General Specifications

Model MH5D
Isolator
(2-output, Free Range Type)

JUXTA

GS 77J04H05-02E

■ General

The MH5D is a plug-in type isolator that converts DC current or DC voltage signals into isolated DC current or DC voltage signals.

- I/O range setting, selection of square root extractor and breakpoint linearization (breakpoint setting), I/O adjustment, I/O monitoring, and loop back test can be made using the optional Parameter Setting Tool (VJ77) or Handy Terminal (JHT200).
- The operation indicating lamp shows the operation status, abnormalities in a setting etc.
- I/O adjustment can be made using the switches on the front panel of the MH5D without a setting tool such as Handy Terminal.

■ Model and Suffix Codes

MH5D -02 □-□□□□/□

Model

Output
2: 2 points

Power supply
1: 15-40 V DC (Operating range: 12 to 48 V)
6: 100-240 V AC/DC (Operating range: 85 to 264 V)

Input signal
A: –20 to +20 mA DC (with 250 Ω receiving resistor)(Note)
B: –50 to +50 mA DC (with 100 Ω receiving resistor)(Note)
1: –10 to +10 V DC
2: –2 to +2 V DC
Z: (Custom order)
Customized current signals or voltage signals

Output-1 signal

A: 0 to 20 mA DC	Span is 5 mA or more
B: 0 to 5 mA DC	Span is 1 mA or more
1: –10 to +10 V DC	Span is 0.1 V or more
2: –100 to +100 mV DC	Span is 10 mV or more

Z: (Custom order)
Customized current signals or voltage signals

Output-2 signal

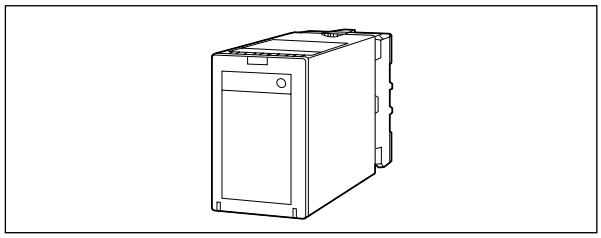
A: 4 to 20 mA DC	1: 0 to 10 mV DC
B: 2 to 10 mA DC	2: 0 to 100 mV DC
C: 1 to 5 mA DC	3: 0 to 1 V DC
D: 0 to 20 mA DC	4: 0 to 10 V DC
E: 0 to 16 mA DC	5: 0 to 5 V DC
F: 0 to 10 mA DC	6: 1 to 5 V DC
G: 0 to 1 mA DC	7: –10 to +10 V DC

Z: (Custom order)
Customized current signals or voltage signals

Breakpoint linearization
0: Not available
1: Available

Optional specification
/SN: Without socket
/R100: With 100 Ω receiving resistor(Note)
/R250: With 250 Ω receiving resistor(Note)

Note: Specify "/R100" or "/R250" when using different receiving resistor from the receiving resistor specified in the input signal suffix code "A" or "B".



■ Ordering Information

Specify the following when ordering.
- Model and suffix codes: e.g. MH5D-026-AAA0
- Input range: e.g. 4 to 20 mA DC
- Output-1 range: e.g. 4 to 20 mA DC

Specify a lowcut point when "with square root extractor" is required: e.g. Lowcut point 0.4%
The isolator will be shipped with a lowcut point of 0.6% if no specification of lowcut point.
Specify breakpoints in Work Sheet when linearization is required.
The isolator will be shipped with a specified resistor if the input signal is current input and a receiving resistor of the optional specification is specified.

■ Input/Output Specifications

Input signal: DC current or DC voltage signal
Input signal setting range:

Input signal suffix code	Setting range
A	±20 mA DC Span is 1 mA or more
B	±50 mA DC Span is 5 mA or more (±35 mA DC Span is 2 mA or more for the optional specification "/R250")
1	±10 V DC Span is 1 V or more
2	±2 V DC Span is 3 mV or more

Input resistance:
Current input:
250 Ω for the suffix code "A"
100 Ω for the suffix code "B"
Note: A specified resistor is applied if a receiving resistor of the optional specification is specified.
Voltage input:
1 MΩ for the suffix code "1"
(800 kΩ during power off)
1 MΩ for the suffix code "2"
(10 kΩ during power off)
Maximum allowable input:
Current input:
40 mA DC or less for 250 Ω receiving resistor.
70 mA DC or less for 100 Ω receiving resistor.
Voltage input: ±15 V DC or less

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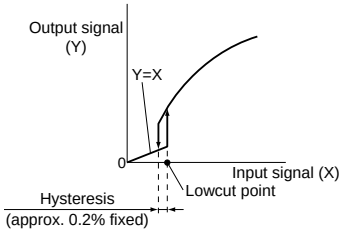
Square root extractor: Outputted against the result of extracting square root of input.

$$Y=\left(\sqrt{\frac{X-(\text{input 0 \% value})}{\text{input span}}}\right)\times(\text{output span})+(\text{output 0 \% value})$$

Lowcut point setting range: 0.3 to 100% of input, setting available by 0.1% notch

Output characteristic: Output for lowcut point or less is cramped with straight line proportional to input.



Output signal: 2 points of DC current or DC voltage signals

Output-1 signal setting range:

Output-1 signal suffix code	Setting range
A	0 to 20 mA DC Span is 5 mA or more
B	0 to 5 mA DC Span is 1 mA or more
1	±10 V DC Span is 0.1 V or more
2	±100 mV DC Span is 10 mV or more

Allowable load resistance:

Voltage output: (Common to output-1 and output-2)
2 kΩ or more for ±5 V DC
10 kΩ or more for ±10 V DC
250 kΩ or more for ±100 mV DC

Current output:
Output-1: 15 (V)/max. output (A) (Ω) or less
Output-2: 7 (V)/max. output (A) (Ω) or less

Linearization:

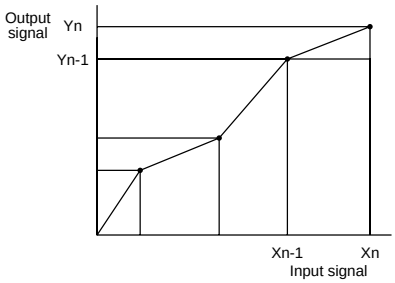
Breakpoint: Up to 32 points (Set a relationship between input and output with % value over the span.)

Allowable setting range of breakpoint:
–6 to +106% (both input and output)

- With 4 significant digits; can be set to the second place of a decimal point.
- Set breakpoints according to the following.

For input: $-6.0\% \leqq X_0 < X_1 < X_2 \cdots X_{n-1} < X_n \leqq 106.0\%$

For output: $-6.0\% \leqq Y_0$ to $Y_n < 106.0\%$



Adjustment range: (Common to output-1 and output-2)
Input adjustment: ±1% of span or more (Zero/Span)
Output adjustment: ±5% of span or more (Zero/Span)

■ Standard Performance

Accuracy rating: ±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.
For square root extractor input, ±1% of span when the input is 2% or less.

The accuracy is limited according to the input/output range settings.

- Accuracy Calculation

Accuracy = Input accuracy + Output accuracy (%)
(Output accuracy for output-2 is ±0.05%.)
Accuracy is obtained by totalizing the expression (1) for input accuracy and the expression (2) for output accuracy. However, ±0.05% is applied if a value obtained from the expression (1) or (2) is less than ±0.05%. For current input, add the error of receiving resistor ±0.1% to the input accuracy.

Input accuracy = ±0.05% × a/b ··· expression (1)

Input signal suffix code		Accuracy calculation condition	
	Input range (Range converted into voltage)	a	b
A*	±2.5 V DC	1(V)	Input span (Span converted into voltage)
B* 1	Outside of ±2.5 V DC and within ±10 V DC	4(V)	
2	±20 mV DC	10(mV)	
	Outside of ±20 mV DC and within ±100 mV DC	40(mV)	
	Outside of ±100 mV DC and within ±0.5 V DC	0.2(V)	
	Outside of ±0.5 V DC and within ±2 V DC	0.8(V)	

*: When input signal is current, the values converted into voltage by the receiving resistor are applied to the input range and input span.

Output-1 accuracy = ±0.05% × a/b ··· expression (2)

Output-1 signal suffix code		Accuracy calculation condition	
	Output range	a	b
A	0 to 20 mA DC	10(mA)	Output span
B	0 to 5 mA DC	2.5(mA)	
1	±2.5 V DC	1(V)	
	Outside of ±2.5 V DC and within ±10 V DC	4(V)	
2	±25 mV DC	10(mV)	
	Outside of ±25 mV DC and within ±100 mV DC	40(mV)	

If 1 or more is set for the line segment gain of linearization, multiply the input/output accuracy by the value of line segment gain.
Line segment gain (slope) is the maximum value calculated from the following expression.

$$\text{Line segment gain} = \frac{Y_n - Y_{n-1}}{X_n - X_{n-1}}$$

Response speed: 150 ms, 63% response (10 to 90%)

Effect of power supply voltage fluctuations:
±0.1% of span or less for the fluctuation within the operating range of each power supply voltage specification.

Effect of ambient temperature change:
±0.15% of span or less for a temperature change of 10°C.

■ Power Supply and Isolation

Power supply rated voltage:
15-40 V DC ⎓ or
100-240 V AC/DC ≂ 50/60 Hz
Power supply input voltage:
15-40 V DC ⎓ (±20%) or
100-240 V AC/DC ≂ (–15, +20%) 50/60 Hz
Power consumption:
24 V DC 2.3 W, 110 V DC 2.2 W
100 V AC 4.6 VA, 200 V AC 6.4 VA
Insulation resistance:
100 MΩ at 500 V DC between input, output, power supply, and grounding terminals mutually.
Withstand voltage:
2000 V AC for 1 minute between input, output, power supply and grounding terminals mutually.
1000 V AC for 1 minute between output-1 and output-2 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

Construction: Plug-in type
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
Connection: M3.5 screw terminals
External dimensions: 86.5 (H)×51 (W)×123 (D) mm (including a socket)
Weight: Main unit: approx. 200 g
Socket: approx. 80 g

■ Accessories

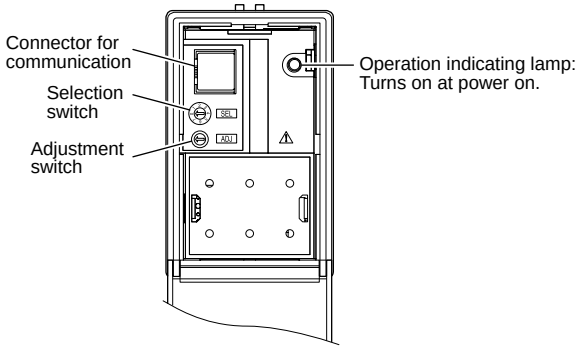
Spacer: One (for DIN rail mounting)
Range label: One
Receiving resistor: One (for current input)

■ Customized Signal Specifications

Output-2	Current signal	Voltage signal
Output range (DC)	0 to 20 mA	–10 to +10 V
Span (DC)	1 to 20 mA	10 mV to 20 V

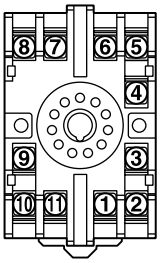
■ Front Panel

Input/output can be adjusted using the selection switch and adjustment switch.



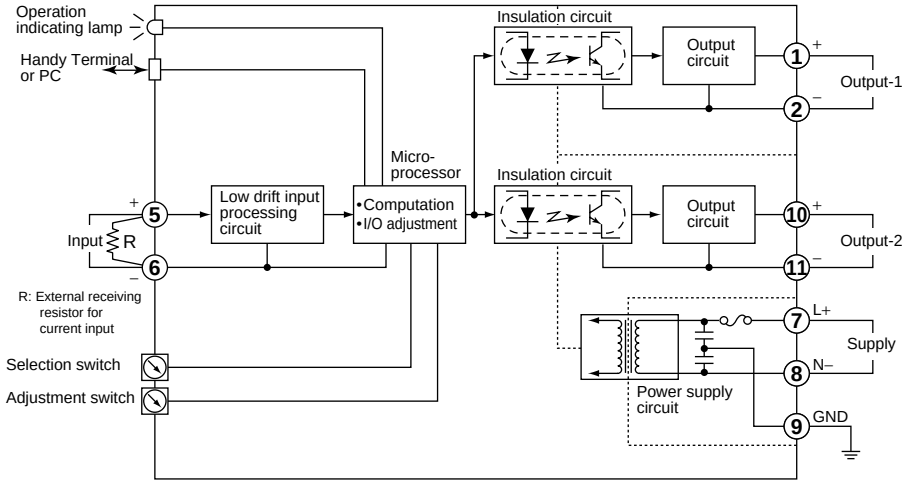
Position of selection switch	Item to be adjusted
0	No function
1	Output-1 zero adjustment
2	Output-1 span adjustment
3	Output-2 zero adjustment
4	Output-2 span adjustment
5	Input zero adjustment
6	Input span adjustment

■ Terminal Assignments



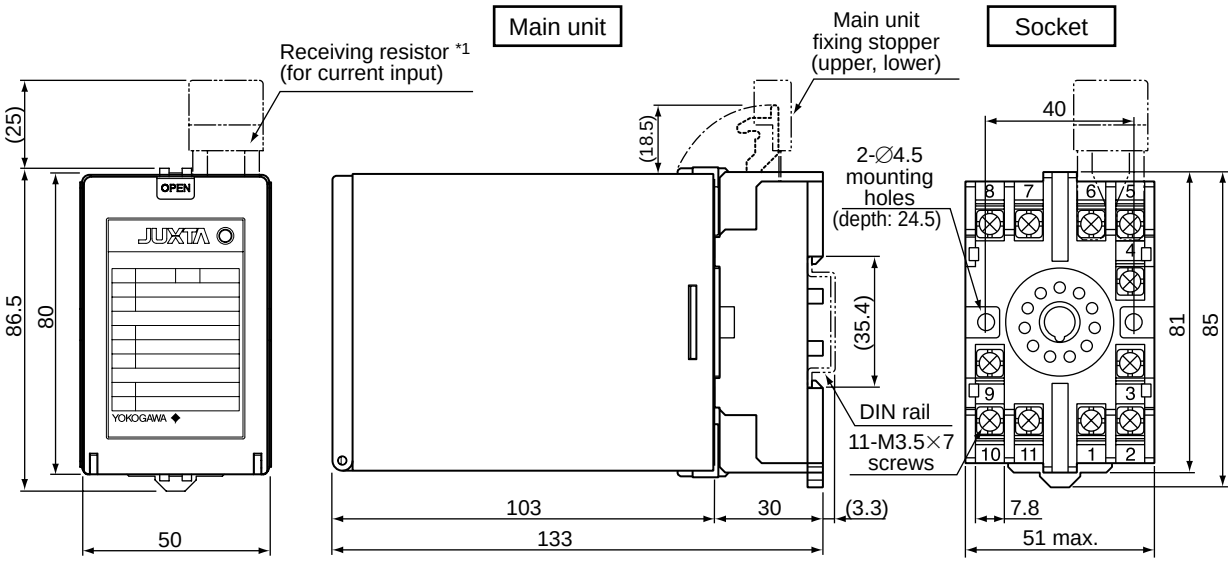
1	OUTPUT-1	(+)
2	OUTPUT-1	(–)
3	N.C.	
4	N.C.	
5	INPUT	(+)
6	INPUT	(–)
7	SUPPLY	(L+)
8	SUPPLY	(N–)
9	GND	(GND)
10	OUTPUT-2	(+)
11	OUTPUT-2	(–)

■ Block Diagrams



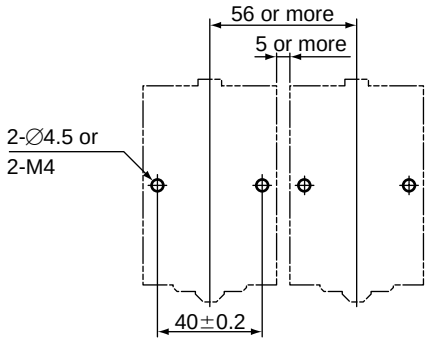
■ External Dimensions

Unit: mm



*1: "250 Ω" or "100 Ω" is attached for current input.

<Mounting Dimensions>



Note:
- When mounting the units close together, leave a space of at least 5mm between them.
- Use the supplied spacer to keep a space of 5 mm for DIN rail mounting.

■ Work Sheet

Model and Suffix Codes

Number of breakpoints _____

Write at least 2 points for input and output breakpoints data.

Input (%)		Output (%)		Input (%)		Output (%)	
X_0		Y_0		X_{16}		Y_{16}	
X_1		Y_1		X_{17}		Y_{17}	
X_2		Y_2		X_{18}		Y_{18}	
X_3		Y_3		X_{19}		Y_{19}	
X_4		Y_4		X_{20}		Y_{20}	
X_5		Y_5		X_{21}		Y_{21}	
X_6		Y_6		X_{22}		Y_{22}	
X_7		Y_7		X_{23}		Y_{23}	
X_8		Y_8		X_{24}		Y_{24}	
X_9		Y_9		X_{25}		Y_{25}	
X_{10}		Y_{10}		X_{26}		Y_{26}	
X_{11}		Y_{11}		X_{27}		Y_{27}	
X_{12}		Y_{12}		X_{28}		Y_{28}	
X_{13}		Y_{13}		X_{29}		Y_{29}	
X_{14}		Y_{14}		X_{30}		Y_{30}	
X_{15}		Y_{15}		X_{31}		Y_{31}	

(Specification conditions)

Input conditions: $-6.0\% \leqq X_0 < X_1 < X_2 < \cdots\cdots X_{n-1} < X_n \leqq 106.0\%$

Output conditions: $-6.0\% \leqq$ (Y_0 to Y_n) $\leqq 106.0\%$