

Plug-in Signal Conditioners M-UNIT

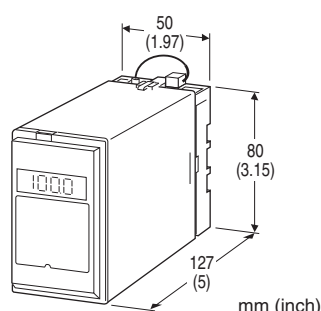
THERMOCOUPLE TRANSMITTER

Functions & Features

- Accepting direct input from a thermocouple and providing a standard process signal
- 7-segment linearization
- Burnout protection
- High-accuracy cold junction compensation
- Isolation up to 2000 V AC
- Fast response type available
- LCD meter (engineering unit display selectable)
- Simple loop test output (0 % and 100 %)
- High-density mounting

Typical Applications

- High-accuracy cold junction compensation benefits narrow span measurements
- 0.1 μ 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
- Power plant (2000 V AC isolation, 110 V DC power supply)



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/E2/BL/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 Ω max.)
- B: 2 - 10 mA DC (Load resistance 1500 Ω max.)
- C: 1 - 5 mA DC (Load resistance 3000 Ω max.)
- D: 0 - 20 mA DC (Load resistance 750 Ω max.)
- E: 0 - 16 mA DC (Load resistance 900 Ω max.)
- F: 0 - 10 mA DC (Load resistance 1500 Ω max.)
- G: 0 - 1 mA DC (Load resistance 15 k Ω max.)
- Z: Specify current (See OUTPUT SPECIFICATIONS)

Voltage

- 1: 0 - 10 mV DC (Load resistance 10 k Ω min.)
- 2: 0 - 100 mV DC (Load resistance 100 k Ω min.)
- 3: 0 - 1 V DC (Load resistance 100 Ω min.)
- 4: 0 - 10 V DC (Load resistance 1000 Ω min.)
- 5: 0 - 5 V DC (Load resistance 500 Ω min.)
- 6: 1 - 5 V DC (Load resistance 500 Ω 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 (Not selectable with Option /UL)
- H: 220 V AC (Not selectable with Option /UL)
- J: 240 V AC (Not selectable with Option /UL)

DC Power

- S: 12 V DC (Not selectable with Option /UL)
- R: 24 V DC (Not selectable with Option /UL)
- V: 48 V DC (Not selectable with Option /UL)
- P: 110 V DC (Not selectable with Option /E2 or /UL)

[4] OPTIONS (multiple selections)

Input Signal Indicator

- blank: Without
- /E: With (0.0 - 100.0 % display)
- /E2: With (in engineering unit with backlight and the simple loop test output)

Response Time (0 - 90 %)

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

(Not selectable with Option /E2)

Burnout

blank: Upscale burnout

/BL: Downscale burnout

/BN: No burnout

Standards & Approvals

blank: Without UL

/UL: UL approval (Not selectable with /E or /E2)

Other Options

blank: none

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

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 (UL not available)

TERMINAL SCREW MATERIAL

/S01: Stainless steel (UL not available)

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 ≤ -10 %, Upscale ≥ 110 %

Linearization: Standard

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

Simple loop test output: 0 % and 100 % signal simulated by selecting the front switch positions. (Only for option code /E2)

■ DISPLAY (Input indicator)

• **Option code:** /E

LCD digital display: 0.0 - 100.0 % (min. digit 0.1 %) (No scaling)

• **Option code:** /E2

LCD digital display: Engineering unit

Display scaling: -10000 - +10000

Decimal position: 10^{-1} - 10^{-4} or no decimal point

Engineering unit: %, μ V, mV, V, mA, A, °C, °F, Ω , DEG K, mHz, Hz, kHz, VAC, AAC, mg, g, kg, t, rpm or rps selectable

Back light: Green at normal, red at loop test output enable

Factory setting: scaling 0.00 - 100.00, unit: %

INPUT SPECIFICATIONS

Minimum span: 3 mV

Offset: Max. 1.5 times span

Input resistance: 30 k Ω min.

Burnout sensing: 0.1 μ 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

N: min. span 200°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 10 mA max.; 5 mA for negative voltage output; at ≥ 0.5 V

INSTALLATION

Power input

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

(approx. 3 VA with Option /E2)

• **DC:** Operational voltage range: rating ± 10 %, or 85 - 150 V for 110 V rating (ripple 10 % p-p max.) approx. 2.6 W (110 mA at 24 V; approx. 3.6 W with Option /E2)

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)

Display accuracy: $\pm (0.3\% \text{ of FS} + 1 \text{ digit})$ (at over 400°C or 750°F for R, S and PR; over 770°C or 1420°F for B)

Simple loop test output setting accuracy: $\pm 0.5\%$

Cold junction compensation error

(at 20°C $\pm 10^\circ\text{C}$ or 68°F $\pm 18^\circ\text{F}$)

K, E, J, T & N: $\pm 0.5^\circ\text{C}$ or $\pm 0.9^\circ\text{F}$

S, R & PR: $\pm 1^\circ\text{C}$ or $\pm 1.8^\circ\text{F}$

Temp. coefficient: $\pm 0.015\% / ^\circ\text{C}$ ($\pm 0.008\% / ^\circ\text{F}$)

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

Burnout response: $\leq 10 \text{ sec.}$

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

Insulation resistance: $\geq 100 \text{ M}\Omega$ with 500 V DC

Dielectric strength: 2000 V AC @1 minute (input to output to power to ground)

STANDARDS & APPROVALS

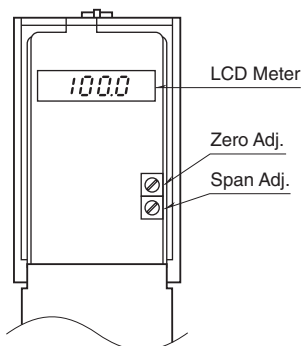
Approval:

UL/C-UL general safety requirements

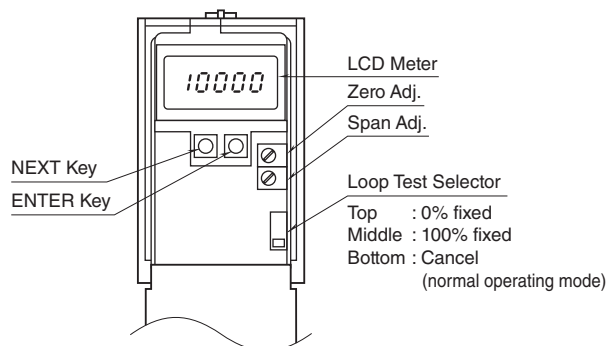
(UL 3111-1, CAN/CSA-C22.2 No.1010-1)

EXTERNAL VIEW

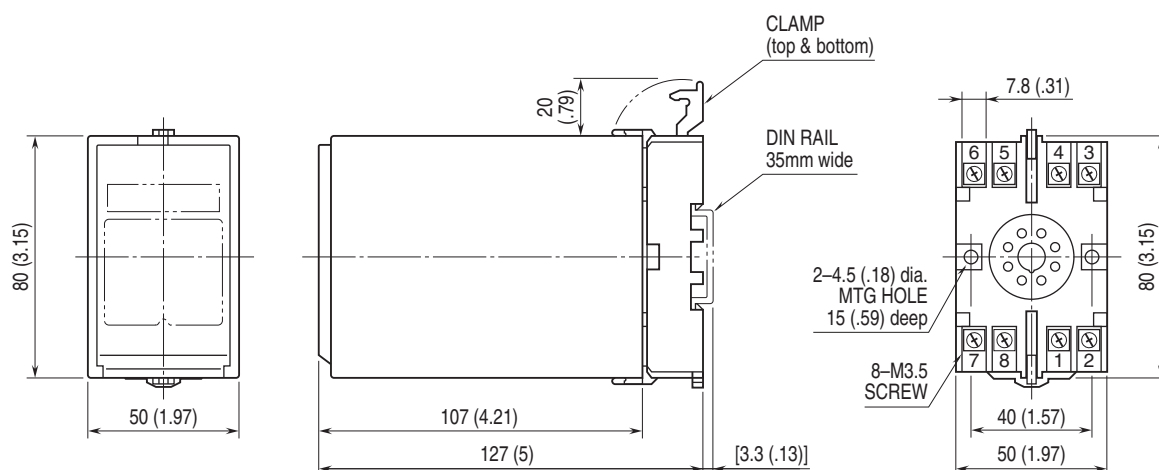
■ OPTION /E



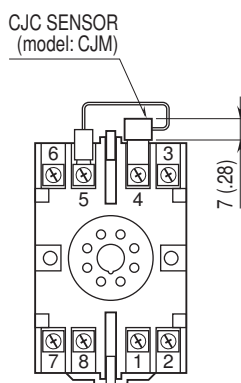
■ OPTION /E2



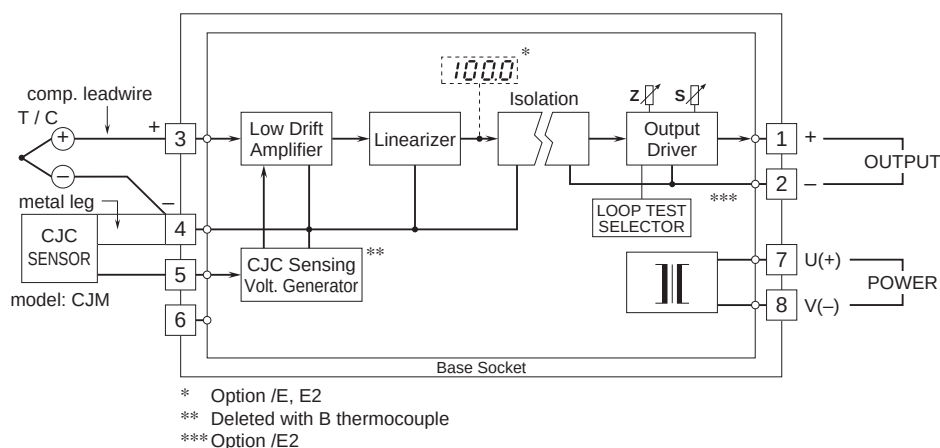
EXTERNAL DIMENSIONS unit: mm (inch)



- 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.