

General Specifications

Model MU5 Universal Temperature Converter (Free Range Type)



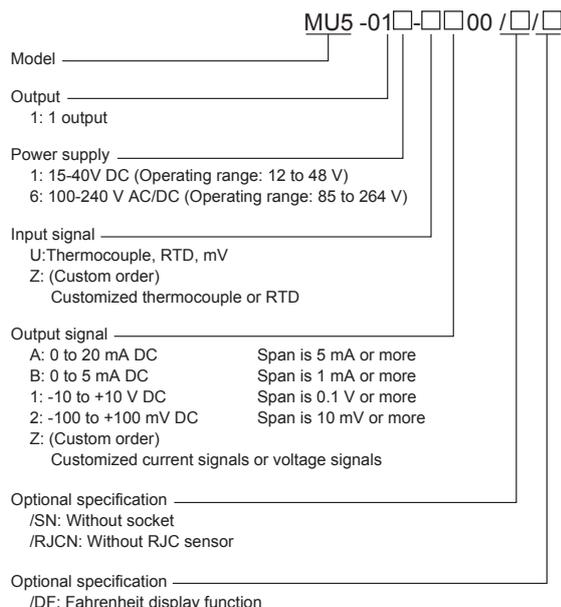
GS 77J04U05-01E

■ General

The MU5 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 MU5 without a setting tool such as Handy Terminal.
- For the Fahrenheit display, specify the option “/DF”.

■ Model and Suffix Codes

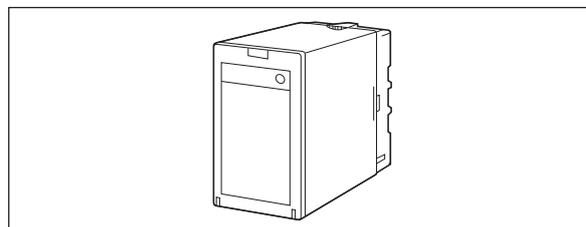


■ Ordering Information

Specify the following when ordering.

- Model and suffix codes: e.g. MU5-016-UA00
- Input type: e.g. Pt100 (ITS-90)
- Input range: e.g. 0 to 100°C
- Output 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): R₀ = 100 Ω, R₁₀₀/R₀ = 1.3851
JPt100 (JIS'89): R₀ = 100 Ω, R₁₀₀/R₀ = 1.3916
Pt100 (IPTS-68): R₀ = 100 Ω, R₁₀₀/R₀ = 1.3850

mV DC signal: -500 to +500 mV DC

Measuring unit: °C, K, °F^(*), mV

*1: When specify the option code “/DF”.

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: 1 point of DC current or DC voltage signal

Output signal setting range:

Output 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: 15 (V)/max. output (A) (Ω) or less

Adjustment range:

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

$$\text{Accuracy} = \text{Input accuracy} + \text{Output accuracy (\%)} \quad [\text{Input accuracy}]$$

<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 thermoelectromotive force, substitute 10 for T_m of the following expression. When ±100 mV, substitute 40. An obtained value is applied as an input accuracy. T_m/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 (T_e) to the input accuracy mentioned above. An obtained value is the input accuracy.

$$T_e [^{\circ}\text{C}] = (-200 [^{\circ}\text{C}] - \text{measured temp. } [^{\circ}\text{C}]) / X$$

(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, $\pm 0.05\%$ is applied if an input accuracy obtained from the expression is less than $\pm 0.05\%$.

$$\text{Input accuracy} = \pm 0.05\% \times a/b$$

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 accuracy]

Compare the specified output range with the output range in the table below (narrower range) and choose accuracy calculation conditions. However, $\pm 0.05\%$ is applied if an output accuracy obtained from the expression is less than $\pm 0.05\%$.

$$\text{Output accuracy} = \pm 0.05\% \times a/b$$

Output signal suffix code	Output range	Accuracy calculation condition	
		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:

$\pm 0.1\%$ of span or less 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 .

Effect of leadwire resistance change:

Thermocouple: $\pm 15 \mu\text{V}$ or less for a change of 100Ω

RTD: $\pm 0.2^\circ\text{C}$ or less for a change of $10 \Omega/\text{wire}$.

■ Power Supply and Isolation

Power supply rated voltage:

15-40 V DC \approx or
100-240 V AC/DC \approx 50/60 Hz

Power supply input voltage:

15-40 V DC \approx ($\pm 20\%$) or
100-240 V AC/DC \approx (-15 , $+20\%$) 50/60 Hz

Power consumption:

24 V DC 1.7 W, 110 V DC 1.6 W
100 V AC 3.5 VA, 200 V AC 4.9 VA

Insulation resistance:

100 M Ω 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.

■ 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) x 123 (D) mm (including a socket)

Weight: Main unit: approx. 200 g

Socket: approx. 60 g

■ Accessories

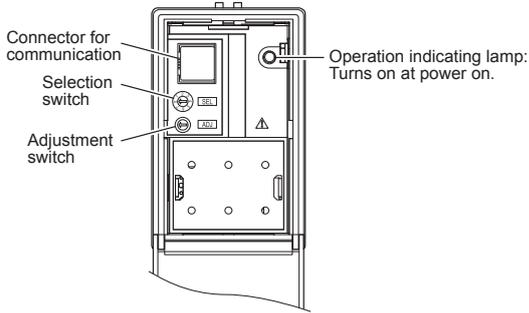
Spacer: One (for DIN rail mounting)

Range label: One

RJC sensor: One (except for "/RJCN")

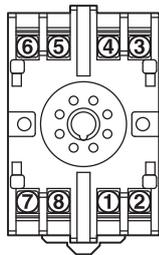
■ Front Panel

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



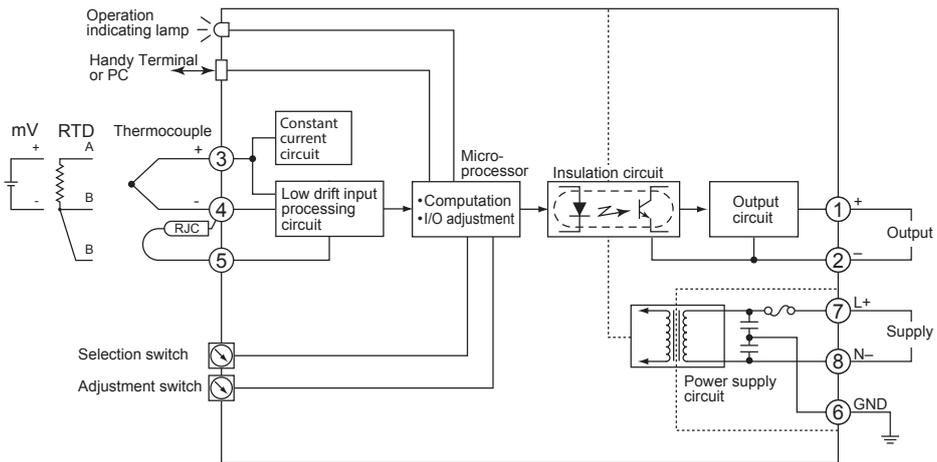
Position of selection switch	Item to be adjusted
0	No function
1	Output zero adjustment
2	Output span adjustment
6	Wiring resistance correction
7	ON/OFF of RJC

■ Terminal Assignments



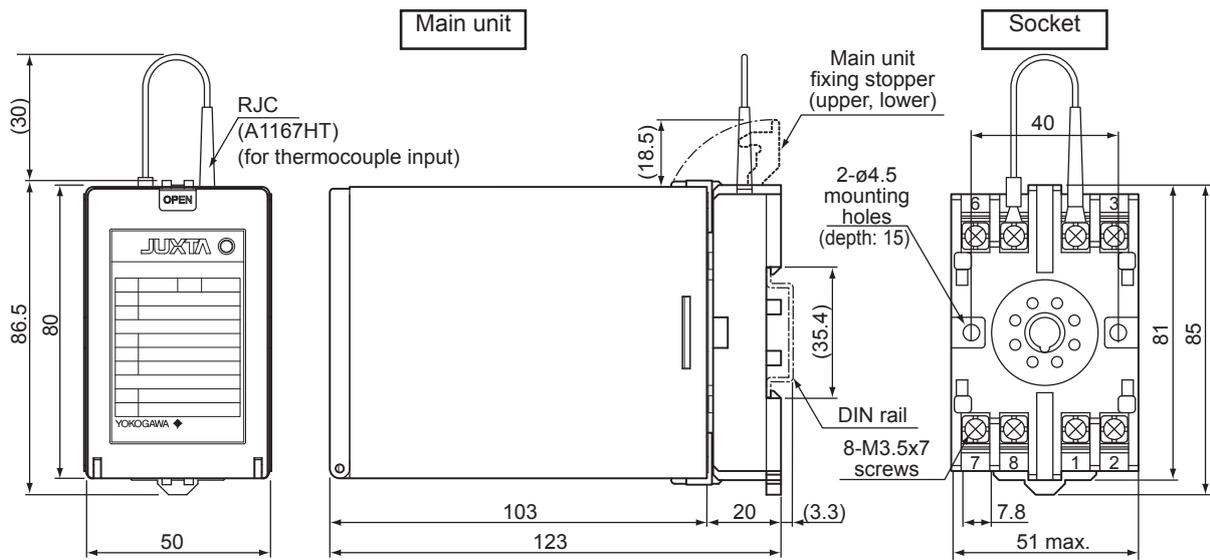
Terminal No.	Signal name	Thermocouple	RTD	mV signal
1	OUTPUT		(+)	
2	OUTPUT		(-)	
3	INPUT	(+)	(A)	(+)
4	INPUT	(-) [RJC]	(B)	(-)
5	INPUT	RJC reverse side	(B)	N.C
6	GND		(GND)	
7	SUPPLY		(L+)	
8	SUPPLY		(N-)	

■ Block Diagrams

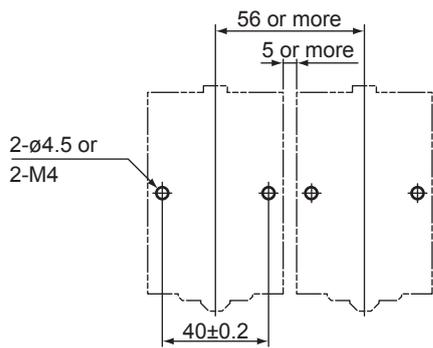


■ External Dimensions

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.

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