

## Super-mini Signal Conditioners Mini-M Series

### THERMOCOUPLE TRANSMITTER

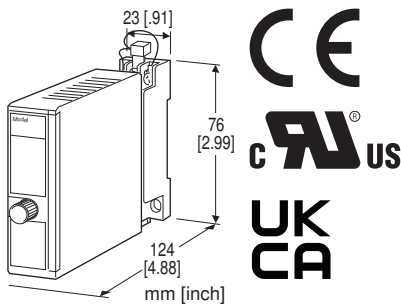
(PC programmable)

#### Functions & Features

- Accepts direct input from a thermocouple and provides a linearized process signal
- PC programmable
- Wide selection of thermocouples
- User's temperature table can be used
- Leadwire resistance compensation

#### Typical Applications

- Small burnout sensing current 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
- Ideal for quick spare part



### MODEL: M2XT2-[1][2]-[3][4]

#### ORDERING INFORMATION

- Code number: M2XT2-[1][2]-[3][4]
- Specify a code from below for each of [1] through [4]. (e.g. M2XT2-2Z1-M2/BL/CE/Q)
- K thermocouple setting will be used if the input code is not specified.
- Temperature range (e.g. 0 - 800°C)
- Output range (e.g. 4 - 20 mA DC)
- Specify the specification for option code /Q (e.g. /C01/S01)

#### [1] INPUT THERMOCOUPLE

- 1: (PR)
- 2: K (CA)
- 3: E (CRC)
- 4: J (IC)

- 5: T (CC)
- 6: B (RH)
- 7: R
- 8: S
- 9: C (WRe 5-26)
- N: N
- U: U
- L: L
- P: P (Platinel II)
- 0: Specify (Configurator software is used to change the input type and precise range.)

#### [2] OUTPUT

##### Current

Z1: Range 0 - 20 mA DC

##### Voltage

V1: Range -2.5 - +2.5 V DC

V2: Range -10 - +10 V DC

(Configurator software is used to change output over the described range of the selected suffix code. For changing out of this range, set the Output Range Selectors inside the unit before software adjustment.)

#### [3] POWER INPUT

##### AC Power

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.)  
P: 110 V DC  
(Operational voltage range 85 - 150 V, ripple 10 %p-p max.)  
(110 V ±10 % for UL)

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

##### Burnout

blank: Upscale burnout  
/BL: Downscale burnout (UL not available)  
/BN: No burnout (UL not available)

##### 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)

**TERMINAL SCREW MATERIAL**

/S01: Stainless steel (UL not available)

**RELATED PRODUCTS**

- PC configurator software (model: JXCON)

Downloadable at M-System's web site.

A dedicated cable is required to connect the module to the PC. Please refer to the internet software download site or the users manual for the PC configurator for applicable cable types.

**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. -15 to +115 %**Manual zero/span adjustments:** See Front View.**Programming:** Downloaded from PC; T/C type, temp. range, output range, zero and span, simulating output, etc.**Burnout protection:** Upscale standard; downscale or no burnout optional by programming

(Set to "no burnout" when the unit is connected with another instrument in parallel.)

**Linearization:** Standard**Cold junction compensation:** CJC sensor attached to the input terminals**Status indicator LED:** Blinking patterns indicate different operating status of the transmitter.**Configurator connection:** 2.5 dia. miniature jack; RS-232-C level**INPUT SPECIFICATIONS****Input resistance:** 1 M $\Omega$  min.**Burnout sensing:** 45 nA  $\pm$ 10 %

If not specified, the input range is shown below.

1 PR: 0-1600°C

2 K: 0-1000°C

3 E: 0-500°C

4 J: 0-500°C

5 T: 0-300°C

6 B: 0-1800°C

7 R: 0-1600°C

8 S: 0-1600°C

9 C: 0-2000°C

N N: 0-1000°C

U U: 0-300°C

L L: 0-500°C

P P: 0-1200°C

**OUTPUT SPECIFICATIONS**

## ■ DC Current

**Operational range:** 0 - 24 mA DC**Output range:** 0 - 20 mA DC**Minimum span:** 1 mA**Offset:** Lower range can be any specific value within the output range provided that the minimum span is maintained.**Load resistance:** Output drive 15 V max.(e.g. 4 - 20 mA: 750  $\Omega$  [15 V  $\div$  20 mA])

If not specified, the output range is 4 - 20 mA DC.

## ■ DC Voltage

**Code V1 (narrow spans)****Operational range:** -3 - +3 V DC**Output range:** -2.5 - +2.5 V DC**Minimum span:** 250 mV**Code V2 (wide spans)****Operational range:** -11.5 - +11.5 V DC**Output range:** -10 - +10 V DC**Minimum span:** 1 V**Offset:** Lower range can be any specific value within the output range provided that the minimum span is maintained.**Load resistance:** Output drive 1 mA max.(e.g. 1 - 5 V: 5000  $\Omega$  [5 V  $\div$  1 mA])

If not specified, the output range is shown below.

V1: 0 - 1 V DC

V2: 1 - 5 V DC

**INSTALLATION****Power Consumption**

## •AC:

Approx. 3 VA at 100 V

Approx. 4 VA at 200 V

Approx. 5 VA at 264 V

## •DC: Approx. 2 W

**Operating temperature:** -30 to +60°C (-22 to +140°F)**Operating humidity:** 30 to 90 %RH (non-condensing)**Mounting:** Surface or DIN rail**Weight:** 120 g (0.26 lb)

## PERFORMANCE

**Accuracy:** [Table 1 Accuracy value + Cold Junction Compensation Error 0.5°C (0.9°F)] or ±0.1 % of span, whichever is greater.

Add 0.2 % when the output span equals 1/10 or narrower of the max. span.

**Cold junction compensation error:**

±0.5°C at 25 ±10°C

±0.9°F at 77 ±18°F

**Temp. coefficient:** ±0.015 %/°C (±0.008 %/°F) of max. span at -5 to +55°C [23 to 131°F]

**Response time:** ≤ 0.9 sec. (0 - 90 %)

**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)

## CALCULATION EXAMPLES OF OVERALL ACCURACY

### [Example 1]

Input: K thermocouple, 0 - 1000°C, Output: 4 - 20 mA DC

1) Absolute value accuracy (Table 1): 0.25°C

2) CJC error (0.5°C) added: 0.75°C

3)  $0.75^\circ\text{C} \div 1000^\circ\text{C} \times 100 = 0.075 \%$

4)  $0.075 \% < 0.1 \%$  of span. ➡ 0.1 % is selected.

5) Output span 16 mA (= 20 mA - 4 mA)

Max. span 20 mA

Output span ≥ 1/10 of max. span ➡ No need of adding 0.2 %.

6) Overall accuracy equals ±0.1 % of span

### [Example 2]

Input: K thermocouple, 50 - 150°C, Output: 2.0 - 2.5 V DC

1) Absolute value accuracy (Table 1): 0.25°C

2) CJC error (0.5°C) added: 0.75°C

3)  $0.75^\circ\text{C} \div (150 - 50)^\circ\text{C} \times 100 = 0.75 \%$

4)  $0.75 \% > 0.1 \%$  of span. ➡ 0.75 % is selected.

5) Output span 0.5 V (= 2.5 V - 2.0 V)

Max. span 5 V

Output span ≤ 1/10 of max. span ➡ Add 0.2 %.

6) Overall accuracy equals ±0.95 % of span (0.75 + 0.2)

**Table 1.**

THERMO-COUPLE	°C			
	MIN. SPAN	MAXIMUM RANGE	ACCURACY	CONFORMANCE RANGE
(PR)	20	0 to 1760	±1.00	0 to 1760
K (CA)	20	-270 to +1370	±0.25	-150 to +1370
E (CRC)	20	-270 to +1000	±0.20	-170 to +1000
J (IC)	20	-210 to +1200	±0.25	-180 to +1200
T (CC)	20	-270 to +400	±0.25	-170 to +400
B (RH)	20	0 to 1820	±0.75	400 to 1760
R	20	-50 to +1760	±0.50	200 to 1760
S	20	-50 to +1760	±0.50	0 to 1760
C (WRe 5-26)	20	0 to 2315	±0.80	0 to 2315
N	20	-270 to +1300	±0.30	-130 to +1300
U	20	-200 to +600	±0.20	-200 to +600
L	20	-200 to +900	±0.25	-200 to +900
P (Platinel II)	20	0 to 1395	±0.25	0 to 1395
THERMO-COUPLE	°F			
	MIN. SPAN	MAXIMUM RANGE	ACCURACY	CONFORMANCE RANGE
(PR)	36	32 to 3200	±1.80	32 to 3200
K (CA)	36	-454 to +2498	±0.45	-238 to +2498
E (CRC)	36	-454 to +1832	±0.36	-274 to +1832
J (IC)	36	-346 to +2192	±0.45	-292 to +2192
T (CC)	36	-454 to +752	±0.45	-274 to +752
B (RH)	36	32 to 3308	±1.35	752 to 3200
R	36	-58 to +3200	±0.90	392 to 3200
S	36	-58 to +3200	±0.90	32 to 3200
C (WRe 5-26)	36	32 to 4199	±1.44	32 to 4199
N	36	-454 to +2372	±0.54	-202 to +2372
U	36	-328 to +1112	±0.36	-328 to +1112
L	36	-328 to +1652	±0.45	-328 to +1652
P (Platinel II)	36	32 to 2543	±0.45	32 to 2543

## 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

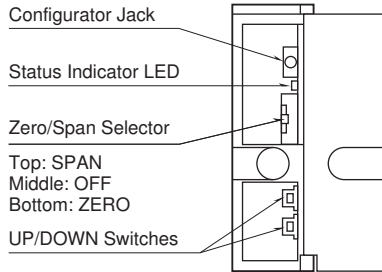
(ANSI/ISA-12.12.01, CAN/CSA-C22.2 No.213)

UL/C-UL general safety requirements

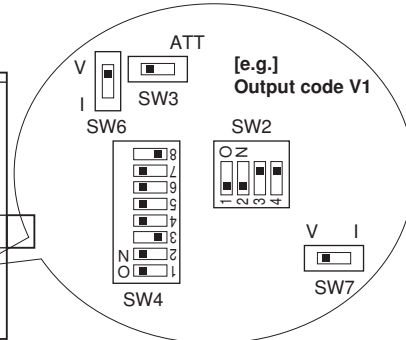
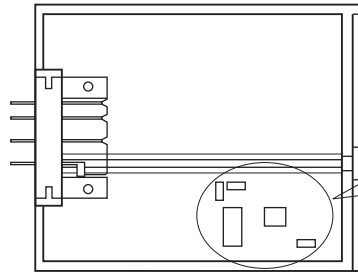
(UL 61010-1, CAN/CSA-C22.2 No.61010-1)

## EXTERNAL VIEW

**FRONT VIEW (with cover open)**



**LEFT SIDE VIEW (with cover removed)**

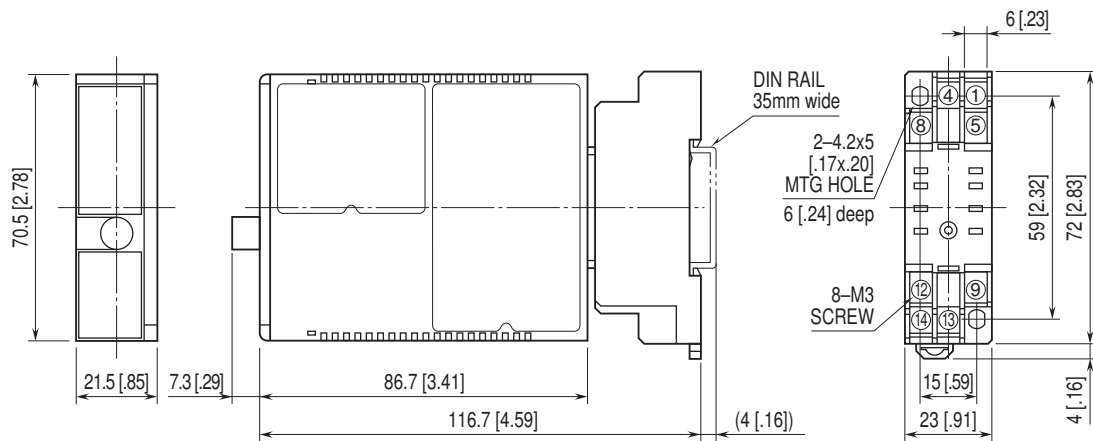


Output Range Selectors

The front cover cannot be turned open by 180 deg. when there is no extra space between units.

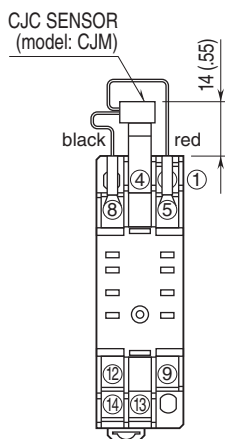
Refer to the instruction manual for detailed procedures.

## EXTERNAL DIMENSIONS unit: mm [inch]

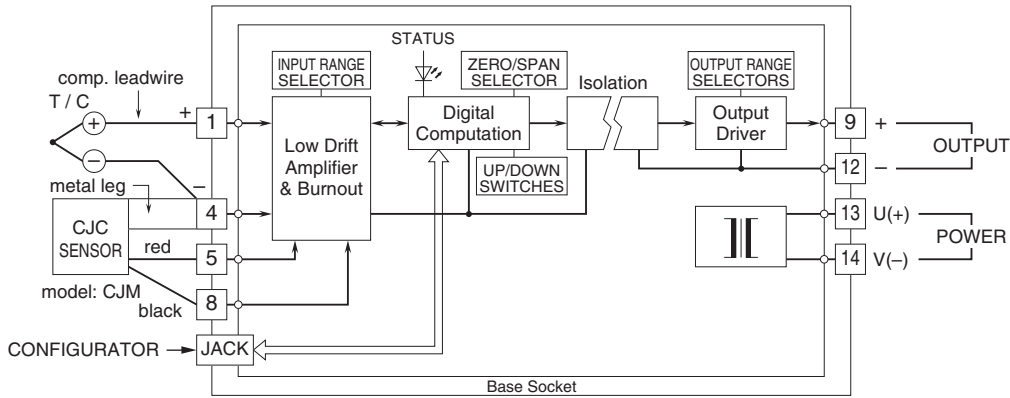


• When mounting, no extra space is needed between units.

## TERMINAL ASSIGNMENTS unit: mm [inch]



## SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM



Specifications are subject to change without notice.