

General Specifications

FX2 Series Computing Units (Variable/Fixed Software Type)

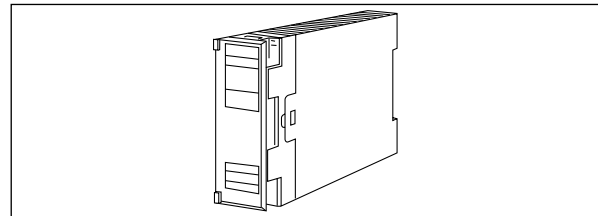


Moving Average Unit, Dead Time Unit, Velocity Unit, First Order Lug Unit, First Order Lead Unit, Velocity Limiter, Peak Holder, Bottom Holder, Analog Memory, Program Setter, Programmable Unit

GS 77J08X02-01E

General

The JUXTA FX2 Series, Computing unit (Variable/Fixed Software Type) receives a voltage input signal, applies various computing functions to it, and outputs isolated DC current or DC voltage signals to controllers or recorders.



List of Computing Units

Table 1. List of FX2 Series

Descriptions	Models □: V or A
Moving Average Unit (Fixed software type)	FX2□-MA
Dead Time Unit (Fixed software type)	FX2□-DT
Velocity Unit (Fixed software type)	FX2□-VC
First Order Lug Unit (Fixed software type)	FX2□-LG
First Order Lead Unit (Fixed software type)	FX2□-LE
Velocity Limiter (Fixed software type)	FX2□-VL
Peak Holder (Variable software type, with contact input for holding)	FX2□-PH
Bottom Holder (Variable software type, with contact input for holding)	FX2□-BH
Analog Memory (Variable software type, with contact input for holding)	FX2□-AM
Program Setter (Variable software type)	FX2□-PS
Programmable Unit (Variable software type, with contact input)	FX2□-FP

Ordering Information

Specify the Model, Suffix codes and the Input range when ordering. (Refer to "Functions" for other items which need to be specified when ordering.)
Model and suffix codes: e.g. FX2A-MA-1A*B
Input range: e.g. 1 to 5 V DC

Input Specifications

Input signal: Refer to Table 2

Table 2. Input Signals

Input signals	Model and Suffix codes
1 point of DC voltage signal	FX2□-MA, FX2□-DT, FX2□-VC, FX2□-LG, FX2□-LE, FX2□-VL
1 point of DC voltage signal, 1 point of contact input	FX2□-PH, FX2□-BH, FX2□-AM, FX2□-FP
1 point of contact input	FX2□-PS

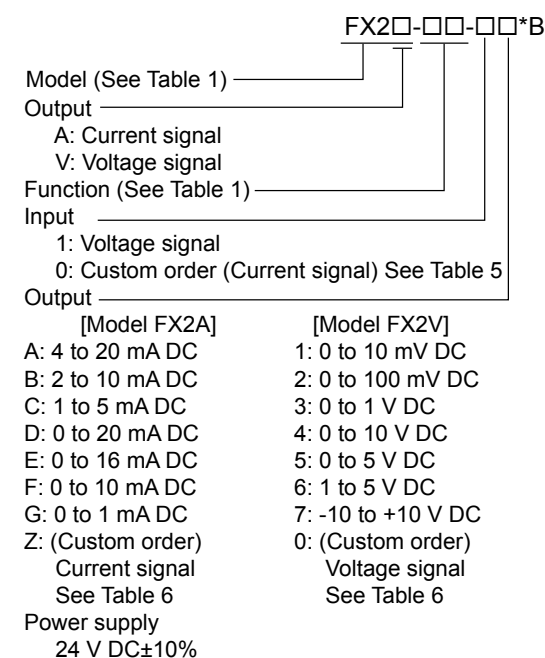
Measuring range: Refer to Table 3

Table 3. Measuring Range

Input signal	Measuring range
DC voltage signal	Specify within 0 to 10 V DC when voltage is applied (Span: 2 V or more)

Input resistance: 1 MΩ (100 kΩ or more during power off)
Allowable applied voltage: -15 to +15 V DC
Contact signal: For the models with contact inputs only
Close: 200 Ω or less
Open: 100 kΩ or more
Contact detection: 9 V, 0.2 mA DC

Model and Suffix Codes



■ Output Specifications

Output signal: DC current signal or DC voltage signal
 Allowable load resistance: Refer to Table 4

Table 4. Output signals

Output range	Output range
4 to 20 mA DC: 750 Ω or less	0 to 10 mV DC: 250 kΩ or more
2 to 10 mA DC: 1500 Ω or less	0 to 100 mV DC: 250 kΩ or more
1 to 5 mA DC: 3000 Ω or less	0 to 1 V DC: 2 kΩ or more
0 to 20 mA DC: 750 Ω or less	0 to 10 V DC: 10 kΩ or more
0 to 16 mA DC: 900 Ω or less	0 to 5 V DC: 2 kΩ or more
0 to 10 mA DC: 1500 Ω or less	1 to 5 V DC: 2 kΩ or more
0 to 1 mA DC: 15 kΩ or less	-10 to +10 V DC: 10 kΩ or more

■ Standard Performance

Accuracy rating: ±0.2% of span
 Note that the accuracy is not guaranteed for output levels less than 0.5% of the span of 0 to X mA output range type.
 FX2□-FP: ±0.2% of span (when Input; %=Output; %)
 Response speed: 500 ms, 63% response (10 to 90%)
 Computation cycle: 100 ms
 Insulation resistance: 100 MΩ or more at 500 V DC between input and output, output and power supply, and input and power supply.
 Withstand voltage: 1500 V AC/min. between (input and output) and power supply.
 500 V AC/min. between output and power supply.

■ Environmental Conditions

Operating temperature range: 0 to 50 °C
 Operating humidity range: 5 to 90% RH (no condensation)
 Power supply voltage: 24 V DC±10%
 Effect of power supply voltage fluctuations: ±0.2% or less of span for fluctuation of 24 V DC±10%
 Effect of ambient temperature change: ±0.2% of span or less for a temperature change of 10 °C.
 Current consumption: 24 V DC 60 mA (FX2V), 82 mA (FX2A)

■ Mounting and Dimensions

Material: ABS resin (Case body)
 Mounting method: Rack, Wall, or DIN rail mounting
 Connection: M4 screw terminal
 External dimensions: 72 x 24 x 127 mm (H x W x D)
 Weight: Approx.130 g

■ Standard Accessories

Tag number label: 1
 Mounting block: 2
 Mounting screw: M4 screw x 2

■ Custom Order Specifications

Input signal: DC current signal - Refer to Table 5
 Input resistance x (Input current) shall be within the measuring span of voltage input signal.

Table 5. Acceptable Range for Input Signals

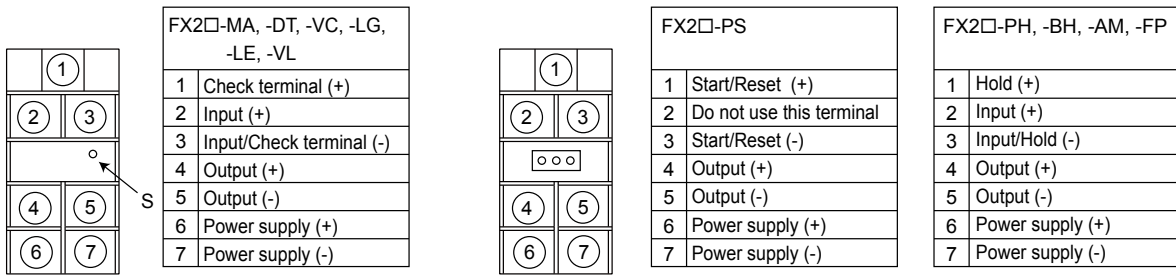
Input signal	Input resistance	Input signal	Input resistance
10 to 50 mA DC	100 Ω	0 to 20 mA DC	250 Ω
4 to 20 mA DC	250 Ω	0 to 16 mA DC	250 Ω
2 to 10 mA DC	500 Ω	0 to 10 mA DC	500 Ω
1 to 5 mA DC	1 kΩ	0 to 1 mA DC	5 kΩ

Output signal: Refer to Table 6

Table 6. Acceptable Range for Output Signals

	Current signal	Voltage signal
Output range	0 to 24 mA DC	-10 to +10 V DC
Span	1 to 24 mA DC	10 mV to 20 V DC
Zero elevation	0 to 200%	-100 to +200%

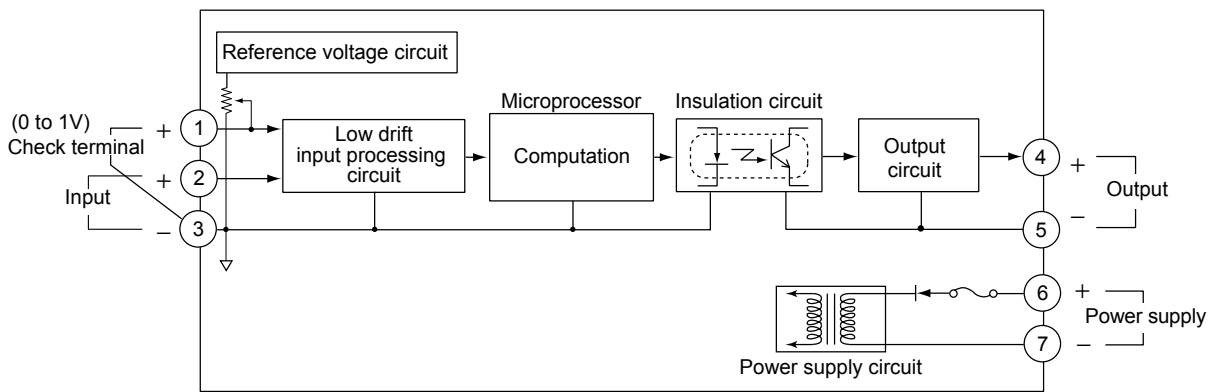
Terminal Assignments



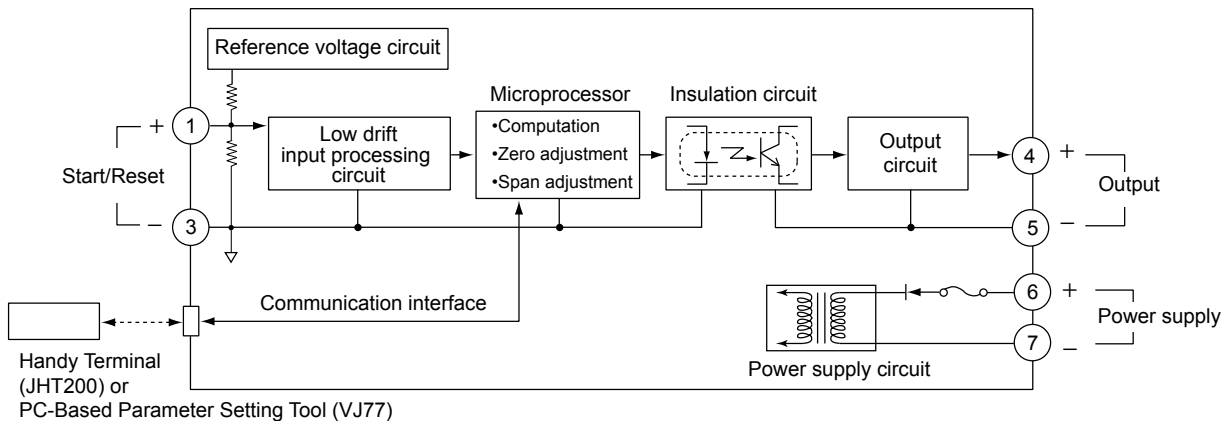
S: FX2□-MA; Moving average time setting volume
 FX2□-DT; Dead time setting volume
 FX2□-VC; Velocity computation time setting volume
 FX2□-LG, -LE; Time constant setting volume
 FX2□-VL; Velocity limit value setting volume

Block Diagrams

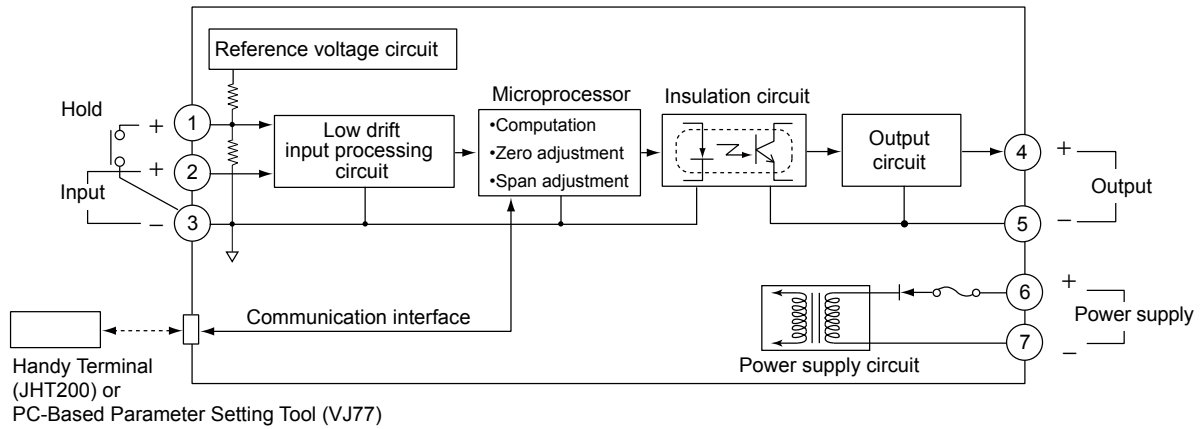
FX2□ -MA, -DT, -VC, -LG, -LE, -VL



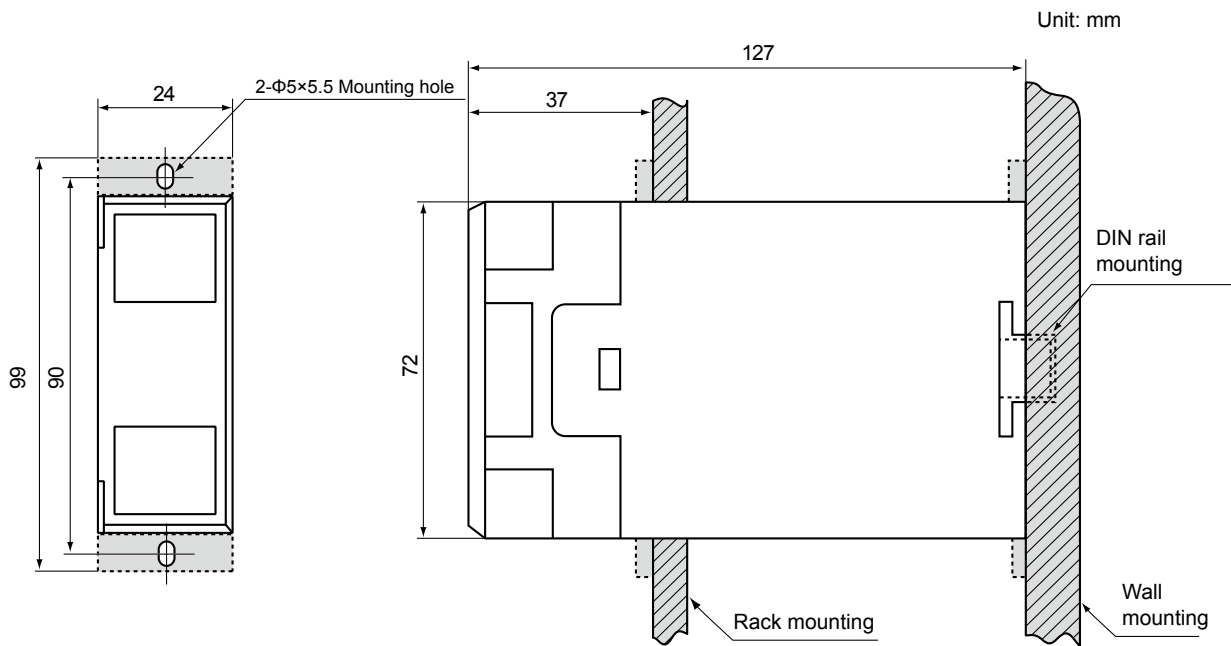
FX2□ -PS



● FX2□ -PH, -BH, -AM, -FP



■ External Dimensions

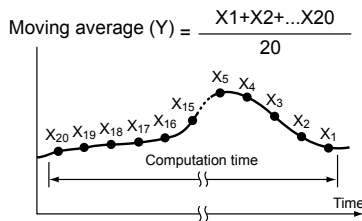


■ Functions

• FX2□-MA Moving Average Unit

This computing unit outputs the average of 20 input data (X) sampled at intervals of one-twentieth of the moving-average time (L). At the next sampling, the unit discards the oldest data and outputs the average of the 20 data, repeating the same operation. The output between samplings is smoothed out by interpolation.

<Example>



Setting range of moving average time:
0 to 1000 sec. (0 to 1 V) with 4 significant digits, minimum unit is 1 sec.
Moving average time can be set by the volume of front panel and monitored by check terminal.
Accuracy of moving average and time constant setting: (±5.0% of set value) ± 5.0 sec.

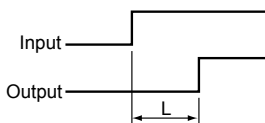
• FX2□-DT Dead Time Unit

This computing unit stores the input values (X) sampled at intervals of one-twentieth of the dead time (L) into 20 buffers and outputs data (Y) by orderly shifting them after the dead time has elapsed. The output between samplings is smoothed by interpolation.

$$Y = \frac{e^{-Ls}}{1+T_s} X$$

X: Input, L: Dead time
Y: Output, T: Time constant

<Example: 0% → 100% step input>



Setting range of dead time:
0 to 1000 sec. (0 to 1 V) with 4 significant digits, minimum unit is 1 sec.
Dead time can be set by the volume of front panel and monitored by check terminal.
Accuracy of dead time and time constant setting: (±5.0% of set value) ± 5.0 sec.

• FX2□-VC Velocity Unit

This computing unit calculates the input velocity by subtracting the input of the last velocity computation (X_L) from the present input (X). The unit then adds a 50% bias to one-half of the obtained velocity and outputs the result (Y).

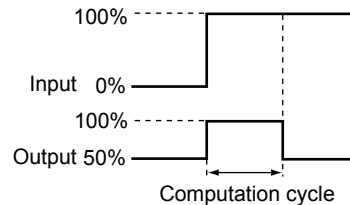
The output obtained is as follows:
When there is no change in input: 50%
When the input has increased: 50% or

more (100% when X-X_L= 100%)
When the input has decreased: 50% or less (0% when X-X_L= -100%)

$$Y = \frac{X - X_L}{2} + 50\%$$

X: Present Input
X_L: Input of the last velocity computation
Y: Output

<Example>



Setting range of velocity computation time:
0 to 1000 sec. (0 to 1 V) with 4 significant digits, minimum unit is 1 sec.
Velocity computation time can be set by the volume of front panel and monitored by check terminal.
Accuracy of velocity computation and time constant setting: (±5.0% of set value) ± 5.0 sec.

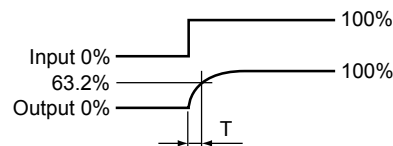
• FX2□-LG First Order Lag Unit

This computing unit provides a first order lag computation on input (X) with a time constant (T) and outputs the result (Y).

$$Y = \frac{1}{1+T_s} X$$

X: Input, T_s: Time constant, Y: Output

<Example: 0% → 100% step input>



Setting range of time constant: 1.0 to 100.0 sec. (0.010 to 1.000 V); minimum unit is 0.1 sec.
Time constant can be set by the volume of front panel and monitored by check terminal.
Accuracy of time constant setting: (±5.0% of set value) ± 1.0 sec.

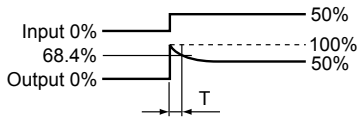
• **FX2□-LE First Order Lead Unit**

This computing unit provides a first order lead computation on input (X) with a time constant (T) and outputs the result (Y).

$$Y = \left(1 + \frac{T_s}{1+T_s} \right) X$$

X: Input, T_s: Time constant, Y: Output

<Example: 0% → 50% step input>



Setting range of time constant: 1.0 to 100.0 sec. (0.010 to 1.000 V); minimum unit is 0.1 sec.

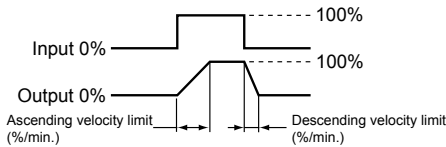
Time constant can be set by the volume of front panel and monitored by check terminal.

Accuracy of time constant setting: (±5.0% of set value) ±1.0 sec.

• **FX2□-VL Velocity Limiter**

This computing unit limits the input (X) velocity at the ascending velocity limit for a positive change, at the descending velocity limit for a negative change, and outputs the limited value (Y). When the input velocity (slope) is not more than the limit, the unit outputs the input as it is.

<Example: 0% → 100% → 0% step input>



Setting range of velocity limit: 0.1 to 600.0%/min.; minimum unit is 0.1 %/min. Setting the limit at 700.0%/min. or above does not limit the input, so the unit simply outputs the input as it is (Open limit function).

Velocity limit value can be set by the volume of front panel and monitored by check terminal. "0 to 1000%/min." corresponds to "0.010 to 1.000 V".

Setting accuracy of velocity limit: (±5.0% of set value) ± 5%/min.

• **FX2□-PH Peak Holder**

This computing unit outputs the current signal or voltage signal (Y) corresponding to the peak value when receiving a voltage signal input from various converters and opening the hold-command input (contact input). If the contact input is closed, it outputs the value corresponding to the input value.

• **FX2□-BH Bottom Holder**

This computing unit outputs the current signal or voltage signal (Y) corresponding to the bottom value when receiving a voltage signal input from various converters and opening the hold-command input (contact input).

If the contact input is closed, it outputs the value corresponding to the input value.

• **FX2□-AM Analog Memory**

This computing unit holds the output signal (Y) at the moment when receiving a voltage signal input from various converters and opening the hold-command input (contact input). If the contact input is closed, it outputs the value corresponding to the input value.

• **FX2□-PS Program Setter**

This computing unit starts the program when opening start/reset input (contact input), and outputs the isolated current or voltage signal (Y) internally generated. When closing the start/reset input, the program is reset. The output signal changes with the time lapse corresponding to the 11 time table breakpoints.

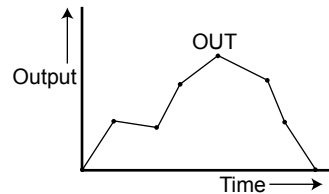
Setting conditions of time table:
 0.0 sec. ≤ (t₀ to t₁₀) ≤ 7984 sec.,
 -10.0% ≤ (Y₀ to Y₁₀) ≤ 110.0%
 t₀ < t₁ < t₂ < t₃ < t₄ < t₅ < t₆ < t₇ < t₈ < t₉ < t₁₀

Time breakpoints: t₀ to t₁₀

Output breakpoints: Y₀ to Y₁₀

Setting resolution: Time; 8 sec., Outputs; 0.1%

<Example>



Ordering information

• Time table: Write and specify all data of t₀ to t₁₀ and Y₀ to Y₁₀ on the work sheet below.

<Work Sheet>

Model and suffix code: _____

Time (sec.)		Output (%)	
t0		Y0	
t1		Y1	
t2		Y2	
t3		Y3	
t4		Y4	
t5		Y5	
t6		Y6	
t7		Y7	
t8		Y8	
t9		Y9	
t10		Y10	

• **FX2□-FP Programmable Unit**

Receiving a voltage signal input from various converters, this computing unit performs various computations and outputs the isolated current or voltage signal.