

## Super-mini Signal Conditioners Mini-M Series

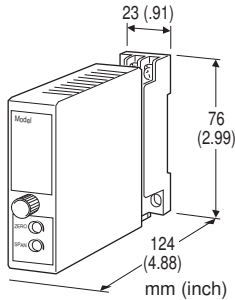
### DC/FREQUENCY CONVERTER

#### Functions & Features

- Provides a pulse rate output in proportion to DC input signal

#### Typical Applications

- Totalizing applications in combination with a counter



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

#### ORDERING INFORMATION

- Code number: M2AP-[1][2]-[3][4]
- Specify a code from below for each of [1] through [4]. (e.g. M2AP-61-M2/CE/Q)
- Output frequency range (e.g. 0 - 500 Hz)
- Special input range (For codes Z & 0)
- 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. 1 kHz)
- 2: 5 V pulse (max. 1 kHz)
- 4: Dry contact AC/DC switch (max. frequency 30 Hz)
- ( '/UL' is not selectable for 'Standards & Approvals' code.)

#### [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)

#### 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 (UL not available)

##### TERMINAL SCREW MATERIAL

- /S01: Stainless steel (UL not available)

## 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 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.

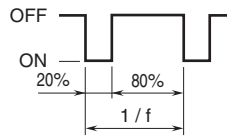
## OUTPUT SPECIFICATIONS

■ **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.  
 ■ **Dry Contact AC/DC Switch**  
**Frequency range:** 0 - 10 pulses/hour through 30 Hz  
**Timer:** Limits within 75 ±25 msec.  
 for wider than 75 msec. pulses  
**Rated load:** 132 V AC @200 mA (cos φ = 1)  
 30 V DC @200 mA (resistive load)  
**Saturation voltage:** 3 V DC

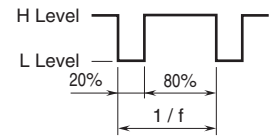
## OUTPUT PULSE WIDTH

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

• **Open Collector**

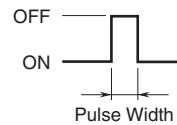


• **Voltage Pulse**

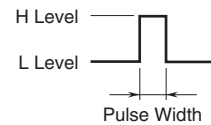


■ **Frequency greater than 500 Hz at 100% input**  
 → See the figure and equation below.

• **Open Collector**



• **Voltage Pulse**

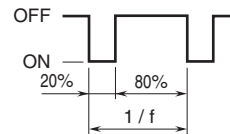


$$\text{Pulse Width [millisec.]} = \frac{1}{2.09 \times 100\% \text{ Frequency [kHz]}}$$

■ **Dry Contact AC/DC Switch**

→ See the figure below. ON pulse width is limited within 75 ±25 msec. when the output frequency gets low (below 2 to 4 Hz).

• **Dry Contact AC/DC Switch**



## 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:** ±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

### EU conformity:

EMC Directive

EMI EN 61000-6-4

EMS EN 61000-6-2

Low Voltage Directive

EN 61010-1

Measurement Category II (input, output)

Installation Category II (power)

Pollution Degree 2

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

Input to output: Basic insulation (300 V)

RoHS Directive

EN 50581

### Approval:

UL/C-UL nonincendive Class I, Division 2,

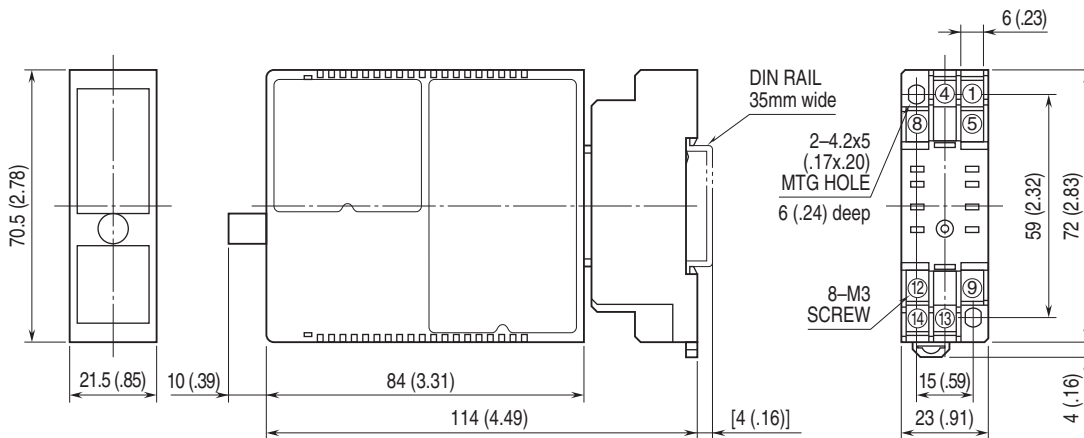
Groups A, B, C, and D

(ANSI/ISA-12.12.01, CAN/CSA-C22.2 No.213)

UL/C-UL general safety requirements

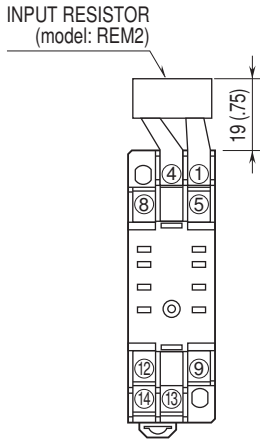
(UL 61010-1, CAN/CSA-C22.2 No.61010-1)

## EXTERNAL DIMENSIONS unit: mm (inch)



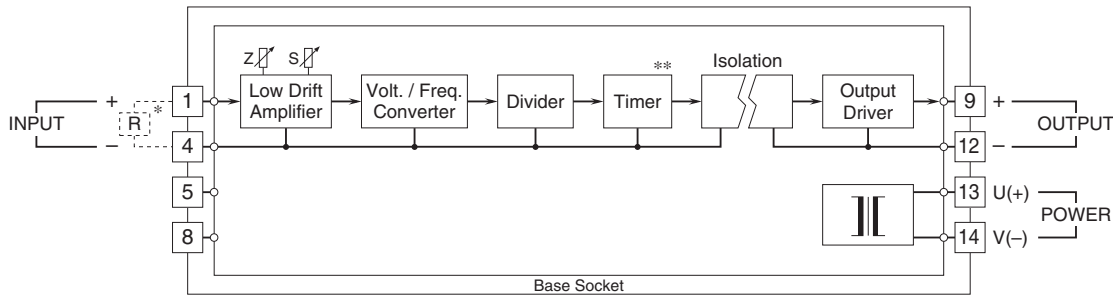
• When mounting, no extra space is needed between units.

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



Input shunt resistor attached for current input.

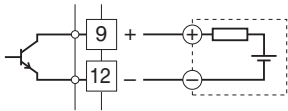
**SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM**



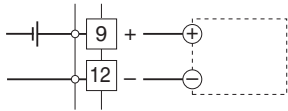
\* Input shunt resistor attached for current input.  
 \*\* Dry contact AC/DC switch only.

Output Connection Examples

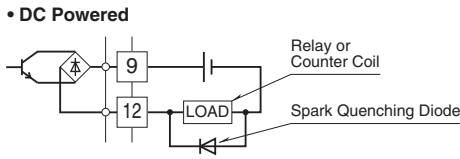
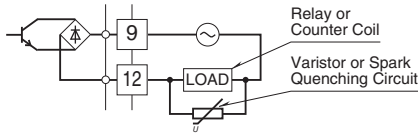
■ Open Collector



■ Voltage Pulse



■ Dry Contact AC/DC Switch



Specifications are subject to change without notice.