General Specifications

Model MU5D
Universal Temperature Converter
(2-output, Free Range Type)

JUXTA

GS 77J04U05-02E

■ General

The MU5D is a plug-in type universal temperature converter that converts input signal (thermocouple, RTD or mV signal) into isolated DC current or DC voltage signals.

- Selection of input type(thermocouple, RTD or mV signal), I/O range setting, burnout setting, output 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.
- Output adjustment, wiring resistance correction, and ON/OFF of RJC can be made using the switches on the front panel of the MU5D without a setting tool such as Handy Terminal.
- For the Fahrenheit display, specify the option "/DF".

■ Model and Suffix Codes

MU5D -02 □-□□□ 0/□/□

Model

Output
2: 2 outputs

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

Input signal
U: Thermocouple, RTD, mV
Z: (Custom order)
Customized thermocouple or RTD

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

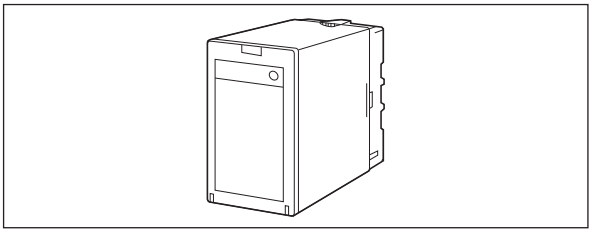
Output-2 signal

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
* See " Customized Signal Specifications."

Optional specification
/SN: Without socket
/RJCN: Without RJC sensor

Optional specification
/DF: Fahrenheit display function



■ Ordering Information

Specify the following when ordering.
- Model and suffix codes: e.g. MU5D-026-UAA0
- Input type: e.g. Pt100 (ITS-90)
- Input range: e.g. 0 to 100 °C
- Output-1 range: e.g. 4 to 20 mA DC
- Burnout: e.g. Up

The universal temperature converter will be shipped with an input type of Pt100 (ITS-90) and an input range of 0 to 100°C if no specification of input type and input range.

■ Input/Output Specifications

Input signal:
Thermocouple: Type K, T, E, J, R, S, B, N (ITS-90: JIS'97), W3(Note1), W5(Note2)
(Note1)W97Re3-W75Re25
(Tungsten97% Rhenium 3% - Tungsten75% Rhenium25%)
The abbreviation of ASTM E988 Standard.
(Note2) W95Re5-W74Re26
(Tungsten95% Rhenium 5% - Tungsten74% Rhenium 26%)
The abbreviation of ASTM E988 Standard.
RTD:
Pt100 (ITS-90: JIS'97), JPt100 (JIS'89)
Pt50 (JIS'81), Pt100 (IPTS68: JIS'89)
Pt100 (ITS-90): R_0 = 100 Ω, R_{100} /R_0 = 1.3851
JPt100 (JIS'89): R_0 = 100 Ω, R_{100} /R_0 = 1.3916
Pt100 (IPTS-68): R_0 = 100 Ω, R_{100} /R_0 = 1.3850
mV DC signal: −500 to +500 mV DC
Measuring unit:°C, K, °F(*1), mV
*1: When specify the option code "/DF".

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Input type and measuring range:

Input type (thermocouple)	Measuring range (°C)
Type K	-270 to +1372
Type T	-270 to +400
Type E	-270 to +1000
Type J	-210 to +1200
Type R	-50 to +1768
Type S	-50 to +1768
Type B	0 to +1820
Type N	-270 to +1300
Type W3	0 to +2300
Type W5	0 to +2300
Input type (RTD)	Measuring range (°C)
Pt100 (ITS-90)	-200 to +850
Pt100 (IPTS-68)	-200 to +660
JPt100 (JIS'89)	-200 to +510
Pt50 (JIS'81)	-200 to +649
Input type (mV DC)	Measuring range (mV DC)
mV	-500 to +500

Measuring span: 3 mV or more (thermocouple, mV signal) , 10°C or more (RTD)
Input resistance: 1 MΩ during power on; 10 kΩ during power off (thermocouple, mV signal)
Input external resistance:
Thermocouple, mV signal: 500 Ω or less
However, this resistance value can be added to the BARD600 internal resistance when the converter is used with BARD600.
RTD: Input span (°C) x 0.4 Ω or less / wire or 10 Ω, whichever is smaller.
However, this resistance value can be added to the BARD700 internal resistance when the converter is used with BARD700.
RTD detective current: Approx. 0.7 mA
Maximum allowable input: ±4 V DC
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: 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-1 7 (V)/max. output (A) (Ω) or less
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.
The accuracy is limited according to the input/output range settings.
For thermocouple, add the accuracy of RJC to the calculated accuracy.
• Accuracy Calculation
Accuracy = Input accuracy + Output accuracy (%)
(Output accuracy for output-2 is ±0.05%.)
[Input accuracy]
<Thermocouple>
• ±0.1% of span or ±1°C, whichever is greater when the following range is included.
Type K, E and T: Less than –200°C
Type B: 400°C to less than 600°C
Type E and J: More than 750°C
Type N: More than 1200°C
• ±0.1% of span or ±2°C, whichever is greater when the following range is included.
Type N: Less than –200°C
• Accuracy is not guaranteed for less than 400°C of Type B.
• When the measuring range is ±20 mV in thermo-electromotive force, substitute 10 for Tm of the following expression. When ±100 mV, substitute 40. An obtained value is applied as an input accuracy.
Tm/measuring span (mV) x input accuracy*
*: Any of ±0.1%, ±1°C or ±2°C.
• Type K, E, T and N: For the measured temperatures less than –200°C, add the following coefficient (Te) to the input accuracy mentioned above. An obtained value is the input accuracy.
Te [°C]=(–200 [°C] – measured temp. [°C]) / X
(X=10 for Type K, T, and E; X=5 for Type N)
• Accuracy of reference junction compensation (RJC):
Other than Type R and S: ±1°C (0 to 50°C)
Type R and S: ±2°C (0 to 50°C)
Type K, E, T and N: For the measured temperatures less than –200°C, multiply the input accuracy mentioned above by K, where K=(Thermocouple output change/°C near 0°C)/(Thermocouple output change/°C at measured temperature)

<RTD>
±0.05% of span or ±0.05°C, whichever is greater.
For Pt50 (JIS'81), ±0.1% of span or ±0.1°C, whichever is greater.

<mV signal>
Compare the specified input range with the input range in the table below (narrower range) and choose accuracy calculation conditions. However, ±0.05% is applied if an input accuracy obtained from the expression is less than ±0.05%.

Input accuracy = ±0.05% x a/b

Input range	Accuracy calculation condition	
	a	b
±20 mV DC	10(mV)	Input span
±100 mV DC	40(mV)	
Outside of ±100 mV DC and within ±500 mV DC	200(mV)	

[Output-1 accuracy]
Compare the specified output-1 range with the output-1 range in the table below (narrower range) and choose accuracy calculation conditions. However, ±0.05% is applied if an output accuracy obtained from the expression is less than ±0.05%.

Output-1 accuracy = ±0.05% x a/b

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)	

Burnout: Up, Down or Off; the maximum burnout time is specified as 60 seconds.
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.
Effect of leadwire resistance change:
Thermocouple: ±15 μV or less for a change of 100 Ω
RTD: ±0.2°C or less for a change of 10 Ω/wire.

■ 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 2.2W
100 V AC 4.6 VA, 200 V AC 6.4VA
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.

■ 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) x 51 (W) x123 (D) mm (including a socket)
Weight: Main unit: approx. 200 g
Socket: approx. 80 g

■ Accessories

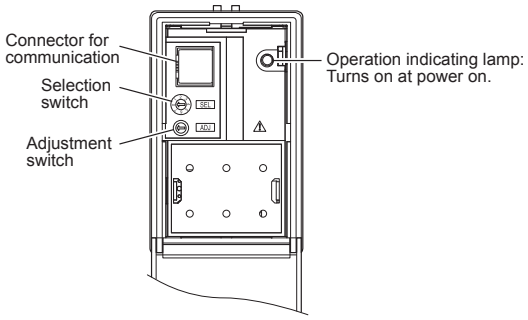
Spacer: One (for DIN rail mounting)
Range label: One
RJC sensor: One (except for "/RJCN")

■ 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

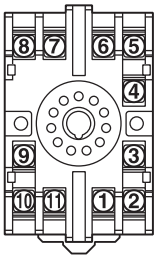
■ Front Panel

Output adjustment, wiring resistance correction, and ON/OFF of RJC can be made using the selection switch and adjustment switch.



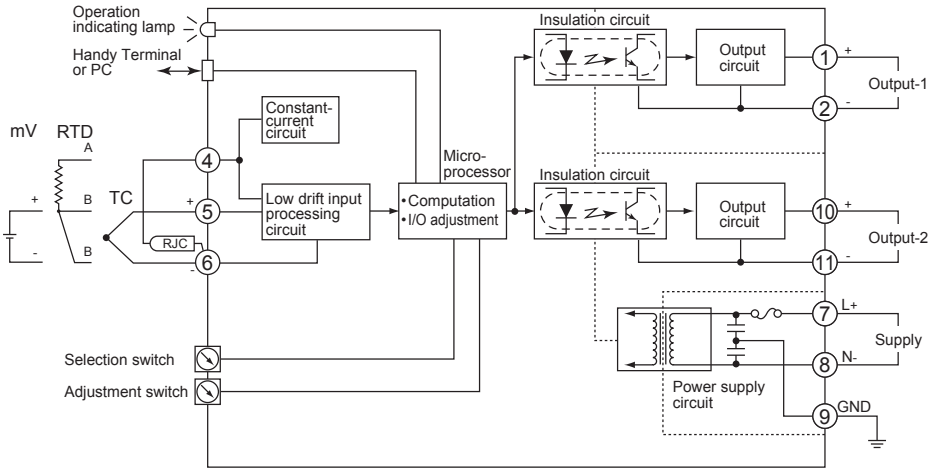
Position of selection switch	Item to be adjusted
0	No function
1	Output-1 zero adjustment
2	Output-1 span adjustment
3	Output-2 zero adjustment
4	Output-2 span adjustment
5	Wiring resistance correction
7	ON/OFF of RJC

■ Terminal Assignments



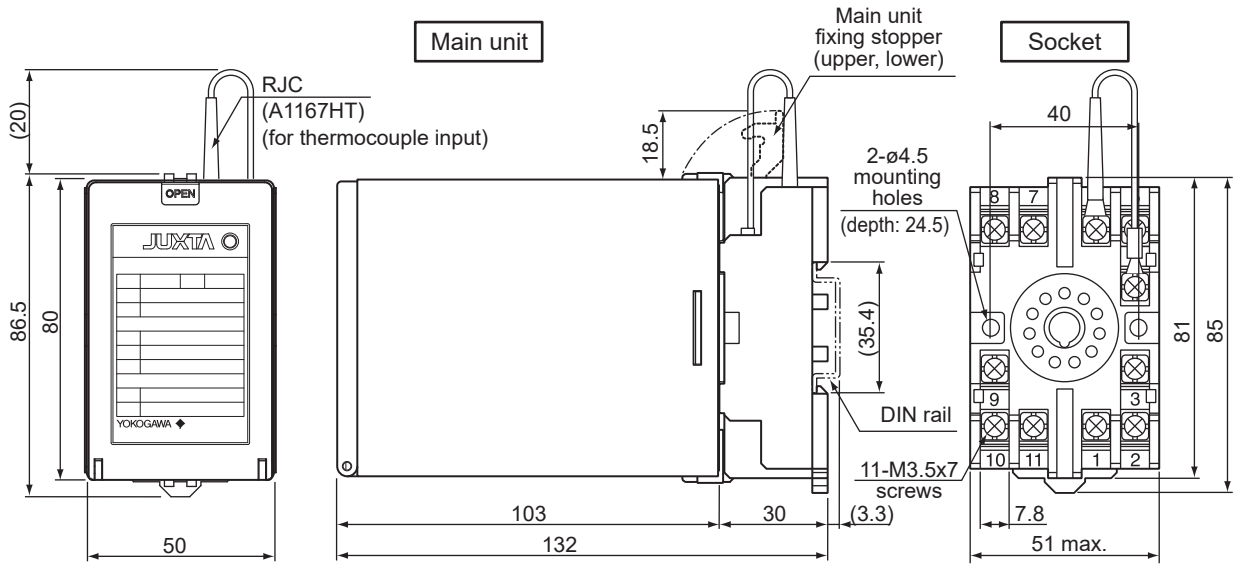
Terminal No.	Signal name	Thermocouple	RTD	mV signal
1	OUTPUT-1	(+)		
2	OUTPUT-2	(-)		
3	N.C			
4	INPUT	RJC reverse side	(A)	
5	INPUT	(+)	(B)	(+)
6	INPUT	(-) RJC	(B)	(-)
7	SUPPLY	(L+)		
8	SUPPLY	(N-)		
9	GND	(GND)		
10	OUTPUT-2	(+)		
11	OUTPUT-2	(-)		

■ Block Diagrams

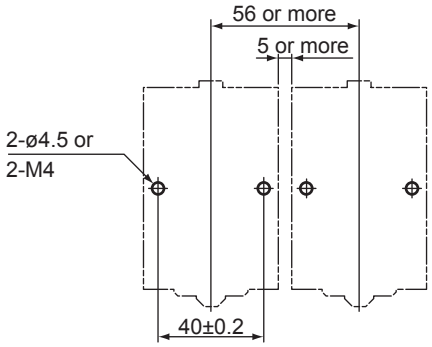


■ External Dimensions

Unit: mm



<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.