

Combination I/O Modules

Specifications	1746-IO4	1746-IO8	1746-IO12	1746-IO12DC
Number of Inputs	2	4	6	6
Number of Outputs	2	4	6	6
Points Per Common	2	4	6	6
	120V ac (Inputs)			24V dc (Inputs)
Voltage Category	100/120V ac (Relay Contact Outputs)			100/120V ac (Relay Contact Outputs)
Operating Voltage Range	85...132V ac @ 47...63 Hz (Inputs) 5...265V ac @ 47...63 Hz / 5...125V dc (Outputs)			10...30V dc (Inputs) 5...265V ac @ 47...63 Hz / 5...125V dc (Outputs)
Backplane Current (mA) at 5V	30 mA		90 mA	
Backplane Current (mA) at 24V	60 mA		80 mA	
Backplane Current (mA) at 125V	45 mA		70 mA	
Continuous Current per Point	See Relay Contact Ratings for 1746-OW4 on page 13.			See Relay Contact Ratings for 1746-OW16 on page 13.
Continuous Current per Module	160A			80A

1746-SIM Input Simulator

The 1746-SIM Input Simulator is designed for use on 16-channel 24V dc sinking and sourcing modules with removable terminal blocks, including 1746-IB16, 1746-ITB16, 1746-IV16, 1746-ITV16, and 1746-IN16 modules. The input simulator provides 16 switches for simulating inputs to the SLC 500.

1746 Analog I/O Modules

Analog I/O modules feature user-selectable voltage or current inputs, backplane isolation, removable terminal blocks, and diagnostic feedback.

The 1746-NI4, 1746-NIO4I, and 1746-NIO4V input channels are filtered to reject high frequency noise and provide 14- to 16-bit (range-dependent) resolution.

All 4-channel analog output modules provide 14-bit resolution and a 2.5 ms conversion rate.

The 1746-FIO4I and 1746-FIO4V modules have less input filtering and can sense more rapidly changing inputs. However, their input resolution is only 12-bit. Because the input filter on the 1746-FIO4I or 1746-FIO4V module may pass more electrical noise, you should thoroughly ground and shield the input transducer, its power supply, and cables.

The 1746-NI8 module provides high accuracy and fast analog signal conversion. The 1746-NI8, 1746-NI16I and 1746-NI16V modules are high density analog input modules that are software configurable.

The 1746-NO8I (current output) and 1746-NO8V (voltage output) modules are high density, analog output modules that provide 8 individually configurable output channels with 16-bit resolution.

Analog I/O Module Overview

Cat. No.	Description	Voltage Category	For Specifications, See
1746-NI4	High Resolution (4) Analog Input Module	-20...+20 mA (or) -10...+10V dc	page 16: General Input Specifications page 16: Current Loop Input Specifications page 17: Voltage Input Specifications
1746-NI8	High Resolution (8) Analog Input Module	-20...+20 mA (or) -10...+10V dc	page 18: General Input Specifications page 18: Input Step Response page 19: Current Loop Input Specifications page 19: Voltage Input Specifications
1746-NI16i *	High Resolution (16) Analog Input Module	-20...+20 mA	page 21: General Input Specifications page 22: Module Update Times
1746-NI16V *	High Resolution (16) Analog Input Module	-10...+10V dc	page 21: General Input Specifications page 22: Module Update Times
1746-NIO4I	High Resolution (2) Analog Input, (2) Analog Current Output Module	-20...+20 mA (or) -10...+10V dc (Inputs) 0...20 mA (Outputs)	page 16: General Input Specifications page 16: Current Loop Specifications page 17: Output Specifications
1746-NIO4V	High Resolution (2) Analog Input, (2) Analog Voltage Output Module	20...+20 mA (or) -10...+10V dc (Inputs) -10...+10V dc (Outputs)	page 16: General Input Specifications page 17: Voltage Input Specifications page 17: Output Specifications
1746-FIO4I	(2) Fast Analog Input, (2) Analog Current Output Module	0...20 mA (or) 0...10V dc (Inputs) 0...20 mA (Outputs)	page 16: General Input Specifications page 16: Current Loop Specifications page 17: Output Specifications
1746-FIO4V	(2) Fast Analog Input, (2) Analog Voltage Output Module	0...20 mA (or) 0...10V dc (Inputs) -10...+10V dc (Outputs)	page 16: General Input Specifications page 17: Voltage Input Specifications page 17: Output Specifications
1746-NO4I	(4) Analog Current Output Module	0...20 mA	page 17: Output Specifications
1746-NO4V	(4) Analog Voltage Output Module	-10...+10V dc	page 17: Output Specifications
1746-NO8I	(8) Analog Current Output Module	0...20 mA	page 20: Output Specifications
1746-NO8V	(8) Analog Voltage Output Module	-10...+10V dc	page 20: Output Specifications

* Single-ended connections only.

16-Channel Input Modules

General Input Specifications for 16-Channel Modules

Cat. No.	1746-NI16I	1746-NI16V
Backplane Current (mA) at 5V	125 mA	125 mA
Backplane Current (mA) at 24V	75 mA	75 mA
Backplane Power Consumption	2.425 W maximum (0.625 W at 5V dc, 1.8 W at 24V dc)	2.425 W maximum (0.625 W at 5V dc, 1.8 W at 24V dc)
Isolation Voltage	Tested at 500V ac and 710V dc for 60 seconds	Tested at 500V ac and 710V dc for 60 seconds
Number of Inputs	16	16
Resolution	16-bit	16-bit
A/D Conversion Method	Sigma Delta	Sigma Delta
Common Mode Voltage Range	±10.25V relative to the analog common terminal (20.5V maximum between any two signal terminals)	±10.25V relative to the analog common terminal (20.5V maximum between any two signal terminals)
Input Filter Frequencies	6 Hz 10 Hz 20 Hz 40 Hz 60 Hz 80 Hz 100 Hz 250 Hz	6 Hz 10 Hz 20 Hz 40 Hz 60 Hz 80 Hz 100 Hz 250 Hz
Type of Input (Selectable)	0...20 mA ±20 mA 4...20 mA 0...1 mA	±10V dc 0...5V dc 1...5V dc 0...10V dc
Type of Data (Selectable)	Engineering Units Scaled for PID Proportional Counts (-32,768...32,767 range) Proportional Counts (User-Defined Range, Class 3 only) 1746-NI4 Data Format	Engineering Units Scaled for PID Proportional Counts (-32,768...32,767 range) Proportional Counts (User-Defined Range, Class 3 only) 1746-NI4 Data Format
Input Impedance	249 Ω	20 Ω
Maximum Voltage Input without Damage	±8V between analog common and any input terminal	±30V between any two signal terminals
Current Input (maximum)	±30 mA between analog common and any input terminal	±30 mA between analog common and any input terminal
Time to Detect Open Circuit	less than 5 s	less than 5 s
Input Resolution	640 nA	312 μV
Display Resolution	0.3%	0.1%
Module Error Over Full Operating Temperature Range	0.08% of full scale at 25 °C (77 °F) 0.15% of full scale at 60 °C (140 °F)	0.08% of full scale at 25 °C (77 °F) 0.15% of full scale at 60 °C (140 °F)
Input Offset Drift with Temperature	360 nA/°C	90 μV/°C
Gain Drift with Temperature	20 ppm/°C	15 ppm/°C
Calibration Accuracy at 25 °C	better than 0.15% of range	better than 0.05% of range
Calibration	Factory calibrated	Factory calibrated

Module update time is dependent on the number of channels enabled and the filter frequency, as illustrated in the table below.
Module Update Times for 1746-NI16I and 1746-NI16V

Filter Frequency	Module Update Time *			
	16 Channels Enabled	12 Channels Enabled	8 Channels Enabled	4 Channels Enabled
6 Hz	630 ms	473 ms	314 ms	7 ms
10 Hz	380 ms	285 ms	190 ms	4 ms
20 Hz	194 ms	145 ms	96 ms	4 ms
40 Hz	100 ms	75 ms	50 ms	4 ms
60 Hz	69 ms	52 ms	34 ms	4 ms
80 Hz	54 ms	39 ms	26 ms	4 ms
100 Hz	37 ms	27 ms	18 ms	4 ms
250 Hz	18 ms	13 ms	9 ms	4 ms

* Assuming all of the enabled channels have the filter frequency shown in the first column.

Temperature
Modules

SLC 500 Thermocouple/mV Input Modules

All modules interface to thermocouple types J, K, T, E, R, S, B, and N, and also accept millivolt signals that standard analog modules are not able to detect. The 1746-INT4 module also interfaces with thermocouple types C and D.

All modules provide fully-integrated cold-junction compensation (CJC) to retain thermocouple input signal accuracy, a choice of input filter frequencies, as well as fault diagnostics and status LEDs.

Note: Block transfers are required in a remote I/O configuration, using a 1747-ASB module with a PLC.