

## Super-mini Signal Conditioners Mini-M Series

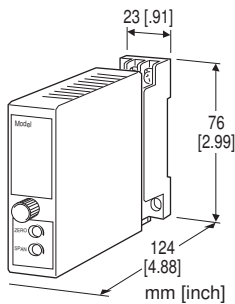
### RTD TRANSMITTER

#### Functions & Features

- Accepts direct input from an RTD
- Linearization
- Burnout
- "Active bridge" circuit containing two constant current sources allows large leadwire resistances up to 200 Ω
- Fast response type available

#### Typical Applications

- Long distance transmission between the RTD and the transmitter
- Combination with intrinsic safety barriers



### MODEL: M2RS-[1][2]-[3][4]

#### ORDERING INFORMATION

• Code number: M2RS-[1][2]-[3][4]

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

- (e.g. M2RS-4A-M2/BL/CE/Q)
- Temperature range (e.g. 0 - 500°C)
- Special output range (For codes Z & 0)
- Specify the specification for option code /Q (e.g. /C01/V01)

For the input code C, specify also the following. If not specified, Cu 10Ω @25°C (usable range -200 - +260°C) will be used.

- Input type (e.g. Cu 10Ω)
- Resistance range (e.g. 9.038 - 12.891 Ω)

### [1] INPUT RTD (2- or 3-wire)

**1:** JPt 100 (JIS'89)

(Usable range: -200 to +500°C, -328 to +932°F; min.span: 50°C, 90°F)

**3:** Pt 100 (JIS'89)

(Usable range: -200 to +650°C, -328 to +1202°F; min.span: 50°C, 90°F)

**4:** Pt 100 (JIS'97, IEC)

(Usable range: -200 to +650°C, -328 to +1202°F; min.span: 50°C, 90°F)

**5:** Pt 50 Ω (JIS'81)

(Usable range: -200 to +500°C, -328 to +932°F; min.span: 100°C, 180°F)

**6:** Ni 508.4 Ω

(Usable range: -50 to +200°C, -58 to +392°F; min.span: 30°C, 54°F)

**C:** Cu (Refer to 'Cu INPUT'.)

**0:** Specify

Note: Consult M-System for 2-wire RTD

### [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

**A:** 24 V AC (Operational voltage range 24 V ±10 %, 47 - 66 Hz)  
(Select 'N' for 'Standards & Approvals' code.)

**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  $\pm$ 10 % for UL)

## [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

### 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)

### ADJUSTMENT

/V01: Multi-turn fine adjustment (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)

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

Linearization: Standard (not available for the input code C)

## INPUT SPECIFICATIONS

Maximum leadwire resistance: 200  $\Omega$  per wire (3-wire)

Sensing current: 2 mA (Pt); 1 mA (Ni 508.4  $\Omega$ )

Refer to 'Cu Input' for the input code C.

## 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  $\geq$  0.5 V

## INSTALLATION

### Power Consumption

#### • AC:

Approx. 3 VA at 24 V

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:  $\pm$ 0.2 %

(Refer to 'Cu INPUT' for the input code C.)

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

Refer to 'Cu Input' for the input code C.

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

## Cu INPUT

### ■ INPUT

#### • Sensing current (resistance span):

140  $\Omega$   $\leq$  Span  $\leq$  300  $\Omega$  : 1 mA

12  $\Omega$   $\leq$  Span  $<$  140  $\Omega$  : 2 mA

8  $\Omega$   $\leq$  Span  $<$  12  $\Omega$  : 3 mA

3.5  $\Omega$   $\leq$  Span  $<$  8  $\Omega$  : 5 mA

#### • Max. leadwire resistance:

200  $\Omega$  or the value calculated using the equation below, whichever is smaller.

Leadwire resistance( $\Omega$ ) = (2500 - 100% resistance( $\Omega$ )  $\times$  Sensing current(mA))  $\div$  (3  $\times$  Sensing current(mA))

#### • Usable range:

3.5  $\Omega$   $\leq$  Resistance span( $\Omega$ )  $\leq$  300 $\Omega$

100 % resistance( $\Omega$ )  $\leq$  (2500 - 3  $\times$  Leadwire resistance ( $\Omega$ )  $\times$  Sensing current (mA))  $\div$  Sensing current (mA)

### ■ PERFORMANCE

#### • Accuracy

Resistance span  $\geq$  20  $\Omega$ :  $\pm$ 0.2 %

**Otherwise use the equation below:**

$$\text{Accuracy}(\%) = 0.02(\Omega) \div \text{Resistance span}(\Omega) \times 100 + 0.1(\%) \times 40(\text{mV}) \div (\text{Resistance span}(\Omega) \times \text{Sensing current}(\text{mA}))$$

• **Temperature coefficient**

**Resistance span(Ω) × Sensing current(mA) ≥ 40(mV):**

$$\pm 0.015 \text{ \%}/^\circ\text{C}$$

**Otherwise use the equation below:**

$$\text{Temperature coefficient}(\text{\%/}^\circ\text{C}) = 0.015(\text{\%/}^\circ\text{C}) \times 40(\text{mV}) \div (\text{Resistance span}(\Omega) \times \text{Sensing current}(\text{mA}))$$

## 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,

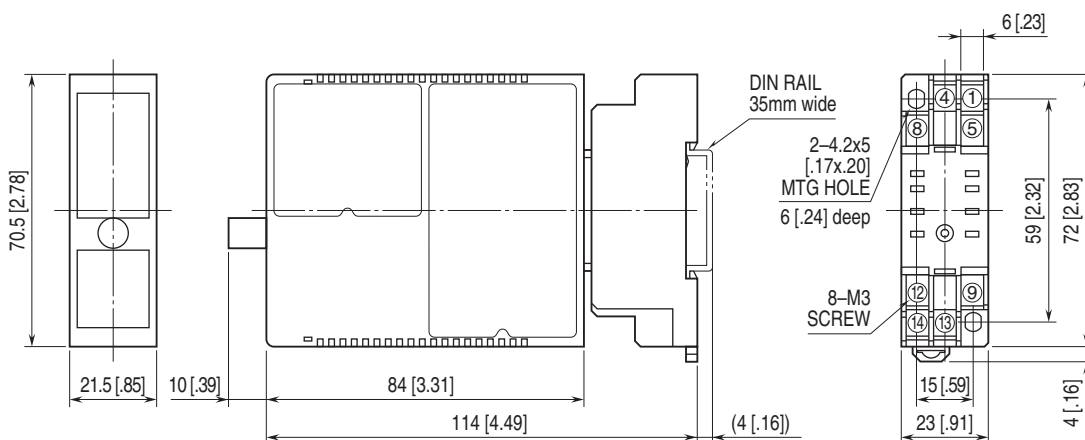
Groups A, B, C, and D

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

UL/C-UL general safety requirements

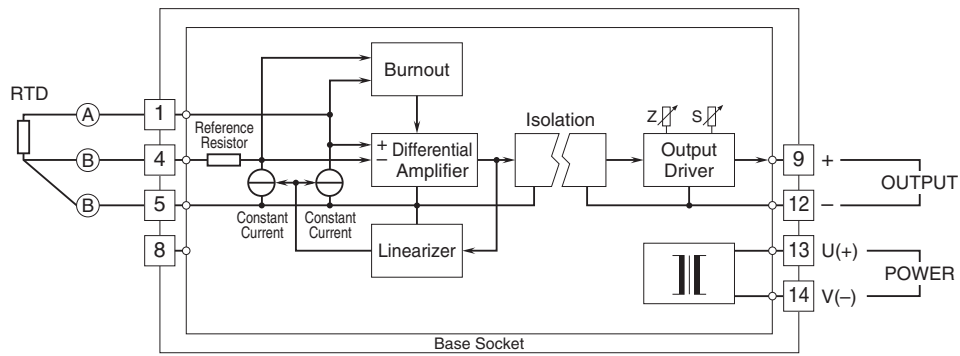
(UL 61010-1, CAN/CSA-C22.2 No.61010-1)

## EXTERNAL DIMENSIONS & TERMINAL ASSIGNMENTS unit: mm [inch]



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

**SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM**



Specifications are subject to change without notice.