

Product Details and Certifications

Cross Reference RA Part Number: 1746-NR8 A



Product: **1746-NR8**

Description: 1746 SLC System, 8 Channel RTD Input Module



Representative Photo Only (actual product may vary based on configuration sections)

I/O MODULES AND HARDWARE

Bulletin Number	1746 SLC 500 I/O Module
Number of Inputs	8
Backplane Current (mA) @ 5V	100 mA
Backplane Current (mA) @ 24V	55 mA
Isolation Voltage, Channel to Channel	±5V
Isolation Voltage, Input to Backplane	500V AC for 1 minute
Common Mode Voltage Separation	±1V maximum

DC Millivolt Input Ranges for 1746-NT4, 1746-NT8, and 1746-INT4 Modules

Input Type	Range	Accuracy @ 25 °C (77 °F)
±50 mV	-50 mV dc...+50 mV DC	50 µV
±100 mV	-100 mV DC...+100 mV DC	50 µV

RTD Input Modules

The RTD modules interface with platinum, nickel, copper, and nickel-iron RTDs, and with variable resistance devices such as potentiometers (0 to 3000Ω maximum). The module provides on-board RTD temperature scaling in degrees Celsius and degrees Fahrenheit or resistance scaling in ohms.

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

RTD/Resistance Input Modules

Attribute	1746-NR4	1746-NR8
Backplane current (mA) @ 5 V	50 mA	100 mA
Backplane current (mA) @ 24V	50 mA	55 mA
Number of inputs	4	8
Input type	100 Ω Platinum (385) 200 Ω Platinum (385) 500 Ω Platinum (385) 1000 Ω Platinum (385) 100 Ω Platinum (3916) 200 Ω Platinum (3916) 500 Ω Platinum (3916) 1000 Ω Platinum (3916) 10 Ω Copper (426) 120 Ω Nickel (618) 120 Ω Nickel (672) 604 Ω Nickel-Iron (518) 150 Ω Resistance Input 500 Ω Resistance Input 1000 Ω Resistance Input 3000 Ω Resistance Input	
Temperature scale (selectable)	1 °C or 1 °F and 0.1 °C and 0.1 °F	
Resistance scale (selectable)	1 or 0.1 Ω for all resistance ranges; or 0.1 Ω or 0.01 Ω for 150 Ω potentiometer	
Filter frequency (selectable filter)	10 Hz 50 Hz 60 Hz 250 Hz	28 Hz 50/60 Hz 800 Hz 6400 Hz
RTD excitation current (Two current values are user-selectable)	0.5 mA ⁽¹⁾ 2.0 mA ⁽²⁾	0.25 mA ⁽¹⁾ 1.0 mA ⁽²⁾
Open-circuit or short-circuit detection	Zero, upscale or downscale	
Maximum cable impedance	25 Ω maximum per 308.4 m (1000 ft)	
Data formats	Raw/Proportional, Engineering Units, Engineering Units x 10, Scaled-for-PID	
Calibration	Autocalibration at powerup and when a channel is enabled	Autocalibration at powerup and user-enabled periodic calibration

RTD/Resistance Input Modules

Attribute	1746-NR4	1746-NR8
Isolation voltage, channel-to-channel	None	±5V
Isolation voltage, input to backplane	500V AC for 1 minute	
Common mode voltage separation	±1V maximum	

- (1) Cannot use for 10 Ω Copper RTD. Recommended for use with higher resistance ranges for both RTDs and direct response inputs (1000 Ω RTDs and 3000 Ω resistance input). Contact the RTD manufacturer for recommendations.
- (2) Must use for 10 Ω Copper RTD. Recommended for use with all other RTD and direct resistance inputs, except 1000 Ω RTDs and 3000 Ω resistance ranges. Contact RTD manufacturer for recommendations.

RTD Channel Step Response for 1746-NR4 and 1746-NR8

1746-NR4					1746-NR8				
Filter Frequency	50 Hz NMR	60 Hz NMR	Cut-off Frequency	Step Response	Filter Frequency	50 Hz NMR	60 Hz NMR	Cut-off Frequency	Step Response
10 Hz	100 dB		2.62 Hz	300 ms	28 Hz	110 dB	95 dB	7.8 Hz	120 ms
50 Hz	100 dB	–	13.1 Hz	60 ms	50/60 Hz	65 dB		13.65 Hz	68.6 ms
60 Hz	–	100 dB	15.72 Hz	50 ms	800 Hz	–	–	209.8 Hz	3.75 ms
250 Hz	–	–	65.5 Hz	12 ms	6400 Hz	–	–	1677 Hz	1.47 ms

Update Time for 1746-NR4 and 1746-NR8

1746-NR4		1746-NR8		
Filter Frequency	Channel Scan Time ⁽¹⁾	Filter Frequency	Channel Scan Time	With Lead Resistance Measurement
10 Hz	305 ms	28 Hz	125 ms	250 ms
50 Hz	65 ms	50/60 Hz	75 ms	147 ms
60 Hz	55 ms	800 Hz	10 ms	18 ms
250 Hz	17 ms	6400 Hz	6 ms	10 ms

- (1) The module-scan time is obtained by summing the channel-scan time for each enabled channel. For example, if 3 channels are enabled and the 50 Hz filter is selected, the module-scan time is 3 x 65 ms = 195 ms.

RTD Temperature Range and Accuracy Specifications

RTD Type	1746-NR4				1746-NR8				
	0.5 mA Excitation		2.0 mA Excitation		0.25 mA Excitation		1.0 mA Excitation		
	Temp. Range	Accuracy ⁽¹⁾	Temp. Range	Accuracy ⁽¹⁾	Temp. Range	Accuracy ⁽¹⁾	Temp. Range	Accuracy ⁽¹⁾	
Platinum (385)	100 Ω	-200...850 °C	±1.0 °C ⁽²⁾	-200...850 °C	±0.5 °C	-200...850 °C	±0.5 °C	-200...850 °C	±0.7 °C
		-328...1562 °F	±2.0 °F	-328...1562 °F	±0.9 °F	-328...1562 °F	±0.9 °F	-328...1562 °F	±1.3 °F
	200 Ω	-200...850 °C	±1.0 °C ⁽²⁾	-200...850 °C	±0.5 °C	-200...850 °C	±0.6 °C	-200...850 °C	±0.7 °C
		-328...1562 °F	±2.0 °F	-328...1562 °F	±0.9 °F	-328...1562 °F	±1.1 °F	-328...1562 °F	±1.3 °F
500 Ω	-200...850 °C	±0.6 °C	-200...850 °C	±0.5 °C	-200...850 °C	±0.7 °C	-200...370 °C	±0.5 °C	
	-328...1562 °F	±1.1 °F	-328...1562 °F	±0.9 °F	-328...1562 °F	±1.3 °F	-328...698 °F	±0.9 °F	
1000 Ω	-200...850 °C	±0.6 °C	-200...240 °C	±0.5 °C	-200...850 °C	±1.2 °C	-200...50 °C	±0.4 °C	
	-328...1562 °F	±1.1 °F	-328...464 °F	±0.9 °F	-328...1562 °F	±2.2 °F	-328...122 °F	±0.7 °F	


RTD Temperature Range and Accuracy Specifications


RTD Type		1746-NR4				1746-NR8			
		0.5 mA Excitation		2.0 mA Excitation		0.25 mA Excitation		1.0 mA Excitation	
		Temp. Range	Accuracy ⁽¹⁾	Temp. Range	Accuracy ⁽¹⁾	Temp. Range	Accuracy ⁽¹⁾	Temp. Range	Accuracy ⁽¹⁾
Platinum (3916)	100 Ω	-200...630 °C -328...1166 °F	±1.0 °C ⁽²⁾ ±2.0 °F	-200...630 °C -328...1166 °F	±0.4 °C ±0.7 °F	-200...630 °C -328...1166 °F	±0.4 °C ±0.7 °F	-200...630 °C -328...1166 °F	±0.6 °C ±1.1 °F
	200 Ω	-200...630 °C -328...1166 °F	±1.0 °C ⁽²⁾ ±2.0 °F	-200...630 °C -328...1166 °F	±0.4 °C ±0.7 °F	-200...630 °C -328...1166 °F	±0.5 °C ±0.9 °F	-200...630 °C -328...1166 °F	±0.6 °C ±1.1 °F
	500 Ω	-200...630 °C -328...1166 °F	±0.5 °C ±0.9 °F	-200...630 °C -328...1166 °F	±0.4 °C ±0.7 °F	-200...630 °C -328...1166 °F	±0.6 °C ±1.1 °F	-200...370 °C -328...698 °F	±0.4 °C ±0.7 °F
	1000 Ω	-200...630 °C -328...1166 °F	±0.5 °C ±0.9 °F	-200...230 °C -328...446 °F	±0.4 °C ±0.7 °F	-200...630 °C -328...1166 °F	±0.9 °C ±1.6 °F	-200...50 °C -328...122 °F	±0.3 °C ±0.6 °F
Copper (426)	10 Ω	Not Allowed		-100...260 °C -148...500 °F	±0.6 °C ±1.1 °F	-100...260 °C -148...500 °F	±0.5 °C ±0.9 °F	-100...260 °C -148...500 °F	±0.8 °C ±1.4 °F
Nickel (618)	120 Ω	-100...260 °C -148...500 °F	±0.2 °C ±0.4 °F	-100...260 °C -148...500 °F	±0.2 °C ±0.4 °F	-100...260 °C -148...500 °F	±0.2 °C ±0.4 °F	-100...260 °C -148...500 °F	±0.2 °C ±0.4 °F
Nickel (672)	120 Ω	-80...260 °C -112...500 °F	±0.2 °C ±0.4 °F	-80...260 °C -112...500 °F	±0.2 °C ±0.4 °F	-80...260 °C -112...500 °F	±0.2 °C ±0.4 °F	-80...260 °C -112...500 °F	±0.2 °C ±0.4 °F
Nickel/Iron (518)	604 Ω	-100...200 °C -148...392 °F	±0.3 °C ±0.5 °F	-100...200 °C -148...392 °F	±0.3 °C ±0.5 °F	-200...200 °C -328...392 °F	±0.3 °C ±0.5 °F	-200...170 °C -328...338 °F	±0.3 °C ±0.5 °F

(1) The accuracy values assume that the module was calibrated within the specified temperature range of 0...60 °C (32...140 °F).

- (2) Module accuracy using 100 Ω or 200 Ω platinum RTDs with 0.5 excitation current depends on the following criteria:
- Module accuracy is ±0.6 °C after you apply power to the module or perform an autocalibration at 25 °C (77 °F) ambient with the module operating temperature at 25 °C (77 °F).
 - Module accuracy is ±(0.6 °C + DT x 0.034 °C/°C) after you apply power to the module or perform an autocalibration at 25 °C (77 °F) ambient with the module operating temperature between 0...60 °C (32...140 °F). DT is the temperature difference between the actual operating temperature of the module at 25 °C (77 °F) and 0.034 °C/°C is the temperature drift shown in the table for 100 Ω or 200 Ω platinum RTDs.
 - Module accuracy is ±1.0 °C after you apply power to the module or perform an autocalibration at 60 °C (140 °F) ambient with the module operating temperature at 60 °C (140 °F).

1746-NR4 Resistance Input Specifications

Resistance	0.5 mA Excitation			0.25 mA Excitation			Resolution	Repeatability
	Resistance Range	Accuracy ⁽¹⁾	Temperature Drift	Resistance Range	Accuracy ⁽¹⁾	Temperature Drift		
150 Ω	0 Ω...150 Ω	±0.2 Ω	±0.006 Ω/°C ±0.003 Ω/°F	0 Ω...150 Ω	±0.15 Ω	±0.004 Ω/°C ±0.002 Ω/°F	0.01 Ω	±0.04 Ω
500 Ω	0 Ω...500 Ω	±0.5 Ω	±0.014 Ω/°C ±0.008 Ω/°F	0 Ω...500 Ω	±0.5 Ω	±0.014 Ω/°C ±0.008 Ω/°F	0.1 Ω	±0.2 Ω
1000 Ω	0 Ω...1000 Ω	±1.0 Ω	±0.029 Ω/°C ±0.016 Ω/°F	0 Ω...1000 Ω	±1.0 Ω	±0.029 Ω/°C ±0.016 Ω/°F	0.1 Ω	±0.2 Ω
3000 Ω	0 Ω...3000 Ω	±1.5 Ω	±0.043 Ω/°C ±0.024 Ω/°F	0 Ω...1900 Ω	±1.5 Ω	±0.043 Ω/°C ±0.024 Ω/°F	0.1 Ω	±0.2 Ω

(1) The accuracy values assume that the module was calibrated within the specified temperature range of 0...60 °C (32...140 °F).


1746-NR8 Resistance Input Specifications

Resistance	0.5 mA Excitation			0.25 mA Excitation			Resolution	Repeatability
	Resistance Range	Accuracy ⁽¹⁾	Temperature Drift	Resistance Range	Accuracy ⁽¹⁾	Temperature Drift		
150 Ω	0 Ω...150 Ω	±0.2 Ω	±0.004 Ω/°C ±0.002 Ω/°F	0 Ω...150 Ω	±0.15 Ω	±0.003 Ω/°C ±0.002 Ω/°F	0.01 Ω	±0.04 Ω
500 Ω	0 Ω...500 Ω	±0.5 Ω	±0.012 Ω/°C ±0.007 Ω/°F	0 Ω...500 Ω	±0.5 Ω	±0.012 Ω/°C ±0.007 Ω/°F	0.1 Ω	±0.2 Ω
1000 Ω	0 Ω...1000 Ω	±1.0 Ω	±0.025 Ω/°C ±0.014 Ω/°F	0 Ω...1000 Ω	±1.0 Ω	±0.025 Ω/°C ±0.014 Ω/°F	0.1 Ω	±0.2 Ω
3000 Ω	0 Ω...1200 Ω	±1.5 Ω	±0.040 Ω/°C ±0.023 Ω/°F	0 Ω...1200 Ω	±1.5 Ω	±0.040 Ω/°C ±0.023 Ω/°F	0.1 Ω	±0.2 Ω

(1) The accuracy values assume that the module was calibrated within the specified temperature range of 0...60 °C (32...140 °F).

Counter I/O Modules

1746-HSCE High Speed Counter

This module offers a single bidirectional counting channel, which supports quadrature, pulse/direction, or up/down counter input. Four on-board open collector outputs allow module control independent of the SLC processor scan. The module features three modes of operation: Range, Rate, and Sequencer.

TIP The 1747-ASB module is not compatible with the 1746-HSCE module.

1746-HSCE2 Multi-Channel High Speed Counter

The Multi-Channel High Speed Counter provides two sets of $\pm A$, $\pm B$, and $\pm Z$ input channels, allowing up to two quadrature, differential line driver, or incremental encoders to be monitored. A and B input channels can also be configured to count single-ended pulse inputs from up to four input devices.

The module supports three operating modes that provide two, three, or four-channel operation. System performance is enhanced with the module's ability to accept control adjustments while it is actively counting pulses. The Z/gate input channel can be used for storing, holding, and resetting counter data.