

## Plug-in Signal Conditioners M-UNIT

### THERMOCOUPLE TRANSMITTER

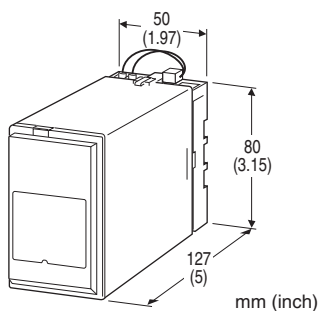
(CE)

#### Functions & Features

- Accepting direct input from a thermocouple and providing a standard process signal
- 7-segment linearization
- Burnout protection
- High-accuracy cold junction compensation
- Signal isolation
- Fast response type available
- High-density mounting

#### Typical Applications

- High-accuracy cold junction compensation benefits narrow span measurements
- 0.1  $\mu$ A burnout sensing enables long distance transmission with minimum offset drifts
- Electric furnace (isolation)
- No burnout type can connect to a single T/C in parallel with a recorder



## MODEL: TCS-[1][2]-[3][4]

### ORDERING INFORMATION

- Code number: TCS-[1][2]-[3][4]

Specify a code from below for each of [1] through [4].

- (e.g. TCS-2A-B/K/BL/CE/Q)
- Temperature range (e.g. 0 - 800°C)
- Special output range (For codes Z & 0)
- Specify the specification for option code /Q (e.g. /C01/S01)

#### [1] 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)
- 0: Specify

#### [2] OUTPUT

##### Current

- A: 4 - 20 mA DC (Load resistance 750  $\Omega$  max.)
- B: 2 - 10 mA DC (Load resistance 1500  $\Omega$  max.)
- C: 1 - 5 mA DC (Load resistance 3000  $\Omega$  max.)
- D: 0 - 20 mA DC (Load resistance 750  $\Omega$  max.)
- E: 0 - 16 mA DC (Load resistance 900  $\Omega$  max.)
- F: 0 - 10 mA DC (Load resistance 1500  $\Omega$  max.)
- G: 0 - 1 mA DC (Load resistance 15 k $\Omega$  max.)
- Z: Specify current (See OUTPUT SPECIFICATIONS)

##### Voltage

- 1: 0 - 10 mV DC (Load resistance 10 k $\Omega$  min.)
- 2: 0 - 100 mV DC (Load resistance 100 k $\Omega$  min.)
- 3: 0 - 1 V DC (Load resistance 3000  $\Omega$  min.)
- 4: 0 - 10 V DC (Load resistance 10 k $\Omega$  min.)
- 5: 0 - 5 V DC (Load resistance 5000  $\Omega$  min.)
- 6: 1 - 5 V DC (Load resistance 5000  $\Omega$  min.)
- 0: Specify voltage (See OUTPUT SPECIFICATIONS)

#### [3] POWER INPUT

##### AC Power

- B: 100 V AC
- C: 110 V AC
- D: 115 V AC
- F: 120 V AC
- G: 200 V AC
- H: 220 V AC
- J: 240 V AC

##### DC Power

- S: 12 V DC
- R: 24 V DC
- V: 48 V DC

#### [4] OPTIONS (multiple selections)

##### Response Time (0 - 90 %)

- blank: Standard ( $\leq$  0.5 sec.)
- /K: Fast Response (Approx. 25 msec.)

##### Burnout

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

##### Standards & Approvals (must be specified)

- /CE: CE marking

##### Other Options

- blank: none

/Q: Option other than the above (specify the specification)

N: min. span 200°F

## SPECIFICATIONS OF OPTION: Q (multiple selections)

**COATING (For the detail, refer to M-System's web site.)**

/C01: Silicone coating

/C02: Polyurethane coating

/C03: Rubber coating

**TERMINAL SCREW MATERIAL**

/S01: Stainless steel

## GENERAL SPECIFICATIONS

**Construction:** Plug-in

**Connection:** M3.5 screw terminals

**Screw terminal:** Chromated steel (standard) or stainless steel

**Housing material:** Flame-resistant resin (black)

**Isolation:** Input to output to power

**Overrange output:** Approx. -10 to +120 % at 1 - 5 V

**Zero adjustment:** -5 to +5 % (front)

**Span adjustment:** 95 to 105 % (front)

**At burnout:** Downscale  $\leq$  -10 %, Upscale  $\geq$  110 %

**Linearization:** Standard

**Cold junction compensation:** CJC sensor attached to the input terminals (B thermocouple is without CJC as standard)

## INPUT SPECIFICATIONS

**Minimum span:** 3 mV

**Offset:** Max. 1.5 times span

**Input resistance:** 30 k $\Omega$  min.

**Burnout sensing:** 0.1  $\mu$ A

**Minimum span (in °C)**

(PR): min. span 370°C

K (CA): min. span 75°C

E (CRC): min. span 50°C

J (IC): min. span 60°C

T (CC): min. span 75°C

B (RH): min. span 780°C

R: min. span 360°C

S: min. span 380°C

N: min. span 110°C

**Minimum span (in °F)**

(PR): min. span 670°F

K (CA): min. span 140°F

E (CRC): min. span 90°F

J (IC): min. span 110°F

T (CC): min. span 140°F

B (RH): min. span 1410°F

R: min. span 650°F

S: min. span 690°F

Note: The described accuracy may be partially not satisfied when the temperature ranges below 0°C. Consult factory.

## OUTPUT SPECIFICATIONS

■ **DC Current:** 0 - 20 mA DC

**Minimum span:** 1 mA

**Offset:** Max. 1.5 times span

**Load resistance:** Output drive 15 V max.

■ **DC Voltage:** -10 - +12 V DC

**Minimum span:** 5 mV

**Offset:** Max. 1.5 times span

**Load resistance:** Output drive 1 mA max. at  $\geq$  3 V

## INSTALLATION

**Power input**

• **AC:** Operational voltage range: rating  $\pm$ 10 %, 50/60  $\pm$ 2 Hz, approx. 2 VA

• **DC:** Operational voltage range: rating  $\pm$ 10 % ripple 10 %p-p max., approx. 2.6 W (110 mA at 24 V)

**Operating temperature:** -5 to +60°C (23 to 140°F)

**Operating humidity:** 30 to 90 %RH (non-condensing)

**Mounting:** Surface or DIN rail

**Weight:** 350 g (0.77 lb)

## PERFORMANCE in percentage of span

**Accuracy:**  $\pm$ 0.3 % (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  $\pm$ 10°C or 68°F  $\pm$ 18°F)

K, E, J, T & N:  $\pm$ 0.5°C or  $\pm$ 0.9°F

S, R & PR:  $\pm$ 1°C or  $\pm$ 1.8°F

**Temp. coefficient:**  $\pm$ 0.015 %/°C ( $\pm$ 0.008 %/°F)

(at over 400°C or 750°F for R, S and PR; over 770°C or 1420°F for B)

**Burnout response:**  $\leq$  10 sec.

**Line voltage effect:**  $\pm$ 0.1 % over voltage range

**Insulation resistance:**  $\geq$  100 M $\Omega$  with 500 V DC

**Dielectric strength:**

1350 V AC @1 minute (input to output)

2300 V AC @1 minute (input or output to power to ground)

## STANDARDS & APPROVALS

**EU conformity:**

EMC Directive

EMI EN 61000-6-4

EMS EN 61000-6-2

Low Voltage Directive

EN 61010-1

Installation Category II

Pollution Degree 2

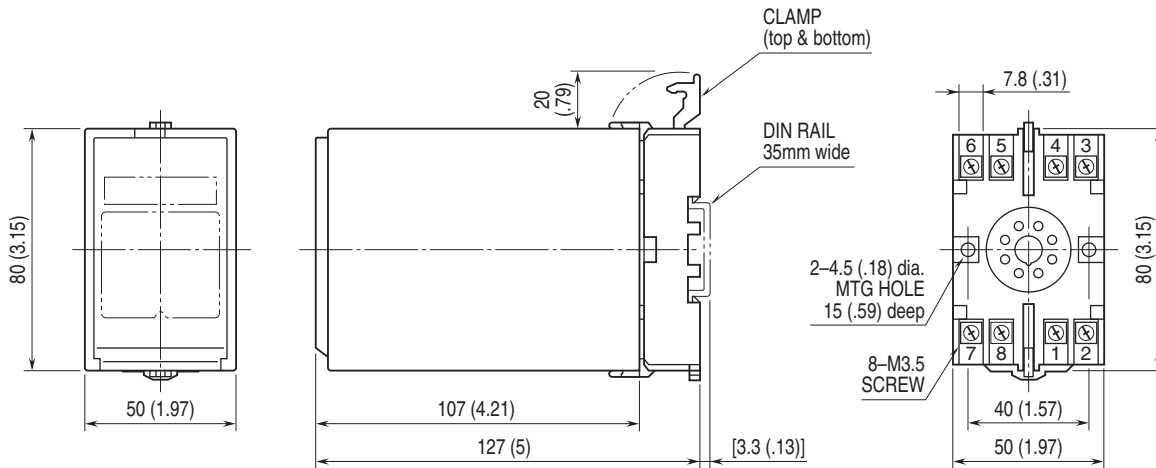
Input or output to power: Reinforced insulation (300 V)

Input to output: Basic insulation (300 V)

RoHS Directive

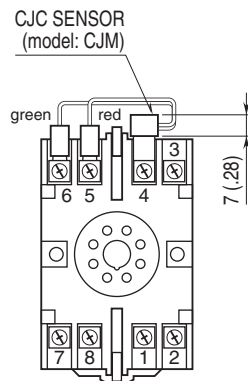
EN 50581

## EXTERNAL DIMENSIONS unit: mm (inch)

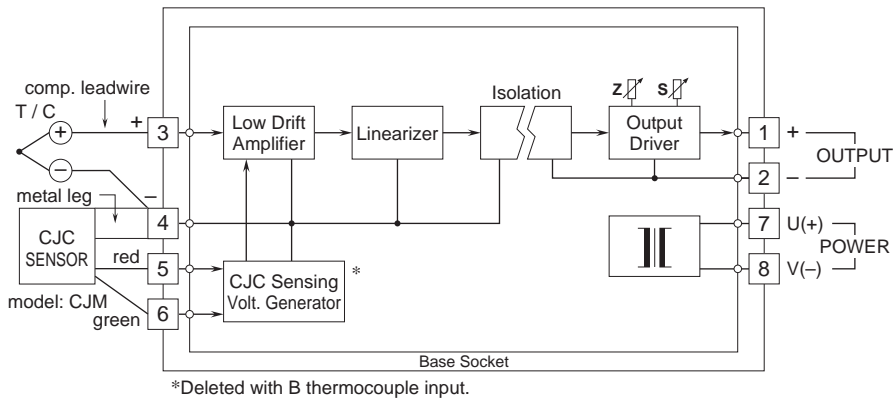


• When mounting, no extra space is needed between units.

## TERMINAL ASSIGNMENTS unit: mm (inch)



**SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM**



Specifications are subject to change without notice.