

General Specifications

Model MVHK Limit Alarm for DC Input (with Active Color PV Display)

JUXTA

GS 77J04H31-01E

■ General

This plug-in type Limit Alarm for DC input receives DC current or DC voltage 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), 4 points of alarms (relay NO contact, 4 points) or 2 points of alarms/1 point fail output can be selected.
- An alarm status in the event of an alarm can be recognized.
- Detects FAIL condition by self-diagnosis function (FAIL output type)
- 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

Model	MVHK-□ 0 □ - □ □ □ 0/□
Type	0: General use type 1: JK12 type (The terminal assignment is same as that of Yokogawa's JK12.) ^{(*)1} 2: Fail output type ^{(*)6}
Power Supply	3: 24 V DC±10% 6: 100-240 V AC/DC (Operating range: 85 to 264 V)
Input Signal	6: 1 to 5 V DC ^{(*)2} A: 4 to 20 mA DC (with 250 Ω receiving resistor) ^{(*)2} U: DC voltage or DC current signal (shipped with factory-set value) ^{(*)3} Z: Custom order
Output Signal	1: Alarm output (transfer contact [1a1b]), 2 points 2: Alarm output (NO contact), 4 points 3: Alarm output 2points, Fail output 1point ^{(*)6}
Monitor Output	6: 1 to 5 V DC A: 4 to 20 mA DC P: Communication function (RS-485) N: No monitor output
Optional Specification	/SN: No socket (with socket if not specified) /R100: With 100 Ω receiving resistor ^{(*)4} /R250: With 250 Ω receiving resistor ^{(*)5} /C0: Coating ^(Note 1) /FB: Fuse bypass ^(Note 2) /F1: Alarm 1: NO, Alarm 2: NO, Fail output: NO ^{(*)6} /F2: Alarm 1: NC, Alarm 2: NO, Fail output: NO ^{(*)6} /F3: Alarm 1: NO, Alarm 2: NC, Fail output: NO ^{(*)6} /F4: Alarm 1: NC, Alarm 2: NC, Fail output: NO ^{(*)6} /F5: Alarm 1: NO, Alarm 2: NO, Fail output: NC ^{(*)6} /F6: Alarm 1: NC, Alarm 2: NO, Fail output: NC ^{(*)6} /F7: Alarm 1: NO, Alarm 2: NC, Fail output: NC ^{(*)6} /F8: Alarm 1: NC, Alarm 2: NC, Fail output: NC ^{(*)6}



- *1: For the type code 1 (JK12 type), only output signal code 1 (2 points of alarm output c contact (1a1b)) can be specified.
- *2: For the input signal code "6," factory-set values are as follows: range code No.: 92; measured input range: 1 to 5 V DC.
For the input signal code "A," factory-set values are as follows: range code No.: 97; measured input range: 4 to 20 mA DC.
- *3: Refer to "Initial Values (Factory-set Values)."
- *4: Specify "/R100" when using the range code No. 95 or 96.
- *5: Specify "/R250" when using the range code No. 97 or 98.
- *6: For the type code 2 (FAIL output type), only output signal code 3 can be specified (the optional specifications /F1 to /F8 must be specified).

Note 1: "/C0" option: Polyurethane coating. The "/C0" 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 at the time of order.

- Model and suffix codes: e.g. MVHK-006-U1N0/R250

■ Initial Values (Factory-set Values)

The table below shows the factory-set values when the input signal code "U" is specified.

For the input signal code "6," the range code No. is "92" and measured input range is "1.00 to 5.00 V DC."

For the input signal code "A," the range code No. is "97" and measured input range is "4.00 to 20.00 mA DC."

See the table below for other factory-set values.

Item	Initial value	
	2 points of alarms	4 points of alarms
Range code No.	92	
Measured input range	-5.00 to +5.00 V DC	
Decimal point position of scaling value	1 (first decimal place)	
Input scaling value	0.0 to 100.0	

Continued on the next page

Item	Initial value		
	2 points of alarms		4 points of alarms
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	20.0	20.0
	Alarm 2	80.0	30.0
	Alarm 3	—	70.0
	Alarm 4	—	80.0
Hysteresis (For all of alarms 1, 2, 3 and 4)	1.0	1.0	
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 scaling value is equivalent to 0 to 100%. (Input range is output in linear.)		
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		

Input and Display Specifications

Input

Number of inputs: 1 point

Input signal: Set the measured input range within the instrument input range.

Range code No.	Instrument input range	Receiving resistor
91	-10.00 to +10.00 V DC	-----
92	-5.00 to +5.00 V DC	-----
93	-1.000 to +1.000 V DC	-----
95	0.00 to 50.00 mADC	100 Ω
96	0.00 to 10.00 mADC	100 Ω
97	0.00 to 20.00 mADC	250 Ω
98	0.000 to 4.000 mADC	250 Ω

Input resistance:

For voltage input: 1 MΩ (100 kΩ during power off)

For current input: 100 Ω or 250 Ω (with external receiving resistor)

Allowable input level:

Voltage input: Within ±30 V DC

Current input: Any level that satisfies the following condition,

$$(\text{Input current})^2 \times \text{Input resistance} \leq 0.5 \text{ W}$$

Display

Input scaling (displayed value): -1999 to 9999
(Decimal point position can be set.)

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.

FAIL indicator lamp: 1 red LED. Lights up in the fail state. (Type code 2 only)

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

Alarm output

Signal type: Relay contact

Number of outputs: 2 points of contact outputs (transfer contact [1a1b]) or 4 points of contact outputs (make contact)

- For type code 1: Contact output 2 points (transfer contact [1a1b] only)

- For type code 2: Contact output 2 points (NO contact and NC contact can be selected by optional specifications)

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 set input scaling value

Setting resolution: 1 digit ^(Note 3)

Setpoint setting: Virtual setpoint when the deviation alarm occurs

Setting range: Within the set input scaling value

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 range of set input scaling value.

Setting resolution: 1 digit ^(Note 3)

Note 3: The content of 1 digit is variable according to the input scaling value.

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.)

● Fail output (Type code 2 only)

Signal type: Relay contact

Number of outputs: 1 point of contact output (make contact and break contact can be selected by optional specifications)

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)

Fail status display: The FAIL indicator on the front lights up.

Fail output: Output relay contact in case of various errors ^(Note 4).
Energized during normal operation and de-energized on failure (same as power failure).

Note 4: EEP sum error, EEP error, AD error, ROM error, RAM error

■ Monitor Output

● Analog Output

Output signal: 1 to 5 V DC or 4 to 20 mA DC

Allowable load resistance:

2 k Ω or more for 1 to 5 V DC

350 Ω or less for 4 to 20 mA DC

Output resistance:

1 Ω or less for 1 to 5 V DC

500 k Ω or more for 4 to 20 mA DC

Output variable range: -6 to +106%

Output scaling: Set any value within the set input scaling value (displayed value).

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

When the range code is No. 91, 92, 95, 97, the input range corresponding to the output scaling is less than 4 V:

$$\text{Accuracy} = \frac{\pm 0.1 (\%) \times 4.0 (\text{V})}{\text{Corresponding input range (V)}} (\%)$$

When the range code is No. 93, 96, 98, the input range corresponding to the output scaling is less than 1 V:

$$\text{Accuracy} = \frac{\pm 0.1 (\%) \times 1.0 (\text{V})}{\text{Corresponding input range (V)}} (\%)$$

For current input, apply the value [input range x input resistance] to the above, and add the resistor error 0.1%.

● Communication Output (RS-485)

The MVHK 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, 9600, 19200, 38400 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: $\pm 0.1\% \pm 1$ digit of instrument input range span
For current input, add the resistor error 0.1%.

Alarm action point setting accuracy: $\pm 0.1\% \pm 1$ digit of instrument input range span
For current input, add the resistor error 0.1%.

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.)

Effect of power supply fluctuation: Within the accuracy range of span for power supply voltage fluctuation.

Effect of ambient temperature change: $\pm 0.2\%$ of span or less for a temperature change of 10 °C

■ Power Supply and Isolation

Power supply voltage: 24 V DC \pm 10%
100-240 V AC/DC (-15%, +10%) 50/60 Hz
Power consumption: 24V DC 3.0 W, 110V DC 2.5W
100 V AC 4.1 VA, 200 V AC 5.3 VA

For type code 2
24V DC 3.3 W, 110V DC 2.8W
100 V AC 4.5 VA, 200 V AC 5.8 VA

Insulation resistance: 100 M Ω /500 V DC between inputs, alarm outputs, power supply and monitor output mutually.

For type code 2
100 M Ω /500 V DC between inputs, (alarm outputs, fail output), power supply and monitor output mutually.

Withstand voltage: 2000 V AC/minute between inputs, (alarm outputs 1, 2, 3, 4), monitor output and power supply mutually.

However, the following is excluded.
1000 V AC/minute between (alarm outputs 1, 4) and (alarm outputs 2, 3) and between inputs and monitor output.

* For 2 points of alarms, alarm outputs 3 and 4 are excluded.

For type code 2
2000 V AC/minute between inputs, (alarm outputs 1, 2, fail output), monitor output and power supply mutually.
However, the following is excluded.
1000 V AC/minute between alarm output 1, alarm output 2 and fail output and between inputs and monitor output.

■ Environmental Conditions

Temperature: 0 to 50 °C (0 to 40 °C for multiple mounting)

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.

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) 4.9 m/s² or less, 1 oct/min for 90 minutes each in the 3-axis directions.

Impact *: 98 m/s² or less, 11 msec, 3-axis 3 times each in 6 directions.

* Type code 2 is an environment without vibration and impact

Altitude: 2000 m or less.

Warm-up time: At least 30 minutes after power on.

■ Transport and Storage Conditions

Ambient temperature: -25 to 70 °C

Temperature change rate: 20 °C per hour or less

Ambient humidity: 5 to 95 %RH (no condensation)

■ Mounting and Appearance

Construction: Plug-in type

Material: Casing: ABS + polycarbonate resin resin (black)

Socket: Modified polyphenylene oxide resin, including glass fiber (black)

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: 86.5 (H) × 51 (W) × 132 (D) mm (including a socket)

Weight: Main unit: 200 g or less

Socket: 80 g or less

■ Accessories

Tag number label: 1 sheet

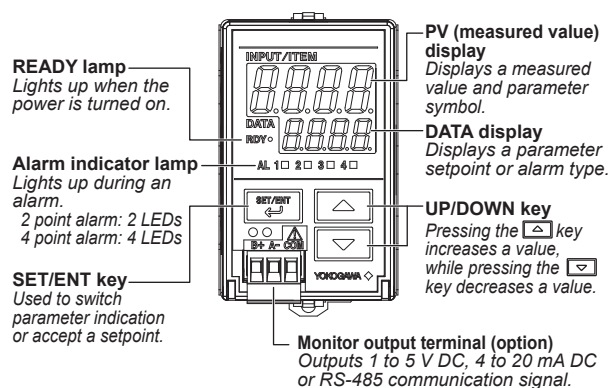
Range label: 1 sheet

Receiving resistor: 1 (supplied when the optional specification code "/R100," "/R250" or the input signal code "A" is specified)

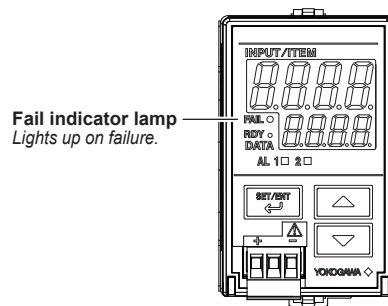
Spacer (used for DIN rail mounting): 1

Monitor output terminal connector: 1 (supplied when monitor output code 6, A, P is specified)

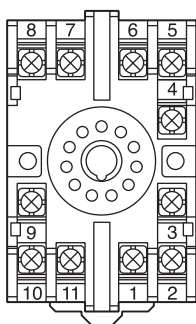
■ Front Panel



● For type code 2



Terminal Assignments



For MVHK-0□□-□1□□

Terminal No.	Signal	
1	Alarm 2	(COM)
2	Alarm 2	(NO)
3	Alarm 2	(NC)
4	Do not use	
5	Input	(+)
6	Input	(-)
7	Supply	(L+)
8	Supply	(N-)
9	Alarm 1	(COM)
10	Alarm 1	(NO)
11	Alarm 1	(NC)

For MVHK-0□□-□2□□

Terminal No.	Signal	
1	Alarm 2, 3	(COM)
2	Alarm 2	(NO)
3	Alarm 3	(NO)
4	Do not use	
5	Input	(+)
6	Input	(-)
7	Supply	(L+)
8	Supply	(N-)
9	Alarm 1, 4	(COM)
10	Alarm 1	(NO)
11	Alarm 4	(NO)

For MVHK-1□□-□1□□

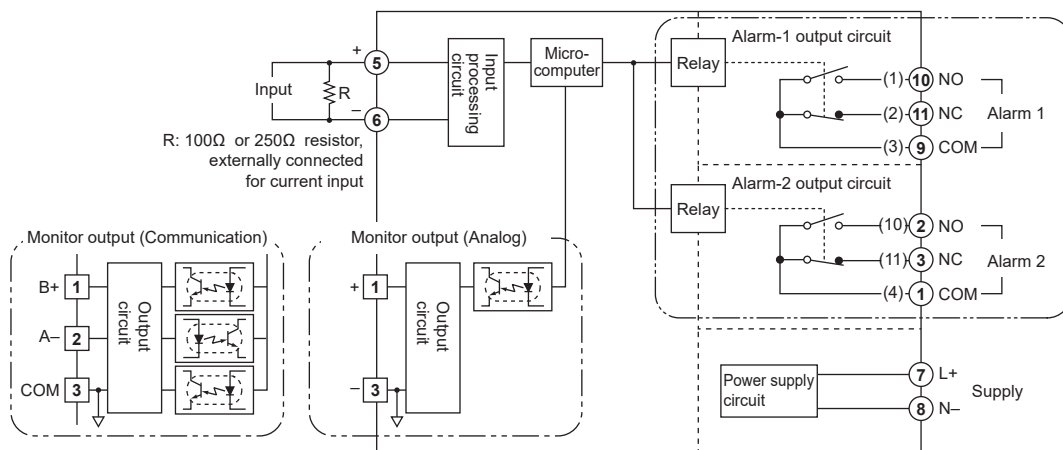
Terminal No.	Signal	
1	Alarm 1	(NO)
2	Alarm 1	(NC)
3	Alarm 1	(COM)
4	Alarm 2	(COM)
5	Input	(+)
6	Input	(-)
7	Supply	(L+)
8	Supply	(N-)
9	Do not use	
10	Alarm 2	(NO)
11	Alarm 2	(NC)

For MVHK-2□□-□3□□/□□

Terminal No.	Signal	
1	Alarm 1	(NO/NC) *
2	Alarm 1	(COM)
3	Fail output	(NO/NC) *
4	Fail output	(COM)
5	Input	(+)
6	Input	(-)
7	Supply	(L+)
8	Supply	(N-)
9	Do not use	
10	Alarm 2	(NO/NC) *
11	Alarm 2	(COM)

* NO, NC depends on the optional specifications specified at the time of ordering.

■ Block Diagrams

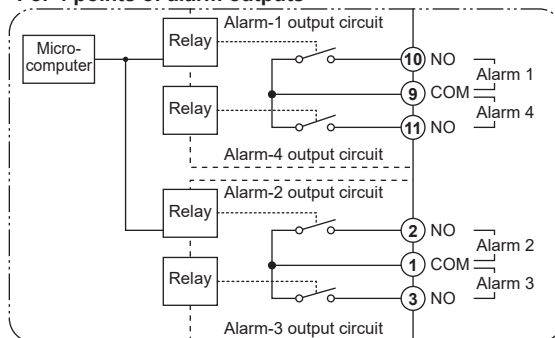


Note: The numbers in "○" indicate the terminal numbers of socket.
 The numbers in "□" indicate the monitor output terminals. The left most number is "1."
 The numbers in "(" indicate the terminal numbers when MVHK-1□□-□□□□ (JK12 type) is specified.
 JK12 type can be specified only for 2 points of alarms.

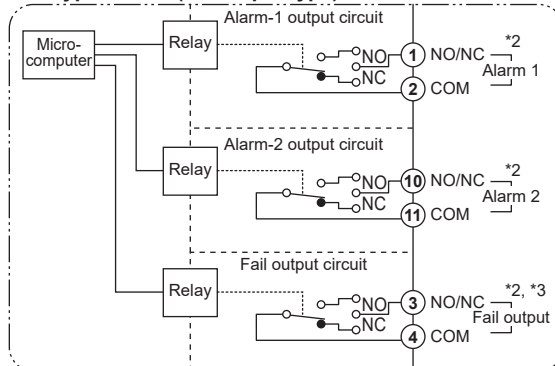
[Notes about the contact configuration for 2 points of alarms]
 Transfer contacts for 2 points of alarms consist of an NO contact and an NC contact. When using transfer contacts, consideration should be given to the risk of a short circuit due to contact MBB¹ resulting from non-concurrent action of the NO and NC contacts or to a short circuit 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



For type code 2 (fail output type)

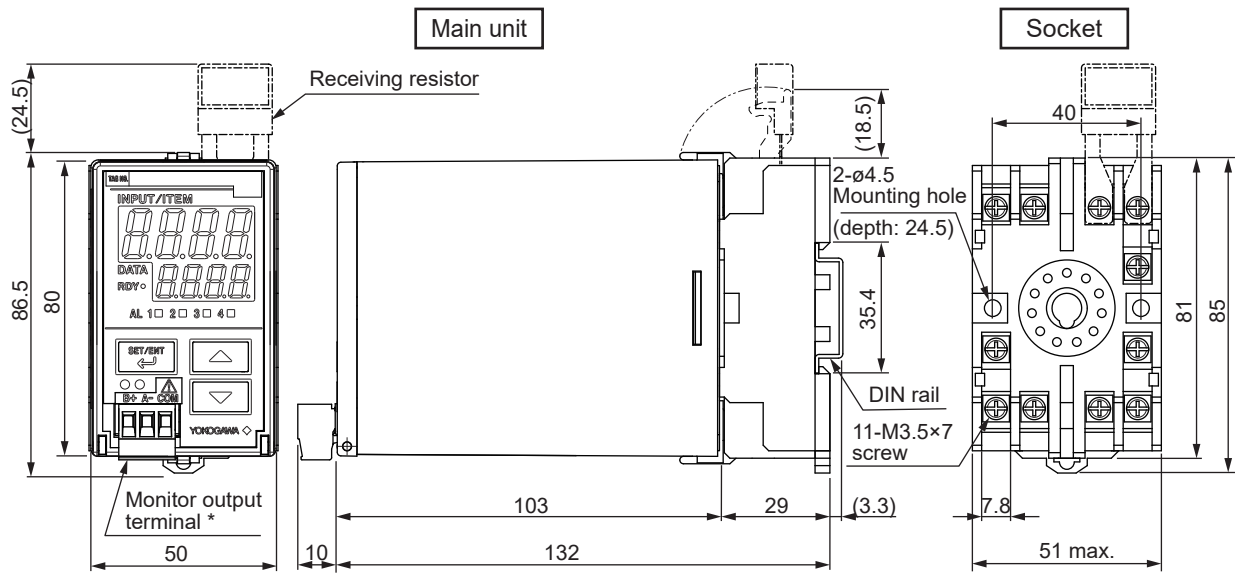


*2: The setting of NC or NO depends on the optional specifications at the time of order. This setting can not be changed after delivery.

*3: The relay operation at FAIL is de-energized.
 When NO is specified: The contact opens when it is FAIL.
 When NC is specified: The contact closes when it is FAIL.

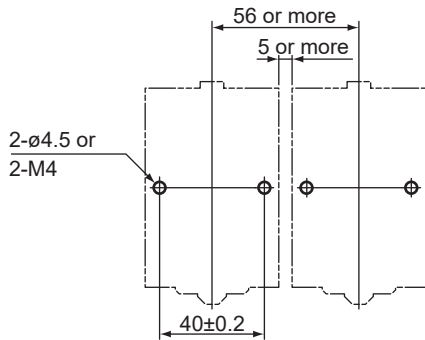
■ External Dimensions

Unit: mm



* To be added when the monitor output is specified.

Mounting Dimensions



Note:

- More than 5 mm interval is required for side-by-side close mounting.
- Use the supplied spacer for DIN rail mounting to keep 5 mm interval.

Normal Allowable Deviation= ± (Value of JIS B 0401-2016 tolerance grade IT18) / 2