# General Specifications

Model MVTK
Digital Limit Alarm (Thermocouple Input Type)
with Active Color PV Display

JUXTA

GS 77J04T31-01E

## ■ General

*This plug-in type Digital Limit Alarm for thermocouple input receives thermocouple signal. It is equipped with Active color PV display (PV display color changing function).*

- Either 2 points of alarms (relay transfer contact [1a1b], 2 points) or 4 points of alarms (relay NO contact, 4 points) can be selected.
- An alarm status in the event of an alarm can be recognized.
- Equipped with easy-to-see large LED display as standard.
- Using the economical mode enables the low power consumption operation (normal operation: approx. 0.5 W, 1 VA).
- Input range and each parameter setting can be changed by the operation keys on the front panel.
- Can be equipped with monitor output (1 to 5 V DC, 4 to 20 mA DC or RS-485 communication).

## ■ Model and Suffix Codes

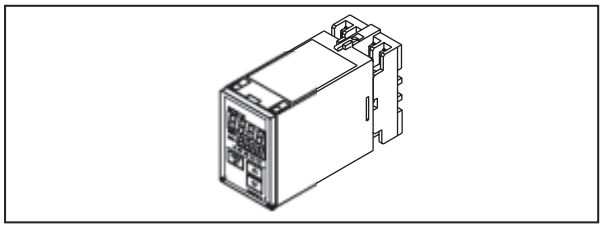
**MVTK-** □ **0** □ **-** □ □ □ □ **/**□

**Model**
**Type**
0: General use type
**Power Supply**
3: 24 V DC±10%
6: 100-240 V AC/DC (Operating range: 85 to 264 V)
**Input Signal**
U: Thermocouple input
Z: Custom order
**Output Signal**
1: Alarm output (transfer contact [1a1b]), 2 points
2: Alarm output (NO contact), 4 points
**Monitor Output**
6: 1 to 5 V DC
A: 4 to 20 mA DC
P: Communication function (RS-485)
N: No monitor output
**Burnout Function**
U: UP
D: DOWN
N: OFF
**Optional Specification**
/SN: Without socket

## ■ Ordering Information

Specify the model and suffix codes at the time of order.

- Model and suffix codes: e.g. MVTK-006-U1NN
- Input range: e.g. Range code No. 1



## ■ Input and Display Specificaitons

Number of inputs: 1 point
Signal type: Thermocouple (ITS-90)
Type K (CA), T (CC), E (CRC), J(IC), R, S, B (RH), N, W3 (Note 1), W5 (Note 2)

Note 1: Type W3 is W97Re3-W75Re25 (tungsten 97% rhenium 3%-tungsten 75% rhenium 25%). The abbreviation of ASTM E988 Standard.
Note 2: Type W5 is W95Re5-W74Re26 (tungsten 95% rhenium 5%-tungsten 74% rhenium 26%). The abbreviation of ASTM E988 Standard.

Input range: Within the instrument input range

| Range code No. | Input type | Instrument input range |
|---|---|---|
| 1 | Type K | -200 to 1200 °C (M range) |
| 2 | | -60.0 to 600.0°C (L range) |
| 3 | Type E | -199.9 to 800.0°C (M range) |
| 4 | | -40.0 to 350.0°C (L range) |
| 5 | Type J | 0.0 to 750.0°C (M range) |
| 6 | | 0.0 to 450.0°C (L range) |
| 7 | Type T | -199.9 to 350.0°C (M range) |
| 8 | | -70.0 to 350.0°C (L range) |
| 9 | Type R | 0 to 1600 °C (L range) |
| 10 | Type S | 0 to 1600 °C (L range) |
| 11 | Type B | 600 to 1700 °C (L range) |
| 12 | Type N | -200 to 1200 °C (M range) |
| 13 | | -199.9 to 710.0°C (L range) |
| 14 | Type W3 | 0 to 2000 °C (M range) |
| 15 | | 0 to 1390 °C (L range) |
| 16 | Type W5 | 0 to 2000 °C (M range) |
| 17 | | 0 to 1560 °C (L range) |
| 21 | Type K | 80 to 1470 K (M range) |
| 22 | | 210.0 to 875.0 K (L range) |
| 23 | Type E | 80 to 1070 K (M range) |
| 24 | | 230.0 to 620.0 K (L range) |
| 25 | Type J | 273 to 1020 K (M range) |
| 26 | | 273.0 to 730.0 K (L range) |
| 27 | Type T | 80.0 to 620.0 K (M range) |
| 28 | | 210.0 to 620.0 K (L range) |
| 29 | Type R | 273 to 1870 K (L range) |
| 30 | Type S | 273 to 1870 K (L range) |
| 31 | Type B | 1120 to 1970 K (L range) |
| 32 | Type N | 80 to 1470 K (M range) |
| 33 | | 170.0 to 980.0 K (L range) |
| 34 | Type W3 | 273 to 2270 K (M range) |
| 35 | | 273 to 1660 K (L range) |
| 36 | Type W5 | 273 to 2270 K (M range) |
| 37 | | 273 to 1830 K (L range) |



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1st Edition : Aug. 2006 (YK)

Input resistance: 1 MΩ (during power on), 4 kΩ (during power off)
Allowable leadwire resistance: 500 Ω or less
However, when used with BARD, this value can be added to the BARD internal resistance.
Maximum allowable input: ±4 V DC
PV (measured value) display: 4-digit, 7-segment, red/green LED, character height of 13.5 mm
Data display: 4-digit, 7-segment, green LED, character height of 9 mm
Alarm indicator lamp: 2 orange LEDs for 2 points of alarms or 4 orange LEDs for 4 points of alarms. Lights up if an alarm occurs.
Economical mode: Turns off the indicating LED if no keystroke is made within the set time.
Setting range: 0 (does not go off) or 1 to 60 minutes
Active color PV display (PV display color changing function): This function changes the PV display color from green to red or from red to green according to the set PV display color mode shown below.
[PV display color mode to be set]
Link to alarm 1: Links to alarm 1.
Link to alarm 1 and alarm 2: Links to alarm 1 and alarm 2.
Link to alarm 1 to alarm 4 (only for 4 points of alarms): Links to alarm 1 to alarm 4.
SP deviation: Changes the PV display color according to whether measured value is within or out of the set SP deviation. The deviation range (high and low limits) can be changed using a parameter.
PV limit: Changes the PV display color according to whether measured value is within or out of the set measured range. The range (high and low limits) can be changed using a parameter.
Fixed color: Fixes PV display color in green or red.

## ■ Output Specifications

Signal type: Relay contact
Number of outputs: 2 points of contact outputs (transfer contact [1a1b]) or 4 points of contact outputs (NO contact)
Contact rating: 120 V AC/1 A, 220 V AC/0.5 A (resistance load); 30 V DC/1 A, 120 V DC/0.1 A (resistance load)
Alarm action:

| Alarm action | Relay action |
|---|---|
| PV high-limit alarm | Energized or de-energized under normal condition |
| PV low-limit alarm | Energized or de-energized under normal condition |
| Deviation high-limit alarm | Energized or de-energized under normal condition |
| Deviation low-limit alarm | Energized or de-energized under normal condition |
| Deviation high and low-limit alarm | De-energized under normal condition |
| Deviation within high and low-limit alarm | De-energized under normal condition |

Stand-by action can be set to each alarm in the table above.
Stand-by action: Stand-by action turns off the PV (measured value) and deviation alarms during the start-up of control and does not allow them to resume until the operation stabilizes.
Alarm setting range: Within the input range
Setting resolution: 1 digit (Note 3)
Setpoint setting: Virtual setpoint when the deviation alarm occurs
Setting range: Within the input range
Setting resolution: 1 digit (Note 3)
Hysteresis setting range: The value resulting from adding a hysteresis value to an alarm setpoint should be within the input range.
Setting resolution: 1 digit (Note 3)
Note 3: The content of 1 digit is variable according to the set range code No.
Alarm ON delay setting: Condition monitoring time from the establishment of alarm 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.)
Alarm OFF delay setting: 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.)

## ■ Monitor Output

● **Analog Output**

Output signal: 1 to 5 V DC or 4 to 20 mA DC
Allowable load resistance:
2 kΩ or more for 1 to 5 V DC
350 Ω or less for 4 to 20 mA DC
Output variable range: -6 to +106%
Output scaling: Set any value within the measured input range (Note 4).

Note 4: Set the value so that the input range corresponding to the output scaling converted into thermoelectromotive force is 3 mV or more.

Output accuracy: ±0.1% of output span
However, the accuracy is limited in the following cases according to the output scaling setting.

When the input range corresponding to the output scaling converted into thermoelectromotive force is less than 27.5 mV in the instrument input range M:

$$\text{Accuracy} = \frac{\pm 0.1\ (\%) \times 27.5\ (\text{mV})}{\text{Input range converted into thermoelectromotive force (mV)}}\ (\%)$$

When the input range corresponding to the output scaling converted into thermoelectromotive force is less than 10 mV in the instrument input range L:

$$\text{Accuracy} = \frac{\pm 0.1\ (\%) \times 10\ (\text{mV})}{\text{Input range converted into thermoelectromotive force (mV)}}\ (\%)$$

● **Communication Output (RS-485)**

The MVTK can be connected to a personal computer, graphic panel, Yokogawa's programmable controller FA-M3 or programmable controllers of other manufacturers.

Standards: EIA RS-485
Maximum number of connectable units:
31 units
Maximum communication distance: 1200 m
Communication method: 2-wire half duplex, start-stop synchronization, non-procedural
Baud rate: 1200, 2400, 4800 or 9600 bps
Data length: 8 or 7 bits
Stop bit: 1 or 2 bits
Parity: Even, odd 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 or 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.

## ■ Standard Performance

Input display accuracy: ±0.1%±1 digit of instrument input range span
Alarm action point setting accuracy: ±0.1%±1 digit of instrument input range span
Reference junction compensation accuracy:
±1°C (other than Type R and S)
±2°C (Type R and S)
at 25°C±15°C
Response speed: 500 ms (Time to alarm output when the input change is 10 to 90% and alarm setpoint is 50%. When the alarm delay setting and hysteresis are minimum.)
Burnout: UP, DOWN or OFF
Burnout time: 60 seconds or less
Action: High-limit alarm output for UP
Low-limit alarm output for DOWN
Insulation resistance: 100 MΩ/500 V DC between inputs, alarm outputs, power supply and monitor output mutually.
Withstand voltage: 2000 V AC/minute between inputs, (alarm outputs 1, 2, 3 and 4), monitor output and power supply mutually.
However, the following is excluded.
1000 V AC/minute between (alarm outputs 1 and 4) and (alarm outputs 2 and 3) and between inputs and monitor output.

Note 5: For 2 points of alarms, alarm outputs 3 and 4 are excluded.

Power supply voltage: 24 V DC±10%
100-240 V AC/DC (-15%, +10%) 50/60 Hz
Power consumption: 24V DC 2.7 W, 110V DC 2.5W
100 V AC 4.2 VA, 200 V AC 5.4 VA
Effect of power supply fluctuation: ±0.1% of span or less for the fluctuations within the allowable range of each power supply specification
Effect of ambient temperature change: ±0.2% of span or less for a temperature change of 10°C
Effect of leadwire resistance change: ±15 μV or less for a change of 100 Ω

## ■ Mounting, Appearance and Environmental Conditions

Construction: Plug-in type
Material: Casing: ABS resin (black), UL94 V-0
Socket: Modified polyphenylene oxide resin, including glass fiber (black), UL94 V-1
Mounting method: Wall or DIN rail mounting
For side-by-side mounting, provide spacing of 5 mm or more between the products.
Connection method: M3.5 screw terminal for input/output and power supply
3-pin 2-piece connector for monitor output
External dimensions: 51 (W) x 86.5 (H) x 133 (D) mm (including a socket)
Weight: Main unit: approx. 270 g
Socket: approx. 80 g
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.

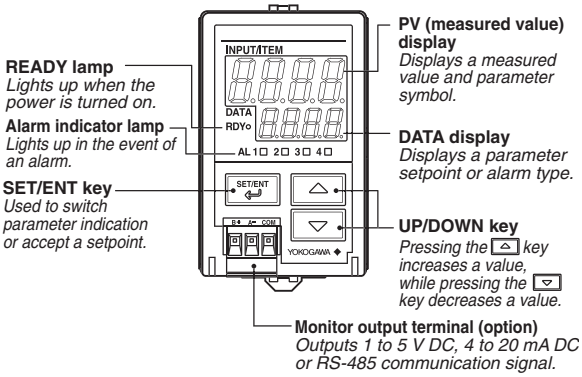
## ■ Accessories

Tag number label: 1 sheet
Range label: 1 sheet
RJC sensor (reference junction compensator): 1
Spacer (used for DIN rail mounting): 1

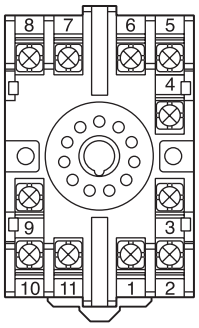
## ■ Initial Values (Factory-set Values)

| Item | | Initial value | |
|---|---|---|---|
| | | 2 points of alarms | 4 points of alarms |
| Range code No. | | 1<br>Input type: Type K<br>Instrument input range:<br>–200 to 1200°C | |
| Economical mode | | 10 minutes | |
| Active color PV display | | 1 (fixed in red) | |
| Direction of alarm action | Alarm 1 | Low-limit alarm | Low-limit alarm |
| | Alarm 2 | High-limit alarm | Low-limit alarm |
| | Alarm 3 | ———— | High-limit alarm |
| | Alarm 4 | ———— | High-limit alarm |
| Alarm setting | Alarm 1 | 20°C | 20°C |
| | Alarm 2 | 80°C | 30°C |
| | Alarm 3 | ———— | 70°C |
| | Alarm 4 | ———— | 80°C |
| Hysteresis (For all of alarms 1, 2, 3 and 4) | | 3°C | 3°C |
| Alarm ON delay | | 0 second | 0 second |
| Alarm OFF delay | | 0 second | 0 second |
| When the monitor output code “6” or “A” is specified | | | |
| Monitor output | | A value that –200 to +1200°C is equivalent to 0 to 100%. | |
| When the monitor output code “P” is specified | | | |
| Address | | 01 | |
| Baud rate | | 9600 | |
| Parity | | Even | |
| Data length | | 8 bits | |
| Stop bit | | 1 bit | |
| Protocol | | PC link | |

## ■ Front Panel




## ■ Terminal Assignments



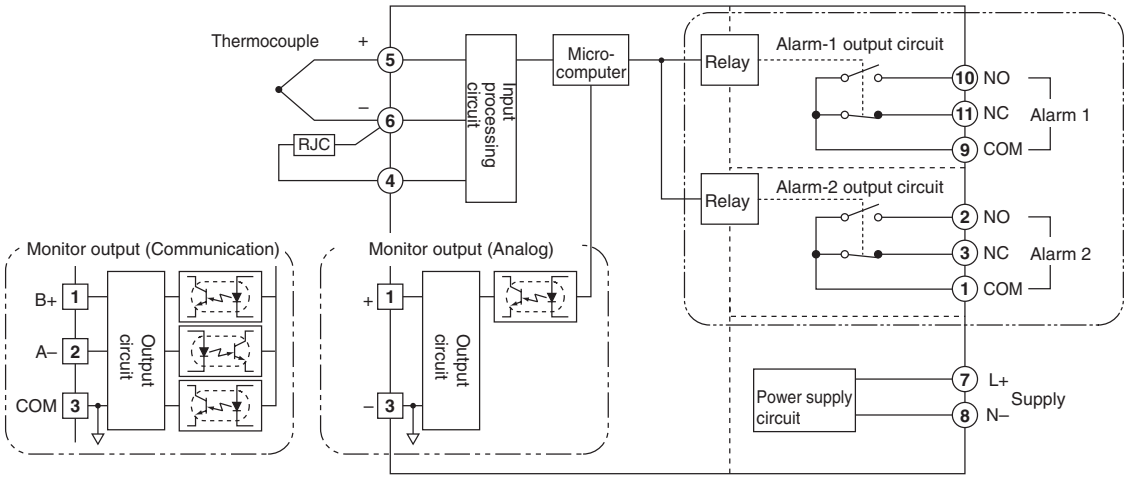

MVTK-0□□-□1□□

| Terminal No. | Signal | |
|---|---|---|
| 1 | Alarm 2 | (COM) |
| 2 | Alarm 2 | (NO) |
| 3 | Alarm 2 | (NC) |
| 4 | Input | |
| 5 | Input | (+) |
| 6 | Input | (–) RJC |
| 7 | Supply | (L+) |
| 8 | Supply | (N–) |
| 9 | Alarm 1 | (COM) |
| 10 | Alarm 1 | (NO) |
| 11 | Alarm 1 | (NC) |

MVTK-0□□-□2□□

| Terminal No. | Signal | |
|---|---|---|
| 1 | Alarm 2, 3 | (COM) |
| 2 | Alarm 2 | (NO) |
| 3 | Alarm 3 | (NO) |
| 4 | Input | |
| 5 | Input | (+) |
| 6 | Input | (–) RJC |
| 7 | Supply | (L+) |
| 8 | Supply | (N–) |
| 9 | Alarm 1, 4 | (COM) |
| 10 | Alarm 1 | (NO) |
| 11 | Alarm 4 | (NO) |

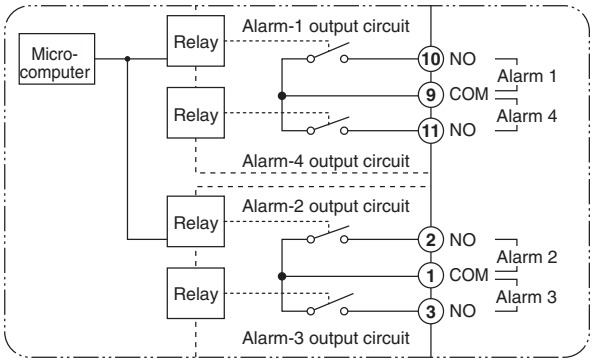
## ■ Block Diagrams




Note: The numbers in "◯" indicate the terminal numbers of socket.
The numbers in "□" indicate the monitor output terminals. The left most number is "1."

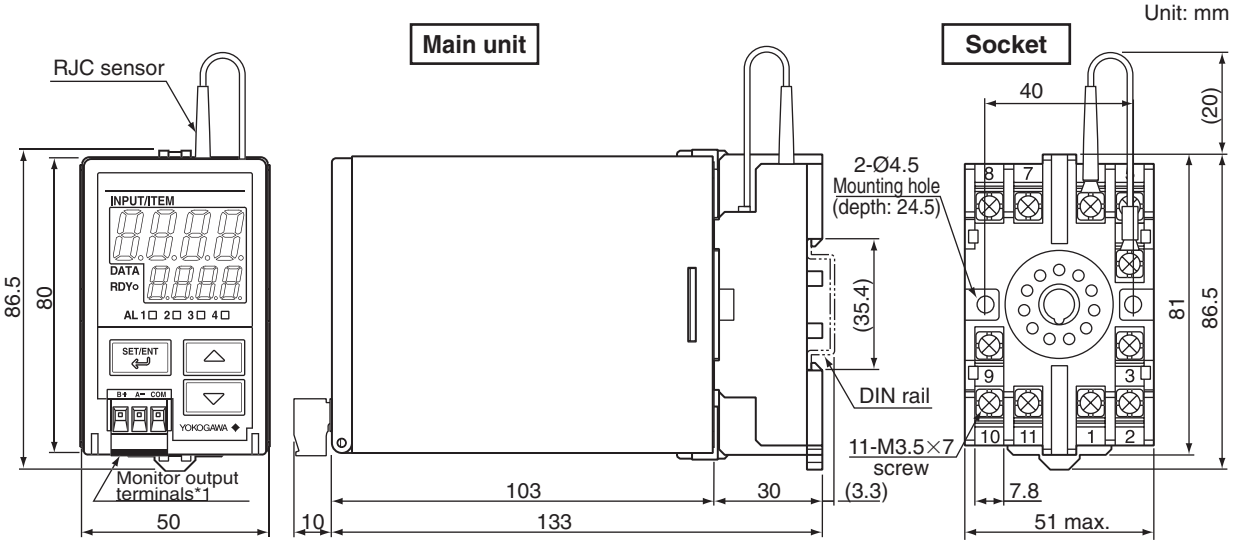
[Notes about the contact configuration for 2 points of alarms]
Transfer contacts for 2 points of alarms consist of an NO contact and an NC contact. When using transfer contacts, consideration should be given to the risk of a short circuit due to contact MBB*1 resulting from non-concurrent action of the NO and NC contacts or to a short ciucuit caused by arcs produced when opening a contact at large current.
*1: The condition where both NO and NC contacts close when the contact actuates

For 4 points of alarm outputs



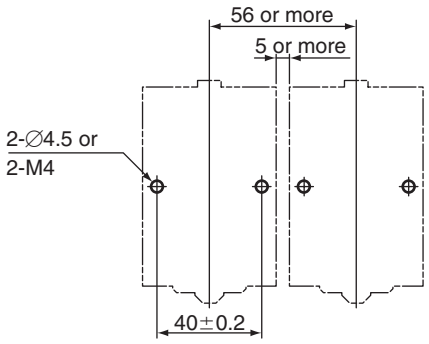
## ■ External Dimensions

Unit: mm




*1 To be added when the monitor output is specified.

<Mounting Dimensions>




Note:
- For side-by-side mounting, provide spacing of 5 mm or more between the products.
- For DIN rail mounting, use the supplied spacer to provide spacing of 5 mm between the products.