

Super-mini Signal Conditioners Mini-M Series

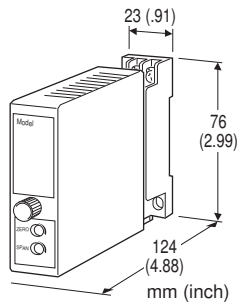
DC/FREQUENCY CONVERTER

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.

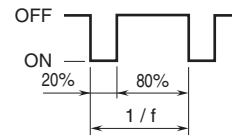
OUTPUT SPECIFICATIONS

■ **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

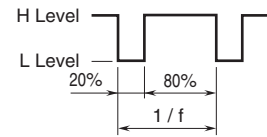
OUTPUT PULSE WIDTH

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

• **Open Collector**

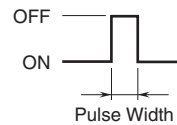


• **Voltage Pulse**

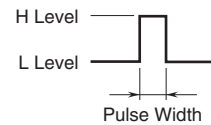


■ **Frequency greater than 500 Hz at 100% input**
 → See the figure and equation below.

• **Open Collector**



• **Voltage Pulse**

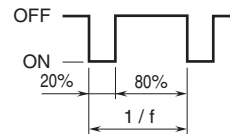


$$\text{Pulse Width [millisec.]} = \frac{1}{2.09 \times 100\% \text{ Frequency [kHz]}}$$

■ **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,

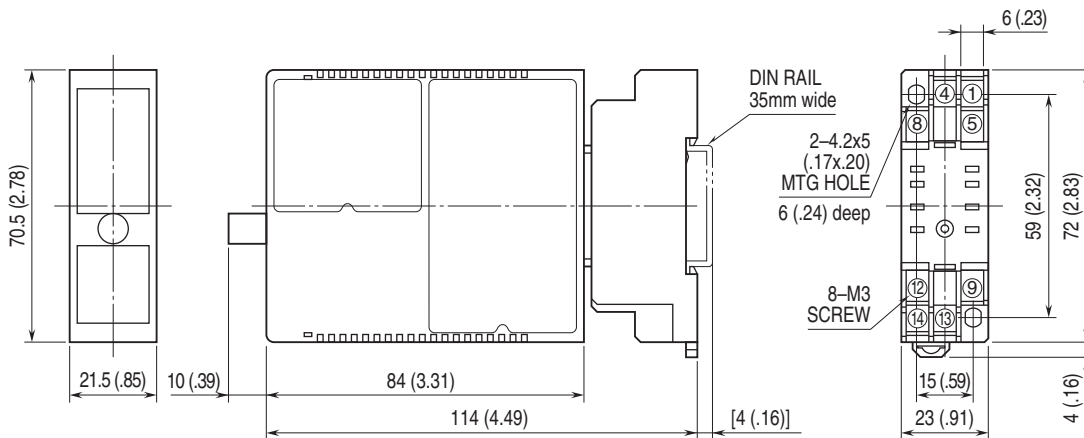
Groups A, B, C, and D

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

UL/C-UL general safety requirements

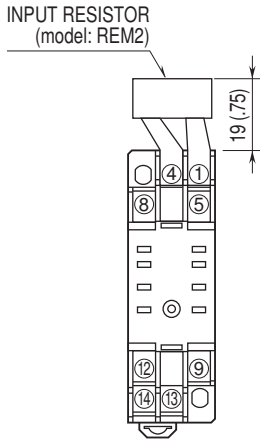
(UL 61010-1, CAN/CSA-C22.2 No.61010-1)

EXTERNAL DIMENSIONS unit: mm (inch)



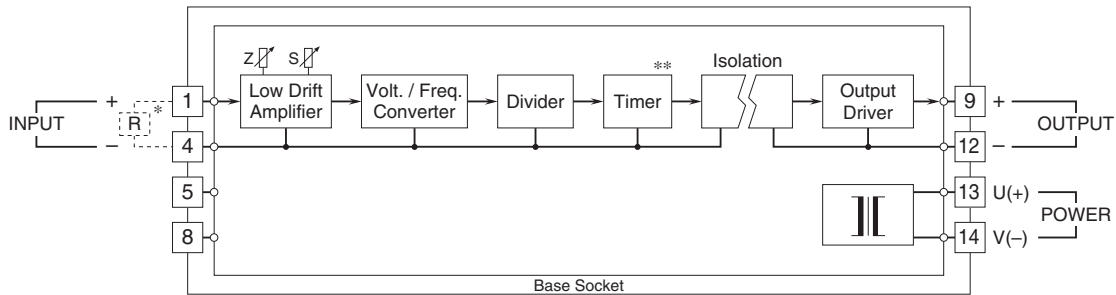
• When mounting, no extra space is needed between units.

TERMINAL ASSIGNMENTS unit: mm (inch)



Input shunt resistor attached for current input.

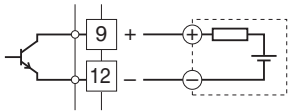
SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM



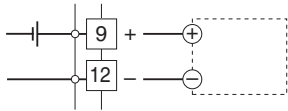
* Input shunt resistor attached for current input.
 ** Dry contact AC/DC switch only.

Output Connection Examples

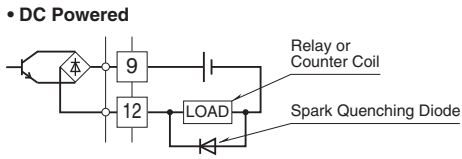
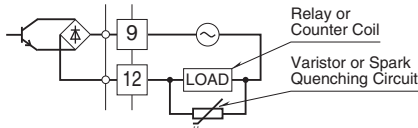
■ Open Collector



■ Voltage Pulse



■ Dry Contact AC/DC Switch



Specifications are subject to change without notice.