General Specifications

GS 77J04X12-01E

Model MXD Universal Computing Unit (1-input, Isolated 1-output Type) <with Contact I/O>

JUXTV

General

This plug-in type universal computing unit receives DC current or DC voltage signals, applies various computing functions to them, and then converts them into isolated DC current or DC voltage signals.

- The optional Parameter Setting Tool (VJ77) or Handy Terminal (JHT200) can be used for the setting changes of various parameters such as computing functions or input/output ranges, the setting changes of programs, and the test outputs.
- The operation indicating lamp shows the operation status, abnormalities in a setting etc.
- Without a setting tool such as Handy Terminal etc., outputs can be adjusted and forced contact outputs can be turned on or off using the switches on the front panel.

Model and Suffix Codes

	<u>MXD</u> -□□□N-□ *B/□
Model —	
Function ———	
A: Free program	
L: Analog memory	
M: Peak holder	
N: Bottom holder	
P: Program setter (No	te 1)
Q: Integrated pulse ou	tput
Input signal ———	
A: 0 to 50 mA DC	Span is 1 mA or more
B: 0 to 10 mA DC	Span is 0.1 mA or more
1: -10 to +10 V DC	Span is 0.1 V or more
2: -2 to +2 V DC	Span is 10 mV or more
N: No analog input (N	ote 1)
Output signal	
A: 0 to 20 mA DC	Span is 2 mA or more
B: 0 to 5 mA DC	Span is 1 mA or more
1: 0 to 10 V DC	Span is 0.1 V or more
2: 0 to 100 mV DC	Span is 10 mV or more
3: -10 to +10 V DC	Span is 0.2 V or more
4: -100 to +100 mV DC	Span is 20 mV or more
Power supply	
1: 15-40 V DC (Opera	ting range: 12 to 48 V DC)
2. 100-240 V AC (Opera	erating range: 85 to 264 V AC)
2. 100 240 V AO (Opt	
Optional specification	

/R250: With 250 Ω receiving resistor

Note 1: The input signal suffix code "N" is fixed when the Program setter is selected. However, the analog input is adjusted and inspected by 1 to 5 V DC of the input signal suffix code "1" before shipment.



Ordering Information

Specify the following when ordering. Model and suffix codes: e.g. MXD-AAAN-2*B Input range: e.g. 4 to 20 mA DC Output range: e.g. 4 to 20 mA DC If the constants for each computing function are specified with the order, the specified values will be assigned before shipment. (Refer to "Functions.")

Input/Output Specifications

Input signal: 1 point of DC current or DC voltage signal; 1 point of contact input

Input setting range:

Input signal suffix code	Setting range	
A	0 to 50 mA DC Span is 1 mA or more*	
В	0 to 10 mA DC Span is 0.1 mA or more	
1	± 10 V DC Span is 0.1 V or more	
2	±2 V DC Span is 10 mV or more	

*: Setting range is 0 to 35 mA DC for the optional specification "/R250."

Input resistance:

Current signal: 100 Ω (external receiving resistor) 250 Ω for the optional specification "/R250" Voltage signal: 1 M Ω for the suffix code "1" (800 k Ω during power off) 1 M Ω for the suffix code "2" (10 k Ω during power off) Permissible applicable input: Current input: 70 mA DC or less for input resistance of 100 Ω 40 mA DC or less for input resistance of 250 Ω Voltage input: ±15 V DC or less Contact input: ON: 200 Ω or less OFF: 100 k Ω or more Contact rating: 5 V DC, 0.1 mA



Output signal: 1 point of DC current or DC voltage signal; 1 point of contact output Analog output setting range:

Output signal suffix code	Setting range	
A	0 to 20 mA DC Span is 2 mA or more	
В	0 to 5 mA DC Span is 1 mA or more	
1	0 to 10 V DC Span is 0.1 V or more	
2	0 to 100 mV DC Span is 10 mV or more	
3	± 10 V DC Span is 0.2 V or more	
4	$\pm 100 \text{ mV DC}$ Span is 20 mV or more	

Analog output permissible load resistance:

Output range	Permissible load resistance
0 to 20 mA DC	750 Ω or less
0 to 5 mA DC	3000 Ω or less
0 to 5 V DC	2 kΩ or more
0 to 10 V DC	10 k Ω or more (when 100% output exceeds 5 V
0 to 100 mV DC	250 kΩ or more
-10 to +10 V DC	10 kΩ or more
-100 to +100 mV DC	250 k Ω or more

Contact output: Open collector Contact capacity: 30 V DC, 200 mA Input adjustment range:

 $\pm 1\%$ of span or more (zero/span adjustments) Output adjustment range:

±5% of span or more (zero/span adjustments)

Standard Performance

Accuracy rating: $\pm 0.1\%$ of span

- However, the accuracy is not guaranteed for output levels less than 0.5% of the span of a 0 to X mA output range type. The accuracy is limited according to the input/output range settings.
 - Accuracy Calculation

Accuracy = Input accuracy + Output accuracy (%) Accuracy is obtained by totalizing the expression (1) for input accuracy and the expression (2) for output accuracy. However, $\pm 0.05\%$ is applied if a value obtained from the expression (1) or (2) is less than $\pm 0.05\%$.

For current input, add the error of receiving resistor $\pm 0.1\%$ to the input accuracy.

Input accuracy = $\pm 0.05\% \times a/b \cdots$ expression (1)

Input signal	Input range	Accuracy calcu	lation condition
suffix code	(Range converted into voltage)	а	b
А	Outside of ±2.5 V DC	4 (\)	
B*1	and within $\pm 10 \text{ V DC}$	4 (V)	
1	±2.5 V DC	1 (V)	
	Outside of ± 0.5 V DC	0 0 0 0	Innut snan
	and within $\pm 2 \text{ V DC}$	0.0 (V)	(Span
B *2	Outside of ±100 mV DC	02(1/)	voltage)
2	and within ± 0.5 V DC	0.2 (V)	
	Outside of ±20 mV DC	40 (mV)	
	and within $\pm 100 \text{ mV DC}$	40 (IIIV)	
	±20 mV DC	10 (mV)	

Note: When input signal is current, the values converted into voltage by the receiving resistor are applied to the input range and input span. *1: For B ("/250Ω").

*2: For B (receiving resistor 100Ω).

Output

$\Delta u = \pm 0.05 / 0 \wedge a / 0 \cdots e A / 0 = 2000 / 0 / 0 / 0 = 0.000 / 0 / 0 / 0 = 0.000 / 0 / 0 / 0 = 0.000 / 0 / 0 / 0 / 0 / 0 / 0 / 0 / 0 /$	Output accuracy	$t = \pm 0.05\%$	\times a/b …	expression	(2)
--	-----------------	------------------	----------------	------------	-----

signal	Output range	Accuracy calcu	lation condition
suffix code	Output range	а	b
Α	0 to 20 mA DC	10 (mA)	
В	0 to 5 mA DC	2.5 (mA)	
	0 to 2.5 V DC	1 (V)	
1	Outside of 0 to 2.5 V DC	4 (\)	
	and within 0 to 10 V DC	4(V)	
	0 to 25 mV DC	10 (mV)	
2	Outside of 0 to 25 mV DC	40 (m)()	Output
	and within 0 to100 mV DC	40 (IIIV)	span
	±2.5 V DC	1 (V)	
3	Outside of ±2.5 V DC	4 (\)	
	and within ± 10 V DC	4(V)	
	±25 mV DC	20(mV)	
4	Outside of ±25 mV DC	40 (m)()	
	and within ±100 mV DC	40 (MV)	

[Example of accuracy calculation]

Input range: 0 to 20 mA DC

Receiving resistor: 250 Ω

(0 to 5 V DC when converted into voltage)

Output range: 20 to 40 mV DC

Input accuracy =

 $\pm 0.05\% \times \frac{4}{5} = \pm 0.04\% \longrightarrow \pm 0.05\%$ (since it is less than $\pm 0.05\%$)

Add $\pm 0.1\%$ (error of receiving resistor) to the above.

Then, Input accuracy = $\pm 0.15\%$

Output accuracy = $\pm 0.05\% \times \frac{40}{20} = \pm 0.1\%$ Therefore, Accuracy = $\pm 0.25\%$

Computation cycle: 100 ms (For the function suffix code "A", selectable from 50 ms, 100 ms and 200 ms.)

Response speed: 500 ms, 63% response (10 to 90%) Effect of power supply voltage fluctuations:

- Equal to or less than whichever is greater, ±0.1% of span or accuracy for the fluctuation within the operating range of
- each power supply voltage specification.
- Effect of ambient temperature change:
 - $\pm 0.15\%$ of span or less for a temperature change of 10°C.

All Rights Reserved. Copyright © 2005, Yokogawa Electric Corporation

GS 77J04X12-01E 2nd Edition Nov. 30, 2005-00

Power Supply and Isolation

Power supply rated voltage: 15-40 V DC \pm or 100-240 V AC \sim 50/60 Hz Power supply input voltage: 15-40 V DC \pm (\pm 20%) or 100-240 V AC \sim (-15, +10%) 50/60 Hz Power consumption: 24 V DC 2.3 W 100 V AC 4.6 VA, 200 V AC 6.4 VA Insulation resistance: 100 M Ω or more at 500 V DC between input, analog output, contact output, power supply, and grounding terminals mutually. (Analog input and contact input terminals are not isolated.)

2000 V AC for 1 minute between input, (analog output, contact output), power supply and grounding terminals mutually. 1000 V AC for 1 minute between analog output and contact output terminals.

Environmental Conditions

Operating temperature range: 0 to 50°C

- Operating humidity range: 5 to 90% RH (no condensation)
- Operating conditions: Avoid installation in such environments as corrosive gas like sulfide hydrogen, dust, sea breeze and direct sunlight . Installation altitude: 2000 m or less above

sea level.

Mounting and Dimensions

Material: Main unit : ABS resin (black), UL94 V-0 ABS resin + polycarbonate resin (black), UL94 V-0 PBT resin, including glass fiber (black), UL94 V-0

Socket: Modified polyphenylene oxide resin, including glass fiber (black), UL94 V-1

Mounting: Wall or DIN rail mounting (When mounting the units close together, leave a space of at least 5 mm between them.)

Connection: M3.5 screw terminals

External dimensions:

Weight:

86.5 (H) \times 51 (W) \times 133 (D) mm (including a socket) Main unit: approx. 200 g

Socket: approx. 80 g

Accessories

Spacer: One (for DIN rail mounting) Range label: One

Receiving resistor: One (for current input) * When the optional specification "/R250" is specified, the 250 Ω receiving resistor is attached. When the optional specification "/R250" is not specified, the 100 Ω receiving resistor is attached.

Front Panel

Output can be adjusted using the selection switch and adjustment switch.



Position of selection switch	Item to be adjusted	
0	No function	
1	Output zero adjustment	
2	Output span adjustment	
3	No function	
4	No function	
5	No function	
6	No function	
7	Forced contact output ON/OFF	

Terminal Assignments



1	ANALOG OUTPUT	(+)
2	ANALOG OUTPUT	(-)
3	CONTACT INPUT	(+)
4	CONTACT INPUT	(-)
5	ANALOG INPUT	(+)
6	ANALOG INPUT	(-)
7	SUPPLY	(L+)
8	SUPPLY	(N–)
9	GND	(GND)
10	CONTACT OUTPUT	(+)
11	CONTACT OUTPUT	(-)

Block Diagram



External Dimensions



*1: The receiving resistor is supplied for the input signal suffix code "A" or "B."

All Rights Reserved. Copyright © 2005, Yokogawa Electric Corporation



Functions

MXD-A Free Program

This computing unit is used to meet individual applications by programming the available commands.

Initial Setting

• Program: Outputs the value that corresponds to the input.

MXD-L Analog Memory

This computing unit carries out the analog output (Y) of the value that corresponds to the analog input (X) as an ordinary computing unit as long as the contact input (DI) is ON (SHORT).

When the contact input is OFF (OPEN), the unit holds the analog output at that time (Y) all the time.

• MXD-M Peak Holder

This computing unit carries out the analog output (Y) of the value that corresponds to the analog input (X) as an ordinary computing unit as long as the contact input (DI) is ON (SHORT).

When the contact input is OFF (OPEN), the unit outputs the analog signal (Y) that corresponds to the peak value of subsequent analog input (X).

MXD-P Program Setter

This computing unit resets the program, outputs and holds the starting value of the time table when the contact input (DI) is ON (SHORT). When the contact input is OFF (OPEN), the unit starts the program and outputs the analog signal (Y) according to the time table. When the program ends, the unit outputs the end value of time table and holds it until the next reset command (contact input in ON (SHORT) status) enters.

Setting conditions of time table:

 $0.0 \text{ second } (0.0\%) \leq (t_0 \text{ to } t_{20}) \leq 320000 \text{ seconds}$ (32000%) Number of significant digits: 4 Minimum unit: 1 second

 $t_0 < t_1 < t_2 < \cdots < t_{20}$

 $-6\% \le (Y_0 \text{ to } Y_{20}) \le 106\%$

Minimum unit: 0.1%.

Ordering Information and Initial Settings

- Time table (21 breakpoints at maximum): Data that outputs 0 to 100% during 0 to 800 seconds.
- Time: 0, 40, 80, 120, 160, 200, 240, 280, 320 … 800 seconds

Output: 0, 5, 10, 15, 20, 25, 30, 35, 40 100% to to t₂₀

Number of significant digits: 4 (e.g. 123456 seconds unacceptable, 1234 seconds acceptable) Y_0 to Y_{20}

Minimum unit: 0.1% (e.g. 12.34% unacceptable, 12.3% acceptable)

• Number of line segments of time tables: 20

• MXD-N Bottom Holder

This computing unit carries out the analog output (Y) of the value that corresponds to the analog input (X) as an ordinary computing unit as long as the contact input (DI) is ON (SHORT).

When the contact input is OFF (OPEN), the unit outputs the analog signal (Y) that corresponds to the bottom value of subsequent analog input (X).

<Work Sheet>

	Time (%)		Output (%)
to		Y ₀	
t1		Y1	
t2		Y ₂	
tз		Y3	
t4		Y 4	
t5		Y 5	
t ₆		Y ₆	
t7		Y 7	
t8		Y8	
t9		Y9	
t 10		Y 10	
t11		Y11	
t 12		Y12	
t 13		Y13	
t 14		Y14	
t 15		Y15	
t 16		Y16	
t 17		Y17	
t 18		Y18	
t 19		Y 19	
t20		Y ₂₀	

MXD-Q Integrated Pulse Output

This computing unit outputs the integrated pulse according to the following expression.

 $\begin{array}{ccc} \text{DO}=\text{K1}\cdot\text{X}\cdot\text{10} \\ \text{where} & \text{DO: Integrated pulse output (pulse/hour)} \\ \text{X: Input signal (%)} \\ \text{K1: Integration factor (no unit)} \\ \text{Pulse output is ON pulse of 100 ms. However, the} \\ \text{maximum number of output pulse is 5 pulses / second.} \\ \text{Also, the analog signal is always output as monitor of} \\ \text{input signal (X).} \end{array}$

Setting range of integration factor: 0.01 to 18 (1% to 1800%) Number of significant digits: 4 Minimum unit: 0.00001 Computation accuracy: 1000±2 (pulse/hour) (How-

ever, when K1 = 1, X = 100%.)

Ordering Information

• Integration factor: e.g. 1.0 Number of significant digits: 4 (e.g. 1.23456 unacceptable; 12.34, 1.234, 0.01234 acceptable)

• The information covered in this document is subject to change without notice for reasons of improvements in quality and/or performance.