

Plug-in Signal Conditioners M-UNIT

DC/FREQUENCY CONVERTER

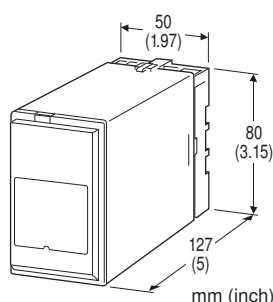
(100 kHz maximum)

Functions & Features

- Provides a pulse rate output in proportion to DC input signal
- Isolation up to 2000 V AC
- High-density mounting
- Maximum frequency 100 kHz

Typical Applications

- Totalizing applications in combination with a counter



MODEL: AP-[1][2]-[3][4]

ORDERING INFORMATION

- Code number: AP-[1][2]-[3][4]
- Specify a code from below for each of [1] through [4].
(e.g. AP-6A-B/Q)
- Special input range (For codes Z & 0)
- Output frequency range (e.g. 0 – 50 kHz)
- Specify the specification for option code /Q
(e.g. /C01/S01)

[1] INPUT

Current

- A: 4 – 20 mA DC (Input resistance 250 Ω)
- A1: 4 – 20 mA DC (Input resistance 50 Ω)
- B: 2 – 10 mA DC (Input resistance 500 Ω)
- C: 1 – 5 mA DC (Input resistance 1000 Ω)
- D: 0 – 20 mA DC (Input resistance 50 Ω)
- E: 0 – 16 mA DC (Input resistance 62.5 Ω)
- F: 0 – 10 mA DC (Input resistance 100 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)

Voltage

- 1: 0 – 10 mV DC (Input resistance 10 k Ω min.)

- 15: 0 – 50 mV DC (Input resistance 10 k Ω min.)
- 16: 0 – 60 mV DC (Input resistance 10 k Ω min.)
- 2: 0 – 100 mV DC (Input resistance 100 k Ω min.)
- 3: 0 – 1 V DC (Input resistance 1 M Ω min.)
- 4: 0 – 10 V DC (Input resistance 1 M Ω min.)
- 5: 0 – 5 V DC (Input resistance 1 M Ω min.)
- 6: 1 – 5 V DC (Input resistance 1 M Ω min.)
- 4W: -10 – +10 V DC (Input resistance 1 M Ω min.)
- 0: Specify voltage (See INPUT SPECIFICATIONS)

[2] OUTPUT

- A: Open collector (max. 100 kHz)
- M: 5 V pulse (max. 100 kHz)
- N: 12 V pulse (max. 100 kHz)
- P: 24 V pulse (max. 100 kHz)
- H: Relay contact (max. 5 Hz)
- 1: Open collector (1 kHz)
- 3: AC/DC switch (1 kHz)
- () = Max. frequency

[3] POWER INPUT

AC Power

- B: 100 V AC
- C: 110 V AC
- D: 115 V AC
- F: 120 V AC
- G: 200 V AC
- H: 220 V AC
- J: 240 V AC

DC Power

- S: 12 V DC
- R: 24 V DC
- V: 48 V DC

[4] OPTIONS

blank: none

/Q: With options (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

TERMINAL SCREW MATERIAL

- /S01: Stainless steel

GENERAL SPECIFICATIONS

Construction: Plug-in
Connection: M3.5 screw terminals
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:** -300 - +300 V DC
Minimum span: 10 mV
Offset: Max. 1.5 times span
Input resistance
 Span 10 - 100 mV : $\geq 10 \text{ k}\Omega$
 Span 0.1 - 1 V : $\geq 100 \text{ k}\Omega$
 Span $\geq 1 \text{ V}$: $\geq 1 \text{ M}\Omega$

OUTPUT SPECIFICATIONS

■ **Output Code 1 and 3**
Frequency range: 0 - 0.01 Hz through 1 kHz
ON pulse width: Approx. 50 % of the duty of the maximum output frequency (500 $\mu\text{sec.}$ - 0.8 sec.)
 Pulse width is forcibly limited to approx. 0.8 sec. if the value [approx. 50 % of the duty of the maximum output frequency] is not smaller than 0.8 sec.
 • **Open Collector:** 50 V DC @ 50mA (resistive load)
Saturation voltage: 0.6 V DC
 • **AC/DC Switch:** 100 V AC @ 200 mA ($\cos \phi = 1$)
 150 V DC @ 200 mA (resistive load)
Voltage drop: 6 V or less
 ■ **Output Code A, M, N and P**
Frequency range: 0 - 0.01 Hz through 100 kHz
ON pulse width: Approx. 50 % of the duty of the maximum output frequency (5 $\mu\text{sec.}$ - 0.4 sec.)
 Pulse width is forcibly limited to approx. 0.4 sec. if the value [approx. 50 % of the duty of the maximum output frequency] is not smaller than 0.4 sec.
 • **Open Collector:** 50 V DC @ 50 mA (resistive load)
Saturation voltage: 0.6 V DC
 • **Voltage Pulse:** 5, 12 or 24 V $\pm 10 \%$
L level: $\leq 0.5 \text{ V}$
Load resistance: 1 k Ω minimum for 5 V
 2.4 k Ω minimum for 12 V
 4.8 k Ω minimum for 24 V
 ■ **Output Code H**
Frequency range: 0 - 0.01 Hz through 5 Hz

ON pulse width: Approx. 50 % of the duty of the maximum output frequency (0.1 sec. - 0.4 sec.)
 Pulse width is forcibly limited to approx. 0.4 sec. if the value [approx. 50 % of the duty of the maximum output frequency] is not smaller than 0.4 sec.

• **Relay Contact**

Maximum frequency: 5 Hz
Rated load: 120 V AC @ 200 mA ($\cos \phi = 1$)
 30 V DC @ 200 mA (resistive load)
Maximum switching voltage: 250 V AC or 30 V DC
Maximum switching power: 24 VA or 6 W
Minimum load: 5 V DC @ 10 mA
Relay life: $\geq 2 \times 10^7$ cycles, mechanical
 $\geq 3 \times 10^5$ cycles, electrical (rate 30/min)

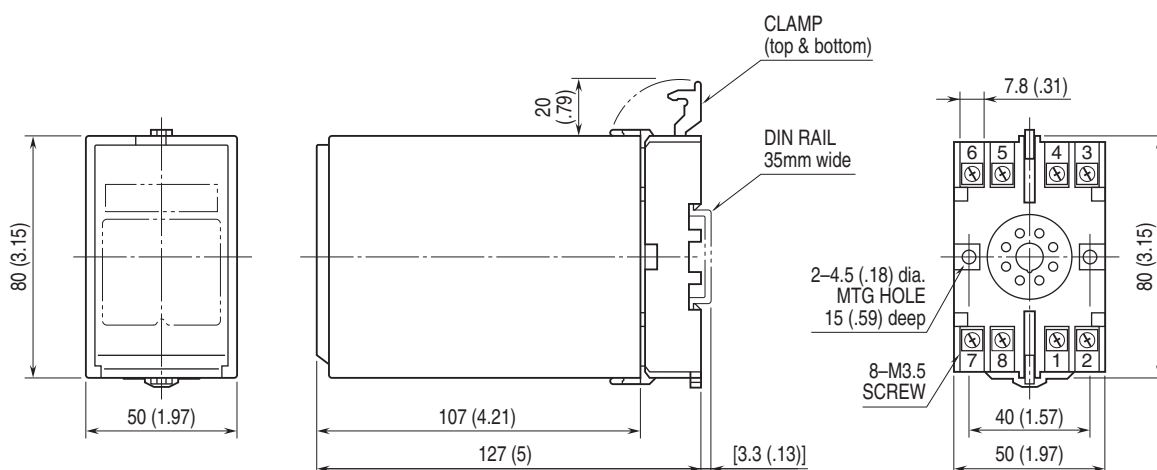
INSTALLATION

Power input
 • **AC:** Operational voltage range: rating $\pm 10 \%$,
 50/60 ± 2 Hz, approx. 2 VA
 • **DC:** Operational voltage range: rating $\pm 10 \%$,
 ripple 10 %p-p max., approx. 2 W (80 mA at 24 V)
Operating temperature: -5 to +55°C (23 to 131°F)
Operating humidity: 30 to 90 %RH (non-condensing)
Mounting: Surface or DIN rail
Weight: 450 g (0.99 lb)

PERFORMANCE in percentage of span

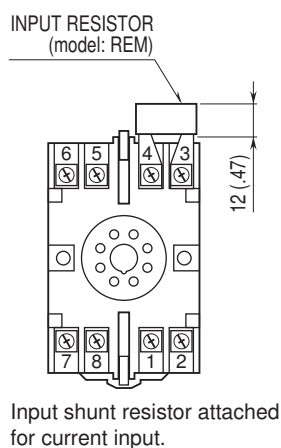
Accuracy: $\pm 0.1 \%$
Temp. coefficient: $\pm 0.015 \%/^{\circ}\text{C}$ ($\pm 0.008 \%/^{\circ}\text{F}$)
Line voltage effect: $\pm 0.1 \%$ over voltage range
Insulation resistance: $\geq 100 \text{ M}\Omega$ with 500 V DC
Dielectric strength: 2000 V AC @1 minute (input to output to power to ground)

EXTERNAL DIMENSIONS unit: mm (inch)

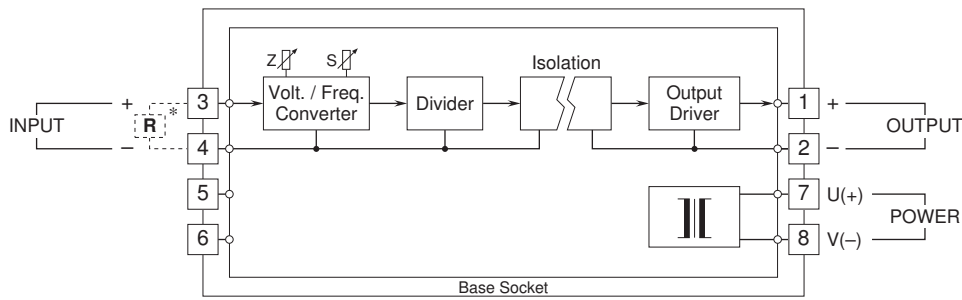


• When mounting, no extra space is needed between units.

TERMINAL ASSIGNMENTS unit: mm (inch)



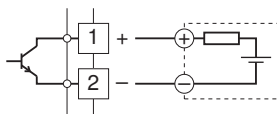
SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM



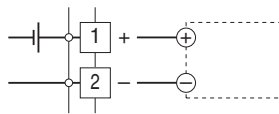
* Input shunt resistor attached for current input.

Output Connection Examples

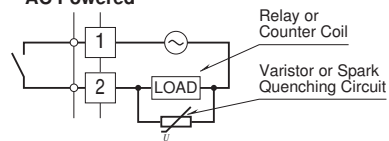
Open Collector



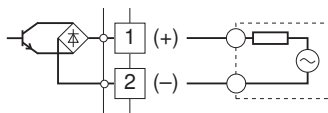
Voltage Pulse



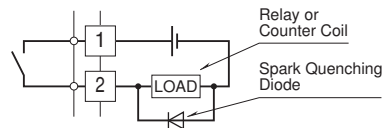
Relay Contact • AC Powered



AC/DC Switch



• DC Powered



Specifications are subject to change without notice.