Super-mini Signal Conditioners Mini-M Series

UNIVERSAL TRANSMITTER

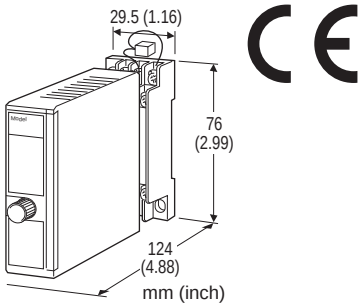
(PC programmable; Modbus-RTU communication)

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
- CE marking

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 [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: 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 (100 Ω @ 0°C)
(Usable range: -50 to +200°C, -58 to +392°F)
R9: Cu 10 (10 Ω @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

[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

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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 ±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 & Approvlas (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

• JX configurator connection kit (model: JXCON)
For configuration JXCON is necessary.

GENERAL SPECIFICATIONS

Construction: Plug-in

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

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: Flashing patterns indicate different operating status of the transmitter.

Configurator connection: 2.5 dia. miniature jack; RS-232-C level

MODBUS COMMUNICATION

Standard: Conforms to RS-485, EIA
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 Ω, 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 or N, 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 MΩ min.

Burnout sensing: 45 nA ±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

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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 (WRe 5 - 26) : 0 – 2000°C
TN N : 0 – 1000°C
TU U : 0 – 300°C
TL L : 0 – 500°C
TP Platinel II : 0 – 1200°C
■ **RTD**: 2- or 3-wire 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 Power input**: Approx. 6 VA
•**DC power input**: 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 lbs)

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

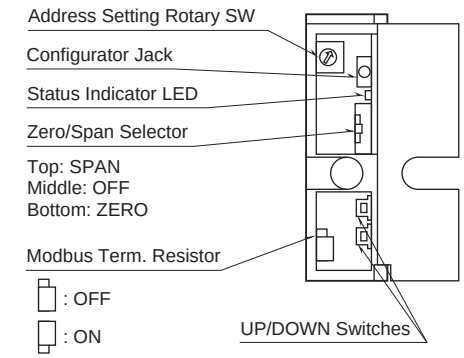
[Example] Input Type -10 – +10 V, Input Range 1 – 5 V, Output Type 0 – 20 mA, Output Range 0 – 10 mA
Max. Input Range (20 V) ÷ Span (4 V) × 0.02 % = 0.1 %
Max. Output Range (20 mA) ÷ Span (10 mA) × 0.02 % = 0.04 %
Overall accuracy = 0.1 + 0.04 = ±0.14 %

STANDARDS & APPROVALS

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)

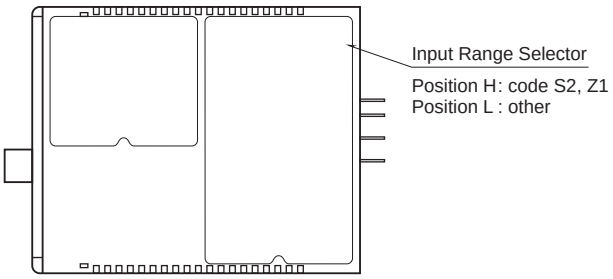
EXTERNAL VIEW

■ **FRONT VIEW (with cover open)**



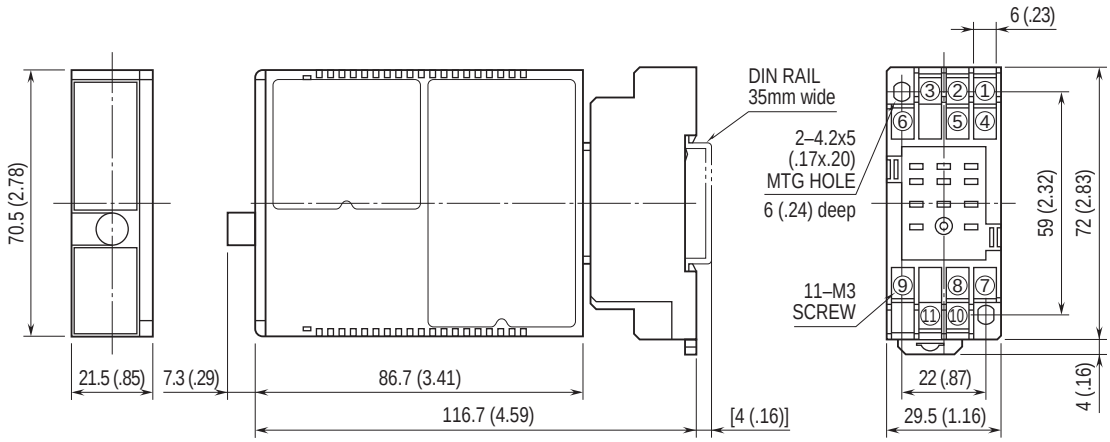
The front cover cannot be opened to 180 deg.
when flush with neighboring units.

■ **RIGHT SIDE VIEW**



Refer to the instruction manual for detailed procedures.

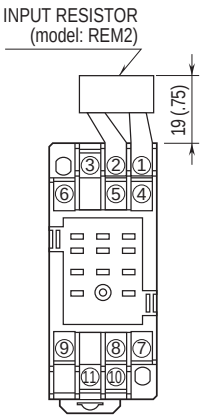
DIMENSIONS unit: mm (inch)



• 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.



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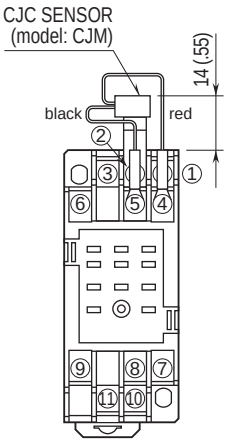
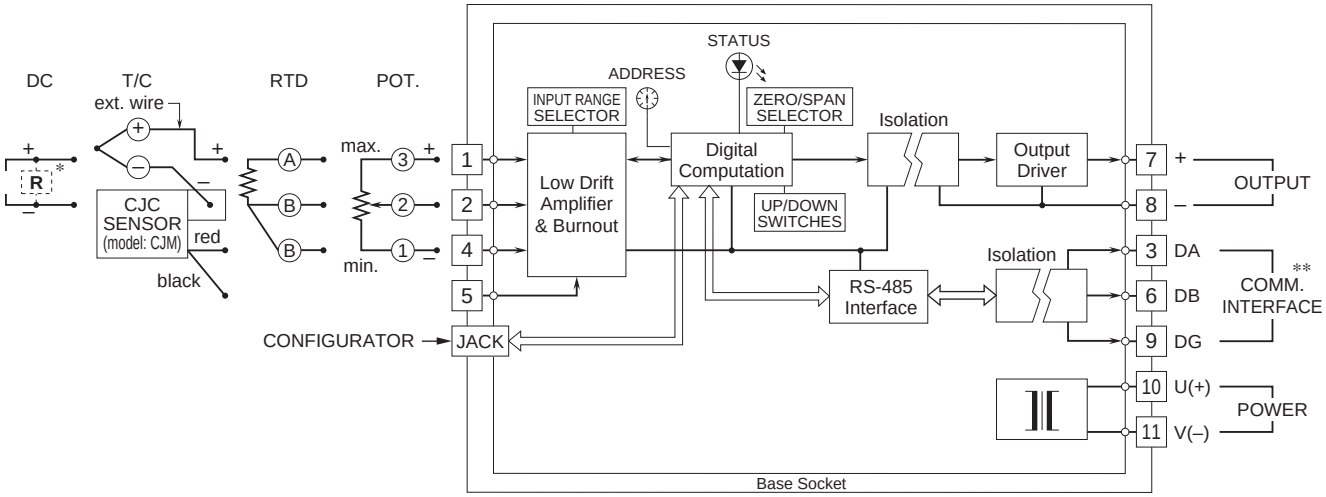
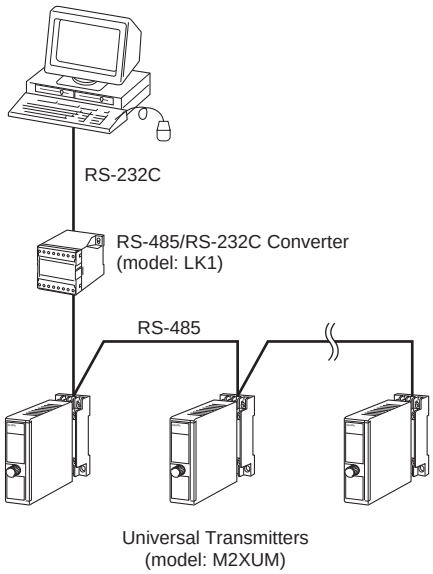


SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM



* 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



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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 16, 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.

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