

## Super-mini Signal Conditioners Mini-M Series

### UNIVERSAL TRANSMITTER

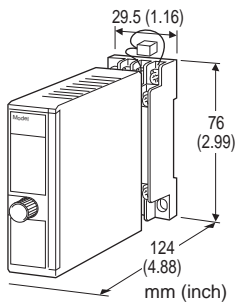
(PC programmable; Modbus-RTU communication)

#### Functions & Features

- Accepts direct inputs from various sensors and provides a standard process signal
- I/O types and calibration ranges are fully programmable via a PC
- Linearization up to 100 points can be programmed for DC and potentiometer inputs
- Isolation between input - output - RS-485 - power

#### Typical Applications

- Signal conversion between control room and field instrumentation with isolation
- Ideal for use as a fast solution, multifunctional spare part



### MODEL: M2XUM-[1][2]-[3][4]

#### ORDERING INFORMATION

- Code number: M2XUM-[1][2]-[3][4]
- Specify a code from below for each of [1] through [4]. (e.g. M2XUM-00-M2/CE/Q)
- Specify the specification for option code /Q (e.g. /C01/S01)

Non-specified orders will be shipped at default factory settings (M2XUM-00: 4 - 20 mA input/4 - 20 mA output). However, the power suffix code **must** be specified. If you specify full code numbers without specific calibration ranges, default settings will be used. Note: Must be used with its socket. NOT installable to a multi-unit installation base. (e.g. model: M2BS-16)

#### [1] INPUT

**0:** User-calibrated (Factory default: 4 - 20 mA DC)

If the unit is to be factory-calibrated to a specific input type, please select from the following:

#### Current

**Z1:** Range 0 - 50 mA DC (Input resistance 100 Ω)

#### Voltage

**S1:** Range -1 - +1 V DC (Input resistance 1 MΩ min.)

**S2:** Range -10 - +10 V DC (Input resistance 1 MΩ min.)

#### Thermocouple

**T1:** (PR) (Usable Range 0 to 1760°C, 32 to 3200°F)

**T2:** K (CA) (Usable range -270 to +1370°C, -454 to +2498°F)

**T3:** E (CRC) (Usable range -270 to +1000°C, -454 to +1832°F)

**T4:** J (IC) (Usable range -210 to +1200°C, -346 to +2192°F)

**T5:** T (CC) (Usable range -270 to +400°C, -454 to +752°F)

**T6:** B (RH) (Usable range 0 to 1820°C, 32 to 3308°F)

**T7:** R (Usable range -50 to +1760°C, -58 to +3200°F)

**T8:** S (Usable range -50 to +1760°C, -58 to +3200°F)

**T9:** C (WRe 5-26) (Usable range 0 to 2315°C, 32 to 4199°F)

**TN:** N (Usable range -270 to +1300°C, -454 to +2372°F)

**TU:** U (Usable range -200 to +400°C, -328 to +752°F)

**TL:** L (Usable range -200 to +900°C, -328 to +1652°F)

**TP:** P (Platinel II) (Usable range 0 to 1395°C, 32 to 2543°F)

**T0:** Specify (Please provide an emf table.)

#### RTD

**(2- or 3-wire)**

**R1:** JPt 100 (JIS'89)

(Usable range: -200 to +500°C, -328 to +932°F)

**R3:** Pt 100 (JIS'89)

(Usable range: -200 to +850°C, -328 to +1562°F)

**R4:** Pt 100 (JIS'97, IEC)

(Usable range: -200 to +850°C, -328 to +1562°F)

**R5:** Pt 50 Ω (JIS'81)

(Usable range: -200 to +649 °C, -328 to +1200°F)

**R6:** Ni 508.4 Ω

(Usable range: -50 to +200°C, -58 to +392°F)

**R7:** Pt 1000

(Usable range: -200 to +200°C, -328 to +392°F)

**R8:** Ni 100 (Usable range: -50 to +200°C, -58 to +392°F)

**R9:** Cu 10 @25°C

(Usable range: -50 to +200°C, -58 to +392°F)

**R0:** Specify (Please provide a resistance table.)

#### Potentiometer

**M:** Total resistance 100 Ω - 10 kΩ

Note: Consult M-System for 2-wire RTD

#### [2] OUTPUT

**0:** User-calibrated (Factory default: 4 - 20 mA DC)

If the unit is to be factory-calibrated to a specific output type, please select from the following:

#### Current

**Z1:** Range 0 - 20 mA DC

#### Voltage

**V1:** Range -2.5 - +2.5 V DC

**V2:** Range -10 - +10 V DC

**[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.)

**P:** 110 V DC

(Operational voltage range 85 – 150 V, ripple 10 %p-p max.)

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

**TERMINAL SCREW MATERIAL**

/S01: Stainless steel

**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 RS-485 to power

**Overrange output:** Approx. -15 to +115 %  
(Negative current output is not provided.)

**Manual zero adjustments:** -5 to +5 %  
(factory setting: 0 %)

**Manual span adjustments:** 95 to 105 %  
(factory setting: 100 %)

**Programming:** PC programmable features include:

- T/C and RTD type and temp. range
- Input and output ranges

- Zero and span adjustments

- Simulated output

- User's linearization table (max. 100 points, specified within -15 – +115 % for both input and output)

- User's TC/RTD table

**Burnout (T/C, RTD and Pot.):** Upscale standard; downscale or no burnout options are PC programmable

**Linearization (T/C, RTD input):** Standard tables stored in memory

**Cold junction compensation (T/C):** CJC sensor (included) to be 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

**MODBUS COMMUNICATION**

Standard: Conforms to TIA/EIA-485-A

Transmission distance: 500 meters max.

Baud rate: 38.4 kbps max.

Communication: Half-duplex, asynchronous, no procedure Protocol: Modbus RTU

Transmission media: Shielded twisted-pair cable (CPEV-S 0.9 dia.)

**INPUT SPECIFICATIONS**

■ **DC Current:** Shunt resistor attached to the input terminals (0.5 W)

**Operational range:** 0 – 70 mA DC with 100  $\Omega$ , 0.5 W

**Input range:** 0 – 50 mA DC

**Minimum span:** 2 mA

**Offset:** Lower range can be any specific value within the input range provided that the minimum span is maintained. If not specified, the input range is 4 – 20 mA DC.

■ **DC Voltage**

**Operational range:** -11.5 – +11.5 V DC

**Input range:** -10 – +10 V DC

**Minimum span:** 10 mV for S1; 100 mV for S2

**Offset:** Lower range can be any specific value within the input range provided that the minimum span is maintained. If not specified, the input range is shown below.

S1: 0 – 100 mV DC

S2: 1 – 5 V DC

■ **Thermocouple**

For T/C types K, E, T, B, R, S, N or U, the accuracy in the temperature ranges near the lower limit may be out of the described value. Consult M-System for more detail.

**Input resistance:** 1 M $\Omega$  min.

**Burnout sensing:** 45 nA  $\pm$ 10 %

**Offset:** Lower range can be any specific value within the input range provided that the minimum span is maintained.

If not specified, the input range is shown below.

T1 PR: 0 - 1600°C  
 T2 K: 0 - 1000°C  
 T3 E: 0 - 500°C  
 T4 J: 0 - 500°C  
 T5 T: 0 - 300°C  
 T6 B: 0 - 1800°C  
 T7 R: 0 - 1600°C  
 T8 S: 0 - 1600°C  
 T9 C: 0 - 2000°C  
 TN N: 0 - 1000°C  
 TU U: 0 - 300°C  
 TL L: 0 - 500°C  
 TP P: 0 - 1200°C

## ■ RTD

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

**Sensing current:** ≤ 1.0 mA

If not specified, the input range is shown below.

R1: JPt 100 0 - 100°C  
 R3: Pt 100 0 - 100°C  
 R4: Pt 100 0 - 100°C  
 R5: Pt 50 Ω 0 - 200°C  
 R6: Ni 508.4 Ω 0 - 100°C  
 R7: Pt 1000 0 - 100°C  
 R8: Ni 100 0 - 100°C  
 R9: Cu 10 0 - 100°C

• **Potentiometer:** 100 Ω - 10 kΩ

**Minimum span:**

(Range) 0 - 100 Ω : 2.5 Ω  
 0 - 300 Ω : 3.0 Ω  
 0 - 1000 Ω : 10 Ω  
 0 - 10 kΩ : 10 Ω

**Excitation:** ≤ 0.5 V DC at 1000 Ω

If not specified, the input range is 0 - 1000 Ω.

## 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 Ω [15 V ÷ 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 Ω [5 V ÷ 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. 6 VA

• **DC:** Approx. 3 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:** Input accuracy + output accuracy

**Input accuracy** (% of input range)

Inversely proportional to span.

(DC) -1 - +1 V : ±0.02

-10 - +10 V : ±0.02

0 - 50 mA : ±0.02

Except the input resistor error.

(T/C) (PR) : ±0.08

K (CA) : ±0.02

E (CRC) : ±0.02

J (IC) : ±0.04

T (CC) : ±0.06

B (RH) : ±0.12

R : ±0.08

S : ±0.08

C (WRe 5 - 26) : ±0.04

N : ±0.04

U : ±0.04

L : ±0.04

P (Platinel II) : ±0.04

(RTD) JPt 100 (JIS '89) : ±0.04

Pt 100 (JIS '89) : ±0.03

Pt 100 (JIS '97, IEC) : ±0.03

Pt 50 Ω (JIS '81) : ±0.04

Ni 508.4 Ω : ±0.05

Pt 1000 : ±0.08

Ni 100 : ±0.14

Cu 10 : ±0.6

(Pot.) 0 - 100 Ω : ±0.08

0 - 300 Ω : ±0.04

0 - 1000 Ω : ±0.04

0 - 10 kΩ : ±0.04

**Output accuracy:** ±0.02 % of output range

Inversely proportional to span.

**Cold junction compensation error:**

±0.4°C or ±0.7°F (at 20°C ±10°C or 68°F ±18°F)

**Temp. coefficient**

(at -5 to +55°C [23 to 131°F] of I/O range)

**Input:** ±0.016 %/°C (±0.009 %/°F) with current

±0.004 %/°C (±0.002 %/°F) with voltage

±0.004 %/°C (±0.002 %/°F) with T/C

±0.004 %/°C (±0.002 %/°F) with RTD

±0.004 %/°C (±0.002 %/°F) with Pot.

**Output:** ±0.013 %/°C (±0.007 %/°F)

**Response time:**

≤ 0.5 sec.(0 - 90 %) with current

≤ 0.5 sec.(0 - 90 %) with voltage

≤ 1.5 sec.(0 - 90 %) with T/C

≤ 0.9 sec.(0 - 90 %) with RTD

≤ 0.9 sec. (0 - 90 %) with Pot.

**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 RS-485 to power to ground)

## CALCULATION EXAMPLES OF OVERALL ACCURACY

[Example] Input Type -10 - +10 V, Input Range 1 - 5 V,

Output Type 0 - 20 mA, Output Range 0 - 10 mA

Max. Input Range (20 V) ÷ Span (4 V) × 0.02 % = 0.1 %

Max. Output Range (20 mA) ÷ Span (10 mA) × 0.02 % =  
0.04 %

Overall accuracy = 0.1 + 0.04 = ±0.14 %

## 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)

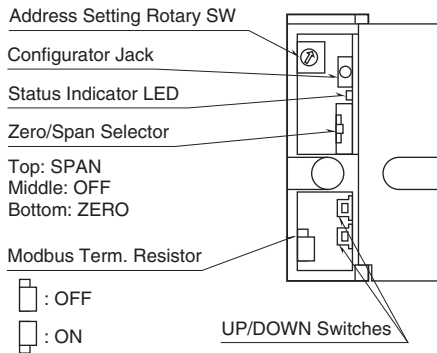
Input to output: Basic insulation (300 V)

RoHS Directive

EN 50581

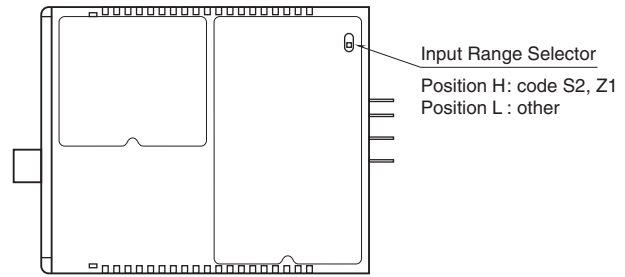
## EXTERNAL VIEW

### FRONT VIEW (with cover open)



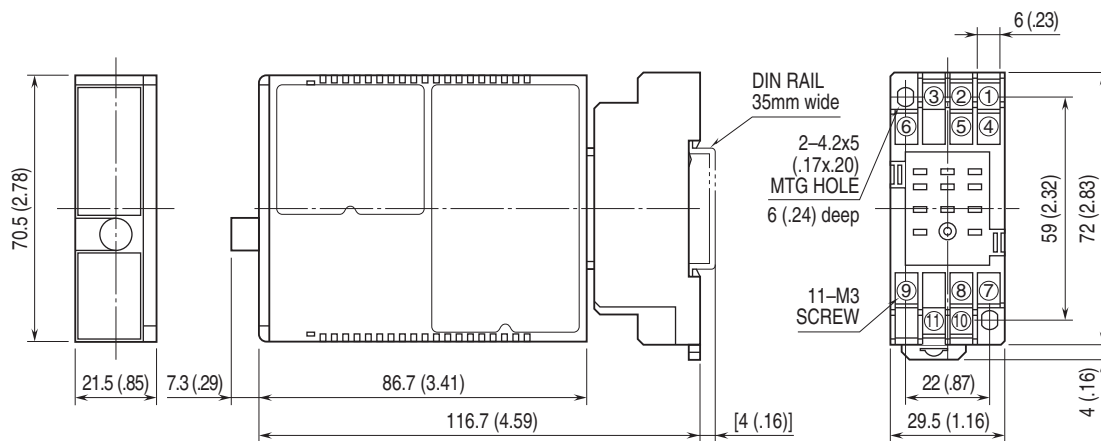
The front cover cannot be opened to 180 deg. when flush with neighboring units.

### RIGHT SIDE VIEW



Refer to the instruction manual for detailed procedures.

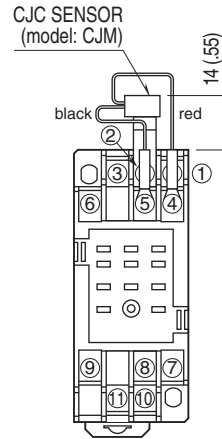
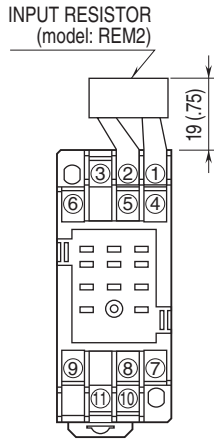
## EXTERNAL DIMENSIONS unit: mm (inch)



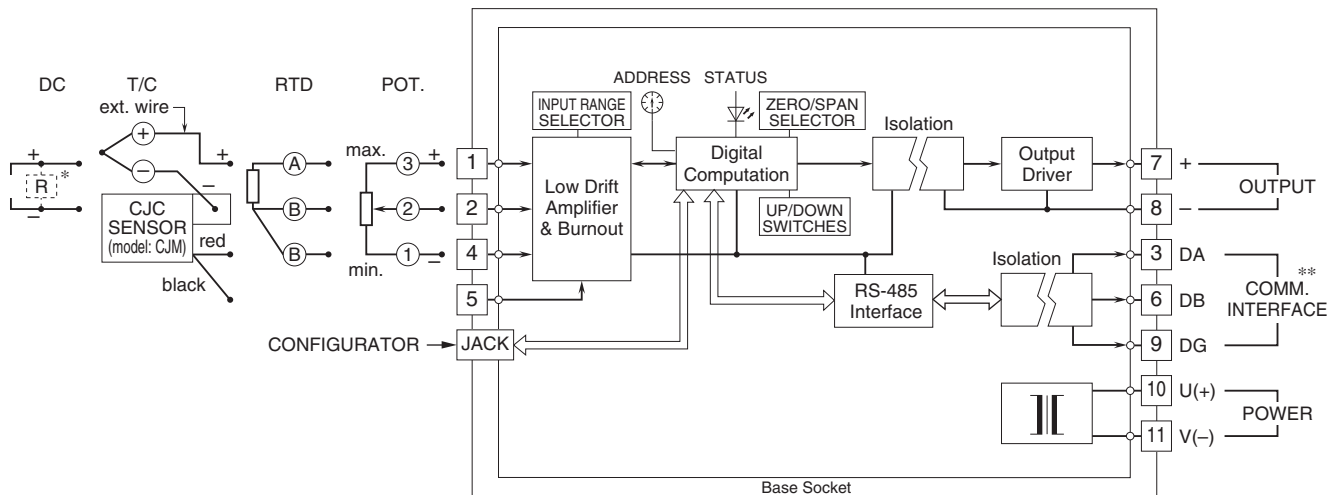
• When mounting, no extra space is needed between units.

## TERMINAL ASSIGNMENTS unit: mm (inch)

Use the input resistor (model: REM2) for a DC current input, and the CJC sensor (model: CJM) for a thermocouple input, both included in the package.



## SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM

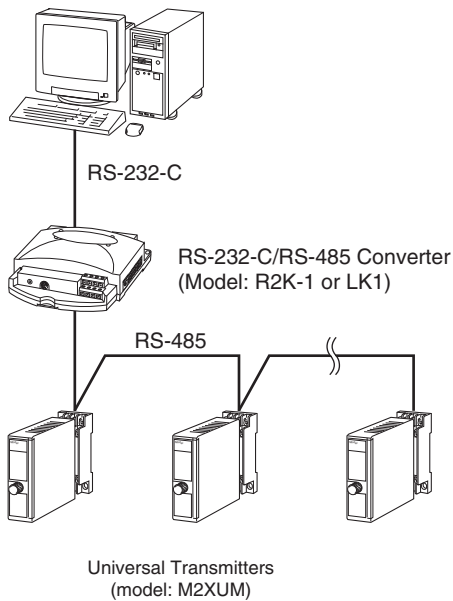


\* Input shunt resistor attached for current input.

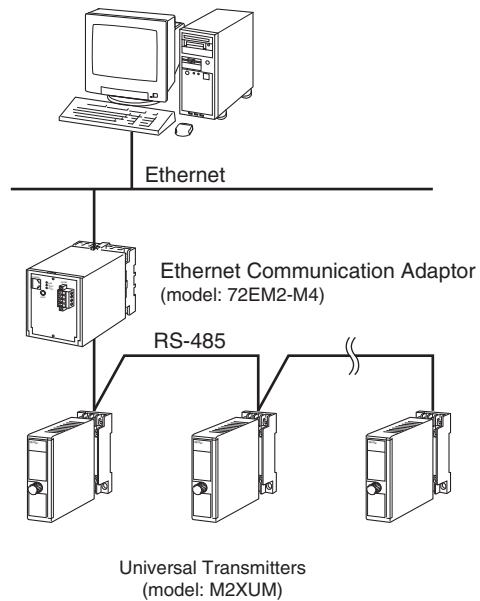
\*\*When the module is at the end of RS-485 transmission line, turn on the Modbus terminating resistor located behind the front cover, off when it is not.

## SYSTEM CONFIGURATION EXAMPLES

### ■ RS-232-C / RS-485



### ■ Ethernet / RS-485



## MODBUS COMMUNICATION PARAMETERS

Refer to the instruction manual for the details about Modbus communication.

### ■ COMMUNICATION PARAMETERS

PARAMETER	SPECIFICATIONS	DEFAULT	MODIFICATION
Data Mode	RTU	RTU	Not modifiable
Baud Rate	9600/19200/38400 bps	38400 bps	JXCON Software
Parity	None/Odd/Even	Odd	JXCON Software
Bit Length	8	8	Not modifiable
Stop Bit	1	1	Not modifiable
Node Address	1 to 247	1	Hardware Rotary SW for 1 through 15, JXCON Software for 16 through 247 (Rotary SW set to 0).
Floating Point Data	Normal/Swapped	Normal	JXCON Software
Physical Layer	RS-485	RS-485	Not modifiable



Specifications are subject to change without notice.