

**Space-saving Signal Conditioners M3-UNIT Series**

**POTENTIOMETER TRANSMITTER**  
(field- and PC-configurable)

MODEL **M3LM**

**MODEL & SUFFIX CODE SELECTION**

MODEL \_\_\_\_\_ M3LM-R4/□□

**INPUT SELECTION**

◆Potentiometers  
Total resistance 90Ω – 20kΩ

**OUTPUT SELECTION**

◆DC Current: Usable range 0 – 20mA; min. span 1mA  
◆DC Voltage: Usable range ±2.5V; min. span 250mV  
Usable range ±10V; min. span 1V

**POWER INPUT** \_\_\_\_\_

R4: 10 – 32V DC

**CONFIGURATION OPTIONS** \_\_\_\_\_

A : PC and field configurable  
B : Field configurable

**OPTIONS** \_\_\_\_\_

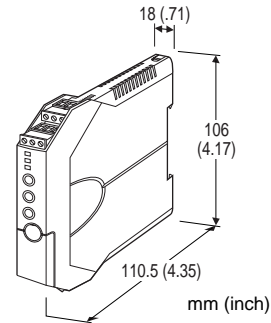
/UL : UL approval

**ORDERING INFORMATION**

Specify code number (e.g. M3LM-R4/A). Orders will be shipped at default factory settings (0 – 1kΩ input/4 – 20mA output).

**RELATED PRODUCTS**

- PC configurator software (model: M3CON)  
Downloadable at M-System's web site:  
<http://www.m-system.co.jp>
- PC configurator cable (model: MCN-CON)



**Functions & Features**

- Provides a DC output proportional to a potentiometer or slidewire position input
- Easy 'One-Step Cal' calibration using the front three control buttons without needing a PC; PC software is also usable.
- Both input and output type and range are configurable
- UL approval

**GENERAL SPECIFICATIONS**

- Connection:** Removable terminal block
- Housing material:** Flame-resistant resin (grey)
- Isolation:** Input to output to power
- Overrange output:** Approx. -15 – +115%  
(Negative current output is not available even within this range.)
- Fine zero and span adjustments:** ±15% via the front control buttons
- Burnout:** Upscale (default), downscale or no burnout selectable
- Configuration**
- 'One-Step Cal' calibration: With I/O type and the full-scale range configured via the internal DIP switches, precise 0% and 100% ranges are calibrated via the front control buttons with a help of LED.
- PC configurator (model: M3CON): Via Windows PC connected to the front jack.  
Programmable features include:
- I/O type and range
  - Zero and span adjustments
  - Burnout action
  - User's RTD table setting
- Status indicator LED:** Tri-color (green/amber/red) LED; Flashing patterns indicate operation status of the transmitter.

**INPUT**

■ **POTENTIOMETER:** Total resistance 90Ω – 20kΩ

**Excitation:** ≤0.65V DC (at 1kΩ)

**Input range v.s. minimum span:**

(range) 0 – 90Ω	: 2.5Ω (span)
0 – 200Ω	: 3Ω
0 – 400Ω	: 3Ω
0 – 1000Ω	: 10Ω
0 – 20kΩ	: 10Ω

**OUTPUT**

■ **DC CURRENT**

**Maximum range:** 0 – 20mA DC

**Minimum span:** 1mA

**Conformance range:** 0 – 24mA DC

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

**Load resistance:** Output drive 12V maximum;  
e.g. 600Ω [12V/20mA] with 4 – 20mA

■ **DC VOLTAGE**

**Narrow Spans (mV)**

**Maximum range:** -2.5 – +2.5V DC

**Minimum span:** 250mV

**Conformance range:** -3 – +3V DC

**Wide Spans (V)**

**Maximum range:** -10 – +10V DC

**Minimum span:** 1V

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

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

**Load resistance:** Output drive 1mA maximum  
e.g. 5000Ω [5V/1mA] with 1 – 5V

**INSTALLATION**

**Power input:** Operational voltage range 9 – 36V DC;  
approx. 3W; ripple 10% p-p max.

**Operating temperature:** -25 to +65°C (-13 to +149°F)  
Max. 55°C (131°F) for UL approval

**Operating humidity:** 0 to 95% RH (non-condensing)

**Mounting:** DIN rail

**Dimensions:** W18×H106×D110.5 mm  
(0.71"×4.17"×4.35")

**Weight:** 100 g (0.22 lbs)

**PERFORMANCE**

**Accuracy:** Input Accuracy + Output Accuracy

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

0 – 90Ω	: ≤ ±0.02 (%)
0 – 200Ω	: ≤ ±0.02
0 – 400Ω	: ≤ ±0.01
0 – 1000Ω	: ≤ ±0.01
0 – 20kΩ	: ≤ ±0.02

**Output accuracy\*:** ≤ ±0.04% of output range

\*Inversely proportional to the span.

\*\*Except the accuracy of input resistor.

[Example] Input Range 250 – 750Ω, Output Range 1 – 5V

Max. Input Range (1000Ω) / Span (500Ω) × 0.01% +

Max. Output Range (20V) / Span (4V) × 0.04% = 0.22%

**Temp. coefficient:** ±0.015%/°C (±0.008%/°F) of max.  
range 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:** ≥100MΩ with 500V DC

**Dielectric strength:** 1500V AC @1 minute

(input to output or power to ground)  
500V @1 minute (output to power)

**STANDARDS & APPROVALS**

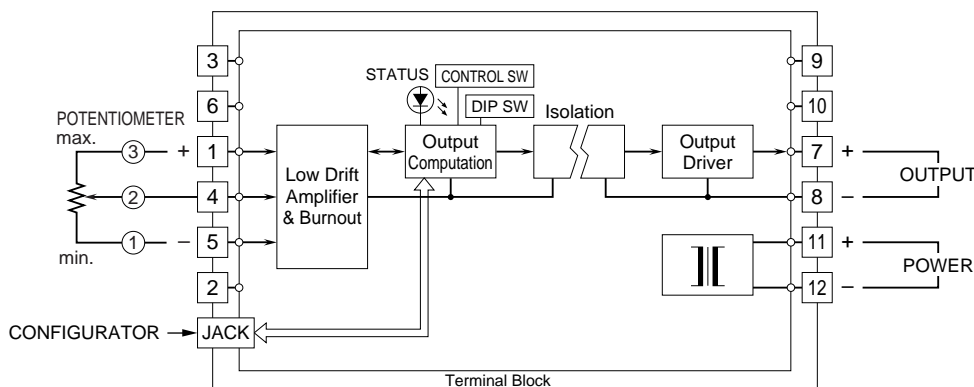
**CE conformity:** EMC Directive (89/336/EEC)

EMI EN61000-6-4

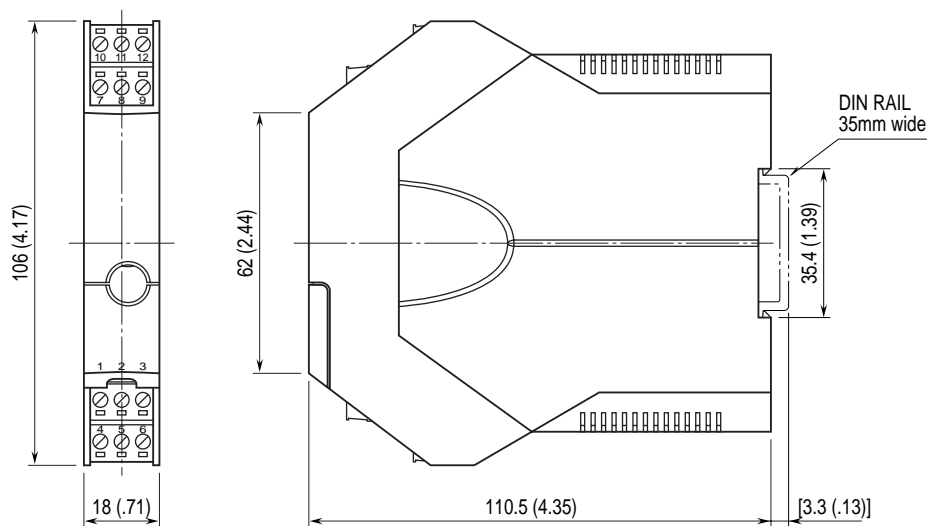
EMS EN61000-6-2

**Approval:** UL/C-UL general safety requirements

(UL 61010-1, CAN/CSA-C22.2 No.1010-1)

**SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM**

## EXTERNAL DIMENSIONS & TERMINAL ASSIGNMENTS mm (inch)



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

## ONE-STEP-CAL CALIBRATION

### CONFIGURATION MODES & DIP SW

When you program the transmitter module, two configuration modes are available: Field Configuration using DIP SW / control buttons, and PC Software. (Option B type is for the field configuration only.)

The internal DIP switches are used to configure input and output type. Once the module is configured, precise ranges are set up with the front control buttons using a simulator connected to the input terminals and a multimeter connected to the output terminals as a reference.

### INPUT & OUTPUT RANGING

For example, suppose that the DIP switches are configured for 0 – 1000Ω full-range. Turn the power supply to the transmitter on and press MODE button to enter to the Input Calibration Mode. Apply the desired minimum (e.g. 0Ω) and maximum (e.g. 500Ω) input levels and push the DOWN (zero) and UP (span) respectively to set the input range to 0 – 500Ω.

Then the output range can be calibrated in a similar manner after moving to the Output Calibration Mode by pressing MODE button again. Increase or decrease the simulated input until the output meter shows the desired levels and push the DOWN (zero) and UP (span) respectively for the minimum (e.g. 4mA) and maximum (e.g. 20mA) levels.

The front LEDs' colors and flashing patterns help you to easily identify the transmitter's status and confirm the setup actions in each step of Calibration Modes. See detailed explanation in "Calibration Flow Chart."

The calibrated input and output ranges are stored in the internal memory. The module reads the DIP-switch-calibrated configuration only once after the power supply is turned on. Set the switches with the power supply removed.

### FINE ZERO & SPAN ADJUSTMENTS

After the transmitter is installed and operational, fine zero and span tuning can be also performed using the front control buttons. Both zero and span are adjustable within ±15%.

### PC SOFTWARE CONFIGURATION

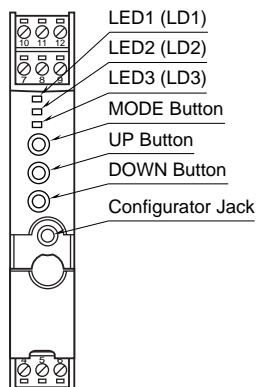
When you need to apply the same setting to multiple transmitters, downloading one setting from the PC is convenient. The PC Configurator Software (model: M3CON) is available separately.

Turn the transmitter to PC Configuration Mode (See Table 1) and all programmable features can be set up on a PC regardless of other DIP SW setting except that the output type must be selected with the DIP SW1-1 through SW1-4 (See Table 5).

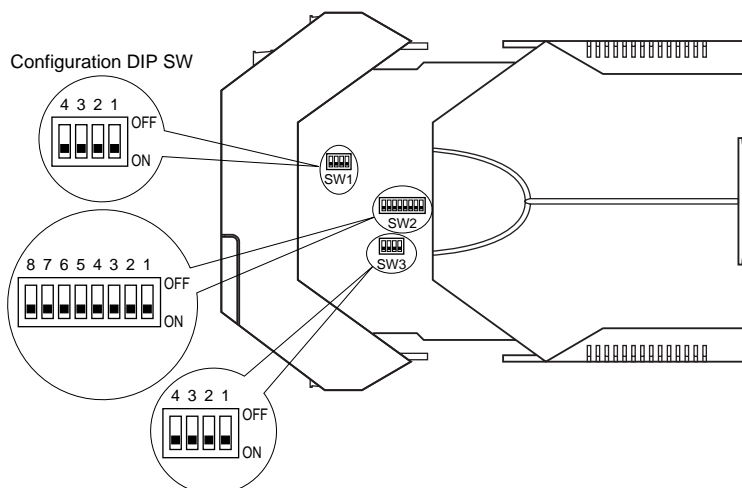
For detailed information on the PC configuration, refer to the M3CON instruction manual.

**EXTERNAL & INTERNAL VIEWS**

■FRONT VIEW



■SIDE VIEW



**DIP SWITCH SETTINGS**

■CONFIGURATION MODE (SW2)

Table 1

MODE	SW2-8	
DIP SW	OFF	Configuration mode can be confirmed with the front LED.
PC	ON	

■POTENTIOMETER (SW2)

Table 2

RESISTANCE	SW2-7	SW2-6	SW2-5	SW2-4
0 – 20kΩ	OFF	OFF	OFF	ON
0 – 1000Ω	OFF	OFF	OFF	OFF
0 – 400Ω	OFF	OFF	ON	OFF
0 – 200Ω	OFF	OFF	ON	ON
0 – 90Ω	OFF	ON	OFF	OFF

■BURNOUT (SW3)

Table 3

BURNOUT	SW3-2	SW3-1
No burnout	OFF	ON
Upscale	OFF	OFF
Downscale	ON	OFF

■OUTPUT TYPE (SW2 & 1)

Table 4

OUTPUT	SW2-3	SW2-2	SW1-4	SW1-3	SW1-2	SW1-1
0 – 20mA	OFF	OFF	OFF	ON	OFF	OFF
-2.5 – +2.5V	OFF	ON	ON	OFF	OFF	ON
-10 – +10V	ON	OFF	ON	OFF	ON	OFF

■OUTPUT TYPE / PC CONFIG (SW1)

Table 5

OUTPUT	SW1-4	SW1-3	SW1-2	SW1-1
0 – 20mA	OFF	ON	OFF	OFF
-2.5 – +2.5V	ON	OFF	OFF	ON
-10 – +10V	ON	OFF	ON	OFF

Specifications subject to change without notice.

# CALIBRATION FLOW CHART

