Allen-Bradley

SLC™ 500 4-Channel Analog I/O Modules

(Catalog Numbers 1746-NI4, 1746-NIO4I, 1746-NIO4V, 1746-NO4I, and 1746-NO4V)

User Manual

Rockwell Automation

1746-NI4 Analog Input Module

The 1746-NI4 Analog Input module contains 4 analog input channels that are user selectable per channel for voltage or current to support a variety of monitoring and controlling applications

1746-NIO4I and NIO4V Analog Combination Modules

The NIO4I and NIO4V Analog Combination I/O modules provide two input and two output channels in a single slot module. The 1746-NIO4I module contains two current or voltage inputs (user selectable per channel), and two current outputs. The 176-NIO4V module contains two current or voltage inputs (user selectable per channel) and two voltage outputs.

1746-NO4I and NO4V Analog Output Modules

The NO4I and NO4V Analog Output Modules provide 4 analog output channels. The NO4I module contains four current outputs. The NO4V module contains four voltage outputs. Both of these modules support a variety of monitoring and controlling applications.

Catalog 1746-	Input Channels per Module	Output Channels per Module	Backplane Current Draw		External 24V dc Power Supply Tolerances
			5V (max.)	24V (max.)	
NI4	4 differential, voltage or current selectable per channel, not individually isolated	NA	35 mA	85 mA	NA
NIO4I	2 differential, voltage or current selectable per channel, not individually isolated	2 current outputs, not individually isolated	55 mA	145 mA	NA
NIO4V	2 differential, voltage or current selectable per channel, not individually isolated	2 voltage outputs, not individually isolated	55 mA	115 mA	NA
NO4I	NA	4 current outputs, not individually isolated	55 mA	195 mA	24 ±10% at 195 mA max. (21.6 to 26.4V dc)(1)
NO4V	NA	4 voltage outputs, not individually isolated	55 mA	145 mA	24 ±10% at 145 mA max. (21.6 to 26.4V dc)(1)

(1) Required for some applications if SLC 24V power is not readily available.

For more specification information, refer to Appendix A.

Procedures

1.	**Check the contents of shipping box.**	**Reference**

Unpack the shipping box making sure that the contents include:

- Analog I/O module (Catalog Number 1746-Series)
- installation instructions (publication 1746-IN008)

If the contents are incomplete, call your local Allen–Bradley representative for assistance.

2.	**Determine your power requirements for the modular controller.**	**Reference**

Review the power requirements of your system to see that your chassis supports placement of the analog module.

Chapter 3 *(Installing and Wiring Your Analog Module)*

Appendix A *(Specifications)*

- For modular style systems, calculate the total load on the system power supply using the procedure described in the *SLC 500 Modular Hardware Style User Manual* (publication 1747-UM011) or the *SLC 500 Family System Overview* (publication 1747-SO001).
- For fixed SLC 500 controllers, refer to the *SLC 500 Fixed Hardware Style Installation & Operation Manual* (publication 1747-6.21).

Catalog Number	Backplane Current Draw		External 24V dc Power Supply Tolerance
	5V (max.)	24V (max.)	
1746-NI4	35 mA	85 mA	NA
1746-NIO4I	55 mA	145 mA	NA
1746-NIO4V	55 mA	115 mA	NA
1746-NO4I	55 mA	195 mA	24 ±10% at 195 mA max. (21.6 to 26.4V dc)[1]
1746-NO4V	55 mA	145 mA	24 ±10% at 145 mA max. (21.6 to 26.4V dc)[1]

[1] Required for some applications if SLC 24V power is not readily available.

3.	**Configure the module using the DIP switches (analog inputs only).**	**Reference**

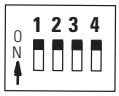
Each analog input channel can be configured for either voltage or current. Locate the DIP switches on your module and set them for your application.

Chapter 3 *(Installing and Wiring Your Analog Module)*

ON – Configures channel for current input

Off – Configures channel for voltage input

1746-NI4

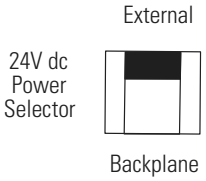


Switch 1 = Channel 0
Switch 2 = Channel 1
Switch 3 = Channel 2
Switch 4 = Channel 3

1746-NIO4I,NIO4V

Switch 1 = Channel 0
Switch 2 = Channel 1

1746-NO4I, NO4V



4.	**Install your module.**	**Reference**

When selecting a slot for an analog module, position the module:

Chapter 3 *(Installing and Wiring Your Analog Module)*

- in a slot away from ac or high voltage dc modules
- in the chassis closest to the bottom of the enclosure where the SLC 500 system is installed
- away from the chassis power supply if installed in a modular system

ATTENTION

Never install, remove, or wire modules with power applied to the chassis or devices wired to the modules.

9.	**Understanding analog outputs.**	**Reference**

Analog outputs convert 16-bit integer values placed in the output image to voltage or current signals for the slot that the analog card is in.

Chapter 4 *(Module Operation and System Considerations)*

Address	1746-NO4	1746-NI04I, -NI04V
O:e.0	Output Channel 0	Output Channel 0
O:e.1	Output Channel 1	Output Channel 1
O:e.2	Output Channel 2	
O:e.3	Output Channel 3	

1746-NO4I, -NIO4I		1746-NO4V, -NIO4V	
Current Range	**Decimal Representation for Output Word**	**Voltage Range**	**Decimal Representation for Output Word**
0 to 21 mA	0 to 32,764	-10 to +10V dc	-32,768 to +32,764
0 to 20 mA	0 to 31, 208	0 to 10V dc	0 to 32,764
4 to 20 mA	6,242 to 31,208	0 to 5V dc	0 to 16,384
		1 to 5V dc	3,277 to 16,384

10.	**Write ladder logic to process the module's analog data.**	**Reference**

Several programming examples are provided in chapter 6 that demonstrate how to scale the raw data from the analog card into engineering units such as psi, percent, etc. Study these examples and apply them to your application as appropriate.

Chapter 5 *(Testing Your Module)*

Chapter 6 *(Programming Examples)*

Determining Your Power Requirements for a Modular Controller

Analog modules require both 5V dc and 24V dc power from the backplane of the SLC 500 system. However, the NO4I and NO4V analog modules can use an external 24V dc power supply. This eliminates the 24V dc backplane power requirement, providing configuration flexibility if SLC power supply loading is critical. These two modules provide user-supplied external 24V dc power supply connections.

The 24V dc user power connection on a fixed SLC 500 can power an NO4I or NO4V analog module. However, the regulation of the 24V dc user connection on a modular SLC 500 power supply, Catalog Number 1746-P1, -P2, -P4 is outside of the requirements of the NO4I and NO4V analog modules and cannot be used.

The following table shows the power requirements for each analog module using backplane power. Use this table to calculate the total load on the modular system power supply. For more information refer to the SLC 500 user manual for modular controllers.

IMPORTANT The analog modules do not supply loop power for the input device. You must supply the appropriate loop power for loop-powered input devices.

Catalog Number	5 Volt Current	24 Volt Current
1746-NI4	35 mA	85 mA
1746-NIO4I	55 mA	145 mA
1746-NIO4V	55 mA	115 mA
1746-NO4I	55 mA	195 mA(1)
1746-NO4V	55 mA	145 mA(1)

(1) Omit these values from your SLC power supply loading calculations if you decide to use an external power supply.

Determining Your Power Requirements for a Fixed Controller

The chart starting on the next page provides available analog module combinations in the expansion chassis of a fixed controller.

•	valid combination
	invalid combination
∇	valid combination when used with external power supply

BASIC net = Basic Module is supplying power to an AIC. No other device requiring power is connected to the AIC.