



FlexArmor

1798-ADN (Contains information on 1798-IB4, -IB8, -OB4E, -OB8E, -IB4D, -IE4, -OE2)

User Manual

Rockwell Automation

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WARNING

Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.

ATTENTION

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



IMPORTANT

Identifies information that is critical for successful application and understanding of the product.

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New Modules Information

In this version of the FlexArmor[™] User Manual information was added about the following three FlexArmor modules:

- 1798-IB4D,
- 1798-IE4, and
- 1798-OE2.

Communication and mapping information about these modules are contained in chapter 2. Configuration information is found in chapter 3.

Notes:

Introduction	Use this manual to install, communicate with, map, configure, and troubleshoot the FlexArmor system.								
Contents	You will find the following information in this manual:								
	For information about	See							
	installing your DeviceNet adapter module	Chapter 1							
	how communication takes place and I/O image mapping	Chapter 2							
	how to configure your DeviceNet adapter	Chapter 3							
	troubleshooting	Chapter 4							
	module specifications	Appendix A							
Audience What We assume	This manual is intended for engineers and technicians who are installing, programming, and maintaining a FlexArmor system. We assume you:								
	• know each of your device's I/O parameters and requirements								
	 Rnow each of your device's 1/O parameters and requi are familiar with RSNetWorx for DeviceNet[™] 	h RSNetWorx for DeviceNet [™]							
	\bullet are familiar with the ${\rm Microsoft}^{\rm @} {\rm Windows}^{\rm @}$ environment								
Common Techniques Used in This Manual	The following conventions are used throughout this manual:Bulleted lists provide information, not procedural steps.Numbered lists provide sequential steps.Pictures of keys and/or screens represent the actual keys you press or the screens you use.								
	 Actions you must perform appear in bold text. For ex Click View to display the EDS file. 	xample:							

Rockwell Automation Support

Before you contact Rockwell Automation for technical assistance, we suggest you please review the troubleshooting information contained in chapter 4 of this publication first.

If the problem persists, call your local distributor or contact Rockwell Automation in one of the following ways:

Phone	United States/Canada	1.440.646.5800							
	Outside United States/Canada	 You can access the phone number for your country via the Internet: 1. Go to http://www.ab.com 2. Click on <i>Product Support</i> (http://support.automation.rockwell.com) 3. Under <i>Support Centers</i>, click on <i>Contact Information</i> 							
Internet	⇒	 Go to http://www.ab.com Click on <i>Product Support</i> (http://support.automation.rockwell.com) 							

Your Questions or Comments on this Manual

If you find a problem with this manual, please notify us of it on the enclosed How Are We Doing form found in the back of the manual.

	Chapter 1	
Install Your DeviceNet Adapter Module	Chapter Objectives	$ \begin{array}{c} 1-1\\ 1-2\\ 1-2\\ 1-2\\ 1-3\\ 1-3\\ 1-4\\ 1-4\\ 1-5\\ \end{array} $
How Communication Takes Place and I/O Image Table Mapping	Chapter 2 Chapter Objectives	2-1 2-2 2-3 2-4 2-5 2-5 2-6 2-7 2-8 2-9 2-9 2-12
Configure Your DeviceNet Adapter	Chapter 3 Chapter Objectives Configure Your Adapter's FlexArmor System About RSNetWorx for DeviceNet Configure Your FlexArmor Adapter and System Online Configure the Adapter Configure the Module View Adapter Parameters Special Parameters View I/O Summary Map the Scanner	3-1 3-2 3-3 3-4 3-6 3-7 3-13 3-15 3-18
Troubleshooting	Chapter 4 Chapter Objectives Troubleshoot With the Indicators	4-1 4-1

ii

Specifications

Appendix A

Input Module Specifications.	A-1
Specifications for the 1798-IB4 Module	A-1
Specifications for the 1798-IB8 Module	A-2
Specifications for the 1798-IB4D Module	A-3
Specifications for the 1798-IE4 Module	A-5
Output Module Specifications	A-7
Specifications for the 1798-OB4E Module	A-7
Specifications for the 1798-OB8E Module	A-8
Specifications for the 1798-OE2 Module	A-9
Communication Adapter Specifications.	A-12
Field Termination Plug Specifications	A-13
Baseplate Specifications.	A-14

Install Your DeviceNet Adapter Module

Chapter Objectives

This chapter describes the FlexArmor system, the DeviceNet Adapter and the procedures for installing your DeviceNet adapter module. The sections in this chapter include:

- the FlexArmor system
- adapter components
- power requirements
- mount the adapter
- set the adapter address switches
- install the adapter module
- connect the external wiring

About the FlexArmor System

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

- Baseplate, 1798-BP2, -BP4, -BP6, or -BP8
- DeviceNet adapter/power supply, 1798-ADN powers the internal logic for as many as eight I/O modules
- I/O modules contain the bus interface and circuitry needed to perform specific functions related to your application. These I/O modules include:
 - Input modules, 1798-IB4 or -IB8, -IB4D, and -IE4
 - Output modules, 1798-OB4E or -OB8E, and OE2
- Field Termination Plug (FTP), 1798-DFTP1 or -DFTP2
- Filler module, 1798-N2



For information on how communications occurs on the FlexArmor system backplane, refer to Chapter 2.

The adapter module consists of the following major components:

- diagnostic indicators
- node address switch

Diagnostic Indicators

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

- Mod/Net status
- I/O status

A complete description of the diagnostic indicators and how to use them for troubleshooting is explained in Chapter 4.

Power Requirements

The FlexArmor system requires a current of 400 mA at 24V dc from the 1798-FTP sensor power connector for FLEX bus operation. This is sufficient to support up to 8 modules. Remember to add this amount to current requirements for other modules using the same 24V supply. The FlexArmor system consumed 90 mA of DeviceNet power.

DeviceNet Adapter Components

Mount the FlexArmor Platform

The DeviceNet adapter module can be mounted directly on a machine. Refer to the specific method of mounting below.

Mounting Instructions

To mount the platform on a wall or panel, use the screw holes provided in the FlexArmor Baseplate.

Install the mounting Baseplate as follows:

1. Lay out the required points as shown in the drilling dimension drawing.



25 mm (0.98 in.) clearance all around

- **2.** Drill the necessary holes for #10 (M6) machine or self-tapping screws.
- **3.** Mount the Baseplate using #10 (M6) screws.
- **4.** Connect functional ground to ground using the functional ground lug connector.

To view a drill template for the FlexArmor Baseplate, refer to the website http://www.ab.com/abecad/.

You are now ready to set the node address on the FlexArmor adapter module and to install your selected FlexArmor components. Please refer to the individual component installation instructions for guidelines.

Set the Network Address Switch on the DeviceNet Adapter

Valid node addresses are 00 to 63.

Set the network address using the rotary switches. The setting of the network address cannot be changed using the DeviceNet configuration software.

Each module is shipped set for node address **63**. The switches are located on the underside of the module. The two switches are:

- MSD (most significant digit)
- LSD (least significant digit)

To reset the node address, use a small blade screwdriver to rotate the switches. Line up the small black dot on the switch with the number setting you wish to use.



IMPORTANT

The baud rate for the adapter is set by way of "baud detection" (Autobaud) at power up.

Install Your FlexArmor DeviceNet Adapter Module

To install the FlexArmor DeviceNet Adapter Module:

1. Hold the adapter at an angle and engage the top of the adapter in the indention on the rear of the Baseplate.

IMPORTANT The adapter module must be installed only in the adapter slot, next to the FTP.

2. Press the module down flush with the panel until the locking lever locks.

3. Repeat steps 1 and 2 for each I/O module for the remaining Baseplate I/O slots.

IMPORTANT	I/O modules can be installed in any slot location to the right of the adapter module. The adapter is capable of addressing eight modules.
4. Screw dow compliance	wn the module retaining screws to ensure IP67 ce.
IMPORTANT	• Torque the screws to 0.5-0.7 Nm. (4.43-6.2 inch pounds).
	• Dust caps on the I/O modules must have 4 inch pounds of torque to maintain IP67 compliance.

Connect External Wiring

Connect external wiring to the DeviceNet Field Termination Plug (DFTP) as shown below.

1. Connect the DeviceNet cable to the DFTP as shown.

Connect	Connector Pin	То							
BLK Wire	3	-V							
BLU Wire	5	CAN* Low							
Base Wire	1	Drain							
WHT Wire	4	CAN High							
RED Wire	2	+V							
*CAN=Controller Area Network									



- 2. Insert the connector into the mating connector on the
- **3.** DeviceNet FTP module.

- **4.** Connect 24V dc power to sensor voltage for adapter and input module power.
- **5.** Connect 24V dc power to output voltage for output module power.

Pin	Function
1	Output Power +
2	Sensor Power +
3	Sensor Power -
4	Output Power -



42539

How Communication Takes Place and I/O Image Table Mapping

Chapter Objectives

In this chapter, you will learn about:

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

Communication Over the FlexArmor Backplane

One 1798-ADN DeviceNet adapter can interface with up to eight FlexArmor I/O modules placed in a FlexArmor baseplate. The adapter communicates to other network system components (typically one or more controllers or scanners, and/or programming terminals) over the DeviceNet 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 zero or more. The length of each I/O module's read words and write words varies 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 4 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.

About I/O Structure

Output data is received by the adapter in the order of the installed I/O modules. The Output data for slot 0 is received first, followed by the Output data for slot 1, and so on up to slot 7.

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 0 is first after the status word, following by Input data from slot 2, and so on up to slot 7.



Description of 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
	0	This bit is set (1) when an error is detected in slot position 0.
	1	This bit is set (1) when an error is detected in slot position 1.
	2	This bit is set (1) when an error is detected in slot position 2.
I/O Module	3	This bit is set (1) when an error is detected in slot position 3.
Fault	4	This bit is set (1) when an error is detected in slot position 4.
	5	This bit is set (1) when an error is detected in slot position 5.
	6	This bit is set (1) when an error is detected in slot position 6.
	7	This bit is set (1) when an error is detected in slot position 7.
Node Address Changed	8	This bit is set (1) when the node address switch setting has been changed since power up.
	9 thru 15	Not used - sent as zeroes.

Possible causes for an I/O Module Fault are:

- transmission errors on the FlexArmor backplane
- a failed module
- a module removed from the FlexArmor Baseplate
- incorrect module inserted in a slot position
- the slot is empty, but the platform is configured for a module in the slot location

Communication Choices

The FlexArmor DeviceNet adapter module supports multiple communication choices. These choices all use the default I/O structure previously described. The adapter master makes the actual communication choice. The choices are:

Polled - data is sent by the adapter in response to received data

Strobe - data is sent by the adapter in response to the strobe command. The single bit allocated to the adapter in the strobe message is not used. If the configured size of the input data (sent from the adapter) is greater than 8 bytes, the strobe connection establishment will fail. In this case, the input size must be re-configured to 8 bytes or less.

Change of State - data is sent by the adapter based on detection of any changed value within the input data. Data is independently received based on change of state from the sender. Data in both directions can be acknowledged or unacknowledged depending on the run time configuration of the system.

Cyclic - data is sent cyclically by the adapter based on a configured time value. Data is independently received cyclically from the sender. Data in both directions can be acknowledged or unacknowledged depending on the run time configuration of the system.

Mapping Data into the Image Table

All FlexArmor modules are supported by the DeviceNet adapter. At present, these consist of:

Module Description	Catalog Number	For image table mapping refer to:
4 Sinking Input Module	1798-IB4	2-5
4 Sinking Input Diagnostic Module	1798-IB4D	2-6
8 Sinking Input Module	1798-IB8	2-7
4 Electronically Fused Sourcing Output Module	1798-OB4E	2-8
8 Electronically Fused Sourcing Output Module	1798-OB8E	2-9
4 Analog Input Module	1798-IE4	2-9
2 Analog Output Module	1798-OE2	2-12

Description of 1798-IB4 Image Table Mapping



Memory Map of 4 Point Discrete Input Module Image Table - 1798-IB4

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	
	Not used D3 D2 D1											D1	D0	Read Word 1			
	Not used													FO	Read Word 2		
	Reserved							Reserved						DT 00-3			Write Word 1

Where D = Input Data (D0 corresponds to input 0, D1 corresponds to input 1, etc.), DT = Input Delay Time (DT 00-3 corresponds to inputs 0 through 3), FO = Fault Bit - Indicates status of module sensor power (0=Normal, 1=Sensor Power Shorted), FE = Fault Enabled Bit, must be set to return fault bit (FO) from module. The "Fault Enabled" bit will be set automatically if the input filter times are configured through RSNetWorx for DeviceNet.

Bits			Description	Selected Delay Time					
02	01	00	Delay Time for Inputs 00-03						
0	0	0	Delay Time 0 (default)	256µs					
0	0	1	Delay Time 1	512µs					
0	1	0	Delay Time 2	1ms					
0	1	1	Delay Time 3	2ms					
1	0	0	Delay Time 4	4ms					
1	0	1	Delay Time 5	8ms					
1	1	0	Delay Time 6	16ms					
1	1	1	Delay Time 7	32ms					

Input Delay Times for the 1798-IB4 Input Module

Description of 1798-IB4D Image Table Mapping



Memory Map of 4 Point Discrete Input Module Image Table - 1798-IB4D

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	Dec
	S 3	S2	S 1	S 0	W3	W2	W1	W0	Not Used I3				I2	I1	IO	Read Word 1	
	Not Used													•	Read Word 2		
	Reserved D3 D2 D1 D0 Reserved DT 00-3											Write Word 1					
Where I = Input Data (I0 corresponds to input 0, I1 corresponds to input 1, etc.); $DT = Input Delay Time (DT 00-3 corresponds to inputs 0 through 3) W = Open Wire Detect; S = Short Circuit Detect; D = Open Wire Disable$																	

	Bits		Description	Selected Delay Time
02	01	00	Delay Time for Inputs 00-03	
0	0	0	Delay Time 0 (default)	256µs
0	0	1	Delay Time 1	512µs
0	1	0	Delay Time 2	1ms
0	1	1	Delay Time 3	2ms
1	0	0	Delay Time 4	4ms
1	0	1	Delay Time 5	8ms
1	1	0	Delay Time 6	16ms
1	1	1	Delay Time 7	32ms

Input Delay Times for the 1798-IB4D Input Module

Description of 1798-IB8 Image Table Mapping



Memory Map of 8 Point Discrete Input Module Image Table - 1798-IB8

Decimal Bit	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	Size
Octal Bit	17	7 16 15 14 13 12 11 10 07 06 05 04 03 02 01												01	00		
		Not used D7 D6 D5 D4 D3 D2 D1 D0													D0	Read Word 1	
									Not us	sed						FO	Read Word 2
		Reserved FE Reserved DT 00-07 Write Word 1															
Where D =	Where D = Input Data (D0 corresponds to input 0, D1 corresponds to input 1, etc.), DT = Input Delay Time (DT 00-07																

Where D = Input Data (D0 corresponds to input 0, D1 corresponds to input 1, etc.), DT = Input Delay Time (DT 00-07 corresponds to inputs 0 through 7) FO = Fault Bit - Indicates status of module sensor power (0=Normal, 1=Sensor Power Shorted), FE = Fault Enabled Bit, must be set to return fault bit (FO) from module. The "Fault Enabled" bit will be set automatically if the input filter times are configured through RSNetWorx for DeviceNet.

	Bits		Description	Selected Delay Time
02	01	00	Delay Time for Inputs 00-07	
0	0	0	Delay Time 0 (default)	256µs
0	0	1	Delay Time 1	512µs
0	1	0	Delay Time 2	1ms
0	1	1	Delay Time 3	2ms
1	0	0	Delay Time 4	4ms
1	0	1	Delay Time 5	8ms
1	1	0	Delay Time 6	16ms
1	1	1	Delay Time 7	32ms

Input Delay Times for the 1798-IB8 Input Module

Description of 1798-OB4E Image Table Mapping



Memory Map of 4 Point Discrete Output Module Image Table - 1798-OB4E

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	
		Not used											F3	F2	F1	F0	Read Word 1
		Reserved											03	02	01	00	Write Word 1

Where O = Output Value (O0 corresponds to output 0, O1 corresponds to output 1, etc.) F0-F3 = Indicate the status of each output point (0=Output normal, 1=Output faulted)



Description of 1798-OB8E Image Table Mapping

Memory Map of 8 Point Discrete Output Module Image Table - 1798-OB8E

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	
				Not	used				F7	F6	F5	F4	F3	F2	F1	F0	Read Word 1
		Reserved O7 O6 O5 O4 O3 O2 O1 O0 Write Wo													Write Word 1		
Where O = Output Value (O0 corresponds to output 0, O1 corresponds to output 1, etc.)																	

F0-F7 = Indicate the status of each output point (0=Output normal, 1=Output faulted)

Description of 1798-IE4 Image Table Mapping



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	
	S						Ana	alog V	alue C	Channe	el 0						Read Word 1
	S						Ana	alog V	Value C	Channe	el 1						Read Word 2
	S			Analog Value Channel 2 Read Word 3													
	S			Analog Value Channel 3 Read Word 4													
	S			Not Used Read Word 5													
	S							N	ot Use	ed							Read Word 6
	S							N	ot Use	ed							Read Word 7
	S							N	ot Use	ed							Read Word 8
	PU				Ν	ot Use	ed - Se	et to Z	ero				U3	U2	U1	U0	Read Word 9
	Not	t Used	ed - Set to 0 C3 C2 C1 C0 Not Used - Set to 0 F3 F2 F1 F0 Write Word 1														
	Not Used - Set to 0 Write Word 2 thru 6																
Where PU	² U = Power up bit; U = Underrange bits for 4-20mA inputs; C = Configure select bit; F = Full range bit;																

Memory Map of Analog Input Module Image Table - 1798-IE4

S = Sign bit (in 2's complement)

Range Selection Bits for the 1798-IE4

Channel No.	Chan	nel O	Char	nnel 1	Cha	nnel 2	Channel 3		
	FO	CO	F1	C1	F2	C2	F3	C3	
Decimal Bit	00	08	01	09	02	10	03	11	
0-10V dc/0-20mA	1	0	1	0	1	0	1	0	
4-20mA	0	1	0	1	0	1	0	1	
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 0000H.

Word	Decimal Bit	Definition
Read Word 1	Bits 00-14	Channel O analog data - 12-bit left justified two's complement number; unused lower bits are zero; 4-20mA uses all 16 bits
	Bit15	Channel O 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
	Bit15	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
	Bit15	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
	Bit15	Channel 3 analog data sign bit
Read Word 5-8		Not Used
	Bits 00-03	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.
Read Word 9	Bits 04-14	Not used - set to 0
	Bit 15	Power Up bit - 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 00-03	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 08-11	Configure select bits (C) for individual channels - Bits 08 corresponds to input channel 0, bit 09 corresponds to input 1, and so on. Refer to range selection above.
Write Word 2-6	Bits 00-15	Not used - set to 0

Word/Bit Descriptions for the 1798-IE4 Analog Input Module Write



Description of 1798-OE2 Image Table Mapping

Memory Map of Analog Output Module Image Table - 1798-OE2

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	
	PU					N	ot Use	ed - Se	et to Z	lero					W1	W0	Read Word 1
	S		Analog Value Channel 0												Write Word 1		
	S		Analog Value Channel 1											Write Word 2			
	S								Not U	Ised							Write Word 3
	S								Not U	Ised							Write Word 4
	S]	Not U	sed -	Set to	0					OE1	OE0	Write Word 5
	S]	Not Used - Set to 0C1C0Not Used - Set to 0F1											F0	Write Word 6		
	S		Not Used - Set to 0											•	Write Word 7 thru 14		

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

Channel No.	Char	inel O	Channel 1			
	FO	CO	F1	C1		
Decimal Bit	00	08	01	09		
0-10V dc/0-20mA	1	0	1	0		
4-20mA	0	1	0	1		
10 to +10V dc	1	1	1	1		
Off ¹	0	0	0	0		

Range Selection Bits for the	1798-0E2
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C = Configure select bit; F = Full range bit 1. When configured to off, individual channels will return OV.

Word/Bit Descriptions for the 1798-OE2 Analog Output Module (Write Word 6)

Word	Decimal Bit	Definition							
	Bits 00-01	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 1.							
Read Word 1	Bit 02-14	Not Used - Set to 0.							
	Bit 15	Power Up bit - 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 O analog data - 12-bit left justified two's complement number; unused lower bits are zero; 4-20mA uses all 16 bits.							
	Bit15	Channel O 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.							
	Bit15	Channel 1 analog data sign bit.							
Read Word 3-4		Not Used							
Write Word 5	Bit 00-01	Output Enable Bits. Bit 00 corresponds to output 0, 01 corresponds to output 1. These bits must be set to 1.							
	Bits 02-15	Not Used - Set to 0.							
Write Word 6	Bits 00-02	Full range bits (F) for individual channels - Bit 00 corresponds to input channel 0, bit 01 corresponds to input channel 1. Refer to the range selection above.							
	Bits 08-09	Configure select bits (C) for individual channels - Bit 08 corresponds to input channel 0, bit 09 corresponds to input channel 1. Refer to range selection above.							
Write Word 7-14		Not Used - Set to 0.							

Notes:

Configure Your DeviceNet Adapter

Chapter Objectives

In this chapter, you will learn how to use RSNetWorx for DeviceNet software to configure the adapter. You will:

- learn briefly about RSNetWorx for DeviceNet
- configure your FlexArmor adapter and system online
- map the scanner

Configure Your Adapter's FlexArmor System

Configure your FlexArmor system by specifying the FlexArmor module that will reside in each slot. Remember, slot 0 is the closet slot to the adapter and slot 7 is the farthest or last slot.

About RSNetWorx for DeviceNet

RSNetWorx for DeviceNet is the software tool used to configure your FlexArmor DeviceNet adapter and its related modules. This software tool can be connected to the adapter via the DeviceNet network.

In this chapter, we assume that you have established a network, and are adding a FlexArmor Adapter to your network.

If you are working off line, drag and drop the devices from the hardware list onto the graph.

IMPORTANT

You will be able to perform most of the functions discussed in this section while working off line but you must be on line to perform all of the functions discussed in this chapter.



Configure Your FlexArmor Adapter and System Online

To configure your adapter:

- 1. Open RSNetWorx for DeviceNet.
- 2. Click the Online icon . (If you are working off line, skip to the next section to learn how to configure the adapter.)

You see the Browse for Network window.

3. Locate the network you wish to access.

Browse for network
Select a communications path to the desired network.
Autobrowse Refresh
回···
<u>.</u> <u>D</u> K <u>C</u> ancel <u>H</u> elp

4. Click **OK**.

You are now in Online mode.

5. Click the Browse for Network icon 🚦 🗸



The network displays on the screen.

Configure the Adapter

You can determine the adapter configuration and system configuration for an adapter at a specific node address. The node address is assigned at the adapter (using the rotary switch) and in the adapter configuration screen.

IMPORTANT

If addressing the adapter in the adapter configuration screen, the address must agree with the physical address of the rotary switches on the adapter.

To access the adapter configuration screen, double-click the FlexArmor adapter icon.

You see the adapter configuration screen.

	1798 DeviceNet Adapter	? ×	
	General Module Configuration 1/0 Summary Transactions		
	offic or v 1798 DeviceNet Adapter		
	Name: 1798 DeviceNet Adapter		
	Description:		
If configuring the adapter off line, set this address to match the Node	Add <u>r</u> ess: 2		
Address switches on the 1/98-ADN.	Device Identity [Primary]		
	Vendor: Rockwell Automation - Allen-Bradley [1]		
	Type: Communication Adapter [12]		
	Device: 1798 DeviceNet Adapter [82]		
	Catalog: 1798:ADN		
	Revision: 2.003		
	OK Cancel Apply H	elp	

Configure the Module

- **1.** Click the **Module Configuration** tab.
- **2.** Click **Upload**.

IMPORTANT You must be online to perform an upload.

Use the following functions, as needed, to configure the module.



IMPORTANT

Downloading to the adapter is an option only when the 1798-ADN is not in the master's scanlist.

IMPORTANT

If you attempt to download when the adapter is in a scanlist, you will receive an **object state conflict** error message.

View Adapter Parameters

1. To display the adapter parameter window, from the **Module Configuration** window, double-click the adapter icon (1798-ADN) under **Module Type**. You see the following window.

> Click these tabs to view configuration information. The General window is shown here.

\frown					
	Slot 'n/a' - 1798-	ADI	? ×		
The General window lists information about the module currently selected.	General Configuration Settings EDS File				
	1798 D	eviceNet Adapter			
	<u>N</u> ame:	1798 DeviceNet Adapter	[]		
	Slot:	n/a			
	Vendor:	Rockwell Automation - Allen-Bradley [1]			
	Туре:	Communication Adapter [12]			
	Device:	1798 DeviceNet Adapter[82]			
	Catalog: External ID:	1798-ADN			
		OK Cancel	Help		

The adapter **Configuration Settings** window lists the status of each module in the FlexArmor system.

Module Bad Flag Possible causes for a

Module Bad Flag:

- Transmission errors on the FlexArmor backplane
- A failed module
- A module removed from the baseplate
- Incorrect module inserted in a slot position
- An empty slot

Idle-to-Fault

Determines the state of the Outputs immediately following an Idle to Fault transition. The options are

- Output Remains
 Idle State
- Output Goes to Fault State

g	Slot	'n/a' - '	179	3-ADN	? ×
or a	Ge	neral C	onfig	guration Settings EDS File	
errors		Se	elect	the parameter that you want to	o configure and initiate an
nor		ac	tion	using the toolbar.	
le	2	<u>G</u> roups	;	🔀 <u>R</u> estore 🛛 孢 <u>H</u> elp	
oved		$D=\Delta$	P	Parameter	Current Value
plate		1	٣	Module 1 Bad Flag	No Error
، برام		2	P	Module 2 Bad Flag	No Error
lot		3	e	Module 3 Bad Flag	Error
SIUL		4	e	Module 4 Bad Flag	No Error
		5	e	Module 5 Bad Flag	No Error
		6	٩	Module 6 Bad Flag	No Error
		7	٩	Module 7 Bad Flag	No Error
		8	e	Module 8 Bad Flag	No Error
tate of ediately –		✓ ¹²		Idle-To-Fault	Outputs Remain in Idle St 💌
to Fault					
tions are:					
emains in					
9					
oes to				ОК	Cancel Help

The **EDS File** window lists information about the EDS file currently being used.

	Slot 'n/a' - 1798-ADN	? ×
	General Configuration Settings	EDS File
	This EDS file is used to provided by the manuf.	o convey device configuration data that is acturer.
	Creation Date:	10-19-2000
	Creation Time:	18:00:00
	Modification Date:	08-14-2002
	Modification Time:	14:23:00
	File Revision:	1.011
Click View to display the EDS file.	► <u>View</u>	
		OK Cancel Help
Module Parameters

To view individual module parameters, from the **Module Configuration** tab, double click on the module whose parameters you wish to view.

1798 DeviceNet Adapter	? ×	
General Module Configuration],	O Summary Transactions	
Select and configuent that reside in the cu	re the adapter, and any associated modules, urrent chassis.	
Chassis <u>Type:</u> FlexArmor Baseplate	splay Hardware By: 😼 Upload atalog Name 💽 🍄 Do <u>w</u> nload	
Hardware:		
 1798-IB4 1798-IB4D 1798-IB8 1798-IE4 1798-OB4E 1798-OB8E 1798-OE2 	Slot Module Type n/a 1738-ADN 0 1738-0B4E 0 1738-0B8E 02 03 03 1738-1B8 04 1738-0E2 05 1738-0E2 06 1738-1E4 07 1738-1B4D	Double click on the module whose parameters you wish to view. For this example, the 1798-0B8E was chosen.
ОК	Cancel <u>Apply</u> Help	

The General	window	lists	information	about the	module currently
selected.					

<u>N</u> ame:	1798 8-Point 24V de Sourcing Output
Slot:	01
Vendor:	Rockwell Automation - Allen-Bradley [1]
Туре:	Unknown Device Type 124 [124]
Device:	1798 8-Point 24V dc Sourcing Output[4]
Catalog:	1798-0B8E
External ID:	

The **Advanced Parameters** window lists status information about the module currently selected.

	Slot '01' - 1798-0B8E	? ×
	General Advanced Parameters Flex Configuration Settings ED Select the parameter that you want to configure and initial action using the toolbar.)S File te an
Use this icon to restore the	Restore MHelp	
parameters	ID 🛆 🎢 Parameter Current Value	
selections to the module default (obtained from the EDS file.) Displays help information on the selected parameters.	Input size 1 W0RD(s) Uutput size 1 W0RD(s) Config size 1 W0RD(s) Program Mode Behavior Reset to Zero Communication Fault Beha Reset to Zero Module Fault Zero Inputs	
	OK Cancel	Help

Parameter #	Parameter Name	Description
3	Input Size	Number of Read words. These are determined by other Parameter selections and cannot be set by the user.
5	Output Size	Number of Write words. These are determined by other Parameter selections and cannot be set by the user.
6	Config. Size	Number of Configuration words. These are determined by other Parameter selections and cannot be set by the user
10	Program Mode Behavior	 Determines the state of the Outputs when the Controller enters Program mode. The options are: Reset to Zero Hold Outputs in Last State Use Safe State Output Values (Set under Flex Config. tab.)
11	Communication Fault Behavior	 Determines the state of the Outputs when the Controller enters Program mode. The options are: Reset to Zero Hold Outputs in Last State Use Safe State Output Values (Set under FLEX Config. tab.)
13	Module Fault	Determines the state of the Inputs in the event of a Module Fault. The options are: • Zero Inputs • Hold Last Input Values

The following table describes the parameters in the **Advanced Parameters** window.

	Slot '01' - '	1798-OB8E		? ×
	General	Advanced Parameters Flex	Configuration Settings	EDS File
	Input words:	11 (I/O Only) 🔽 Output words:	01 (I/O Only) 🔹	😡 <u>D</u> efaults
	<u>C</u> onfigural	tion:		🔁 <u>H</u> elp
	ID	Parameter	Current Value	
	Safe <u>S</u> tate			Nelp
no safo	Safe <u>S</u> tate	e: Parameter	Current Value	1 Help
le safe	Safe <u>S</u> tate	e: Parameter Point 0 Safe State	Current Value	[™] Help
e safe cting the	Safe State	e: Parameter Point 0 Safe State Point 1 Safe State	Current Value Off Off	® Help ▲
e safe cting the posing	Safe <u>S</u> tate ID 13 14 15 16	e: Parameter Point 0 Safe State Point 1 Safe State Point 2 Safe State Point 3 Safe State	Current Value Off Off Off Off	Melp
e safe cting the posing rom the	Safe <u>S</u> tate ID 13 14 15 16 17	e: Parameter Point 0 Safe State Point 1 Safe State Point 2 Safe State Point 3 Safe State Point 4 Safe State	Current Value Off Off Off Off Off	
e safe cting the posing rom the	Safe <u>S</u> tate ID 13 14 15 16 17	e: Parameter Point 0 Safe State Point 1 Safe State Point 2 Safe State Point 3 Safe State Point 4 Safe State	Current Value Off Off Off Off Off Off	
e safe cting the posing rom the	Safe <u>S</u> tate ID 13 14 15 16 17 •	e: Parameter Point 0 Safe State Point 1 Safe State Point 2 Safe State Point 3 Safe State Point 4 Safe State	Current Value Off Off Off Off Off Off	Help A

Safe State Data found under the **Flex Configuration Settings** tab is shown below.

Set the value of the safe state data by selecting the value and then choosing either ON or OFF from the drop down list.

Special Parameters

Special parameters for individual modules can also be found under the **Flex Configuration Settings** tab. The following section identifies special parameter windows for the 1798-IB4D, -IE4, and -OE2 modules.

1798-IB4D Filter Time and Open Wire Disable

SI	ot '02	- 1	798-1B4D		? ×
	Genera	al Ì A	dvanced Parameters Flex Cont	iiguration Settings	EDS File
	Input words:	01	(I/O Only) T Output 00 words:	1/0 Only) 🔹	₩ Defaults
	<u>C</u> onfig	uratio	in:		🔁 <u>H</u> elp
	ID		Parameter	Current Value	
		1	Input Filter Time	0.256 ms	F
		4	Open Wire Disable Ch0	Off	-
		5	Open Wire Disable Ch1	Off	•
		6	Open Wire Disable Ch2	Off	•
		7	Open Wire Disable Ch3	Off	•
	L				
	Safe <u>S</u>	tate:			🔁 H <u>e</u> lp
	ID		Parameter	Current Value	
			There are no paramete	rs to display.	
-				-	
			ОК	Cancel	Help

Enter filter time and open wire parameters for the 1798-IB4D.

1798-IE4 Input	Channel Range	Selection
----------------	---------------	-----------

	Slot '03' - 1798-IE4	?×
	General Advanced Parameters Flex Configuration Settin	ngs EDS File
	Input words: 04 (1/0 Only) Qutput 00 (1/0 Only) words:	→
	<u>C</u> onfiguration:	🔁 <u>H</u> elp
	D Parameter Current Value	<u> </u>
Select the proper current or	41 Input Channel 0 Range Sele 0-20mA/0-10V	'do 💽
voltage range for your	42 Input Channel 1 Range Sele 0-20mA/0-10V	de 🔽
annlication	43 Input Channel 2 Range Sele 0-20mA/0-10V	'dc 💽 📕
apprication.	44 Input Channel 3 Range Sele 0-20mA/0-10V	'dc 🔹
	1001 Undefined WORD 00000000 000	00000 🛄 🚽
	Safe <u>S</u> tate:	🔁 H <u>e</u> lp
	D Parameter Current Valu	e
	There are no parameters to display.	
	OK Cancel	Help

1798-OE2 Output Channel Enable and Range Selection

	Slot '04' - 1798-0E2	? ×
	General Advanced Parameters Flex Config	guration Settings EDS File
	Input words:	/0 Only) 💽 🎉 <u>D</u> efaults
	<u>C</u> onfiguration:	🔁 Help
	ID Parameter	Current Value
	50 Output Enable Ch0	On [
output channels and	51 Output Enable Ch1	0n 🟳
he output channel	48 Output Channel 0 Range Se	0-20mA/0-10Vdc
ppropriate for your	49 Output Channel 1 Range Se	0-20mA/0-10Vdc
tion.	1001 Undefined WORD	00000000 00000000
	•	
	Safe <u>S</u> tate:	🔁 H <u>e</u> lp
	ID 🔄 🗱 Parameter	Current Value
	30 🛭 🔄 Safe State Ch. 0 0-20mA/	/S 0.000 mA/0.000 Vdc
e state values	35 🛭 🔄 Safe State Ch. 1 0-20mA	/S 0.000 mA/0.000 Vdc
	4	F
	OK	Cancel Help

Enable select th range a applicat

Set safe

The **EDS File** window is the last tab in the module parameters window. The **EDS File** window lists information about the EDS file currently being used.

	Slot '01' - 1798-0B8E	?	×
	General Advanced Parameters	Flex Configuration Settings EDS File	
	This EDS file is used to provided by the manufa	convey device configuration data that is courer.	-
	Creation Date: Creation Time: Modification Date:	11-17-2000 10:00:00 08-14-2002	
	Modification Time:	14:28:00	
Click View to display the EDS file.	File Revision:	1.010	
		OK Cancel Help	

View I/O Summary

1. To view I/O summary information, click the **I/O Summary** tab from the adapter window.



2. Click the + sign to the left of the input or output module to view the amount of data mapped to each module in the system.

👫 1798 DeviceNet Ada	pter		? ×
General Module Configu	ration 1/0 Summary	Transactions	
View the input input and outp	and output sizes for th ut sizes for the chassi:	ne modules, as well as s.	the total
I/O <u>Т</u> уре:			
Polled 🗾	Monitor		
Module	Bytes	Description	
⊞ =∜ Input	32		
□ \$\$ Output	48		
⊞ [UU] - 1798-01 □ [01] - 1798-01 □	B4E 2		
E E [01] - 1738-0	905 2		
	4 2		
	E2 28		
🗉 🔋 [06] - 1798-IE	4 12		
•		1	
	IK Cancel	Apply	Help

3. Click the **+** sign to the left of a module to display detailed module information.

📽 1798 DeviceNet Adapter 🔹 😵					
General Module Configuration 1/O Summary Transactions					
View the input and output sizes for the modules, as well as the total input and output sizes for the chassis.					
I/O <u>T</u> ype: Polled ▼	Monitor				
Module	Bytes	Description			
⊞ 📣 Input	32				
🗆 🗇 Output	48				
🖃 🔋 [00] - 1798-0B4	E 2				
	1 Bit	Output 0			
	1 Bit	Output 1			
	1 Bit	Output 2			
	1 Bit	Output 3			
	12 Bits	<undefined></undefined>			
🗉 🗄 🚦 [01] - 1798-0B8	E 2				
🖽 🚦 [03] - 1798-IB8	2				
🖽 🚦 [04] - 1798-IB4	2				
🗉 🗄 📒 [05] - 1798-0E2	28				
🖽 🛃 [06] - 1798-IE4	12				
OK	Cancel	Apply	Help		

	Slot '00' 1798-0	B4E				X
Toggle	•					
input and	Connection	ID	e	Parameter	Current Value	
output data	C Input	3	?	Output 0	Off	
mapped to <		4	7	Output 1	Off	
the module		5	7	Output 2	Off	
the module.		6	Ť	Output 3	Off	
Clicking the						
Monitor —	Monitor					
button will						
display the						
current						
value of the						
listed						
noromotore						
parameters.						
	<u>C</u> lose	•				

	1798 DeviceNet Adapter		? ×			
	General Module Configuration	1/0 Summary Transactions	1			
Highlight a module	View the input and output sizes for the modules, as well as the total input and output sizes for the chassis.					
Monitor button to		Monitor				
display detailed	Module	Bytes Descriptic	n			
module information		32				
as shown in the	🗆 🗇 Output	48				
nade NOTE. You		2				
must be in online		2				
mode to perform	⊡ 💀 [04] - 1798-IB4	2				
this function.	🕀 🔋 [05] - 1798-0E2	28				
	🕀 👸 [06] - 1798-IE4	12				
			<u> </u>			
	OK	Cancel Apply	Help			

Map the Scanner

To map the scanner:

1. From the RSNetWorx for DeviceNet configuration screen, double-click the scanner.



🎬 1756-DNB/A (8) 🔹 🔹 😵
General Module Scanlist Input Output ADR Summary
1756-DNB/A
Name: 1756-DNB/A (8)
Description:
Add <u>r</u> ess: 6
Device Identity [Primary]
Vendor: Rockwell Automation - Allen-Bradley [1]
Device: Communication Adapter [12]
Product: 1756-DNB/A [14]
Catalog: 1756-DNB/A
Revision: 3.003
OK Cancel Apply Help

You see the scanner configuration window.

2. Click the **Scanlist** tab.

🍱 1756-DNB/A (8)	? ×
General Module Scanlist Input	Output ADR Summary
Availa <u>b</u> le Devices:	<u>S</u> canlist:
🗐 03, 1798 DeviceNet Ada	>>
🔽 Automap on Add	Node A <u>c</u> tive
Upload from Scanner	Electronic Key:
Download to Scanner	<u>V</u> endor <u>P</u> roduct Code
Edit I/O Parameters	☐ Major <u>R</u> evision ☐ Mi <u>n</u> or ☐ or <u>hig</u> her
ОК С	ancel <u>A</u> pply Help

	🍱 1756-DNB/A (8)	? ×
	General Module Scanlist Input C	Jutput ADR Summary
Select Automap on Add to automatically map the correct amount of input and	Available Devices:	Scanlist:
output data at the time the FlexArmor system is added — to the scanlist.	Automap on Add Upload from Scanner Download to Scanner Edit 1/0 Parameters	Node Agtive Electronic Key: ✓ Device Lype ✓ Yendor ✓ Product Code Major Bevision Minor □ or higher
	OK Cance	l <u>A</u> pply Help

3. Highlight the device in the **Available Devices** list and click the right arrow to move the device to the Scanlist.

4. Click OK.

The devices in the scanlist will be mapped automatically.

To map devices manually, click the Edit I/O Parameters button.

5. Click **Yes** to download the changes. (You must be on line to perform this function.)

锋 1756-DNB/A (8) 📪
General Module	Scanlist Input Output ADR Summary
Node	Type Rx Map AutoMap
	<u>U</u> nmap
	Advanced
	Options
M <u>e</u> mory: As	sembly Data 💌 Start DWord: 🛛 🛫
Bits 31 - 0	
1:I.Data[0]	03, 1798 DeviceNet Adapter (7)
1:1.Data[1]	03, 1798 DeviceNet Adapter (7)
1:1.Data[2]	U3, 1798 DeviceNet Ad
1:1.Data[4]	
1:I.Data[5]	
1:1.Data[6]	
1:1.Data[7]	T
, T.I.Dataiol	
	OK Cancel <u>Apply</u> Help

6. Click the **Input** tab to view input data mapped to the scanner.

7. Click the **Output** tab to view output data mapped to the scanner.

🏘 1756-DNB/A (8) 🔹 🔹 😵
General Module Scanlist Input Output ADR Summary
Node Type Tx Map AutoMap
<u>U</u> nmap
A <u>d</u> vanced
<u>Options</u>
M <u>e</u> mory: Assembly Data 💌 <u>S</u> tart DWord: 0 🚔
Bits 31 - 0
1:0.Data[0] 03, 1798 DeviceNet Adapter (7)
1:0.Data[1] 03, 1798 DeviceNet Adapter (7)
1:0.Data[4]
1:0.Data[5]
1:0.Data[6]
1:0.Data[7]
OK Cancel <u>A</u> pply Help

	General Module Scanlist Input Output ADR Summary
For information about enabling ADR, see the documentation that comes with the scanner.	Image: Constraint of the second s

8. Click the **ADR** tab to view ADR (Auto Device Replace) options.

The **Summary** tab contains a list of the devices to which the scanner is currently talking.

24	📽 1756-DNB/A (12) 🔹 😵 😵								
G	eneral M	odule	Scanlist	Input	Outpu	ıt Ì ADR	Sumr	mary	
	Node		Active	Кеу	Bx	Rx Map	Tx	Tx Map	-
	102, 17	98	Yes	DVP	10	Yes	8	Yes	
	🗐 06, <s< td=""><td>lav</td><td>No</td><td></td><td>0</td><td>No</td><td>0</td><td>No</td><td></td></s<>	lav	No		0	No	0	No	
	L								- 11
			ОК	Can	icel	App	ly	Hel	P

Troubleshooting

Chapter Objectives

This chapter describes how to use the indicators on the module for troubleshooting.

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

- Mod/Net status
- I/O status

The table below provides the indicator conditions and status.

Mod/Net Status Indicator	
Indication	Status
Off	No power, or no network access
Flashing Green/OFF	On line, but not connected to master
Solid Green	On line, link OK, connected
Flashing Red	Recoverable fault
Solid Red	Critical adapter failure
I/O Status Indicator	
Indication	Status
Off	No power or outputs off
Flashing Red/Off	Recoverable fault - outputs in fault
Flashing Green/Off	Idle/program mode - outputs in Idle
Solid Green	Device operational - outputs live - run
Solid Red	Critical adapter fault - unrecoverable

Troubleshoot With the Indicators

Notes:

Specifications

Input Module Specifications

Specifications for the 1798-IB4 Module

Specifications	1798-IB4			
Module Type	Digital Input, Sinking			
Number of Channels	1 group of 4			
Sensor Source Current	400 mA maximum			
On-state Voltage	10-28.8V dc; 24V dc nominal			
On-state Current	2-12 mA; 8 mA @ 24V dc			
Off-state Voltage	5V dc maximum			
Off-State Current	1.5 mA minimum			
Channel Impedance	4.6KΩ maximum			
Isolation Voltage	850V dc channel-to-system for 1s			
Delay Times:Off to On On to Off	256 us, 512 us, 1 ms, 2ms 4 ms, 8 ms, 16 ms, 32 ms (Selectable; 256 us default)			
FlexBus Current	20 mA maximum			
Power Dissipation	2.0W @ 28.8V dc			
Thermal Dissipation	6.8 BTU/hr. @ 28.8V dc			
Indicators	4 channel status - yellow 1 fault LED indicator- red			
External DC Power Voltage (24V dc nom.) Current	10-28.8V dc; 5% AC ripple 450 mA maximum			
Dimensions (H x D x W)	118 mm X 57 mm X 40 mm 4.63 in. X 2.25 in. X 1.58 in.			
Environmental Conditions: Operating Temperature Storage Temperature Shock: Operating Non-Operating Vibration	-20 to 60°C (-4 to 140°F) -40 to 85°C (-40 to 185°F) 30G peak, 11±1 ms pulse width 50G peak, 11±1 ms pulse width 5G @ 10-500 Hz per JEC 68-2-6			
Conductors	See publication DN-6.7.2			
Enclosure	Meets IP67			
Certifications (When product is marked)	c-UL-us UL Listed Industrial Control Equipment, certified for US and Canada UL UL Listed Industrial Control Equipment CE ¹ European Union 89/336/EEC EMC Directive, compliant with: EN 50081-2; Industrial Emissions EN 50082-2; Industrial Immunity EN 61326; Meas./Control/Lab., Industrial Requirements EN 61000-6-2; Industrial Immunity			
	C-Tick' Australian Radiocommunications Act, compliant with: AS/NZS 2064; Industrial Emissions			

1. See the Product Certification link at www.ab.com for Declarations of Conformity, Certificates, and other certification details.

Specifications for the 1798-IB8 Module

Specifications	1798-IB8		
Module Type	Digital Input, Sinking		
Number of Channels	1 group of 8		
Sensor Source Current	400 mA maximum		
On-state Voltage	10-28.8V dc; 24V dc nominal		
On-state Current	2-12 mA; 8 mA @ 24V dc		
Off-state Voltage	5V dc maximum		
Off-State Current	1.5 mA minimum		
Channel Impedance	4.6KΩ maximum		
Isolation Voltage	850V dc channel-to-system for 1s		
Delay Times:Off to On On to Off	256 us, 512 us, 1 ms, 2ms 4 ms, 8 ms, 16 ms, 32 ms (Selectable; 256 us default)		
FlexBus Current	20 mA maximum		
Power Dissipation	3.0W @ 28.8V dc		
Thermal Dissipation	10.2 BTU/hr. @ 28.8V dc		
Indicators	8 channel status - yellow 1 fault LED indicator - red		
External DC Power Voltage (24V dc nom.) Current	10-28.8V dc; 5% AC ripple 500 mA maximum		
Dimensions (H x D x W)	118 mm X 57 mm X 40 mm 4.63 in. X 2.25 in. X 1.58 in.		
Environmental Conditions: Operating Temperature Storage Temperature Shock: Operating Non-Operating Vibration	-20 to 60°C (-4 to 140°F) -40 to 85°C (-40 to 185°F) 30G peak, 11±1 ms pulse width 50G peak, 11±1 ms pulse width 5G @ 10-500 Hz per IEC 68-2-6		
Conductors	See publication DN-6.7.2		
Enclosure	Meets IP67		
Certifications (When product is marked)	c-UL-us UL Listed Industrial Control Equipment, certified for US and Canada UL UL Listed Industrial Control Equipment CE ¹ European Union 89/336/EEC EMC Directive, compliant with: EN 50081-2; Industrial Emissions EN 50082-2; Industrial Immunity EN 61326; Meas./Control/Lab., Industrial Requirements EN 61000-6-2; Industrial Immunity		
	C-Tick ¹ Australian Radiocommunications Act, compliant with: AS/NZS 2064; Industrial Emissions		
 See the Product Certification link at v 	vww.ab.com for Declarations of Conformity, Certificates, and other		

certification details.

Specifications for the 1798-IB4D Module

Specifications - 1798-IB4D		
Module Type	Digital Input, Sinking	
Number of Channels	1 group of 4	
Sensor Source Current	50 mA per connector	
On-state Voltage	10-28.8V dc; 24V dc nominal	
On-state Current	2-12 mA; 8 mA @ 24V dc	
Off-state Voltage	5V dc maximum	
Off-State Current	1.5 mA minimum	
Channel Impedance	4.6K Ω maximum	
Isolation Voltage	850V dc channel-to-system for 1s	
Delay Times:Off to On	256 us, 512 us, 1 ms, 2ms	
On to Off	4 ms, 8 ms, 16 ms, 32 ms	
	(Selectable; 256 us default)	
FlexBus Current	80 mA maximum	
Power Dissipation	2.0W @ 28.8V dc	
Thermal Dissipation	6.8 BTU/hr. @ 28.8V dc	
Indicators	4 channel status - yellow	
	4 diagnostic indicators- red	
External DC Power	10, 20, 0 // do: E ⁰ / AC ripple	
Vullage (24V uc nulli.)	10-28.8 V uC, 5% AC HPPIE	
Dimensions	118 mm x 57 mm x 40 mm	
(H x D x W)	4.63 in. x 2.25 in. x 1.58 in.	
Operational Temperature	IEC 60068-2-1 (Test Ad. Operating Cold).	
- F	IEC 60068-2-2 (Test Bd, Operating Dry Heat),	
	IEC 60068-2-14 (Test Nb, Operating Thermal Shock):	
	-20 to 60°C (-4 to 140°F)	
Storage Temperature	IEC 60068-2-1 (Test Ab, Un-packaged Non-operating Cold),	
	IEC 60068-2-2 (Test Bb, Un-packaged Non-operating Dry Heat),	
	Shork)	
	$-40 \text{ to } 85^{\circ}\text{C}$ (-40 to 185°F)	
Shock	IEC60068-2-27 (Test Ea, Unpackaged shock):	
	Operating 30g	
	Non-operating 50g	
Emissions	CISPR 11:	
	Group 1, Class A	
ESD Immunity	IEC 61000-4-2:	
	bKV contact discharges	
Padiated PE Immunity		
nduidleu nf iiiiiiiuiiily	1000-4-5.	
	10V/m with 200Hz 50% Pulse 100%AM at 900MHz	
EFT/B Immunity	IEC 61000-4-4:	
	±2kV at 5kHz on power ports	
	±2kV at 5kHz on signal ports	
Surge Transient Immunity	IEC 61000-4-5:	
	\pm 1kV line-line(DM) and \pm 2kV line-earth(CM) on power ports	
	±1kV line-line(DM) and ±2kV line-earth(CM) on signal ports	
Conducted RF Immunity	LEC 61000-4-6:	
	I UVIIIIS WILL IKHZ SILE-WAVE 8U%AIVI TROM I SUKHZ TO 8UIVIHZ	

Vibration	IEC60068-2-6 (Test Fc, Operating):		
	5g @ 10-500Hz		
Conductors	See publication DN-6.7.2		
Enclosure	Meets IP67		
Certifications (When product is marked)	c-UL-usUL Listed Industrial Control Equipment, certified for US and Canada		
	CE ¹ European Union 89/336/EEC EMC Directive, compliant		
	with: EN 50081-2; Industrial Emissions		
	EN 50082-2; Industrial Immunity		
	EN 61000-6-2; Industrial Immunity		
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Specifications - 1798-IB4D (continued)

Specifications for the 1798-IE4 Module

Specifications - 1798-IE4 Analog Input Module		
Module Type	Analog Input	
Number of Channels	4 single-ended, non-isolated	
ResolutionBits Voltage/Cnt Current/Cnt	12 - Unipolar, 11+ sign - Bipolar 2.56 mV - Unipolar; 5.13 mV - Bipolar 5.13 uA	
Data Format	16 hit: 2's complement: left-justified	
Conversion Type		
Conversion Bate	256 us - All channels	
Current Terminal	4-20 mA: 0-20 mA (user configurable)	
Voltage Terminal	±10V: 0-10V (user configurable)	
Normal Mode Rejection Voltage Terminal Current Terminal	-3 db @ 17 Hz; -20 db/decade; -10 db @ 50 Hz; 11.4 db @ 60 Hz -3 db @ 9 Hz; -20 db/decade;	
	-15.3 db @ 50 Hz; -16.8 db @ 60 Hz	
Step Response to 63% Voltage Terminal Current Terminal	9.4 ms 18.2 ms	
Impedance:Voltage Terminal Current Terminal	100 k Ω ; 200 k Ω @ DC 238 Ω	
Absolute Accuracy Voltage Terminal Current Terminal	0.20% FS @ 25°C 0.20% FS @ 25°C	
Accuracy Drift:Voltage Terminal Current Terminal	0.00428% FS per°C 0.00407% FS per°C	
Calibration	None Required	
Maximum Overload Voltage Terminal Current Terminal	Single channel; continuous 30V 32 mA	
Isolation Voltage	850V dc channel-to-system for 1s	
FlexBus Current	10 mA maximum	
Sensor Source Current (per connector)	50 mA	
Power dissipation	2.5W @ 28.8V dc	
Thermal Dissipation	8.5 BTU/hr @ 28.8V dc	
Indicator	1 fault LED Indicator - red	
External DC Power Voltage (24V dc nom.) Current	10-28.8V dc; 5% AC ripple 50 mA @ 24V dc	
Dimensions (H x D x W)	118 mm x 57 mm x 40 mm 4.63 in. x 2.25 in. x 1.58 in.	
Operational Temperature	IEC 60068-2-1 (Test Ad, Operating Cold), IEC 60068-2-2 (Test Bd, Operating Dry Heat), IEC 60068-2-14 (Test Nb, Operating Thermal Shock): -20 to 60°C (-4 to 140°F)	

Specifications - 1798-IE4 Analo	og Input Module (Continued)
Storage Temperature	IEC 60068-2-1 (Test Ab, Un-packaged Non-operating Cold), IEC 60068-2-2 (Test Bb, Un-packaged Non-operating Dry Heat), IEC 60068-2-14 (Test Na, Un-packaged Non-operating Thermal Shock): -40 to 85°C (-40 to 185°F)
Shock	IEC60068-2-27 (Test Ea, Unpackaged shock): Operating 30g Non-operating 50g
Emissions	CISPR 11: Group 1, Class A
ESD Immunity	IEC 61000-4-2: 6kV contact discharges 8kV air discharges
Radiated RF Immunity	IEC 61000-4-3: 10V/m with 1kHz sine-wave 80%AM from 30MHz to 2000MHz 10V/m with 200Hz 50% Pulse 100%AM at 900MHz
EFT/B Immunity	IEC 61000-4-4: ±2kV at 5kHz on power ports ±2kV at 5kHz on signal ports
Surge Transient Immunity	IEC 61000-4-5: ±1kV line-line(DM) and ±2kV line-earth(CM) on power ports ±1kV line-line(DM) and ±2kV line-earth(CM) on signal ports
Conducted RF Immunity	IEC 61000-4-6: 10Vrms with 1kHz sine-wave 80%AM from 150kHz to 80MHz
Vibration	IEC60068-2-6 (Test Fc, Operating): 5g @ 10-500Hz
Enclosure	Meets IP67
Certifications (When product is marked)	c-UL-usUL Listed Industrial Control Equipment, certified for US and CanadaULUL Listed Industrial Control EquipmentCE1European Union 89/336/EEC EMC Directive, compliant with: EN 50081-2; Industrial Emissions EN 50082-2; Industrial Immunity EN 61326; Meas./Control/Lab., Industrial Requirements EN 61000-6-2; Industrial Immunity
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Output Module Specifications

Specifications for the 1798-0B4E Module

Specifications	1798-0B4E
Module Type	Digital Output, Sourcing
Number of Channels	1 group of 4
On-state Voltage	10-28.8V dc; 24V dc nominal
On-state Current (per channel)	1.0A per channel
On-state Current (per module)	4.0A per module
Off-state Voltage	28.8V dc maximum
Off-State Current	0.5 mA maximum leakage
On-State Voltage Drop	0.5V dc maximum drop
Surge Current	2.0A for 50 ms (Repeatable every 2 seconds)
Isolation Voltage	850V dc for 1 second
Delay Times:Off to On	0.5 ms maximum
On to Off	1.0 ms maximum
FlexBus Current	60 mA maximum
Power Dissipation	2.4 W @ 28.8 V dc
Thermal Dissipation	8.2 BTU/hr. @ 28.8V dc
Indicators	4 channel status - yellow
	1 fault LED indicator- red
External DC Power	
Voltage (24V dc nom.)	10-28.8V dc; 5% AC ripple
	4.UA maximum
Umensions (H x D x W)	118 mm X 57 mm X 40 mm 4.63 in. X 2.25 in. X 1.58 in.
Environmental Conditions: Operating Temperature Storage Temperature Shock: Operating Non-Operating Vibration	-20 to 60° C (-4 to 140° F) -40 to 85° C (-40 to 185° F) 30G peak, 11 ± 1 ms pulse width 50G peak, 11 ± 1 ms pulse width 5G @ 10-500Hz per IEC 68-2-6 (see graph on pext page)
Conductors	See publication DN-6.7.2
Cordsets	5 pin micro (12mm) style connectors
Enclosure	Moots IP67
Certifications (When product is marked)	c-UL-us UL Listed Industrial Control Equipment, certified for US and Canada UL UL Listed Industrial Control Equipment CE ¹ European Union 89/336/EEC EMC Directive, compliant with: EN 50081-2; Industrial Emissions EN 50082-2; Industrial Immunity EN 61326; Meas./Control/Lab., Industrial Requirements EN 61000-6-2; Industrial Immunity C-Tick ¹ Australian Radiocommunications Act, compliant with: AS/NZS 2064; Industrial Emissions
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Specifications for the 1798-OB8E Module

Specifications	1798-0B8E
Module Type	Digital Output, Sourcing
Number of Channels	1 group of 8
On-state Voltage	10-28.8V dc; 24V dc nominal
On-state Current (per channel)	1.0A per channel
On-state Current (per module)	5.0A per module
Off-state Voltage	28.8V dc maximum
Off-State Current	0.5 mA maximum leakage
On-State Voltage Drop	0.5V dc maximum drop
Surge Current	2.0A for 50 ms (Repeatable every 2 seconds)
Isolation Voltage	850V dc for 1 second
Delay Times:Off to On On to Off	0.5 ms maximum 1.0 ms maximum
FlexBus Current	60 mA maximum
Power Dissipation	2.9 W @ 28.8 V dc
Thermal Dissipation	9.9 BTU/hr. @ 28.8V dc
Indicators	8 channel status - yellow 1 fault LED indicator - red
External DC Power Voltage (24V dc nom.) Current	10-28.8V dc; 5% AC ripple 5.0A maximum
Dimensions (H x D x W)	118 mm X 57 mm X 40 mm 4.63 in. X 2.25 in. X 1.58 in.
Environmental Conditions: Operating Temperature Storage Temperature Shock: Operating Non-Operating Vibration	-20 to 60°C (-4 to 140°F) -40 to 85°C (-40 to 185°F) 30G peak, 11±1ms pulse width 50G peak, 11±1ms pulse width 5G @ 10-500Hz per IEC 68-2-6 (see graph on next page)
Conductors	See publication DN-6.7.2
Cordsets	5 pin micro (12mm) style connectors
Enclosure	Meets IP67
Certifications (When product is marked)	c-UL-us UL Listed Industrial Control Equipment, certified for US and Canada UL UL Listed Industrial Control Equipment CE ¹ European Union 89/336/EEC EMC Directive, compliant with: EN 50081-2; Industrial Emissions EN 50082-2; Industrial Immunity EN 61326; Meas./Control/Lab., Industrial Requirements EN 61000-6-2; Industrial Immunity
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Operating Temperature CD Rating Curve

Specifications for the 1798-OE2 Module

Specifications - 1798-OE2 Analog Output Module		
Module Type	Analog Output	
Number of Channels	2 single-ended, non-isolated	
ResolutionBits Voltage/Cnt Current/Cnt	12 + sign 2.56 mV 5.13 uA	
Data Format	16 bit; 2's complement; left-justified	
Conversion Type	Pulse width modulation	
Conversion Rate	1.024 ms - All channels	
Current Terminal	4-20 mA; 0-20 mA (0 mA output until the module is configured)	
Voltage Terminal	±10V; 0-10V - 3 mA maximum (0V output until the module is configured)	
Step Response to 63% of FS	24 mS	
Output Load on Voltage	3 mA maximum	
Resistive Load on mA Output	15-750 ohms	
Absolute Accuracy Voltage Terminal Current Terminal	0.133% FS @ 25°C 0.425% FS @ 25°C	
Accuracy Drift Voltage Terminal Current Terminal	0.0045% FS per°C 0.0069% FS per°C	
Calibration	None Required	
FlexBus Current	10 mA maximum	
Power dissipation	2.5W @ 28.8V dc	
Sensor Source Current (per connector)	50 mA	

Specifications - 1798-OE2 Analog Output Module		
Thermal Dissipation	8.5 BTU/hr @ 28.8V dc	
Indicator	1 fault LED Indicator - red	
External DC Power Voltage (24V dc nom.) Current	10-28.8V dc; 5% AC ripple 85 mA @ 24V dc	
Dimensions (H x D x W)	118 mm x 57 mm x 40 mm 4.63 in. x 2.25 in. x 1.58 in.	
Operational Temperature	IEC 60068-2-1 (Test Ad, Operating Cold), IEC 60068-2-2 (Test Bd, Operating Dry Heat), IEC 60068-2-14 (Test Nb, Operating Thermal Shock): -20 to 60°C (-4 to 140°F)	
Storage Temperature	IEC 60068-2-1 (Test Ab, Un-packaged Non-operating Cold), IEC 60068-2-2 (Test Bb, Un-packaged Non-operating Dry Heat), IEC 60068-2-14 (Test Na, Un-packaged Non-operating Thermal Shock): -40 to 85°C (-40 to 185°F)	
Shock	IEC60068-2-27 (Test Ea, Unpackaged shock): Operating 30g Non-operating 50g	
Emissions	CISPR 11: Group 1, Class A	
ESD Immunity	IEC 61000-4-2: 6kV contact discharges 8kV air discharges	
Radiated RF Immunity	IEC 61000-4-3: 10V/m with 1kHz sine-wave 80%AM from 30MHz to 2000MHz 10V/m with 200Hz 50% Pulse 100%AM at 900MHz	
EFT/B Immunity	IEC 61000-4-4: ±2kV at 5kHz on power ports ±2kV at 5kHz on signal ports	
Surge Transient Immunity	$\begin{array}{l} \mbox{IEC 61000-4-5:} \\ \pm 1 \mbox{kV line-line(DM) and } \pm 2 \mbox{kV line-earth(CM) on power ports} \\ \pm 1 \mbox{kV line-line(DM) and } \pm 2 \mbox{kV line-earth(CM) on signal ports} \end{array}$	
Conducted RF Immunity	IEC 61000-4-6: 10Vrms with 1kHz sine-wave 80%AM from 150kHz to 80MHz	
Conductors	See publication DN-6.7.2	
Vibration	IEC60068-2-6 (Test Fc, Operating): 5g @ 10-500Hz	
Enclosure	Meets IP67	

Certifications (When product is marked)	c-UL-us UL	UL Listed Industrial Control Equipment, certified for US and Canada UL Listed Industrial Control Equipment
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Communication Adapter Specifications

Specifications for the 1798-ADN modules are listed below.

Specifications	1798-AD	N
External DC Power (Input Power): Voltage (24V dc nom.) Current	10-28.8V dc; 5% AC ripple 400 mA @ 24V dc	
FlexBus (Output Power): Voltage (5V dc nom.) Current	4.75 - 5.2 640 mA @	V dc; 5% AC ripple ⊉ 5.2V dc
Isolation Voltage (Communication Lines/System): 24V dc External Power to 5V dc FlexBus Output	850V dc f	or 1 second
Dimensions (H x D x W)	118 mm) 4.63 in. X	(50 mm X 40 mm 1.95 in. X 1.58 in.
Environmental Conditions: Operating Temperature Storage Temperature Shock: Operating Non-Operating Vibration	-20 to 60' -40 to 85' 30G peak 50G peak 5G @ 10-	°C (-4 to 140°F) °C (-40 to 185°F) , 11±1 ms pulse width , 11±1 ms pulse width 500 Hz per IEC 68-2-6
Enclosure	Meets IP	67
Certifications (When product is marked)	c-UL-us UL CE ¹	UL Listed Industrial Control Equipment, certified for US and Canada UL Listed Industrial Control Equipment European Union 89/336/EEC EMC Directive, compliant with: EN 50081-2; Industrial Emissions EN 50082-2; Industrial Immunity EN 61326; Meas./Control/Lab., Industrial Requirements EN 61000-6-2; Industrial Immunity
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Field Termination Plug Specifications

Specifications for the Field Termination Plug are listed below.

Voltage Rating	28.8V dc maximum	
Sensor and Adapter Current	2.5A maximum	
Output Current	10A maximum	
Sensor/Output Voltage	10-28.8V dc	
Sensor/Output Power Connector	0.875 in male	
Dimensions (H x D x W)	121 mm X 36.3 mm X 42 mm 4.75 in. X 1.43 in. X 1.65 in.	
Environmental Conditions Operational Temperature Storage Temperature Shock Operating Non-operating Vibration	-20 to 60°C (-4 to 140°F) -40 to 85°C (-40 to 185°F) 30g peak acceleration, 11(±1) ms pulse width 50g peak acceleration, 11(±1) ms pulse width Tested 5g @ 10-500 Hz per IEC 68-2-6	
Conductors	See publication DN-6.7.2	
Enclosure	Meets IP67	
Agency Certification (When product is marked)	c-UL-us UL Listed Industrial Control Equipment, certified for US and Canada UL UL Listed Industrial Control Equipment CE ¹ European Union 89/336/EEC EMC Directive, compliant with: EN 50081-2; Industrial Emissions EN 50082-2; Industrial Immunity EN 61326; Meas./Control/Lab., Industrial Requirements EN 61000-6-2; Industrial Immunity C-Tick ¹ Australian Radiocommunications Act, compliant with: AS/NZS 2064; Industrial Emissions	

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Baseplate Specifications

Specifications for the Baseplate are listed below.

FlexArmor Baseplates - Cat. No. 1798-BP2, -BP4, -BP6, -BP8								
General Specifications								
External Power	28.8V dc maximum							
Sensor Power Bus Output Power Bus	2.5A maximum 10A maximum							
Environmental Conditions Operational Temperature Storage Temperature Shock Operating Non-operating Vibration	-20 to 60°C (-4 to 140°F) -40 to 85°C (-40 to 185°F) 30g peak acceleration, 11(±1) ms pulse width 50g peak acceleration, 11(±1) ms pulse width Tested 5g @ 10-500 Hz per IEC 68-2-6							
Enclosure	Meets IP67							
Certifications (When product is marked)	c-UL-us UL Listed Industrial Control Equipment, certified f US and Canada UL UL Listed Industrial Control Equipment CE ¹ European Union 89/336/EEC EMC Directive, compliant with: EN 50081-2; Industrial Emissions EN 50082-2; Industrial Immunity EN 61326; Meas./Control/Lab., Industrial Requirements EN 61000-6-2; Industrial Immunity							
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1798-ADN specifications A-12 **1798-BP** specifications A-14 1798-FTP specifications A-13 1798-IB4 image table mapping 2-5 input delay times 2-6 memory map 2-5 specifications A-1 1798-IB4D filter time and open wire disable 3-13 image table mapping 2-6 input delay times 2-7 memory map 2-6 specifications A-3 1798-IB8 image table mapping 2-7 input delay times 2-8 memory map 2-7 specifications A-2 1798-IE4 image table mapping 2-9 input channel range 3-13 memory map 2-10 range selection 2-10 specifications A-5 word/bit description 2-11 1798-0B4E image table mapping 2-8 memory map 2-8 1798-0B4E-specifications A-7 1798-0B8E image table mapping 2-9 memory map 2-9 specifications A-8 1798-0E2 image table mapping 2-12 memory map 2-12 output channel enable of range 3-14 range selection 2-13 specifications A-9 word/bit description 2-13 A

adapter configuration window 3-4 adapter input status word 2-3

C

change of state communication 2-4 communication 2-1 over the backplane 2-1 communication choices 2-4 configure adapter's FlexArmor system 3-1 configure DeviceNet adapter 3-1 using RSNetWorx for DeviceNet 3-2 configure FlexArmor adapter and system online 3-3 adapter configuration window 3-4 I/O summary window 3-15 module configuration window 3-6 view adapter parameters 3-7 connect external wiring 1-5 cyclic communication 2-4

D

DeviceNet adapter compenents diagnostics indicators 1-2 diagnostic indicators troubleshooting 4-1

F

FlexArmor system description 1-1

I/O image table mapping 2-1 I/O structure 2-2 adapter input status word 2-3 mapping data into image table 2-5 1798-IB4 image table mapping 2-5 1798-IB4D image table mapping 2-6 1798-IB8 image table mapping 2-5 1798-0B4E image table mapping 2-8, 2-9 1798-OB8E image table mapping 2-8, 2-9 1798-OE2 image table mapping 2-12I/O status indicators troubleshooting 4-1 I/O structure 2-2 I/O summary window 3-15 image table mapping 1798-IB4 2-5 1798-IB4D 2-6 1798-IB8 2-7 1798-IE4 2-9 1798-0B4E 2-8 1798-0B8E 2-9

1798-0E2 2-12 input delay times 1798-IB4 2-6 1798-IB4D 2-7 install DeviceNet adapter module 1-1 connect external wiring 1-5 FlexArmor system description 1-1 install FlexArmor DeviceNet adatper module 1-4 major compenents diagnostics indicators description 1-2 mounting FlexArmor platform 1-3 power requirements 1-2 setting network address switch 1-4 install FlexArmor DeviceNet adapter module 1-4

Μ

map the scanner 3-18mapping data into image table 2-5 1798-IB4 2-5 1798-IB4D 2-6 1798-IB8 2-7 1798-IE4 2-9 1798-0B4E 2-8 1798-0B8E 2-9 1798-0E2 2-12 memory map 1798-IB4 2-5 1798-IB4D 2-6 1798-IB8 2-7 1798-IE4 2-10 1798-0B4E 2-8 1798-0B8E 2-9 1798-0E2 2-12 mod/net status indicators troubleshooting 4-1 module configuration window 3-6 mounting FlexArmor platform 1-3

P

polled communication 2-4 power requirements 1-2

R

range selection 1798-IE4 2-10 1798-0E2 2-13 RSNetWorx for DeviceNet 3-2

S

setting network address switch 1-4 special parameters 3-13 1798-IB4D filter time and open wire disable 3-13 1798-IE4 input channel range 3-13 1798-OE2 output channel enable of range 3-14 specifications A-1 baseplate A-14 communication adapter A-12 field termination plug A-13 input modules A-1 output modules A-7 strobe communication 2-4

Т

troubleshooting 4-1

V

view adapter parameters 3-7 module parameters 3-9

W

word/bit description 1798-IE4 2-11 1798-0E2 2-13

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Cat. No.	1798			Pub. No.	1798-UM001B-EN-P	Pub. Date	November 200	Part No. 957726-15		
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