Super-mini Signal Conditioners Mini-M Series

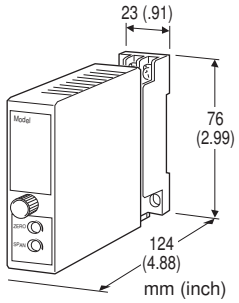
DC/FREQUENCY CONVERTER

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.

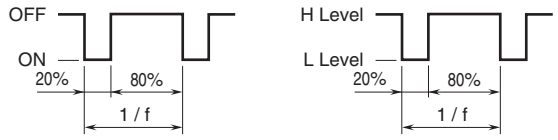
OUTPUT SPECIFICATIONS

■ **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 ø = 1)
30 V DC @200 mA (resistive load)
Saturation voltage: 3 V DC

OUTPUT PULSE WIDTH

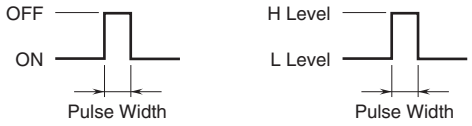
■ **Frequency less than 500 Hz at 100% input**
→ Duty ratio 20% (See the figure below)

• Open Collector **• Voltage Pulse**



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

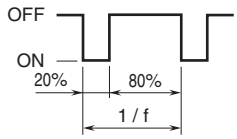
• Open Collector **• Voltage Pulse**



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

■ **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

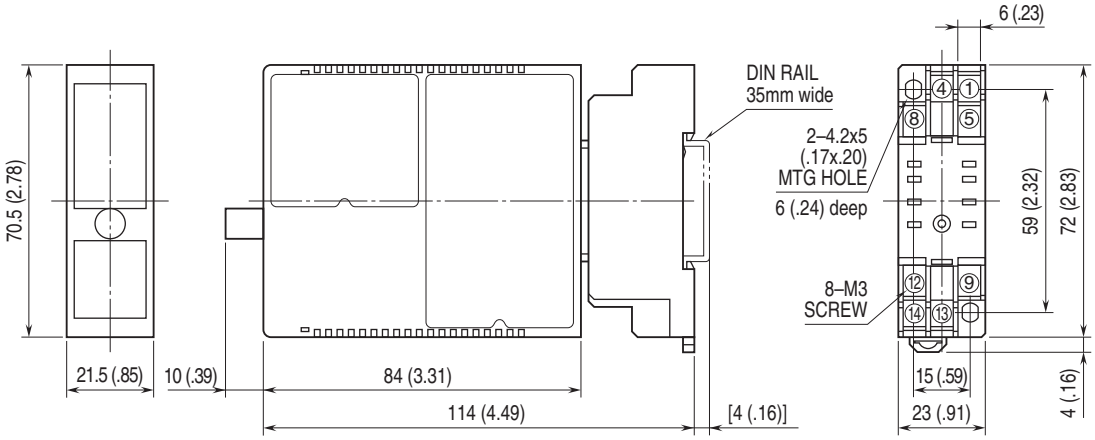
EN 50581

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)

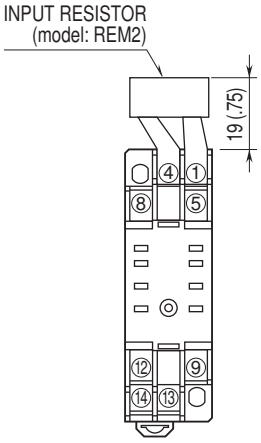
UL/C-UL general safety requirements
(UL 61010-1, CAN/CSA-C22.2 No.61010-1)

EXTERNAL DIMENSIONS unit: mm (inch)



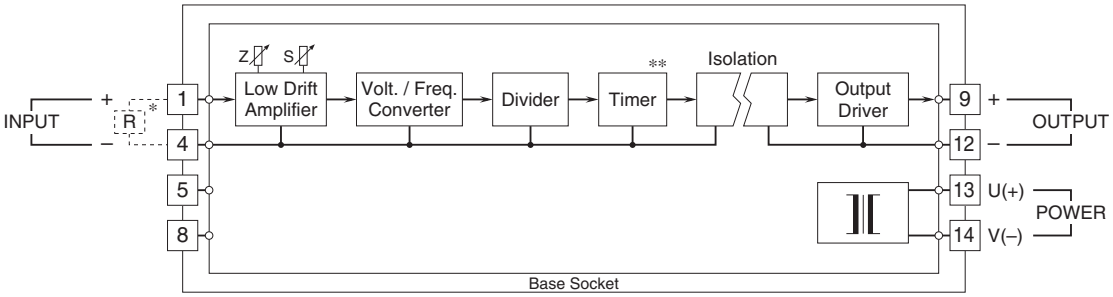
• When mounting, no extra space is needed between units.

TERMINAL ASSIGNMENTS unit: mm (inch)



Input shunt resistor attached
for current input.

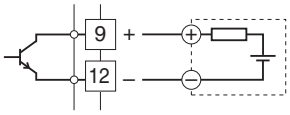
SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM



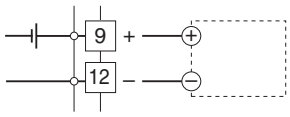
* Input shunt resistor attached for current input.
** Dry contact AC/DC switch only.

Output Connection Examples

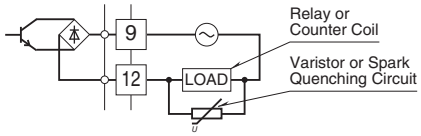
■ **Open Collector**



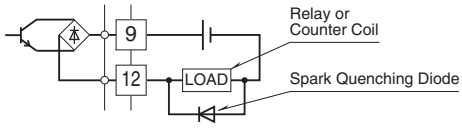
■ **Voltage Pulse**



■ **Dry Contact AC/DC Switch**
• AC Powered



• DC Powered



⚠ Specifications are subject to change without notice.