

# General Specifications

## Model VJU7 Universal Temperature Converter (Isolated Single-output and Isolated Dual-output Types)



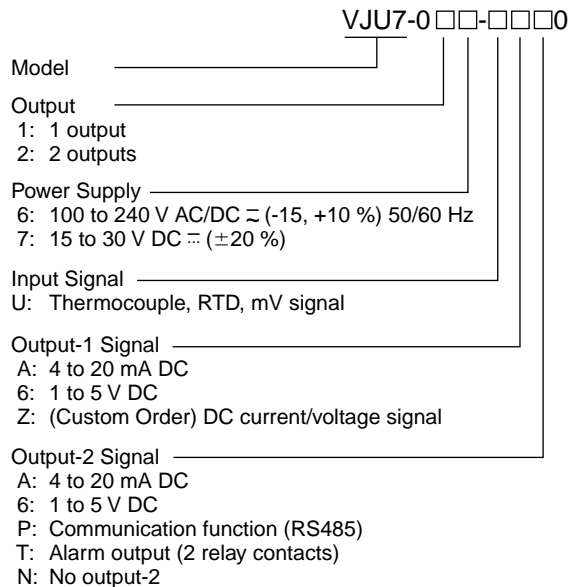
GS 77J01U07-01E

### General

This plug-in type universal temperature converter converts input signal (thermocouple, RTD or mV signal) into isolated DC voltage signal or DC current signal.

- Universal input enables selection of input type (thermocouple, RTD, mV signal) and of measuring ranges within specifications.
- DC voltage signal, DC current signal, communication output (RS485), or alarm output (2 relay contacts) is selectable as output-2.
- Change of input types / input ranges/burnout action, and I/O monitoring etc. can be done through Handy Terminal (JHT200 etc.).

### Specifications



### Input

Input Signal Type:

Thermocouple (ITS-90): Type K, T, E, J, R, S, B, N, W3 (see Note 1), W5 (see Note 2)

Note 1: W3 is the abbreviation of W97Re3-W75Re25 (tungsten97 % rhenium 3 % - tungsten75 % rhenium25 %) ASTM E988 Standard

Note 2: W5 is the abbreviation of W95Re5-W74Re26 (tungsten95 % rhenium 5 % - tungsten74 % rhenium 26 %) ASTM E988 Standard

RTD : Pt100 (ITS-90), JPt100 (JIS'89)  
Pt50  $\Omega$  (JIS'81), Pt100 (IPTS-68)  
Pt100 (ITS-90) :  $R_0=100 \Omega$ ,  $R_{100}/R_0=1.3851$   
JPt100 (JIS'89) :  $R_0=100 \Omega$ ,  $R_{100}/R_0=1.3850$   
Pt100  $\Omega$  (IPTS-68) :  $R_0=100 \Omega$ ,  $R_{100}/R_0=1.3916$   
mV signal : Can be set within -10 to 100 mV

Table 1 Input Type and Range

Input Type	Range
<b>TC sensor type</b>	<b>(°C)</b>
Type K	-200 to 1200
Type E	-200 to 800
Type J	0 to 750
Type T	-200 to 350
Type R	0 to 1600
Type S	0 to 1600
Type B	600 to 1700
Type N	-200 to 1200
Type W3	0 to 2000
Type W5	0 to 2000
<b>RTD sensor type</b>	<b>(°C)</b>
Pt100(ITS-90)	-200 to 660
Pt100(IPTS-68)	-200 to 660
JPt100(JIS'89)	-200 to 510
Pt50(JIS'81)	-200 to 649
<b>mV (DC voltage)</b>	<b>mV DC</b>
	-10 to 100

Measuring Span: 3 mV or more (thermocouple, mV signal)  
10 °C or more (RTD)

Input Resistance: 1 M $\Omega$  (when power on), 4 k $\Omega$  (when power off) when thermocouple, mV input

Input External Resistance:

Thermocouple, mV signal: 500  $\Omega$  or less

However, when combination with BARD200, it is the value connectable as external resistance besides internal resistance.

RTD: Input span (°C)  $\times$  0.4  $\Omega$  or less / wire or 10  $\Omega$  or less, whichever smaller

However, when combination with BARD 300, it is the value connectable as external resistance besides internal resistance.

RTD Detective Current: About 0.5 mA

Permissible Applicable Voltage:  $\pm$ 4 V DC or less

## ■ Output

### 1. Output-1

Output Signal	Output Resistance	Permissible Load Resistance
1 to 5 V DC	1 Ω or less	2 kΩ or more
4 to 20 mA DC	500 kΩ or more	750 Ω or less

#### ● Custom Order Output Signal

2 to 10 mA DC, 1 to 5 mA DC, 0 to 20 mA DC,  
0 to 16 mA DC, 0 to 10 mA DC, 0 to 1 mA DC  
0 to 10 mV DC, 0 to 100 mV DC, 0 to 1 V DC,  
0 to 10 V DC, 0 to 5 V DC, -10 to +10 V DC

### 2. Output -2

#### ● Analog Output

Output Signal	Output Resistance	Permissible Load Resistance
1 to 5 V DC	1 Ω or less	2 kΩ or more
4 to 20 mA DC	500 kΩ or more	350 Ω or less

#### ● Communication Function

This transmitter can be connected to a personal computer, graphic panel, YOKOGAWA programmable controller FA-M3, or programmable controllers of other manufacturers.

Standards: EIA RS485

Maximum number of connectable controllers:  
31 controllers

Maximum communication distance: 1200 m

Communication method: 2-wire half duplex, start-stop  
synchronization, non-procedural

Communication rate: 1200, 2400, 4800, 9600 bps

Data length: 8, 7 bit

Stop bit: 1, 2 bit

Parity: Even parity, odd parity, or none

Communication protocol: PC-link, PC-link with SUM,  
MODBUS ASCII, MODBUS RTU, or  
LADDER

PC-link communication: Communication protocol with a  
personal computer, graphic panel, UT link  
module of FA-M3

MODBUS communication: Communication protocol  
with a personal computer (SCADA).

Ladder communication: Communication protocol with  
ladder communication module of FA-M3  
and programmable controller of other  
manufacturers

## ■ Alarm Output

Signal Type: Relay contact

Output Signal: N. O. contact output (contact ON at  
excitation) 2 points, COM common

Contact Capacity: 30 V DC, 1 A

Alarm Operating Direction: High limit alarm or low limit  
alarm

Relay Operating Direction Setting: Excitation or non-  
excitation at normal status

Alarm Setting Ranges: 0 to 100 % of input range

Temperature input [°C], mV input [%]

Setting resolution: 0.1 °C or 0.1 %, 4 significant digits

Hysteresis: Set the value added to alarm setting point at  
alarm release

Setting range: 0 to 100 % of input range

Temperature input [°C], mV input [%]

Setting resolution: 0.1 °C or 0.1 %, 4 significant digits

Alarm On-Delay Setting: Delay time from alarm condition  
completion to output

(Ex. Outputted when alarm status continues  
for 1 second or more after input value is over  
alarm point in case of set value "1 second.")

Setting range: 0 to 999 seconds

Setting resolution: 1 second (however, add about  
0.2 seconds to setting time to prevent wrong  
operation)

Alarm Off-Delay Setting: Delay time from alarm normal  
condition completion to output

(Ex. Released when normal status continues  
for 2 seconds or more after input value  
becomes normal status from alarm status in  
case of set value "2 seconds.")

Setting range: 0 to 999 seconds

Setting resolution: 1 second (however, add about  
0.2 seconds to setting time to prevent wrong  
operation)

Alarm Operation Display: Front LED lights at excitation,  
2 LEDs

## ■ Items Available to Be Set

The following items can be set through Handy Terminal:

Input type, input range, burnout, address number,  
communication rate, parity, data length, stop bit, protocol,  
alarm operating direction, relay operating direction, alarm  
setting, hysteresis, alarm on-delay, alarm off-delay

## ■ Standard Performance

Accuracy rating: ±0.1 % of span.

However, accuracy is limited in the following cases.

Thermocouple input:

Input range is -10 to 100 mV (M range), span is under  
27.5 mV, in thermally generated emf  
conversion; accuracy (%) = ±0.1 % × 27.5  
mV / input span [mV]

Input range is -2.5 to 25 mV (L range), span is under  
10 mV, in thermally generated emf  
conversion; accuracy (%) = ±0.1 % × 10  
mV / input span [mV]

RTD input:

Input range is 0 to 520 Ω (H range), span is under 130 Ω  
(refer to the reference resistance table);  
accuracy (%) = ±0.1 % × 130 Ω / input  
span [Ω]

Input range is 0 to 176 Ω (M range), span is under  
38.6 Ω (refer to the reference resistance  
table);  
accuracy (%) = ±0.1 % × 38.6 Ω / input  
span [Ω]

Reference Junction Compensation Accuracy:

±1 °C (except for Type R, S); ±2 °C (Type R,  
S) for terminal temperature 25 °C ± 15 °C

Response Speed: 200 ms, 63 % response (10 to 90 %)  
 Alarm output: 350 ms (input change 10 to 90 %, alarm setting point 50 %, time till alarm output, when alarm delay setting and hysteresis are min.)

Burnout: No up/down

Burnout time: within 60 seconds

Effect of Power Supply Voltage Fluctuation:  $\pm 0.1$  % or less of span for power supply voltage fluctuation of 15 to 30 V DC ( $\pm 20$  %), 100 to 240 V AC/DC

Effect of Ambient Temperature Change:  $\pm 0.2$  % or less of span for change of 10 °C

Effect of Wiring Resistance Change:

Thermocouple:  $\pm 15$   $\mu$ V or less of span for change of 100 $\Omega$  RTD:  $\pm 0.2$  °C or less of span for change of 10 $\Omega$ /wire.

### ■ Safety and EMC Standards

The following standards will be acquired.

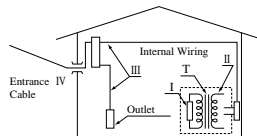
Safety: approved by CSA1010, approved by UL3121-1.

Installation category: CAT. II (CSA1010)

Pollution degree: 2 (CSA1010)

As for the apparatus authorized, power supply voltage is limited to 15V-30VDC, and the circuit to connect is limited to a class 2. (UL3121-1)

Category	Description	Remarks
CAT. I	For measurements performed on circuits not directly connected to MAINS.	
CAT. II	For measurements performed on circuits directly connected to the low voltage installation.	Appliances, portable equipments, etc.
CAT. III	For measurements performed in the building installation.	Distribution board, circuit breaker, etc.
CAT. IV	For measurements performed at the source of the low-voltage installation.	Overhead wire, cable systems, etc.



EMC standards: Complies with EN61326.

The above conformed instrument is only for voltage of 15 to 30 V DC

### ■ Power Supply and Isolation

Power Supply Rated Voltage:

100 to 240 V AC/DC  $\approx$  50/60 Hz

15 to 30 V DC  $\approx$

Power Supply Input Voltage: 100 to 240 V AC/DC  $\approx$  (-15, +10 %) 50/60 Hz

15 to 30 V DC  $\approx$  ( $\pm 20$  %)

Power Dissipation: 24 V DC 2.6 W, 110 V DC 2.6 W

100 V AC 5 VA, 200 V AC 6.7 VA

Insulation Resistance: 100 M $\Omega$  /500 V DC between input, output-1, output-2, power supply, and ground mutually

Withstand Voltage: 2000 V AC / minute between input, (output-1, output-2), power supply, and ground mutually

1000 V AC / minute between input and

output-2, 1000 V AC / minute between

output-1 and output-2 at alarm output

### ■ Environmental Conditions

Temperature: 0 to 50 °C

Humidity: 5 to 90 % RH (no condensation)

Ambient Condition: Avoid installation in such environments as corrosive gas like sulfide hydrogen, dust, sea breeze and direct sunlight

Installation altitude 2000m or less above sea level.

### ■ Mounting and Appearance

Construction: Compact plug-in type

Material: Modified Polyphenylene Oxide (Case body)

Mounting Method: Wall, DIN rail, or dedicated base (VJ mounting base: VJCE) mountings

Connection Method: M3 screw terminal

External Dimension: 29.5 $\times$ 76 $\times$ 124.5 mm (W $\times$ H $\times$ D)

Weight: Approx.170 g

### ■ Accessories

Tag No. Label: 1 sheet

Range Label: 1 sheet

RJC Sensor: 1

### ■ Instruction Required When Ordering

- Model and suffix code

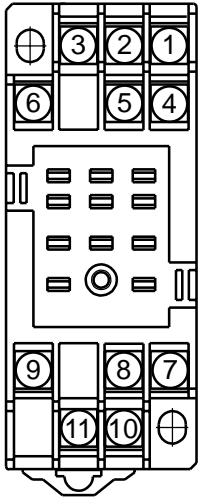
Shipped after setting the input type (selected from Table 1), input range (within available measuring range in Table 1), and burnout action as specified.

### ■ Factory Setting

Factory settings are as follows:

- Input type: RTD input Pt100 (ITS-90)
- Input range: 0 to 100 °C
- Burnout: Off
- **When output-2 is specified as communication output**
  - Address No.: 01
  - Communication rate: 9600 bps
  - Parity: Even
  - Data length: 8 bit
  - Stop bit: 1 bit
  - Protocol: PCLINK
- **When output-2 is specified as alarm output**
  - Alarm operating direction: High limit alarm (alarm-1), low limit alarm (alarm-2)
  - Relay operating direction: Excitation at alarm (alarm-1/2)
  - Alarm setting: The value equivalent to 100 % (alarm-1), The value equivalent to 0 % (alarm-2)
  - Hysteresis: The value equivalent to 3 % (alarm-1/2)
  - Alarm on-delay: 0 second (alarm-1/2)
  - Alarm off-delay: 0 second (alarm-1/2)

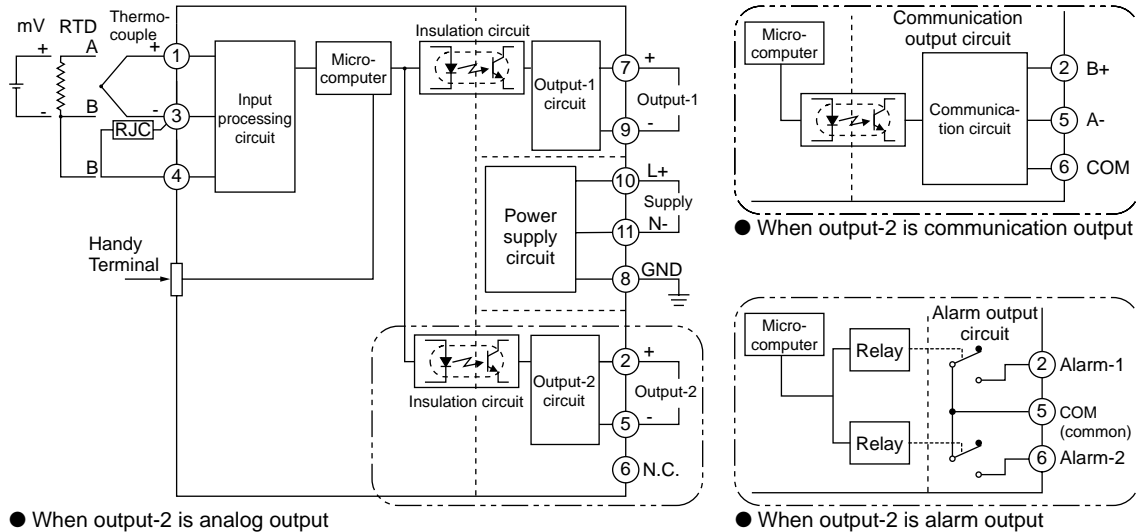
### Terminal Arrangement & Terminal Connection



Terminal No.	Signal	Thermocouple	RTD	mV input	Output-2 Analog output	Output-2 Communication output	Output-2 Alarm output
1	Input	(+)	(A)	(+)	←	←	←
2	Output-2	→	→	→	(+)	B (+)	ALM1
3	Input	(-) [RJC]	(B)	(-)	←	←	←
4	Input		(B)	N.C.	←	←	←
5	Output-2	→	→	→	(-)	A (-)	COM
6	Output-2	→	→	→	N.C.	COM	ALM2
7	Output-1	(+) Output-1 circuit					
8	GND	GND					
9	Output-1	(-) Output-1 circuit					
10	Supply	(L+) Power supply circuit					
11	Supply	(N-) Power supply circuit					

Note 3: In case of one output type, output-2 is N.C.

### Block Diagram



### External Dimension

