

# CUTLER-HAMMER PROGRAMMABLE CONTROLLERS

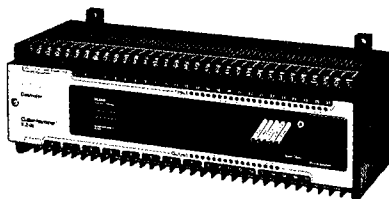
5/31/89  
Supersedes  
TIP F200 (D100)  
dated 7/1/86

## D100 Micro Programmable Logic Controllers

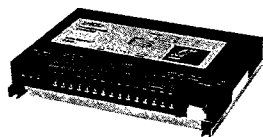
**T**ECHNICAL  
**I**NFORMATION  
**P**UBLICATION  
**F200**  
**(D100)**



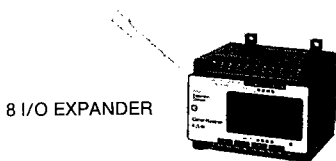
20 I/O CONTROLLER



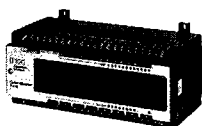
40 I/O CONTROLLER



14 I/O CONTROLLER



8 I/O EXPANDER



20 I/O EXPANDER



40 I/O EXPANDER

### DESIGN CHARACTERISTICS

The D100 Micro Programmable Logic Controller is a family of products for use in a wide spectrum of applications. The D100 Micro PLC is small in size and economically priced.

#### Features:

- Expandable 14 to 120 I/O
- Utilizes true ladder logic programming
- Programmer displays eight rungs of logic at one time
- Large LCD screen displays "power flow" while D100 is running

### CONTROLLER

The Controller is a stand alone programmable logic controller containing Central Processing Unit (CPU), power supply, memory, and Input/Output circuitry with terminals. Controllers are offered in several I/O configurations and capabilities — see Systems Configuration below. Controllers contain the RAM memory and back-up battery. See PROMS on the next page for PROM writing features of controllers.

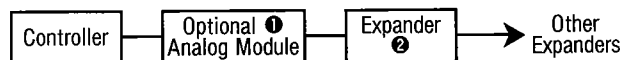
### EXPANDERS

All of the controllers are expandable. Any of the Expansion modules listed can be connected to any of the controllers to expand the system Input/Output capability up to the maximum capability of the controller. Expanders connect to the controller and subsequent expanders by short connecting cables. Expanders are offered in several configurations — see Systems Configuration below.

### SYSTEM CONFIGURATIONS

#### Controller

Type	Controller I/O		System Max. I/O	
	Inputs	Outputs	Inputs	Outputs
14 I/O	8	6	20	14
20, 20A	12	8	24	16
40, 40A	24	16	48	32
40H	24	16	72	48



#### Expander

Type	Expander I/O	
	Inputs	Outputs
8 I/O	8	0
	4	4
	0	8
20 I/O	12	8
40 I/O	24	16

- ① If an Analog module is used in the system, it must be connected directly to the controller before any expanders are added. The Analog Module does not affect the I/O count. The Controller must be analog compatible.
- ② Up to two expanders may be used as long as the total number of inputs and outputs (controller and all expanders) is not greater than the maximum listed for the controller used.

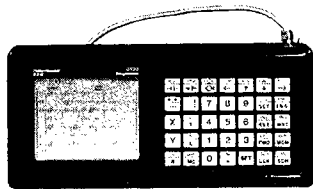
The installation and use of Cutler-Hammer products should be in accordance with the provisions of the U.S. National Electrical Code and/or other local codes or industry standards that are pertinent to the particular end use. Installation or use not in accordance with these codes and standards could be hazardous to personnel and/or equipment.

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**PROGRAMMER**

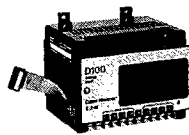


PROGRAMMER

The hand-held Programmer will program any D100 Controller up to its fully expanded capability. A large LCD screen displays up to eight ladder diagram rungs, each with up to ten elements, on each screen. An unlimited number of screens can be used in a program. The control scheme is programmed and displayed in familiar and easy-to-understand ladder logic using conventional symbols.

The programmer is also used to monitor the operation of the system. During operation, the display of the ladder logic shows power flow and device (coil and contact) operation. Timer and counter registers can also be observed in real time. Several monitoring display options are available for observation of multiple devices in several convenient formats.

**ANALOG INPUT MODULE**



ANALOG INPUT  
 MODULE

An Analog Input Module is available for use with D100 14 I/O, D100 20A and D100 40A controllers. This module connects to the controller before the first expansion module and provides two analog inputs to the system. Three input ranges are provided for each analog channel: 0-10 volts, 0-5 volts and 0-20 milliamperes. The analog signal is converted to a register value and stored in an assigned register. Twelve other registers are assigned preset values. The signal register is continuously compared to the presets to control circuits in the system.

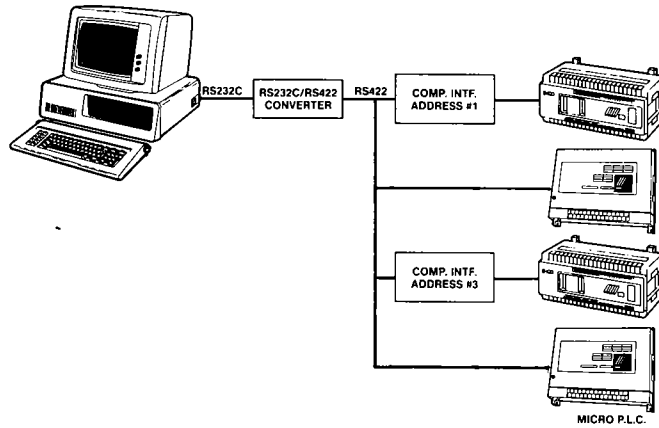
**COMPUTER COMMUNICATIONS**

The D100 can communicate with an IBM<sup>®</sup> (or compatible) personal computer (PC). The D100 can be programmed and monitored from a remote PC. The program and its operation can also be documented on a printer connected to the PC. Necessary software and hardware are offered for D100-to-PC communications.

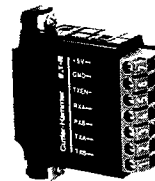
® Trademark of the International Business Machine Corporation.

**SOFTWARE**

**Software** — A computer communications program for programming the D100, complete with installation and operation manual, is available on either 5-1/4 inch or 3-1/2 inch disks. A showcase disk is offered which presents hardware/software feature/benefits on screen.



**PROTOCOL MODULE**

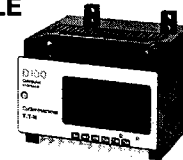


PROTOCOL  
 MODULE

**Protocol Module** — The protocol module is an interface between a single D100 system and one PC. The protocol module plugs into a computer COM port (RS232) and connects by cable to the controller programmer receptacle. The protocol module can be located up to 1000 feet from the controller.

**MULTIDROP MODULE**

COMPUTER  
 INTERFACE  
 MULTIDROP  
 MODULE



**Multidrop Module** — A multidrop module connects to the controller programmer receptacle and then, by cable, to a PC. From one to sixteen multidrop modules can be connected to one PC. Each multidrop module has a selector switch to set each system address individually. The multidrop module can be located up to 1000 feet from the computer.

**RS422-232 CONVERTER**



RS232  
 CONVERTER

**RS422-232 Converter** — The multidrop module uses an RS422 protocol. For computers that only have an RS232 COM port, a converter is required for communication with the multidrop module. This module converts RS422 communications to RS232.

See note on installation and use of product at bottom of page 1.

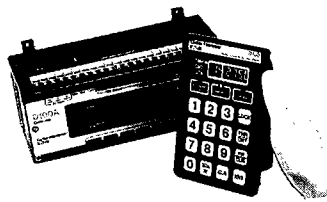
# CUTLER-HAMMER PROGRAMMABLE CONTROLLERS

TECHNICAL  
INFORMATION  
PUBLICATION  
**F200  
(D100)**

5/31/89  
Supersedes  
TIP F200 (D100)  
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## D100 Micro Programmable Logic Controllers

### TIMER/COUNTER ACCESS MODULE



The Timer/Counter Access Module is an accessory which makes it easier to:

- Monitor the current and preset values of timer and counter registers.
- Change the preset values of the registers while the program is running.

The module plugs into the programmer receptacle and gets its power from the controller. It can be used as a portable diagnostic tool for several systems or can be permanently connected to one system. It has password protection to prevent unauthorized access to registers and still provide a monitoring function. The module can be panel mounted and is NEMA 4, 12 rated.

### PROMS

PROMS (Programmable Read Only Memories) are devices which record and store programs. PROMS can be used to:

- Store a program for quick retrieval in the event of accidental loss.

### CONTROLLERS

Power Supply	Inputs		Outputs		Catalog No.	Use Prom
	No.	Type	No.	Type		

#### 20 I/O CONTROLLERS

115 V ac	12	24 V dc	8	Triac	D100CA20	D100 EE10 ①
115 V ac	12	24 V dc	8	Transist.	D100CD20	
115 V ac	12	115 V ac	8	Triac	D100CAA20	
24 V dc	12	24 V dc	8	Relay	D100DCR20	

#### 40 I/O CONTROLLERS

115 V ac	24	24 V dc	16	Triac	D100CA40	D100 EE10 ①
115 V ac	24	24 V dc	16	Transist.	D100CD40	
115 V ac	24	115 V ac	16	Triac	D100CAA40	
24 V dc	24	24 V dc	16	Relay	D100DCR40	

#### 40 I/O HIGH SPEED CONTROLLERS

115 V ac	24	24 V dc	16	Relay	D100CR40	D100 EE10 ①
115 V ac	24	24 V dc	16	Triac	D100CA40H	
115 V ac	24	24 V dc	16	Transist.	D100CD40H	
115 V ac	24	115 V ac	16	Relay	D100CRA40H	
115 V ac	24	115 V ac	16	Triac	D100CAA40H	

#### 14 I/O CONTROLLERS —

#### HIGH SPEED COUNT AND ANALOG CAPABLE

115 V ac	8	24 V dc	6	Relay	D100CR14	D100 EE14
115 V ac	8	115 V ac	6	Relay	D100CRA14	

#### 20 I/O CONTROLLERS —

#### HIGH SPEED COUNT AND ANALOG CAPABLE

115 V ac	12	24 V dc	8	Relay	D100CR20A	D100 EE28
115 V ac	12	115 V ac	8	Relay	D100CRA20A	

#### 40 I/O CONTROLLERS —

#### HIGH SPEED COUNT AND ANALOG CAPABLE

115 V ac	24	24 V dc	16	Relay	D100CR40A	D100 EE28
115 V ac	24	115 V ac	16	Relay	D100CRA40A	

① UV PROM D100UV10 can also be used with these controllers.

- Repeat a program for use in multiple applications such as several machine tools performing the same operations.
- Send a program to a remote location to change the operation of a system.

Proms fall into two major classifications:

- EEPROM (Electrically Erasable Programmable Read Only Memories) — erasable by the programmer or software.

D100EE10 — Cartridge-mounted electronically erasable PROM. Can be plugged into and removed from the controller from the front without tools.

D100EE28 — Cartridge-mounted electronically alterable PROM. Mounted in plug-in cartridge same as D100EE10.

D100EE14 — Unmounted electronically alterable PROM chip for use in D100 14 I/O controllers. These PROMS plug into a socket inside the controller — require removal of the cover for access to the socket.

- UV PROM (UltraViolet erasable Programmable Read Only Memories) — erasable only by an ultraviolet light source (not furnished by Cutler-Hammer)

D100UV10 — Directly interchangeable with the D100EE10.

Once programmed, EEPROMS can be used in any controller that they can be plugged into. However, they can be erased and programmed in controllers only as noted in the table below. It is good practice to use them only in controllers in which they can be programmed and erased.

### EXPANDERS

Power Supply	Inputs		Outputs		Catalog No.
	No.	Type	No.	Type	

#### 8 I/O EXPANDERS

115 V ac	8	24 V dc	---	---	D100ENC8
115 V ac	8	115 V ac	---	---	D100ENA8
115 V ac	4	24 V dc	4	Relay	D100ERC8
115 V ac	4	115 V ac	4	Relay	D100ERA8
115 V ac	---	---	8	Relay	D100ERN8
115 V ac	---	---	8	Triac	D100EAN8
115 V ac	---	---	8	Transist.	D100EDN8

#### 20 I/O EXPANDERS

115 V ac	12	24 V dc	8	Relay	D100ER20
115 V ac	12	24 V dc	8	Triac	D100EA20
115 V ac	12	24 V dc	8	Transist.	D100ED20
115 V ac	12	115 V ac	8	Relay	D100ERA20
115 V ac	12	115 V ac	8	Triac	D100EAA20
24 V dc	12	24 V dc	8	Relay	D100DER20

#### 40 I/O EXPANDERS

115 V ac	24	24 V dc	16	Relay	D100ER40
115 V ac	24	24 V dc	16	Triac	D100EA40
115 V ac	24	24 V dc	16	Transist.	D100ED40
115 V ac	24	115 V ac	16	Relay	D100ERA40
115 V ac	24	115 V ac	16	Triac	D100EAA40

See note on installation and use of product at bottom of page 1.

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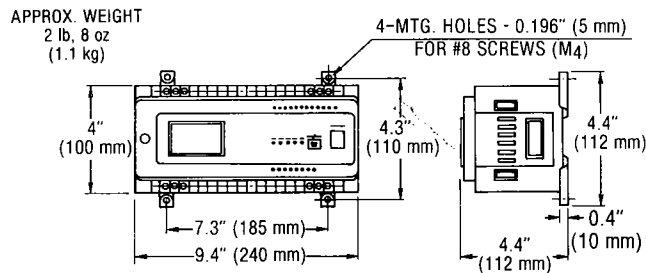
**ACCESSORIES**

Description	Catalog Number
<b>ANALOG INPUT MODULE</b>	
Two-point analog Input Module: 0-10 V dc, 0-5 V dc, 4-20 mA dc	D100AIM2
<b>COMPUTER COMMUNICATIONS</b>	
Computer Software — 5-1/4" disks	D100CCS60
Computer Software — 3-1/2" disks	D100CCS35
Showcase Disk - Onscreen Features/Benefits	D100CCS20S
Protocol Module — One controller to one computer (RS232)	D100CPM232
Multidrop module — for connecting up to 16 controllers to one computer, one required for each controller (RS422).	D100CPM422
RS422/232 converter with power supply for computers without 422 port.	D5010CPM422

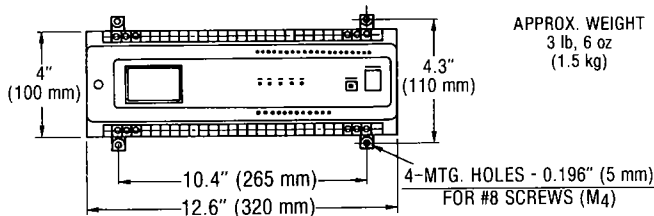
Description	Catalog Number
<b>ACCESSORIES</b>	
LCD Programmer with Cable	D100PG10A
Timer/Counter Access Module	D100TCM20
EEPROM Memory Cartridge for 20, 40 and 40H Controllers	D100EE10
EEPROM for 14 I/O Controllers	D100EE14
EEPROM Memory Cartridge for 20A and 40A Controllers	D100EE28
UV/PROM Memory Cartridge for 20, 40 and 40H Controllers	D100UV10
Optional 50 cm (19.7") Expansion Cable	D100AU50
<b>SPARE PARTS</b>	
Battery — Lithium 3 V, 1200 mA	D100AB10
Programmer Cable	D100AC10
Fuse — 250 V, 3.0 A	D100AF10
30 cm (11.8") Expansion Cable	D100AU30
User/Instruction Manual	D100DM10

**APPROXIMATE DIMENSIONS — Dim: in (mm)**

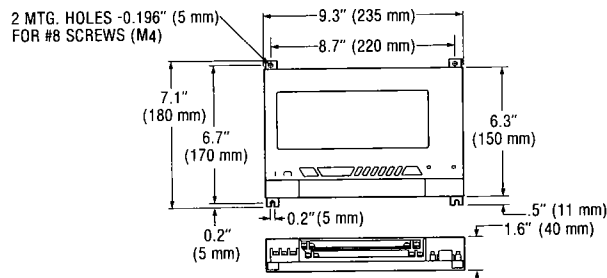
**20 I/O CONTROLLERS AND EXPANDERS**



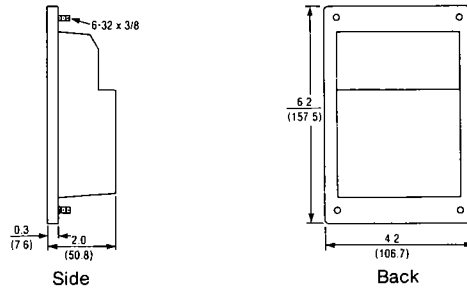
**40 I/O CONTROLLERS AND EXPANDERS**



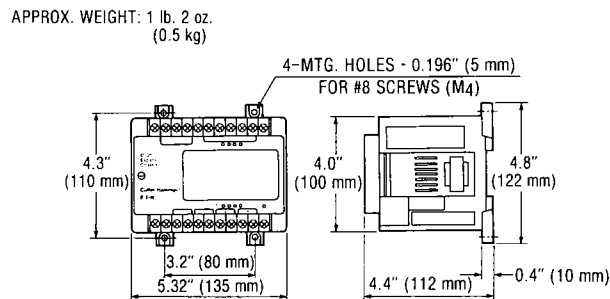
**14 I/O CONTROLLER**



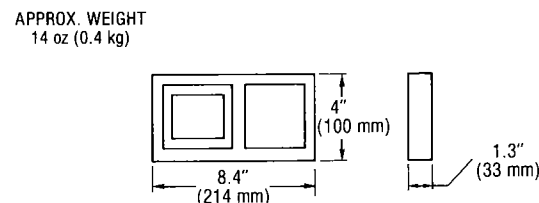
**TIMER/COUNTER ACCESS MODULE**



**8 I/O EXPANDER, ANALOG INPUT MODULE AND COMPUTER MULTIDROP MODULE**



**LCD PROGRAMMER**



Dim: in. (mm)

See note on installation and use of product at bottom of page 1.