

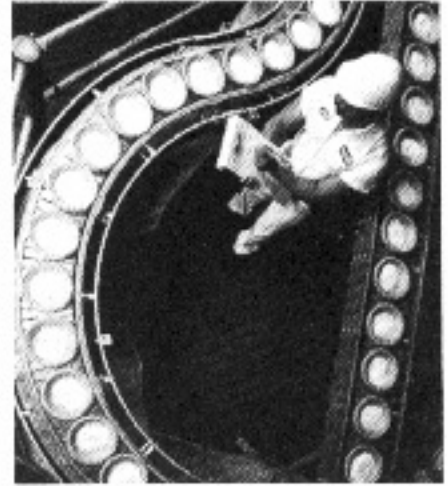
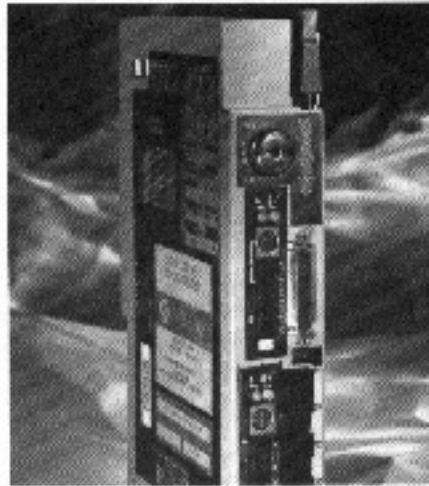


**ALLEN-BRADLEY**

## **PLC-5 Protected Processors**

(Cat. Nos. 1785-L26B, -L46B, -L86B)

Product Data



Put a lock on your proprietary programs and algorithms with Allen-Bradley's new line of PLC-5 protected processors.

With PLC-5 protected processors, you can design custom software-protection schemes for each of your applications. You can limit access to critical or proprietary areas of your programs, while allowing access to other data. In addition, you can selectively guard processor memory and I/O elements, as well as restrict use of processor operations.

# Allen-Bradley Drives

## Introduction

The PLC-5 protected processor expands system validity and security beyond that provided by the password-and-privilege capability of PLC-5 enhanced processors. Now you can guard individual data *elements*, in addition to nodes, channels, and files.

With a protected processor, you can:

- lock critical data elements
- selectively protect critical data while allowing access to other non-critical data
- create and customize your own protection file

Protected processors give you the same power offered by the PLC-5/20, -5/40, and -5/80, but provide additional security enhancements designed to give you increased levels of access control and flexibility.

PLC-5 enhanced processors let you use passwords-and-privileges to:	In addition, PLC-5 protected processors let you use data element protection to:
control I/O forcing privileges for a class of users; total or no control	prevent I/O forcing for specific module groups while allowing it for other groups
allow or disallow logical write privileges; total or no control	prevent writes to specific segments of data-table words while allowing writes to other data-table words
set read-only protection on particular files	restrict read privileges for individual data elements

When you choose a protected processor, you get increased protective capabilities as well as all these PLC-5 system features:

- three programming languages
  - ladder logic
  - structured text
  - sequential function charts (SFCs)
- an extensive, built-in instruction-set library that includes:
  - floating-point math
  - trigonometric/PID
  - ASCII string handling
  - statistical control functions
- increased cost-effectiveness of communication to remote sites with built-in communication capabilities suited for SCADA applications



**ATTENTION:** Protected processors alone do not ensure PLC system security. System security is a combination of the PLC-5 protected processor, the software, and your application expertise.

## Lock Critical Data Elements

Maintain your technological edge by preventing edits to or restoration of proprietary logic. Use the protected processor to lock critical data elements, thus preventing:

- edits to predefined program files
- re-programming of critical addresses from another location
- forcing of critical I/O data
- alterations to recipe parameters stored in data tables
- edits by users at remote sites
- system alteration through PLC communication and communication-parameter locks
- machine-restarts prior to correction of failures/faults
- files created in a standard PLC-5 from being restored to a protected processor

Also use the protected processor to:

- maintain interlocking process sequences
- monitor protection-violation attempts
- protect the processor's status file to prevent modification of MCPs and rack lists

The PLC-5 protected processor provides enhanced functions you can use in several applications to maintain system validation and to increase security levels.



**ATTENTION:** Allen-Bradley personnel cannot perform any system-administration functions for protected processors. Your OEM or system administrator **must** remember the access password to protected data elements.

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## Selectively Protect Data

*You choose the data elements to lock.* Instead of having total or no control over access privileges, the protected processor allows you to customize access to such functions as I/O forcing and data-table writing.

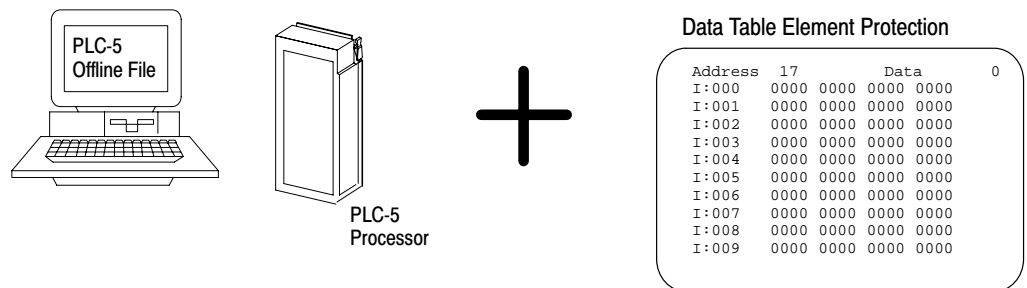
You can limit access to individual data-table elements while still allowing access to other less-critical elements.

Use this feature to:

- allow programmers to use only specified data-table locations when programming
- protect value-add from OEMs and system administrators by guarding against customer modification of original programs
- selectively prevent access to any data that impacts your critical processes

Two features combine in the protected processor to give you this customized protection:

- enhanced PLC-5 password-and-privilege capability
- data table element protection (DTEP) in the protected processor



## Passwords and Privileges

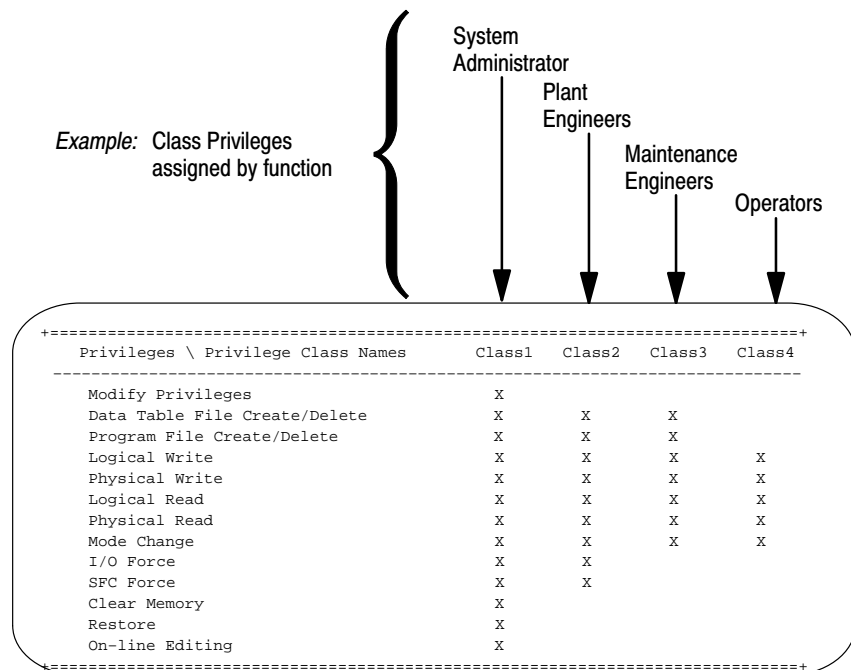
The PLC-5 protected processor gives you all the password-and-privilege capabilities provided by PLC-5 enhanced series processors. Using four privilege classes and associated passwords, you can limit access to critical areas of your programs.

When you assign privileges, you decide who can:

- read or not read programs or files
- edit or not edit programs or files
- create or delete programs and files
- force I/O
- modify privileges

Using 6200 Series Programming Software, you may assign Class privileges according to specific user accounts or a user's job function. For example, you may want to:

Assign	To
Class 1	System administrator only
Class 2	Plant engineers
Class 3	Maintenance engineers
Class 4	Operators



Using passwords and class privileges, you can restrict access to:

- communication channels
- nodes attached to the Data Highway Plus link
- program files
- data files

**Important:** For more information about password-and-privilege capabilities of PLC-5 enhanced processors, see the Enhanced and Ethernet Programmable Controllers User Manual, publication 1785-6.5.12.

### Data Table Element Protection

In addition to password-and-privilege protection for nodes, channels, and program/data files, the protected processor provides for guarding individual *data-table elements*.

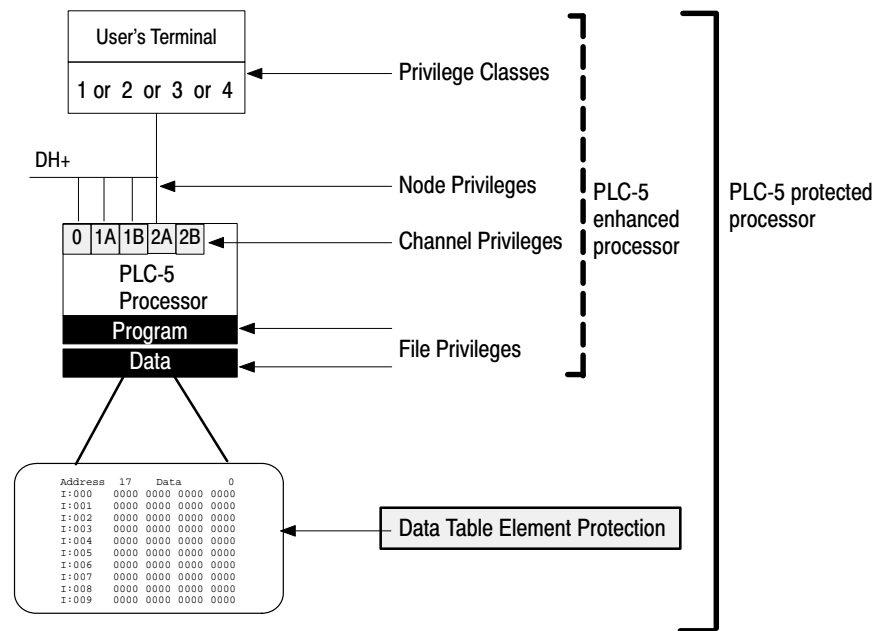
As illustrated in Figure 1, Data Table Element Protection (DTEP) combines with password-and-privilege features to expand your processor's protective capability and provide:

- more consistent operation of programs and processes
- reduced risk of unauthorized or unintentional program modifications

You can use DTEP to protect such data as:

- security-critical output words
- counter, timer, or BT/MG/PD control structures
- data table words used to specify indirect addresses in critical data tables
- processor status file words that configure the system

**Figure 1**  
**Protective Hierarchy**



## Create Your Own Protection File

To protect data-table elements, the protected processor gives you the ability to create a Data Table Element Protection (DTEP) file, which defines data-table ranges that cannot be altered by anyone other than users possessing privileges you assign.

Specify elements to be protected by including their addresses in the DTEP file. This file contains *only* those addresses you want to protect. As a result, you can still allow access to other elements by excluding them from the DTEP file. For example, you may protect critical I/O, but still allow end-users the ability to force *non*-critical I/O for testing or debugging programs.

Your custom-designed DTEP file protects against both online *and* offline editing.

### Online Programming

When the DTEP file is enabled during online programming, the PLC-5 uses the DTEP file to screen all communication commands that can modify data table elements or force I/O. In doing so, the protected processor rejects requests to:

- add ladder code that could write to protected data-table words
- modify protected data-table words through write operations
- modify protected I/O-image elements through I/O forcing
- write through Channel 3 (because you can write through this channel, but you cannot specify a privilege class)

### Offline Programming

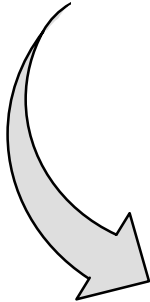
The protected processor also protects against program alterations made offline that are then restored. When the DTEP file is enabled, the protected processor:

- rejects all I/O-force table information present during a restore process
- screens restore requests that have ladder or structured-text insert instructions
- aborts the restore process when any protection violation occurs

To create your own protection file:

1. Set up an integer file.
2. Copy the integer file number to the status file.
3. Specify addresses of the data table file and the range of elements you want to protect.

Specify addresses to be protected by including them in the DTEP file



```

                                DATA TABLE MAP
FILE          TYPE          LAST ADDRESS  SIZE (elements)  SIZE (words)
0             O output      O:177         128              134
1             I input       I:177         128              134
2             S status      S:127         128              134
3             B binary or bit B3/15          1                7
4             T timer       T4:0          1                9
5             C counter     C5:0          1                9
6             R control     R6:0          1                9
7             N integer     N7:30         31              37
8             F floating point F8:0          1                8
9             F floating point F9:0          1                8
10            unused       0             0                6

                                PROCESSOR MEMORY LAYOUT
                                853 words of memory used in 64 data table files
                                108 words of memory used in 16 program files
                                48191 words of unused memory available

Enter address to create
> N10:10
Rem Prog          PLC-5/46 Series C Revision G      5/46 File PROTECT

```

```

Address    0    1    2    3    4    5    6    7    8    9
N10:0      0    0    0    0    0    0    0    0    0    0
N10:10     0    0    0    0    0    0    0    0    0    0

Press a function key or enter a value.
N10:0 =
Rem Prog   Forces:None      Data:Decimal   Addr:Decimal   5/46 File PROTECT
Change     Specify         Next           Prev
Radix     Address             File           File
F1        F5              F7            F8

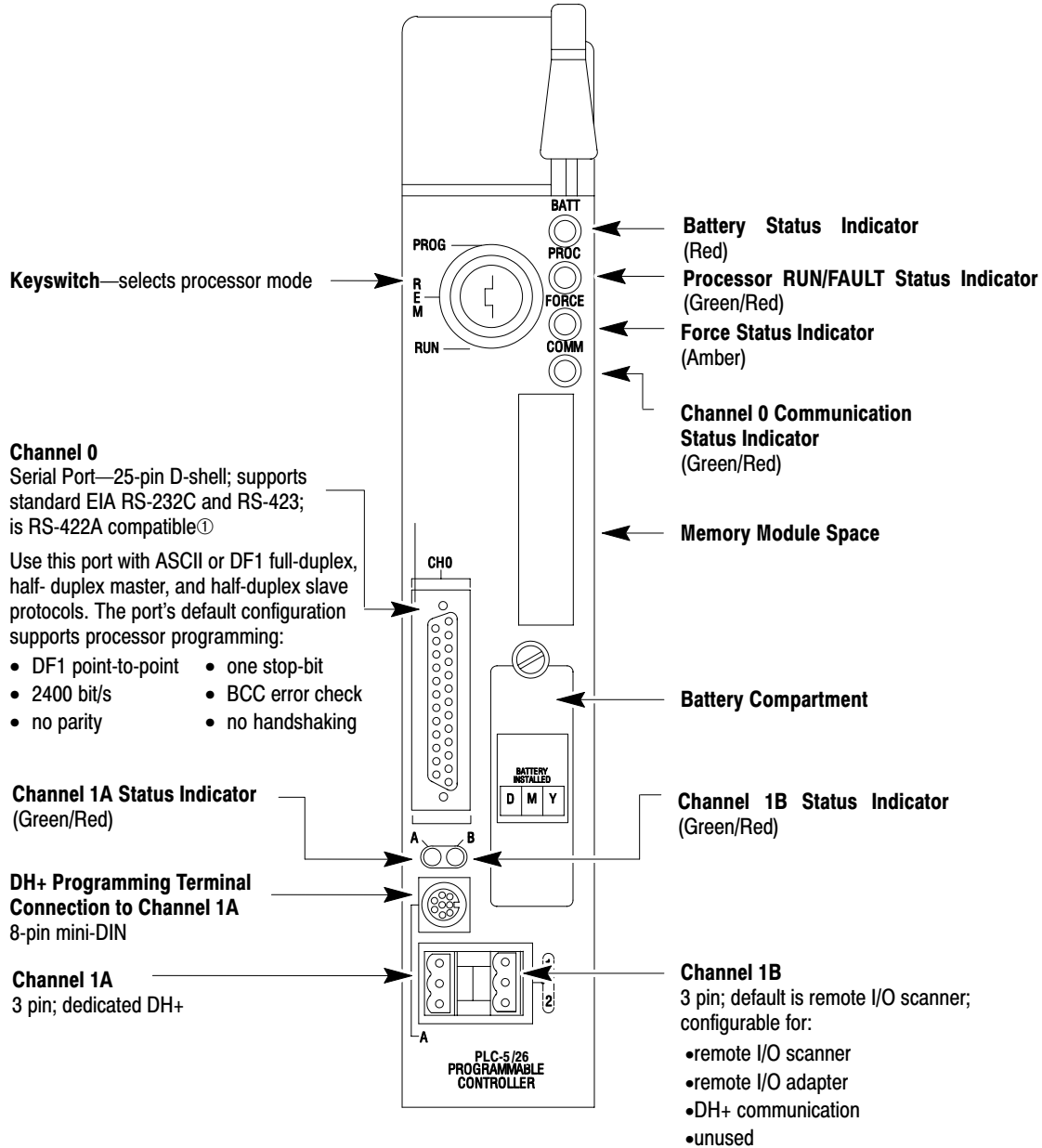
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## Product Data

PLC-5 Protected Processors  
1785-L26B, -L46B, -L86B

**Figure 2**  
**PLC-5/26 Processor Front Panels**



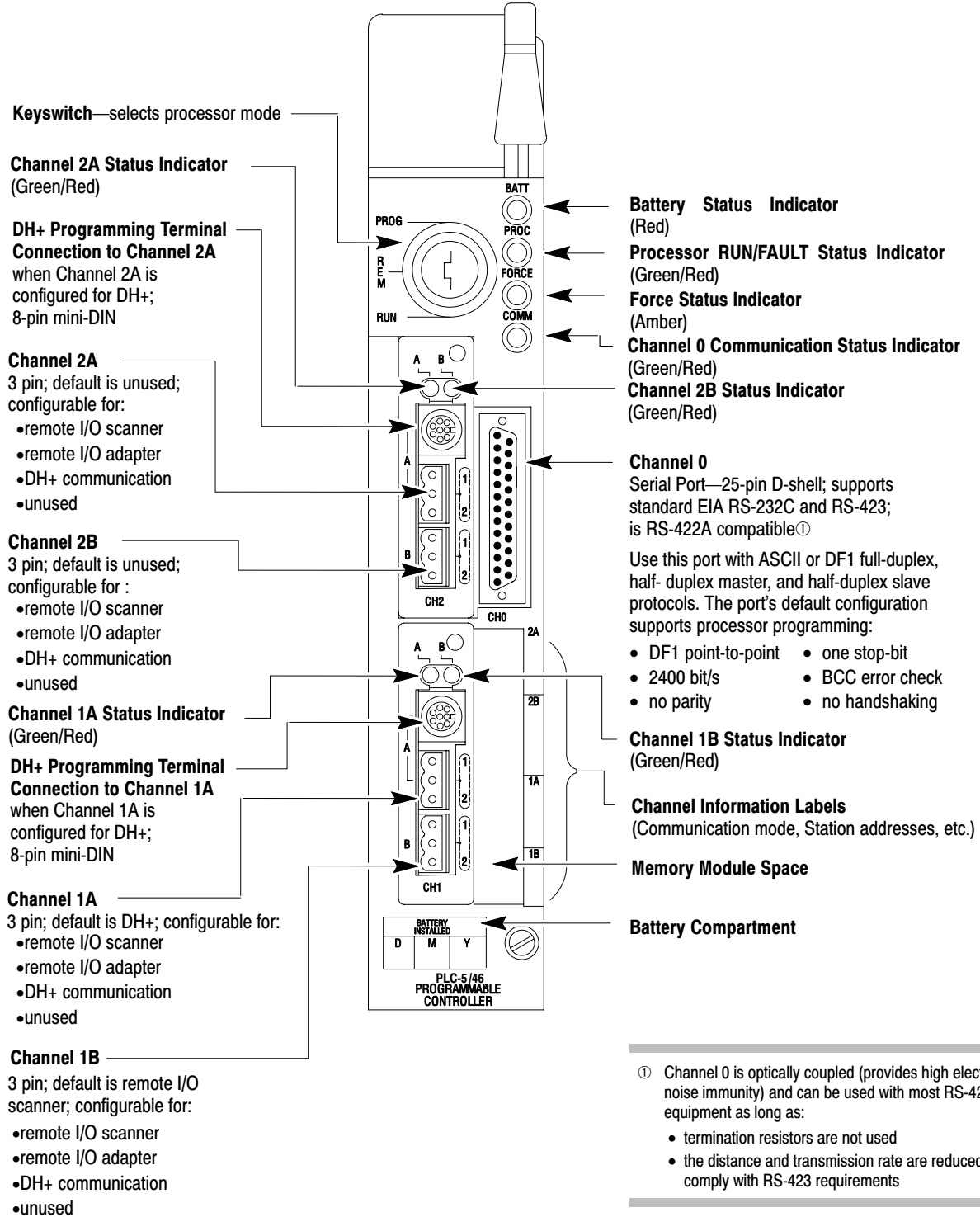
<sup>①</sup> Channel 0 is optically coupled (provides high electrical noise immunity) and can be used with most RS-422A equipment as long as:

- termination resistors are not used
- the distance and transmission rate are reduced to comply with RS-423 requirements

## Product Data

PLC-5 Protected Processors  
1785-L26B, -L46B, -L86B

**Figure 3**  
**PLC-5/46 and -5/86 Processor Front Panels**



<sup>①</sup> Channel 0 is optically coupled (provides high electrical noise immunity) and can be used with most RS-422A equipment as long as:

- termination resistors are not used
- the distance and transmission rate are reduced to comply with RS-423 requirements

## Processor Specifications

<b>Backplane Current</b>	PLC-5/26 . . . . . 2.3A PLC-5/46, -5/86 . . 3.3A
<b>Heat Dissipation</b>	PLC-5/26 . . . . . 41.30 BTU/hr PLC-5/46, -5/86 . . 59.04 BTU/hr
<b>Environmental Conditions</b>	Operating Temperature . . . . . 0 to 60° C (32-140° F) Storage Temperature . . . . . – 40 to 85° C (– 40 to 185° F) Relative Humidity . . . . . 5 to 95% (without condensation)
<b>Time-of-Day Clock/Calender</b>	Maximum Variations at 60° C . ± 5 min per month Typical Variations at 20° C . . . ± 20 s per month Timing Accuracy . . . . . 1 program scan
<b>Battery</b>	1770-XYC
<b>Memory Modules</b>	1785-ME16                      1785-ME64 1785-ME32                      1785-M100
<b>Typical Discrete I/O Scan</b>	<ul style="list-style-type: none"> <li>• 10 ms / remote I/O adapter communication at 57.6 kbps</li> <li>• 7 ms / remote I/O adapter communication at 115.2 kbps</li> <li>• 3 ms / remote I/O adapter communication at 230.4 kbps</li> </ul>
<b>I/O Modules</b>	Bulletin 1771 I/O including 8-, 16-, 32-pt, and intelligent modules
<b>Hardware Addressing</b>	2-slot <ul style="list-style-type: none"> <li>• Any mix of 8-pt modules</li> <li>• 16-pt modules must be I/O pairs</li> <li>• No 32-pt modules</li> </ul> 1-slot <ul style="list-style-type: none"> <li>• Any mix of 8- or 16-pt modules</li> <li>• 32-pt modules must be I/O pairs</li> </ul> 1/2-slot — Any mix of 8-,16-, or 32-pt modules
<b>Communication</b>	<ul style="list-style-type: none"> <li>• DH+ (trunk line: 3,048 cable-m (10,000 cable-ft); drop line: 30.4 cable-m (100 cable-ft))</li> <li>• DH using 1785-KA</li> <li>• Serial</li> </ul>
<b>Location</b>	1771-I/O chassis, left-most slot
<b>Keying</b>	<ul style="list-style-type: none"> <li>• Between 40 and 42</li> <li>• Between 54 and 56</li> </ul>
<b>Agency Certification</b> (When product is marked)	<ul style="list-style-type: none"> <li>• CSA Class I, Division 2, Groups A, B, C, D</li> <li>• UL listed</li> </ul>



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