



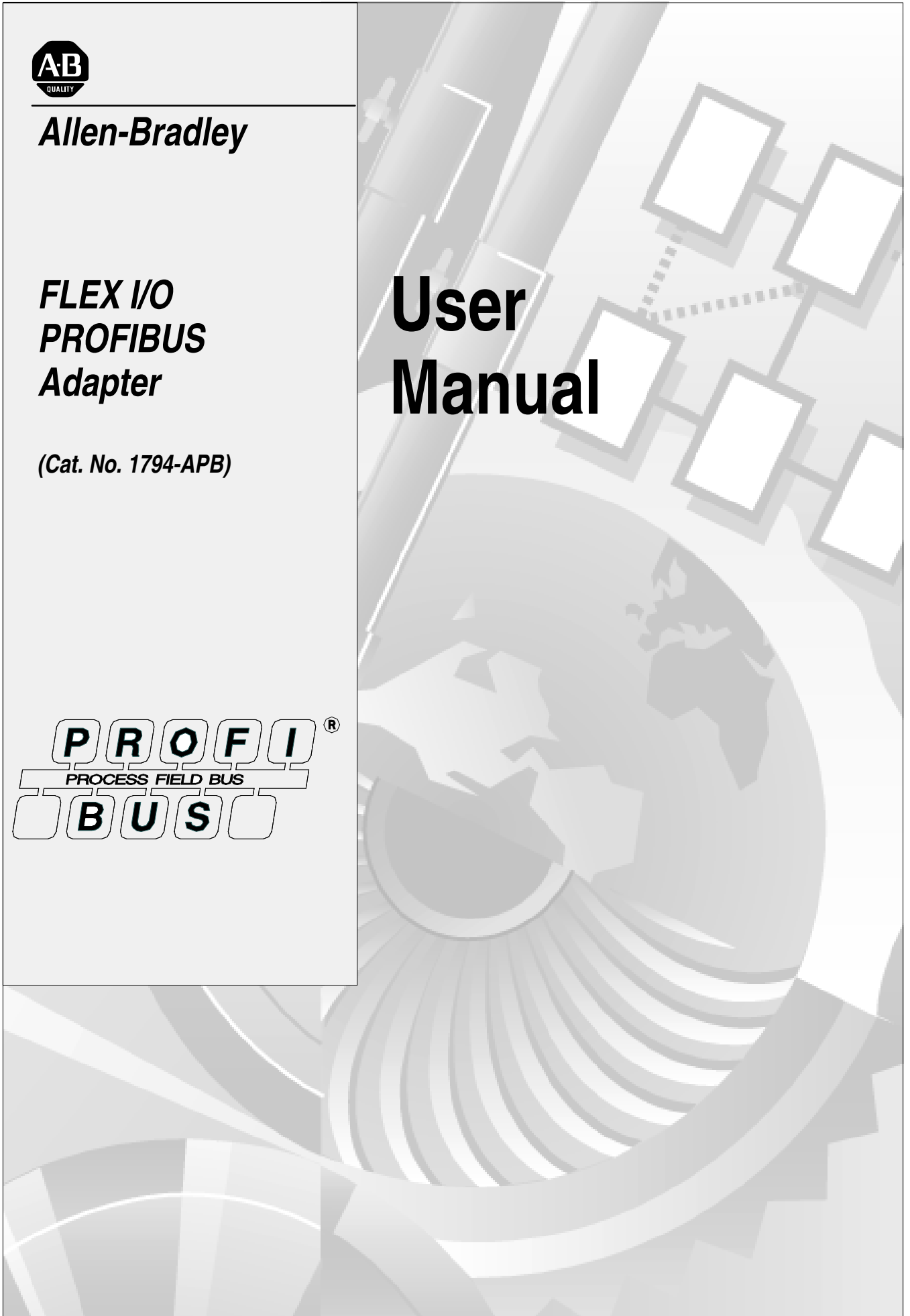
Allen-Bradley

**FLEX I/O
PROFIBUS
Adapter**

(Cat. No. 1794-APB)



User Manual



Important User Information

Solid state equipment has operational characteristics differing from those of electromechanical equipment. “Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls” (Publication SGI-1.1) describes some important differences between solid state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

In no event will the Allen-Bradley Company be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, the Allen-Bradley Company cannot assume responsibility or liability for actual use based on the examples and diagrams.

No patent liability is assumed by Allen-Bradley Company with respect to use of information, circuits, equipment, or software described in this manual.

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Throughout this manual we use notes to make you aware of safety considerations.



ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss.

Attentions help you:

- identify a hazard
- avoid the hazard
- recognize the consequences

Important: Identifies information that is especially important for successful application and understanding of the product.

About this User Manual

Purpose

Use this manual to install and configure your FLEX I/O™ PROFIBUS Adapter, cat. no. 1794-APB.

Vocabulary

In this manual, we refer to:

- the FLEX I/O PROFIBUS adapter module as the “adapter”
- the programmable controller as the “processor”

What this Manual Contains

The following table shows what each chapter of this manual describes:

Chapter	Title	Describes
1	Overview of FLEX I/O and Your PROFIBUS Adapter	The FLEX I/O system and PROFIBUS adapter.
2	How Communication Takes Place and I/O Mapping	Backplane communication between the modules and the adapter, and how data is mapped into the image table.
3	Connect the Adapter to the PROFIBUS DP Network	The DP physical layer, how to select the line type you should use and how to connect to and terminate the network.
4	Configure the Adapter for Master/Slave Communication	How to configure the adapter for master/slave communication.
5	Troubleshooting	How to use the indicators for troubleshooting.
Appendix A	Specifications	Adapter specifications.
Appendix B	Device Data Base File	Device Data Base (GSD) File.

Related Publications

For additional information on planning and installing your PROFIBUS system using FLEX I/O modules, refer to the following publications:

Catalog Number	Description	Related Publications	
		Pub. Type	Pub. Number
1794-APB	24V dc PROFIBUS Adapter	Installation Instructions	1794-5.40
1794-TB2 1794-TB3	2-wire Terminal Base 3-wire Terminal Base	Installation Instructions	1794-5.2
1794-TBN	Terminal Base Unit	Installation Instructions	1794-5.16
1794-TBNF	Fused Terminal Base Unit	Installation Instructions	1794-5.17
1794-PS1	Power Supply	Installation Instructions	1794-5.35
1794-IB16	24V dc 16 Input Module	Installation Instructions	1794-5.4
1794-OB16	24V dc 16 Output Module	Installation Instructions	1794-5.3
1794-IR8	24V dc RTD Analog 8 Input Module	Installation Instructions User Manual	1794-5.22 1794-6.5.4
1794-IT8	24V dc Thermocouple Analog 8 Input Module	Installation Instructions User Manual	1794-5.21 1794-6.5.7
1794-IE8	24V dc Selectable Analog 8 Input Module	Installation Instructions User Manual	1794-5.6 1794-6.5.2
1794-OE4	24V dc Selectable Analog 4 Output Module	Installation Instructions User Manual	1794-5.5 1794-6.5.2
1794-IE4XOE2	24V dc 4 Input/2 Output Analog Combo Module	Installation Instructions User Manual	1794-5.15 1794-6.5.2
1794-IB8S	24V dc Sensor Input Module	Installation Instructions	1794-5.7
1794-IA8	120V ac 8 Input Module	Installation Instructions	1794-5.9
1794-OA8	120V ac 8 Output Module	Installation Instructions	1794-5.10
1794-OW8	24V dc 8 Relay Output Module	Installation Instructions	1794-5.19
1794-CE1	Extender Cable	Installation Instructions	1794-5.12
1794-NM1	Mounting Kit	Installation Instructions	1794-5.13

To order these publications, contact your local Allen-Bradley representative.

Conventions



More Information...

This icon appears when more information is available in related documentation.

Compliance to European Union Directives

If this product has the CE mark it is approved for installation within the European Union and EEA regions. It has been designed and tested to meet the following directives.

EMC Directive

This product is tested to meet Council Directive 89/336/EEC Electromagnetic Compatibility (EMC) and the following standards, in whole or in part, documented in a technical construction file:

- EN 50081-2EMC – Generic Emission Standard, Part 2 – Industrial Environment
- EN 50082-2EMC – Generic Immunity Standard, Part 2 – Industrial Environment

This product is intended for use in an industrial environment.

Low Voltage Directive

This product is tested to meet Council Directive 73/23/EEC Low Voltage, by applying the safety requirements of EN 61131–2 Programmable Controllers, Part 2 – Equipment Requirements and Tests.

For specific information required by EN 61131-2, see the appropriate sections in this publication, as well as the following Allen-Bradley publications:

- Industrial Automation Wiring and Grounding Guidelines For Noise Immunity, publication 1770-4.1
- Guidelines for Handling Lithium Batteries, publication AG-5.4
- Automation Systems Catalog, publication B111

Overview of FLEX I/O and Your PROFIBUS Adapter Module

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Overview of FLEX I/O and Your PROFIBUS Adapter Module

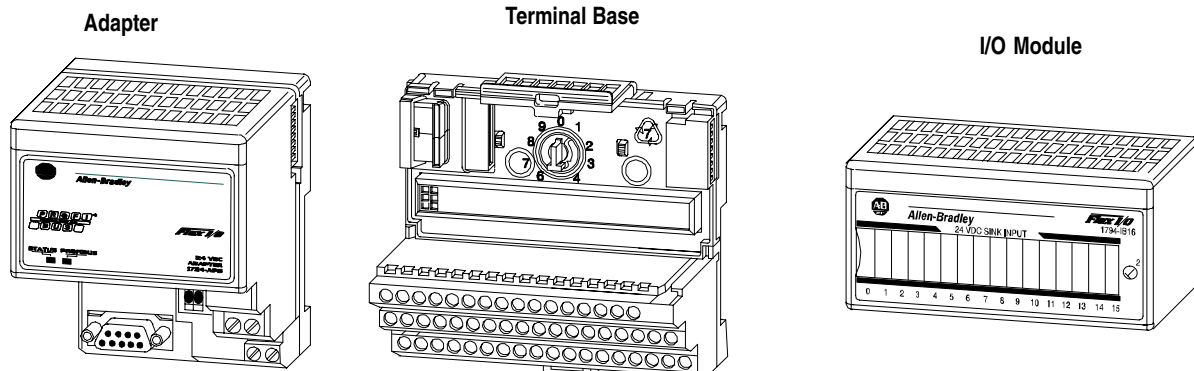
What this Chapter Contains

This chapter describes:

- what the FLEX I/O system is and what it contains
- how to mount and remove your system easily
- optional accessories
- mounting dimensions and spacing requirements
- the 1794-APB FLEX I/O PROFIBUS Adapter
- adapter components
- how to connect power wiring

The FLEX I/O System

FLEX I/O is a small, modular I/O system for distributed applications that performs all of the functions of rack-based I/O. The FLEX I/O system contains the following components:



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- PROFIBUS adapter/power supply – powers the internal logic for as many as eight I/O modules
- terminal base – contains a terminal strip to terminate wiring for two- or three-wire devices
- I/O module – contains the bus interface and circuitry needed to perform specific functions related to your application

For information on how communication occurs over the FLEX I/O system backplane, refer to Chapter 2.

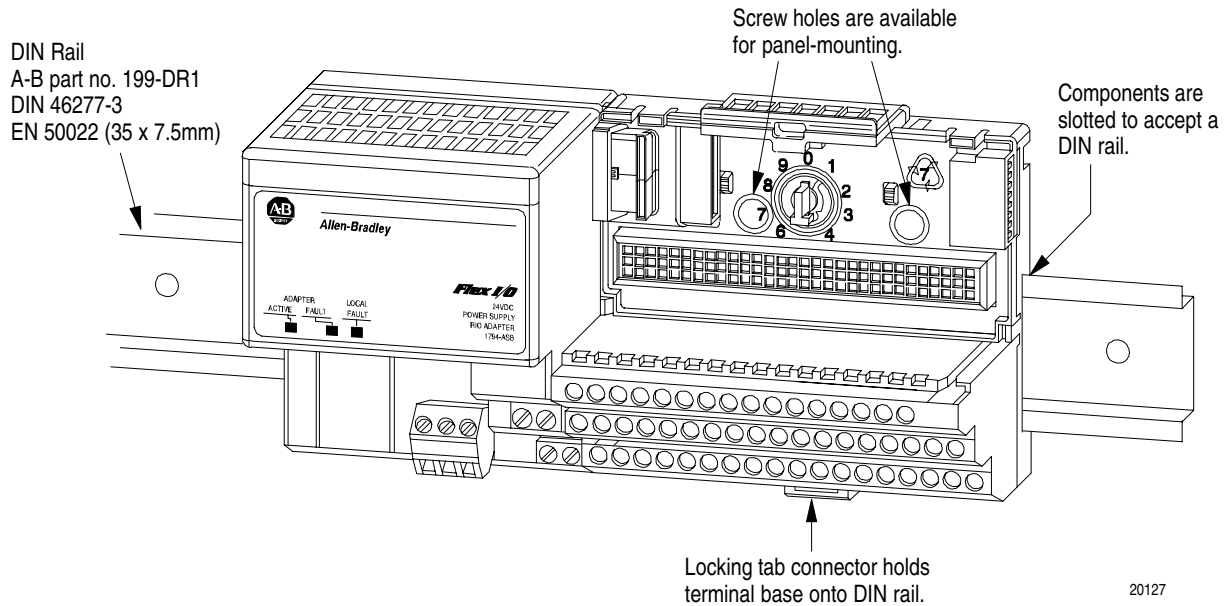


More Information...

Mount and Remove your System Easily

You can horizontally or vertically mount the FLEX I/O system on a standard DIN rail. The adapter and terminal base easily snap on the DIN rail by hand. Refer to the installation instructions shipped with these components.

Screw holes are also provided to horizontally or vertically panel-mount your system in an enclosure. To panel-mount your FLEX I/O system, use the optional mounting kit (1794-NM1). An example of a DIN rail-mounted system is shown below.

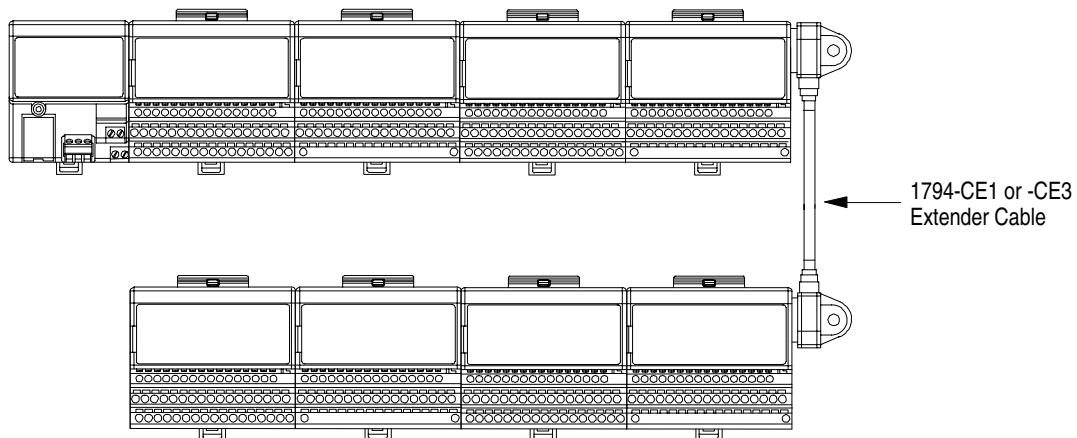


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Optional Accessories

Extender Cables (1794-CE1 or -CE3)

Use the optional 1794-CE1 (0.3m) or -CE3 (0.9m) extender cable (one per system) to arrange your system in two rows or split your system into horizontal and vertical orientation.



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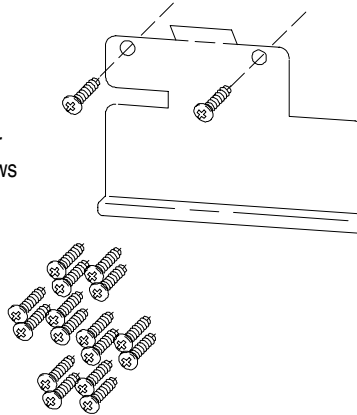


ATTENTION: This cable can only be used between I/O modules. Do not use between the adapter and I/O modules. Do not use more than one cable per system.

Mounting Kit (1794-NM1)

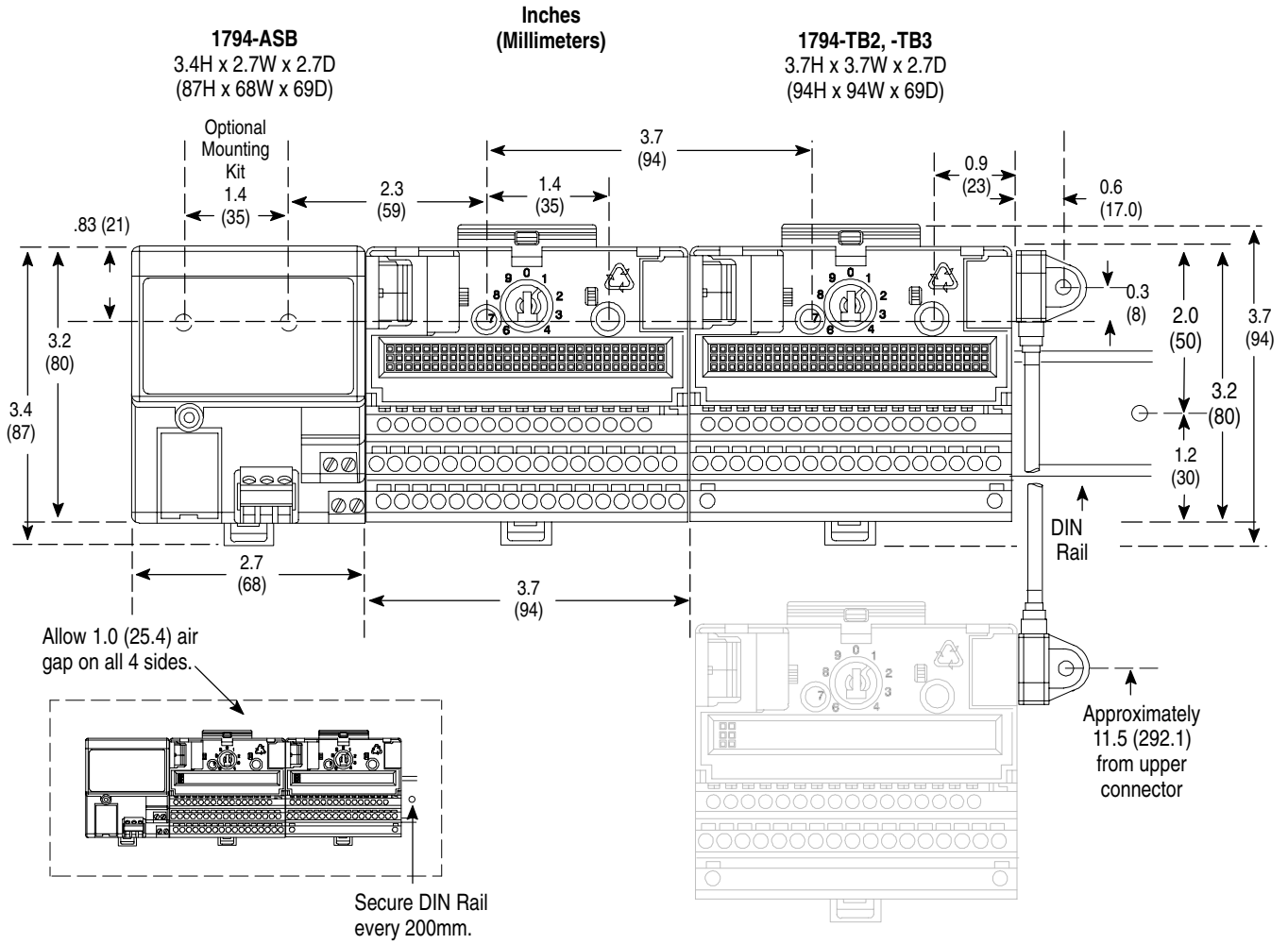
Use the optional 1794-NM1 mounting kit to mount your system on a panel or wall without a DIN rail.

1794-NM1
Mounting Kit with
18 screws (2 screws for
the adapter and 2 screws
for each module)



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Mounting Dimensions and Spacing Requirements

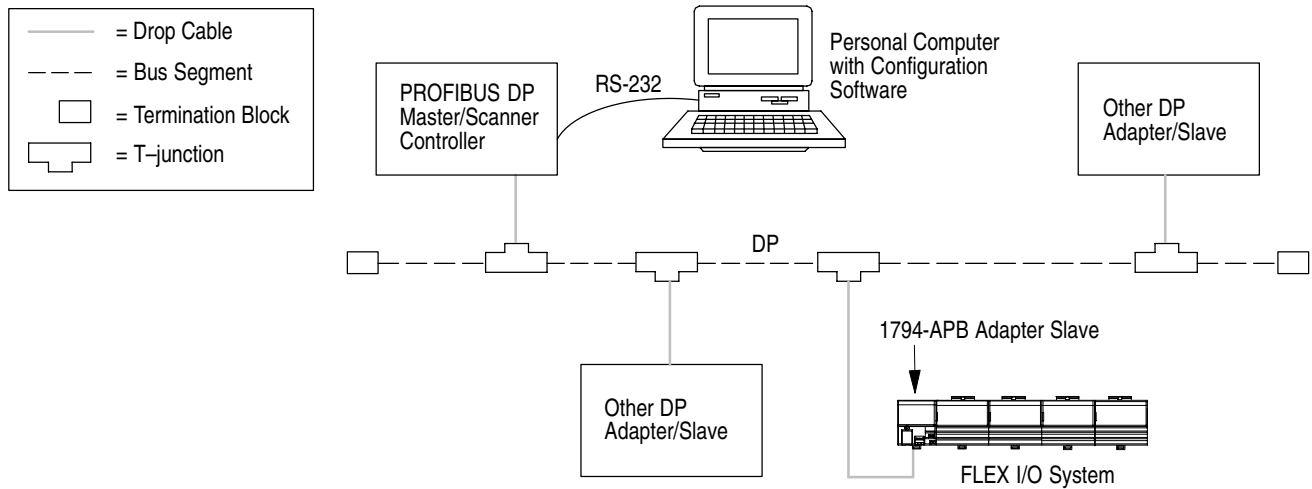


Purpose of the 1794-APB FLEX I/O Adapter

The 1794-APB is a FLEX I/O adapter that interacts with the FLEX I/O backplane and any PROFIBUS DP master/scanner controller on a PROFIBUS DP network.

The 1794-APB module is a slave device to the DP master/scanner, and is a master controller of the FLEX I/O system where it is installed.

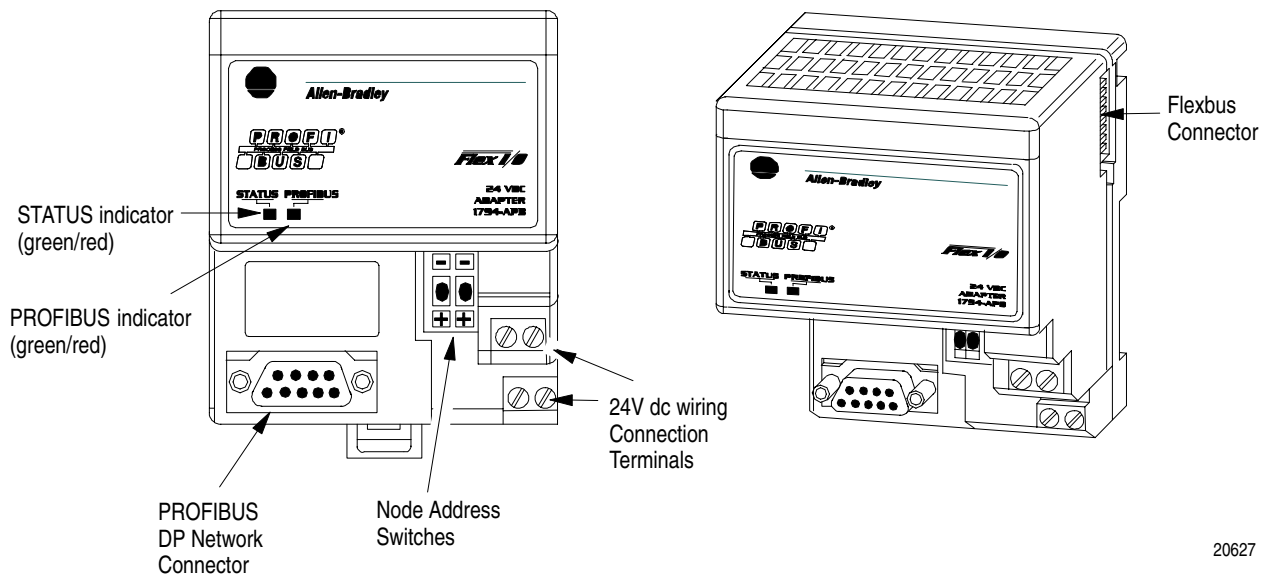
The I/O data exchange occurs as follows: Output data is sent from the DP master/scanner controller across the PROFIBUS DP network to the 1794-APB adapter. The adapter then automatically transfers the data across the FLEX I/O backplane to the output modules. Inputs from the input modules are collected by the FLEX I/O adapter via the backplane and sent across the PROFIBUS DP network to the DP master/scanner controller.



PROFIBUS Adapter Components

The adapter module consists of the following components:

- two diagnostic indicators
- PROFIBUS DP network connector
- 24V dc power wiring connection terminals
- two node address switches



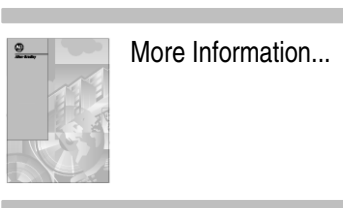
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Diagnostic Indicators

Diagnostic indicators are located on the front panel of the adapter module. They show both normal operation and error conditions in your FLEX I/O system. The indicators are:

- Device status (STATUS)
- Communication link status (PROFIBUS)

Upon power-up, the adapter goes to an initialization state and performs a self-test (memory check, data memory clear, CRC on code). The indicators also go through a self-test sequence. If a failure occurs, the adapter transitions to a faulted state and waits for reset (cycle power). Otherwise, the adapter begins monitoring the network (run state) for messages.



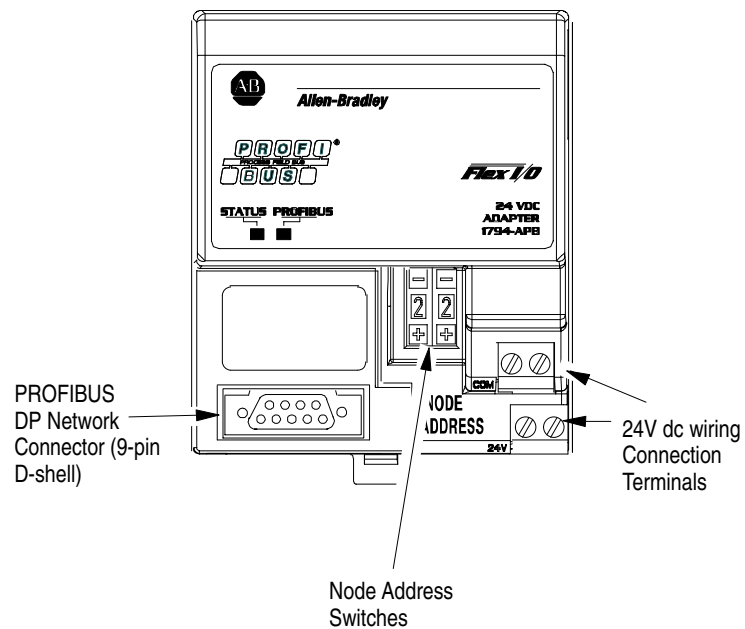
Chapter 5 describes the diagnostic indicators and how to use them for troubleshooting.

Network Connector

Use the 9-pin D-shell connector to connect your adapter to the PROFIBUS network.

Setting the Node Address Switches

Set the node address using the 2-position thumbwheel switch. Valid settings range from 01 to 99. Use a pen to press either the + or – buttons to change the number.



Power Wiring

Connections are provided for connecting the required 24V dc power to the front of the module. The power wiring can be daisy-chained to the terminal base unit located next to the adapter to supply power to the module installed in that base unit.



More Information...

Refer to the Installation Instructions (pub. no. 1794-5.40) you received with your adapter to learn how to install and wire the adapter.

How Communication Takes Place and I/O Image Table Mapping

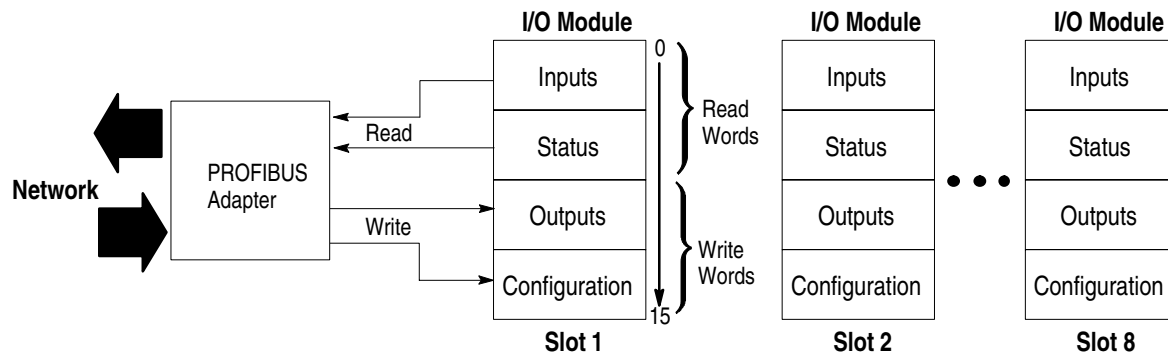
What this Chapter Contains

In this chapter, you will learn about:

- communication over the FLEX I/O backplane (between the PROFIBUS adapter and the I/O modules)
- how data is mapped into the I/O image table

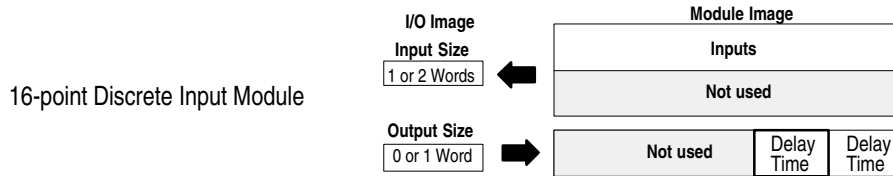
Communication Over the I/O Backplane

One 1794-APB PROFIBUS adapter can interface with up to eight terminal base units with installed FLEX I/O modules, forming a FLEX I/O system of up to eight slots. The adapter communicates to other network system components over the PROFIBUS network. The adapter communicates with its I/O modules over the backplane.



The I/O map for a module is divided into read words and write words. Read words consist of input and status words, and write words consist of output and configuration words. The number of read words or write words can be 0 or more. The length of each I/O module's read words and write words vary in size depending on module complexity. Each I/O module will support at least 1 input word or 1 output word. Status and configuration are optional, depending on the module.

For example, a 16 point discrete input module will have up to 2 read words and 1 write word.

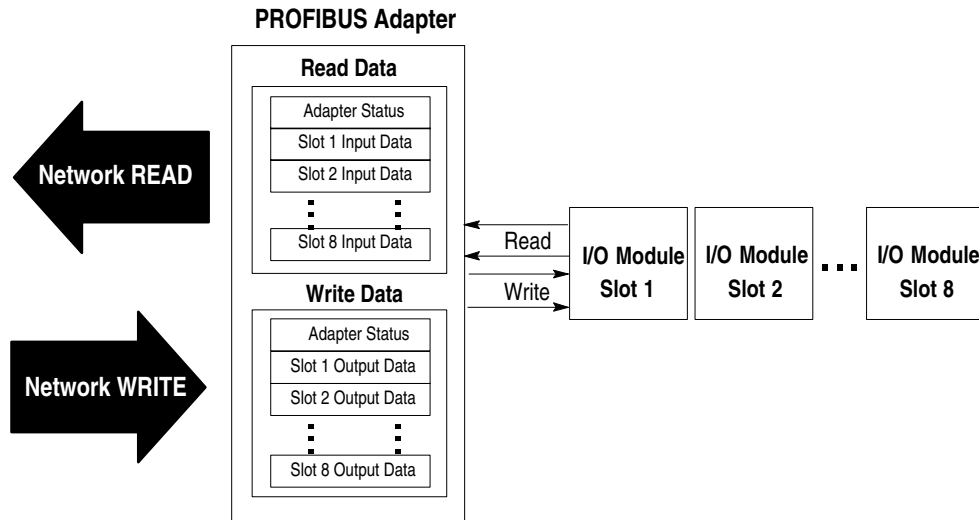


Check the I/O map for each module for the exact mapping.

Polled I/O Structure

The first word of output data sent by the adapter is the Adapter Status Word. Output data is received by the adapter in the order of the installed I/O modules. The Output data for Slot 1 is received first, followed by the Output data for Slot 2, and so on up to slot 8. All bits in the output status word are reserved

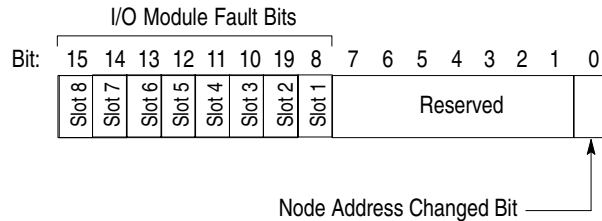
The first word of input data sent by the adapter is the Adapter Status Word. This is followed by the input data from each slot, in the order of the installed I/O modules. The Input data from Slot 1 is first after the status word, followed by Input data from Slot 2, and so on up to slot 8.



Adapter Input Status Word

The input status word consists of:

- I/O module fault bits – 1 status bit for each slot
- node address changed – 1 bit



The adapter input status word bit descriptions are shown in the following table.

Bit Description	Bit	Explanation
I/O Module Fault	8	This bit is set (1) when an error is detected in slot position 1.
	9	This bit is set (1) when an error is detected in slot position 2.
	10	This bit is set (1) when an error is detected in slot position 3.
	11	This bit is set (1) when an error is detected in slot position 4.
	12	This bit is set (1) when an error is detected in slot position 5.
	13	This bit is set (1) when an error is detected in slot position 6.
	14	This bit is set (1) when an error is detected in slot position 7.
	15	This bit is set (1) when an error is detected in slot position 8.
Reserved	1-7	Reserved
Node Address Changed	0	This bit is set (1) when the node address switch setting has been changed since power up.

Possible causes for an **I/O module fault** are:

- transmission errors on the FLEX I/O backplane
- a failed module
- a module removed from its terminal base
- incorrect module inserted in a slot position
- the slot is empty

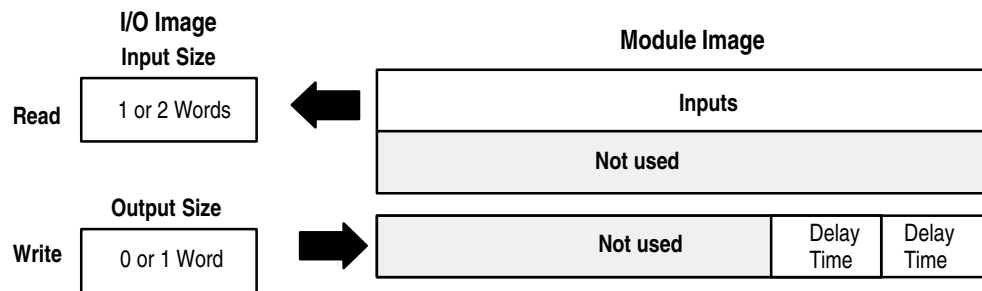
The **node address changed** bit is set when the node address switch setting has been changed since power up. The new node address does not take affect until the adapter has been powered down and then powered back up. Until this power cycling occurs, the node address switches will not match the actual node address.

Mapping Data into the Image Table

All FLEX I/O modules are supported by the PROFIBUS adapter. Presently, these consist of:

Module Description	Catalog Number	For image table mapping, refer to:
16 Sink Input Module	1794-IB16	page 2-4
16 Source Output Module	1794-OB16	page 2-6
8 Sensor Input Module	1794-IB8S	page 2-7
8 Input Module	1794-IA8	page 2-8
8 Output Module	1794-OA8	page 2-8
8 Relay Output Module	1794-OW8	page 2-9
8 Input Analog Module	1794-IE8	page 2-10
4 Output Analog Module	1794-OE4	page 2-12
4 in/2 out Analog Combo Module	1794-IE4XOE2	page 2-15
8 Input RTD Analog Module	1794-IR8	page 2-17
8 Input Thermocouple Module	1794-IT8	page 2-21
SCANport Module	1203-FM1	page 2-25

1794-IB16 – 16-point Discrete Input Module Image Table Mapping



1794-IB16 Memory Map

Decimal Bit	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	Size
Octal Bit	17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	Read Words
	D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0	Read Word 1
	Not used															Read Word 2	

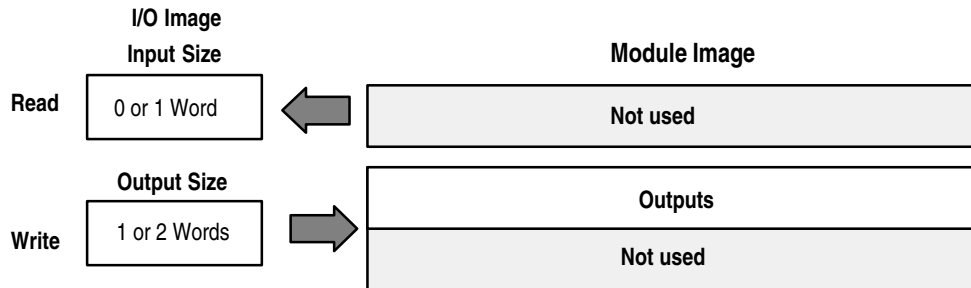
Octal Bit	17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	Read Words
	Not used										DT 12-15			DT 00-11		Write Word 1	

Where D = Input Data (D0 corresponds to input 0, D1 corresponds to input 1, etc.
 DT = Input Delay Time (DT 00-11 corresponds to inputs 0 thru 11; DT 12-15 corresponds to inputs 12 thru 15)

1794-IB16 Input Delay Times

Bits			Description	Selected Delay Time
02	01	00	Delay Time for Inputs 00-11	
05	04	03	Delay Time for Inputs 12-15	
0	0	0	Delay Time 0 (default)	512µs
0	0	1	Delay Time 1	1ms
0	1	0	Delay Time 2	2ms
0	1	1	Delay Time 3	4ms
1	0	0	Delay Time 4	8ms
1	0	1	Delay Time 5	16ms
1	1	0	Delay Time 6	32ms
1	1	1	Delay Time 7	64ms

1794-OB16 – 16-point Discrete Output Module Image Table Mapping

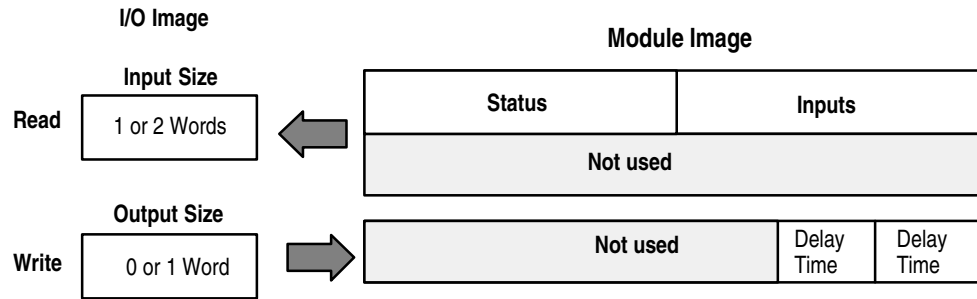


1794-OB16 Memory Map

Decimal Bit	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	Size
Octal. Bit	17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	Read Words
	Not used																Read Word 1
	O15	O14	O13	O12	O11	O10	O9	O8	O7	O6	O5	O4	O3	O2	O1	O0	Write Word 1
	Not used																Write Word 2

Where O = Output value (O0 corresponds to output 0, O1 corresponds to output 1, etc.)

1794-IB8S – 8-point Discrete Sensor Input Module Image Table Mapping



1794-IB8S Memory Map

Decimal Bit	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	Size
Octal Bit	17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	Read Words
	S7	S6	S5	S4	S3	S2	S1	S0	D7	D6	D5	D4	D3	D2	D1	D0	Read Word 1
	Not used															Read Word 2	
	Not used									DT 12-15			DT 00-11			Write Word 1	

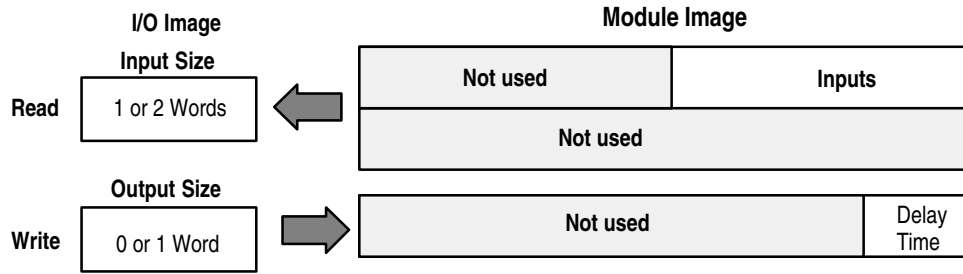
Where S = Status of input (where S1 corresponds to the diagnostic bit for input 1, S2 corresponds to the diagnostic bit for input 2, etc.)
 D = Input Data (where D0 corresponds to input 0, D1 corresponds to input 1, etc.)
 DT = Input Delay Time (where DT 00-11 corresponds to inputs 0 thru 11; DT 12-15 corresponds to inputs 12 thru 15.
Make certain that the delay time for 00-11 is the same as the delay time for 12-15.

Smart Sensor						
Bits 08-15	S = Diagnostic data – 1 = Fault present (Smart) 0 = Normal (no errors)			Bits 00-07	D = Input data 1 = Sensor on 0 = Sensor off	
Standard Sensor						
Bits 08-15	S = Diagnostic data – 1 = Diagnostics not disabled 0 = Normal (Disabled)			Bits 00-07	D = Input data 1 = Sensor on 0 = Sensor off	

1794-IB8S Input Delay Times

Bits			Description	Selected Delay Time
02	01	00	Delay Time for Inputs 00-11	
05	04	03	Delay Time for Inputs 12-15	
0	0	0	Delay Time 0 (default)	512µs
0	0	1	Delay Time 1	1ms
0	1	0	Delay Time 2	2ms
0	1	1	Delay Time 3	4ms
1	0	0	Delay Time 4	8ms
1	0	1	Delay Time 5	16ms
1	1	0	Delay Time 6	32ms
1	1	1	Delay Time 7	64ms

1794-IA8 – 8-point Discrete Input Module Image Table Mapping



1794-IA8 Memory Map

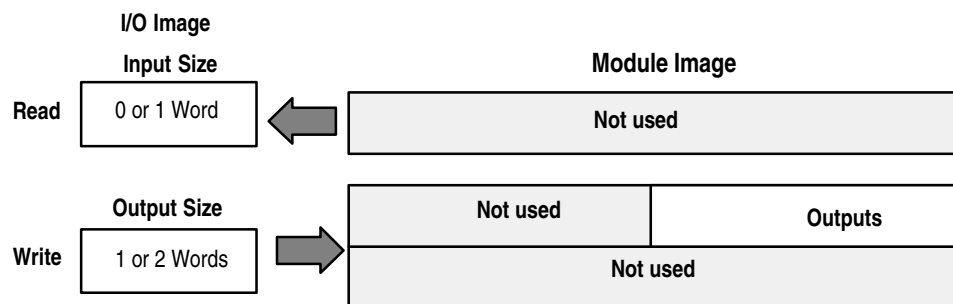
Decimal Bit	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	Size
Octal Bit	17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	Read Words
	Not used								D7	D6	D5	D4	D3	D2	D1	D0	Read Word 1
	Not used																Read Word 2
	Not used												DT 00-07				Write Word 1

Where D = Input Data (where D0 corresponds to input 0, D1 corresponds to input 1, etc.
 DT = Input Delay Time (where DT 00-07 corresponds to inputs 0 thru 7)

1794-IA8 Input Delay Times

Bits			Description	Maximum Delay Time	
02	01	00	Delay Time for Inputs 00-07	Off to On	On to Off
0	0	0	Delay Time 0 (default)	8.6ms	26.6ms
0	0	1	Delay Time 1	9ms	27ms
0	1	0	Delay Time 2	10ms	28ms
0	1	1	Delay Time 3	12ms	30ms
1	0	0	Delay Time 4	17ms	35ms
1	0	1	Delay Time 5	26ms	44ms
1	1	0	Delay Time 6	43ms	61ms
1	1	1	Delay Time 7	78ms	96ms

1794-OA8 – 8-point Discrete Output Module Image Table Mapping

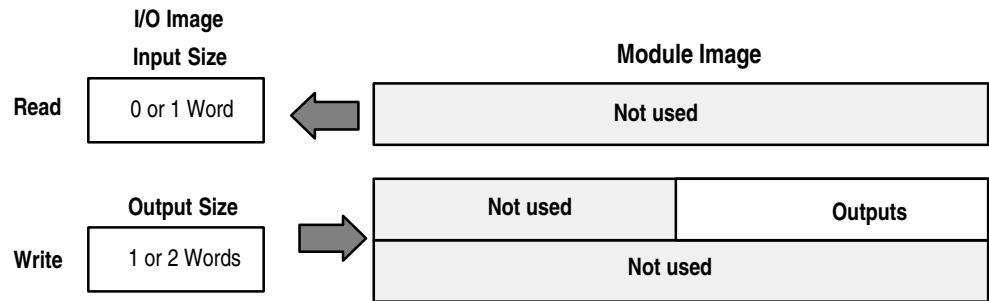


1794-OA8 Memory Map

Decimal Bit	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	Size
Oct. Bit	17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	Read Words
	Not used																Read Word 1
	Not used								O7	O6	O5	O4	O3	O2	O1	O0	Write Word 1
	Not used																Write Word 2

Where O = Output value (where O0 corresponds to output 0, O1 corresponds to output 1, etc.)

1794-OW8 – 8-point Discrete Relay Output Module Image Table Mapping

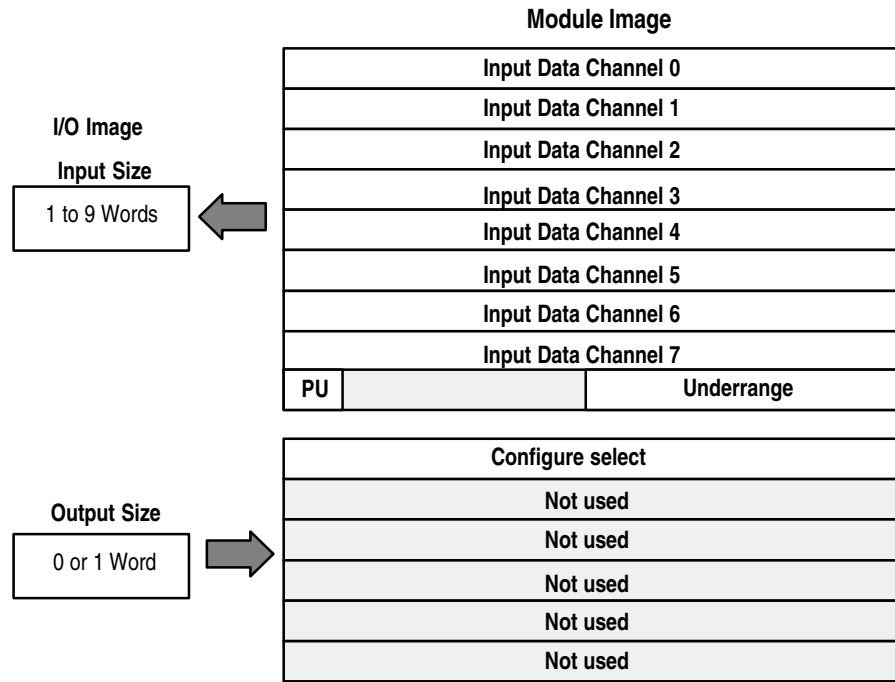


1794-OW8 Memory Map

Decimal Bit	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	Size
Oct. Bit	17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	Read Words
	Not used																Read Word 1
	Not used								O7	O6	O5	O4	O3	O2	O1	O0	Write Word 1
	Not used																Write Word 2

Where O = Output value: where O0 corresponds to output 0, O1 corresponds to output 1, etc., and when bit = 0, the output is off; when bit = 1, the output is on.

1794-IE8 – 8 Input Analog Module



1794-IE8 Memory Map

Decimal Bit	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	Size
Oct. Bit	17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	Read Words
	S	Analog Value Channel 0														Read Word 1	
	S	Analog Value Channel 1														Read Word 2	
	S	Analog Value Channel 2														Read Word 3	
	S	Analog Value Channel 3														Read Word 4	
	S	Analog Value Channel 4														Read Word 5	
	S	Analog Value Channel 5														Read Word 6	
	S	Analog Value Channel 6														Read Word 7	
	S	Analog Value Channel 7														Read Word 8	
	PU	Not used – set to zero							U7	U6	U5	U4	U3	U2	U1	U0	Read Word 9
	C7	C6	C5	C4	C3	C2	C1	C0	F7	F6	F5	F4	F3	F2	F1	F0	Write Word 1
	Not used – set to 0															Write Word 2 thru 6	

Where: PU = Power up bit – included in series B modules only.
 U = Underrange bits for 4-20mA inputs
 C = Configure select bit
 F = Full range bit
 S = sign bit (in 2's complement)

1794-IE8 Range Selection Bits

Channel No.	Channel 0		Channel 1		Channel 2		Channel 3		Channel 4		Channel 5		Channel 6		Channel 7	
	F0	C0	F1	C1	F2	C2	F3	C3	F4	C4	F5	C5	F6	C6	F7	C7
Decimal Bit	00	08	01	09	02	10	03	11	04	12	05	13	06	14	07	15
0-10V dc/0-20mA	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
4-20mA	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
-10 to +10V dc	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Do Not Use ¹	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

C = Configure select bit

F = Full range bit

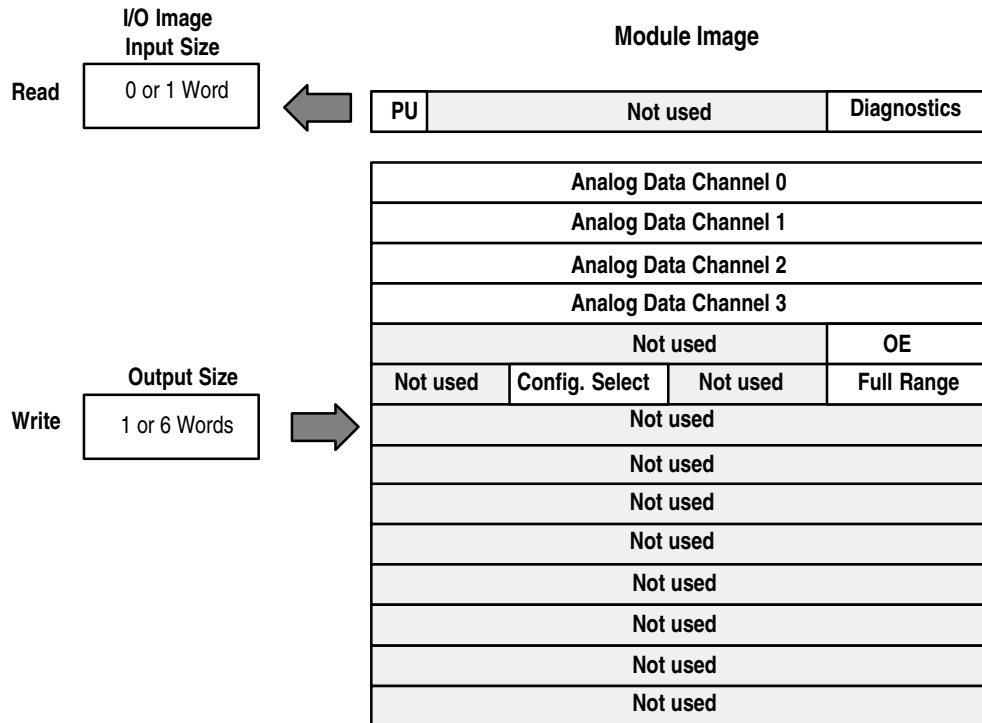
¹ Do not use this configuration. Individual channels revert to 4-20mA if bit selection is all zeroes.

1794-IE8 Word/Bit Descriptions

Word	Decimal Bit	Definition
Read Word 1	Bits 00-14	Channel 0 analog data – 12-bit left justified two's complement number; unused lower bits are zero; 4-20mA uses all 16 bits.
	Bits 15	Channel 0 analog data sign bit.
Read Word 2	Bits 00-14	Channel 1 analog data – 12-bit left justified two's complement number; unused lower bits are zero; 4-20mA uses all 16 bits.
	Bits 15	Channel 1 analog data sign bit.
Read Word 3	Bits 00-14	Channel 2 analog data – 12-bit left justified two's complement number; unused lower bits are zero; 4-20mA uses all 16 bits.
	Bits 15	Channel 2 analog data sign bit.
Read Word 4	Bits 00-14	Channel 3 analog data – 12-bit left justified two's complement number; unused lower bits are zero; 4-20mA uses all 16 bits.
	Bits 15	Channel 3 analog data sign bit.
Read Word 5	Bits 00-14	Channel 4 analog data – 12-bit left justified two's complement number; unused lower bits are zero; 4-20mA uses all 16 bits.
	Bits 15	Channel 4 analog data sign bit.
Read Word 6	Bits 00-14	Channel 5 analog data – 12-bit left justified two's complement number; unused lower bits are zero; 4-20mA uses all 16 bits.
	Bits 15	Channel 5 analog data sign bit.
Read Word 7	Bits 00-14	Channel 6 analog data – 12-bit left justified two's complement number; unused lower bits are zero; 4-20mA uses all 16 bits.
	Bits 15	Channel 6 analog data sign bit.
Read Word 8	Bits 00-14	Channel 7 analog data – 12-bit left justified two's complement number; unused lower bits are zero; 4-20mA uses all 16 bits.
	Bits 15	Channel 7 analog data sign bit.

Word	Decimal Bit	Definition
Read Word 9	Bits 00-07	Underrange bits (U) for individual channels (4-20mA current input only)– Bit 00 corresponds to input channel 0, bit 01 corresponds to input channel 1, and so on. When set (1), indicates either a broken or open input wire, or input current below 4-20mA.
	Bits 08-14	Not used – set to 0.
	Bit 15	Power Up bit – included in series B modules only. This bit is 0 in series A modules. This bit is set to 1 when all bits in the configuration register are 0 (unconfigured state). The configuration register can be cleared by either of the reset inputs, or by the user writing all zeroes to it.
Write Word 1	Bits 00-07	Full range bits (F) for individual channels – Bit 00 corresponds to input channel 0, bit 01 corresponds to input channel 1, and so on. Refer to range selection above.
	Bits 08-15	Configure select bits (C) for individual channels – Bit 08 corresponds to input channel 0, bit 09 corresponds to input channel 1, and so on. Refer to range selection above.
Write Word 2	Bits 00-15	Not used – set to 0.
Write Word 3	Bits 00-15	Not used – set to 0.
Write Word 4	Bits 00-15	Not used – set to 0.
Write Word 5	Bits 00-15	Not used – set to 0.
Write Word 6	Bits 00-15	Not used – set to 0.

1794-OE4 – 4 Output Analog Module Image Table Mapping



1794-OE4 Memory Map

Decimal Bit	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	Size
Oct. Bit	17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	Read Words
	PU	Not used – set to 0											W3	W2	W1	W0	Read Word 1
	S	Analog Data – Channel 0														Write Word 1	
	S	Analog Data – Channel 1														Write Word 2	
	S	Analog Data – Channel 2														Write Word 3	
	S	Analog Data – Channel 3														Write Word 4	
	Not used – set to 0												OE3	OE2	OE1	OE0	Write Word 5
	Not used – set to 0				C3	C2	C1	C0	Not used – set to 0				F3	F2	F1	F0	Write Word 6
	Not used – set to 0																Write Words 7 thru 14

Where: PU = Power up bit – included in series B modules only.
 W = Diagnostic bits for current output wire broken or load resistance high. (Not used on voltage outputs.)
 S = Sign bit (in 2's complement)
 OE = Output enable bits (bit 00 corresponds to output 0, bit 01 corresponds to output 1 and so on. **ATTENTION: These bits must be set to 1.**)
 C = Configure select bit
 F = Full range bit

1794-OE4 Range Selection Bits (Write Word 6)

Channel No.	Channel 0		Channel 1		Channel 2		Channel 3	
	F0	C0	F1	C1	F2	C2	F3	C3
Decimal Bit	00	08	01	09	02	10	03	11
4–20mA	0	1	0	1	0	1	0	1
0–10V dc/0–20mA	1	0	1	0	1	0	1	0
-10 to +10V dc	1	1	1	1	1	1	1	1
Off ¹	0	0	0	0	0	0	0	0

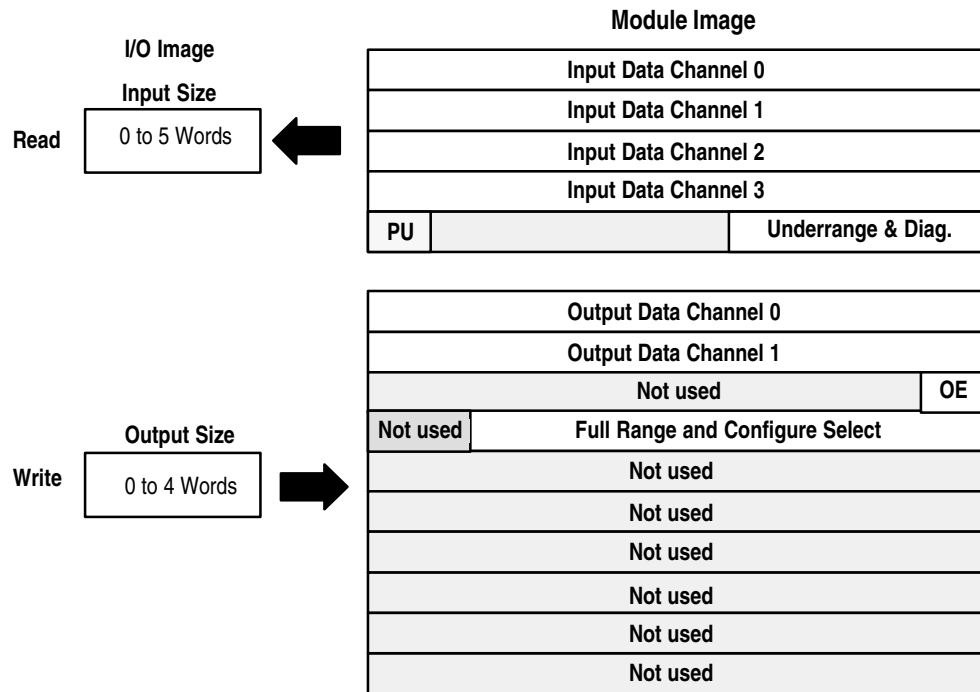
C = Configure select bit
 F = Full range bit
¹ When configured to off, individual channels will return 0V.

1794-OE4 Word/Bit Descriptions

Word	Decimal Bit	Definition
Read Word 1	Bits 00-03	Current outputs only – When set (1), the wire on the output is broken or the load resistance is too high. Bit 00 corresponds to channel 0, bit 01 corresponds to channel 2, and so on.
	Bits 04-14	Not used – set to 0.
	Bit 15	Power Up bit – included in series B modules only. This bit is 0 in series A modules. This bit is set to 1 when all bits in the configuration register are 0 (unconfigured state). The configuration register can be cleared by either of the reset inputs, or by the user writing all zeroes to it.
Write Word 1	Bits 00–14	Channel 0 analog data – 12-bit left justified two's complement number; unused lower bits are zero; 4-20mA uses all 16 bits.
	Bits 15	Channel 0 analog data sign bit.

Word	Decimal Bit	Definition
Write Word 2	Bits 00-14	Channel 1 analog data – 12-bit left justified two's complement number; unused lower bits are zero; 4-20mA uses all 16 bits.
	Bits 15	Channel 1 analog data sign bit.
Write Word 3	Bits 00-14	Channel 2 analog data – 12-bit left justified two's complement number; unused lower bits are zero; 4-20mA uses all 16 bits.
	Bits 15	Channel 2 analog data sign bit.
Write Word 4	Bits 00-14	Channel 3 analog data – 12-bit left justified two's complement number; unused lower bits are zero; 4-20mA uses all 16 bits.
	Bits 15	Channel 3 analog data sign bit.
Write Word 5	Bits 00-03	Output Enable bits. Bit 00 corresponds to input 0, bit 01 corresponds to input 1, bit 02 corresponds to input 2, and bit 03 corresponds to input 3. These bits must be set to 1.
	Bits 04-15	Not used – set to 0.
Write Word 6	Bits 00-03	Full range bits (F) for individual channels – Bit 00 corresponds to output channel 0, bit 01 corresponds to output channel 1, and so on. Refer to range selection above.
	Bits 04-07	Not used – set to 0.
	Bits 08-11	Configure select bits (C) for individual channels – Bit 08 corresponds to output channel 0, bit 09 corresponds to output channel 1, and so on. Refer to range selection above.
	Bits 12-15	Not used – set to 0.
Write Word 7	Bits 00-15	Not used – set to 0.
Write Word 8	Bits 00-15	Not used – set to 0.
Write Word 9	Bits 00-15	Not used – set to 0.
Write Word 10	Bits 00-15	Not used – set to 0.
Write Word 11	Bits 00-15	Not used – set to 0.
Write Word 12	Bits 00-15	Not used – set to 0.
Write Word 13	Bits 00-15	Not used – set to 0.
Write Word 14	Bits 00-15	Not used – set to 0.

1794-IE4XOE2 – Analog Combo Module Image Table Mapping



1794-IE4XOE2 Memory Map

Decimal Bit	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	Size
Oct. Bit	17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	Read Words
	S	Analog Value Input Channel 0														Read Word 1	
	S	Analog Value Input Channel 1														Read Word 2	
	S	Analog Value Input Channel 2														Read Word 3	
	S	Analog Value Input Channel 3														Read Word 4	
	PU	Not used – set to 0									W1	W0	U3	U2	U1	U0	Read Word 5
	S	Analog Data – Output Channel 0														Write Word 1	
	S	Analog Data – Output Channel 1														Write Word 2	
		Not used – set to 0												OE1	OE0	Write Word 3	
		Not used	C5	C4	C3	C2	C1	C0	0	0	F5	F4	F3	F2	F1	F0	Write Word 4
		Not used – set to 0														Write Word 5 thru 10	

Where: PU = Power up bit – included in series B modules only.
 W = Diagnostic bits for current output wire broken or load resistance high. (Not used on voltage outputs.)
 U = Underrange bits for 4-20mA inputs
 OE = Output enable bits (bit 00 corresponds to output 0, bit 01 corresponds to output 1). **ATTENTION: These bits must be set to 1.**
 S = Sign bit (in 2's complement)
 C = Configure select bit
 F = Full range bit

1794-IE4XOE2 Range Selection Bits

Channel No.	Input Channel 0		Input Channel 1		Input Channel 2		Input Channel 3		Output Channel 0		Output Channel 1	
	F0	C0	F1	C1	F2	C2	F3	C3	F4	C4	F5	C5
Decimal Bit	00	08	01	09	02	10	03	11	04	12	05	13
4-20mA	0	1	0	1	0	1	0	1	0	1	0	1
0-10V dc/0-20mA	1	0	1	0	1	0	1	0	1	0	1	0
-10 to +10V dc	1	1	1	1	1	1	1	1	1	1	1	1
Off ¹	0	0	0	0	0	0	0	0	0	0	0	0

C = Configure select bit

F = Full range bit

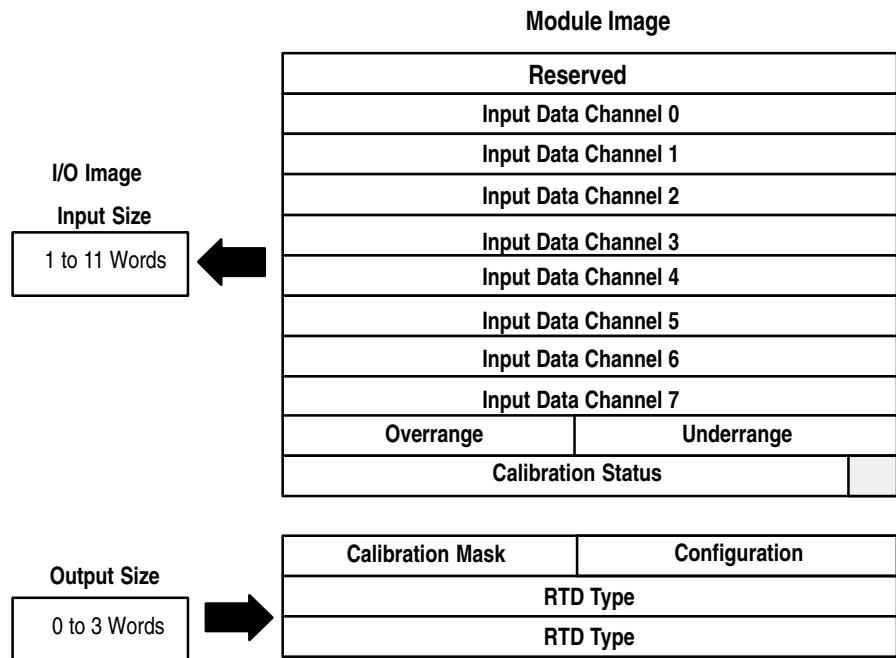
¹ When configured to off, individual channels will return either 0V or 0mA.

1794-IE4XOE2 Word/Bit Descriptions

Word	Decimal Bit	Definition
Read Word 1	Bits 00-14	Channel 0 analog data – 12-bit left justified two's complement number; unused lower bits are zero; 4-20mA uses all 16 bits.
	Bits 15	Channel 0 analog data sign bit.
Read Word 2	Bits 00-14	Channel 1 analog data – 12-bit left justified two's complement number; unused lower bits are zero; 4-20mA uses all 16 bits.
	Bits 15	Channel 1 analog data sign bit.
Read Word 3	Bits 00-14	Channel 2 analog data – 12-bit left justified two's complement number; unused lower bits are zero; 4-20mA uses all 16 bits.
	Bits 15	Channel 2 analog data sign bit.
Read Word 4	Bits 00-14	Channel 3 analog data – 12-bit left justified two's complement number; unused lower bits are zero; 4-20mA uses all 16 bits.
	Bits 15	Channel 3 analog data sign bit.
Read Word 5	Bits 00-03	Underrange bits (U) for individual channels (4-20mA current inputs only) – Bit 00 corresponds to input channel 0, bit 01 corresponds to input channel 1, and so on.
	Bits 04-05	Wire Off bits (W) – Current outputs only – When set (1), the wire on the current output is broken or the load resistance is too high. Bit 00 corresponds to channel 0, bit 01 corresponds to channel 2, and so on.
	Bits 06-14	Not used – set to 0.
	Bit 15	Power Up bit – included in series B modules only. This bit is 0 in series A modules. This bit is set to 1 when all bits in the configuration register are 0 (unconfigured state). The configuration register can be cleared by either of the reset inputs, or by the user writing all zeroes to it.
Write Word 1	Bits 00-14	Channel 0 analog data – 12-bit left justified two's complement number; unused lower bits are zero; 4-20mA uses all 16 bits.
	Bits 15	Channel 0 analog data sign bit.
Write Word 2	Bits 00-14	Channel 1 analog data – 12-bit left justified two's complement number; unused lower bits are zero; 4-20mA uses all 16 bits.
	Bits 15	Channel 1 analog data sign bit.

Word	Decimal Bit	Definition
Write Word 3	Bits 00-01	Output Enable bits. Bit 00 corresponds to output 0, bit 01 corresponds to output 1. These bits must be set to 1.
	Bits 02-15	Not used – set to 0.
Write Word 4	Bits 00-05	Full range bits (F) for individual channels – Bit 00 corresponds to input channel 0, bit 01 corresponds to input channel 1, bit 02 corresponds to input channel 3, bit 03 corresponds to input channel 3, bit 04 corresponds to output channel 1, and bit 05 corresponds to output channel 2. Refer to range selection above.
	Bits 06-07	Not used – set to 0.
	Bits 08-13	Configure select bits (C) for individual channels – Bit 08 corresponds to input channel 0, bit 09 (11) corresponds to input channel 1, bit 10 (12) corresponds to input channel 2, bit 11 (13) corresponds to input channel 3, bit 12 (14) corresponds to output channel 0, and bit 13 (15) corresponds to output channel 1. Refer to range selection above.
	Bits 14-15	Not used – set to 0.
Write Word 5	Bits 00-15	Not used – set to 0.
Write Word 6	Bits 00-15	Not used – set to 0.
Write Word 7	Bits 00-15	Not used – set to 0.
Write Word 8	Bits 00-15	Not used – set to 0.
Write Word 9	Bits 00-15	Not used – set to 0.
Write Word 10	Bits 00-15	Not used – set to 0.

1794-IR8 – RTD Input Analog Module Image Table Mapping



1794-IR8 Read

Dec. Bit	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
Oct. Bit	17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00
Read Word 1	Reserved															
Read Word 2	Channel 0 Input Data															
Read Word 3	Channel 1 Input Data															
Read Word 4	Channel 2 Input Data															
Read Word 5	Channel 3 Input Data															
Read Word 6	Channel 4 Input Data															
Read Word 7	Channel 5 Input Data															
Read Word 8	Channel 6 Input Data															
Read Word 9	Channel 7 Input Data															
Read Word 10	Overrange Bits								Underrange Bits							
Read Word 11	0	0	0	0	0	Bad Cal	Cal Done	Cal Range	0	Diagnostic Status Bits			Pwr Up	0	0	0

1794-IR8 Write

Dec. Bit	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
Oct. Bit	17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00
Write Word 1	8-bit Calibration Mask								Cal Clk	Cal Hi Cal Lo	Filter Cutoff			Enh	MDT	
Write Word 2	RTD 3 Type				RTD 2 Type				RTD 1 Type				RTD 0 Type			
Write Word 3	RTD 7 Type				RTD 6 Type				RTD 5 Type				RTD 4 Type			

Where: Enh = Enhanced
MDT = Module Data Type

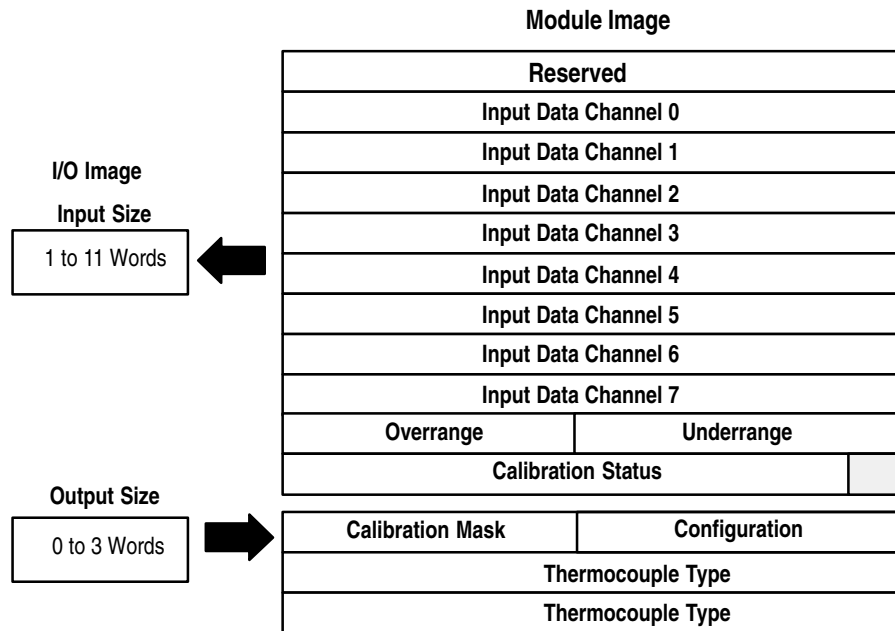
1794-IR8 Word/Bit Descriptions

Word	Dec. Bits (Octal Bits)	Description
Read Word 1	00-15 (00-17)	Reserved
Read Word 2	00-15 (00-17)	Channel 0 Input data
Read Word 3	00-15 (00-17)	Channel 1 Input data
Read Word 4	00-15 (00-17)	Channel 2 Input data
Read Word 5	00-15 (00-17)	Channel 3 Input data
Read Word 6	00-15 (00-17)	Channel 4 Input data
Read Word 7	00-15 (00-17)	Channel 5 Input data
Read Word 8	00-15 (00-17)	Channel 6 Input data
Read Word 9	00-15 (00-17)	Channel 7 Input data

Word	Dec. Bits (Octal Bits)	Description
Read Word 10	00-07	Underrange bits – these bits are set if the input signal is below the input channel's minimum range.
	08-15 (10-17)	Overrange bits – these bits are set if 1), the input signal is above the input channel's maximum range, or 2), an open detector is detected.
Read Word 11	00-01	Not used – set to 0
	02	Reserved
	03	Powerup bit – this bit is set (1) until configuration data is received by the module.
	04-06	Critical Error bits – If these bits are anything other than all zeroes, return the module to the factory for repair
	07	Unused – set to 0
	08 (10)	Calibration Range bit – set to 1 if a reference signal is out of range during calibration
	09 (11)	Calibration Done bit – set to 1 after an initiated calibration cycle is complete.
	10 (12)	Calibration Bad bit – set to 1 if the channel has not had a valid calibration.
	11-15 (13-17)	Unused – set to 0
Write word 1	00-01	Module Data Type
		Bit 01 00 Definition
		0 0 °C (default)
		0 1 °F
		1 0 Bipolar counts scaled between -32768 and +32767
	1 1 Unipolar counts scaled between 0 and 65535	
	02	Enhanced mode select – measures voltage drop across a precision resistor in the module to compare with the unknown input.
	03-05	A/D Filter First Notch Frequency
		Bit 05 04 03 Definition
		0 0 0 10Hz (default)
		0 0 1 25Hz
		0 1 0 50Hz
		0 1 1 60Hz
		1 0 0 100Hz
		1 0 1 250Hz
	1 1 0 500Hz	
	1 1 1 1000Hz	
06	Calibration High/Low bit – This bit is set during gain calibration; reset during offset calibration.	
07	Calibration clock – this bit must be set to 1 to prepare for a calibration cycle; then reset to 0 to initiate calibration.	
08-15	Calibration mask – The channel, or channels, to be calibrated will have the correct mask bit set. Bit 0 corresponds to channel 0, bit 1 to channel 1, and so on.	

Word	Dec. Bits (Octal Bits)	Description					
Write Word 2	00-03	Channel 0 RTD Type					
		Bit	03	02	01	00	RTD Type – Range
			0	0	0	0	Resistance (default)
			0	0	0	1	No sensor connected – do not scan
			0	0	1	0	100 ohm Pt $\alpha = 0.00385$ Euro (-200 to +870°C)
			0	0	1	1	100 ohm Pt $\alpha = 0.003916$ U.S. (-200 to +630°C)
			0	1	0	0	200 ohm Pt $\alpha = 0.00385$ (-200 to +630°C)
			0	1	0	1	500 ohm Pt $\alpha = 0.00385$ (-200 to +630°C)
			0	1	1	0	Reserved
			0	1	1	1	10 ohm Copper (-200 to +260°C)
			1	0	0	0	120 ohm Nickel (-60 to +250°C)
			1	0	0	1	100 ohm Nickel (-60 to +250°C)
			1	0	1	0	200 ohm Nickel (-60 to +250°C)
			1	0	1	1	500 ohm Nickel (-60 to +250°C)
			1	1	0	0	Module data time stamp
				1101 to 1111 – Reserved			
	04-07	Channel 1 RTD Type (see bits 00-03)					
	08-11	Channel 2 RTD Type (see bits 00-03)					
	12-15	Channel 3 RTD Type (see bits 00-03)					
Write Word 3	00-03	Channel 4 RTD Type (see write word 2, bits 00-03)					
	04-07	Channel 5 RTD Type (see write word 2, bits 00-03)					
	08-11	Channel 6 RTD Type (see write word 2, bits 00-03)					
	12-15	Channel 7 RTD Type (see write word 2, bits 00-03)					

1794-IT8 – Thermocouple Input Module Image Table Mapping



1794-IT8 Read

Dec. Bit	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
Octal Bit	17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00
Read Word 1	Reserved															
Read Word 2	Channel 0 Input Data															
Read Word 3	Channel 1 Input Data															
Read Word 4	Channel 2 Input Data															
Read Word 5	Channel 3 Input Data															
Read Word 6	Channel 4 Input Data															
Read Word 7	Channel 5 Input Data															
Read Word 8	Channel 6 Input Data															
Read Word 9	Channel 7 Input Data															
Read Word 10	Overrange Bits								Underrange Bits							
Read Word 11	0	0	0	0	0	Bad Cal	Cal Done	Cal Range	0	Diagnostics	Pwr Up	Bad Structure	CJC over	CJC Under		

1794-IT8 Write

Dec. Bit	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
Octal Bit	17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00
Write Word 1	8-Bit Calibration Mask								Cal Clk	Cal hi Cal lo	Filter Cutoff			FDF	Data Type	
Write Word 2	Thermocouple 3 Type				Thermocouple 2 Type				Thermocouple 1 Type			Thermocouple 0 Type				
Write Word 3	Thermocouple 7 Type				Thermocouple 6 Type				Thermocouple 5 Type			Thermocouple 4 Type				

Where: FDF = fixed digital filter bit

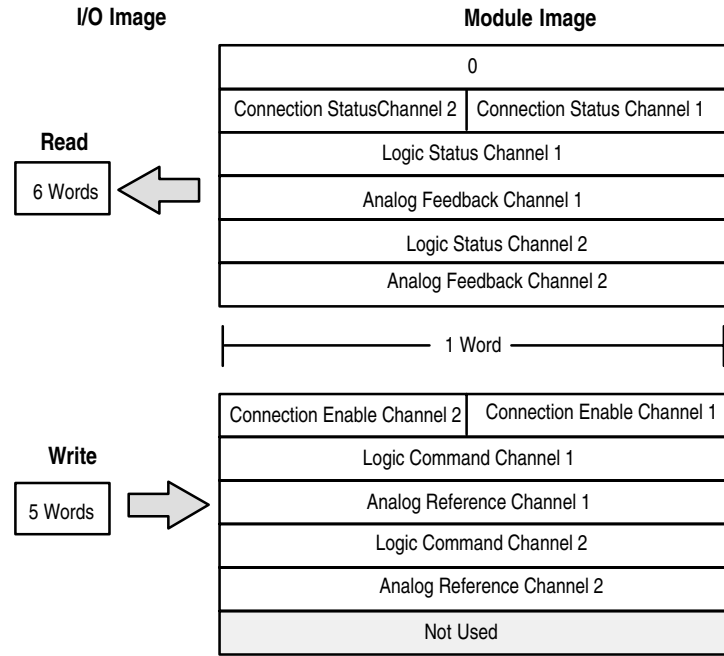
1794-IT8 Word/Bit Descriptions

Word	Decimal Bit (Octal Bit)	Description
Read Word 1	00-15 (00-17)	Reserved
Read Word 2	00-15 (00-17)	Channel 0 Input data
Read Word 3	00-15 (00-17)	Channel 1 Input data
Read Word 4	00-15 (00-17)	Channel 2 Input data
Read Word 5	00-15 (00-17)	Channel 3 Input data
Read Word 6	00-15 (00-17)	Channel 4 Input data
Read Word 7	00-15 (00-17)	Channel 5 Input data
Read Word 8	00-15 (00-17)	Channel 6 Input data
Read Word 9	00-15 (00-17)	Channel 7 Input data
Read Word 10	00-07 (00-07)	Underrange bits – these bits are set if the input signal is below the input channel's minimum range.
	08-15 (10-17)	Overrange bits – these bits are set if 1), the input signal is above the input channel's maximum range, or 2), an open detector is detected.
Read Word 11	00 (00)	Cold Junction sensor underrange bit. – this bit is set if the cold junction temperature is below 0°C.
	01 (01)	Cold Junction sensor overrange bit. – this bit is set if the cold junction temperature is above 70°C.
	02 (02)	Bad Structure – this bit is set if there is an invalid thermocouple type selected.
	03 (03)	Powerup bit – this bit is set (1) until configuration data is received by the module.
	04-06 (04-06)	Critical Fault bits – If these bits are anything other than zero, return the module to the factory for repair.
	07 (07)	Unused – set to 0
	08 (10)	Calibration Range bit – set to 1 if a reference signal is out of range during calibration
	09 (11)	Calibration Done bit – set to 1 after an initiated calibration cycle is complete.
	10 (12)	Calibration Bad bit – set to 1 if the channel has not had a valid calibration.
	11-15 (13-17)	Unused – set to 0

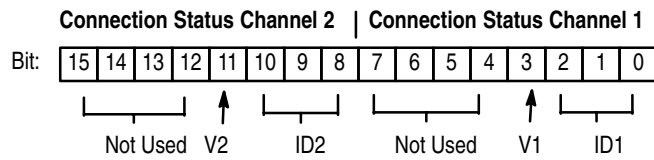
Word	Decimal Bit (Octal Bit)	Description				
Write Word 1	00-01 (00-01)	Module Data Type				
		Bit	01	00	Definition	
			0	0	°C (default)	
			0	1	°F	
			1	0	Bipolar counts scaled between -32768 and +32767	
			1	1	Unipolar counts scaled between 0 and 65535	
	Bit 02 (02)	Fixed Digital Filter – When this bit is set (1), a software digital filter is enabled. This filter settles to 100% of a Full Scale step input in 60 scans.				
	03-05 (03-05)	A/D Filter First Notch Frequency				
		Bit	05	04	03	Definition
			0	0	0	10Hz (default)
			0	0	1	25Hz
			0	1	0	50Hz
			0	1	1	60Hz
			1	0	0	100Hz
			1	0	1	250Hz
			1	1	0	500Hz
			1	1	1	1000Hz
	06 (06)	Calibration High/Low bit – This bit is set during gain calibration; reset during offset calibration.				
	07 (07)	Calibration clock – this bit must be set to 1 to prepare for a calibration cycle; then reset to 0 to initiate calibration.				
	08-15 (10-17)	Calibration mask – The channel, or channels, to be calibrated will have the correct mask bit set. Bit 8 corresponds to channel 0, bit 9 to channel 1, and so on.				

Word	Decimal Bit (Octal Bit)	Description					
Write Word 2	00-03 (00-03)	Channel 0 Thermocouple Type					
		Bit	03	02	01	00	Thermocouple Type – Range
			0	0	0	0	Millivolts (default)
			0	0	0	1	B 300 to 1800°C (572 to 3272°F)
			0	0	1	0	E -270 to 1000°C (-454 to 1832°F)
			0	0	1	1	J -210 to 1200°C (-346 to 2192°F)
			0	1	0	0	K -71 to 1372°C (-95 to 2502°F)
			0	1	0	1	R -50 to 1768°C (-58 to 3214°F)
			0	1	1	0	S -50 to 1768°C (-58 to 3214°F)
			0	1	1	1	T -73 to 400°C (-99 to 752°F)
			1	0	0	0	C 0 to 2315°C (32 to 4199°F)
			1	0	0	1	N -270 to 1300°C (-450 to 2372°F)
			1	0	1	0	Reserved
			1	0	1	1	Reserved
			1	1	0	0	Module reports cold junction temperature for channels 00-03
			1	1	0	1	Module reports cold junction temperature for channels 04-07
			1	1	1	0	Reserved
		1	1	1	1	No sensor connected (do not scan)	
	04-07 (04-07)	Channel 1 Thermocouple Type (see bits 00-03)					
	08-11 (10-13)	Channel 2 Thermocouple Type (see bits 00-03)					
	12-15 (14-17)	Channel 3 Thermocouple Type (see bits 00-03)					
Write Word 3	00-03 (00-03)	Channel 4 Thermocouple Type (see word 13, bits 00-03)					
	04-07 (04-07)	Channel 5 Thermocouple Type (see word 13, bits 00-03)					
	08-11 (10-13)	Channel 6 Thermocouple Type (see word 13, bits 00-03)					
	12-15 (14-17)	Channel 7 Thermocouple Type (see word 13, bits 00-03)					

1203-FM1 – SCANport Module Image Table Mapping



Connection Status Word Definition

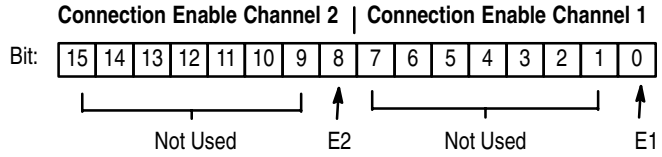


	Description
V1	SCANport channel 1 valid data bit. When high (1), the Logic Status and Analog Feedback values are valid and can be used. When low (0), the values should not be used.
ID1	SCANport channel 1 connected peripheral port ID number. This three bit field contains the port number that channel 1 is connected to on the SCANport device. It should contain a value between 1 and 7. If this field is 7, then the channel is not connected to the SCANport device, or the SCANport device may not be powered.
V2	SCANport channel 2 valid data bit. When high (1), the Logic Status and Analog Feedback values are valid and can be used. When low (0), the values should not be used.
ID2	SCANport channel 2 connected peripheral port ID number. This three bit field contains the port number that channel 2 is connected to on the SCANport device. It should contain a value between 1 and 7. If this field is 7, then the channel is not connected to the SCANport device, or the SCANport device may not be powered.

Logic Status/Analog Feedback Definition

The Logic Status and Analog Feedback values are defined within the product manuals of the connected SCANport device(s).

Connection Enable Word Definition



	Description
E1	SCANport channel 1 enable bit. When set to 1, the module will attempt to connect to the SCANport device. When reset to 0, the module stops communicating with the connected SCANport device. This usually causes the device to fault.
E2	SCANport channel 2 enable bit. When set to 1, the module will attempt to connect to the SCANport device. When reset to 0, the module stops communicating with the connected SCANport device. This usually causes the device to fault.

Logic Command/Analog Reference Definition

The Logic Command and Analog Reference values are defined within the product manuals of the connected SCANport device(s).

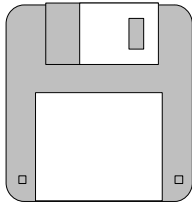
Defaults

Each I/O module has default values associated with it. At default, each module will generate inputs/status and expect outputs/configuration.

Module Defaults for:		Adapter Defaults		Optimal Sizes	
Catalog Number	Description	Input Default	Output Default	Input Default	Output Default
1794-IB16	16-pt 24V dc Sink Input	1	1	1	0
1794-OB16	16-pt 24V dc Source Output	1	1	0	1
1794-IA8	8-pt 120V ac Input	1	1	1	0
1794-OA8	8-pt 120V ac Output	1	1	0	1
1794-IB8S	8-pt 24V dc Sensor Input	1	1	1	0
1794-OW8	8-pt Relay Output	1	1	0	1
1794-IE8	8-pt Analog Input	9	6	8	0
1794-OE4	4-pt Analog Output	1	14	0	4
1794-IE4XOE2	4 in/2 out Analog Combo	5	10	4	2
1794-IR8	8-pt RTD Analog Input	11	4	10	0
1794-IT8	8-pt Thermocouple Input	11	4	10	0
1203-FM1	SCANport Module	6	5	4	3

The default values reflect the maximum number of read/write words.

You can change the I/O data size for a module by reducing the number of words mapped into the adapter module, as shown in optimal sizes.



PROFIBUS Manager Software
Catalog Number 1785-PFBMGR

Optimal sizes are the settings that provide optimal data to and from the I/O module. You need a software configuration tool to change the size. If you are using the Allen-Bradley 1785-PFB/B coprocessor as a master, you must use the Allen-Bradley PROFIBUS Manager Software configuration tool. Since the FLEX I/O adapter is compatible with any master, you can use any comparable configuration tool available on the market.

The optimal settings provide the fastest network time by only mapping read and write words used by the I/O modules. If you reduce your data sizes to only include optimal data, you can only change your configuration data with a software tool. If you need to change configuration information on an optimal basis, your data size must be large enough to include the necessary words.

If you are using PROFIBUS Manager Software to configure your adapter, refer to your PROFIBUS Manager Software User Manual, publication 1785-6.5.20 for more information.



More Information...

For additional information on FLEX I/O modules, refer to the following publications.

Module Description	Catalog Number	Installation Instructions	User Manual
16 Sink Input Module	1794-IB16	1794-5.4	
16 Source Output Module	1794-OB16	1794-5.3	
8 Sensor Input Module	1794-IB8S	1794-5.7	
8 Input Module	1794-IA8	1794-5.9	
8 Output Module	1794-OA8	1794-5.10	
8 Relay Output Module	1794-OW8	1794-5.19	
8 Input Analog Module	1794-IE8	1794-5.6	
4 Output Analog Module	1794-OE4	1794-5.5	1794-6.5.2
4 in/2 out Analog Combo Module	1794-IE4XOE2	1794-5.15	
8 RTD Input Analog Module	1794-IR8	1794-5.22	1794-6.5.4
8 Thermocouple Input Module	1794-IT8	1794-5.21	1794-6.5.7
SCANport Module	1203-FM1	1203-5.8	

Connect the Adapter to the PROFIBUS DP Network

What this Chapter Contains

This chapter describes:

- the DP physical layer
- using line types A and B
- equipment you need
- how to connect the adapter to the network
- how to terminate the network

The DP Physical Layer

The PROFIBUS network media is a balanced transmission line corresponding to the standard EIA RS-485, terminated at both ends. Both line A and line B types are available, depending on your system requirements.

Specifications and guidelines for DP media:

- linear bus, terminated at both ends
- drop cables (preferably no longer than .30m), no branches
- shielded twisted pair
- max. line length between 100 and 1200m (depending on baudrate and cable type)
- number of stations: 32
- DP baudrates: 9.6, 19.2, 93.75, 187.5, 500 Kbit/s and 1.5M bit/s

Use the following table to determine what line type will best meet your needs.

Characteristic	Bus Segments and Drop Cables			
	Line A Requirements	Line B Requirements	Total Capacity of all Drop Cables	
Impedance	135–165 Ω (3–29 MHz)	100–130 Ω (f > 100 kHz)		
Capacity	< 30 pF/m	< 60 pF/m		
Resistance	< 110 Ω/km	–		
Wire Gauge	> 0.64 mm	> 0.53 mm		
Conductor Area	> 0.34 mm ²	> 0.22 mm ²		
Maximum Length ¹ with a Baud Rate (bits/s) of:	≤ 19.2k	1200 m ²	1200 m ²	≤ 15nF
	93.75k	1200 m ²	1200 m ²	≤ 3nF
	187.5k	1000 m ²	600 m ²	≤ 1nF
	500k	400 m ²	200 m ²	≤ 0.6nF
	1.5M	200 m ²	NA	≤ 0.2nF
NA = Not Applicable				
¹ If using a combination of both line types, divide the lengths shown by two.				
² This is the sum of all bus segment and drop cable lengths.				

Cabling and Equipment Required for Line A Type

Line A cabling can support baudrates as high as 1.5M bits/s.

Cables

You need a shielded twisted pair cable for your cabling (bus segments or drop cables). Any line A cable available on the market can be used to connect your adapter to a PROFIBUS network.

T-junction Connectors

You need t-junction connectors to connect your droplines to bus segments. You can use any t-junctions available on the market.

Termination Blocks

Termination blocks are only needed if the devices on the end of the network do not have built-in terminating resistors. If you need termination blocks, you can use any termination blocks available on the market.

Bus Connector

Connect your adapter to the PROFIBUS DP network by attaching a bus connector to the female 9 pin D-Sub connector on the front of the module.



More Information...

Important: For detailed information on the topology and cabling for line A, see the PROFIBUS Standard (DIN 19245 Parts 1 & 3, Issue 1994).

Cabling and Equipment Required for Line B Type

Line B cabling can support baudrates as high as 500k bits/s.

Cables

You need a shielded twisted pair cable for your cabling (bus segments or drop cables). Any shielded twisted pair cables available on the market can be used to connect your adapter to a PROFIBUS network, however, bus segment cables must contain wire for data ground and a cable braid shield. We recommend Sprecher+Schuh cable as shown in the table below.

T-junction Connectors

You need t-junction connectors to connect your droplines to bus segments. You can use any t-junctions available on the market, however, we recommend Sprecher+Schuh connectors as shown in the table below.

Termination Blocks

Termination blocks are only needed if the devices on the end of the network do not have built-in terminating resistors. If you need to use termination blocks, any termination blocks available on the market can be used, however, we recommend Sprecher+Schuh termination blocks as shown in the table below.

Bus Connector

Connect your adapter to the PROFIBUS DP network by attaching a bus connector to the female 9 pin D-Sub connector on the front of the module.

Important: For detailed information on the topology and cabling for line B, see the PROFIBUS Standard (DIN 19245 Parts 1 & 3, Issue 1994).



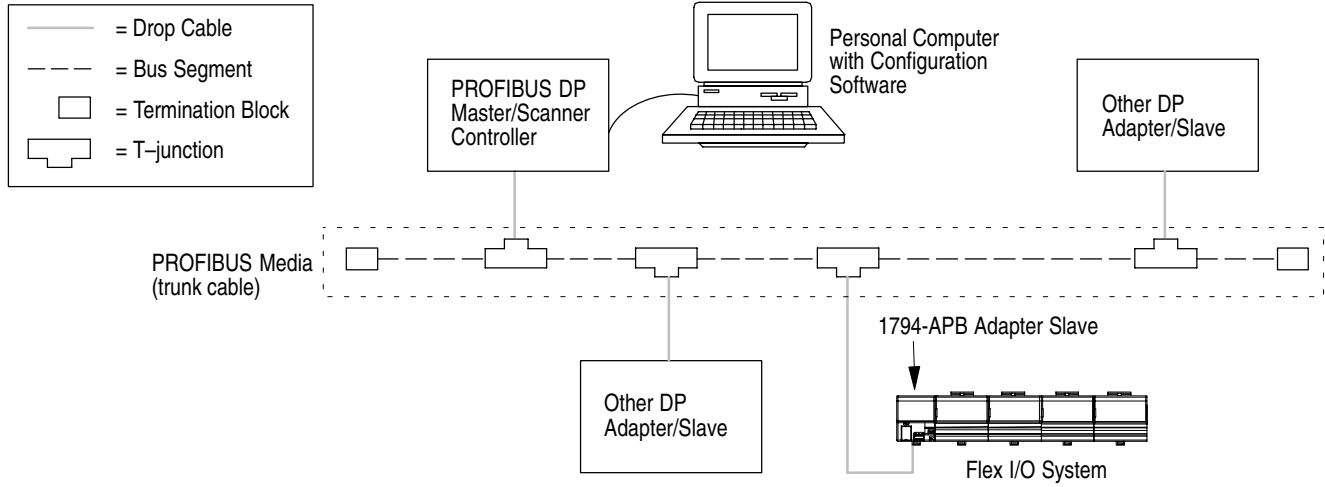
More Information...

Equipment	Type	Catalog Number	Part Number
Drop cable	Sprecher + Schuh	PTL-2, PTL-4, or PDC-10	87.890.282-10
T-junction connector	Sprecher + Schuh	PTS-0	87.890.276-01
Bus segment cable	Sprecher + Schuh	none	299.257.001
Bus segment 1m	Sprecher + Schuh	PCB-10	87.890.281-10
Connector	Sprecher + Schuh	none	87.890.283-01
Termination Block	Sprecher + Schuh	PCE-0	87.890.284-01

Connect the Adapter to the Network

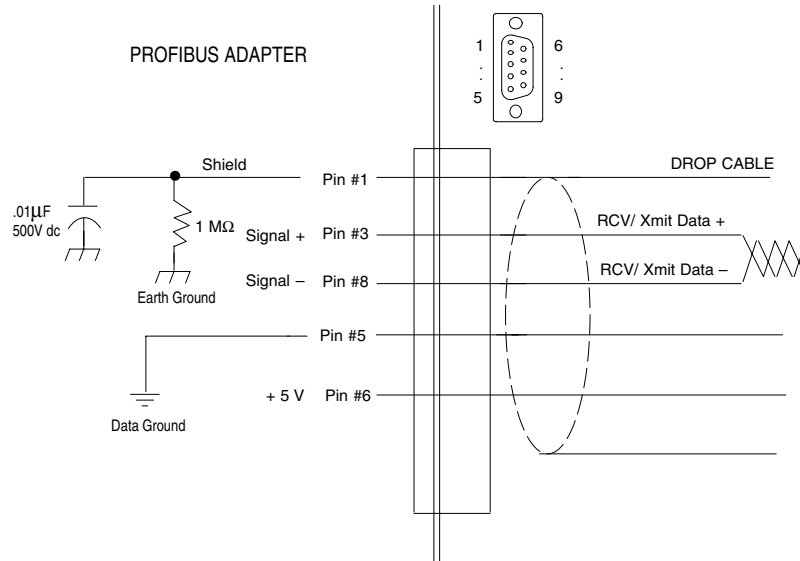
For line A or B connections, use bus segments with t-junctions and termination blocks to form the PROFIBUS media (trunk cable). Use termination blocks to terminate the line at each end of the trunk cable. Use drop cables to connect devices to the network.

The maximum number of stations on the same network is 32.



Connect to the Adapter

Connect your drop cable (using either line A or B) to the adapter as shown below:



1. Connect the cable shield to Pin #1. The shield is connected to the FLEX I/O chassis ground through an RC circuit as shown above.
2. Connect the data signal pins on both ends (Signal + Pin #3 and Signal - Pin#8).
3. Insert the wired connector into the mating connector on the PROFIBUS adapter.

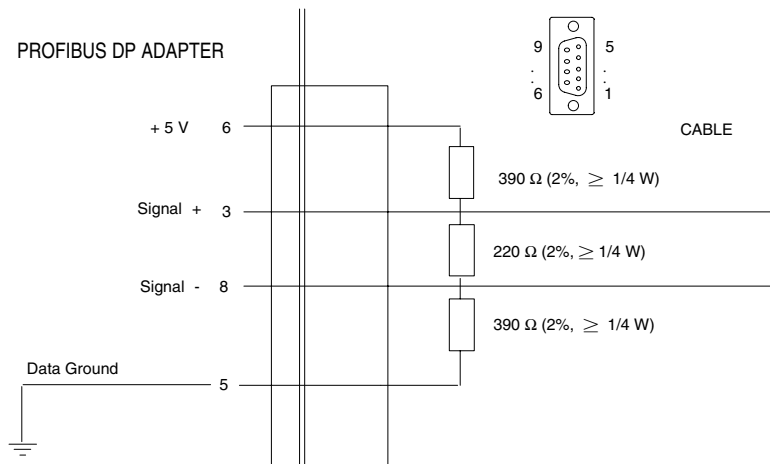
Terminate the Network

You must use termination blocks only if your devices on the end of the network do not have built-in terminating resistors.

Terminate the PROFIBUS media (trunk cable) at both ends of the network. If you are not using a connector with built-in resistors, terminate the cable at the adapter connector as shown below.

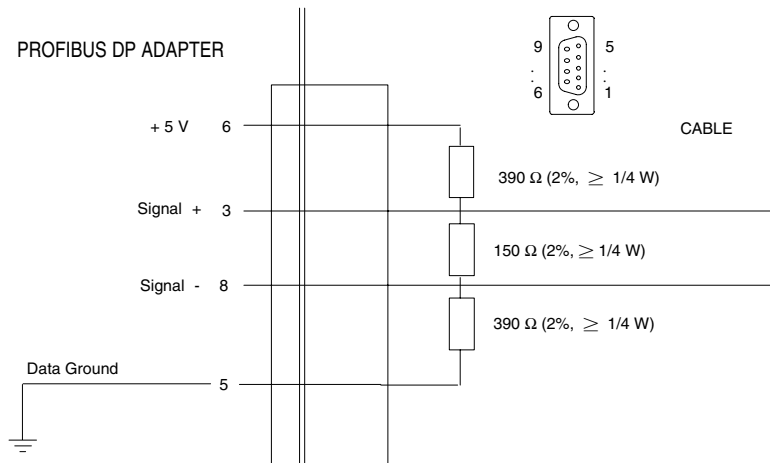
Terminate at the Adapter Using Line A

Since Line A has a higher line impedance, you must use the following termination resistors:



Terminate at the Adapter Using Line B

Use the following termination resistors with line B:



Configure the Adapter for Master/Slave Communication

What this Chapter Contains

In this chapter, we describe:

- how master/slave communication takes place
- entering user parameter data
- entering check configuration data
- read configuration response data
- a programming configuration example using Allen-Bradley PROFIBUS manager software

How Master/Slave Communication Takes Place

A data exchange between the master and slave cannot be performed until check configuration and send parameter data are issued. Each time you power-up the network, the master sends check configuration and send parameter data to the slave (FLEX I/O adapter).

Check configuration data determines or checks the number of input and output words used by each FLEX I/O module.

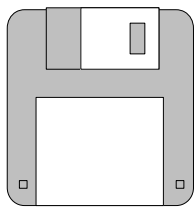
Send parameter data contains device-specific parameters you define for each FLEX I/O module.

You need a **software configuration tool** to set the values associated with these parameters. If you are using the Allen-Bradley 1785-PFB/B coprocessor as a master, you must use the Allen-Bradley PROFIBUS Manager Software configuration tool. Since the FLEX I/O adapter is compatible with any master, you can use any configuration tool available on the market.

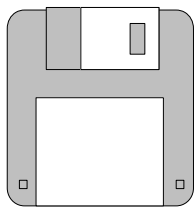
The **device database (GSD) file** is included on the software diskette you received with your shipment of the FLEX I/O adapter. The GSD file is used by your configuration tool to help you set up your system. Your configuration tool automatically reads the GSD file and extracts defaults used in the data exchange.

The file is in ASCII format and you can view it with any text editor. A printed copy of your GSD file appears in Appendix B of this user manual.

The user parameter data fields are not defined in the GSD file. Depending on the format you choose, you may have to manually edit these values with your configuration tool.



PROFIBUS Manager Software
Catalog Number 1785-PFBMGR



Software diskette with GSD file



More Information...

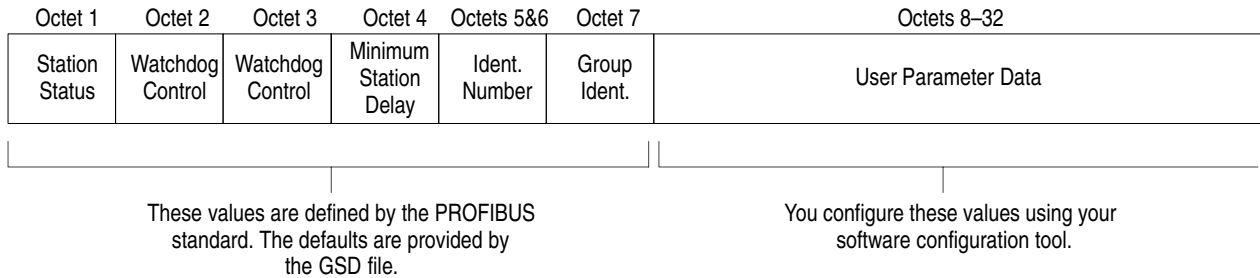
For more information on how you define and enter these user parameter values, refer to the documentation associated with your master and software configuration tool. If you are using an Allen Bradley 1785-PFB/B Coprocessor master, refer to publications 1785-6.5.15 and 1785-6.5.20.

Entering User Parameter Data

Send parameter data is comprised of a string of octets (1–32) that contains 244 bytes of data:

- octets 1–7 contain data specific to the:
 - PROFIBUS standard
 - defaults contained in the database (GSD) file
- octets 8–32 are user configurable and contain **user parameter data**. User parameter data consists of these formats:
 - auto configure
 - condensed
 - full

The following illustration shows the structure of the send parameter data table.



User Parameter Data

The first byte of the user parameter data is the **flags byte**. This byte selects the appropriate format and also specifies adapter behavior. The flags byte is defined in the following table:

Send Parameter Data Flags Byte

Bit Position	Name	Description
0-1	Format Selection	00 = Auto Configure 01 = Reserved 10 = Condensed 11 = Full
2-3	Fault Action	00 = Reset to zero 01 = Hold Last State 10 = Use Safe State 11 = Reserved
4	Format Selection	0 = Reset inputs to zero 1 = Hold Last Value
5-7	Reserved	Reserved bits must be zero

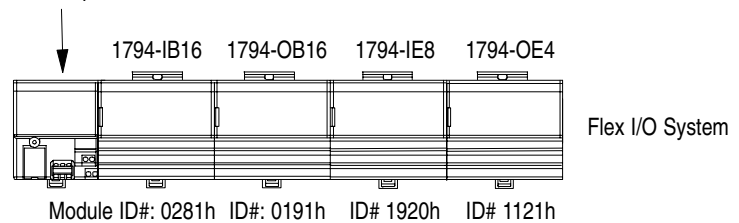
If the send parameter data is received with no user parameter data, the flags byte is set to zero which selects:

- auto configure
- reset outputs to zero on fault
- reset inputs to zero on fault

The reserved bits must be set to zero to prevent undesired firmware update behavior. This is the default behavior of the module as defined in the GSD file.

The descriptions in this chapter use the following example FLEX I/O configuration to explain the information required for each of these functions:

1794-APB Adapter Slave



Auto Configure Format

The Auto Configure format allows you to change modules without affecting the User Parameter or Check Configuration data. This format provides no keying from the master on the I/O modules installed in the FLEX I/O system. The installed module at power-up is taken as the key.

If you change a module while it is being controlled by a master, a minor recoverable fault will occur. To recover from this fault, you must replace the module with an identical module type.

User Parameter Example

User Parameter Message, Auto Configure Format (Length 1 byte)

Name	Value	Description
Octet 8:	00h	Auto Configure Format, Reset to Zero on Fault

Condensed Format

The condensed format consists of the flags byte and the module key parameter for each of the eight slots. This parameter dictates which I/O module must be installed. If at any time the actual module ID does not match this module key, the slot will be considered in fault and the following occurs:

- STATUS LED flashes red/off
- an error bit in the poll response data is set
- a diagnostic bit in the Ext_Diag_Data field returned in the Read DP-Slave Diagnostic Information message response is set

All eight slots must be configured. The size for this format is always 17 bytes (including the flags byte). The condensed format structure must be repeated for each of the eight slots.

Data format for Condensed Format

Name	Size	Description
Module Key	WORD	Module ID # that must be installed ¹

¹ Only bits 0-12 are used. Bits 13-15 must be zero except when keying an empty slot where 0FFFFh is used.

The following table shows the identification numbers for current FLEX I/O modules.

FLEX I/O Module Catalog Number	Module Identification Number (module key)
Four-word Modules	
1794-IB16	0281h
1794-OB16	0191h
1794-IA8	0285h
1794-OA8	0195h
1794-IB8S	0289h
1794-OW8	0199h
Sixteen-word Modules	
1794-IE8/A	1920h
1794-OE4/A	1121h
1794-IE4XOE2/A	1522h
1794-IT8	1B00h
1794-IR8	1B01h
1794-IE8/B	1924h
1794-OE4/B	1125h
1794-IE4XOE2	1526h
1293-FM1	1600h

When you use the condensed format, no safe state data can be defined, thus the safe state data is left at the power up default of all zeroes. Setting the Fault Action in the byte to Use Safe State with this format is the equivalent of setting Reset to Zero.

User Parameter Example

User Parameter Message, Condensed Format (Length 17 bytes)

Name	Value	Description
Octet 8:	02h	Condensed Format, Reset to Zero on Fault, Rest Inputs to Zero
Octet 9-10:	0281h	1794-IB16 16-point discrete input module
Octet 11-12:	0191h	1794-OB16 16-point discrete output module
Octet 13-14:	1920h	1794-IE8 8-point analog input module
Octet 15-16:	1121h	1794-OE4 4-point analog output module
Octet 17-18:	0FFFFh	Empty
Octet 19-20:	0FFFFh	Empty
Octet 21-22:	0FFFFh	Empty
Octet 23-24:	0FFFFh	Empty



More Information...

Refer to the configuration example on page 4-11 to understand how and where to enter this data.

Full Format

The full format consists of the flags byte and four parameters for each of the eight slots. The module key parameter is the same for the full format as defined by the condensed format, but adds three more parameters for each slot.

Use the full format to:

- provide Safe State values for output points
- send FLEX I/O module configurations once (when you send parameters) instead of every poll
- configure data sizes to reduce the size of data required during run mode

You must configure all eight slots. The minimum size is 25 bytes (no slots have FLEX I/O module configuration or safe state data). The maximum size is 237 bytes (the size of the PROFIBUS user parameter area).

Data format for Full Format

Name	Size	Description
Module Key	WORD	Module ID that must be installed ¹
Module Data Sizes ²	BYTE	Bits 0-3 Safe State Size (in words) Bits 4-7 Config Size (in words)
Safe State Data	ARRAY	Output Safe States. Word array of size Safe State Size.
Module Configuration Data	ARRAY	Flex Module Configuration. Word array of size Config Size.

¹ Only bits 0-12 are used. Bits 13-15 must be zero except when keying an empty slot where 0FFFFh is used.

² Each of the two sizes can range from 0-15 words but when combined cannot exceed 15 words total.

There are some possible configurations of FLEX I/O modules that would exceed the user parameter area of 237 bytes. Be aware of the totals of the words and modules you are using.

The data format is repeated for each Flex I/O slot. and all slots are configured, even when empty.

	Flags byte
Slot #1	Module Key
	Module Data Sizes
	Module Configuration Data
Slot #2	Module Key
	Module Data Sizes
	Safe State Data
Slot #3	Module Key
	Module Data Sizes
	Module Configuration Data
Slot #4	Module Key
	Module Data Sizes
	Module Configuration Data
	Safe State Data
Slot #5	Module Key
	Module Data Sizes
Slot #6	Module Key
	Module Data Sizes
Slot #7	Module Key
	Module Data Sizes
Slot #8	Module Key
	Module Data Sizes

User Parameter Example

<i>User Parameter Message, Full Format (Length 43 bytes)</i>		
Name	Value	Description
Octet 8:	02h	Full Format, Reset to Zero on Fault
Octet 9-10:	0281h	Slot 1 Module Key 1794-IB16 16-point discrete input module
Octet 11:	10h	Slot 1 config size 1 word, safe state size 0 words
Octet 12-13:	0000h	1 config word, input delay times
Octet 14-15:	0191h	Slot 2 Module Key 1794-OB16 16-point discrete output module
Octet 16:	01h	Slot 2 config size 0 words, safe state size 1 word
Octet 17-18:	0000h	1 safe state data word, safe state value for output points
Octet 19-20:	1920h	Slot 3 Module Key 1794-IE8 8-point analog input module
Octet 21:	10h	Slot 3 config size 1 word, safe state size 0 words
Octet 22-23:	0000h	1 config word, channel selection
Octet 24-25:	5121h	Slot 4 Module Key 1794-OE4 4-point analog output module
Octet 26:	24h	Slot 4 config size 2 words, safe state size 4 words
Octet 27-28:	0000h	2 config words – channel selection and
Octet 29-30:	0000h	output enable
Octet 31-32:	0000h	4 safe state data words – safe state value for output point 1
Octet 33-34:	0000h	output point 2
Octet 35-36:	0000h	output point 3
Octet 37-38:	0000h	output point 4
Octet 39-40:	0FFFFh	Slot 5 empty
Octet 41:	00h	Slot 5 all sizes zero
Octet 42-43:	0FFFFh	Slot 6 empty
Octet 44:	00h	Slot 6 all sizes zero
Octet 45-46:	0FFFFh	Slot 7 empty
Octet 47:	00h	Slot 7 all sizes zero
Octet 48-49:	0FFFFh	Slot 8 Empty
Octet 50:	00h	Slot 8 all sizes zero



More Information...

Refer to the configuration example on page 4-11 to understand how and where to enter this data.

Entering Check Configuration Data

On a PROFIBUS DP network, the I/O data exchanged between the PROFIBUS DP master and a DP slave is encapsulated into **logical modules**. The total I/O data exchanged between a PROFIBUS DP master and a DP slave device comprises a set of logical modules which is defined in the check configuration data.

Each physical slot of the FLEX I/O system is represented by two logical modules (one input and one output). When the FLEX I/O adapter is powered-up, the check configuration message configures the module format (input and output words) and defines the size of the modules within the device. When the sizes are configured, the I/O data can be optimized to remove unused data from the data stream.

Both input and output sizes can be configured. If a slot is empty, or if either the input or output module is zero length, the specific identifier for an empty module (free place) must be used.

If the end of the identifiers is reached before all slots have been configured, the remaining slots are configured as empty.

The first two modules allocated are for the adapter itself, and must always be a 1 word input module and a 1 word output module, regardless of what parameter format you choose. The adapter uses these words for adapter status information. Modules for each of the individual slots (FLEX I/O modules) must also follow these word assignments.

The format of the adapter status word is defined in the following table:

Adapter Status Word

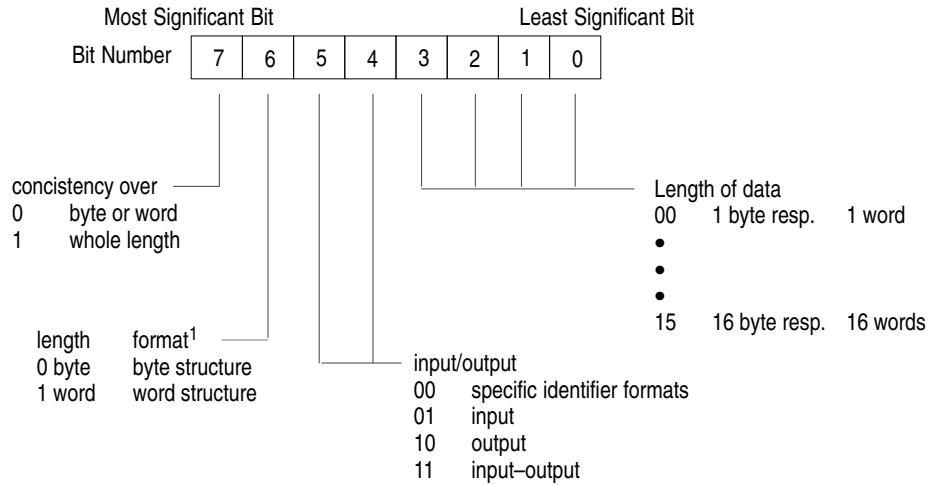
Input Status Word		
Bit Position	Name	Description
0	Address Change	This bit is set when the Node Address switch is changed since power up.
1-7	Reserved	Sent as zeroes.
8-15	I/O Module Fault ¹	This bit is set when an error is detected in a slot position (bits 0-7 refer to slots 1-8)
Output Status Word		
Bit Position	Name	Description
0-15	Reserved	Sent as zeroes.

¹ I/O Module Faults are caused by:

- transmission errors on the FLEX I/O backplane
- bad module
- removed module
- incorrect module inserted

The adapter expects the identifier area for each of the eight FLEX I/O slots to be 2 bytes. The DP input/output identifier and all specific DP identifiers (except the empty module) are not supported.

The identifier byte and its format are described in the following illustration. This byte is defined in Part 3 of the PROFIBUS standard.



¹ When transferring words, PROFIBUS DP transfers the high byte first, followed by the low byte. If word structure is entered in the column format, the DP master has the possibility to swap the bytes within the word, if required by the target system.

The maximum size of this identifier area is 17 bytes. If no FLEX I/O modules are installed in the upper slots, the length may be less. Consistency must be over a word.

Check Configuration Example

Check Configuration Message when used with Send Parameter Auto Configure or Condensed Format (Length 10 bytes)

Name	Identifier Byte	Description
Octet 1:	50h	Input Status Word (input – 1 word)
Octet 2:	60h	Output Status Word (output – 1 word)
Octet 3:	51h	Slot 1, input module 2 words
Octet 4:	60h	Slot 1, output module 1 word
Octet 5:	00h	Slot 2, input module empty
Octet 6:	60h	Slot 2, output module 1 word
Octet 7:	57h	Slot 3, input module 8 words
Octet 8:	60h	Slot 3, output module 1 word
Octet 9:	50h	Slot 4, input module empty
Octet 10:	65h	Slot 4, output module 6 words
I/O sizes configured: 22 input bytes, 20 output bytes		



More Information...

Refer to the configuration example on page 4-11 to understand how and where to enter this data.

Check Configuration Example

Check Configuration Message when used with Send Parameter Full Format (Length 10 bytes)

Name	Identifier Byte	Description
Octet 1:	50h	Status Word (input – 1 word)
Octet 2:	60h	Output Status Word (output – 1 word)
Octet 3:	51h	Slot 1, input module 2 words
Octet 4:	00h	Slot 1, output module 1 word
Octet 5:	00h	Slot 2, input module empty
Octet 6:	60h	Slot 2, output module 1 word
Octet 7:	57h	Slot 3, input module 8 words
Octet 8:	00h	Slot 3, output module 1 word
Octet 9:	00h	Slot 4, input module empty
Octet 10:	63h	Slot 4, output module 6 words
I/O sizes configured: 22 input bytes, 12 output bytes		

Read Configuration Response Data

The read configuration message response returns the current configuration data. At power up, the configuration is the maximum read and write sizes supported by each FLEX I/O module.

A valid check configuration message updates the internal configuration. The updated internal configuration is then returned in the message response.

Power Up Configuration Example

Read Configuration Message response at Power Up (Length 10 bytes)

Name	Identifier Byte	Description
Octet 1:	50h	Status Word (input – 1 word)
Octet 2:	60h	Output Status Word (output – 1 word)
Octet 3:	51h	Slot 1, input module 2 words
Octet 4:	60h	Slot 1, output module 1 word
Octet 5:	50h	Slot 2, input module empty
Octet 6:	61h	Slot 2, output module 1 word
Octet 7:	58h	Slot 3, input module 8 words
Octet 8:	65h	Slot 3, output module 1 word
Octet 9:	50h	Slot 4, input module empty
Octet 10:	65h	Slot 4, output module 6 words



More Information...

Refer to the configuration example on page 4-11 to understand how and where to enter this data.

Configuration Example Using PROFIBUS Manager Software



More Information...

If you are using the Allen-Bradley PROFIBUS Manager configuration software, follow this example to understand how to access and enter data. This example is a User Parameter Message, Full Format.

For more detailed information on configuring your network, refer to your PROFIBUS Manager User Manual, publication 1785-6.5.20.

If you are using another configuration tool, how you access and enter data is similar, however, refer to the user documentation supplied with that tool.

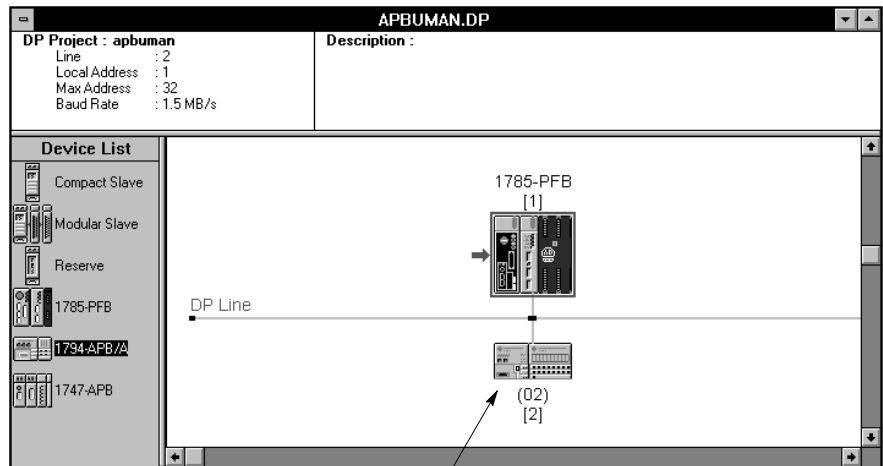
The directions in this example assume you have the software installed and have constructed a DP network containing at least one 1794-APB FLEX I/O PROFIBUS adapter module.

User Parameter Example

User Parameter Message, Full Format (Length 43 bytes)

Name	Value	Description
Octet 8:	02h	Full Format, Reset to Zero on Fault
Octet 9–10:	0281h	Slot 1 Module Key 1794-IB16 16-point discrete input module
Octet 11:	10h	Slot 1 config size 1 word, safe state size 0 words
Octet 12–13:	0000h	1 config word, input delay times
Octet 14–15:	0191h	Slot 2 Module Key 1794-OB16 16-point discrete output module
Octet 16:	01h	Slot 2 config size 0 words, safe state size 1 word
Octet 17–18:	0000h	1 safe state data word, safe state value for output points
Octet 19–20:	1920h	Slot 3 Module Key 1794-IE8 8-point analog input module
Octet 21:	10h	Slot 3 config size 1 word, safe state size 0 words
Octet 22–23:	0000h	1 config word, channel selection
Octet 24–25:	5121h	Slot 4 Module Key 1794-OE4 4-point analog output module
Octet 26:	24h	Slot 4 config size 2 words, safe state size 4 words
Octet 27–28:	0000h	2 config words – channel selection and
Octet 29–30:	0000h	output enable
Octet 31–32:	0000h	4 safe state data words – safe state value for output point 1
Octet 33–34:	0000h	output point 2
Octet 35–36:	0000h	output point 3
Octet 37–38:	0000h	output point 4
Octet 39–40:	0FFFFh	Slot 5 empty
Octet 41:	00h	Slot 5 all sizes zero
Octet 42–43:	0FFFFh	Slot 6 empty
Octet 44:	00h	Slot 6 all sizes zero
Octet 45–46:	0FFFFh	Slot 7 empty
Octet 47:	00h	Slot 7 all sizes zero
Octet 48–49:	0FFFFh	Slot 8 Empty
Octet 50:	00h	Slot 8 all sizes zero

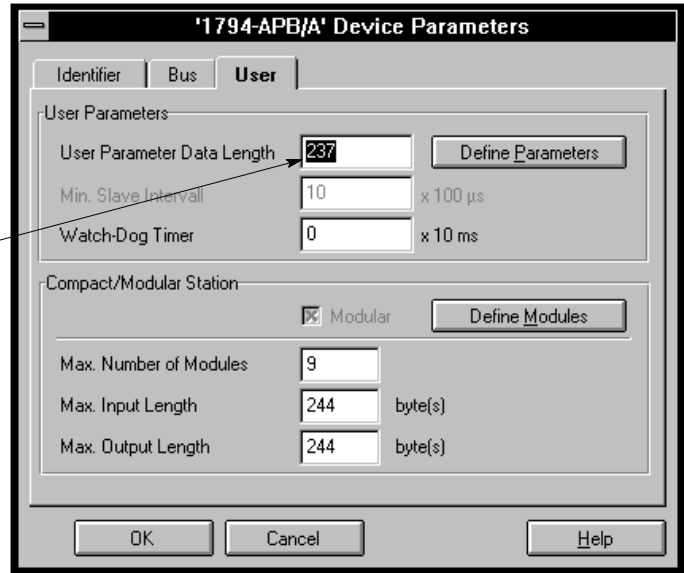
1. In your network, double-click on



• Double-click here

You see the **1794-APB Device Parameters** screen which indicates a User Parameter Data Length of 237:

• Change to 43

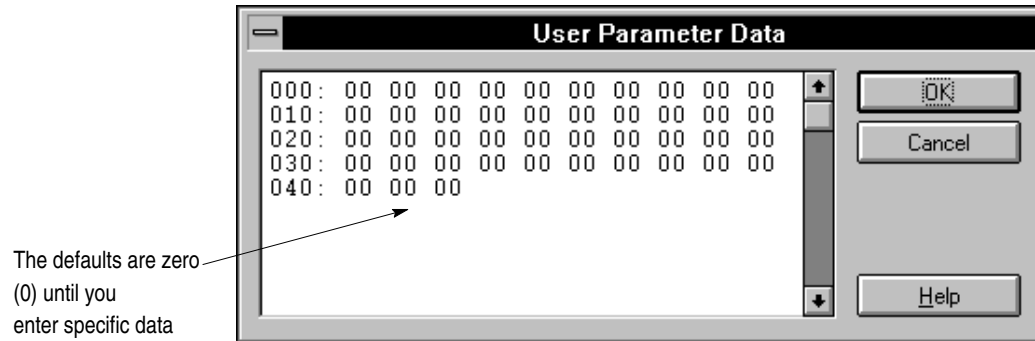


2. Change the **User Parameter Data Length** to 43.

3. Double-click on

Define Parameters

You see the **User Parameter Data** screen:

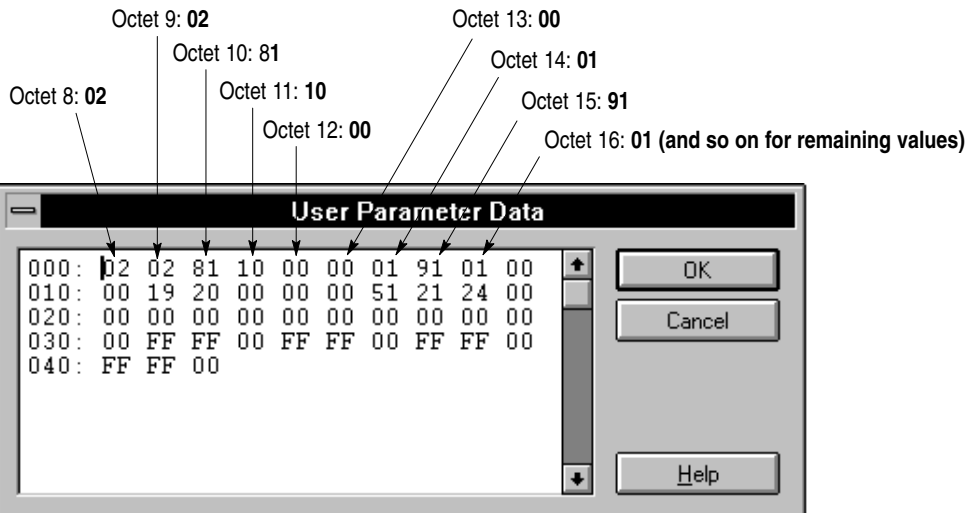


4. Enter the Condensed Format data values as shown in the User Parameter example:

User Parameter Example

User Parameter Message, Full Format (Length 43 bytes)


Name	Value	Description
Octet 8:	02h	Full Format, Reset to Zero on Fault
Octet 9-10:	0281h	Slot 1 Module Key 1794-IB16 16-point discrete input module
Octet 11:	10h	Slot 1 config size 1 word, safe state size 0 words
Octet 12-13:	0000h	1 config word, input delay times
Octet 14-15:	0191h	Slot 2 Module Key 1794-OB16 16-point discrete output module
Octet 16:	01h	Slot 2 config size 0 words, safe state size 1 word
Octet 17-18:	0000h	1 safe state data word, safe state value for output points
Octet 19-20:	1920h	Slot 3 Module Key 1794-IE8 8-point analog input module
Octet 21:	10h	Slot 3 config size 1 word, safe state size 0 words
Octet 22-23:	0000h	1 config word, channel selection
Octet 24-25:	5121h	Slot 4 Module Key 1794-OE4 4-point analog output module
Octet 26:	24h	Slot 4 config size 2 words, safe state size 4 words
Octet 27-28:	0000h	2 config words – channel selection and
Octet 29-30:	0000h	output enable
Octet 31-32:	0000h	4 safe state data words – safe state value for output point 1
Octet 33-34:	0000h	output point 2
Octet 35-36:	0000h	output point 3
Octet 37-38:	0000h	output point 4
Octet 39-40:	0FFFFh	Slot 5 empty
Octet 41:	00h	Slot 5 all sizes zero
Octet 42-43:	0FFFFh	Slot 6 empty
Octet 44:	00h	Slot 6 all sizes zero
Octet 45-46:	0FFFFh	Slot 7 empty
Octet 47:	00h	Slot 7 all sizes zero
Octet 48-49:	0FFFFh	Slot 8 Empty
Octet 50:	00h	Slot 8 all sizes zero



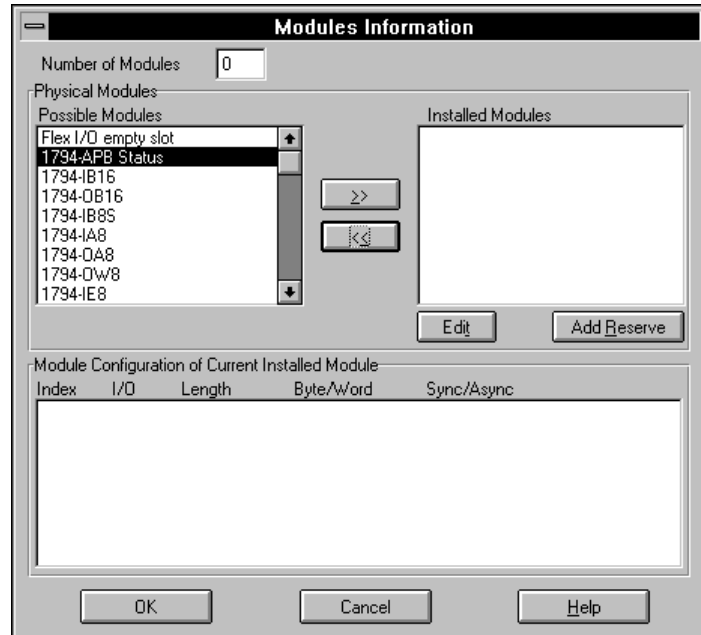
5. After you enter all octet values, click




6. In the **1794-APB Device Parameters** screen, click



You see the **Modules Information** screen:




7. Highlight each of the possible modules in the **Possible Modules** column, then click on . Repeat this for the four FLEX

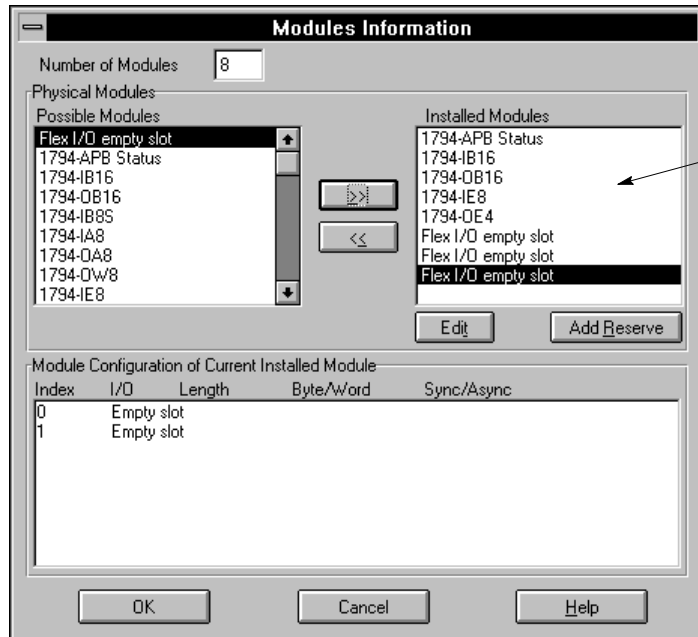
I/O modules in the example. Also add **1794-APB Status** (counts as one module) and three **Flex I/O empty slot** modules. All eight slots must be accounted for.

Notice as you add each module, the **Module Configuration** status appears:

Module Configuration of Current Installed Module				
Index	I/O	Length	Byte/Word	Sync/Async
0	In	9	words	Sync
1	Out	1	word	Sync

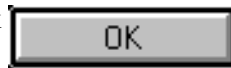
8. If you want to edit the configuration of a module, highlight the module and click on 

9. After you account for all module slots in the example, the **Modules Information** screen should look similar to this:



All module slots in the example are accounted for.

10. Click



More Information...

For more detailed information on configuring your network, refer to your PROFIBUS Manager User Manual, publication 1785-6.5.20.

Troubleshooting

What this Chapter Contains

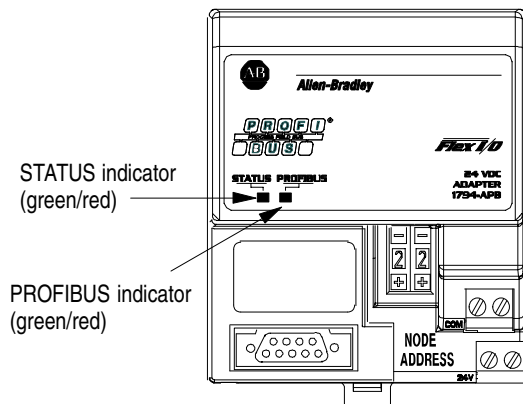
In this chapter, we describe how to use the adapter's indicators for troubleshooting.

Troubleshooting with the Indicators

Locate the two bi-color indicators on the front panel of the adapter. They show both normal operation and fault conditions in your Flex I/O PROFIBUS system. The indicators are:

- STATUS – this indicator provides device status
- PROFIBUS – this indicator provides communication link status

Use the following table to determine the indicator conditions and status.



STATUS Indicator	
Indication	Status
OFF	No power
Solid Green	Normal operation
Flashing Red/OFF	Recoverable fault <ul style="list-style-type: none"> – Flex I/O module bad – Incorrect Flex I/O module installed – Node address changed since power up
Solid Red	Unrecoverable fault

PROFIBUS Indicator	
Indication	Status
OFF	No power or no communication
Solid Green	Data is being transmitted and recieved
Flashing Red/OFF	Recoverable fault <ul style="list-style-type: none"> – Invalid Send Parameter data – Invalid Check Configuration data
Solid Red	Unrecoverable fault <ul style="list-style-type: none"> – Unable to communicate

Viewing Status from the Master's Configuration Software

You can use read diagnostics to view status using the master's configuration software. The adapter returns identification in response to the Read DP-Slave Diagnostic Information message.

Read DP-Slave Diagnostics Information Message

Ext_Diag_Data field (Length 9 bytes)

Octet	Description
7	Device Related diagnostic header byte (05h)
8	Revision – Minor
9	Revision – Major
10	Adapter Status Bit 0 – Node Address Changed Bits 1-7 – Reserved
11	Node Address switch setting
12	Identifier Related diagnostic header byte (44h)
13-15	Identifier diagnostic bits ¹

¹ One identifier bit for each logical module (adapter and each slot use two identifier bits). The bits set indicate a module fault.

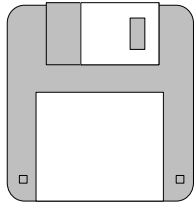
Specifications

1794-APB Flex I/O PROFIBUS Adapter Specifications	
I/O Capacity	8 modules
Input Voltage Rating	24V dc nominal
Input Voltage Range	19.2V to 31.2V dc (includes 5% ac ripple)
Communication Rate	All rates up to 1.5Mbit/s
Indicators	STATUS LED – red/grn PROFIBUS LED – red/grn
Flexbus Output Current	640mA maximum @ 5V dc
Isolation Voltage	100% tested at 850V dc for 1s between user power and flexbus
Power Consumption	400mA maximum from external 24V dc supply
Power Dissipation	7.68W maximum @ 19.2V dc
Thermal Dissipation	26 BTU/hr @ 19.2V dc
Environmental Conditions	
Operational Temperature	0 to 55°C (32 to 131°F)
Storage Temperature	–40 to 85°C (–40 to 185°F)
Relative Humidity	5 to 95% noncondensing
Shock	30 g peak acceleration, 11(+1)ms pulse width
Operating	50 g peak acceleration, 11(+1)ms pulse width
Non-operating	Tested 5 g @ 10–500Hz per IEC 68-2-6
Vibration	
PROFIBUS Connector	9-pin D-shell
PROFIBUS Drop Cable	Standard Drop Cable
Power Conductors	
Wire Size	12 gauge (4mm ²) stranded maximum 3/64 inch (1.2mm) insulation max.
Category	2 ¹
Agency Certification (when product or packaging is marked)	<ul style="list-style-type: none"> • UL listed • CSA certified • CSA Class I, Division 2 • IEC • JIS • FCC • PNO • CE marked for all applicable directives

¹ Use this conductor category information for planning conductor routing. Refer to publication 1770-4.1, "Industrial Automation Wiring and Grounding Guidelines."

Device Data Base File

What this Chapter Contains



Software diskette with GSD file

This chapter contains an example of the device data base (GSD) file for the 1794-APB Adapter.

This file is included on the software diskette you received with your shipment of the FLEX I/O adapter. The GSD file is used by your configuration tool to help you set up your system. Your configuration tool automatically reads the GSD file and extracts defaults used in the data exchange.

The file is in ASCII format and you can view it with any text editor. A printed copy of your GSD file appears below.

This device data base file changes when new FLEX I/O modules are introduced. When you add new modules to your system, contact your local Allen-Bradley representative for the latest version of this file.

```

;=====
; Profibus Device Database of :
;   Allen-Bradley DP slave
;   Model : 1794-APB/A   Revision Series A Rev. 1.0
;   Description : Flex I/O Profibus adapter
; Language : English
; Date : 15 February 1996
; Author : Allen-Bradley
;=====

#Profibus_DP

AB_GSD_Revision    = "1.0"

; Device identification
Vendor_Name       = "Allen-Bradley"
Model_Name        = "1794-APB/A"
Revision          = "Series A Rev. 1.0"
Ident_Number      = 0x1101
Protocol_Ident    = 0           ; DP protocol
Station_Type      = 0           ; Slave device
FMS_supp          = 0           ; FMS not supported
Hardware_Release  = "Series A"
Software_Release  = "Rev. 1.0"

```



```
; Supported baudrates
9.6_supp    = 1
19.2_supp   = 1
93.75_supp  = 1
187.5_supp  = 1
500_supp    = 1
1.5M_supp   = 1
3M_supp     = 0
6M_supp     = 0
12M_supp    = 0

; Maximum responder time for supported baudrates
MaxTsdr_9.6    = 60
MaxTsdr_19.2   = 60
MaxTsdr_93.75  = 60
MaxTsdr_187.5  = 60
MaxTsdr_500    = 100
MaxTsdr_1.5M   = 150

; Supported hardware features
Redundancy      = 0          ; not supported
Repeater_Ctrl_Sig = 0      ; not connected
24V_Pins        = 0          ; not connected

; Supported DP features
Freeze_Mode_supp = 0
Sync_Mode_supp   = 0
Auto_Baud_supp   = 1        ; supported
Set_Slave_Add_supp = 0

; Maximum Length of User Parameter
User_Prm_Data_Len = 237

; Default User Parameter string :
; Autoconfigure, Reset to Zero, Reset inputs to zero
User_Prm_Data      = 0x00

; Maximum polling frequency
Min_Slave_Intervall = 10      ; 10*100 μs => 1 millisecond

; Maximum supported sizes
Modular_Station = 1          ; modular
Max_Module      = 9          ; physical modules = slots
Max_Input_Len   = 244
Max_Output_Len  = 244
Max_Data_Len    = 488

; Meaning of "device diagnostic" field
```

```
;Firmware revisions of device
Unit_Diag_Area = 0-15
Value (1) = "Firmware Rev. : 1.0"
Unit_Diag_Area_End

Unit_Diag_Bit (16) = "Node address changed"

;The following byte (corresponding to Unit_Diag_Area = 24-31) contains
;the current setting of the node address switch.
;Please look at the user manual (section "Troubleshooting") for a detailed
;explanation about the meaning of these bytes.

; Definition of all available physical modules
;=====

; Empty slot for Flex I/O (2 configuration bytes per slot)
Module = "Flex I/O empty slot"    0x00, 0x00
EndModule

; Flex I/O adapter status (must be the first module in config, 1 word in, 1 word
out)
Module = "1794-APB Status"    0x50, 0x60
EndModule

; Definition of modules for autoconfigure and condensed formats
;=====

; Flex I/O module 1794-IB16, 16-point Discrete Input Module (default config= 1
word in, 1 word out)
Module = "1794-IB16"    0x50, 0x60
EndModule

; Flex I/O module 1794-OB16, 16-point Discrete Output Module (default config= 0
word in, 1 word out)
Module = "1794-OB16"    0x00, 0x60
EndModule

; Flex I/O module 1794-IB8S, 8-point Discrete Sensor Input Module (default
config= 1 word in, 1 word out)
Module = "1794-IB8S"    0x50, 0x60
EndModule

; Flex I/O module 1794-IA8, 8-point Discrete Input Module (default config= 1
word in, 1 word out)
Module = "1794-IA8"    0x50, 0x60
EndModule

; Flex I/O module 1794-OA8, 8-point Discrete Output Module (default config= 0
word in, 1 word out)
Module = "1794-OA8"    0x00, 0x60
EndModule
```

```
; Flex I/O module 1794-OW8, 8-point Discrete Relay Output Module (default
config= 0 word in, 1 word out)
Module = "1794-OW8"    0x00, 0x60
EndModule

; Flex I/O module 1794-IE8, 8 Input Analog Module (default config= 9 words in, 1
word out)
Module = "1794-IE8"    0x58, 0x60
EndModule

; Flex I/O module 1794-OE4, 4 Output Analog Module (default config= 1 word in, 6
words out)
Module = "1794-OE4"    0x50, 0x65
EndModule

; Flex I/O module 1794-IE4XOE2, Analog Combo Module (default config= 5 words in,
4 words out)
Module = "1794-IE4XOE2"    0x54, 0x63
EndModule

; Flex I/O module 1794-IR8, RTD Input Analog Module (default config= 11 words
in, 3 words out)
Module = "1794-IR8"    0x5A, 0x62
EndModule

; Flex I/O module 1203-FM1, Flex I/O SCANport Module 1 (default config= 6 words
in, 5 words out)
Module = "1203-FM1"    0x55, 0x64
EndModule

; Definition of modules for full format
;=====

; Flex I/O module 1794-IB16, 16-point Discrete Input Module (default config= 1
word in, 0 word out)
Module = "1794-IB16/full format"    0x50, 0x00
EndModule

; Flex I/O module 1794-OB16, 16-point Discrete Output Module (default config= 0
word in, 1 word out)
Module = "1794-OB16/full format"    0x00, 0x60
EndModule

; Flex I/O module 1794-IB8S, 8-point Discrete Sensor Input Module (default
config= 1 word in, 0 word out)
Module = "1794-IB8S/full format"    0x50, 0x00
EndModule

; Flex I/O module 1794-IA8, 8-point Discrete Input Module (default config= 1
word in, 0 word out)
Module = "1794-IA8/full format"    0x50, 0x00
EndModule
```

```
; Flex I/O module 1794-OA8, 8-point Discrete Output Module (default config= 0
word in, 1 word out)
Module = "1794-OA8/full format"    0x00, 0x60
EndModule

; Flex I/O module 1794-OW8, 8-point Discrete Relay Output Module (default
config= 0 word in, 1 word out)
Module = "1794-OW8/full format"    0x00, 0x60
EndModule

; Flex I/O module 1794-IE8, 8 Input Analog Module (default config= 9 words in, 0
word out)
Module = "1794-IE8/full format"    0x58, 0x00
EndModule

; Flex I/O module 1794-OE4, 4 Output Analog Module (default config= 1 word in, 4
words out)
Module = "1794-OE4/full format"    0x50, 0x63
EndModule

; Flex I/O module 1794-IE4XOE2, Analog Combo Module (default config= 5 words in,
2 words out)
Module = "1794-IE4XOE2/full format" 0x54, 0x61
EndModule

; Flex I/O module 1794-IR8, RTD Input Analog Module (default config= 11 words
in, 0 words out)
Module = "1794-IR8/full format"    0x5A, 0x00
EndModule

; Flex I/O module 1203-FM1, Flex I/O SCANport Module 1 (default config= 4 words
in, 3 words out)
Module = "1203-FM1/full format"    0x53, 0x62
EndModule

; Profibus Manager specific parameters
AB_Icon_File = "res\flex.ico"
AB_Bitmap_File = "res\flex.bmp"
AB_Attach_Offset = 32
AB_Description = "Allen-Bradley Flex I/O Profibus adapter"

;=====
```


This Glossary contains terms specific to Allen-Bradley and PROFIBUS FMS and DP.



Allen-Bradley communication defaults

values used for communication configuration data such as OD, CRL (for FMS) DP slave database, and bus parameters whenever the coprocessor's working RAM configuration is reinitialized.

application layer

the seventh layer of the seven-layer OSI reference model. This layer is where the coprocessor first interacts with the application program.



baud rate

the speed of communication between devices on the network. All devices must communicate at the same rate.

broadcast relationships

allow transmission of messages to all nodes simultaneously, but only unconfirmed services are available.

bus parameters

communication parameters used by Link Layer. Main Bus Parameters are station address, maximum address and baud rate. These can be changed using the Local Station Manager or PROFIBUS Manager.



client

the FMS device that makes use of resources to perform some type of application function.

CLOSE command

in FMS, terminates the connection with a remote node on the network.

communication object model

describes the externally visible behavior associated with an FMS service or group of services. Three types of communication object models are domain objects, program invocation objects and variable objects.

CREF

communication reference. In FMS, an index assigned to each entry connection defined in the CRL.

CSTAT

a qualifier that allows to save the status of a connection.

communication parameters

parameters within the PROFIBUS communication layers that control the communication process. They are used to configure and indicate current status of communication and consist of the OD, CRL, bus parameters for FMS, and slave database and bus parameters for DP.

communication relationship

in FMS, defines all the parameters for the communication between two nodes.

configuration management

in FMS, set of FMA 7 services to upload and download the PROFIBUS bus parameters, CRL, and to read SAP status and station identification.

connector header

a connector that attaches between the processor and coprocessor and provides communication between the two modules.

connection type

in FMS, the type of connection between two nodes. There are three connection types: defined (D), open at the responder (O), and open at the initiator (I)

connection zero

opens automatically during the coprocessor's power-up and allows access to local data either by physical addressing or via objects defined locally in the OD.

consistency

the DP protocol allows to associate data consistency requirements with blocks of data exchanged between a PLC master and its slaves. A consistent block of data must always be written or read as a whole, because contained data is not independent. For example, when it holds both real data and data identification, or when granularity exceeds 2 bytes (e.g. floating point data).

context management

set of FMA 7 services that establishes and releases connections

coprocessor

the 1785-PFB/B PROFIBUS Coprocessor module

CRL

Communication Relationship List. In FMS, a CRL is a database within the station, holding the description of all communication relationships of that station to all other stations, independent of the time of use. For more information on CRLs, refer to DIN 19245 Part 2: Process Field Bus.

default settings

values used for communication configuration data such as OD, CRL (for FMS) DP slave database, and bus parameters whenever the coprocessor's working RAM configuration is reinitialized.



defined connection

in FMS, a connection type that specifies both end nodes of the channel by giving their network address and the FDL service access points (SAPs) used in both nodes

diagnostics

three LED indicators located on the front panel of the coprocessor provide the user with the status of the coprocessor and its communication channels. Also referred to as *user interface*.

domain object

in FMS, represents a portion of the processor's memory image. In the coprocessor, represents the processor's entire memory image.

DIN

Deutsches Institut für Normung. The German Normalization Agency.

DP

Decentralized Periphery. A German/European standard (DIN 19245 Part 3) that specifies a simplified user interface with PROFIBUS link layer services and protocol to use with decentralized peripherals.

DP interface

a 9-pin female D-shell connector located at Port 2 on the front panel of the coprocessor.

EC 96

European Community 1996. European Union Directives for 1996.

EMC

Electro-magnetic Compatibility.

ESD

Electrostatic Discharge. Can cause internal circuit damage to the coprocessor.

FDL

Fieldbus Data Link. A German standard (DIN 19245 Part 1) that specifies the Data Link layer of the PROFIBUS fieldbus.

FMA

Fieldbus Management. A German standard (DIN 19245 Parts 1 and 2) that specifies the network management services and protocol of the PROFIBUS fieldbus.

FMS

Fieldbus Message Specification. A German standard (DIN 19245 Part 2) that specifies the Application Layer services and protocol of the PROFIBUS fieldbus.

FMS interface

a 9-pin female D-shell connector located at Port 1 on the front panel of the coprocessor.

FMS Physical Access Addressing

FMS option that allows the access of data at a physical address by specifying the address in the service.

FMS Symbolic Access Addressing

FMS option that allows to statically associate a symbolic name or short reference number (or index) with a physical address within a node.

fault management

set of FMA 7 services that allows resetting the communication and indicates communication faults and events

HPRIO

High Priority service request. A qualifier to specify high priority for unconfirmed services such as UINFO and USTAT.

I/O chassis

the chassis or rack that serves as the location for the processor, coprocessor, power supply and other I/O modules. Also referred to as *chassis*.

LED

Light-emitting diode.

link layer

defines a hybrid method for accessing the communication medium (bus) with master/active stations or slave/passive stations.

Local Station Manager

an Allen-Bradley PC program that runs under Microsoft Windows version 3.1. This program transfers data (FDL, CRL, OD, station address, communication rate, and maximum station address) between the PC and the coprocessor over RS-232.

logical module


DP protocol describes I/O data exchanged between a PLC master and a slave device as a set of logical modules (up to 64, but 32 preferred) each one featuring up to 16 bits maximum of inputs, outputs or a combination of both. The actual structure of exchanged input and output frames is deduced from this description.

lower layer interface (LLI)

in FMS, responsible for interfacing the FMS layer 7 with FDL layer 2. LLI manages connections

LSAP or SAP

Link layer Service Access Point. A logical sub-addresses within devices that allow the distribution of communication flow over dedicated tasks, depending on the required processing. FMS uses LSAPs indifferently to define generic communication relationships between two devices (logical communication channels). DP uses predefined LSAPs to access specific functions or services between masters and slaves.

master

initiates transfer of messages without any prior remote request. The right to access the bus (token) is circulated among the master stations. Management of this logical token ring is performed automatically by the masters (such as startup, removal or insertion of masters). Also referred to as *active stations or scanner*.

module


any of the plug-in hardware devices that are located in the 1771 I/O chassis: processor, coprocessor, power supply or I/O module

module slot

location in the I/O chassis for installing a module. Each module slides into a module slot that lines up with the backplane connector. Also referred to as *slot*.

multicast relationships

allow transmission of messages to a group of nodes simultaneously, but only unconfirmed services are available.

network


a series of stations or nodes connected by some type of communication medium. A network may consist of a single link or multiple links.

node

an address or software location on the network. Also referred to as *node*.

STATUS LED

a bicolor LED, located on the front panel of the coprocessor that indicates the condition of the coprocessor

OD

Object Dictionary. In FMS, an OD is a database within the station, holding the description of all explicit communication objects of that station and making them available for control and monitoring.

open at the initiator

in FMS, a connection type where the source service access point (SAP) is shared among several communication relationships (associated with a different destination address and SAP). The device uses only one of these relationships at a time, depending on the selected remote node.

open at the responder

in FMS, a connection type where the destination address and service access point (SAP) are undefined, thus making the connection available to any device.

OPEN command

in a MSG instruction, establishes a connection between the coprocessor and a remote node on the network

OSI

Open Systems Interconnect. A standard that provides the framework for defining the process of communication between nodes on the PROFIBUS network.

physical layer

The first layer of the seven-layer OSI reference model. This layer is where the coprocessor connects to the network media.

PICS

Protocol Implementation Conformance Statement. System conformance requirements associated with network communications, consisting of four parts: implementation and system information, supported services, supported parameters and their options, and local implementation values

PLC-5™ processor

Any one of the family of Allen-Bradley Programmable Logic Controllers that support the coprocessor interface: PLC-5/11™, -5/20™, -5/30™, -5/40™, -5/60™ and -5/80™.

PNO

PROFIBUS Nutzerorganisation, or PROFIBUS User Organization.

PORT 1 LED

a bicolor LED, located on the front panel of the coprocessor that indicates the condition of the FMS communication channel of the coprocessor

PORT 2 LED

a bicolor LED, located on the front panel of the coprocessor that indicates the condition of the DP communication channel of the coprocessor

power supply

module that supplies power to the I/O chassis containing the processor and coprocessor and other modules

processor

Any one of the family of Allen-Bradley Programmable Logic Controllers that support the coprocessor interface: PLC-5/11™, -5/20™, -5/30™, -5/40™, -5/60™ and -5/80™.

processor interface

a 58-pin connector located on the left side of the coprocessor that uses a PLC-5 Connector Header to attach to the processor for communication between the two modules.

PROFIBUS

PROcess Field BUS. A German standard (DIN 19245 Parts 1, 2 and 3) that specifies a fieldbus for communications at the process level.

PROFIBUS Manager

an Allen-Bradley PC program that runs under Microsoft® Windows™ version 3.1. This program allows you to create, download and monitor network FMS and DP configurations on your personal computer through an RS-232 interface to your coprocessor.

program invocation objects

allow an FMS client to place the processor into different modes (for example, program, test, run)

protocol

the language or packaging of information that is transmitted between nodes on a network.

qualifier

in a MSG instruction, a word that specifies options for an MSG command

RFI

Radio Frequency Interference.

RS-232

communication protocol between the personal computer and the coprocessor

RS-232 interface

a 9-pin male D-shell connector located at the RS-232 port on the front panel of the coprocessor. Use this interface to connect the Local Station Manager and PROFIBUS Manager installed in your personal computer.

server

an FMS device that makes resources available for use by another FMS device. Also referred to as *slave*.



station

an address or software location on the network. Also referred to as *node*.

SET command

in a MSG instruction, allows transfer of an element, an array of elements or an FMS structure to or from a node on the network.

slave

are only allowed to transmit immediate acknowledge or immediate response to master requests. At the Link Layer level, any master can access any slave without restrictions. Also referred to as *passive stations or adapters*.

STATUS command

in a MSG instruction, retrieves status information from a remote node and stores it locally.

system parameters

allow you to check the current state of the coprocessor

third party multivendor configurator

a remote software tool used to define connections between devices and their communication parameters on the network. The tool is available on the open market from many vendors.

UINFO command

Unsolicited Variable Information. In a MSG instruction, a command that sends unsolicited data such as an element, array of elements or predefined FMS structure.

USTAT command

Unsolicited Status Information. In a MSG instruction, a command that sends unsolicited status information such as an element, array of elements or predefined FMS structure.

user interface

three LED indicators located on the front panel of the coprocessor provide the user with the status of the coprocessor and its communication channels. Also referred to as *diagnostics*.

variable objects

data that can be accessed from the network within an FMA server.

VFD

Virtual Field Device. A portion of the FMS server application process that makes a set of resources (data files, program files, I/O) and their associated functionality available for control and monitoring. For more information on VFDs, refer to DIN 19245 Parts 1 and 2: Process Field Bus.

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1794-APB FLEX I/O PROFIBUS Adapter
Module. *See adapter*

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