

General Specifications

Model VJUK Limit Alarm for Universal Input (DC, temperature input type)

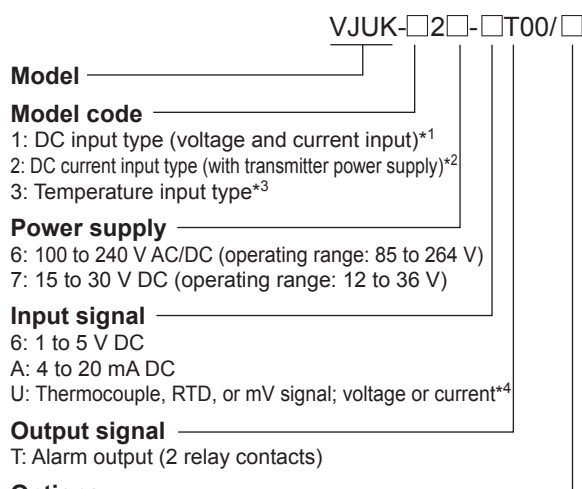
GS 77J01U21-01E

■ Overview

The VJUK is a plug-in type alarm setting device that receives voltage/current, thermocouple/RTD, or mV signal as an input signal.

- Various parameters can be changed from a PC (VJ77).

■ Model and Suffix Codes



*1. Input signal can be selected from 6, A, and U.

*2. Input signal is fixed to A.

*3. Input signal is fixed to U.

*4. When the model code is 1, the input signal is voltage and current.

When the model code is 3, the input signal is thermocouple, RTD, and mV signal.

*5. When option code /C0 or /FB is specified, the conformity to the safety and EMC standards is excluded. CE marking is not applicable.

*6. The /RJCN option can be selected when the model code is 3.

*7. The /R100 and /R250 options can be selected when the input signal is U.



(Note 1) "/C0" option: Polyurethane coating. The "/C0" (HumiSeal coating) option does not guaranteed the coating effect though it is expected that the corrosion resistance for electric circuit is reinforced. And it is not able to submit coating test data.

(Note 2) "/FB" option: The primary power supply fuse is deleted, short circuit and ship it.

■ Ordering Information

Specify the model and suffix codes.

The input type (select from table 1), input range (within the measurable range of table 1), and burnout action are set to the specified values before shipment. Other parameters are set to their default values before shipment.

Example 1. Model and suffix codes: VJUK-126-UT00/R100

Example 1. Input range (mandatory specification item when the /R100 or /R250 option is specified): 0 to 20 mA

Example 2. Model and suffix codes: VJUK-226-AT00

Example 2. Square root calculation (mandatory specification item): Yes

Example 2. low-cut value (%): 0.5

Example 3. Model and suffix codes: VJUK-326-UT00

Example 3. Input type: Pt100 (ITS-90)

Example 3. Input range: 0 to 100°C

Example 3. Burnout (mandatory specification item): Up

Optional Specification Items and Mandatory Specification Items

- You can specify the tag number of your company to print on the label. Up to 16 alphanumeric characters can be used.
- For specification items related to the model code and input signal, see the following table.

Model code	Input signal	Ordering Information (optional)		Ordering Information (mandatory)		Remarks
		Input type	Input range	Square root calculation	Burnout	
-1: DC input	-6: 1 to 5 V DC	None	None	None	None	—
	-A: 4 to 20 mA DC	None	None	None	None	—
	-U: Voltage/current	None	0 to 50 mA DC	None	None	Input range is mandatory for models with the /R100 option.
		None	0 to 35 mA DC	None	None	Input range is mandatory for models with the /R250 option.
-2: DC current input (with transmitter power supply)	-A: 4 to 20 mA DC	None	-10 to 10 V DC	None	None	—
		None	None	Select include or not include	None	If square root calculation is included, you can specify the low-cut value (optional).
-3: Temperature input	-U: Thermocouple, RTD, mV signal	See table 1. (However, mandatory specification item when /DF option is specified.)		None	Off, up, down	—

■ Factory Default Settings

The factory default settings are provided below.

Changing the settings requires a PC (VJ77).

- Low-cut value (%): 0.6 (for model code 2)
- Input type: RTD input Pt100 (ITS-90) (for model code 3)
- Input range: 1 to 5 V DC (for model code 1, input signal U)
0 to 100°C (for model code 3)
- Alarm operation direction: Alarm 1 is the high limit alarm; alarm 2 is the low limit alarm.
- Relay operation direction: Energized when an alarm occurs for both alarms 1 and 2.
- Alarm settings: Alarm 1 is set to 100%; alarm 2 is set to 0% (actual value for model code 3).
- Hysteresis: Both alarms 1 and 2 are set to 3% (actual values for model code 3).
- Alarm on delay: 0 s for both alarms 1 and 2
- Alarm off delay: 0 s for both alarms 1 and 2
- Software filter: Off

■ Input Specifications

Input signal format (for model code 1):

Input range:

Input signal 6: 1 to 5 V

Input signal A: 4 to 20 mA

Input signal U:

- 0 to 50 mA DC current range, 5 mA or more span (where the input resistance is 100 Ω) (when /R100 and /R250 are not specified)
- 0 to 50 mA DC current range, 5 mA or more span (when /R100 is specified)
- 0 to 35 mA DC current range, 2 mA or more span (when /R250 is specified)
- -10 to +10 VDC voltage range, 0.1 V or more span

Input resistance:

DC current signal:

- 100 Ω, external input resistor (shunt resistor) (when input signal A is specified and /R100 is specified)
- 250 Ω, external input resistor (shunt resistor) (/R250 is specified)

DC voltage signal:

1 MΩ (100 kΩ when current is not flowing)

Allowable excessive input:

Voltage input: ±30 VDC or less

Current input: Current that satisfies (input current)² × input resistance ≤ 0.5 W

Input signal format (for model code 2):

Input signal: 4 to 20 mA DC from a 2-wire type transmitter, 1 point

Input resistance: 250 Ω

Transmitter power supply: 25 to 25.5 V DC

(With current limiter: Limited to a range of 25 to 35 mA)

Allowable conductor resistance: $RL \leq (20 - \text{minimum transmitter operating voltage}) / V / 0.02 \text{ A}$ (Ω)

Example: EJA110J: Minimum operating voltage 10.5 V
 $RL \leq (20 - 10.5) / 0.02 = 475 \text{ Ω}$

Allowable excessive input: 40 mA or less

Square root math function: Outputs based on the result of the square root of the input

Input signal format (for model code 3):

Thermocouple JIS C 1602, IEC 60584-1 (ITS-90):

Type K, T, E, J, R, S, B, N, W3^{*1}, W5^{*2}

*1. W3 is an abbreviation for W97Re3-W75Re25 (tungsten 97% rhenium 3%-tungsten 75% rhenium25%) ASTM E988 standard.

*2. W5 is an abbreviation for W95Re5-W74Re26 (tungsten 95% rhenium 5%-tungsten 74% rhenium26%) ASTM E988 standard.

RTD: JIS C 1604, IEC 60751 (ITS-90) Pt100

JIS C 1604:1989, DIN (IPTS-68) Pt100

JIS C 1604:1989, JPt100

JIS C 1604:1981, Pt50 JIS C 1604

mV signal: Set in the range of -10 to 100 mV DC

Temperature unit: °C, K, mV

Table 1 Types and measurement ranges for input signal U of model code 3

Input type (thermocouple)	Measurable range (°C)
JIS C 1602, IEC 60584-1 (ITS-90) TYPE K	-270 to 1372
JIS C 1602, IEC 60584-1 (ITS-90) TYPE T	-270 to 400
JIS C 1602, IEC 60584-1 (ITS-90) TYPE E	-270 to 1000
JIS C 1602, IEC 60584-1 (ITS-90) TYPE J	-210 to 1200
JIS C 1602, IEC 60584-1 (ITS-90) TYPE R	-50 to 1768
JIS C 1602, IEC 60584-1 (ITS-90) TYPE S	-50 to 1768
JIS C 1602, IEC 60584-1 (ITS-90) TYPE B	0 to 1820
JIS C 1602, IEC 60584-1 (ITS-90) TYPE N	-270 to 1300
Type W3	-0 to 2300
Type W5	-0 to 2300
Input type (RTD)	Measurable range (°C)
JIS C 1604, IEC 60751 (ITS-90) PT100	-200 to 850
JIS C 1604:1989, DIN (IPTS-68) Pt100	-200 to 660
JIS C 1604:1989, JPt100	-200 to 510
JIS C 1604:1981, Pt50	-200 to 649
Input type (mV signal)	Measurable range (mV DC)
mV	-10 to 100

Measurement span: 3 mV or more for a thermocouple and mV signal

10°C or more for an RTD

Input resistance: 1 MΩ (when current is flowing), 4 kΩ (when current is not flowing)

For thermocouple, mV input

Burnout detection current: 0.1 μA (for thermocouple, mV input)

External input resistance:

Thermocouple, mV signal: 500 Ω or less

When combined with BARD-600, this is the value that can be connected as an external resistance in addition to the internal resistance of the BARD-600.

RTD: input span per wire (°C) × 0.4 Ω or less or 10 Ω or less, whichever is smaller. (The resistance of each wire must be the same.) When combined with BARD-700, this is the value that can be connected as an external resistance in addition to the internal resistance of the BARD-700.

RTD detection current: Approx. 0.2 mA DC

Allowable excessive input: ±4 V DC or less

Input signal format (for model code 1, 2, 3):

Input adjustment range: ± 1% of span (both zero and span)

- Software filter: OFF, Low, Middle, High (default value: OFF)
When Low, Middle, or High is selected, a first-order filter equivalent to 100 ms, 300 ms, or 1 s is inserted in the input.

■ Output Specifications

Output format: Relay contact
Output signal: Contact "a" input (contact on when energized), 2 points
Contact rating: 30 V DC, 1 A (resistance load)
Contact life: 100,000 operations (resistance load)
Alarm operation direction: High limit alarm or low limit alarm
Relay operation direction: Energized or de-energized when normal can be selected.
Alarm setpoint range: 0 to 100% of the input range
Set in units of temperature for temperature input and in percentage for other inputs
Setting resolution: 4 significant digits for temperature input and 0.1% for other inputs
Hysteresis setting range: 0 to 100% of the input range
Set in units of temperature for temperature input and in percentage for other inputs
Setting resolution: 4 significant digits for temperature input and 0.1% for other inputs
Alarm on delay setting: Condition monitoring time from when the alarm condition is met until output (If the value is 1 s, the alarm is output when the input value exceeds the alarm point, and the alarm condition continues for 1 s or more.)
Setting range: 0 to 999 s
Setting resolution: 1 s (however, approximately 0.2 s is added to the set time to prevent erroneous operation)
Alarm off delay setting: Condition monitoring time from when the normal condition is met until output (If the value is 2 s, the alarm is released when the input value recovers from the alarm condition to the normal condition, and the normal condition continues for 2 s or more.)
Setting range: 0 to 999 s
Setting resolution: 1 s (however, approximately 0.2 s is added to the set time to prevent erroneous operation)
Alarm operation indication: The two front panel LEDs light when an alarm occurs.

■ Items Available to Be Set

The following parameters can be changed using a PC (VJ77).

Square root calculation, low-cut, input sensor type, input type, temperature unit, input range, burnout, output operation direction, address number, baud rate, parity, data length, stop bits, protocol, alarm operation direction, relay operation direction, alarm setting, hysteresis, alarm on delay, alarm off delay, input/output adjustment, input adjustment, software filter

■ Standard Performance

Accuracy rating: $\pm 0.1\%$ of span
However, there are the following limitations.
Model code 1

- In the range of -10 to +10 V and less than 4V span, accuracy (%) = $\pm 0.1\% \times 4 \text{ V} / \text{input span [V]}$
- In the range of -2.5 to +2.5V and less than 1V span, accuracy (%) = $\pm 0.1\% \times 1 \text{ V} / \text{input span [V]}$

For current input, apply the above for [input range \times input resistance], and add the 0.1% resistance error.

Model code 2

For square root input, the accuracy is $\pm 1\%$ of the span for input less than or equal to 2%.

Model code 3

<Thermocouple>

- If the input range obtained through thermoelectromotive force conversion is $\pm 25 \text{ mV}$ or less, the accuracy is $\pm 0.1\%$ of the span or $10 \text{ }\mu\text{V}$, whichever is greater.
- If the input range obtained through thermoelectromotive force conversion is greater than $\pm 25 \text{ mV}$ but less than or equal to $\pm 100 \text{ mV}$, the accuracy is $\pm 0.1\%$ of the span or $40 \text{ }\mu\text{V}$, whichever is greater.

However, accuracy is not guaranteed for 0 to 400°C input to Type B.

<mV input>

- If the input range is $\pm 25 \text{ mV}$ or less, the accuracy is $\pm 0.1\%$ of the span or $10 \text{ }\mu\text{V}$, whichever is greater.
- If the input range is greater than $\pm 25 \text{ mV}$ but less than or equal to $\pm 100 \text{ mV}$, the accuracy is $\pm 0.1\%$ of the span or $40 \text{ }\mu\text{V}$, whichever is greater.

<RTD>

$\pm 0.1\%$ of span or $\pm 0.1^\circ\text{C}$, whichever is greater (for Pt50, $\pm 0.1\%$ or $\pm 0.2^\circ\text{C}$, whichever is greater)

Reference junction compensation accuracy:

Other than type R, S: $\pm 1^\circ\text{C}$ ($25 \pm 15^\circ\text{C}$), $\pm 2^\circ\text{C}$ (except for terminal temperature $25^\circ\text{C} \pm 15^\circ\text{C}$)

Type R, S: $\pm 2^\circ\text{C}$ ($25 \pm 15^\circ\text{C}$), $\pm 4^\circ\text{C}$ (except for terminal temperature $25^\circ\text{C} \pm 15^\circ\text{C}$)

Reference junction compensation is not performed for type B.

For type K, E, T, and N, the accuracy below -200°C is obtained by multiplying the following coefficient (K).

$$K = \frac{\text{Thermoelectromotive force per degree near } 0^\circ\text{C}}{\text{Thermoelectromotive force per degree near measurement temperature}}$$

Burnout: UP, DOWN or OFF

Burnout time: 60 s or less

Effect of wiring resistance:

Thermocouple input: $\pm 15 \text{ }\mu\text{V}$ for a change of $100 \text{ }\Omega$

RTD input: $\pm 0.2^\circ\text{C}$ for a change of $10 \text{ }\Omega$ in a wire

Model codes 1, 2, and 3

Effects of supply voltage fluctuation: Within the accuracy range for fluctuation within the allowed range specified in the relevant supply voltage specifications.

Effects of ambient temperature change: $\pm 0.15\%$ of span for a change of 10°C

Response speed: 450 ms (time until an alarm is output for a input fluctuation of 10 to 90% and alarm setpoint of 50% when the alarm delay and hysteresis are set to their minimum values)
If the software filter is on, add the following to the value above: Low: 100 ms, Middle: 300 ms, High: 1 s.

■ Safety and EMC Standards

CE:

EMC directive

EN 61326-1 Class A Table 2 compliance
EN 61000-3-2 compliance
EN 61000-3-3 compliance
EN 55011 Class A Group 1 compliance

Low voltage directive:

EN 61010-1, EN 61010-2-030
Overvoltage category II ^{*1}, Pollution degree 2 ^{*2},
Measurement category O (other)

CSA: CAN/CSA-22.2 No. 61010-1

CAN/CSA C22.2 No. 61010-2-030
Overvoltage category II ^{*1}, Pollution degree 2 ^{*2},
Measurement category O (other)

UL: UL 61010-1 (CSA NRTL/C)

UL 61010-2-030 (CSA NRTL/C)
Overvoltage category II ^{*1}, Pollution degree 2 ^{*2},
Measurement category: O (other)

RCM: EN 55011 Class A Group 1 compliance

KC: Electromagnetic wave interference prevention standard, electromagnetic wave protection standard compliance

*1 Overvoltage category II: Describes a number which defines a transient overvoltage condition. Implies the regulation for impulse withstand voltage.
"II" applies to electrical equipment which is supplied from the fixed installation like a distribution board.

*2 Pollution degree 2: Describes the degree to which a solid, liquid, or gas which deteriorates dielectric strength or surface resistivity is adhering.
"2" applies to normal indoor atmosphere. Normally, only non-conductive pollution occurs.

However, if optional code /C0 or /FB is specified, the conformity to the safety and EMC standards is excluded.

■ Environment Standard

EU RoHS directive: EN IEC 63000

(However, when option code /C0 or /FB is specified, CE marking is not applicable because the product does not comply with the Safety and EMC standards.)

■ Power Supply and Isolation

Rated supply voltage: 100 to 240 V AC/DC \approx 50/60 Hz or 15 to 30 V DC \approx

Power supply input voltage: 100 to 240 V AC/DC (-15, +10%) 50/60 Hz or 15 to 30 V DC (\pm 20%)

Power consumption:

Model codes 1 and 3

24 V DC 1.9 W, 110 V DC 1.9 W
100 V AC 4.1 VA, 200 V AC 5.1 VA

Model code 2

24 V DC 2.7 W, 110 V DC 2.7 W
100 V AC 5.1 VA, 200 V AC 6.9 VA

Insulation resistance: Between the input, output-1, output-2, power supply, and ground mutually: 100 M Ω at 500 V DC

Withstanding voltage: Between the input, (output-1 and output-2), power supply, and ground mutually: 2000 V AC for 1 minute
Between the output-1 and output-2: 1000 V AC for 1 minute

■ Installation Specifications

Operating temperature range: -10 to 55°C (-10 to 45°C during side-by-side mounting*)

* If the previous model (style S3.xx earlier) is installed together, the ambient temperature is 0 to 40°C.

Operating humidity range: 5 to 90%RH (no condensation)

Operating environment: Area free of hydrogen sulfide gas and other corrosive gases and dust and where the device is not exposed to sea breeze or direct sunlight
Altitude 2000 m or less

Magnetic field: 400 A/m or less

Continuous vibration: (at 5 to 9 Hz) Half amplitude of 3 mm or less
(at 9 to 150 Hz) 9.8m/s² or less, 1 oct/min for 90 minutes each in the three axis directions

Impact: 98 m/s² or less, 11 ms, 3 axes, 6 directions, 3 times each

Altitude: 2000 m or less.

Installation location: Indoors

Warm-up time: 30 minutes or more after the power is turned on

■ Transport and Storage Conditions

Temperature: -25 to 70°C

Temperature change rate: 20°C per hour or less

Humidity: 5 to 95%RH (no condensation)

■ Mounting and Dimensions

Construction: Compact plug-in type

Material: Modified Polyphenylene Oxide (Case body)

Mounting: Can be mounted on a wall, DIN rail, or VJ mounting base

Connection method: M3 screw terminal connection

External dimensions: 76 (H) \times 29.5 (W) \times 124.5 (D) mm (including the socket)

Weight: Main unit: 100 g or less,
Socket: 50 g or less

■ Standard Accessories

Tag number label: 1 sheet

Range label: 1 sheet (when model code 1 or 3 is specified)

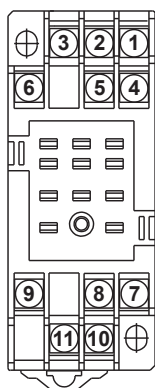
RJC sensor (A1167HT): 1 piece
(when optional code RJC is not specified) (when model code 3 is specified)

Input resistor (shunt resistor): 1 piece (100 Ω : E9786WD) (when model code 1 and input signal A are specified)

Input resistor (shunt resistor): 1 piece (100 Ω : E9786WD) (when the /R100 option is specified)

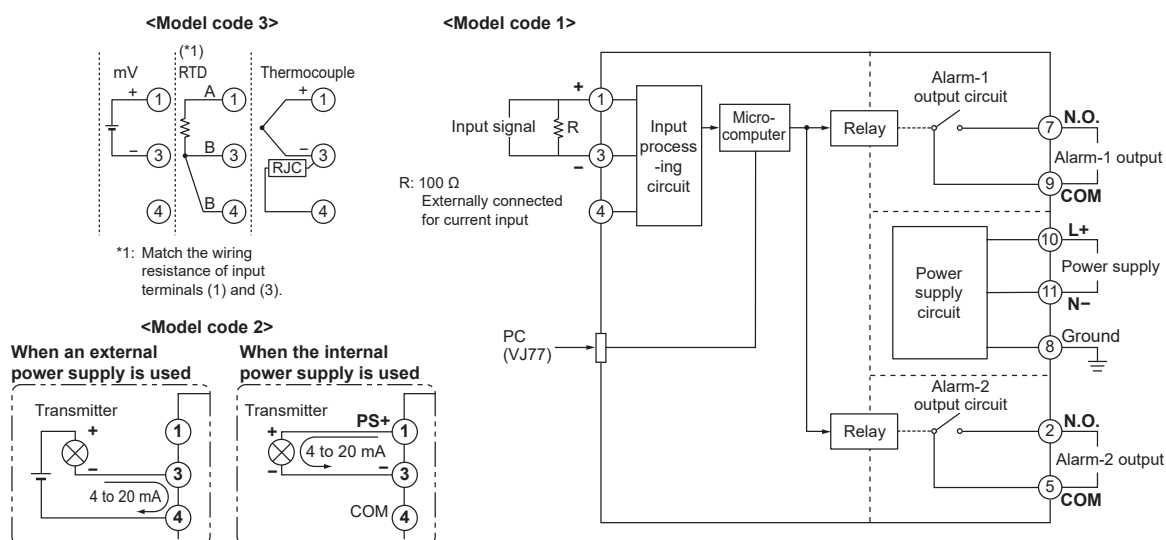
Input resistor (shunt resistor): 1 piece (250 Ω : E9786WE) (when the /R250 option is specified)

■ Terminal Arrangement



Terminal No.	Model code 1	Model code 2	Model code 3		
			Thermocouple	RTD	mV input
1	Input (+)	Input (PS+)	(+)	(A)	(+)
2	Alarm-2 output (N.O.)				
3	Input (-)	Input (-)	(-) [RJC]	(B)	(-)
4	Use prohibited	Input (COM)	(RJC opposite side)	(B)	Use prohibited
5	Alarm-2 output (COM)				
6	Use prohibited				
7	Alarm-1 output (N.O.)				
8	Ground				
9	Alarm-1 output (COM)				
10	Power supply (L+)				
11	Power supply (N-)				

■ Block Diagram



■ External Dimensions

