Analog I/O Module Specifications

General Specifications (END Refresh Type)

Type No.	FC4A-L03A1	FC4A-L03AP1	FC4A-J2A1	FC4A-K1A1
Rated Power Voltage	24V DC			
Allowable Voltage Range	20.4 to 28.8V DC			
Terminal Arrangement	See Analog I/O Module Terminal Arrangement on pages 2-64 to 2-67.			
Connector on Mother Board	MC1.5/11-G-3.81BK (Phoenix Contact)			
Connector Insertion/Removal Durability	100 times minimum			
Internal Current Draw	50 mA (5V DC) 0 mA (24V DC)	50 mA (5V DC) 0 mA (24V DC)	50 mA (5V DC) 0 mA (24V DC)	50 mA (5V DC) 0 mA (24V DC)
External Current Draw (Note 1)	50 (45) mA (Note 2) (24V DC)	50 (40) mA (Note 2) (24V DC)	40 (35) mA (Note 2) (24V DC)	40 mA (24V DC)
Weight (Approx.)	100g (85g) (Note 2)			

Note 1: The external current draw is the value when all analog inputs are used and the analog output value is at 100%.

Note 2: Values in ( ) represent analog I/O modules earlier than version 200. For analog I/O module version, see page 2-56.

General Specifications (Ladder Refresh Type)

Type No.	FC4A-J4CN1	FC4A-J8C1	FC4A-J8AT1
Rated Power Voltage	24V DC		
Allowable Voltage Range	20.4 to 28.8V DC		
Terminal Arrangement	See Analog I/O Module Terminal Arrangement on pages 2-64 to 2-67.		
Connector on Mother Board	MC1.5/10-G-3.81BK (Phoenix Contact)		
Connector Insertion/Removal Durability	100 times minimum		
Internal Current Draw	50 mA (5V DC) 0 mA (24V DC)	40 mA (5V DC) 0 mA (24V DC)	45 mA (5V DC) 0 mA (24V DC)
External Current Draw (Note)	55 mA (24V DC)	50 mA (24V DC)	55 mA (24V DC)
Weight	140g	140g	125g

Type No.	FC4A-K2C1	FC4A-K4A1
Rated Power Voltage	24V DC	
Allowable Voltage Range	20.4 to 28.8V DC	
Terminal Arrangement	See Analog I/O Module Terminal Arrangement on pages 2-64 to 2-67.	
Connector on Mother Board	MC1.5/10-G-3.81BK (Phoenix Contact)	MC1.5/11-G-3.81BK (Phoenix Contact)
Connector Insertion/Removal Durability	100 times minimum	
Internal Current Draw	60 mA (5V DC) 0 mA (24V DC)	65 mA (5V DC) 0 mA (24V DC)
External Current Draw (Note)	85 mA (24V DC)	130 mA (24V DC)
Weight (Approx.)	110g	100g

Note: The external current draw is the value when all analog inputs are used and the analog output value is at 100%.

Analog Input Specifications (Ladder Refresh Type)

Type No.		FC4A-J4CN1 / FC4A-J8C1		FC4A-J4CN1	
Analog Input Signal Type		Voltage Input	Current Input	Thermocouple	Resistance Thermometer
Input Range		0 to 10V DC	4 to 20 mA DC	Type K: 0 to 1300°C Type J: 0 to 1200°C Type T: 0 to 400°C	Pt100, Pt1000: 3-wire type (–100 to 500°C) Ni100, Ni1000: 3-wire type (–60 to 180°C)
Input Impedance		1 MΩ	FC4A-J4CN1: 7Ω FC4A-J8C1: 100Ω	1 MΩ	—
Input Detection Current		—	—	—	0.1 mA
AD Conversion	Sample Duration Time	2 ms maximum			
	Sample Repetition Time	FC4A-J4CN1: 10 ms maximum FC4A-J8C1: 2 ms maximum		30 ms maximum	10 ms maximum
	Total Input System Transfer Time (Note 1)	FC4A-J4CN1: 50 ms × channels + 1 scan time FC4A-J8C1: 8 ms × channels + 1 scan time		85 ms × channels + 1 scan time	50 ms × channels + 1 scan time
	Type of Input	Single-ended input			
	Operating Mode	Self-scan			
	Conversion Method	FC4A-J4CN1: ∑Δ type ADC FC4A-J8C1: Successive approximation register method			
Input Error	Maximum Error at 25°C	±0.2% of full scale		±0.2% of full scale + cold junction compensation error (±3°C maximum)	Pt100, Ni100: ±0.4% of full scale Pt1000, Ni1000: ±0.2% of full scale
	Cold Junction Compensation Error	—	—	±3.0°C maximum	—
	Temperature Coefficient	±0.005% of full scale/°C			
	Repeatability after Stabilization Time	±0.5% of full scale			
	Non-lineality	±0.04% of full scale			
	Maximum Error	±1% of full scale			

Type No.		FC4A-J4CN1 / FC4A-J8C1		FC4A-J4CN1	
Analog Input Signal Type		Voltage Input	Current Input	Thermocouple	Resistance Thermometer
Data	Digital Resolution	50000 increments (16 bits)		K: Approx. 24000 increments (15 bits) J: Approx. 33000 increments (15 bits) T: Approx. 10000 increments (14 bits)	Pt100: Approx. 6400 increments (13 bits) Pt1000: Approx. 64000 increments (16 bits) Ni100: Approx. 4700 increments (13 bits) Ni1000: Approx. 47000 increments (16 bits)
	Input Value of LSB	0.2 mV	0.32 µA	K: 0.058°C J: 0.038°C T: 0.042°C	Pt100: 0.086°C Pt1000: 0.0086°C Ni100: 0.037°C Ni1000: 0.0037°C
	Data Type in Application Program	Default: 0 to 50000		Default: 0 to 50000	Pt100, Ni100: 0 to 6000 Pt1000, Ni1000: 0 to 60000
		Optional: –32768 to 32767 (selectable for each channel) (Note 2)			
		—		Temperature: Celsius, Fahrenheit	
	Monotonicity	Yes			
	Input Data Out of Range	Detectable (Note 3)			
Noise Resistance	Maximum Temporary Deviation during Electrical Noise Tests	±3% maximum (when a 500V clamp voltage is applied to the power supply and I/O lines)			Not assured
	Input Filter	Software			
	Recommended Cable for Noise Immunity	Twisted pair cable		—	
	Crosstalk	2 LSB maximum			
Isolation		Between input and power circuit: Transformer isolated Between input and internal circuit: Photocoupler-isolated			
Effect of Improper Input Connection		No damage			
Maximum Permanent Allowed Overload (No Damage)		11V DC	22 mA DC	—	
Selection of Analog Input Signal Type		Using programming software			
Calibration or Verification to Maintain Rated Accuracy		Not possible			

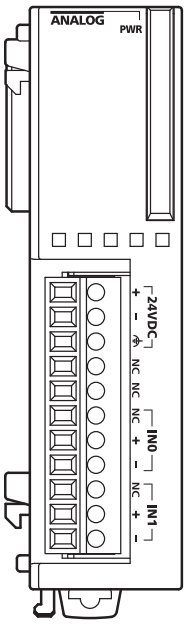
Note 1: Total input system transfer time = Sample repetition time + Internal processing time
The total input system transfer time increases in proportion to the number of channels used.

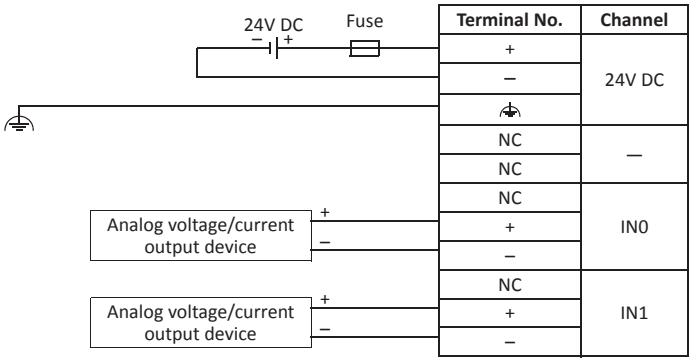
Note 2: The data processed in the analog I/O module can be linear-converted to a value between –32768 and 32767. The optional range designation, and analog I/O data minimum and maximum values can be selected using data registers allocated to analog I/O modules. See page 9-13.

Note 3: When an error is detected, a corresponding error code is stored to a data register allocated to analog I/O operating status. See page 9-7.

FC4A-J2A1 (Analog Input Module) — Screw Terminal Type

Applicable Terminal Block: **FC4A-PMT11P (supplied with the analog input module)**



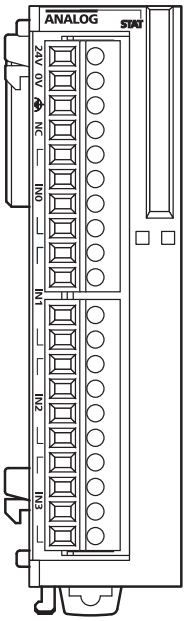


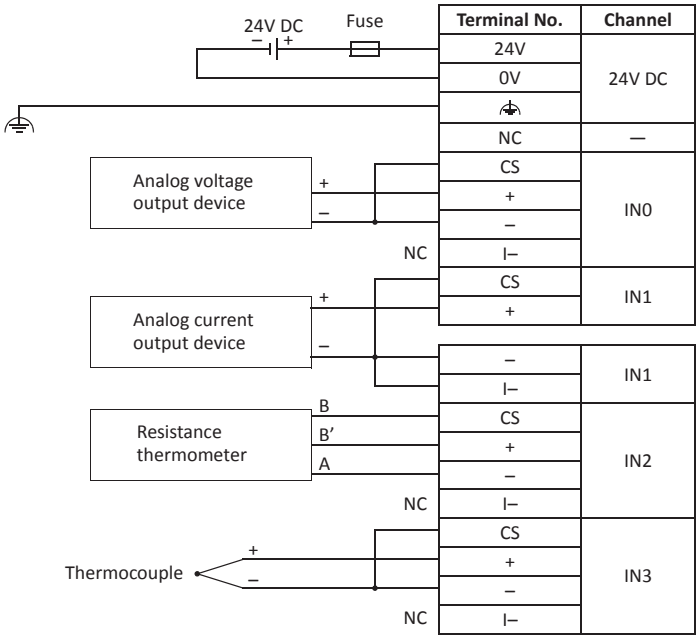
Terminal No.	Channel
+	24V DC
–	
⏚	
NC	—
NC	
NC	IN0
+	
–	
NC	IN1
+	
–	

- Connect a fuse appropriate for the applied voltage and current draw, at the position shown in the diagram. This is required when equipment containing the MicroSmart is destined for Europe.
- Do not connect any wiring to unused terminals.
- When the analog I/O module may malfunction due to noise, use the shielded cable for the analog input and output and connect both ends of the shield to a ground.

FC4A-J4CN1 (Analog Input Module) — Screw Terminal Type

Applicable Terminal Block: **FC4A-PMT10P (supplied with the analog input module)**





Terminal No.	Channel
24V	24V DC
0V	
⏚	
NC	—
CS	IN0
+	
–	
I–	
CS	IN1
+	
–	
I–	
CS	IN2
+	
–	
I–	
CS	IN3
+	
–	
I–	

- Connect a fuse appropriate for the applied voltage and current draw, at the position shown in the diagram. This is required when equipment containing the MicroSmart is destined for Europe.
- When connecting a resistance thermometer, connect three wires B, B', and A to the CS (current sense), +, and – terminals of input channels IN0 through IN3, respectively.
- When connecting a thermocouple, connect the + wire to the + terminal and the – wire to the CS and – terminals.
- Do not connect the thermocouple to a hazardous voltage (60V DC or 42.4V peak or higher).
- Do not connect any wiring to unused terminals.
- – terminals of input channels IN0 through IN3 are interconnected.
- When the analog I/O module may malfunction due to noise, use the shielded cable for the analog input and output and connect both ends of the shield to a ground.