Chapter 1
Module Overview

The 1746sc-INI4i monitors up to 4 isolated analog current inputs, while the 1746sc-INI4vi monitors up to 4 isolated analog current or voltage inputs (selectable by channel). In both modules, you can select different input ranges (for example, 4–20 mA or 1–5 Vdc) independently, by channel, for optimal use of rack space.



Read this chapter to familiarize yourself further with your isolated analog module (shown above). This chapter covers:

- General features and benefits.
- Detailed specifications.

Section 1.1
General Features
And Benefits

Both modules provide 750 VDC channel-to-channel isolation, which means no electrical crosstalk between channels (resulting in less noise and a high effective resolution). They also provide 750 VDC field wiring- to-backplane isolation to protect your processor and other rack components. And for state-of-the-art precision, they offer 16-bits of resolution.

For added reliability, both modules perform a battery of diagnostic tests at startup and can alert you to open input circuits through status bits and LEDs. The open-circuit response state is selectable. Onboard over-voltage and over-current protection also help prevent damage to the module due to wiring errors.

Because channel-to-channel isolation is built into these modules, they eliminate the need for expensive, external analog isolation blocks and the time and space required to install them. Both modules provide a single-slot solution for applications requiring up to 4, mixed, analog inputs.

They also feature auto-calibration, so you never have to perform this time-

consuming task.

These modules incorporate proprietary Allen-Bradley technology, so they operate and perform like the latest high-performance Allen-Bradley products for full compatibility. Four selectable filter frequencies are provided for signal/noise optimization. For even greater convenience, they are fully configured through software (no DIP switches), can alert the processor to a variety of errors through status bits, and can scale input signals to user-defined ranges without any ladder programming.

Section 1.2
Detailed Specifications

Table 1-1. Electrical Specifications-Module

Description	Specification
Backplane Current Consumption (typical)	
1746sc-INI4i	440 mA at 5 VDC 0 mA at 24 VDC
1746sc-INI4vi	550 mA at 5 VDC 0 mA at 24 VDC
Backplane Power Consumption (typical)	2.75 W
Number of Channels	4 (differential, individually isolated)
I/O Chassis Location	Any 1746 I/O module slot except slot 0
A/D Conversion Method	Sigma-Delta
Input Filtering	Programmable notch filters
Normal Mode Rejection (between _ and – inputs)	96 dB at 50 Hz 98 dB at 60 Hz
Common Mode Rejection (between inputs and chassis ground)	99 dB at 1 kHz, 25 degrees C
Calibration	Factory calibrated Auto-calibrated every 10 seconds (when enabled)
Opto-Electrical Isolation (10 seconds)	750 VDC channel-to-channel 750 VDC field wiring-to-backplane
Module ID Code	
1746sc-INI4i	3522
1746sc-INI4vi	3520
Thermal Dissipation	3.25 W maximum

Table 1-2. Electrical Specifications-Inputs

Description	Specification
Input Current Ranges (selectable for each channel)	4 to 20 mA 0 to 20 mA
Input Voltage Ranges–INI4vi only (selectable for each channel)	-10 to +10 VDC 0 to 10 VDC 0 to 5 VDC 1 to 5 VDC
SLC Communication Formats (selectable for each channel)	Scaled engineering units Scaled for PID Proportional counts 1746-INI4 format User-defined scale A User-defined scale B
Input Impedance Current Inputs Voltage Inputs—INI4vi only	 Less than 250 Ohms Greater than 220 Ohms
Input Overcurrent Protection	70 mA non-continuous 33 mA continuous
Input Filter 3 dB Cutoff Frequencies (selectable for each channel)	13.1 Hz for 50 Hz filter 15.7 Hz for 60 Hz filter 65.5 Hz for 250 Hz filter 131 Hz for 500 Hz filter
Input Step Response Time	80 ms for 50 Hz filter 66.7 ms for 60 Hz filter 16 ms for 250 Hz filter 8 ms for 500 Hz filter
Channel Update Time (minimum) Current Inputs Voltage Inputs	 14 ms with 500 Hz filters and all channels enabled 18 ms with 500 Hz filters and all channels enabled
Input Resolution (maximum) Current Inputs Voltage Inputs-INI4vi only	16-bit 312.8 nA/count 312.8 μV/count
Overall Accuracy Current Inputs Voltage Inputs-INI4vi only	 0.15% of full scale at 25 °C 0.25% of full scale at 60 °C 0.10% of full scale at 25 °C 0.25% of full scale at 60 °C

Description	Specification
Overall Drift Current Inputs Voltage Inputs-INI4vi only	 Offset: ±539 nA/°C Gain: ±50.5 ppm/°C Offset: ±352 µV/°C Gain: 34.8 ppm/°C

Table 1-3. Physical Specifications

Description	Specification
LED Indicators	Four green channel status indicators, one for each channel One green module status indicator
Recommended Cable	Belden 8761 (shielded, twisted-pair) or equivalent
Wire Size (maximum)	One 12–24 AWG wire per terminal
Terminal Block	Removable (supplied)

Table 1-4. Environmental Specifications

Description	Specification
Operating Temperature	0 to 60 °C (32 to 140 °F)
Storage Temperature	-40 to 85 °C (-40 to 185 °F)
Relative Humidity	5 to 95% non-condensing Certifications
Certifications	UL/CUL and CE
Hazardous Environment Classifications	Class I Division 2 Groups A, B, C, D

Section 1.3 Regulatory Requirements

Compliance Standards	Industry Standards
UL Safety	UL 61010-2-201 Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 2-201: Particular Requirements for Control Equipment (NRAQ, NRAQ7) CAN/CSA C22.2 No. 61010-1-12 (Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 1: General Requirements)
UL Hazardous Locations	ANSI/ISA–12.12.01 Nonincendive Electrical Equipment for Use in Class I, Division 2 Hazardous (Classified) Locations (NRAG) CSA C22.2 No. 213-M1987 - Non-incendive Electrical Equipment for use in Class I Division 2 Hazardous Locations - March 1987 (NRAG7) Temp code T4 or better, Pollution degree 2, gas groups A, B, C, and D
CE EMC Directive	EN 61131-2 Programmable Controllers: Third Edition 2007-02, Clause 8, Zones A&B EN 61000-6-2: Generic Industrial Immunity EN 61000-6-4: Generic Industrial Emissions
UKCA	Electromagnetic Compatibility Regulations 2016 BS EN 61131-2, BS EN 61000-6-4, BS EN 61000-6-2
FCC	27 CFR Part 15, Class A
CMIM	Arrêté ministériel n° 6404-15 du 29 ramadan 1436 (16 juillet 2015) NM EN 61131-2, NM EN 61000-6-4, NM EN 61000-6-2