid programming of ELC Link for distributed I/O, standard communications, high-speed counters, pulse outputs, positioning, interrupts, PIDs and extension module setup.
- **Communications** – Connecting to networks is easy on Modbus®, Modbus TCP, DeviceNet™, and PROFIBUS.

Using these technologies, the ELC can connect to communicating MCCs where the ELC is a master on DeviceNet or Modbus TCP. ELC also communicates to PowerNet products over Modbus and Modbus TCP, providing connectivity to switchgear and PowerNet applications.

Of course, the ELC communicates seamlessly to Eaton's operator interface products.

ELC Controllers/Modules

Product Description

ELC Controllers

The ELC family offers five styles of controllers. These controllers offer combinations of the following features:

- High-speed pulse capture and high-speed pulse output, up to 200 kHz.
- Up to 22 interrupts.
- Large selection of discrete I/O modules including AC/DC in, relay/transistor out, and high current relay out.
- Large selection of specialty modules including analog in, out, combined, thermocouple, RTD Platinum.
- Over 200 instructions to choose from: Floating point math, communications, 16- and 32-bit math, logical, block move, block compare, retentive data storage, conversion, time base from clock/calendar.
- 2 Modbus (ASCII or RTU) serial ports: 1 slave only, 1 master/slave.
- Network communications on Modbus TCP, DeviceNet and PROFIBUS.
- ELC controller can be wired for remote I/O communications (except the PB model).

ELC Modules

ELC Expansion Modules

ELC expansion modules provide the correct amount of I/O for application solutions. Choose from a wide selection of 4, 6, 8 and 16 point I/O modules to create a system with up to 508 points of I/O (256 inputs and 252 outputs maximum).

ELC Specialty Modules

In addition to discrete expansion I/O, specialty modules like Analog In, Analog Out, Platinum Temperature, Thermocouple and Switch Modules are available.

The RS-485 adapter can easily connect an MVX9000 drive to a network of ELCs on Modbus. DeviceNet and PROFIBUS DP slave modules are available for right side mounting to all controllers, while Ethernet and DeviceNet scanner specialty modules can be added to the left side of the ELC-PV controllers.

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Catalog Number Selection

Table 50-1. ELC Controllers/Modules Catalog Numbering System

```
E L C - PA  10  A  A  D  R
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Device Type
PB = Processor without clock
PC = Processor with clock
PH = Processor with clock and high-speed I/O
PA = Processor with clock and embedded analog
PV = Processor with clock, high-speed I/O and high-speed CPU
AN = Analog Expansion Module
EX = Digital Expansion Module
PT = Platinum RTD Expansion Module
TC = Thermocouple Expansion Module

I/O Count
xx = Total Number of I/O

Analog Inputs
A = Analog
N = None

Analog Outputs
A = Analog
N = None

Digital Inputs
A = AC
D = DC
S = Switch
N = None

Digital Outputs
T = Transistor
R = Relay
I = High Current Relay
N = None

ELC Controller Features

There are 5 controller styles:

- **PB Series (Basic)** – 14 I/O (8i/6o). Over 130 instructions provide all the power you need. Add expansion modules to the right side of the unit to create applications with up to 230 I/O points. Two Modbus (ASCII/RTU) serial ports for master/slave communications. The master port is RS-485 with the ability to communicate to 31 other devices. The master port can also be configured to communicate to devices such as ASCII, bar code readers, etc. The program is stored in EEPROM for retention in the event of power loss. This unit does not provide a real-time clock.

- **PC Series (Clock/Calendar)** – 12 I/O (8i/4o). Same features as the basic model plus clock/calendar, distributed I/O capability with up to 16 devices, and file area for data storage and retrieval. The program is stored in RAM with battery backup. The replaceable battery has greater than a 5-year life. This unit also has 2 digital potentiometers that vary the data in internal registers.

- **PA Series (Analog)** – 10 I/O (6i/4o). Same features as PC Series with a different I/O mix. This unit has a total I/O mix of 4 digital inputs, 2 digital outputs, 2 analog inputs, and 2 analog outputs. The analog channels can be set up for either voltage or current. This unit has (2) 7-segment LEDs that can be used to display unit ID, error codes, process steps, etc.

- **PH Series (High-Speed)** – 12 I/O (8i/4o). All the features of the PC Series with the added ability to capture or output pulses up to 100 kHz and includes single-axis motion control.

- **PV Series (Advanced)** – 28 I/O (16i/12o). The PV Series has the most extensive feature set of the ELC controllers. It allows for expansion up to 508 I/O points and is compatible with the same expansion modules, specialty modules and software. Programs written for the other controllers can be migrated to a PV controller where greater speed or more I/O is required. Compared to the current ELC controllers, the PV series provides 10 times improvement in speed for about 0.24µ seconds/step. The program is stored in RAM and backed using a rechargeable lithium-ion battery. No need to change batteries. Controller also includes 2-axis motion control.

The new PV series controller adds an additional expansion bus to the left of the controller. While the PV series is compatible with today's current expansion modules, which extend to the right of the controller, you can add high-speed and specialty modules to the left. Left side Ethernet master and DeviceNet master modules are available for use with the PV Series controller.
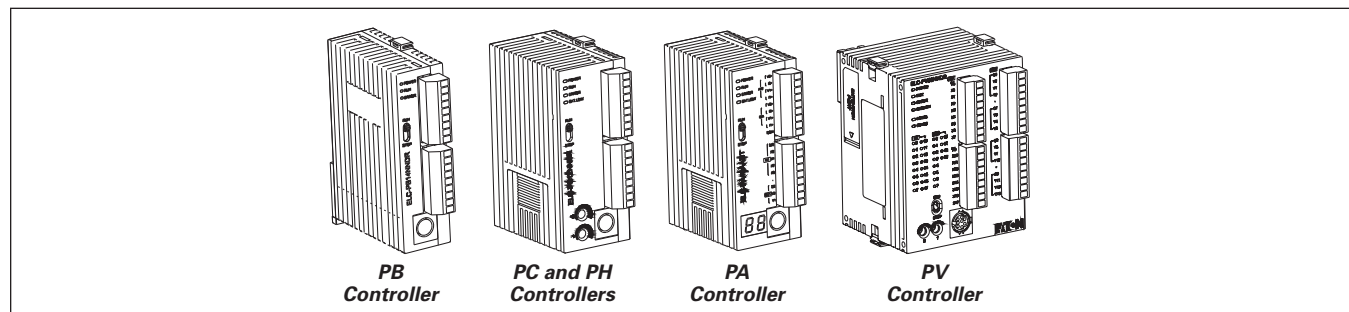
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Specifications

ELC Controllers

| PB Controller | PC and PH Controllers | PA Controller | PV Controller |

Figure 50-1. ELC Controllers

Table 50-2. ELC Controller Features and Specifications

Controller	ELC-PB14NNDR/DT	ELC-PA10AADR/DT	ELC-PC12NNAR/DR/DT	ELC-PH12NNDT	ELC-PV28NNDR/DT
Dimensions W x H x D (mm)	25.2 x 90 x 60	37.4 x 90 x 60			70 x 90 x 60
I/O Type — Embedded	14 (8DI/6DO)	10 (4DI/2DO/2AI/2AO)	12 (8DI/4DO)		28 (16DI/12DO)
Maximum Additional I/O Points	224 (112 In/112 Out)				480 (240 In/240 Out)
DC In Sink/Source	Yes				
Execution Speed	Basic Instructions — 2 µs Minimum				0.24 µs Minimum
Program Language	Instructions + Ladder Logic + Sequential Function Chart				
Program Capacity (steps)	3792	7920			15,872
Data Memory Capacity (bits)	1280	4096			
Data Memory Capacity (words)	744	5000			10,000
Index Registers	2	8			16
File Memory Capacity (words)	None	1600 Words			10,000 Words
Retentive Storage	Yes				
Commands Basic/Advanced	32/107	32/168			32/193
Floating Point	Yes				
SFC Commands (steps)	128	1024			
Timers Qty.	128	244 Standard With Additional Timers for Subroutine and Retentive Applications			
Timers Resolution	1–100ms				
Counters Qty.	128	250			253
High-speed Counters (see note)	Up to 4	Up to 6		Up to 8	
Max. High-speed Counting (see note)	2 at 20 kHz	1 at 30 kHz		1 at 100 kHz	2 at 200 kHz
Pulse Output	2 Channels, 10 kHz Max.	2 Channels, 50 kHz Max.		100 kHz	200 kHz
PID	Yes				
Master Control Loop	8 Loops				
Subroutines	64 Subroutines	256 Subroutines			
For/Next Loops	Yes				
Interrupts	6	15			22
Real-time Clock/Calendar	No	Built-in			
Password Security	Yes				
Diagnostic Relays	Yes				
Diagnostic Word Registers	Yes				
Specialty Expansion Modules	8 (Analog In/Analog Out/TC/RTD/PT) Modules Do Not Count in Total I/O				
Serial Ports	2 Modbus (ASCII/RTU) 1=Slave (RS-232)/11=Master-Slave (RS-485)				
Remote I/O	No	With 16 Other Devices			With 32 Other Devices
Run Time Editing	No	Yes			
Run/Stop Switch	Yes				
Removable Terminal Strips	Yes				
Special Features	—	2, 7-Segment Displays	2 Potentiometers		2 Potentiometers High-speed, Left Side Bus

Note: High-speed counter inputs can be used for different types of 32-bit counting, such as single-ended, single-phase two input and quadrature. Therefore, all high-speed counters may not be used at the same time. Please refer to the ELC Systems Manual, MN05003003E, for details.

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ELC Right Side Digital Expansion Modules

Digital right side expansion modules can be used with any ELC controller. They simply snap together to allow the ELC backplane to pass through each connected module. Add only the amount of I/O you need. Choose I/O counts as small as 6 points and as large as 16 points per module.

I/O modules are available in a broad selection of AC/DC inputs, relay/transistor and high current outputs which may be used together in any combination.

Add as many modules as needed to reach the proper I/O count. In addition to the embedded I/O on the PB, PC, PA and PH controllers, 112 digital inputs and 112 digital outputs can be added by use of expansion modules. An additional 240 digital inputs and 240 digital outputs can be added to the PV controller. These I/O counts are all independent of the analog and specialty module I/O counts.
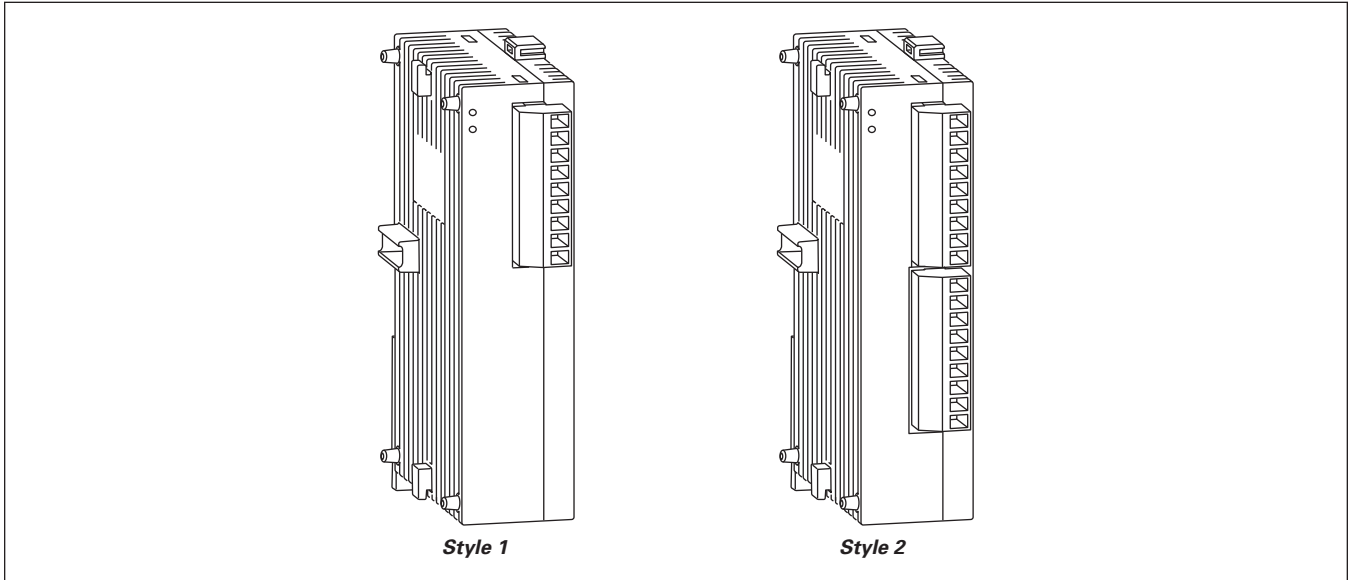

Style 1   *Style 2*

Figure 50-2. ELC Right Side Digital Expansion Modules

Table 50-3. ELC Right Side Digital Expansion Module Features

Model	Style	Inputs		Outputs	
		Points	Type	Points	Type
ELC-EX08NNAN — AC IN	1	8	120V AC	0	—
ELC-EX08NNDN — DC IN	1	8	DC Sink or Source	0	—
ELC-EX08NNNR — Relay OUT	1	0	—	8	Relay
ELC-EX08NNNT — PNP Transistor OUT	1	0	—	8	PNP Transistor
ELC-EX06NNNI — High Current Relay OUT	2	0	—	6	Relay (6 Amps)
ELC-EX08NNDR — IN/OUT Combo	2	4	DC Sink or Source	4	Relay
ELC-EX16NNDR — IN/OUT Combo	2	8	DC Sink or Source	8	
ELC-EX08NNDT — IN/OUT Combo	2	4	DC Sink or Source	4	PNP Transistor
ELC-EX16NNDT — IN/OUT Combo	2	8	DC Sink or Source	8	

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ELC Right Side Analog and Specialty Modules

These modules offer various features other than the standard digital inputs and outputs. A maximum of 8 analog and specialty I/O modules can be used with any controller. The RS-485 connection device can be used separately from the ELC controllers. All analog, temperature, and the motion modules have a separate power input which must be powered even when connected directly to the ELC controller system. In addition to a separate power input, these modules have an RS-485 port so they can communicate Modbus to any other Modbus device, including the ELC controllers. This allows them to be mounted closer to the sensing devices for better accuracy.

- **ELC-AN02NANN** – 2 channel analog output module uses voltage or current mode for any channel with12 bit resolution in any mode.
- **ELC-AN04NANN** – 4 channel analog output module uses voltage or current mode for any channel with12 bit resolution in any mode.
- **ELC-AN06AANN** – 4 analog input channels and 2 analog output channels. Input channels use voltage or current mode for any channel. Inputs are 12 bit resolution in voltage mode and 11 bits resolu-

tion in current mode. Analog output channels use voltage or current mode for any channel with12 bit resolution in any mode.

- **ELC-AN04ANNN** – 4 analog input module uses voltage or current mode for any channel. Inputs are 14 bit resolution in voltage mode and 13 bits resolution in current mode.
- **ELC-PT04ANNN** – 4 channel PT100 temperature sensor input module. Use 3-wire PT100 sensors on each channel with 14 bit resolution. Temperature ranges from -200 °C~600 °C or -328 °F~1112 °F.
- **ELC-TC04ANNN** – 4 channel thermocouple temperature sensor input module. Use J, K, R, S, or T sensors on any channel with 14 bit resolution. Temperature ranges from -148 °C~3092°F.
- **ELC-EX08NNSN** – 8 input switch module. Use for debugging applications or for manual switch inputs to the ELC controller.
- **ELC-COPBDP** – PROFIBUS-DP slave module. Supports baud rates up to 12M bps with auto-baud detection. Consumes 4 bytes of input data (32 input bits of X) and 4 bytes or output data (32 bits of Y).
- **ELC-CODNET** – DeviceNet slave module. Supports baud rates up to 500K bps. Supports explicit and

polled connections. Consumes 4 bytes of input data (32 input bits of X) and 4 bytes or output data (32 bits of Y).

- **ELC-485APTR** – Used primarily for easy connection of an MVX/NFX drive to the ELC controller. This module is a passive RS-485 connection device. It has an RJ12 port for connecting to a drive. It has a 2-pin screw terminal to connect to the ELC controller. It also has 1 male DB9 and a female DB9, which may be used for connecting to other RS-485 devices. This module can be connected directly to the ELC controller but should be placed as the last module to the right since it does not pass the I/O bus through to the next module.
- **ELC-MC01** – Single axis motion control module. Can be used with any ELC controller for single axis motion control. Add more MC01 modules for up to 8 axes. If used with the PH series controller it can provide a second axis since the PH series has single axis built in. If used with the PV series controller it can perform as a 3rd axis motion control module since the PV series incorporates 2 axis of motion control and is capable of providing output pulses up to 200 kHz.
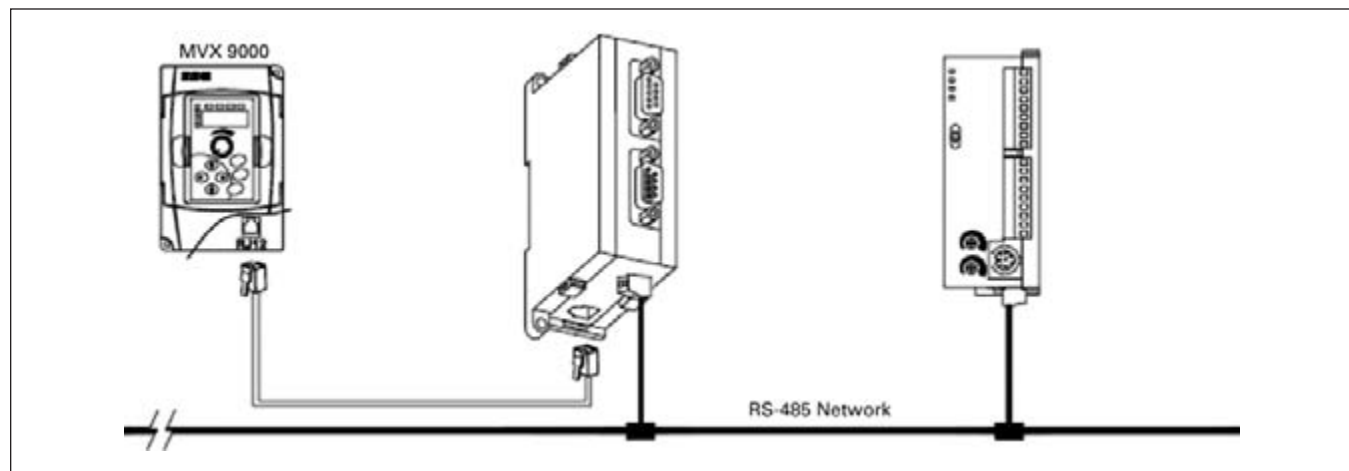

Figure 50-3. RS-485 Network

Style 1   Style 2   Style 3   Style 4   Style 5   Style 6 — with ELC-ACCOVER   Style 7
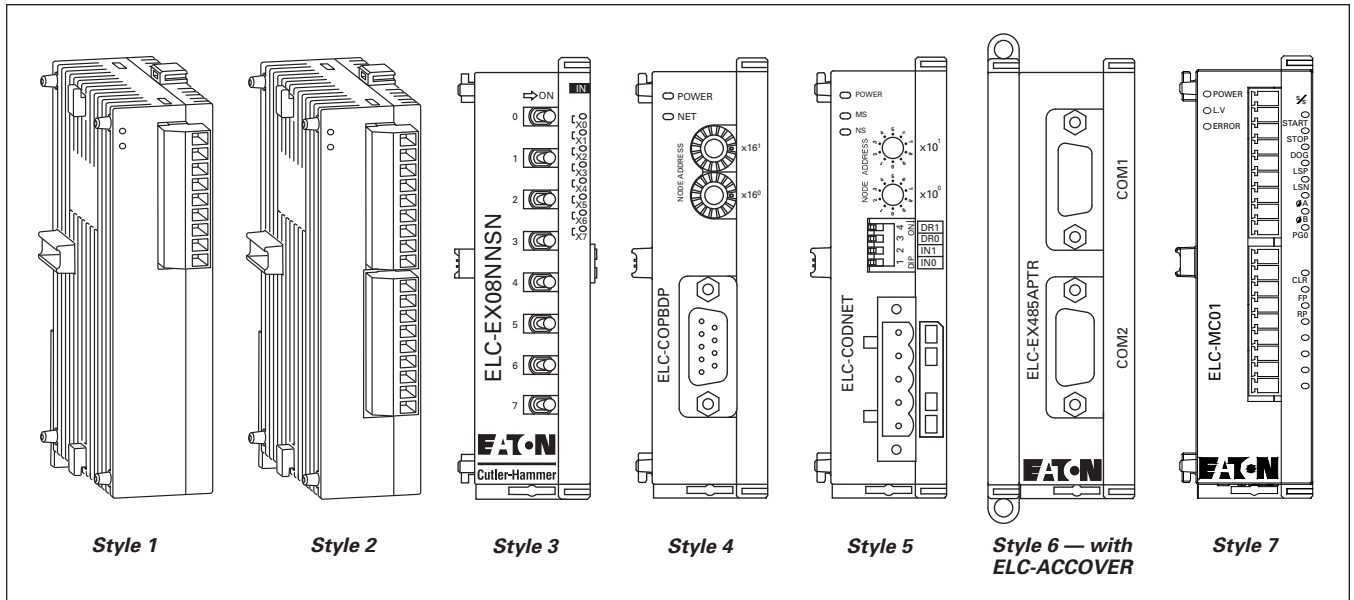
Figure 50-4. ELC Right Side Analog and Specialty Modules

Table 50-4. ELC Right Side Analog and Specialty Module Features

Model	Power	Style	Inputs		Outputs	
			Points	Type	Points	Type
ELC-AN02NANN — Analog OUT	24V DC	1	0	—	2 (12 bits)	0~20 mA, 4~20 mA
ELC-AN04NANN — Analog OUT		2	0		4 (12 bits)	0V ~ +10V, 2V ~ +10V
ELC-AN06AANN — Analog Combo		2	4 (V = 12 bits, I = 11 bits)	±10V, ±20 mA	2 (12 bits)	0~20 mA, 0 ~ +10V
ELC-AN04ANNN — Analog IN		2	4 (V = 12 bits, I = 13 bits)	±10V, ±20 mA	0	—
ELC-PT04ANNN — PT100		2	4 (V = 14 bits, I = 14 bits)	PT100	0	
ELC-TC04ANNN — Thermocouple		2	4	Thermocouple	0	
ELC-EX08NNSN — Switch Input	24V DC	3	8	Switch	0	
ELC-COPBDP — PROFIBUS DP (Slave)	24V DC	4	32	Digital	32	Digital
ELC-CODNET — DeviceNet (Slave)	24V DC	5	32	Digital	32	Digital
ELC-485APTR — RS-485 Easy Connect	N/A	6	0	—	0	—
ELC-MC01 — Single Axis Motion Control	24V DC	7	N/A	Phase in, Start, Stop, etc.	N/A	Phase, Pulse, Direction

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CA08102001E

For more information visit: **www.eaton.com**

ELC Controllers / Modules

ELC Left Side Specialty Modules

Left side specialty modules connect to a high-speed bus located on the left of the PV controller. A single PV processor can support up to 8 left side specialty modules and in any combination desired. This is in addition to the right side analog, specialty and digital I/O modules.

■ **ELC-COENETM** – Ethernet communication module. Enables the PV controller to connect to ModbusTCP networks auto detecting 10/100MB connections. The Ethernet module enables the uploading and downloading of programs in addition to

program monitoring. Use ELCSoft to search for all the Ethernet modules attached to the network and manage them remotely. Share data in a peer-to-peer network to reduce long l/O wiring. Send emails for alerts and notifications. For example, advise personnel of alarm condition or send daily production yield summaries. Keep accurate time with the NTP (Network Time Protocol) feature which synchronizes your controller with an NTP server. The Ethernet module will automatically detect and use the type of patch or crossover cable attached. IP addresses may be filtered to manage module traffic in order to maximize communication performance.

■ **ELC-CODNETM** – DeviceNet master module maps up to 380 bytes of data directly into the PV controller for quick and easy access. Use Polled, Bit-Strobe and Change of State/Cyclic DeviceNet commands, or send explicit messages. Configuration of DeviceNet components in ELCSoft is easy with the drag-and-drop interface. Use the pre-populated EDS files within ELCSoft and add others to simplify the configuration.

Table 50-5. ELC Left Side Specialty Module Features

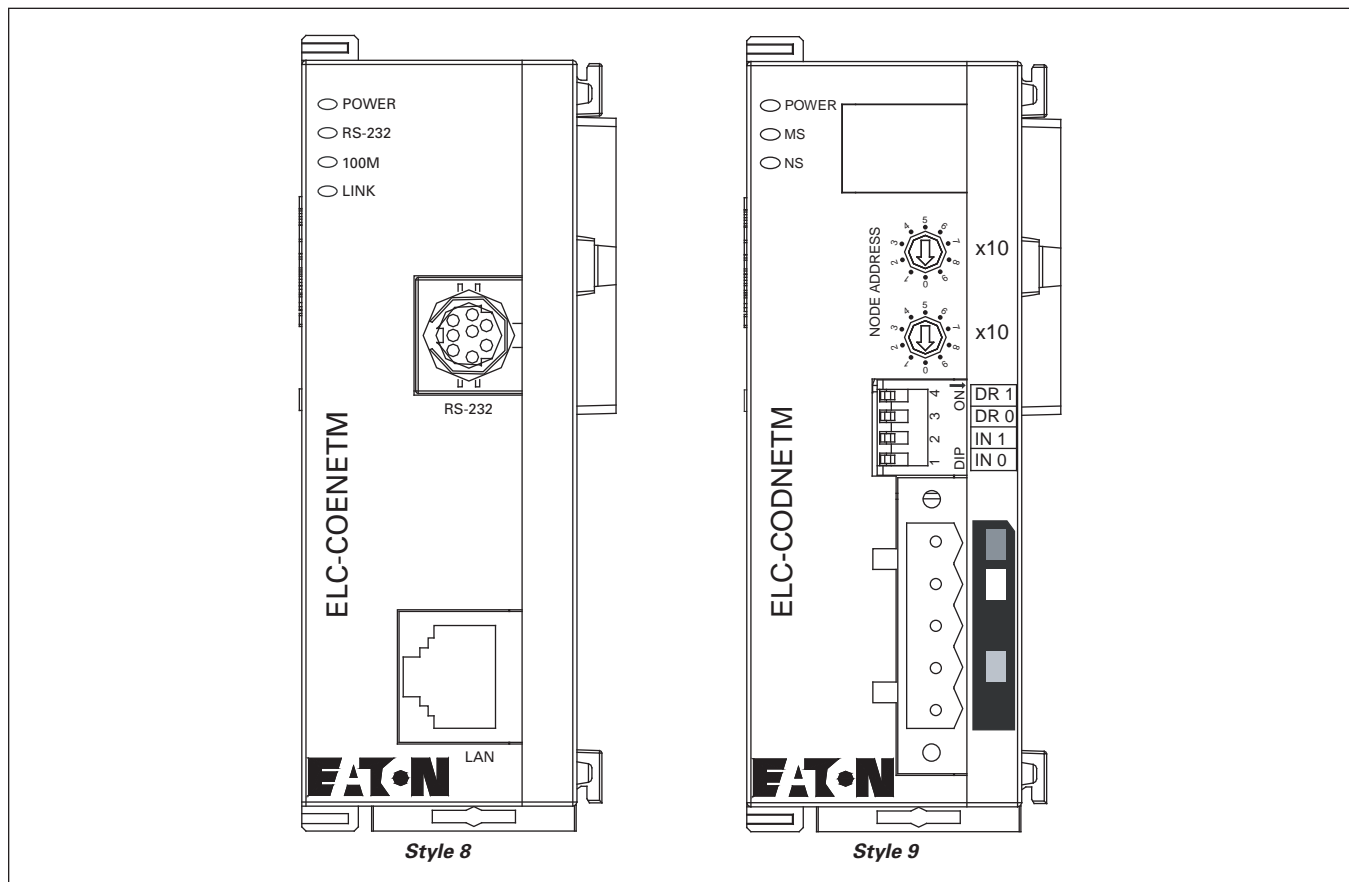| Model	Power	Style	Inputs		Outputs	
			Points	Type	Points	Type
ELC-COENETM — Ethernet Modbus TCP (Master/Slave)	N/A	8	N/A	ModbusTCP	N/A	ModbusTCP
ELC-CODNETM — DeviceNet Scanner (Master/Slave)	N/A	9	190 bytes	DeviceNet	190 bytes	DeviceNet

Style 8 *Style 9*

Figure 50-5. ELC Left Side Specialty Modules

ELC Power Supplies

All ELC controllers, analog and specialty expansion modules operate from 24V DC. These power supplies provide a convenient way to provide robust DC voltage for ELC and other products.
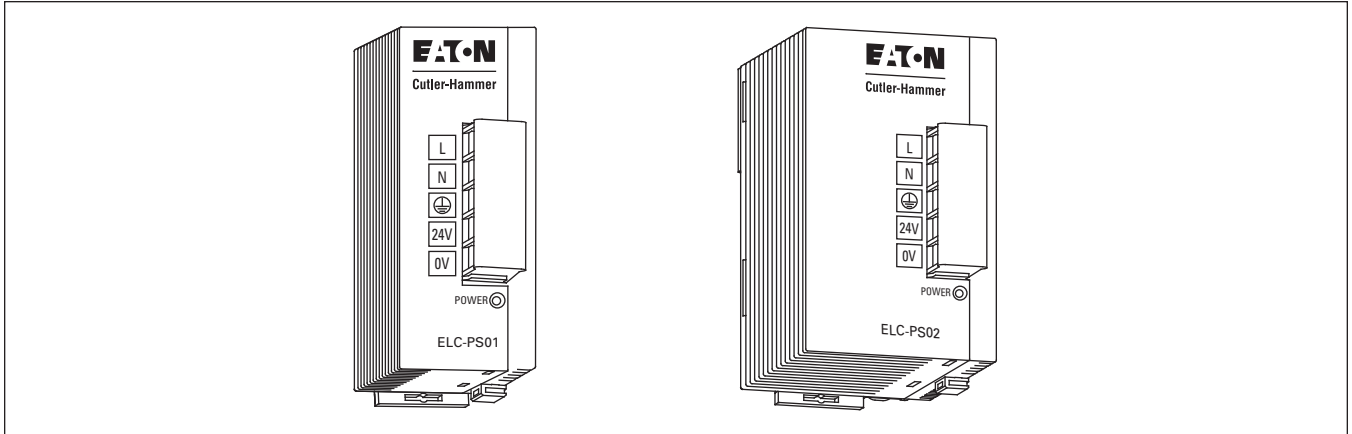

Figure 50-6. ELC Power Supplies

Table 50-6. ELC Power Supply Specifications

Item	ELC-PS01	ELC-PS02
Dimensions W x H x D in Inches (mm)	1.44 x 3.54 x 2.36 (36.5 x 90 x 60)	2.17 x 3.54 x 2.36 (55 x 90 x 60)
Input Power	100 – 240V AC 50/60 Hz	
Output Volts	24V DC	
Output Current (A)	1A	2A
Watts	24	48

ELC Accessories

ELC Storage Devices

ELC-ACPGMXFR

The ELC-ACPGMXFR module is a multifunction device that provides the ability to back up an application already loaded onto one of the ELC controllers. The transfer module can be used for copying the same application to multiple controllers and to transfer an existing application to a new controller in the event of a failure. It will store system settings, passwords and the application including the data registers for pre-loaded recipes. Once stored in the module, the application, data registers and settings can be transferred to another ELC controller of the same model number.

ELC Cables

ELC-CBPCELC1 and ELC-CBPCELC3

Use these cables to download, upload, and monitor ELC controllers or to connect any ELC-GPxx to an ELC controller. The ELC-CBPCELC1cable is 1 meter long and has a right connector to the ELC controller to help reduce depth when cable is attached. The ELC-CBPCELC3 is 3 meters long with a straight connector.

ELC-HHP Hand-Held Programmer

ELC-HHP

ELC-HHP is an easy-to-use, hand-held programming and monitoring tool for ELC controllers when a PC is not available. With ELC-HHP, applications can be programmed directly with the attached keypad. Applications can also be uploaded from an ELC, saved and transferred to a different ELC, or downloaded from a PC and transferred to other ELCs. External power is not required when using the hand-held programmer because it draws its power from either the ELC or the PC through the attached cable.

ELC-ACCOVER Plate Mount

Use the ELC-ACCOVER surface mount stand-alone modules instead of mounting to a DIN-rail. This may be used to mount analog, temperature or the RS-485 adapters remotely.

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ELC Programming Software

ELCSoft programming software configures all ELC controllers. With ELCSoft, applications can be created, edited and monitored. Move programs from one controller to another with ease. Program in ladder, sequential function chart, or instruction language. ELCSoft is the single program to develop ELC controller applications. ELCSoft is also used to configure the DeviceNet master and Modbus TCP Ethernet modules.

Requirements

- Operating Systems – Windows 2000, Windows XP and Windows Vista.
- Hard Drive – at least 100 M bytes.
- RAM – at least 512 M bytes.
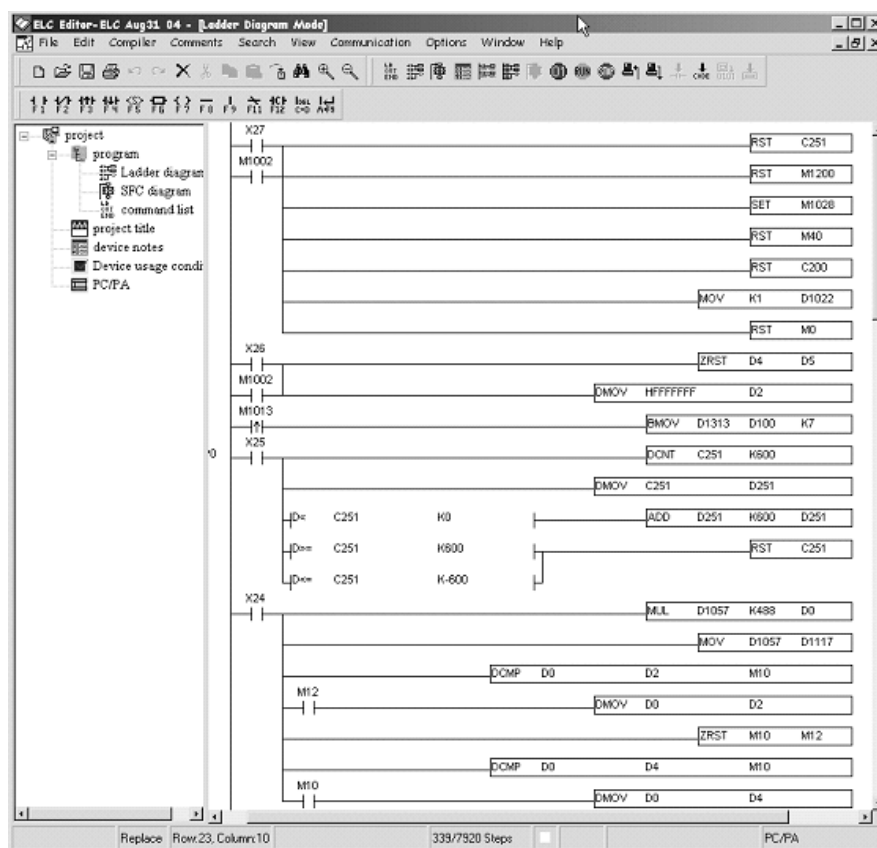
ELCSoft Ladder Diagram Mode

ELCSoft Editor

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February 2009
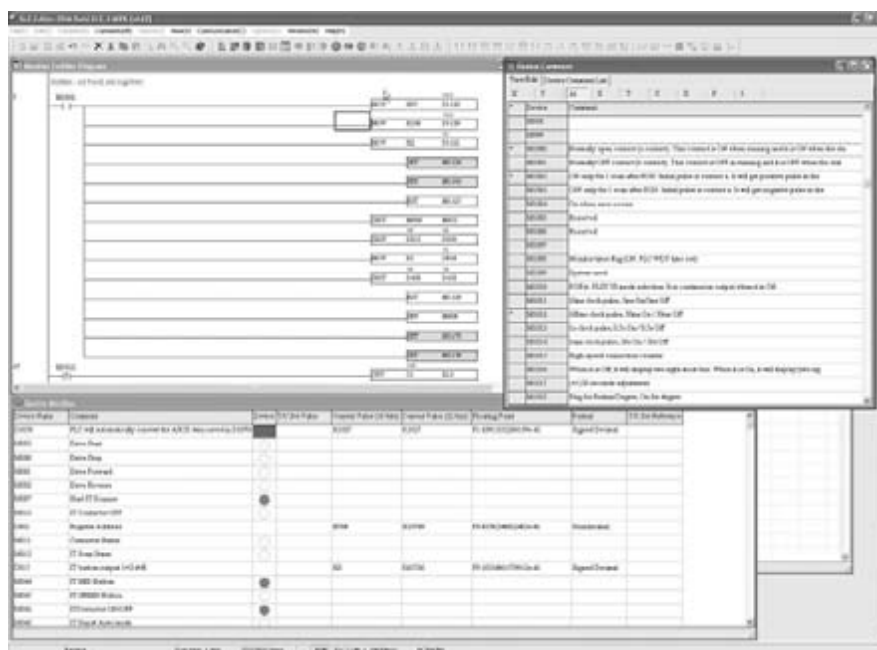
Product Selection

Table 50-7. ELC Controllers (PB, PC, PA, PH, PV)

Description	Inputs			Outputs			Max. Current Consumption (at 24V DC)	Catalog Number	Price U.S. $
	AC	DC	Analog	Relay	Transistor	Analog			
14 I/O PB Series	—	8	—	6	—	—	150 mA	**ELC-PB14NNDR**	
14 I/O PB Series	—	8	—	—	6	—	150 mA	**ELC-PB14NNDT**	
12 I/O PC Series	8	—	—	4	—	—	150 mA	**ELC-PC12NNAR**	
12 I/O PC Series	—	8	—	4	—	—	150 mA	**ELC-PC12NNDR**	
12 I/O PC Series	—	8	—	—	4	—	150 mA	**ELC-PC12NNDT**	
10 I/O PA Series	—	4	2	2	—	2	210 mA	**ELC-PA10AADR**	
10 I/O PA Series	—	4	2	—	2	2	210 mA	**ELC-PA10AADT**	
12 I/O PH Series	—	8	—	—	4	—	170 mA	**ELC-PH12NNDT**	
28 I/O PV Series	—	16	—	12	—	—	220 mA	**ELC-PV28NNDR**	
28 I/O PV Series	—	16	—	—	12	—	220 mA	**ELC-PV28NNDT**	

Table 50-8. Right Side Digital Expansion Modules

Description	Inputs		Outputs		Max. Current Consumption (at 24V DC)	Catalog Number	Price U.S. $
	AC	DC	Relay	Transistor			
6 Relay Out (6 Amp)	—	—	6	—	70 mA	**ELC-EX06NNNI**	
8 AC In	8	—	—	—	50 mA	**ELC-EX08NNAN**	
8 DC In	—	8	—	—	50 mA	**ELC-EX08NNDN**	
8 Relay Out	—	—	8	—	70 mA	**ELC-EX08NNNR**	
8 Transistor Out	—	—	—	8	70 mA	**ELC-EX08NNNT**	
8 In/Out Combo	—	4	4	—	70 mA	**ELC-EX08NNDR**	
8 In/Out Combo	—	4	—	4	70 mA	**ELC-EX08NNDT**	
16 In/Out Combo	—	8	8	—	90 mA	**ELC-EX16NNDR**	
16 In/Out Combo	—	8	—	8	90 mA	**ELC-EX16NNDT**	
8 Switch Input	—	8	—	—	20 mA	**ELC-EX08NNSN**	

Table 50-9. Right Side Analog and Specialty Modules

Description	Analog In	Analog Out	Max. Current Consumption (at 24V DC)	Catalog Number	Price U.S. $
4 Analog In	4		90 mA	**ELC-AN04ANNN**	
2 Analog Out		2	125 mA	**ELC-AN02NANN**	
4 Analog Out		4	170 mA	**ELC-AN04NANN**	
6 Analog In/Out	4	2	90 mA	**ELC-AN06AANN**	
4 Thermocouple J, K, R, S, T	4		90 mA	**ELC-TC04ANNN**	
4 Platinum RTD, PT100	4		90 mA	**ELC-PT04ANNN**	

Table 50-10. Right Side Specialty Expansion Modules

Description	Catalog Number	Price U.S. $
PROFIBUS DP (Slave)	**ELC-COPBDP**	
DeviceNet (Slave)	**ELC-CODNET**	
RS-485 Easy Connect Adapter, DB9, RJ-12, 2-Pin Connections to RS-485	**ELC-485APTR**	
Motion Control, 1 Axis Module (Up to 8 Modules per Controller)	**ELC-MC01**	

Table 50-11. Left Side Specialty Expansion Modules (Require a PV Series Controller)

Description	Catalog Number	Price U.S. $
Ethernet ModbusTCP (Master/Slave)	**ELC-COENETM**	
DeviceNet Scanner (Master/Slave)	**ELC-CODNETM**	

Table 50-12. ELC Software and Accessories

Description	Catalog Number	Price U.S. $
Programming Software for ELC Controllers	**ELCSOFT**	
24 Watt, 1 Amp Power Supply	**ELC-PS01**	
48 Watt, 2 Amp Power Supply	**ELC-PS02**	
Hand-Held Programmer (Includes interface cables)	**ELC-HHP**	
Cable to Connect a PC or an ELC-GP unit to ELC, 3 meters (DB9 pin female to 8 pin DIN)	**ELC-CBPCELC3**	
Cable to Connect a PC or an ELC-GP unit to ELC, 1 meter with right angle connecter (DB9 pin female to 8 pin DIN)	**ELC-CBPCELC1**	
Program transfer module for ELC controllers	**ELC-ACPGMXFR**	
Plate mount for specialty modules, qty. 10	**ELC-ACCOVER**	
ELC Starter Kit (Includes ELC-PA10AADT, ELC-PS01, ELC-GP04, ELC-CBPCELC3, ELC-CBPCGP3, ELCSoft, ELCSoftGP)	**ELCSTARTKIT1**	

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Discount Symbol **2CD-5**

Standards and Certifications

Table 50-13. Approvals/Certifications

Description	Specification
Electrical/EMC	
ESD Immunity	8 kV air discharge
EFT Immunity	Power Line: 2 kV; Digital I/O: 1 kV; Analog & Communication I/O: 250V
Damped-Oscillatory Wave	Power Line: 1 kV; Digital I/O: 1 kV
RS Immunity	26 MHz – 1 GHz, 10 V/m
Other Approvals	
Agency Certifications	CE; C-Tick; cULus; Class I Div 2 Group A, B, C, D (pending on PV controllers and left side specialty modules)

Technical Data and Specifications

Table 50-14. Environmental Ratings

Description	Specification
Transportation & Storage	
Temperature	-13° – 158°F (-25° – 70°C)
Humidity	5 – 95%
Operating	
Temperature	32° – 131°F (0° – 55°C)
Humidity	50 – 95%
Power Supply Voltage	ELC: 24V DC (-15% – 20%) (With DC input reverse polarity protection), Expansion Unit: supplied by the ELC
Power Consumption	3 – 6W
Insulation Resistance	> 5 MΩ at 500V DC (Between all inputs/outputs and earth)
Grounding	The diameter of grounding wire cannot be smaller than the wire diameter of terminals L and N (All ELC units should be grounded directly to the ground pole).
Vibration / Shock Resistance	Standard: IEC1131-2, IEC 68-2-6 (TEST Fc) / IEC1131-2 & IEC 68-2-27 (TEST Ea)

Table 50-15. DC Input Point Electrical Specifications

Description	Specification
Input Type	DC (SINK or SOURCE)
Input Current	24V DC 5 mA
Active Level	OFF ➔ ON, above 16V DC
	ON ➔ OFF, below 14.4V DC
Response Time	About 10 mS (An adjustment range of 0 – 10,000 mS could be selected through D1020 and D1021)

Table 50-16. Output Point Electrical Specifications

Output Type	Relay – R		Transistor – T
Current Specification	1.5A/1 point (5A/COM)		0.3A/1 point @ 40°C; When the output of Y0 and Y1 is high-speed pulse, Y0 and Y1 = 30 mA
Voltage Specification	Below 250V AC, 30V DC		30V DC
Maximum Loading	75 VA (Inductive)	9W/1 point	When the output of Y0 and Y1 is high-speed pulse, Y0 and Y1 = 0.9W (Y0 = 32 kHz, Y1 = 10kHz), Y0 can be 50 kHz using D registers.
	90W (Resistive)		
Response Time	Adjustable 0 – 15 ms, default is 10 ms	OFF ➔ ON 20 μs ON ➔ OFF 30 μs	Y0 and Y1 are specified points for high-speed pulse
Output Circuit Diagram			

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**PLC, I/O & Communications Products
ELC Programmable Logic Controllers**

50-13

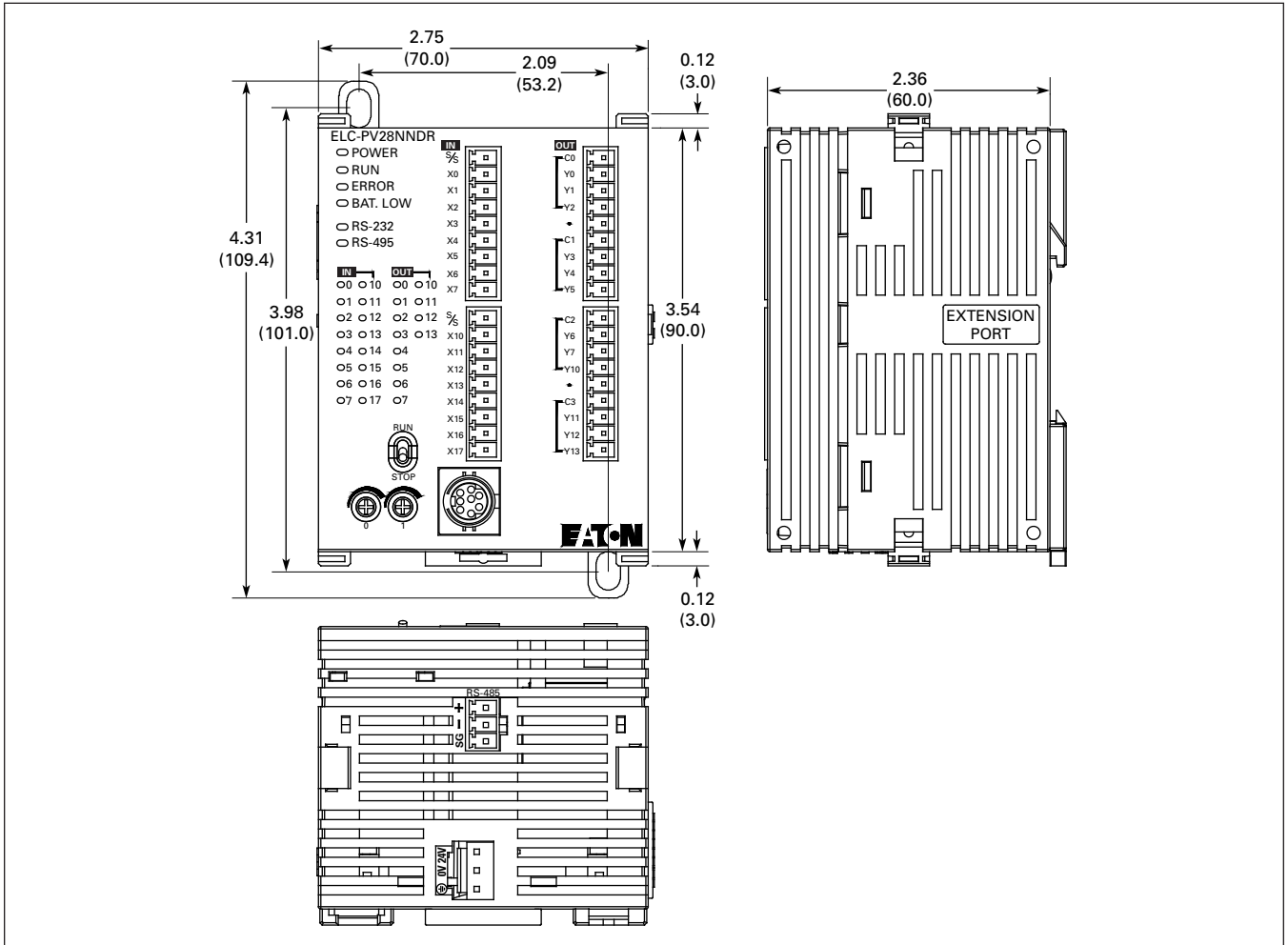February 2009

ELC Controllers/Modules

Dimensions

Figure 50-7. ELC-PV Controller — Approximate Dimensions in Inches (mm)
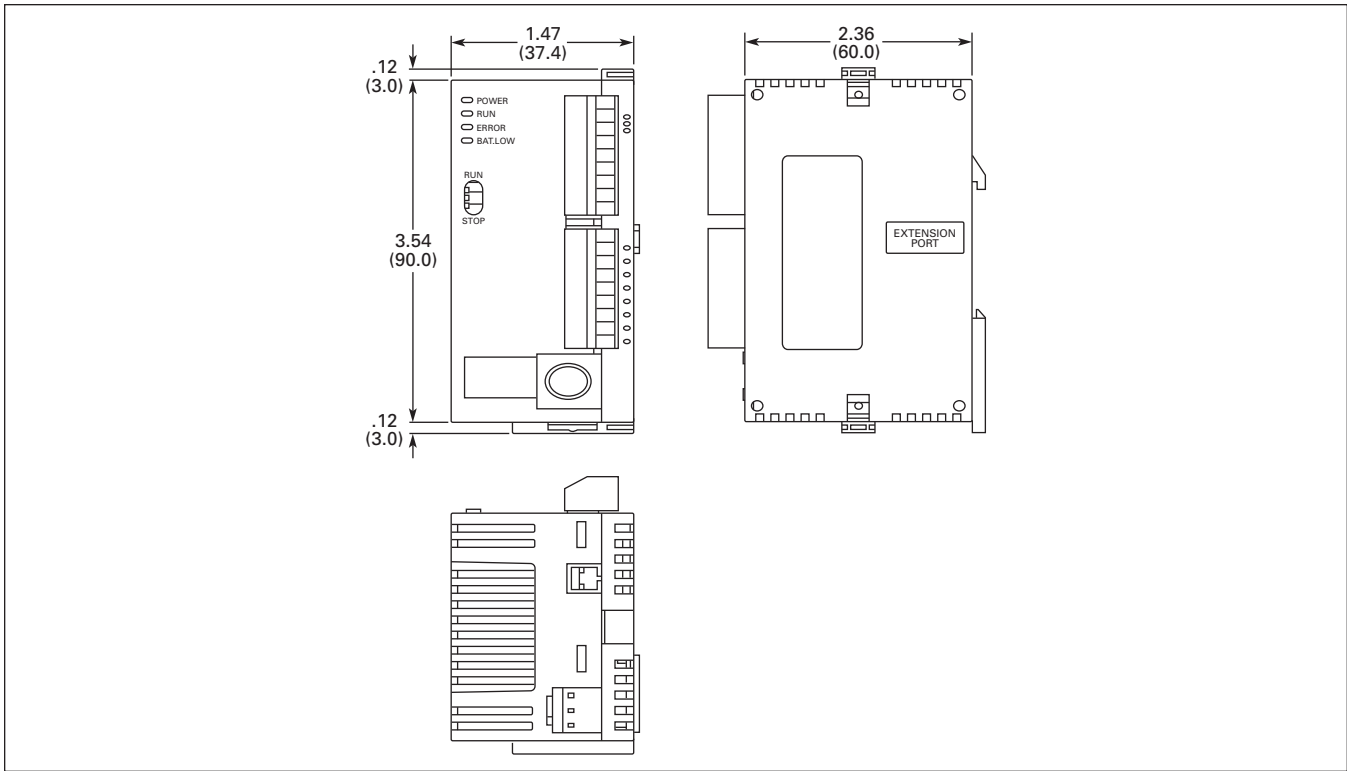
ELC Controllers/Modules

Figure 50-8. ELC-PA10, ELC-PC12 and ELC-PH12 Controllers — Approximate Dimensions in Inches (mm)
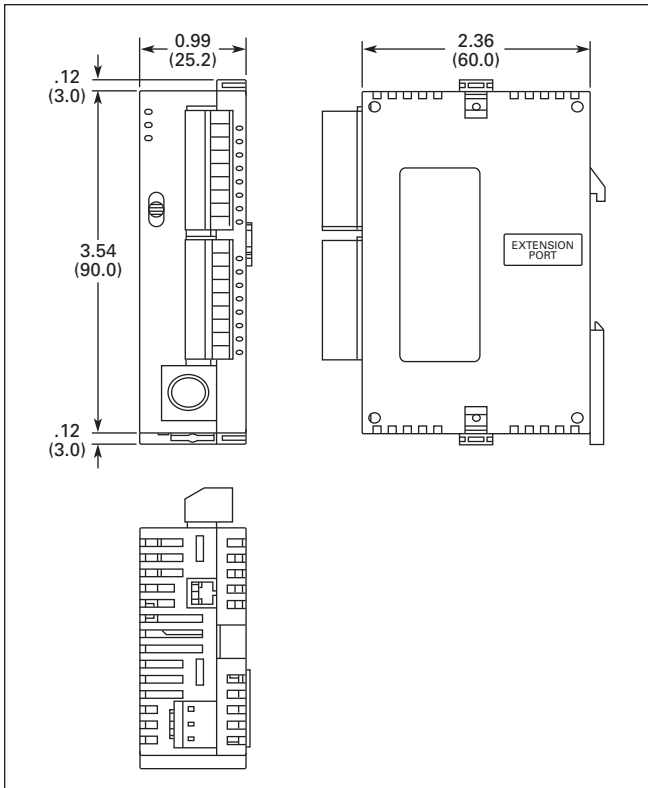
50

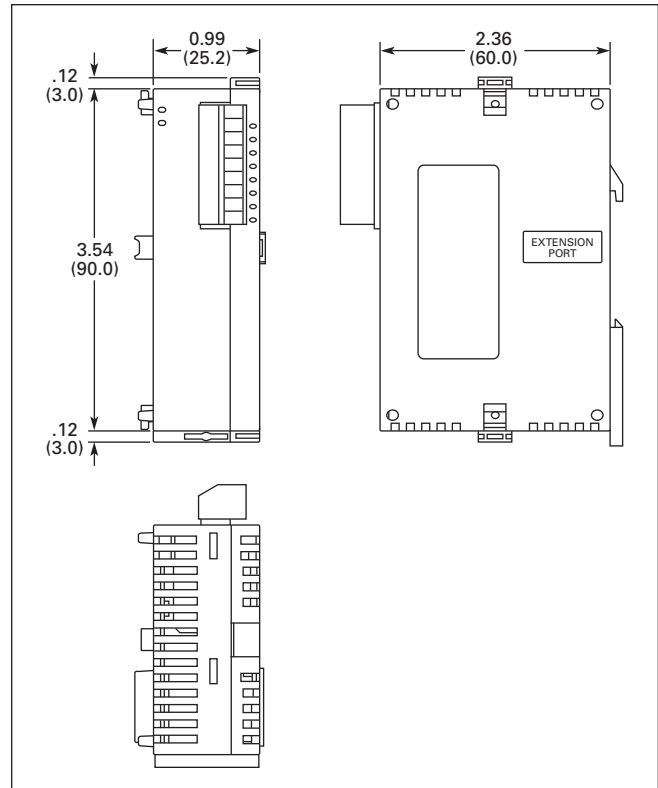Figure 50-9. ELC-PB14 Controllers — Approximate Dimensions in Inches (mm)

Figure 50-10. ELC Right Side Specialty and Expansion Modules — Approximate Dimensions in Inches (mm)
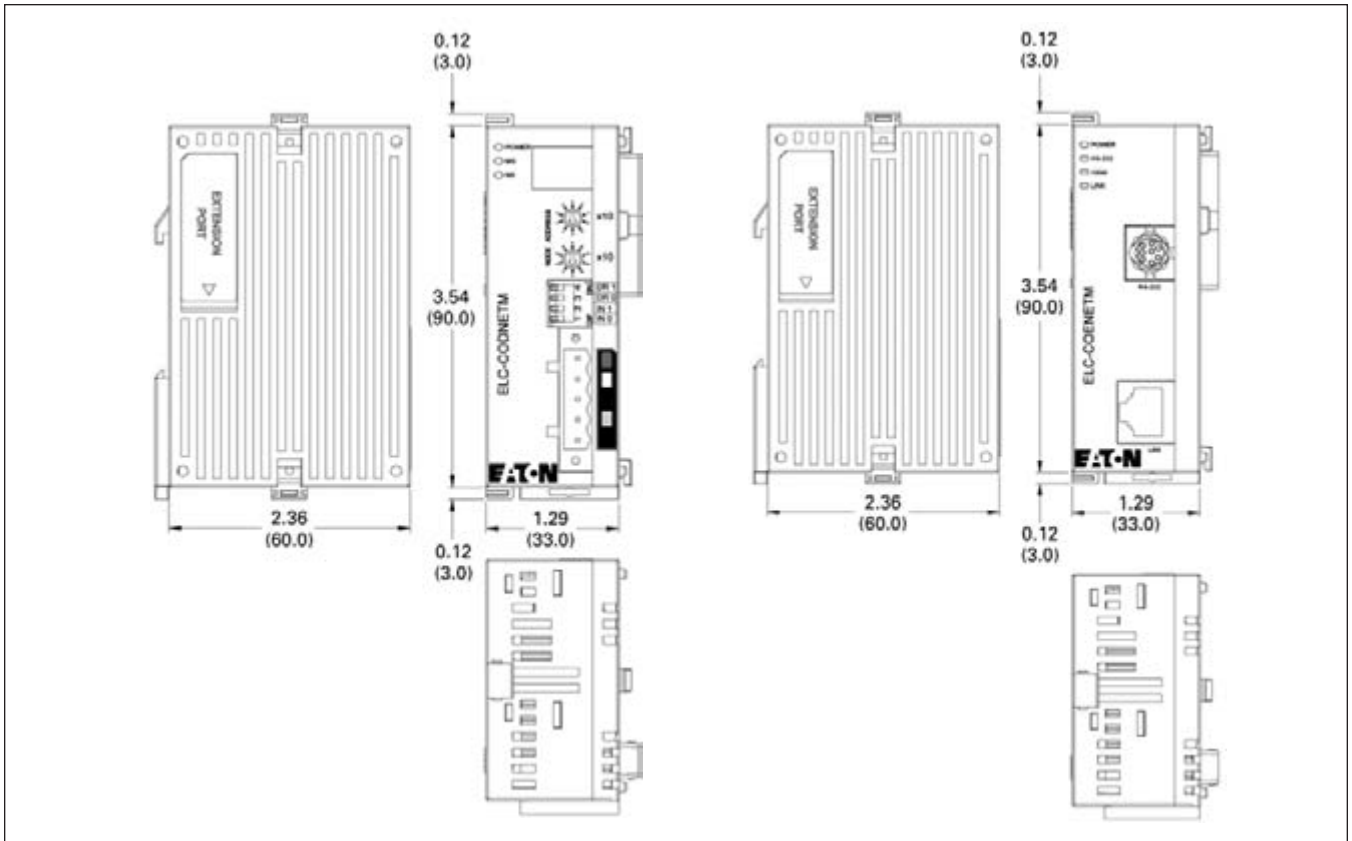
Figure 50-11. ELC Left Side Communications Modules ELC-CODNETM and ELC-COENETM — Approximate Dimensions in Inches (mm)

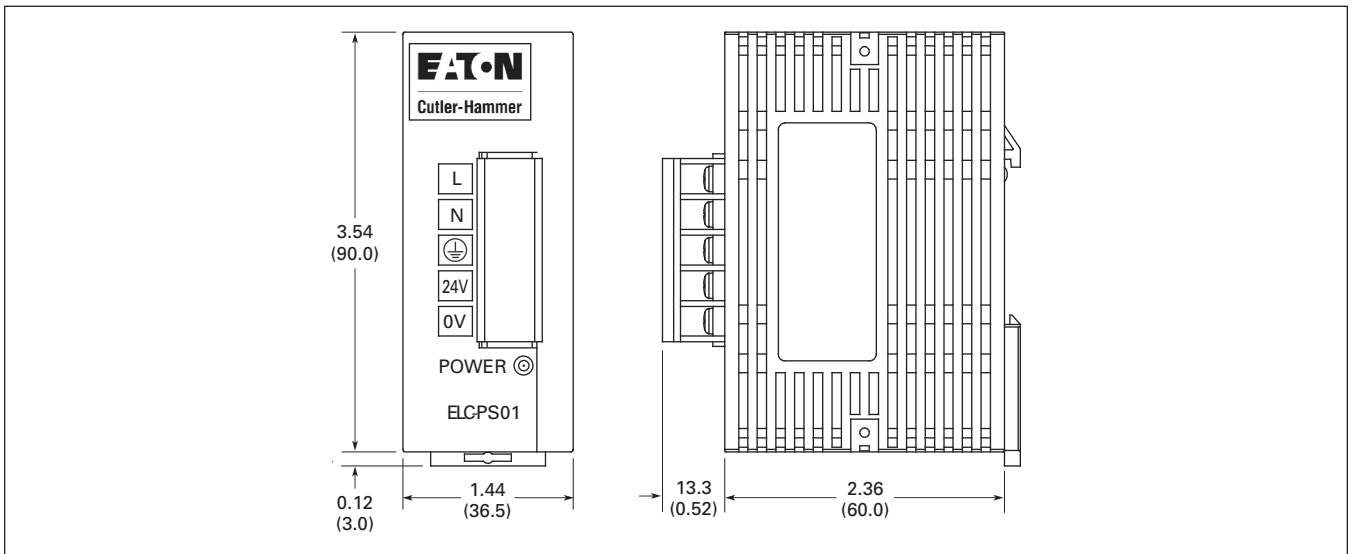**Figure 50-12. ELC-PS01 Power Supply — Approximate Dimensions in Inches (mm)**

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CA08102001E

For more information visit: **www.eaton.com**
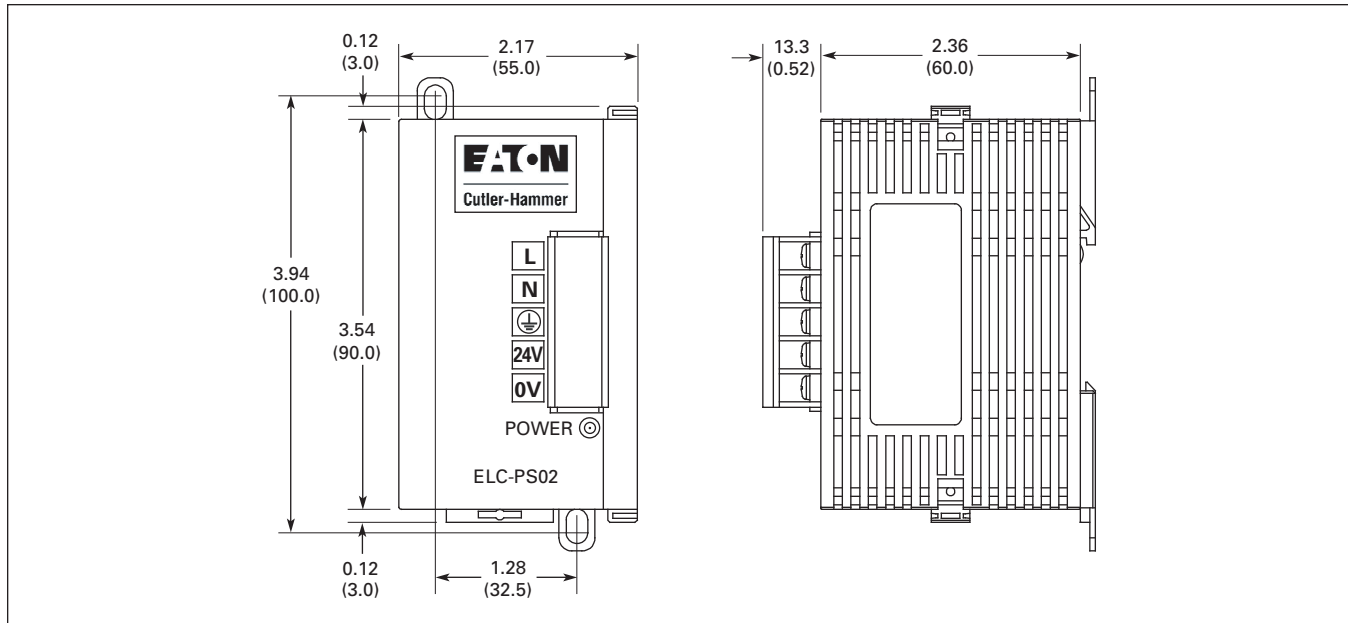
ELC Controllers/Modules

Figure 50-13. ELC-PS02 Power Supply — Approximate Dimensions in Inches (mm)
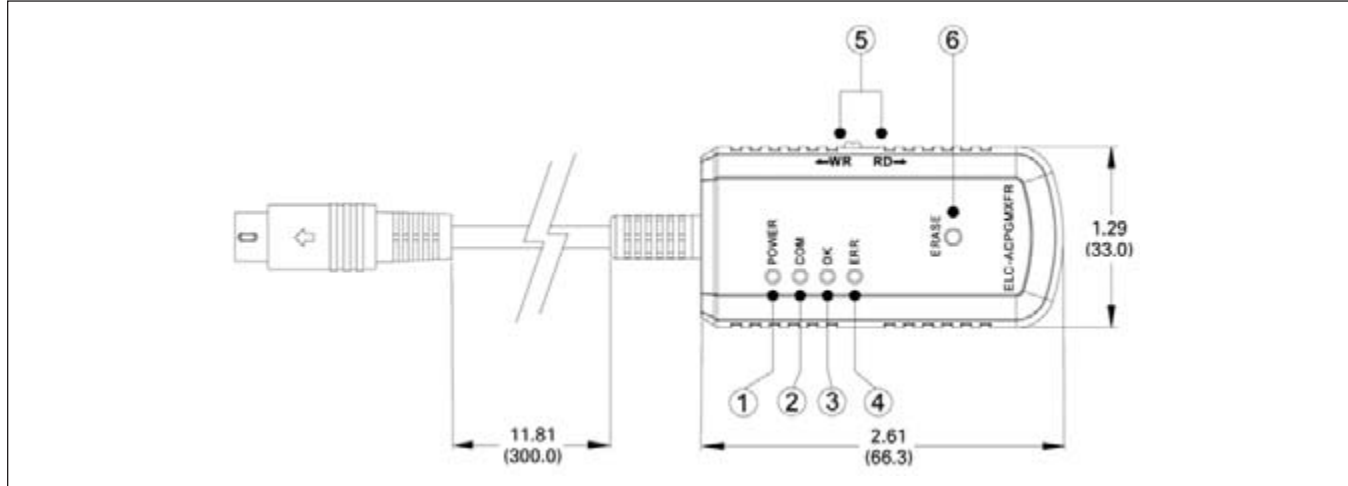
Figure 50-14. ELC-ACPGMXFER Storage Device — Approximate Dimensions in Inches (mm)

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February 2009
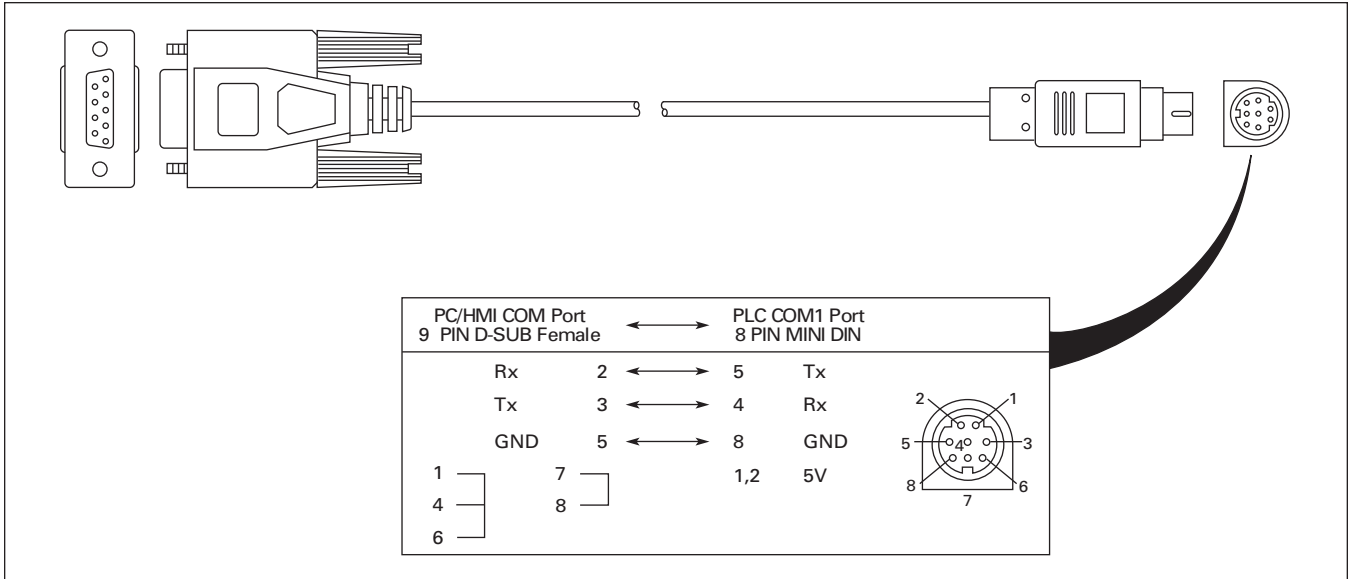
Figure 50-15. ELC-CBPCELC1 Cable (Right Angle Connector not Shown) and ELC-CBPCELC3 Cable (Straight Connector as Shown)

PC/HMI COM Port		PLC COM1 Port	
9 PIN D-SUB Female		8 PIN MINI DIN	
Rx	2	5	Tx
Tx	3	4	Rx
GND	5	8	GND
1	7	1,2	5V
4	8		
6			
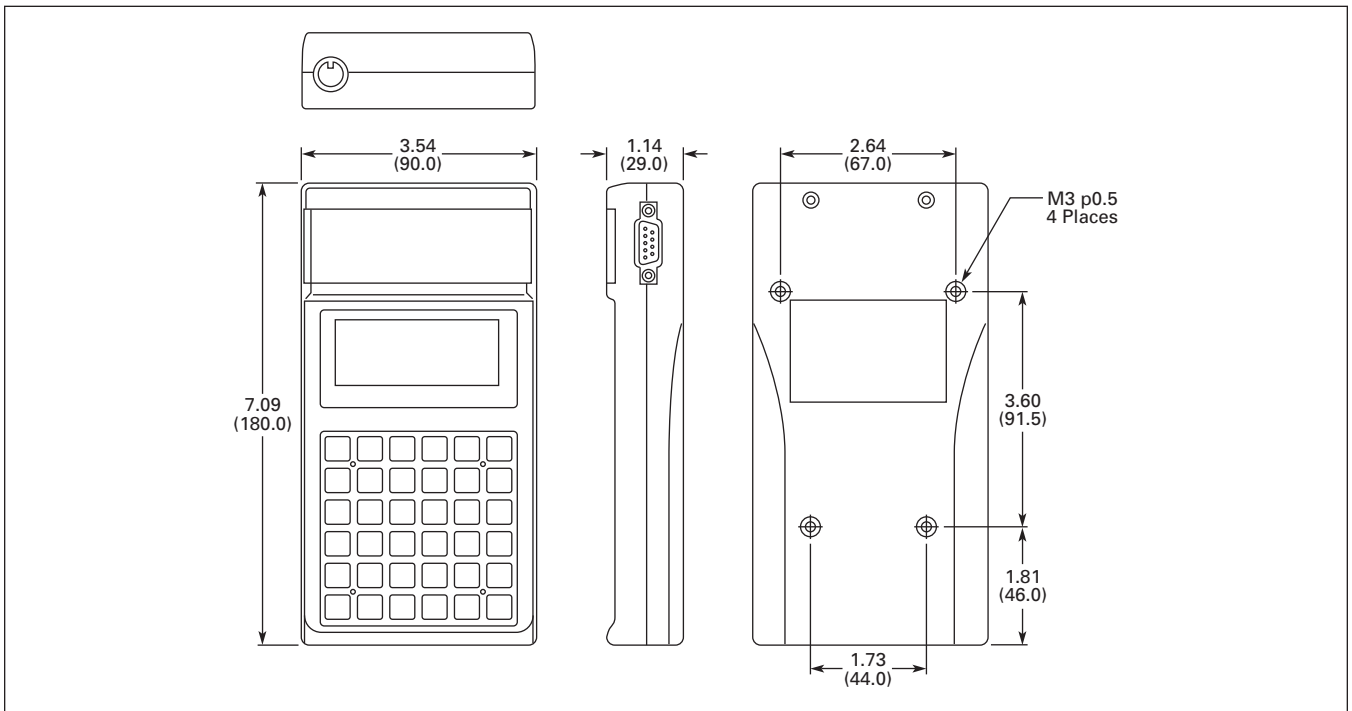
Figure 50-16. ELC-HHP Hand Held Programmer — Approximate Dimensions in Inches (mm)

3.54 (90.0)
1.14 (29.0)
2.64 (67.0)
M3 p0.5 4 Places
7.09 (180.0)
3.60 (91.5)
1.81 (46.0)
1.73 (44.0)

ELC Controllers/Modules

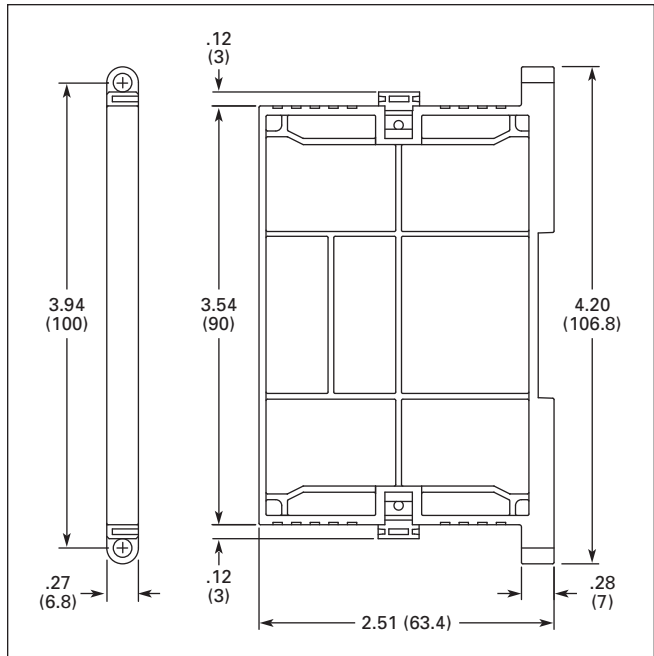**Figure 50-17. ELC-ACCOVER Plate Mount for Specialty Modules —
Approximate Dimensions in Inches (mm)**

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DeviceNet Starter Network Adapter Product (DSNAP)

Catalog Number D77B-DSNAP-X3 with 54 mm IT. Starter

Product Description

The Cutler-Hammer® DeviceNet Starter Network Adapter Product (DSNAP) from Eaton's electrical business is a front-mount device that serves as a single node on DeviceNet, providing communication capability, control and monitoring to Intelligent Technologies (*IT.*) Electromechanical Starters, as well as the S751 and S752 Soft Start, as listed in **Tables 50-17 – 50-19**.

The *IT.* DSNAP has an optional HANDS/OFF/AUTO (HOA) module that enables the starter to be operated in hand mode; even if the DSNAP is not powered. The HOA option is used for customers who need the extra security of manual control in conjunction with the communication capabilities of DeviceNet.

With the addition of a D64 zero sequence CT, the DSNAP can be enabled to detect ground faults for added protection.

Features

- Communication to DeviceNet consuming one DeviceNet MAC ID.
- Manually set MAC ID and baud rate; configuration using a software application is not required for normal operation.
- Advanced configuration using CH Studio.
- Includes pre-wired starter interconnect cable and terminal adapter.

Comprehensive Motor Data and Control

- RMS average current.
- % of operating FLA.
- % thermal memory.
- Integral contact position detection.
- Operating status and fault codes.
- At speed (soft starters).
- START/STOP control.
- RUN/FORWARD-REVERSE control.
- Trip reset.

Extended Starter Capabilities

- Ground fault detection (with accessory).
- Fault log.
- Overcurrent warning (adjustable).
- Undercurrent warning (adjustable).

Table 50-17. IEC SNAP Connectivity

IEC E101, E501		
Frame	Size	Continuous Ampacity Rating
45 mm	B	18 Amp
		25 Amp
		32 Amp
54 mm	C	40 Amp
		50 Amp
76 mm	D	65 Amp
		85 Amp
		100 Amp
105 mm	E	125 Amp
		160 Amp
		200 Amp
140 mm	F	250 Amp
		315 Amp
		420 Amp

Table 50-18. NEMA SNAP Connectivity

NEMA N101, N501	
Size	Continuous Ampacity Rating
00	9
0	18
1	27
2	45
3	90
4	135
5	270

Table 50-19. S751/S752 SNAP Connectivity

S751/S752 Soft Start	
54 mm	All Sizes

50
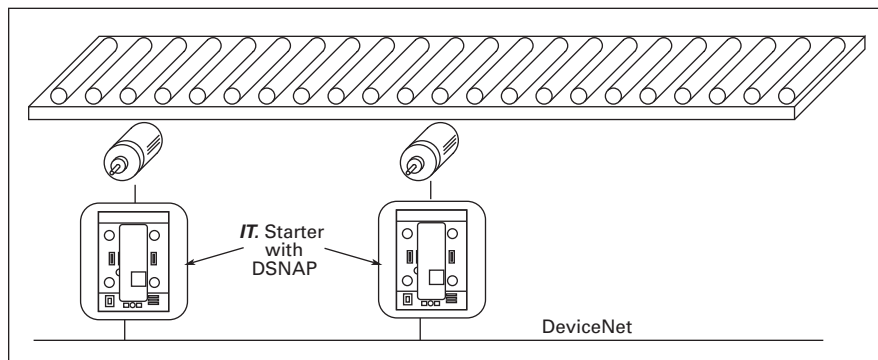
Figure 50-18. Typical DSNAP Application

Application Description

In a typical application, the DSNAP front mounts to an *IT.* starter or soft start. The DSNAP connects directly to DeviceNet, allowing for control and monitoring of the starter/soft start. A PC or PLC serves as the central control and scans the DSNAP for motor control and monitoring information. The HOA module provides for the ability to locate operators on the panel for manual operation.

Starter Network Adapters (SNAP) (D77B Series) — DeviceNet SNAP

Standards and Certifications

Approvals

Table 50-20. Approvals/Certifications

Description	Specification
Electrical/EMC	
ESD Immunity (IEC 61000-4-2)	± 8 kV air, ± 4 kV contact
Radiated Immunity (IEC 61000-4-3)	10V/m 80 – 1,000 MHz, 80% amplitude modulation @ 1 kHz
Fast Transient (IEC 61000-4-4)	± 2 kV supply and control, ± 1 kV communications
Surge (IEC 61000-4-5)	± 1 kV line-to-ground, ± 2 kV line-to-line
RF Conducted (IEC 61000-4-6)	10V, .15 – 80 MHz
Magnetic Field (IEC 61000-4-8)	30A/m, 50 Hz
Voltage Dips (IEC 61000-4-11)	30% dip @ 10 mS, 60% dip @ 100 mS, >95% interrupt @ 5 mS
Other Approvals	
Ingress Protection Code (IEC 60947-1)	IP20
Radiated and Conducted Emissions	EN 5011 Class A
Agency Certifications	UL 508, CUL (CSA C22.2 No. 14), CE (Low Voltage Directive), ODVA Conformance Tested

Technical Data and Specifications

Table 50-21. DeviceNet Specifications

DeviceNet Connections	Group 2 Slave Polling Explicit No UCMM
DeviceNet Baud Rate	125K, 250K, 500K

Table 50-22. Environmental Ratings

| Description	Specifications
Transportation/Storage	
Temperature	-58° to 176°F (-50° to 80°C)
Humidity	5 – 95% non-condensing
Operating	
Temperature	-4° to 131°F (-20° to 55°C)
Humidity	5 – 95% non-condensing
Altitude	Above 2000 meters (6600 feet) consult factory
Pollution Degree	2
Power Draw	90 mA Steady State
Shock (IEC 68-2-27)	15G any direction for 11 mS
Vibration (IEC 68-2-6)	5 – 150 Hz, 5G, .7 mm max. peak-to-peak
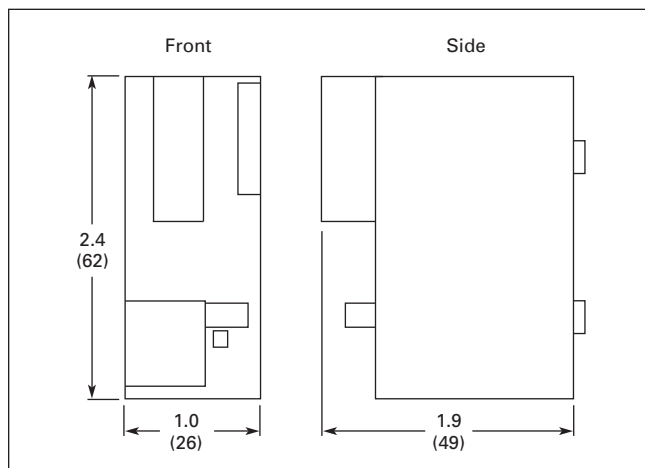
Dimensions

Figure 50-19. DSNAP — Approximate Dimensions in Inches (mm)

Product Selection

Table 50-23. Product Selection

Description	Catalog Number	Price U.S. $
DSNAP Kit for FVNR Starters	D77B-DSNAP-X1	
DSNAP Kit for FVR Starters	D77B-DSNAP-X2	
DSNAP Kit for FVNR Starters with HOA	D77B-DSNAP-X3	
DSNAP Kit for FVR Starters with HOA	D77B-DSNAP-X4	
DSNAP Adapter for Size 5 and Size F Frame Starters	D77B-140A	
SNAP Auxiliary Connector	D77B-AC1	

Note: For D64 zero sequence CTs refer to **Tab 49**.

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Discount Symbol **1CD1**

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PLC, I/O & Communications Products
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50-21

Starter Network Adapters (SNAP) (D77B Series) — QCPort SNAP

QCPort Starter Network Adapter Product (QSNAP)

Catalog Number D77B-QSNAP-X1 with 54 mm IT. Starter

Product Description

The Cutler-Hammer QCPort Starter Network Adapter Product (QSNAP) from Eaton's electrical business is a front-mount device providing communication capability, control and monitoring to Intelligent Technologies (***IT.***) Electromechanical Starters, as well as the S751 and S752 Soft Start, as listed in **Tables 50-24** – **50-26**. The QSNAP allows connection to any communications adapter and provides access to any support network.

The ***IT.*** QSNAP has an optional HANDS/OFF/AUTO (HOA) module that enables the starter to be operated in hand mode; even if the QSNAP is not powered. The HOA option is used for customers who need the extra security of manual control in conjunction with industrial network communication capabilities.

With the addition of a D64 zero sequence CT, the QSNAP can be enabled to detect ground faults for added protection.

Features

- Configuration using a software application is not required for normal operation.
- Advanced configuration using CH Studio.
- Includes pre-wired starter interconnect cable and terminal adapter

Comprehensive Motor Data and Control

- RMS average current.
- % of operating FLA.
- % thermal memory.
- Integral contact position detection.
- Operating status and fault codes.
- At speed (soft starters).
- START/STOP control.
- RUN/FORWARD-REVERSE control.
- Trip reset.

Extended Starter Capabilities

- Ground fault detection (with accessory).
- Fault log
- Overcurrent warning (adjustable).
- Undercurrent warning (adjustable).
- Emergency stop detection.

Table 50-24. IEC SNAP Connectivity

IEC E101, E501		
Frame	Size	Continuous Ampacity Rating
45 mm	B	18 Amp
		25 Amp
		32 Amp
54 mm	C	40 Amp
		50 Amp
76 mm	D	65 Amp
		85 Amp
		100 Amp
105 mm	E	125 Amp
		160 Amp
		200 Amp
140 mm	F	250 Amp
		315 Amp
		420 Amp

Table 50-25. NEMA SNAP Connectivity

NEMA N101, N501	
Size	Continuous Ampacity Rating
00	9
0	18
1	27
2	45
3	90
4	135
5	270

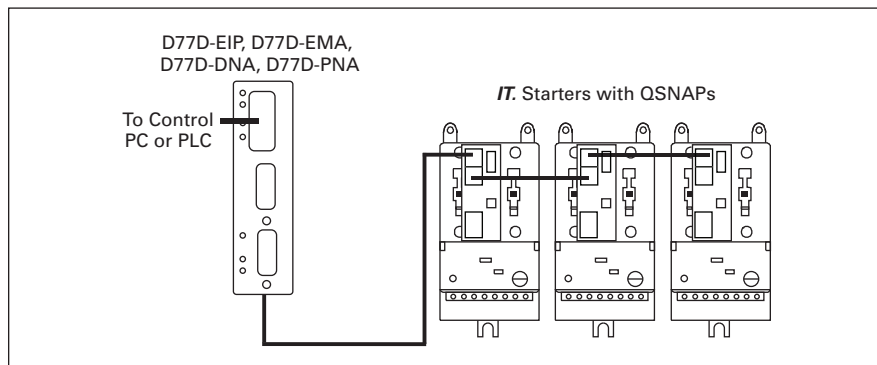**Table 50-26. S751/S752 SNAP Connectivity**

S751/S752 Soft Start	
54 mm	All Sizes

Application Description

A typical application may contain many QSNAPs connected to a single network adapter. With this architecture, an entire panel can be represented by a single network adapter.

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Figure 50-20. Typical QSNAP Application

D77D-EIP, D77D-EMA, D77D-DNA, D77D-PNA

To Control PC or PLC

IT. Starters with QSNAPs

Starter Network Adapters (SNAP) (D77B Series) — QCPort SNAP

Standards and Certifications

Approvals

Table 50-27. Approvals/Certifications

Description	Specification
Electrical/EMC	
ESD Immunity (IEC 61000-4-2)	± 8 kV air, ± 4 kV contact
Radiated Immunity (IEC 61000-4-3)	10V/m 80 – 1,000 MHz, 80% amplitude modulation @ 1 kHz
Fast Transient (IEC 61000-4-4)	± 2 kV supply and control, ± 1 kV communications
Surge (IEC 61000-4-5)	± 1 kV line-to-ground, ± 2 kV line-to-line
RF Conducted (IEC 61000-4-6)	10V, .15 – 80 MHz
Magnetic Field (IEC 61000-4-8)	30A/m, 50 Hz
Voltage Dips (IEC 61000-4-11)	30% dip @ 10 mS, 60% dip @ 100 mS, >95% interrupt @ 5 mS
Other Approvals	
Ingress Protection Code (IEC 60947-1)	IP20
Radiated and Conducted Emissions	EN 5011 Class A
Agency Certifications	UL 508, CUL (CSA C22.2 No. 14), CE (Low Voltage Directive), ODVA Conformance Tested

Technical Data and Specifications

Table 50-28. Environmental Ratings

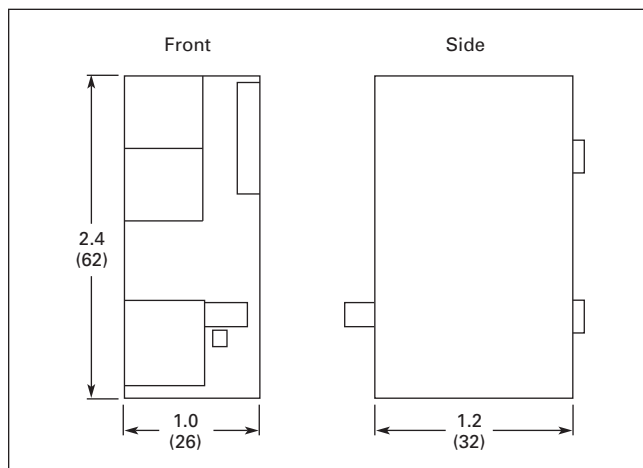| Description	Specifications
Transportation/Storage	
Temperature	-58° to 176°F (-50° to 80°C)
Humidity	5 – 95% non-condensing
Operating	
Temperature	-13° to 149°F (-25° to 65°C)
Humidity	5 – 95% non-condensing
Altitude	Above 2000 meters (6600 feet) consult factory
Power Draw	90 mA Steady State
Shock (IEC 68-2-27)	15G any direction for 11 mS
Vibration (IEC 68-2-6)	5 – 150 Hz, 5G, .7 mm max. peak-to-peak

Dimensions

Figure 50-21. QSNAP — Approximate Dimensions in Inches (mm)

Product Selection

Table 50-29. Product Selection

Description	Catalog Number	Price U.S. $
QSNAP Kit for FVNR Starters	D77B-QSNAP-X1	
QSNAP Kit for FVR Starters	D77B-QSNAP-X2	
QSNAP Kit for FVNR Starters with HOA	D77B-QSNAP-X3	
QSNAP Kit for FVR Starters with HOA	D77B-QSNAP-X4	
QSNAP Adapter for Size 5 and Size F Frame Starters	D77B-140A	
SNAP Auxiliary Connector	D77B-AC1	

Note: For D64 zero sequence CTs, refer to **Tab 49**.

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Discount Symbol **1CD1**

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50-23

Communication Adapters (D77D Series) — DeviceNet Adapter

Cat. No. D77D-DNA

Product Description

The Cutler-Hammer Intelligent Technologies (*IT.*) DeviceNet Adapter (D77D-DNA) from Eaton's electrical business has greatly increased the functionality of *IT.* communicating products, allowing monitoring and control for *IT.* motor control devices. The adapter concentrates all data from these devices into a single DeviceNet node.

To simplify the configuration of the D77D-DNA, a simple auto-configure button press sets the system up for default operation. This automatically configures the DeviceNet I/O assemblies to the system devices. The data from these devices is assembled into a single input and output message.

Application Description

In a typical DeviceNet Adapter application, the D77D-DNA connects directly to DeviceNet, and resides in a system with communicating motor controls. The data from these *IT.* devices is assembled into a single input and output message before being presented to DeviceNet.

Features, Functions and Benefits

- Communication to DeviceNet consuming one DeviceNet MAC ID.
- Provides for control of all *IT.* communicating devices connected to the gateway.
- Manually set to MAC ID and baud rate; configuration using a software application is not required for normal operation.
- Single button press auto configures the gateway, setting up the system for default operation.
- Advanced configuration using CH Studio.

- Provides for backplane and inter-connect cable connections to motor control products.
- Provides one I/O DeviceNet message representing all connected devices.
- Two independent ports.
- Powered from backplane.
- Isolated from DeviceNet.
- Status LEDs for DeviceNet and module health.
- Provides for configuration of I/O devices over DeviceNet.
- Small package size.
- DIN-rail mountable.

Standards and Certifications

Approvals

Table 50-30. Approvals/Certifications

Description	Specification
Electrical/EMC	
ESD Immunity (IEC 61000-4-2)	± 8 kV air, ± 4 kV contact
Radiated Immunity (IEC 61000-4-3)	10V/m 80 – 1,000 MHz, 80% amplitude modulation @ 1 kHz
Fast Transient (IEC 61000-4-4)	± 2 kV supply and control, ± 1 kV communications
Surge (IEC 61000-4-5)	± 1 kV line-to-ground, ± 2 kV line-to-line
RF Conducted (IEC 61000-4-6)	10V, .15 – 80 MHz
Magnetic Field (IEC 61000-4-8)	30A/m, 50 Hz
Other Approvals	
Ingress Protection Code	IP20
Radiated and Conducted Emissions	EN 5011 Class A
Agency Certifications	UL 508, CUL (CSA C22.2 No. 14), CE (Low Voltage Directive), ODVA Conformance Tested

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Technical Data and Specifications

Table 50-31. DeviceNet Specifications

Description	Specification
DeviceNet Connections	Group 2, Polling, Bit Strobe, Explicit, No UCMM
Maximum DeviceNet I/O Size	128 Bytes Input 128 Bytes Output
DeviceNet Baud Rate	125K, 250K, 500K
QCPort Channels	2 Independent Channels

Table 50-32. Environmental Ratings

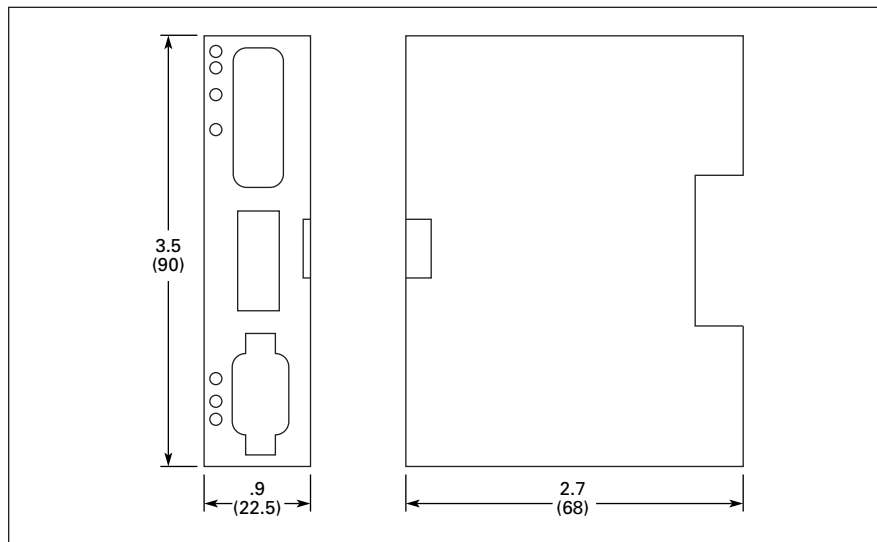| Description	Specification
Transportation/Storage	
Temperature	-58° – 176°F (-50° – 80°C)
Humidity	5 – 95% non-condensing
Operating	
Temperature	-13° – 131°F (-25° – 55°C)
Humidity	5 – 95% non-condensing
Altitude	Above 6,600 ft. (2,000m) consult factory
Shock (IEC 68-2-27)	15G any direction for 11 mS
Vibration (IEC 68-2-6)	5 – 150 Hz, 5G .7 mm maximum peak-to-peak
Pollution Degree	2

Dimensions

Figure 50-22. D77D-DNA — Approximate Dimensions in Inches (mm)
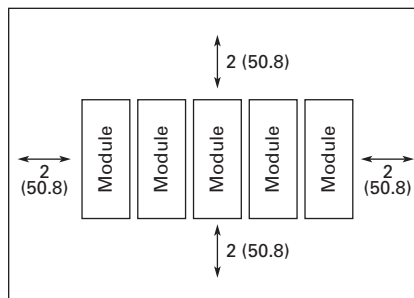

Figure 50-23. D77D-DNA Module Ventilation — Approximate Dimensions in Inches (mm)

Product Selection

Table 50-33. DeviceNet Adapter Product Selection

Description	Catalog Number	Price U.S. $
DeviceNet Adapter	**D77D-DNA**	

Discount Symbol **1CD1**

Cat. No. D77D-EMA

Product Description

The Cutler-Hammer Intelligent Technologies *(IT)*. Ethernet Modbus Adapter (D77D-EMA) from Eaton's electrical business has greatly increased the functionality of Cutler-Hammer *IT*. communicating products, allowing monitoring and control for *IT*. motor control devices. The adapter concentrates all data from these devices into a single Modbus node.

The Modbus Adapter supports not only Modbus TCP but also Modbus serial (ASCII and RTU) as a slave device. This combination of the two physical layers provides for ultimate functionality when connecting to a Modbus system. A unique attribute of the D77D-EMA is that it supports Modbus serial Pass-Through. In this mode a customer can connect Modbus serial devices to one of the channels and monitor and control them over Modbus TCP.

To simplify the configuration of the D77D-EMA, a simple auto-configure button press sets the system up for default operation. This automatically configures the Modbus registers to the I/O system devices.

Application Description

In a typical Modbus Adapter application, the D77D-EMA connects directly to Modbus, and resides in a system with communicating motor controls. The data from these *IT*. devices is assembled into input and output registers before being presented to Modbus.

Features, Functions and Benefits

- Communication to Modbus consuming one address.
- Supports Boot P and static IP addressing.
- 10/100 BaseT Connection.
- RS-485 Modbus slave serial connection.
- Supports Serial Modbus Pass-Through over Modbus TCP.
- Provides for control of all *IT*. communicating devices connected to the gateway.
- Manually set to address and baud rate for serial Modbus; configuration using a software application is not required for normal operation.
- Single button press auto configures the gateway, setting up the system for default operation.
- Advanced configuration using CH Studio.
- Provides for backplane and interconnect cable connections to motor control products.
- Two independent ports.
- Powered from backplane.
- Isolated from Modbus.
- Status LEDs for Modbus and module health.
- Provides for configuration of I/O devices over Modbus TCP.
- Small package size.
- DIN-rail mountable.

Standards and Certifications

Approvals

Table 50-34. Approvals/Certifications

Description	Specification
Electrical/EMC	
ESD Immunity (IEC 61000-4-2)	± 8 kV air, ± 4 kV contact
Radiated Immunity (IEC 61000-4-3)	10V/m 80 – 1,000 MHz, 80% amplitude modulation @ 1 kHz
Fast Transient (IEC 61000-4-4)	± 2 kV supply and control, ± 1 kV communications
Surge (IEC 61000-4-5)	± 1 kV line-to-ground, ± 2 kV line-to-line
RF Conducted (IEC 61000-4-6)	10V, .15 – 80 MHz
Magnetic Field (IEC 61000-4-8)	30A/m, 50 Hz
Other Approvals	
Ingress Protection Code	IP20
Radiated and Conducted Emissions	EN 5011 Class A
Agency Certifications	UL 508, CUL (CSA C22.2 No. 14), CE (Low Voltage Directive), Modbus Conformance Tested

Technical Data and Specifications

Table 50-35. Environmental Ratings

Description	Specification
Transportation/Storage	
Temperature	-58° – 176°F (-50° – 80°C)
Humidity	5 – 95% non-condensing
Operating	
Temperature	-13° –149 °F (-25° – 65°C)
Humidity	5 – 95% non-condensing
Altitude	Above 6,600 ft. (2,000m) consult factory
Shock (IEC 68-2-27)	15G any direction for 11 mS
Vibration (IEC 68-2-6)	5 – 150 Hz, 5G .7 mm maximum peak-to-peak
Pollution Degree	2

Table 50-36. Modbus Specifications

Description	Specification
Connections	10/100 BaseT RS-485
I/O Size	1024 Registers Input 1024 Registers Output
Baud	Ethernet 10 Megabit Serial 1200 to 115.2K baud
Addressing	Ethernet – Boot P or Static IP Serial – DIP Switch 1 – 255
Channels	2 Independent Channels

50

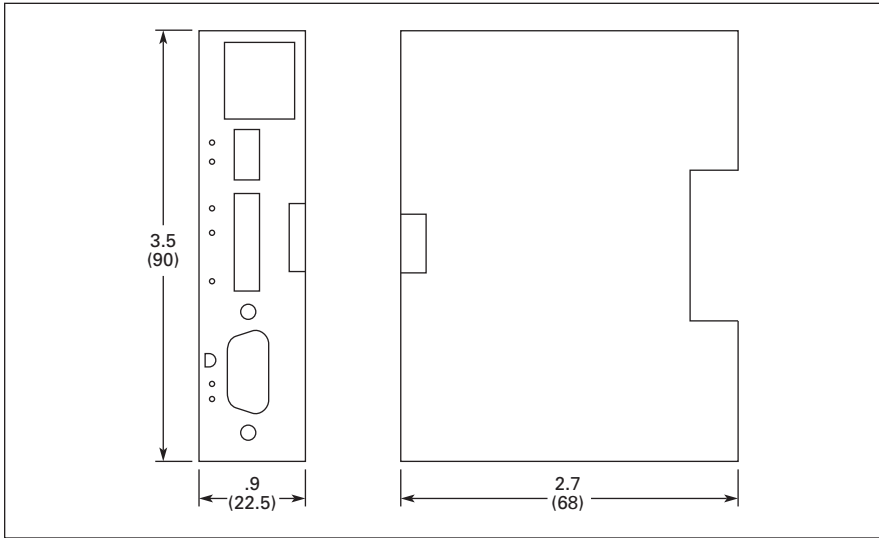**Communication Adapters (D77D Series) — Modbus Adapter**

Dimensions

Figure 50-24. D77D-EMA — Approximate Dimensions in Inches (mm)
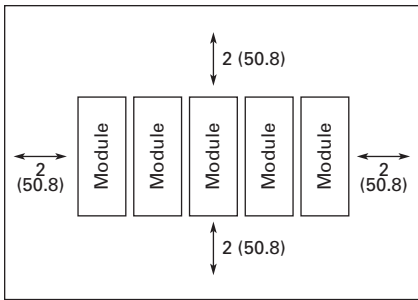

Figure 50-25. D77D-EMA Module Ventilation — Approximate Dimensions in Inches (mm)

Product Selection

Table 50-37. Modbus Adapter Product Selection

Description	Catalog Number	Price U.S. $
Modbus Adapter	**D77D-EMA**	

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Cat. No. D77D-EIP

Product Description

The Cutler-Hammer Intelligent Technologies *(IT.)* EtherNet/IP (D77D-EIP) from Eaton's electrical business has greatly increased the functionality of Cutler-Hammer *IT.* communicating products, allowing monitoring and control for *IT.* motor control devices. The adapter concentrates all data from these devices into a single EtherNet/IP node.

The EtherNet/IP Adapter is a slave device on EtherNet/IP.

To simplify the configuration of the D77D-EIP, a simple auto-configure button press sets the system up for default operation. This automatically configures the EtherNet/IP assemblies to the I/O system devices.

Application Description

In a typical EtherNet/IP Adapter application, the D77D-EIP connects directly to EtherNet/IP, and resides in a system with communicating motor controls. The data from these *IT.* devices is assembled into input and output assemblies before being presented to EtherNet/IP.

Features, Functions and Benefits

- Communication to EtherNet/IP consuming one address.
- Supports Boot P, DHCP and static IP addressing.
- 10/100 BaseT Connection.
- Provides for control of all *IT.* communicating devices connected to the network adapter.
- Single button press auto configures the gateway, setting up the system for default operation.
- Advanced configuration using CH Studio.
- Provides for backplane and interconnect cable connections to motor control products.
- Two independent ports.
- Powered from backplane.
- Isolated from EtherNet/IP.
- Status LEDs for EtherNet/IP and module health.
- Provides for configuration of I/O devices over EtherNet/IP.
- Small package size.
- DIN-rail mountable.

Standards and Certifications

Approvals

Table 50-38. Approvals/Certifications

Description	Specification
Electrical/EMC	
ESD Immunity (IEC 61000-4-2)	± 8 kV air, ± 4 kV contact
Radiated Immunity (IEC 61000-4-3)	10V/m 80 – 1,000 MHz, 80% amplitude modulation @ 1 kHz
Fast Transient (IEC 61000-4-4)	± 2 kV supply and control, ± 1 kV communications
Surge (IEC 61000-4-5)	± 1 kV line-to-ground, ± 2 kV line-to-line
RF Conducted (IEC 61000-4-6)	10V, .15 – 80 MHz
Magnetic Field (IEC 61000-4-8)	30A/m, 50 Hz
Other Approvals	
Ingress Protection Code	IP20
Radiated and Conducted Emissions	EN 5011 Class A
Agency Certifications	UL 508, CUL (CSA C22.2 No. 14), CE (Low Voltage Directive), Modbus Conformance Tested

Technical Data and Specifications

Table 50-39. Environmental Ratings

Description	Specification
Transportation/Storage	
Temperature	-58° – 176°F (-50° – 80°C)
Humidity	5 – 95% non-condensing
Operating	
Temperature	-13° –149 °F (-25° – 65°C)
Humidity	5 – 95% non-condensing
Altitude	Above 6,600 ft. (2,000m) consult factory
Shock (IEC 68-2-27)	15G any direction for 11 mS
Vibration (IEC 68-2-6)	5 – 150 Hz, 5G .7 mm maximum peak-to-peak
Pollution Degree	2

Table 50-40. EtherNet/IP Specifications

Description	Specification
Connections	10/100 BaseT
I/O Size	504 bytes Input 504 bytes Output
Baud	Ethernet 10/100 Megabit
Addressing	Ethernet – Boot P, Static IP or DHCP
Channels	2 Independent Channels

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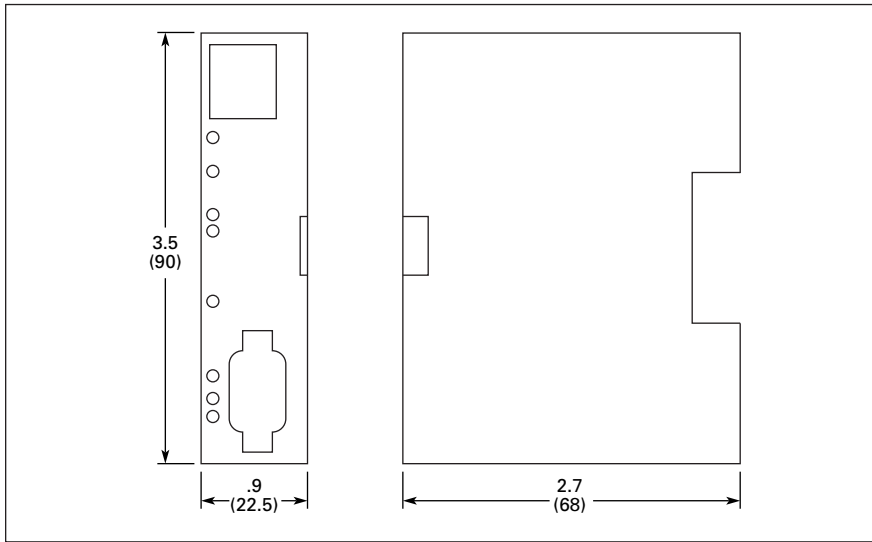**Communication Adapters (D77D Series) — EtherNet/IP Adapter**

Dimensions

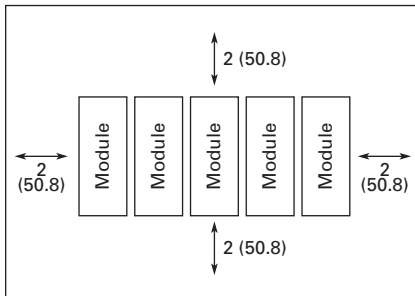**Figure 50-26. D77D-EIP — Approximate Dimensions in Inches (mm)**

Figure 50-27. D77D-EIP Module Ventilation — Approximate Dimensions in Inches (mm)

Product Selection

Table 50-41. EtherNet/IP Adapter Product Selection

Description	Catalog Number	Price U.S. $
Modbus Adapter	**D77D-EIP**	

Discount Symbol **1CD1**

Cat. No. D77D-PNA

Product Description

The Cutler-Hammer Intelligent Technologies *(IT.)* PROFIBUS Adapter (D77D-PNA) from Eaton's electrical business has greatly increased the functionality of Cutler-Hammer *IT.* communicating products, allowing monitoring and control for *IT.* motor control devices. The adapter concentrates all data from these devices into a single node.

The PROFIBUS Adapter supports not only PROFIBUS but also Modbus (ASCII and RTU) as a slave device. This combination of the two physical layers provides for ultimate functionality when connecting to a control system. This unique feature of the D77D-PNA provides for deterministic control using PROFIBUS along with the flexibility to monitor and configure I/O devices over Modbus. The Modbus connection is a read-only connection not allowing control of I/O devices ensuring a single point of control.

To simplify the configuration of the D77D-PNA, a simple auto-configure button press sets the system up for default operation. This automatically configures the telegrams to the system devices.

Application Description

In a typical PROFIBUS Adapter application, the D77D-PNA connects directly to PROFIBUS, and resides in a system with communicating motor controls. The data from these *IT.* devices is assembled into input and output telegrams before being presented.

Features, Functions and Benefits

- Communication to PROFIBUS consuming one address.
- Supports hardware addressing.
- DB9 Connection.
- Modbus slave connections on motherboard.
- Provides for control of all *IT.* communicating devices connected to the network adapter.
- PROFIBUS supports autobaud.
- Single button press auto configures the gateway, setting up the system for default operation.
- Advanced configuration using CH Studio.
- Provides for backplane and interconnect cable connections to motor control products.
- Two independent ports.
- Powered from backplane.
- Isolated from PROFIBUS.
- Status LEDs for module health.
- Provides for configuration of I/O devices over Modbus TCP.
- Small package size.
- DIN-rail mountable.

Standards and Certifications

Approvals

Table 50-42. Approvals/Certifications

Description	Specification
Electrical/EMC	
ESD Immunity (IEC 61000-4-2)	± 8 kV air, ± 4 kV contact
Radiated Immunity (IEC 61000-4-3)	10V/m 80 – 1,000 MHz, 80% amplitude modulation @ 1 kHz
Fast Transient (IEC 61000-4-4)	± 2 kV supply and control, ± 1 kV communications
Surge (IEC 61000-4-5)	± 1 kV line-to-ground, ± 2 kV line-to-line
RF Conducted (IEC 61000-4-6)	10V, .15 – 80 MHz
Magnetic Field (IEC 61000-4-8)	30A/m, 50 Hz
Other Approvals	
Ingress Protection Code	IP20
Radiated and Conducted Emissions	EN 5011 Class A
Agency Certifications	UL 508, CUL (CSA C22.2 No. 14), CE (Low Voltage Directive), Modbus Conformance Tested

Technical Data and Specifications

Table 50-43. Environmental Ratings

Description	Specification
Transportation/Storage	
Temperature	-58° – 176°F (-50° – 80°C)
Humidity	5 – 95% non-condensing
Operating	
Temperature	-13° –149 °F (-25° – 65°C)
Humidity	5 – 95% non-condensing
Altitude	Above 6,600 ft. (2,000m) consult factory
Shock (IEC 68-2-27)	15G any direction for 11 mS
Vibration (IEC 68-2-6)	5 – 150 Hz, 5G .7 mm maximum peak-to-peak
Pollution Degree	2

Table 50-44. PROFIBUS Specifications

Description	Specification
Connection	DB9
I/O Size	244 Bytes Input 176 Bytes Output
Baud	Up to 12 Megabit
Addressing	DIP Switch 1 – 255
Channels	2 Independent Channels
CHA Current Draw	170 mA
CHB Current Draw	10 mA

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Accessories

Table 50-45. I/O Module Product Accessories

Description	Catalog Number	Price U.S. $
7-Position Backplane with DIN-Rail 12-Position Backplane with DIN-Rail	**D77E-BP7** **D77E-BP12**	
25 cm Interconnect Plug-and-Play Cable 1 Meter Interconnect Plug-and-Play Cable 2 Meter Interconnect Plug-and-Play Cable 3 Meter Interconnect Plug-and-Play Cable	**D77E-QPIP25** **D77E-QPIP100** **D77E-QPIP200** **D77E-QPIP300**	
I/O Terminator DIN Style and Power Tap	**D77E-QPLR**	
I/O Terminator RJ11 Style	**D77E-TERRJ**	

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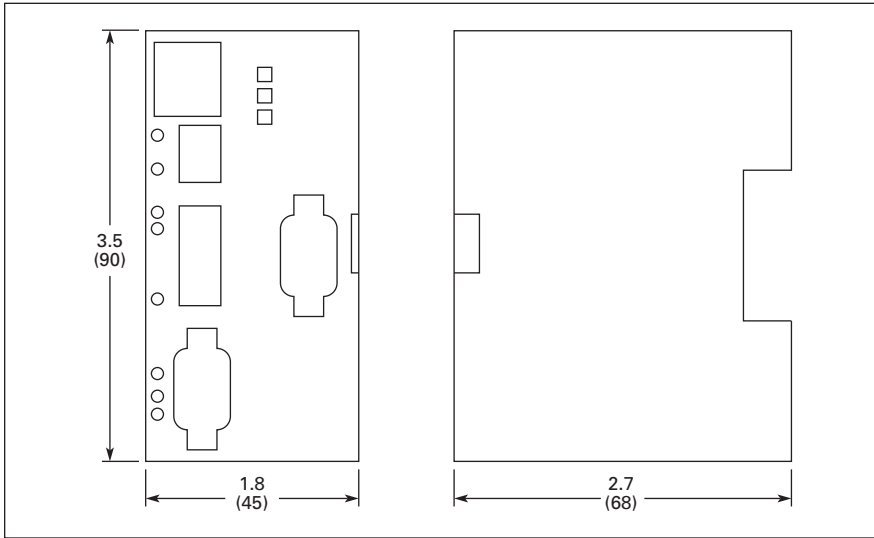Discount Symbol **1CD1**

Dimensions

Figure 50-28. D77D-PNA — Approximate Dimensions in Inches (mm)
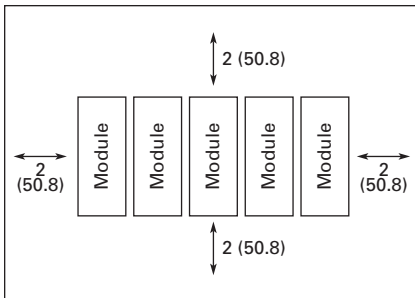

Figure 50-29. D77D-PNA Module Ventilation — Approximate Dimensions in Inches (mm)

Product Selection

Table 50-46. PROFIBUS Adapter Product Selection

Description	Catalog Number	Price U.S. $
PROFIBUS Adapter	**D77D-PNA**	

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Discount Symbol **1CD1**

CH Studio Component Manager Software

CH Studio

Product Description

CH Studio Component |Manager Software

CH Studio from Eaton's electrical business is an integrated software development environment that supports the configuration and monitoring of control products and systems. The application simplifies the monitoring and configuration of entire networks, as well as the enhanced features of individual *IT.* communicating devices within those networks.

CH Studio takes advantage of the Windows graphical interface to present a suite of tools that is easy to learn and efficient to use, while meeting the requirements for developing complex network configurations.

Screen Shot

CH Studio components include Explorer, Property, Output, Toolbox, Message Editor, Property Pages, and Device Selector windows and dialog boxes.

Configure Eaton's Cutler-Hammer Control Devices

Component Manager provides for the configuration and monitoring of the following Cutler-Hammer products:

- *IT.* Motor Control Center (MCC).
- *IT.* Electro-Mechanical Motor Starters connected by a Starter Network Adapter Product (SNAP) or Cover Control.
- *IT.* S751/S752 Soft Starters connected by a SNAP, Cover Control or a Network Adapter.
- *IT.* I/O modules.
- *IT.* S811 Soft Starter connected by network Adapter.
- *IT.* D77D-DNA DeviceNet network Adapter.
- *IT.* D77D-EMA Modbus/TCP network Adapter.
- *IT.* D77D-EIP EtherNet/IP network Adapter.
- *IT.* D77D-PNA PROFIBUS network Adapter.
- Cutler-Hammer legacy DeviceNet products.

Configure Other DeviceNet Products

CH Studio provides the capacity to configure and monitor all DeviceNet products that are supported by a published EDS file, regardless of vendor.

The DeviceNet management package includes prepackaged support of over 4000 different devices, and the capability to include new EDS files, as needed.

Application Description

The CH Studio Software runs on any personal computer hosting one of the following supported Windows operating systems:

- MS Windows XP.
- MS Windows 2000.

A typical automation system is comprised of a programmable logic controller acting as a master, and numerous slave devices such as network adapters and motor starters. The devices are networked via an industrial fieldbus such as DeviceNet or Modbus/TCP.

A personal computer hosting CH Studio may be connected to an industrial network using a supported interface card or common Ethernet port (a variety of network protocols, such as Modbus/TCP, utilize Ethernet for a physical layer). CH Studio can then be used to configure and commission the automation products and network.
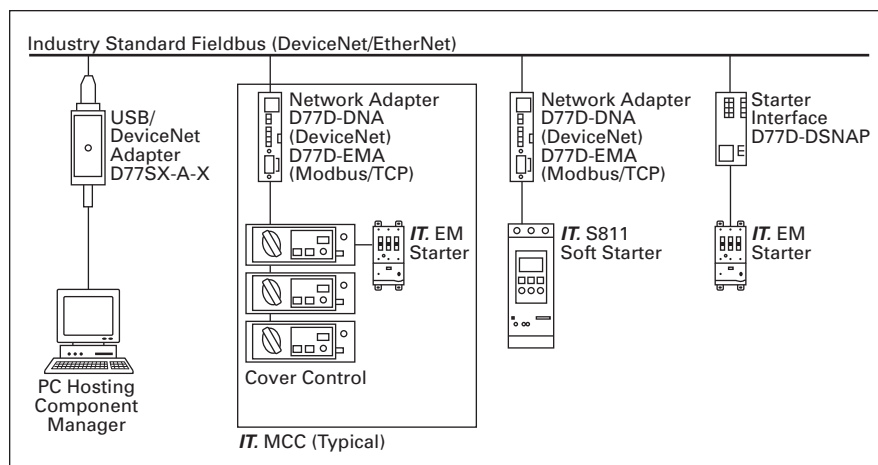
Figure 50-30. Network Diagram

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Features, Functions and Benefits

Studio provides powerful features:

- Fast discovery of devices on DeviceNet, Modbus/TCP and Ethernet/IP networks.
- "Snapshot" storage of an entire networks worth of device parameters with just one mouse-click.
- Rapid configuration of *IT.* family products via "plug-in" support components that are regularly updated via the Internet.
- Online and offline operation with flexible synchronization options.
- Custom configuration dialogs for point and click ease of configuration, support for any DeviceNet product with or without EDS files.
- Extensive report generation to assist PLC or DCS programmers.
- OPC server for industry standard communications with third party products such as HMI, data acquisition and control applications.
- Built-in 4800+ device EDS file database.
- OPC server-to-control and monitor QCPort device over OPC.
- Tag export feature to import tag data to the controller.
- Live I/O to view actual status of the QCPort I/O when online.

Technical Data and Specifications

- Processor: 230 MHz Pentium class minimum; 300+ MHz recommended.
- Memory (RAM): 64 MB Minimum (may limit performance); 128 MB+ recommended.
- Hard Drive Space: 120 MB — CHStudio additional 70 meg for online documentation in .PDF format.
- Super VGA 800x600 or higher resolution video adapter and monitor.
- CDROM or DVD Drive (required for installation).
- Keyboard and Microsoft mouse or compatible pointing device.
- Industrial network adapter. Studio makes use of the Ethernet port that comes as standard equipment on most PCs for industrial protocols such as MODBUS/TCP. For DeviceNet networks a USB/DeviceNet converter is available, or you may use one of the popular SS Technologies Devicenet interfaces in the 5136 series (ISA, PCI, PCMCIA supported).

USB DeviceNet Adapter

The D77SX-A-X USB converter is a cost-effective interface for DeviceNet networks. Specifically designed for use with CH Studio, the USB converter provides a high performance DeviceNet interface with Plug and Play ease of installation. The D77SX-A-X comes in kit form including USB and 6-foot DeviceNet to mini cables. Drivers for the converter are built into CH Studio.

Product Selection

The following table lists the Catalog Numbers for available CH Studio software packages:

Table 50-47. CH Studio Product Selection

Description	Catalog Number	Price U.S. $
CH Studio Component Manager V2.1	**D77SC-X-D**	
CH Studio Component Manager V2.1 w/USB Interface	**D77SC-A-D**	
USB/DeviceNet Interface (Alone)	**D77SX-A-X**	
CH Studio Component Manager 2.1 and OPC Server	**D77SC-X-P**	
CH Studio Component Manager 2.1 OPC Server	**D77SC-A-P**	

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Discount Symbol **1CD1**

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