General Specification

GS 34M06H63-03E

FA-M3
F3CX04-0H/DF
Temperature Monitoring Module
with Fahrenheit display function

FA-M3

■ General

The temperature monitoring module (hereafter called “the module”) is an input module to be mounted on the FA-M3 base module.

The module is provided with four input processing functions and one input processing function setup and operation interface to handle up to four inputs. Common and individual settings allow the module to support a wide variety of applications.

Two monitoring modes are available: Single-input and Two-input Changeover. In Single-input mode (default), individual input processing functions operate independently. In Two-input changeover mode, two input processing functions operate as a pair.

■ Features

- High accuracy, high resolution, high speed
  The input sampling period may be selected from 10ms, 100ms, or 200ms. The input conversion accuracy is ±0.1% of full scale, and the input resolution is 0.1°C (using 5-digit representation). Low-resolution operation (using 4-digit representation) is also available.
- Universal input
  The input type may be set to thermocouple, RTD, or DC voltage for each channel.
- ToolBox for Temperature Monitoring Modules
  A dedicated ToolBox software is provided for this module. With this software, you can easily set up various parameters of the module and monitoring by following screen instructions.

● Specifications

General

- The module, occupying a single slot, monitors four channels of temperature inputs.
- As input conditions and other data that are needed for temperature monitoring are stored in the module, no parameter setup is required at system startup.

Input

- Individual input channels are isolated from each other, as well as from the internal circuit.

■ Model and Suffix Codes

Model	Suffix Code	Style Code	Option Code	Description
F3CX04	-0H	—	/DF	4 channels of universal input Single-slot size /DF: with Fahrenheit display function

■ Specifications

● General Specifications

Item		Specification
Number of channels		4 channels
Isolation	Between input terminals and internal circuit	Isolation (capacitive/inductive couplling devices) (tested for 1500 V AC voltage withstanding for 1 minute)
	Between input terminals	
Alarm types		4 types of alarm: input upper limit alarm, input lower limit alarm (with or without waiting for each of the above 2 alarms)
Number of alarm outputs (input relays)		4 points per channel (Only alarms 1 and 2 have input relays)
Alarm delay timer		Yes
Warm-up time		30 minutes min.
Max. allowable ambient temperature change rate*1		10°C/h max.
Mounting position		Horizontal or inverted orientation not allowed
External connection		40-pin spring terminal block* 2
External dimensions* 3		28.9 (W) x 100 (H) x 104.2 (D) mm
Current consumption		200 mA at 5 V DC
Weight		160 g
Surrounding air temperature range		Operating : 0 to 55°C
		Storage :-20 to 75°C
Surrounding humidity range		Operating : 10 to 90% RH (non-condensing)
		Storage : 10 to 90% RH (non-condensing)
Surrounding atmosphere		Must be free of corrosive gases, flammable gases or heavy dust.

*1: The stated accuracy for the reference junction for thermocouple input deteriorates if the ambient temperature change exceeds this rate.
*2: When wiring to this module, be sure to use the terminal block provided. The 40-pin spring terminal block (Part No.: T9113PL) for this module can be purchased separately as a spare part.
*3: External dimensions excluding protrusions (for details, see the External Dimensions drawing).

● Input specifications

Item		Specification
Input sampling period*1		10m s, 100 ms, 200 ms
Input types and ranges		See Table A2.4, “Instrument Range and Accuracy”. Individual inputs separately configurable by software or collectively by hardware Thermocouple input : 15 ranges RTD input : 9 ranges DC voltage input : 6 ranges
Burnout detection		Thermocouples or RTDs are checked for burnout. Up-scale, down-scale, or none may be selected.
Detection current	Thermocouple	100 nA max.
	RTD	100 nA max.
Input insulation resistance		1 MΩ min.
Allowable signal source resistance	Thermocouple or DC mV input	250 Ω max.
	DC voltage input	2 kΩ max.
Allowable wiring resistance	RTD	10 Ω max. per wire (three wires must have the same resistance)
Measuring current	RTD	Approx. 250 μA
Reference junction compensation	Thermocouple*2	± 2.0°C (0 to 55°C)
Allowable input voltage range		-20 to 20 V DC
Noise reduction*3*4*5	Common mode	120 dB (50/60 Hz) min.
	Normal mode	40 dB (50/60 Hz) min.
Effect of ambient temperature		± 0.01%/°C or ± 1μV/°C, whichever is greater

*1: You can select an input sampling period of 10 ms for 4 channels, 100 ms for 2 channels, 100 ms for 4 channels, or 200 ms for 4 channels.
*2: This value assumes that all input terminals are correctly wired (that is, using ferrule, wire diameters and connections are correct).
*3: This value assumes that the power supply frequency is correctly selected.
*4: This module continues to operate at a input accuracy of ±0.5% max. of F.S. during the radiated electromagnetic field test.
*5: This is the value when an input sampling period of 100ms or 200ms is selected. If 10ms is selected, 50/60 Hz noise canceling is not be enabled.

• **Instrument Range and Accuracy (for high resolution operation with SW1-1 set to OFF) 1/4**

Input Category	Input Type[*1]	Instrument Range[*2]	Input Type Selector witch[*3] SW1-3	SW1-4	SW5	Software Setting	Accuracy[*4]	Resolution[*2]
Software setting (factory setting)			OFF	OFF	0	Instrument ranges may be specified by software using one of the following codes.		
Thermocouple	K[*5]	-200.0 to 1370.0°C	OFF	OFF	1	1 ($01)	± 0.5°C[*5]	0.1°C[*5]
		-200.0 to 1000.0°C			2	2 ($02)	± 0.5°C[*5]	0.1°C[*5]
		-200.0 to 500.0°C			3	3 ($03)	± 0.5°C[*6]	0.1°C[*6]
	J	-200.0 to 1200.0°C			4	4 ($04)	± 0.5°C[*7]	0.1°C[*7]
		-200.0 to 500.0°C			5	5 ($05)	± 0.5°C[*8]	0.1°C[*8]
	T	-270.0 to 400.0°C			6	6 ($06)	± 0.5°C[*9]	0.1°C[*9]
	B[*10]	0.0 to 1600.0°C			7	7 ($07)	± 1.0°C[*10]	0.1°C[*10]
	S[*11]	0.0 to 1600.0°C			8	8 ($08)	± 1.0°C[*11]	0.1°C[*11]
	R[*11]	0.0 to 1600.0°C			9	9 ($09)	± 1.0°C[*11]	0.1°C[*11]
	N	-200.0 to 1300.0°C			A	10 ($0A)	± 0.6°C[*12]	0.1°C[*12]
	E	-270.0 to 1000.0°C			B	11 ($0B)	± 0.5°C[*13]	0.1°C[*13]
	L	-200.0 to 900.0°C			C	12 ($0C)	± 0.6°C	0.1°C
	U	-200.0 to 400.0°C			D	13 ($0D)	± 0.6°C	0.1°C
	W[*14]	0.0 to 1600.0°C			E	14 ($0E)	± 0.8°C[*14]	0.1°C[*14]
	Platinel 2	0.0 to 1390.0°C			F	15 ($0F)	± 0.6°C	0.1°C
RTD	JPt100	-200.0 to 500.0°C	OFF	ON	0	16 ($10)	± 0.4°C	0.1°C
		-200.0 to 200.0°C			1	17 ($11)	± 0.4°C	0.1°C
		0.0 to 300.0°C			2	18 ($12)	± 0.3°C	0.1°C
		0.00 to 150.00°C			3	19 ($13)	± 0.20°C	0.02°C
	Pt100	-200.0 to 850.0°C			4	20 ($14)	± 0.4°C	0.1°C
		-200.0 to 500.0°C			5	21 ($15)	± 0.4°C	0.1°C
		-200.0 to 200.0°C			6	22 ($16)	± 0.4°C	0.1°C
		0.0 to 300.0°C			7	23 ($17)	± 0.3°C	0.1°C
		0.00 to 150.00°C			8	24 ($18)	± 0.20°C	0.02°C
DC voltage	DC mV input[*15]	0 to 10.00 mV DC	— [*16]	ON	9	25 ($19)	± 0.1% of instrument range ± 1 digit[*15]	
		0 to 100.0 mV DC			A	26 ($1A)		
	DC V input[*15]	0.000 to 1.000 V DC			B	27 ($1B)		
		0.000 to 5.000 V DC			D	29 ($1D)		
		1.000 to 5.000 V DC			E	30 ($1E)		
		0.00 to 10.00 V DC			F	31 ($1F)		

*1: Applicable standard is JIS/IEC/DIN (ITS-90) for thermocouples and RTD.

*2: For thermocouples K, B, S, R, W, and for RTD in the 0.00 to 150.00°C range, the input ranges may be set wider than their instrument range. However, if the difference between the upper and lower limit settings exceeds 1600°C, the resolution will be twice the stated value. Furthermore, the actual range for an acceptable input is the input range ±5%.

*3: When you turn on the power after changing the hardware switch settings, data stored in the Non-volatile memory is initialized to follow the switch settings.

*4: This accuracy applies if the ambient temperature is 25 ± 5°C and the input value is within the instrument range. If the input type is thermocouple and reference junction compensation is used, you should also take into consideration the accuracy of the reference junction compensation. If the input sampling period of 10 ms is selected, the accuracy will be twice the stated value.

*5: For K-type thermocouples, the input range may be set from -270.0 to 1370.0°C beyond its instrument range. The accuracy and resolution depend on measured temperatures as follows:
-270.0 to -200.0°C: Neither accuracy or resolution is guaranteed.
-200.0 to 0.0°C: ±1.0°C accuracy, 0.2°C resolution

*6: For K-type thermocouples, the accuracy and resolution depend on measured temperatures as follows:
-200.0 to -180.0°C: ±0.9°C accuracy, 0.2°C resolution
-180.0 to -100.0°C: ±0.6°C accuracy, 0.1°C resolution

*7: For J-type thermocouples, the accuracy and resolution depend on measured temperatures as follows:
-200.0 to -100.0°C: ±1.0°C accuracy, 0.2°C resolution

*8: For J-type thermocouples, the accuracy and resolution depend on measured temperatures as follows:
-200.0 to -150.0°C: ±0.6°C accuracy, 0.1°C resolution

*9: For T-type thermocouples, the accuracy and resolution depend on measured temperatures as follows:
-270.0 to -200.0°C: ±3.5°C accuracy, 0.5°C resolution
-200.0 to -100.0°C: ±1.0°C accuracy, 0.1°C resolution

*10: For B-type thermocouples, the input range may be set from 0.0 to 1800.0°C beyond its instrument range. The accuracy and resolution depend on measured temperatures as follows:
0.0 to 300.0°C: Neither accuracy nor resolution is guaranteed.
300.0 to 900.0°C: ±2.5°C accuracy, 0.3°C resolution

*11: For S-type and R-type thermocouples, the input range may be set from 0.0 to 1700.0°C beyond its instrument range. The accuracy and resolution depend on measured temperatures as follows:
0.0 to 200.0°C: ±1.5°C accuracy, 0.2°C resolution

*12: For N-type thermocouples, the accuracy and resolution depend on measured temperatures as follows:
-200.0 to 0.0°C: ±1.3°C accuracy, 0.3°C resolution

*13: For E-type thermocouples, the accuracy and resolution depend on measured temperatures as follows:
-270.0 to -200.0°C: ±6.5°C accuracy, 2.0°C resolution
-200.0 to -100.0°C: ±1.0°C accuracy, 0.2°C resolution

*14: For W-type thermocouples, the input range may be set from 0.0 to 2300.0°C beyond its instrument range. The accuracy and resolution depend on measured temperatures as follows:
0.0 to 100.0°C: ±1.0°C accuracy, 0.2°C resolution

*15: Resolution is determined by the upper and lower limits for the input range, as well as the upper and lower scaling limits. It is represented by one digit.

*16: "–" means that the value is ignored.

• **Instrument Range and Accuracy (for low resolution operation with SW1-1 set to OFF) 2/4**

Input Category	Input Type[*1]	Instrument Range[*2]	Input Type Selector Switch[*3]			Software Setting	Accuracy[*4]	Resolution[*2]
			SW1-3	SW1-4	SW5			
Software setting			ON	OFF	0	Instrument ranges may be specified by software using one of the following codes.		
Thermocouple	K[*5]	-200 to1370°C	ON	OFF	1	33 ($21)	± 2°C[*5]	1°C[*5]
		-200 to1000°C			2	34 ($22)	± 2°C[*5]	1°C[*5]
		-200 to500°C			3	35 ($23)	± 2°C	1°C
	J	-200 to 1200°C			4	36 ($24)	± 2°C	1°C
		-200 to 500°C			5	37 ($25)	± 2°C	1°C
	T[*6]	-270 to 400°C			6	38 ($26)	± 2°C[*6]	1°C
	B[*7]	0 to 1600°C			7	39 ($27)	± 2°C[*7]	1°C[*7]
	S[*8]	0 to 1600°C			8	40 ($28)	± 2°C[*8]	1°C
	R[*8]	0 to 1600°C			9	41 ($29)	± 2°C[*8]	1°C
	N[*9]	-200 to 1300°C			A	42 ($2A)	± 2°C[*9]	1°C
	E[*10]	-270 to 1000°C			B	43 ($2B)	± 2°C[*10]	1°C[*10]
	L	-200 to 900°C			C	44 ($2C)	± 2°C	1°C
	U	-200 to 400°C			D	45 ($2D)	± 2°C	1°C
	W[*11]	0 to 1600°C			E	46 ($2E)	± 2°C	1°C
	Platinel 2	0 to 1390°C			F	47 ($2F)	± 2°C	1°C
RTD	JPt100	-200 to 500°C	ON	ON	0	48 ($30)	± 2°C	1°C
		-200 to 200°C			1	49 ($31)	± 2°C	1°C
		0 to 300°C			2	50 ($32)	± 2°C	1°C
		0.0 to 150.0°C			3	51 ($33)	± 0.3°C	0.1°C
	Pt100	-200 to 850°C			4	52 ($34)	± 2°C	1°C
		-200 to 500°C			5	53 ($35)	± 2°C	1°C
		-200 to 200°C			6	54 ($36)	± 2°C	1°C
		0 to 300°C			7	55 ($37)	± 2°C	1°C
		0.0 to 150.0°C			8	56 ($38)	± 0.3°C	0.1°C

*1: Applicable standard is JIS/IEC/DIN (ITS-90) for thermocouples and RTD.
*2: For thermocouples K, B, S, R, W, and for RTD in the 0.0 to 150.0°C range, the input ranges may be set wider than their instrument range. Furthermore, the actual range for an acceptable input is the input range ±5%.
*3: When you turn on the power after changing the hardware switch settings, data stored in the Non-volatile memory is initialized to follow the switch settings.
*4: This accuracy applies if the ambient temperature is 25 ± 5°C and the input value is within the instrument range. If the input type is thermocouple and reference junction compensation is used, you should also take into consideration the accuracy of the reference junction compensation.
*5: For K-type thermocouples, the upper and lower input range limits may be set from -270 to 1370°C. The accuracy and resolution depend on measured temperatures as follows:
-270 to -200°C: Neither accuracy nor resolution is guaranteed.
*6: For T-type thermocouples, the accuracy and resolution depend on measured temperatures as follows:
-270 to -200°C: ±4°C accuracy, 1°C resolution
*7: For B-type thermocouples, the upper and lower input range limits may be set from 0 to 1800°C. The accuracy and resolution depend on measured temperatures as follows:
0 to 300°C: Neither accuracy nor resolution is guaranteed.
300 to 900°C: ±3°C accuracy, 1°C resolution
*8: For S-type and R-type thermocouples, the upper and lower input range limits may be set from 0 to 1700°C.
*9: For N-type thermocouples, the accuracy and resolution depend on measured temperatures as follows:
-200 to 0°C: ±3°C accuracy, 1°C resolution
*10: For E-type thermocouples, the detailed accuracy and resolution are as follows:
-270 to -200°C: ±8°C accuracy, 2°C resolution
-200 to 1000°C: ±2°C accuracy, 1°C resolution
*11: For W-type thermocouples, the upper and lower input range limits may be set from 0 to 2300°C.

• **Instrument Range and Accuracy (for high resolution operation with SW1-1 set to ON) 3/4**

Input Category	Input Type[*1]	Instrument Range[*2]	Input Type Selector Switch[*3] SW1-3	SW1-4	SW5	Software Setting	Accuracy[*4]	Resolution[*2]
Software setting (factory setting)			OFF	OFF	0	Instrument ranges may be specified by software using one of the following codes.		
Thermocouple	K[*5]	-328.0 to 2498.0°F	OFF	OFF	1	1 ($01)	± 1.0°F[*5]	0.2°F[*5]
		-328.0 to 1832.0°F			2	2 ($02)	± 1.0°F[*5]	0.2°F[*5]
		-328.0 to 932.0°F			3	3 ($03)	± 1.0°F[*6]	0.2°F[*6]
	J	-328.0 to 2192.0°F			4	4 ($04)	± 1.0°F[*7]	0.2°F[*7]
		-328.0 to 932.0°F			5	5 ($05)	± 1.0°F[*8]	0.2°F
	T	-454.0 to 752.0°F			6	6 ($06)	± 1.0°F[*9]	0.2°F[*9]
	B[*10]	32 to 2912°F			7	7 ($07)	± 2°F[*10]	1°F[*10]
	S[*11]	32 to 2912°F			8	8 ($08)	± 2°F[*11]	1°F
	R[*11]	32 to 2912°F			9	9 ($09)	± 2°F[*11]	1°F
	N	-328.0 to 2372.0°F			A	10 ($0A)	± 1.2°F[*12]	0.2°F[*12]
	E	-454.0 to 1832.0°F			B	11 ($0B)	± 1.0°F[*13]	0.2°F[*13]
	L	-328.0 to 1652.0°F			C	12 ($0C)	± 1.2°F	0.2°F
	U	-328.0 to 752.0°F			D	13 ($0D)	± 1.2°F	0.2°F
	W[*14]	32 to 2912°F			E	14 ($0E)	± 2°F	1°F
	Platinel 2	32.0 to 2534.0°F			F	15 ($0F)	± 1.2°F	0.2°F
RTD	JPt100	-328.0 to 932.0°F	OFF	ON	0	16 ($10)	± 0.8°F	0.2°F
		-328.0 to 392.0°F			1	17 ($11)	± 0.8°F	0.2°F
		32.0 to 572.0°F			2	18 ($12)	± 0.6°F	0.2°F
		32.0 to 302.0°F			3	19 ($13)	± 0.4°F	0.2°F
	Pt100	-328.0 to 1562.0°F			4	20 ($14)	± 0.8°F	0.2°F
		-328.0 to 932.0°F			5	21 ($15)	± 0.8°F	0.2°F
		-328.0 to 392.0°F			6	22 ($16)	± 0.8°F	0.2°F
		32.0 to 572.0°F			7	23 ($17)	± 0.6°F	0.2°F
		32.0 to 302.0°F			8	24 ($18)	± 0.4°F	0.2°F
DC voltage	DC mV input[*15]	0 to 10.00 mV DC	— [*16]	ON	9	25 ($19)	± 0.1% of instrument range ± 1 digit[*15]	
		0 to 100.0 mV DC			A	26 ($1A)		
	DC V input[*15]	0.000 to 1.000 V DC			B	27 ($1B)		
		0.000 to 5.000 V DC			D	29 ($1D)		
		1.000 to 5.000 V DC			E	30 ($1E)		
		0.00 to 10.00 V DC			F	31 ($1F)		

*1: Applicable standard is JIS/IEC/DIN (ITS-90) for thermocouples and RTD.
*2: For thermocouples K, B, S, R, W, and for RTD in the 32.0 to 302.0 °F range, the input ranges may be set wider than their instrument range. However, if the difference between the upper and lower limit settings exceeds 2880°F, the resolution will be twice the stated value. Furthermore, the actual range for an acceptable input is the input range±5%.
*3: When you turn on the power after changing the hardware switch settings, data stored in the Non-volatile memory is initialized to follow the switch settings.
*4: This accuracy applies if the ambient temperature is 77°F±9°F and the input value is within the instrument range. If the input type is thermocouple and reference junction compensation is used, you should also take into consideration the accuracy of the reference junction compensation. If the input sampling period of 10 ms is selected, the accuracy will be twice the stated value.
*5: For K-type thermocouples, the input range may be set from -454.0 to 2498.0°F beyond its instrument range. The accuracy and resolution depend on measured temperatures as follows:
-454.0 to -328.0°F: Neither accuracy or resolution is guaranteed.
-328.0 to 32.0°F: ±2.0°F accuracy, 0.4°F resolution
*6: For K-type thermocouples, the accuracy and resolution depend on measured temperatures as follows:
-328.0 to -292.0°F: ±2.0°F accuracy, 0.4°F resolution
-292.0 to -148.0°F: ±1.2°F accuracy, 0.2°F resolution
*7: For J-type thermocouples, the accuracy and resolution depend on measured temperatures as follows:
-328.0 to -148.0°F: ±2.0°F accuracy, 0.4°F resolution
*8: For J-type thermocouples, the accuracy and resolution depend on measured temperatures as follows:
-328.0 to -238.0°F: ±1.2°F accuracy, 0.2°F resolution
*9: For T-type thermocouples, the accuracy and resolution depend on measured temperatures as follows:
-454.0 to -328.0°F: ±6.5°F accuracy, 1.0°F resolution
-328.0 to -148.0°F: ±2.0°F accuracy, 0.2°F resolution
*10: For B-type thermocouples, the input range may be set from 32 to 3272°F beyond its instrument range. The accuracy and resolution depend on measured temperatures as follows:
32 to 572°F: Neither accuracy nor resolution is guaranteed.
572 to 1652°F: ±5°F accuracy, 1°F resolution
*11: For S-type and R-type thermocouples, the input range may be set from 32 to 3092°F beyond its instrument range. The accuracy and resolution depend on measured temperatures as follows:
32 to 392°F: ±3°F accuracy, 1°F resolution
*12: For N-type thermocouples, the accuracy and resolution depend on measured temperatures as follows:
-328.0 to 32.0°F: ±2.5°F accuracy, 0.6°F resolution
*13: For E-type thermocouples, the accuracy and resolution depend on measured temperatures as follows:
-454.0 to -328.0°F: ±12.0°F accuracy, 4.0°F resolution
-328.0 to -148.0°F: ±2.0°F accuracy, 0.4°F resolution
*14: For W-type thermocouples, the input range may be set from 32 to 4172°F beyond its instrument range.
*15: Resolution is determined by the upper and lower limits for the input range, as well as the upper and lower scaling limits. It is represented by one digit.
*16: "–" means that the value is ignored.

• Instrument Range and Accuracy (for low resolution operation with SW1-1 set to ON) 4/4

Input Category	Input Type[*1]	Instrument Range[*2]	Input Type Selector Switch[*3] SW1-3	SW1-4	SW5	Software Setting	Accuracy[*4]	Resolution[*2]
Software setting			ON	OFF	0	Instrument ranges may be specified by software using one of the following codes.		
Thermocouple	K[*5]	-328 to 2498°F	ON	OFF	1	33 ($21)	± 2°F[*5]	1°F[*5]
		-328 to 1832°F			2	34 ($22)	± 2°F[*5]	1°F[*5]
		-328 to 932°F			3	35 ($23)	± 2°F	1°F
	J	-328 to 2192°F			4	36 ($24)	± 2°F	1°F
		-328 to 932°F			5	37 ($25)	± 2°F	1°F
	T[*6]	-454 to 752°F			6	38 ($26)	± 2°F[*6]	1°F
	B[*7]	32 to 2912°F			7	39 ($27)	± 2°F[*7]	1°F[*7]
	S[*8]	32 to 2912 °F			8	40 ($28)	± 2°F[*8]	1°F
	R[*8]	32 to 2912°F			9	41 ($29)	± 2°F[*8]	1°F
	N[*9]	-328 to 2372°F			A	42 ($2A)	± 2°F[*9]	1°F
	E[*10]	-454 to 1832°F			B	43 ($2B)	± 2°F[*10]	1°F[*10]
	L	-328 to 1652°F			C	44 ($2C)	± 2°F	1°F
	U	-328 to 752°F			D	45 ($2D)	± 2°F	1°F
	W[*11]	32 to 2912°F			E	46 ($2E)	± 2°F	1°F
	Platinel 2	32 to 2534°F			F	47 ($2F)	± 2°F	1°F
RTD	JPt100	-328 to 932°F	ON	ON	0	48 ($30)	± 2°F	1°F
		-328 to 392°F			1	49 ($31)	± 2°F	1°F
		32 to 572°F			2	50 ($32)	± 2°F	1°F
		32 to 302°F			3	51 ($33)	± 2°F	1°F
	Pt100	-328 to 1562°F			4	52 ($34)	± 2°F	1°F
		-328 to 932°F			5	53 ($35)	± 2°F	1°F
		-328 to 392°F			6	54 ($36)	± 2°F	1°F
		32 to 572°F			7	55 ($37)	± 2°F	1°F
		32 to 302°F			8	56 ($38)	± 2°F	1°F

*1: Applicable standard is JIS/IEC/DIN (ITS-90) for thermocouples and RTD.
*2: For thermocouples K, B, S, R, W, and for RTD in the 32 to 302 °F range, the input ranges may be set wider than their instrument range (see the notes below). Furthermore, the actual range for an acceptable input is the input range±5%.
*3: When you turn on the power after changing the hardware switch settings, data stored in the Non-volatile memory is initialized to follow the switch settings.
*4: This accuracy applies if the ambient temperature is 77°F±9°F and the input value is within the instrument range. If the input type is thermocouple and reference junction compensation is used, you should also take into consideration the accuracy of the reference junction compensation.
*5: For K-type thermocouples, the upper and lower input range limits may be set from -454 to 2498°F. The accuracy and resolution depend on measured temperatures as follows:
-454 to 328°F: Neither accuracy nor resolution is guaranteed.
*6: For T-type thermocouples, the accuracy and resolution depend on measured temperatures as follows:
-454 to -328°F: ±7°F accuracy, 1°F resolution
*7: For B-type thermocouples, the upper and lower input range limits may be set from 32 to 3272°F. The accuracy and resolution depend on measured temperatures as follows:
32 to 572°F: Neither accuracy nor resolution is guaranteed.
572 to 1652°F: ±5°F accuracy, 1°F resolution
*8: For S-type and R-type thermocouples, the upper and lower input range limits may be set from 32 to 3092°F. The accuracy and resolution depend on measured temperatures as follows:
32 to 392°F: ±3°F accuracy, 1°F resolution
*9: For N-type thermocouples, the accuracy and resolution depend on measured temperatures as follows:
-328 to 32°F: ±4°F accuracy, 1°F resolution
*10: For E-type thermocouples, the detailed accuracy and resolution are as follows:
-454 to 328°F: ±12°F accuracy, 4°F resolution
-328 to 148°F: ±3°F accuracy, 1°F resolution
*11: For W-type thermocouples, the upper and lower input range limits may be set from 32 to 4172°F.

• Power Supply Frequency

Power Supply Frequency	Input Type Selector Switch[*1] SW1-2	SW1-4	SW5	Remarks
Software setting	Any	OFF	0	Power supply frequency may be specified by software. (Factory setting)
50Hz	OFF	Other than the above.		Removes 50 Hz power supply frequency noise overlapping input signals. [*2]
60Hz	ON			Removes 60 Hz power supply frequency noise overlapping input signals. [*2]

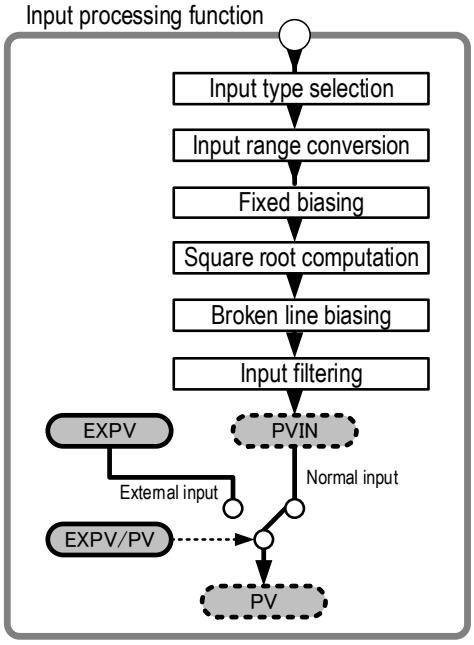
*1: When you turn on the power after changing the hardware switch settings, data stored in the Non-volatile memory is initialized to follow the switch settings.
*2: If an input sampling period of 10ms is selected, 50/60 Hz noise canceling is not be enabled.

■ Functions List

Category	Functions		Description
Monitoring	Input sampling period		Sets the input sampling period.
	Monitoring mode selection		Specifies monitoring mode for each of 2 channels.
	Monitoring mode	Single input mode	Basic function for independent operation
		Two- input changeover	Switches between two measured inputs (e.g. using a register or measured value range) and handles them as one measured input (using a pair of 2 channels).
		Disabled	Channels specified as 'disabled' are not used.
Input processing	Input type selection		Sets input type using switches (for all channels) or software (for individual channels).
	Power supply frequency specification		Specifies the power supply frequency. An appropriate setting value will reduce common mode noise.
	Input range setting		Sets input ranges.
	PV range setting		Sets PV range for two-input changeover mode.
	Burnout selection		Selectable from Up Scale, Down Scale, or OFF (no burnout detection) for thermocouple or RTD input open-circuit detection. *1
	Reference junction compensation		Sets thermocouple reference junction compensation to either On or Fixed Value.
	Input operation functions	Broken-line biasing	Specifies any temperature and its bias value. A compensation value based on the linear interpolation of the specified bias values is automatically added to a measured input. This function is particularly useful for a deteriorated sensor, for which input compensation is desirable.
		Fixed biasing	Specifies a fixed bias value to be automatically added to measured input values. This function is useful when a measured input suffers a fixed deviation due to a known physical problem with a sensor, or when fine adjustment of measured input is desirable for better consistency with values indicated by other equipment, even though data deviation is within tolerance.
		Input filtering	Filtering can be used to remove high frequency noise from measured inputs such as flow rate and pressure.
		Square root extraction	Performs square root extraction on measured inputs. This function is useful for converting differential pressure signals (of orifice, nozzle, or other types of restriction flowmeter) to flow rate signals.
	Two-input changeover		Sets the two-input changeover mode to perform changeover based on temperature range, preset temperature value, or register value.
Alarm	Alarm	Alarm setup	Sets four alarms for each channel.
		Waiting	Suppresses alarm during the startup period after powering on until the operation stabilizes.
		Delay timer	Reports an alarm only if an alarm condition persists for a minimum duration.
Backup function (Storing of preset values)			Holds parameters in non-volatile memory. It can be rewritten 10 million times (100,000 times before REV:01:00).

*1: When burnout selection is set to OFF, the measured input value at the time of burnout (open circuit) is unpredictable and may approach either the upper limit or the lower limit. Furthermore, the burnout relay is not set.
However, +OVER or -OVER detection is performed.

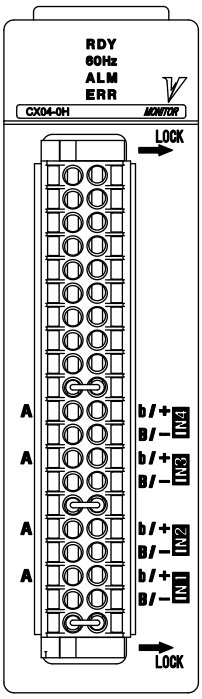
・Function block diagram for F3CX04



■ Components and Functions

● Front view

F3CX04-0H/DF



Status Indicators

RDY (green)

Lit when the internal circuit is functioning normally.
Turns off when an error occurs in the module.

60 Hz (green)

Indicates the frequency of the commercial power supply,
Off: 50Hz;
On: 60 Hz.

ALM (orange)

Lit when an alarm occurs in any channel.

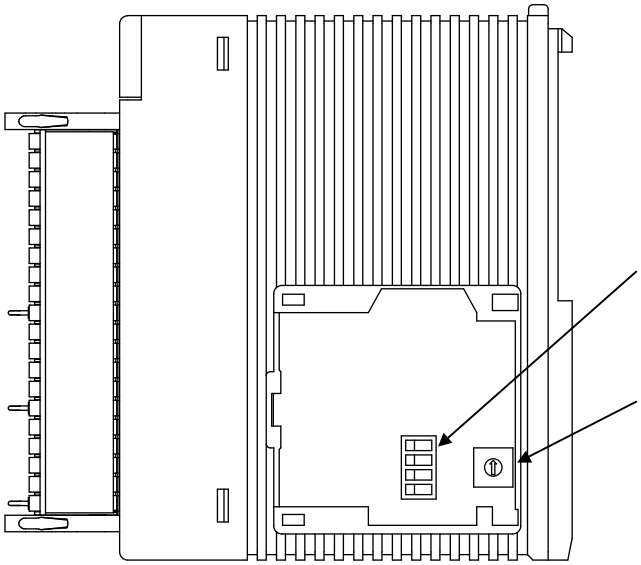
ERR (red)

Lit or flashes when a hardware failure is detected or an error is detected in stored data.
Lit when an error is detected in RAM, ROM, system data, calibration values, ADC, RJC or Non-volatile memory.
Flashes when a parameter error or burnout is detected.

I/O terminal block

40-pin spring terminal block.

● Right side view



SW1-1: Temperature unit selector switch
SW1-2: Power frequency selector switch
SW1-3: Input type selector switch
SW1-4: Input type selector switch

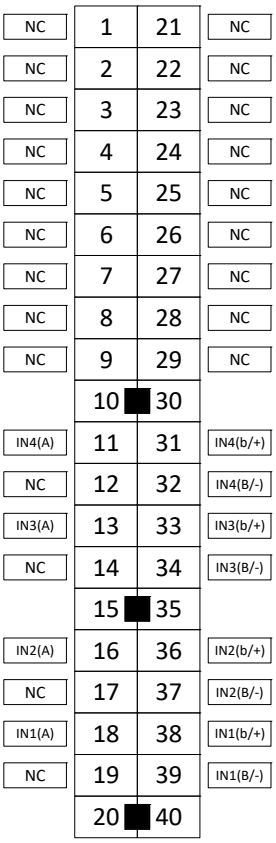
SW5: Input type selector switch
(Input type is determined by the combined values of SW1-3, SW1-4, and SW5.)

Note: This is the right side view of the module with its cover removed.

External Connection Diagram

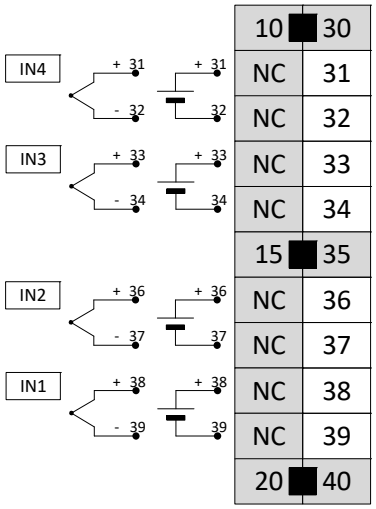
Terminal Wiring Diagram

F3CX04-0H/DF

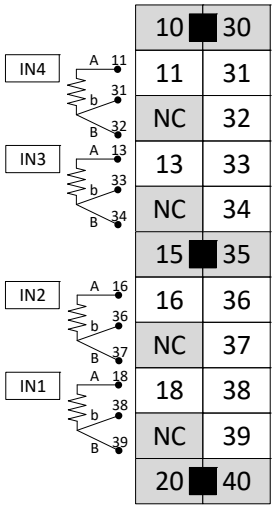


Input Terminal Wiring Examples

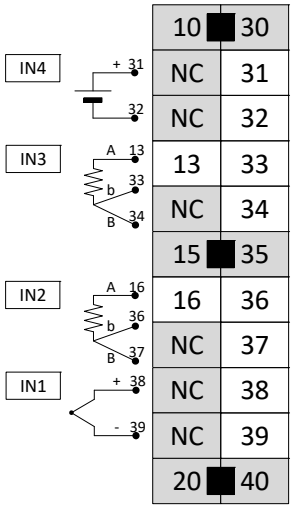
・For thermocouple and DC voltage input



・For RTD input



・With IN1 as the thermocouple input,
IN2-3 as the RTD input, and IN4 as the DC voltage input



■ Cable and Crimp-style Terminal

Cable Type	Shielded twist-pair wire
Cable temperature rating	75°C min.
Cable connection method	Using ferrule

	Manufacturer	Model	Compatible Wire
Crimp-style terminals and compatible wires	Phoenix Contact	AI 0,34-8 TQ	AWG22 (0.34 mm^2)
		AI 0,5-10 WH	AWG20 (0.52 mm^2)
		AI 0,75-10 GY	AWG18 (0.75 mm^2)
		AI 1-10 RD	AWG18 (1.00 mm^2)

■ Operating Environment

● CPU Modules

There is no restriction on the type of CPU modules that can be used with this module.

However, this module cannot be accessed by Byte size. If using the RTOS-CPU module, use Word size access.

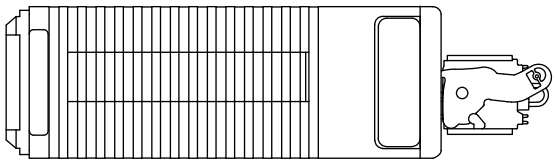
● FA-M3 ToolBox for Temperature Control and Monitoring Modules

This module supports R7.03 and later of the FA-M3 ToolBox for Temperature Control and Monitoring Modules. However, R7.03 has the following functional restrictions.

- Input sampling periods of 10 ms and 100 ms for 4 channels cannot be selected.
- The upper and lower limits of the RTD input range cannot be set to a value that exceeds the default value.

R7.04 and later will no longer have any functional restrictions in R7.03.

■ External Dimensions



Unit : mm