

## Super-mini Signal Conditioners Mini-M Series

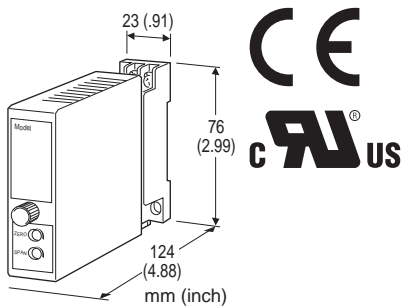
### DC/FREQUENCY CONVERTER

#### Functions & Features

- Provides a pulse rate output in proportion to DC input signal
- CE marking
- UL approval

#### Typical Applications

- Totalizing applications in combination with a counter



### MODEL: M2AP-[1][2]-[3][4]

#### ORDERING INFORMATION

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

- Code number: M2AP-[1][2]-[3][4]  
(e.g. M2AP-61-M2/CE/Q)

Specify variables.

- Output frequency range (e.g. 0 - 500 Hz)
- Specify the specification for option code /Q  
(e.g. /C01/S01)

#### [1] INPUT

##### Current

- A: 4 - 20 mA DC (Input resistance 250 Ω)
- D: 0 - 20 mA DC (Input resistance 50 Ω)
- G: 0 - 1 mA DC (Input resistance 1000 Ω)
- H: 10 - 50 mA DC (Input resistance 100 Ω)
- Z: Specify current (See INPUT SPECIFICATIONS)  
( 0 % input must be 0 mA.)

##### Voltage

- 3: 0 - 1 V DC (Input resistance 1 MΩ min.)
- 4: 0 - 10 V DC (Input resistance 1 MΩ min.)
- 5: 0 - 5 V DC (Input resistance 1 MΩ min.)
- 6: 1 - 5 V DC (Input resistance 1 MΩ min.)
- 0: Specify voltage (See INPUT SPECIFICATIONS)  
( 0 % input must be 0 V.)

#### [2] OUTPUT

- 1: Open collector (max. frequency 1 kHz)
- 2: 5 V pulse (max. frequency 1 kHz)
- 3: Mercury relay contact (max. frequency 30 Hz)  
(Select '/N' for 'Standards & Approvals' code.)  
(Not conformed to RoHS Directive)

#### [3] POWER INPUT

##### AC Power

**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.)

(Select '/N' for 'Standards & Approvals' code.)

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

##### STANDARDS & APPROVALS (must be specified)

/N: Without CE or UL

/CE: CE marking

/UL: UL approval (CE marking)

##### OTHER OPTIONS

blank: none

/Q: Option other than the above (specify the specification)

(UL not available)

#### 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

#### 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 power

**Zero adjustment:** 0 - 5 % (front)

**Span adjustment:** 95 to 105 % (front)



## INPUT SPECIFICATIONS

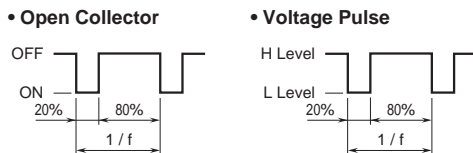
- **DC Current:**  
Shunt resistor attached to the input terminals (0.5 W)  
Specify input resistance value for code Z.
- **DC Voltage:** 0 - 300V DC  
**Minimum span:** 1V  
**Input resistance:** 1 MΩ min.

## OUTPUT SPECIFICATIONS

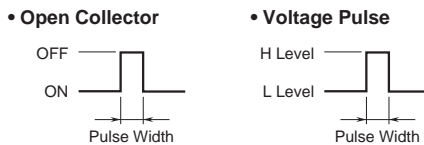
- **Open Collector:** 30 V DC @100 mA (resistive load)  
**Frequency range:** 0 - 10 pulses/hour through 1 kHz  
**Saturation voltage:** 0.6 V DC
- **5 V Pulse**  
**Frequency range:** 0 - 10 pulses/hour through 1 kHz  
**Hi level:** 3.0 - 5.5 V  
**Lo level:** ≤ 0.5 V  
**Load resistance:** 250 Ω min.
- **Mercury Relay Contact**  
**Frequency range:** 0 - 10 pulses/hour through 30 Hz  
**Timer:** Limits ON time ≤ 75 ±25 millisec.  
**Rated load:** 132 V AC @200mA (cos φ = 1)  
30 V DC @200 mA (resistive load)  
**Maximum switching voltage:** 350 V AC or 500 V DC  
**Maximum switching current:** 200 mA AC or 300 mA DC  
**Maximum switching power:** 26 VA or 6 W  
**Relay life:** ≥ 5 × 10<sup>8</sup> cycles, mechanical  
≥ 5 × 10<sup>7</sup> cycles, electrical

## OUTPUT PULSE WIDTH

- **Frequency less than 500 Hz at 100% input**  
→ Duty ratio 20% (See the figure below)

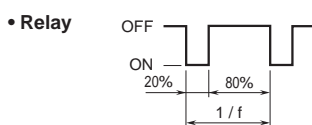


- **Frequency greater than 500 Hz at 100% input**  
→ See the figure and equation below.



$$\text{Pulse Width [millisec.]} = \frac{1}{2.09 \times 100\% \text{ Frequency [kHz]}}$$

- **Mercury Relay Contact**  
→ See the figure below. ON pulse width is limited within 75 ±25 ms when the output frequency is low.



## INSTALLATION

- Power Consumption**
- **AC Power input:**  
Approx. 3 VA at 100 V  
Approx. 4 VA at 200 V  
Approx. 5 VA at 264 V
- **DC Power input:** 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 lbs)

## PERFORMANCE in percentage of span

- Accuracy:** ±0.1 %
- Temp. coefficient:** ±0.015 %/°C (±0.008 %/°F)
- Response time:** Approx. 3 sec. (0 - 90 %)
- 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 power to ground)

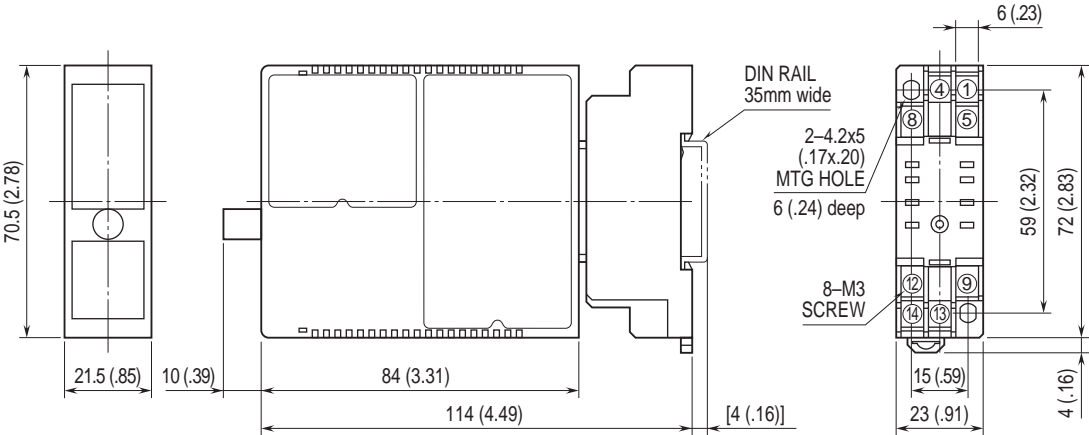
## STANDARDS & APPROVALS

- CE conformity:**  
EMC Directive (2004/108/EC)  
EN 61000-6-4 (EMI)  
EN 61000-6-2 (EMS)  
Low Voltage Directive (2006/95/EC)  
EN 61010-1  
Installation Category II  
Pollution Degree 2  
Max. operating voltage 300 V  
Input or output to power: Reinforced insulation  
Input to output: Basic insulation

- Approval:**  
UL/C-UL nonincendive Class I, Division 2,  
Groups A, B, C, and D hazardous locations  
(UL 1604, CAN/CSA-C22.2 No.213)  
UL/C-UL general safety requirements  
(UL 61010B-1, CAN/CSA-C22.2 No.1010-1)

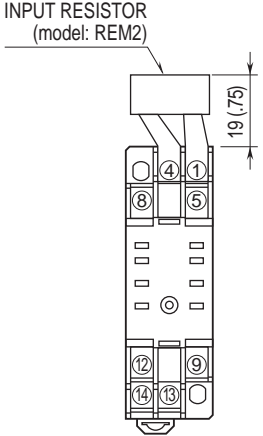


**DIMENSIONS unit: mm (inch)**



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

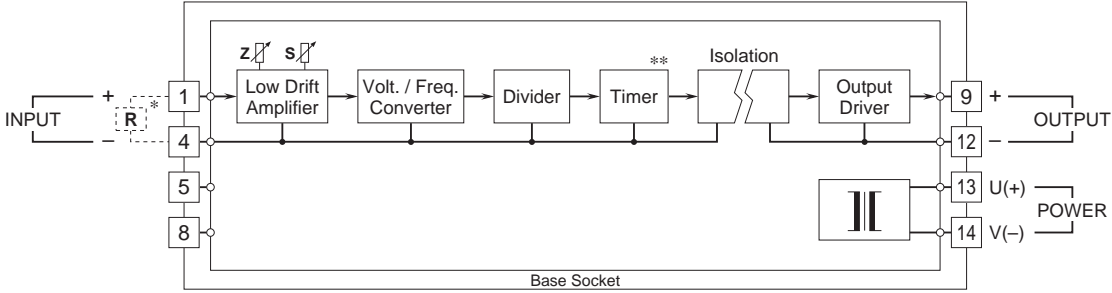
**TERMINAL ASSIGNMENTS unit: mm (inch)**



Input shunt resistor attached for current input.



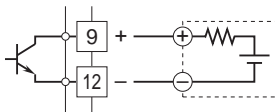
**SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM**



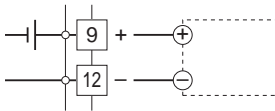
\* Input shunt resistor attached for current input.  
 \*\*Mercury relay contact only.

**Output Connection Examples**

■ Open Collector

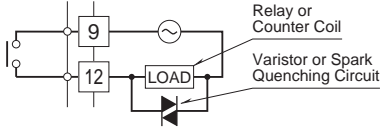


■ Voltage Pulse

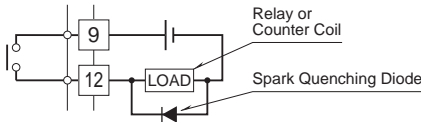


■ Relay

• AC Powered



• DC Powered



Specifications are subject to change without notice.

