# User's Manual

## Model VJRK Limit Alarm for RTD Input

**JUXTA**

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You can download the latest manuals from the following website:

**http://www.yokogawa.com/ns/juxta/im/**

Thank you for purchasing the JUXTA Signal Conditioner.
Please read through this manual before use for correct handling.

**YOKOGAWA ◆**
Yokogawa Electric Corporation

## CAUTIONARY NOTES FOR SAFE USE OF THE PRODUCT

This User's Manual should be carefully read before installing and operating the product. Please keep this User's Manual for future reference.
For more information of the safety precautions, please refer to the "Precautions on the Use of the JUXTA Series (IM 77J01A00-91Z1)". The related manuals and general specifications are shown in the table below.

| Doc. Name | Doc. Number |
|---|---|
| Precautions on the Use of the JUXTA Series (User's Manual) | IM 77J01A00-91Z1 |
| Model VJRK Limit Alarm for RTD Input (User's Manual) | IM 77J01R21-01E (This manual) |
| Model VJRK Limit Alarm for RTD Input (General Specifications) | GS 77J01R21-01E |

User's manuals in the above table are essential parts of the product; keep it in a safe place for future reference.
This manual is intended for the following personnel;
• Engineers responsible for installation, wiring, and maintenance of the equipment.
• Personnel responsible for normal daily operation of the equipment.
The following symbol is used on the product and in this manual to ensure safe usage.

⚠ **WARNING**

**Calls attention to actions or conditions that could cause serious or fatal injury to the user, and indicates precautions that should be taken to prevent such occurrences.**

⚠ **CAUTION**

**Calls attention to actions or conditions that could cause injury to the user or damage to the instrument or property and indicates precautions that should be taken to prevent such occurrences.**

## CHECKING THE PRODUCT SPECIFICATIONS AND THE CONTENTS OF THE PACKAGE

**(1) Model and Specifications Check**
Check that the model and specifications indicated on the nameplate attached to the side face of the main unit are as ordered.

**(2) Contents of the Package**
Check that the package contains the following items:
• VJRK: 1
Standard Accessories:
• Tag number label: 1 sheet
• Range label: 1 sheet
• User's manual (IM 77J01R21-01E, this manual): 1 copy
• User's manual (IM 77J01A00-91Z1): 1 copy

## GENERAL

This plug-in type Limit Alarm for RTD input receives RTD signal.
• Each parameter setting can be changed using a PC (VJ77 PC-based Parameters Setting Tool) or the Handy Terminal (JHT200 ).

## MODEL AND SUFFIX CODES

| Model | Suffix codes | | | | | | | | Description |
|---|---|---|---|---|---|---|---|---|---|
| **VJRK** | -0 | 2 | x | -x | T | 0 | 0 | /x | Limit Alarm for RTD Input |
| Fixed code | -0 | | | | | | | | Always -0 |
| Output configuration | | 2 | | | | | | | 2 outputs |
| Power supply | | | 6 | | | | | | 100-240 V AC/DC[1] |
| | | | 7 | | | | | | 15-30 V DC[2] |
| Input signal | | | | -1 | | | | | Pt100 (ITS-90) |
| | | | | -2 | | | | | JPt100 (JIS'89) |
| | | | | -3 | | | | | Pt50 (JIS'81) |
| | | | | -4 | | | | | Pt100 (IPTS-68) |
| Output signal | | | | | T | | | | Alarm output (2 relay contacts) |
| Fixed code | | | | | | 0 | | | Always 0 |
| Fixed code | | | | | | | 0 | | Always 0 |
| Option | | | | | | | | /SN | No socket (with socket if not specified) |
| | | | | | | | | /C0 | HumiSeal coating |
| | | | | | | | | /FB | Fuse bypass |
| | | | | | | | | /DF | Fahrenheit display function |

*1: Operating range: 85 to 264V AC/DC
*2: Operating range: 12 to 36V DC
*3: DC voltage signal or DC current signal

## 1. MOUNTING METHODS

⚠ **CAUTION**

● **Plug/disconnect the main unit into/from the socket vertically to the socket face.  Otherwise the terminals may bend and it may cause bad contact.**
● **The converter shall not tilt 5 degrees or more in either direction when installed.**
● **When the converter is not connected to the socket, it is necessary to protect the socket against ingress of dust to the connector part.**
● **Keep this product in a conductive bag when plugged out, during transport or storage.**

### 1.1 Wall Mounting

Loosen the main unit-fixing screw to disconnect the main unit from the socket.  Next, anchor the socket onto the wall with screws. Then, plug the main unit into the socket and secure the main unit with the main unit-fixing screw.

Unit: mm
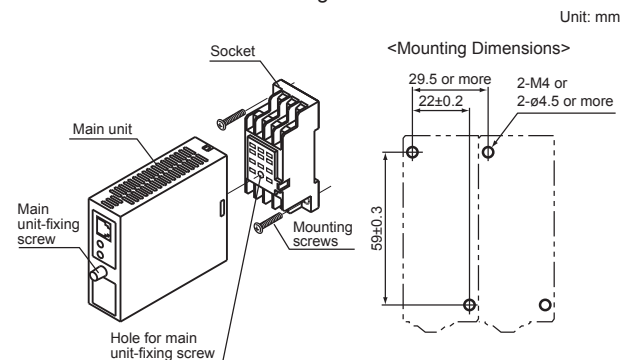
## 1.2 DIN Rail Mounting

Locate the VJRK so that the DIN rail fits into the upper part of the DIN-rail groove at the rear of the socket, and fasten the socket using the slide lock at the lower part of the socket.
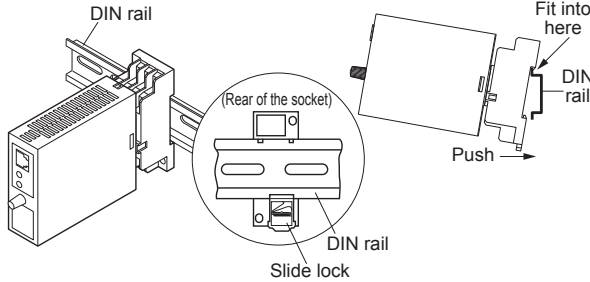


## 1.3 Mounting Using a Multi-mounting Base

For mounting using a multi-mounting base, see the Instruction Manual for VJCE (VJ Mounting Base).

## 1.4 Using a Duct

Wiring duct should be installed at least 30 mm away from the top and bottom faces of the main unit.

# 2. INSTALLATION LOCATIONS

- Avoid the following environments for installation locations: Areas with vibrations, corrosive gases, dust, water, oil, solvents, direct sunlight, radiation, a strong electric field, and/or a strong magnetic field, direct radiant heat, wind, temperature fluctuation, 2,000 m or more above sea level.
- If there is any risk of a surge being induced into the power line and/or signal lines due to lightning or other factors, a dedicated lightning arrester should be used as protection for both the product and a field-installed device.
- Operating temperature/humidity range: -10 to 55°C (-10 to 45°C for side-by-side mounting*)/5 to 90%RH (no condensation)
  * If the previous model (style S3.xx earlier) is installed together, the ambient temperature is 0 to 40°C.
- Continuous vibration: (at 5 to 9 Hz) Half amplitude of 3 mm or less (at 9 to 150 Hz) 9.8m/s$^2$ 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

# 3. EXTERNAL WIRING

## WARNING

- **To avoid the risk of an electric shock, turn off the power supply and use a tester or similar device to ensure that no power is supplied to a cable to be connected, before carrying out wiring work.**
- **Do not operate the product in the presence of flammable or explosive gases or vapors. To do so is highly dangerous.**
- **Use of the product ignoring the specifications may cause overheating or damage. Before turning on the power, ensure the following:**
  - Power supply voltage and input signal value applied to the product should meet the required specifications.
  - The external wiring to the terminals and wiring to ground are as specifications.

Wiring should be connected to the terminals on the socket of the VJRK. The terminals for external connections are of M3 screws. Use crimp-on lugs for connections to the terminals.

- It is recommended that signal wires have a nominal cross-sectional area of 0.5 mm$^2$ or thicker, while the power cable has a nominal cross-sectional area of 1.25 mm$^2$ or thicker.
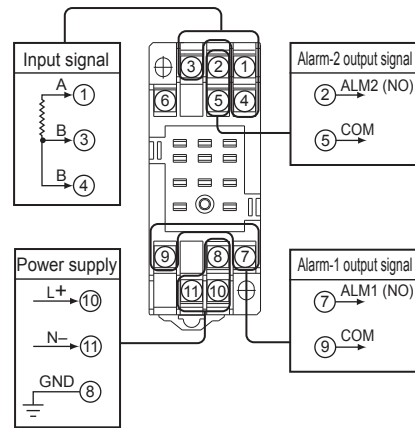


## CAUTION

- **The product is sensitive to static electricity; exercise care in operating it. Before you operate the product, touch a nearby metal part to discharge static electricity.**
- **If an inductance (L) load such as auxiliary relays or solenoid valves is used, always insert a spark killer for diminishing sparks, such as a CR filter or a diode in parallel with the inductance load. Otherwise a malfunction or relay failure may occur. Refer to the following guidelines for a capacitor and resistor:**
  Capacitor : 0.5 to 1 µF with respect to a contact current of 1 A
  Resistor: 0.5 to 1 Ω with respect to a contact voltage of 1 V
- **The power line and input/output signal lines should be installed away from noise-generating sources. Otherwise accuracy cannot be guaranteed.**
- **Make sure to earth ground the ground terminal through minimum resistance. The length and thickness of the grounding cable should be as short and thick as possible. Directly connect the lead from the ground terminal (terminal no. 8) of the product to the ground. Do not carry out daisy-chained inter-ground terminal wiring.**
- **If the ambient temperature is 50 °C or more, please use the cable that the rated temperature is 70 °C or more.**

# 4. DESCRIPTION OF FRONT PANEL AND CONNECTION OF SETTING TOOLS

## 4.1 Front Panel

The communications connector on the front panel is used for setting up parameters using a PC (VJ77 PC-based Parameters Setting Tool) or the Handy Terminal (JHT200). The alarm indicator lamps for alarm 1 and alarm 2 light up if an alarm occurs.
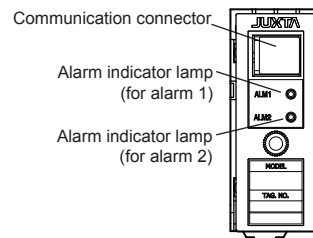
## 4.2 Connecting the Setting Tools

Connect the modular jack conversion adapter to the JUXTA communication cable with 5-pin connector and then connect this adapter to the communication connector of JUXTA.

<How to connect with the setting tool>
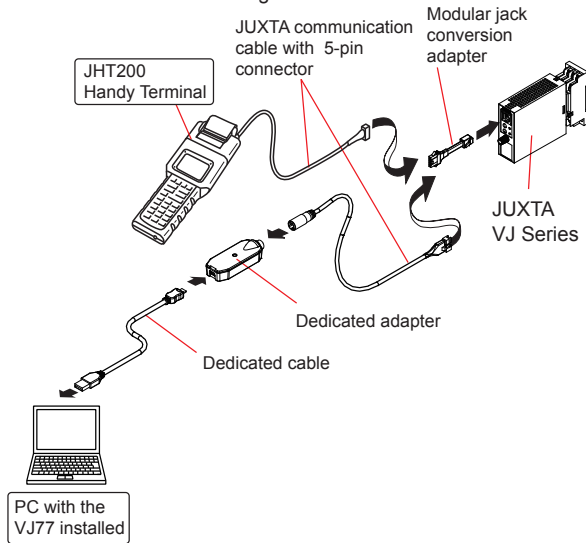


- Use the VJ77 of version R2.02.01 or later.
- The modular jack conversion adapter does not come with the JHT200 Handy Terminal. It is sold separately.

# 5. SETTING PARAMETERS

Set the parameters using a PC (VJ77 PC-based Parameters Setting Tool) or the Handy Terminal (JHT200). Refer to the list of parameters in this manual and the user's manual for VJ77 PC-based Parameters Setting Tool (IM 77J01J77-01E) or JHT200 Handy Terminal (IM 77J50H01-01EN).

⚠ **CAUTION**

For the input sensor type, input type and temperature unit, the default values of the input range, alarm setpoints and others are pre-defined according to the values to be selected. Set the parameters as follows.
1. Settings related to inputs: Set the parameters in order starting with (1).
   (1) Input sensor type
   (2) Input type
   (3) Temperature unit
   (4) Input range
2. Before setting the parameters related to alarm output and making the adjustments such as wiring resistance correction and output correction, set the parameters described in 1 above.
   If setting the parameters (1) to (3) in 1 above after setting the parameters related to alarm output or making the adjustment, the setpoint will be changed or the adjustment will be reset to the default.

## 5.1 Settings Related to Input

### 5.1.1 Input Type and Temperature Unit

Select the RTD type to use from among Pt100-90, Pt100-68, JPt100 and Pt50 in **[D09: RTD TYPE]**.
- Pt100-90: ITS-90 ($R_0$=100 Ω, $R_{100}/R_0$=1.3851)
- Pt100-68: IPTS-68 ($R_0$=100 Ω, $R_{100}/R_0$=1.3850)
- JPt100: JIS'89 ($R_0$=100 Ω, $R_{100}/R_0$=1.3916)
- Pt50: JIS'81

Select the temperature unit to use in **[D21: UNIT]**.

### 5.1.2 Input Range

Set the 0% value of input range in **[D24: INPUT1 L_RNG]** and the 100% value of input range in **[D25: INPUT1 H_RNG]** numerically within the specified range.

| Input type | Pt100 (ITS-90) | Pt100 (IPTS-68) | JPt100 (JIS'89) | Pt50 (JIS'81) |
|---|---|---|---|---|
| Measurable range (°C) | –200 to 850 | –200 to 660 | –200 to 510 | –200 to 649 |

### 5.1.3 Burnout

Select the direction of burnout action from among UP, DOWN and OFF in **[D39: BURN OUT]**.

### 5.1.4 Software Filter

Set the software filter in **[D57: S/W 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.

### 5.1.5 Wiring Resistance Correction

When an error occurs due to the influence of the input wiring resistance, the input can be corrected. Apply a stable input as shown below and select EXECUTE in **[P01: WIRING R]**. The correction is also required when the direction of burnout action is changed from UP (DOWN) to DOWN (UP) or the wiring for input is changed.



Short-circuit at the cable end.
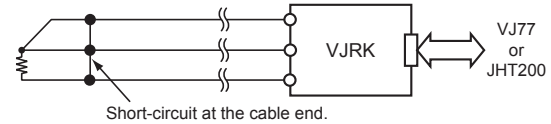
## 5.2 Settings Related to Alarm Output

### 5.2.1 Alarm Setpoint

Set the alarm setpoints of alarm 1 and alarm 2 in **[E01: SET POINT1]** and **[E02: SET POINT2]** numerically.
- Setting range: 0 to 100% of input range
- Setting resolution: 4 significant digits

### 5.2.2 Direction of Alarm Action

Select the direction of alarm-1 action and that of alarm-2 action from among HIGH ALM (high-limit alarm) and LOW ALM (low-limit alarm) in **[E05: ALM1 ACTION]** and **[E06: ALM2 ACTION]**.
- To activate alarm status when input signal ≥ alarm setpoint, select HIGH ALM.
- To activate alarm status when input signal ≤ alarm setpoint, select LOW ALM.

### 5.2.3 Hysteresis

Set the alarm-1 and alarm-2 hysteresis in **[E07: HYSTERESIS1]** and **[E08: HYSTERESIS2]**. Hysteresis is a value added to the alarm setpoint in order for an alarm status to be released (to normal) after the alarm status has been activated. The alarm status will be released in the following conditions, depending on the direction of alarm action.
* When HIGH ALM (high-limit alarm) is set: Alarm is released when input signal < (alarm setpoint - hysteresis).
* When LOW ALM (low-limit alarm) is set: Alarm is released when input signal > (alarm setpoint + hysteresis).
- Setting range: 0 to 100% of input range
- Setting resolution: 4 significant digits

### 5.2.4 Alarm ON Delay and Alarm OFF Delay

Set the alarm-1 and alarm-2 ON delays in **[E11: ON DELAY1]** and **[E12: ON DELAY2]** and then alarm-1 and alarm-2 OFF delays in **[E13: OFF DELAY1]** and **[E14: OFF DELAY2]**.
An alarm ON delay is the condition monitoring time from the establishment of alarm conditions to its output; an alarm OFF delay is the condition monitoring time from the establishment of return-to-normal conditions to its output.
- Setting range: 0 to 999 seconds
- Setting resolution: 1 second (However, about 0.2 second is to be added to the set time to prevent wrong operation.)

For example, when an alarm ON delay is set to 1 second, alarm output is generated if alarm status continues for 1 second or more after the input value exceeds the alarm setpoint. Further, when an alarm OFF delay is set to 2 seconds, alarm output is released if normal condition continues for 2 seconds or more after the input value has returned to normal from the alarm status.
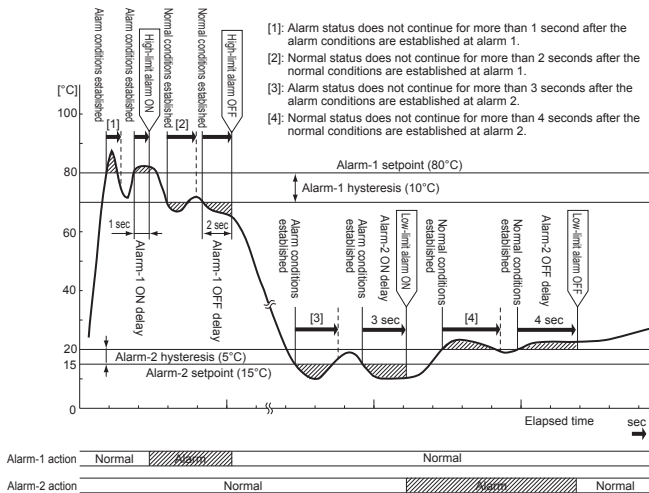
### 5.2.5 Direction of Relay Action

Select the direction of relay energizing in alarm-1 normal condition and alarm-2 normal condition from among NRM DE-ENERGIZED (de-energized under normal condition) and NRM ENERGIZED (energized under normal condition) in **[E15: RL1 ACTION]** and **[E16: RL2 ACTION]** and set them.

# 6. DESCRIPTION OF ALARM ACTIONS

This chapter describes examples of alarm actions under the following conditions.

| Item | Alarm 1 | | Alarm 2 | |
|---|---|---|---|---|
| | **Parameter** | **Setpoint** | **Parameter** | **Setpoint** |
| Direction of alarm action | E05 : ALM1 ACTION | High-limit alarm | E06 : ALM2 ACTION | Low-limit alarm |
| Alarm setting | E03 : SET POINT1 | 80°C | E04 : SET POINT2 | 15°C |
| Hysteresis | E09 : HYSTERESIS1 | 10°C | E10 : HYSTERESIS2 | 5°C |
| Alarm ON delay | E11 : ON DELAY1 | 1 sec | E12 : ON DELAY2 | 3 sec |
| Alarm OFF delay | E13 : OFF DELAY1 | 2 sec | E14 : OFF DELAY2 | 4 sec |
| Description of alarm actions | The alarm is output if the condition where the input value is 80°C or more of high-limit alarm continues for 1 second or more. After the alarm is output, when the condition where the input value is less than 70°C of high-limit alarm continues for 2 seconds or more, the status returns to normal. | | The alarm is output if the condition where the input value is 15°C or less of low-limit alarm continues for 3 seconds or more. After the alarm is output, when the condition where the input value is more than 20°C of low-limit alarm continues for 4 seconds or more, the status returns to normal. | |



[1]: Alarm status does not continue for more than 1 second after the alarm conditions are established at alarm 1.
[2]: Normal status does not continue for more than 2 seconds after the normal conditions are established at alarm 1.
[3]: Alarm status does not continue for more than 3 seconds after the alarm conditions are established at alarm 2.
[4]: Normal status does not continue for more than 4 seconds after the normal conditions are established at alarm 2.

# 7. LIST OF PARAMETERS

| | DISPLAY | ITEM | |
|---|---|---|---|
| | MODEL | Model | |
| | TAG NO | Tag No. | |
| | SELF CHK | Self-check result | |
| **A** | **DISPLAY1** | **Display 1** | |
| A01 | INPUT1 | Input value 1 | |
| A09 | OUTPUT1 | Output value 1 | |
| A15 | ALM1 STATUS | Alarm-1 status | |
| A16 | ALM2 STATUS | Alarm-2 status | |
| A54 | STATUS | Status | *1 |
| A56 | REV NO | Rev No. | |
| A58 | MENU REV | Menu Rev | |
| A60 | SELF CHK | Self-check result | |
| **B** | **DISPLAY2** | **Display 2** | |
| B01 | INPUT1 | Input value 1 | |
| B09 | OUTPUT1 | Output value 1 | |
| B15 | ALM1 STATUS | Alarm-1 status | |
| B16 | ALM2 STATUS | Alarm-2 status | |
| B60 | SELF CHK | Self-check result | |
| **D** | **SET (I/O)** | **Setting (I/O)** | |
| D01 | TAG NO.1 | Tag no.1 | |
| D02 | TAG NO.2 | Tag no.2 | |
| D03 | COMMENT1 | Comment 1 | |
| D04 | COMMENT2 | Comment 2 | |
| D09 | RTD TYPE | RTD type | |
| D21 | UNIT | Unit | |
| D24 | INPUT1 L_RNG | Input-1 low range | |
| D25 | INPUT1 H_RNG | Input-1 high range | |
| D39 | BURN OUT | Burnout | |
| D57 | S/W FILTER | Software filter | *2 |

| | | | |
|---|---|---|---|
| D59 | NMRR | Frequency setting | |
| D60 | SELF CHK | Self-check result | |
| **E** | **SET(ALM)** | **Setting (alarm output)** | *2 |
| E01 | SET POINT1 | Alarm-1 setting (temperature) | |
| E02 | SET POINT2 | Alarm-2 setting (temperature) | |
| E05 | ALM1 ACTION | Direction of alarm-1 action | |
| E06 | ALM2 ACTION | Direction of alarm-2 action | |
| E07 | HYSTERESIS1 | Alarm-1 hysteresis (temperature) | |
| E08 | HYSTERESIS2 | Alarm-2 hysteresis (temperature) | |
| E11 | ON DELAY1 | Alarm-1 ON delay setting | |
| E12 | ON DELAY2 | Alarm-2 ON delay setting | |
| E13 | OFF DELAY1 | Alarm-1 OFF delay setting | |
| E14 | OFF DELAY2 | Alarm-2 OFF delay setting | |
| E15 | RL1 ACTION | Direction of alarm-1 relay action | |
| E16 | RL2 ACTION | Direction of alarm-2 relay action | |
| E60 | SELF CHK | Self-check result | |
| **P** | **ADJUST** | **Adjustment** | *2 |
| P01 | WIRING R | Wiring resistance correction | |
| P04 | IN1 ZERO ADJ | Zero adjustment of input 1 | |
| P05 | IN1 SPAN ADJ | Span adjustment of input 1 | |
| P60 | SELF CHK | Self-check result | |
| **Q** | **TEST** | **Test** | *2 |
| Q10 | ALM1 TEST | Forced output (alarm 1) | |
| Q11 | ALM2 TEST | Forced output (alarm 2) | |
| Q60 | SELF CHK | Self-check result | |

*1 The status is displayed for service personnel to see history records.
*2 The parameters are the items to be set at the factory.

# 8. MAINTENANCE

The product enters the operable status as soon as the power is turned on, but requires 10 to 15 minutes of warm-up to meet the performance requirements.

## 8.1 Calibration Apparatus

- 6-dial decade resistance box (YOKOGAWA 279301 or equivalent): 1
- Digital Multimeter (YOKOGAWA 7561 or equivalent): 1
- Setting tool for adjustment (Refer to "4.2 Connecting the Setting Tools" in this manual.)

## 8.2 Calibration Procedure

1. Connect the instruments as shown in figure below.
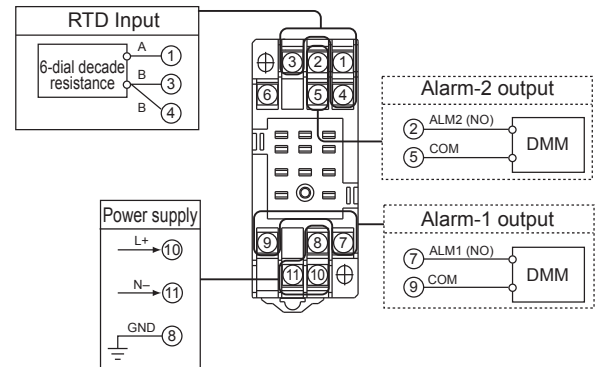


2. Produce the input signal equivalent to 0% of the input range from the 6-dial decade resistance box to the product.
3. Then, read the input value of Display items, "A01: INPUT1" using the VJ77 or JHT200 and check that the input value is within the rated accuracy range.
4. Take the same procedure for the input signal equivalent to 25, 50, 75 and 100% of the input range and check that the input values are within the rated accuracy range.

For alarm output, check the relay action by the alarm indicator lamp or resistance of output terminals.
- Use the setting tool (VJ77 Parameter Setting Tool or JHT200 Handy Terminal) to adjust the output signals.
User's Manual for VJ77 [Document No.: IM 77J01J77-01E]
User's Manual for JHT200 [Document No.: IM 77J50H01-01EN]

# 9. 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)

⚠ **CAUTION**

**Keep this product in a conductive bag when plugged out, during transport or storage.**