**Super-mini Signal Conditioners Mini-M Series**

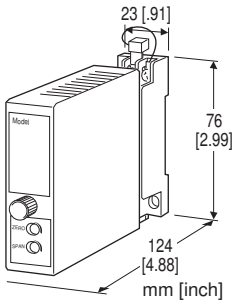
## THERMOCOUPLE TRANSMITTER

Functions & Features

• Accepts direct input from a thermocouple and provides a standard process signal
• 5-segment linearization
• Burnout
• High-accuracy cold junction compensation
• Fast response type available

Typical Applications

• High-accuracy cold junction compensation benefits narrow span measurements
• 0.1 μA burnout sensing enables long distance transmission with minimum offset drifts
• Electric furnace (isolation ensured even when 200 V AC power for heater leaks through furnace wall)
• No burnout type can connect to a single T/C in parallel with a recorder




## MODEL: M2TS–[1][2]–[3][4]

## ORDERING INFORMATION

• Code number: M2TS-[1][2]-[3][4]
Specify a code from below for each of [1] through [4].
(e.g. M2TS-2A-M2/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/V01)

## [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 kΩ max.)
Z: Specify current (See OUTPUT SPECIFICATIONS)

**Voltage**

1: 0 – 10 mV DC (Load resistance 10 kΩ min.)
2: 0 – 100 mV DC (Load resistance 100 kΩ min.)
3: 0 – 1 V DC (Load resistance 1000 Ω min.)
4: 0 – 10 V DC (Load resistance 10 kΩ min.)
5: 0 – 5 V DC (Load resistance 5000 Ω min.)
6: 1 – 5 V DC (Load resistance 5000 Ω min.)
0: Specify voltage (See OUTPUT SPECIFICATIONS)

## [3] POWER INPUT

**AC Power**

M: 85 – 264 V AC (Operational voltage range 85 – 264 V, 47 – 66 Hz)
(Select '/N' for 'Standards & Approvals' code.)
M2: 100 – 240 V AC (Operational voltage range 85 – 264 V, 47 – 66 Hz)
(90 – 264 V for UL)

**DC Power**

R: 24 V DC
(Operational voltage range 24 V ±10 %, ripple 10 %p-p max.)
R2: 11 – 27 V DC
(Operational voltage range 11 – 27 V, ripple 10 %p-p max.)
(Select '/N' for 'Standards & Approvals' code.)
P: 110 V DC
(Operational voltage range 85 – 150 V, ripple 10 %p-p max.)
(110 V ±10 % for UL)

## [4] OPTIONS (multiple selections)

**Response Time (0 – 90 %)**

blank: Standard (≤ 0.5 sec.)
/K: Fast Response (Approx. 25 msec.)

**Burnout**

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

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

/N: Without CE, UKCA or UL

/CE: CE marking
/UK: CE, UKCA marking
/UL: UL approval, CE marking
**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)
/C04: Polyolefin coating (UL not available)
**ADJUSTMENT**
/V01: Multi-turn fine adjustment (UL not available)
/VN: Sealed adjustment holes (UL not available)
**TERMINAL SCREW MATERIAL**
/S01: Stainless steel (UL not available)

## GENERAL SPECIFICATIONS

Construction: Plug-in
Connection: M3 screw terminals (torque 0.8 N·m)
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)
Burnout: Upscale standard; downscale or no burnout optional
At burnout: Downscale ≤ -10 %, Upscale ≥ 110 %
Linearization: Standard
Cold junction compensation: CJC sensor attached to the input terminals

## INPUT SPECIFICATIONS

Minimum span: 3 mV
Offset: Max. 1.5 times span
Input resistance: 30 kΩ min.
Burnout sensing: 0.1 μA

MIN. 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

MIN. 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

Remark: 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 ≥ 0.5 V

## INSTALLATION

Power Consumption
•AC:
Approx. 3 VA at 100 V
Approx. 4 VA at 200 V
Approx. 5 VA at 264 V
•DC: Approx. 3 W
Operating temperature: -5 to +55°C (23 to 131°F)
Operating humidity: 30 to 90 %RH (non-condensing)
Mounting: Surface or DIN rail
Weight: 150 g (0.33 lb)

## PERFORMANCE in percentage of span

Accuracy: ±0.4 % (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 25°C ±10°C or 77°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 %/°C (±0.008 %/°F)
(at over 770°C or 1420°F for B)
Burnout response: ≤ 10 sec.
Line voltage effect: ±0.1 % over voltage range
Insulation resistance: ≥ 100 MΩ with 500 V DC

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

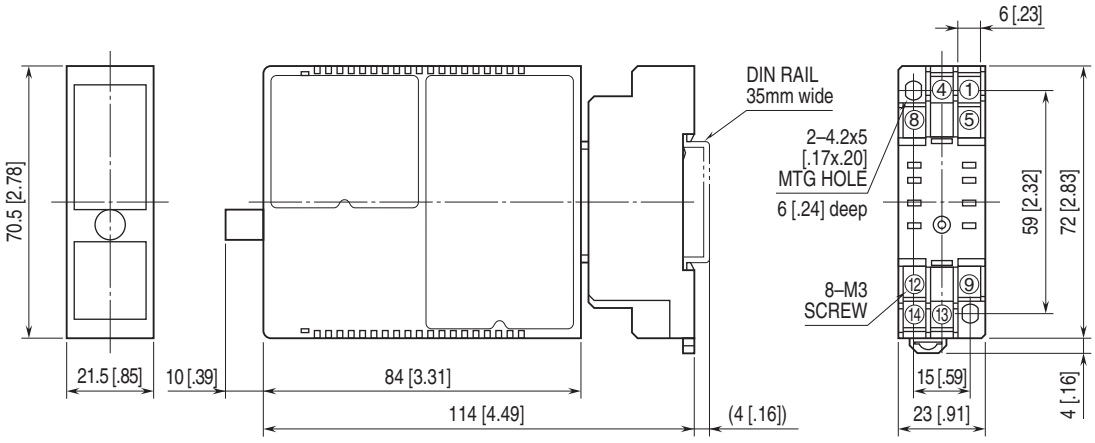
## STANDARDS & APPROVALS

**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

**UK conformity (UKCA):**
The UK legislations and designated standards are equivalent to the applicable EU directives.
(Refer to M-System's website for more information about the legislations and designated standards.)

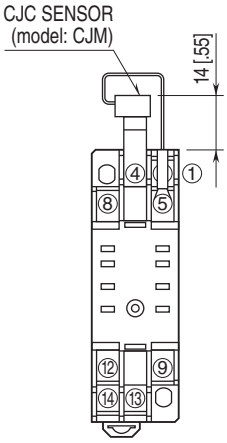
**Approval**:
UL/C-UL nonincendive Class I, Division 2,
Groups A, B, C, and D
(ANSI/ISA-12.12.01, CAN/CSA-C22.2 No.213)
UL/C-UL general safety requirements
(UL 61010-1, CAN/CSA-C22.2 No.61010-1)

## EXTERNAL DIMENSIONS unit: mm [inch]

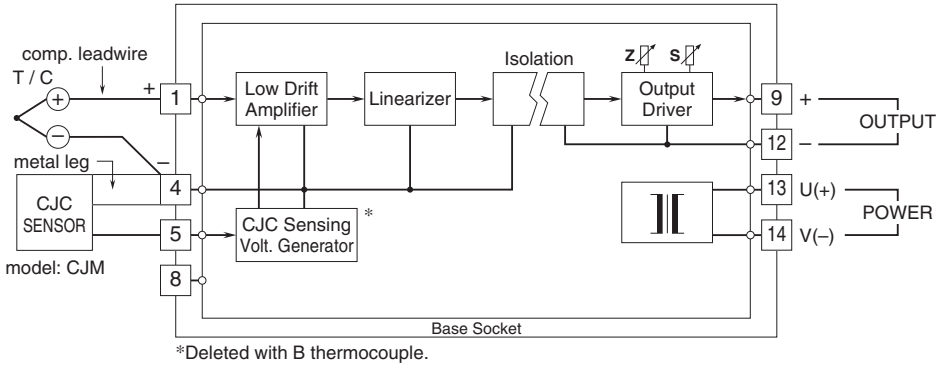



• When mounting, no extra space is needed between units.

## TERMINAL ASSIGNMENTS unit: mm [inch]




## SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM




*Deleted with B thermocouple.

⚠ Specifications are subject to change without notice.