

## Super-mini Signal Conditioners Mini-M Series

### RTD TRANSMITTER

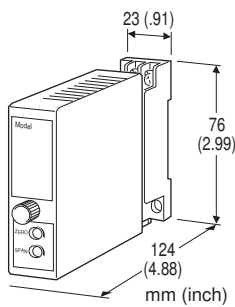
(1 mA sensing current)

#### Functions & Features

- Accepts direct input from an RTD
- Linearization
- Burnout
- 1 mA sensing current (except Cu Input)
- "Active bridge" circuit containing two constant current sources allows large leadwire resistances up to 200  $\Omega$
- Fast response type available

#### Typical Applications

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



## MODEL: M2RS1-[1][2]-[3][4]

### ORDERING INFORMATION

- Code number: M2RS1-[1][2]-[3][4]  
Specify a code from below for each [1] through [4].  
(e.g. M2RS1-4A-M2/K/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 10 $\Omega$  @25°C (usable range -200 - +260°C) will be used.

- Input type (e.g. Cu 10 $\Omega$ )
- Resistance range (e.g. 9.038 - 12.891  $\Omega$ )

### [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  $\Omega$  (JIS'81)

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

6: Ni 508.4  $\Omega$

(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  $\Omega$  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 1000  $\Omega$  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

M2: 100 - 240 V AC (Operational voltage range 85 - 264 V, 47 - 66 Hz)

#### DC Power

R: 24 V DC

(Operational voltage range 24 V  $\pm$ 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.)

### [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

/CE: 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

### ADJUSTMENT

/V01: Multi-turn fine adjustment

### TERMINAL SCREW MATERIAL

/S01: Stainless steel

## GENERAL SPECIFICATIONS

Construction: Plug-in

Connection: M3 screw terminals (torque 0.8 N·m)

Screw terminal: Chromated 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)

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

## INPUT SPECIFICATIONS

Maximum leadwire resistance: 200 Ω per wire (3-wire)

Sensing current: 1 mA

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 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:  $\leq 20$  sec.

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

Insulation resistance:  $\geq 100$  MΩ 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):

$140 \Omega \leq \text{Span} \leq 300 \Omega$  : 1 mA

$12 \Omega \leq \text{Span} < 140 \Omega$  : 2 mA

$8 \Omega \leq \text{Span} < 12 \Omega$  : 3 mA

$3.5 \Omega \leq \text{Span} < 8 \Omega$  : 5 mA

#### • Max. leadwire resistance:

200 Ω or the value calculated using the equation below, whichever is smaller.

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

#### • Usable range:

$3.5 \Omega \leq \text{Resistance span}(\Omega) \leq 300\Omega$

$100\% \text{ resistance}(\Omega) < (2500 - 3 \times \text{Leadwire resistance}(\Omega)) \times$   
Sensing current (mA)  $\div \text{Sensing current}(\text{mA})$

### ■ PERFORMANCE

#### • Accuracy

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

Otherwise use the equation below:

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(mA))

#### • Temperature coefficient

Resistance span(Ω)  $\times$  Sensing current(mA)  $\geq 40(\text{mV})$ :  
 $\pm 0.015$  %/°C

Otherwise use the equation below:

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

## STANDARDS & APPROVALS

### CE conformity:

EMC Directive (2004/108/EC)

EMI EN 61000-6-4: 2007

EMS EN 61000-6-2: 2005

Low Voltage Directive (2006/95/EC)

EN 61010-1: 2001

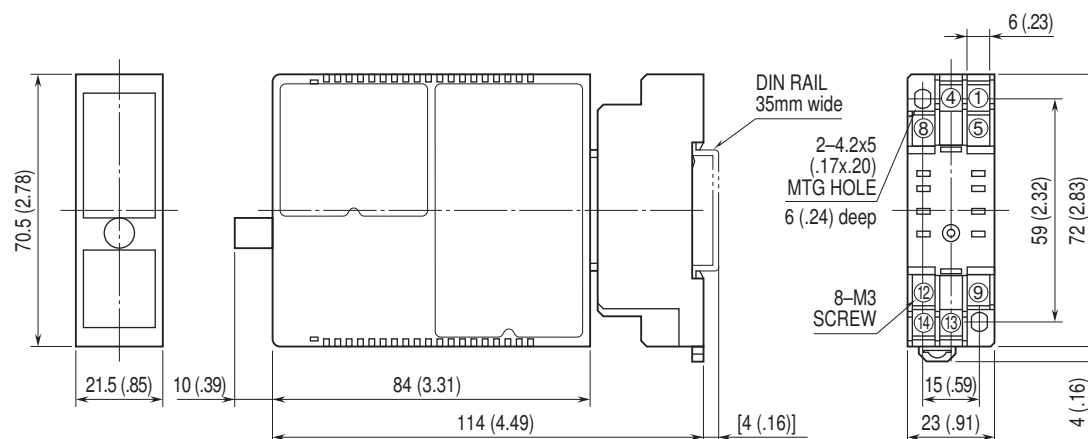
Installation Category II

Pollution Degree 2

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

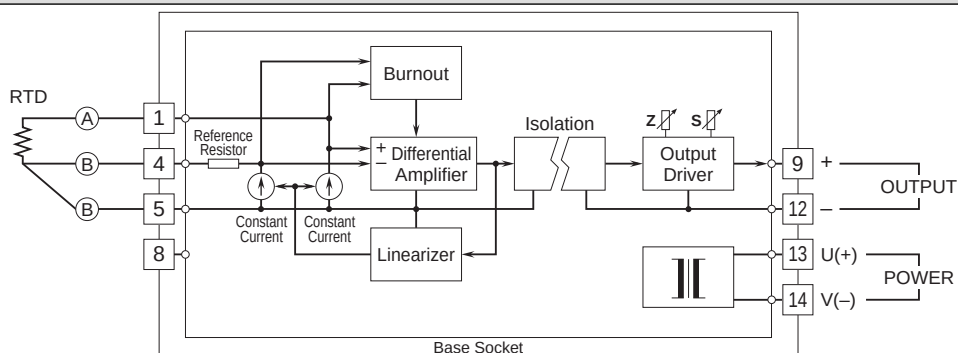
Input to output: Basic insulation (300 V)

## DIMENSIONS unit: mm (inch)



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

## SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM



Specifications are subject to change without notice.