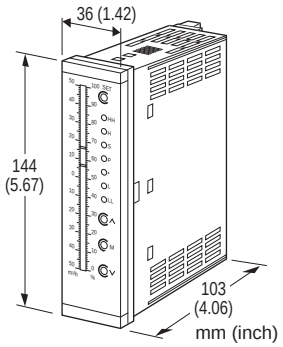
## Bargraph Indicators 48N Series

## BARGRAPH INDICATING ALARM

(thermocouple input)

**Functions & Features**

- Displays a process variable in graphic bargraph of 101 LED segments
- Provides max. 4 alarm contact outputs
- Multi-color indicator
- Linearization and burnout
- IP65 front cover
- Scale plate is easily replaced
- Separable terminal block




CE

## MODEL: 48NAT–[1][2][3][4]–[5][6]

## ORDERING INFORMATION

- Code number: 48NAT-[1][2][3][4]-[5][6]

Specify a code from below for each [1] through [6].
(e.g. 48NAT-42V2-R/CE/D/BL/Q)

- Temperature range (e.g. 0 – 500 °C)
- Bargraph scale (e.g. 0 – 100 %) (See 'Scale Plate.')
- Specify the specification for option code /Q (e.g. /SET)

### [1] ALARM OUTPUT

**2**: 2 points
**4**: 4 points

### [2] BAR LED COLOR

**R**: Red
**Y**: Amber
**G**: Green
**B**: Blue
**1**: Multi-color (red, orange and green), Pattern 1 (See 'External View.')
**2**: Multi-color (red, orange and green), Pattern 2 (See 'External View.')

### [3] MOUNTING DIRECTION

**V**: Vertical
**H**: Horizontal

### [4] INPUT THERMOCOUPLE

**1**: (PR) (Usable Range 0 to 1760°C, 32 to 3200°F)
**2**: K (CA) (Usable range -270 to +1370°C, -454 to +2498°F)
**3**: E (CRC) (Usable range -270 to +1000°C, -454 to +1832°F)
**4**: J (IC) (Usable range -210 to +1200°C, -346 to +2192°F)
**5**: T (CC) (Usable range -270 to +400°C, -454 to +752°F)
**6**: B (RH) (Usable range 0 to 1820°C, 32 to 3308°F)
**7**: R (Usable range -50 to +1760°C, -58 to +3200°F)
**8**: S (Usable range -50 to +1760°C, -58 to +3200°F)
**N**: N (Usable range -270 to +1300°C, -454 to +2372°F)

### [5] POWER INPUT

**AC Power**

**M:** 85 – 264 V AC (Operational voltage 85 – 264 V, 50/60 Hz (CE marking not available)

**M2**: 100 – 240 V AC (Operational voltage range 85 – 264 V, 50/60 Hz)

**DC Power**

**R**: 24 V DC
(Operational voltage range 24 V ±15 %, ripple 10 %p-p max.)

### [6] OPTIONS (multiple selections)

**Standards & Approvals**

**blank**: Without CE
**/CE**: CE marking

**Bezels**

**blank:** Bezels for M-System's 48 Series panel cutout
**/D**: Bezels for DIN panel cutout
**/F**: Bezels for Fuji Electric's PAJ, PAK, PBA panel cutout

**Burnout**

**blank**: Upscale burnout
**/BL**: Downscale burnout
**/BN**: No burnout

**Other Options**

**blank**: none
**/Q**: Option other than the above (specify the specification)

## SPECIFICATIONS OF OPTION: Q

**EX-FACTORY SETTING**

**/SET**: Preset according to the Ordering Information Sheet (No. ESU-9437)

## BEZEL OPTION

Bezels are used to adapt the 48N Series to an existing panel cutout. In order to replace M-System's 48 Series products,

use the one attached to the 48N Series as standard. When the existing panel is cut according to DIN standard, specify '/D' suffix code.
For a new installation, no bezel is required. Please refer to 'Mounting Requirement' and mount the 48N directly.
Ingress protection is invalid when the 48N is mounted with a bezel, or when multiple modules are stacked side by side.

## SPARE PARTS

• Scale plate

## GENERAL SPECIFICATIONS

**Construction**: Panel flush mounting
**Degree of protection**: IP65; applicable to the front panel for single unit mounted according to the specified panel cutout
**Connection**: M3 screw terminals (torque 0.6 N·m)
**Screw terminal**: Nickel-plated steel
**Housing material**: Flame-resistant resin (black)
**Isolation**: Input to output to power
**Zero adjustment**: 0 – 10 % (front)
**Span adjustment**: 90 to 100 % (front)
**Scale plate**: Flame resistant resin (white scale & characters on black base)
**Setpoint adjustment**
**2 points**:
H [L setpoint ] to 100 %
L 0 to [H setpoint]
or No alarm trip
**4 points**:
HH [H setpoint] to 100 %
H [L setpoint] to [HH setpoint]
L [LL setpoint] to [H setpoint]
LL 0 to [L setpoint]
or No alarm trip
**Alarm deadband (hysteresis)**: 1 %
**Burnout:** Upscale standard; downscale or no burnout optional.
The highest bargraph segment blinks with upscale burnout; the lowest blinks with downscale burnout.
**Linearization**: Standard
**Cold junction compensation**: CJC sensor attached to the input terminals (B thermocouple is without CJC as standard)
**Setting**: (Front button)
• Zero and span adjustments
• Alarm setpoint
• Others
(Refer to the instruction manual for details)

■ **BARGRAPH**
**LED**: 101-segment LED, 100 mm (3.96") long, 3.00 mm (.12") wide
**Display range**: 0 to 100 (scaling function not available)
**Scale:** Two different scales available for single bargraph
**Characters**: Max. 4 characters including decimal point and negative sign
**Divisions**: Min. 22, max. 100
**Engineering unit**: Max. 6 characters

## INPUT SPECIFICATIONS

■ **Input:** Thermocouples
**Minimum span:** 3 mV
**Input resistance:** ≥ 20 kΩ
**Burnout sensing:** ≤ 0.25 μA
**Temperature range (in °C)**
**(PR)**: min. span 370°C; lower range 0 to 880°C
**K (CA)**: min. span 75°C; lower rang -270 to +1200°C
**E (CRC)**: min. span 50°C; lower range -270 to +750°C
**J (IC)**: min. span 60°C; lower range -210 to +800°C
**T (CC)**: min. span 75°C; lower range -270 to +325°C
**B (RH)**: min. span 780°C; lower range 0 to 750°C
**R**: min. span 360°C; -50 to +550°C
**S**: min. span 380°C; -50 to +550°C
**N**: min. span 110°C; -270 to +1100°C

**Temperature range (in °F)**
**(PR)**: min. span 670°F; lower range 32 to 1616°F
**K (CA)**: min. span 140°F; lower range -454 to +2192°F
**E (CRC)**: min. span 90°F; -454 to +1382°F
**J (IC)**: min. span 110°F; -346 to +1472°F
**T (CC)**: min. span 140°F; -454 to +617°F
**B (RH)**: min. span 1450°F; 32 to 1382°F
**R**: min. span 680°F; -58 to +1022°F
**S**: min. span 700°F; -58 to +1022°F
**N**: min. span 200°F; -454 to +2012°F

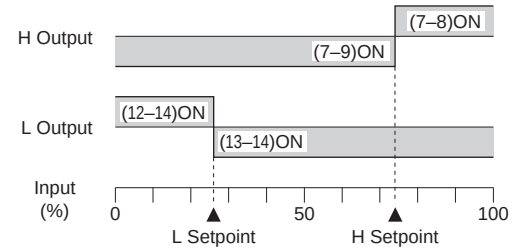
Remark: The transmitter may not satisfy specified accuracy for temperature ranges below 0°C. For more details, consult M-System.

## OUTPUT SPECIFICATIONS

■ **Alarm Output**: Relay contact
**Rated load**: 250 V AC @1 A (cos ø = 1)
30 V DC @5 A (resistive load)
**Maximum switching voltage**: 250 V AC, 220 V DC
**Maximum switching power**: 380 VA, 150 W
**Minimum load**: 5 V DC @100 mA
**Mechanical life**: ≥ $5 \times 10^8$ cycles (rate 180 cycles/min.)

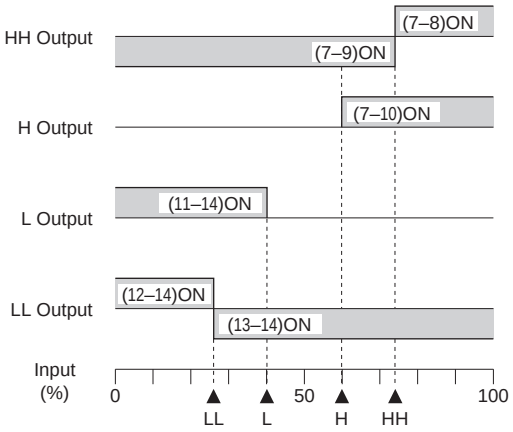
**Alarm Trip Operation** Terminal No. in parentheses

• **Alarm Suffix Code 2**




Terminals 7 –□ 9, 13 – 14 turn on at a loss of power.

• **Alarm Suffix Code 4**




Terminals 7 –□ 9, 13 – 14 turn on at a loss of power.

## INSTALLATION

**Power Consumption**

**•AC**:

Approx. 5.5 VA at 100 V with max. load
Approx. 7 VA at 200 V with max. load
Approx. 8 VA at 264 V with max. load

**•DC**

Approx. 3.5 W at 20.4 V with max. load
Approx. 3.5 W at 24 V with max. load
Approx. 3.5 W at 27.6 V with max. load

**Operating temperature**: -5 to +55°C (23 to 131°F)
**Operating humidity**: 30 to 90 %RH (non-condensing)
**Mounting**: Panel flush mounting
**Weight**: 300 g (0.66 lb)

## PERFORMANCE in percentage of span

**Accuracy**: ±1 % ±1 digit
(at over 400°C or 750°F for R, S and PR; over 770°C or 1420°F for B)

**Cold junction compensation error**
(at 20°C ±10°C or 68°F ±18°F)
**K, E, J, T, N**: ±0.5°C or ±0.9°F
**S, R, PR**: ±1°C or ±1.8°F

**Temp. coefficient:** ±0.015 % of FS/°C(±0.008 % of FS/°F)
(at over 400°C or 750°F for R, S and PR; over 770°C or 1420°F for B)

**Response time:** ≤ 0.5 sec.
**Burnout response**: ≤ 10 sec.
**Insulation resistance**: ≥ 100 MΩ with 500 V DC
**Dielectric strength**: 2000 V AC @1 minute (input to output to power to ground)

## STANDARDS & APPROVALS

**CE conformity**:
EMC Directive (2004/108/EC)
EMI EN 61000-6-4: 2007
EMS EN 61000-6-2: 2005
Low Voltage Directive (2006/95/EC)
EN 61010-1: 2001
Installation Category II
Pollution Degree 2
Input to output to power – Reinforced insulation (300 V)

## SCALE PLATE

**■ WHAT MUST BE SPECIFIED WHEN ORDERING**

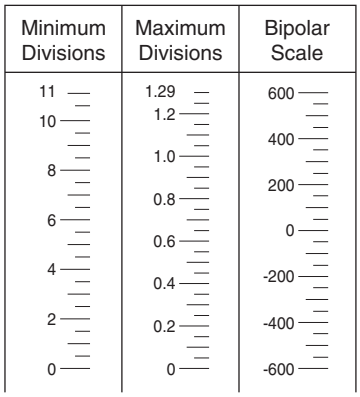
Please specify the bargraph scale range and engineering unit. The overvall scale plate design including the number of divisions, division line length, character font is determined by M-System.

[Example] : Bargraph range 0 to 300℃
Bargraph scale range: 0 – 300
Engineering unit for the bargraph: ℃

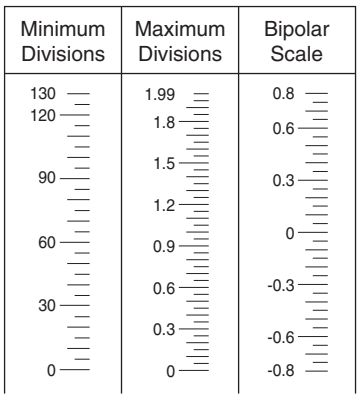
**■ TYPES OF DIVISIONS**

Five (5) types of divisions are used depending upon the scale span, which determined by the following equation:
Scale Span = (Max. range value – Min. range value) x $10^n$
where n = integer (used to limit the calculated scale span to the minimum of 1.1, below 11.0.)
The number of divisions is automatically determined by the scale span.

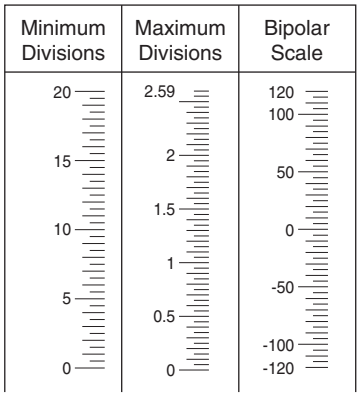
**• Type 1: 1.1 Scale Span < 1.3**
Number of divisions: 22 to 25.9
Scale: Starts at 0, increments by 0.02 / 0.2 / 2 / 20 / 200. Min. and max. values indicated. 4 digits including negative sign and decimal point.
Division lines: Long, Short, Medium, Short, Long (4 divisions repeated)



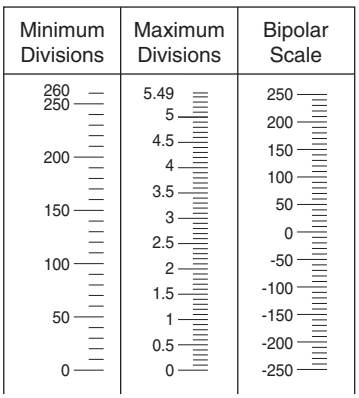

**• Type 2: 1.3 Scale Span < 2.0**
Number of divisions: 26 to 39.9
Scale: Starts at 0, increments by 0.03 / 0.3 / 3 / 30 / 300. Min. and max. values indicated. 4 digits including negative sign and decimal point.
Division lines: Long, Short, Medium, Short, Medium, Short, Long (6 divisions repeated)



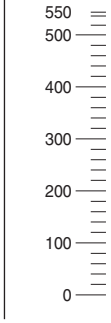
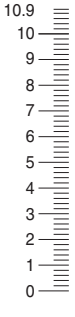
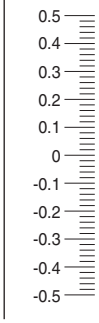

**• Type 3: 2.0 Scale Span < 2.6**
Number of divisions: 40 to 51.9
Scale: Starts at 0, increments by 0.05 / 0.5 / 5 / 50 / 500. Min. and max. values indicated. 4 digits including negative sign and decimal point.
Division lines: Long, Short, Medium, Short, Medium, Short, Medium, Short, Medium, Short, Long (10 divisions repeated)




**• Type 4: 2.6 Scale Span < 5.5**
Number of divisions: 26 to 54.9
Scale: Starts at 0, increments by 0.05 / 0.5 / 5 / 50 / 500. Min. and max. values indicated. 4 digits including negative sign and decimal point.
Division lines: Long, Medium, Medium, Medium, Medium, Long (5 divisions repeated)



• **Type 5: 5.5 Scale Span < 11.0**
Number of divisions: 27.5 to 54.9
Scale: Starts at 0, increments by 0.01 / 0.1 / 1 / 10 / 100 / 1000. Min. and max. values indicated. 4 digits including negative sign and decimal point.
Division lines: Long, Medium, Medium, Medium, Medium, Long (5 divisions repeated)

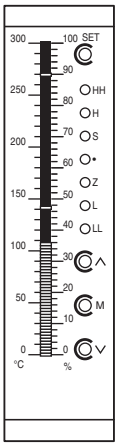
| Minimum Divisions | Maximum Divisions | Bipolar Scale |
|---|---|---|
|  |  |  |







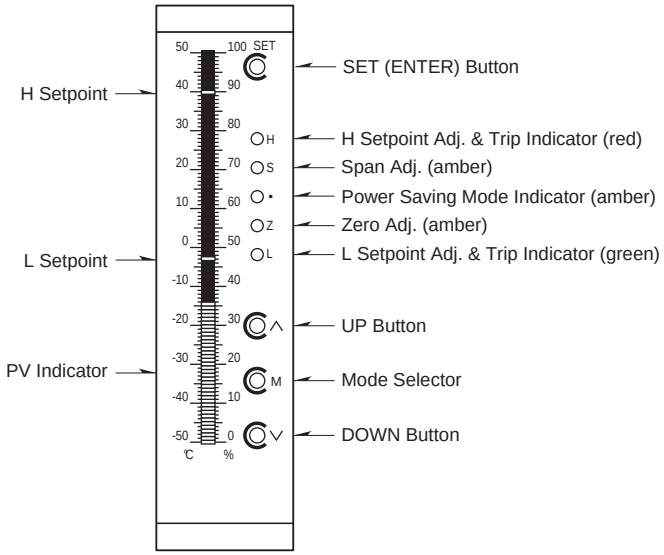
[Example] : Bargraph range 0 to 300℃ (Type 4) for left
Bargraph range 0 to 100 % (Type 5) for right
Left scale range: 0 – 300
Left scale unit (bargraph): ℃
Right scale range: 0 – 100
Right scale unit (bargraph): %



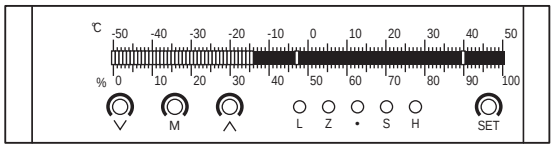
## EXTERNAL VIEW

■ **ALARM SUFFIX CODE 2: 2 points**

• **Vertical Mounting**

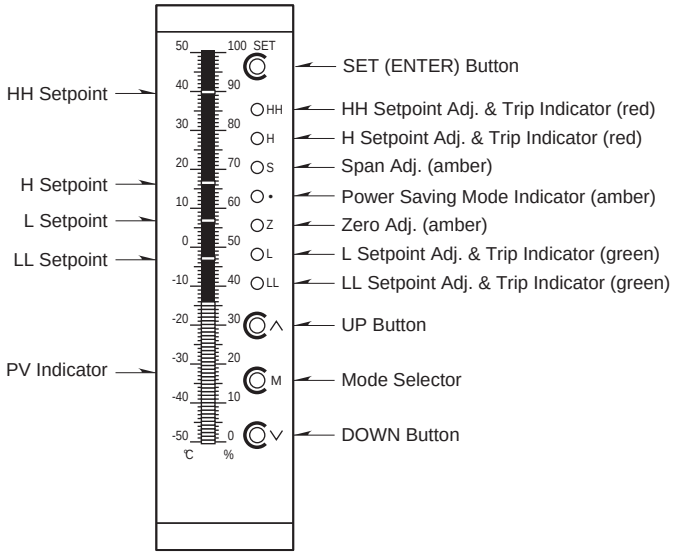



• **Horizontal Mounting**

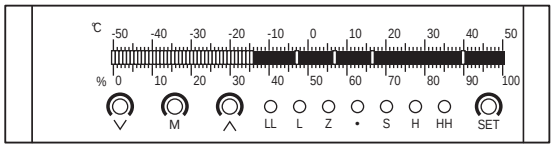



■ **ALARM SUFFIX CODE 4: 4 points**

• **Vertical Mounting**

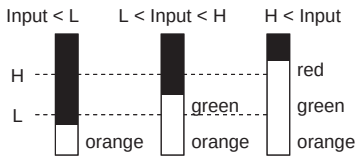



• **Horizontal Mounting**

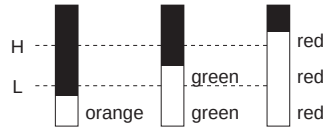



• **Bar Color Patterns**

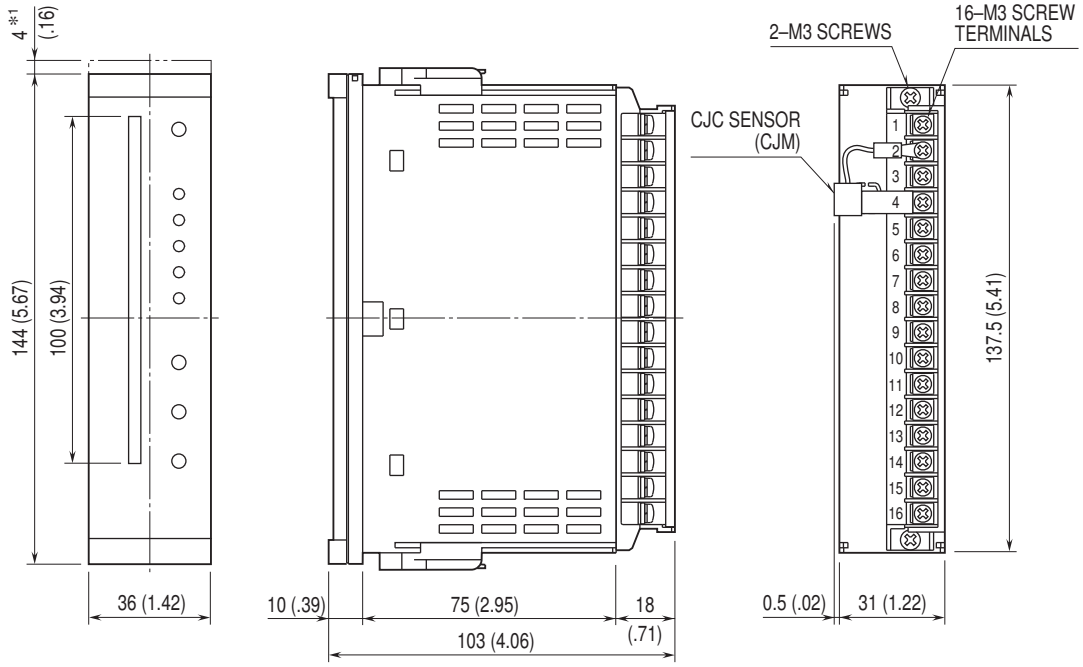
Pattern 1 (model suffix code 1)



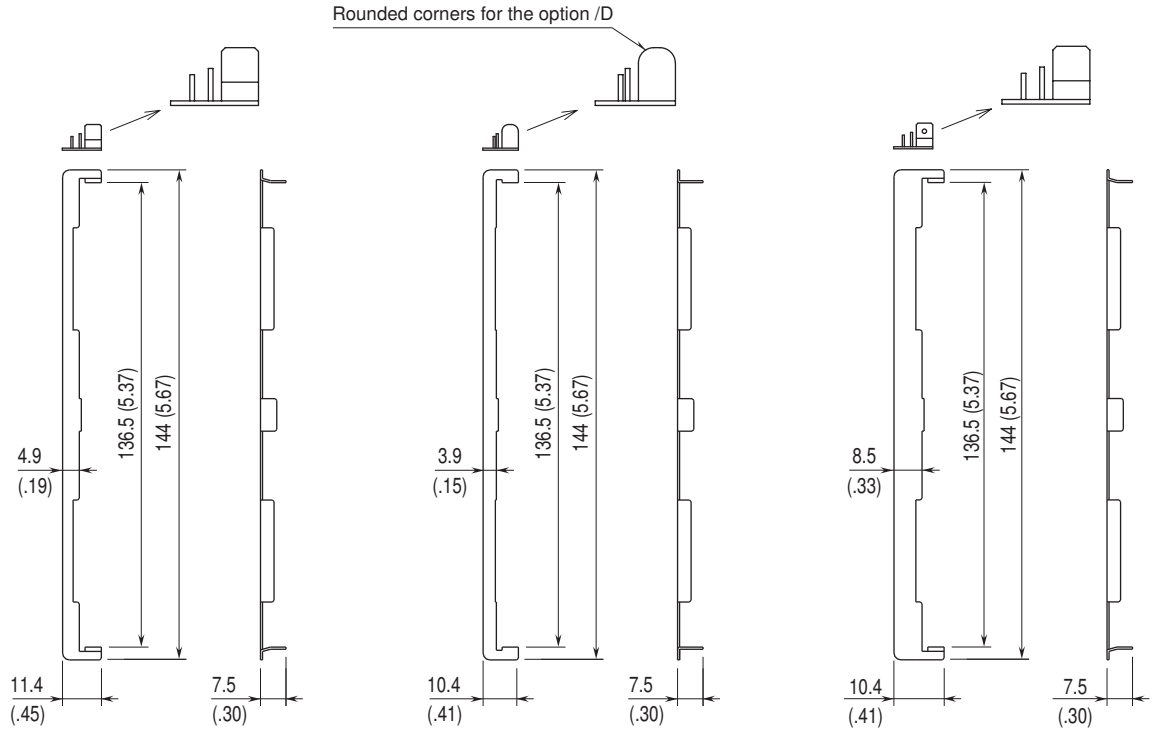

Pattern 2 (model suffix code 2)



## DIMENSIONS unit: mm (inch)




**STANDARD BEZEL**[*2] **OPTION /D BEZEL**[*3] **OPTION /F BEZEL**[*4]

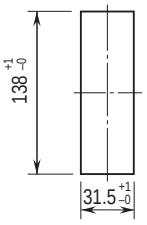



*1. Space required when replacing the scale plate.
*2. Used for the existing panel cutout of M-System 48 Series (38 × 139.5 mm).
*3. Used for the existing DIN panel cutout (33 × 138 mm)
*4. Used for the existing panel cutout of Fuji Electric PAJ, PAK, PBA (44 × 138 mm), etc.

## PANEL CUTOUT unit: mm

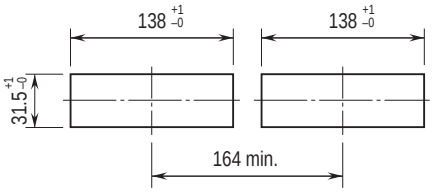
■ **SINGLE MOUNTING (ingress protection)**

• **Vertical Mounting**




Panel thickness: 1.6 – 8.0 mm

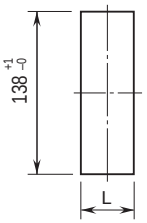
• **Horizontal Mounting**




Panel thickness: 1.6 – 8.0 mm

■ **CLUSTERED MOUNTING (no ingress protection)**

• **Vertical Mounting**

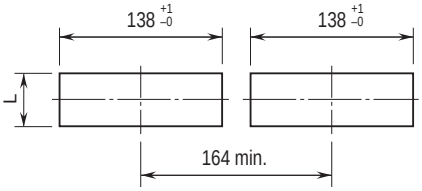



Panel thickness: 1.6 – 8.0 mm

$L = \{31.5 + 36 \times (N - \square\ 1)\}^{+1}_{0}$

(N : number of units)

• **Horizontal Mounting**




Panel thickness: 1.6 – 8.0 mm

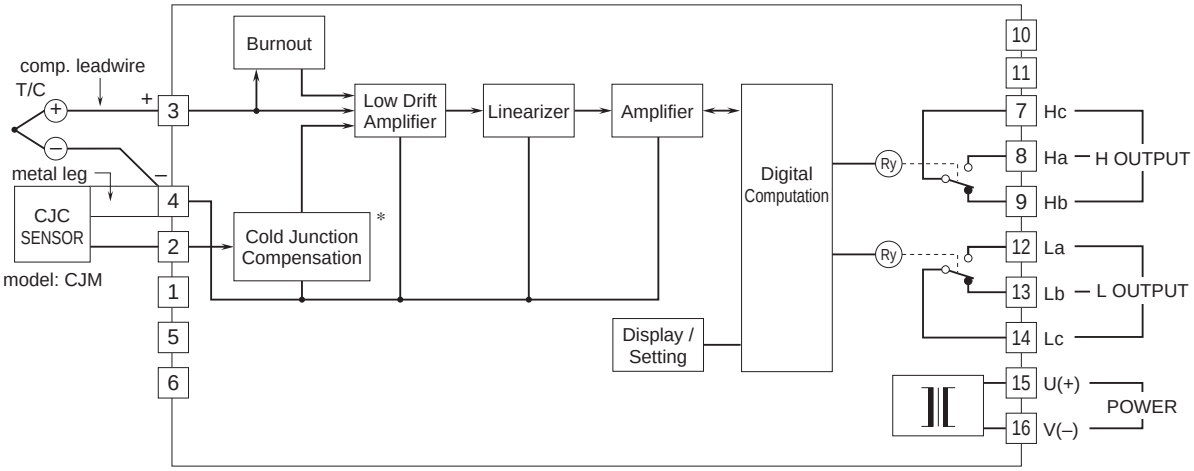
$L = \{31.5 + 36 \times (N - \square\ 1)\}^{+1}_{0}$

(N : number of units)

Note 1. Observe at the minimum of 3 cm above and below the units for heat dissipation.
Note 2. No bezel is needed when the panel is cut according to the above drawings.

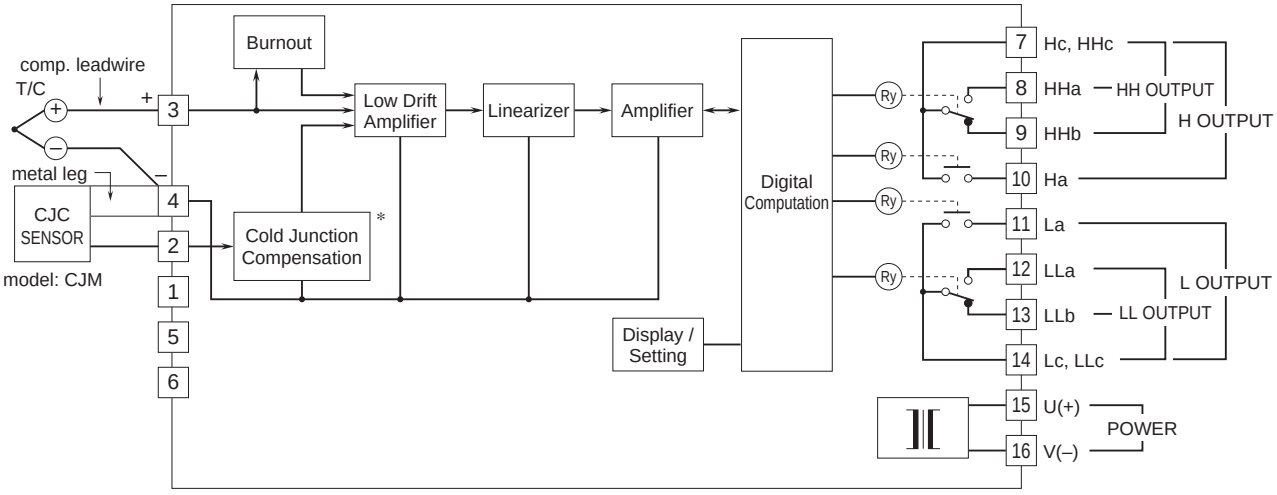
## SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM

■ **ALARM SUFFIX CODE 2: 2 points**




*Deleted with B thermocouple

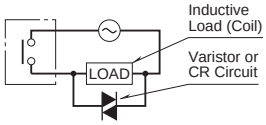
■ **ALARM SUFFIX CODE 4: 4 points**



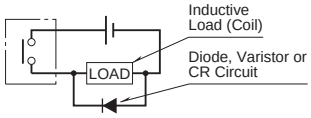

*Deleted with B thermocouple

■ **Relay Protection**

**• AC Powered**




**• DC Powered**




⚠ Specifications are subject to change without notice.