

## Plug-in Signal Conditioners M-UNIT

### DC/FREQUENCY CONVERTER

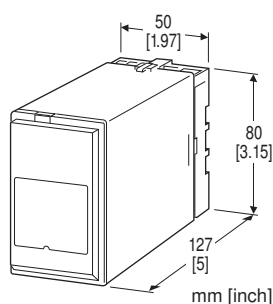
(100 kHz maximum)

#### 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  $\Omega$ )
- A1: 4 - 20 mA DC (Input resistance 50  $\Omega$ )
- B: 2 - 10 mA DC (Input resistance 500  $\Omega$ )
- C: 1 - 5 mA DC (Input resistance 1000  $\Omega$ )
- D: 0 - 20 mA DC (Input resistance 50  $\Omega$ )
- E: 0 - 16 mA DC (Input resistance 62.5  $\Omega$ )
- F: 0 - 10 mA DC (Input resistance 100  $\Omega$ )
- G: 0 - 1 mA DC (Input resistance 1000  $\Omega$ )
- H: 10 - 50 mA DC (Input resistance 100  $\Omega$ )
- Z: Specify current (See INPUT SPECIFICATIONS)

Voltage

- 1: 0 - 10 mV DC (Input resistance 10 k $\Omega$  min.)

- 15: 0 - 50 mV DC (Input resistance 10 k $\Omega$  min.)
- 16: 0 - 60 mV DC (Input resistance 10 k $\Omega$  min.)
- 2: 0 - 100 mV DC (Input resistance 100 k $\Omega$  min.)
- 3: 0 - 1 V DC (Input resistance 1 M $\Omega$  min.)
- 4: 0 - 10 V DC (Input resistance 1 M $\Omega$  min.)
- 5: 0 - 5 V DC (Input resistance 1 M $\Omega$  min.)
- 6: 1 - 5 V DC (Input resistance 1 M $\Omega$  min.)
- 4W: -10 - +10 V DC (Input resistance 1 M $\Omega$  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 our 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 ( $\cos \theta = 1$ )  
 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 $\Omega$  minimum for 5 V  
 2.4 k $\Omega$  minimum for 12 V  
 4.8 k $\Omega$  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 ( $\cos \theta = 1$ )  
 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)

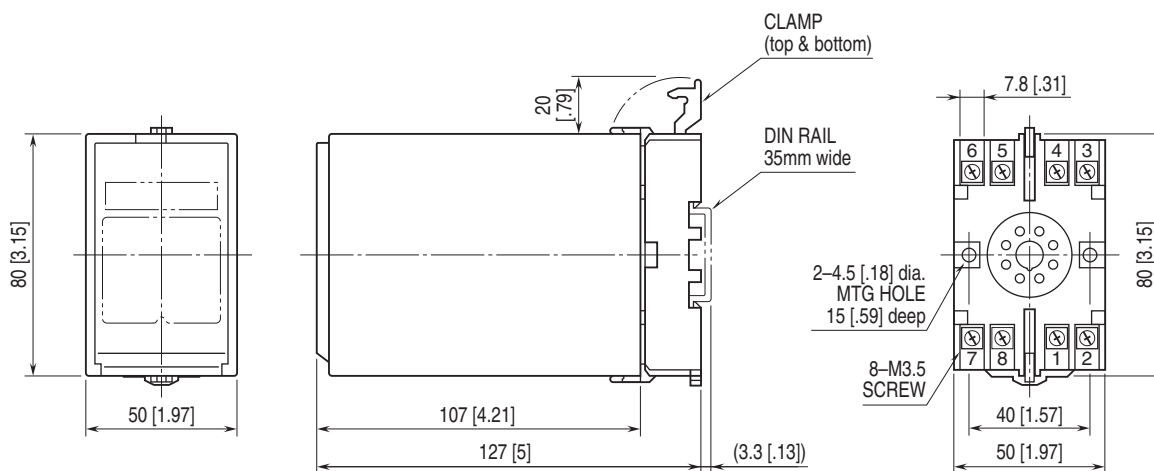
**INSTALLATION**

**Power input**  
 • **AC:** Operational voltage range: rating  $\pm 10 \%$ ,  
 50/60  $\pm 2$  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**

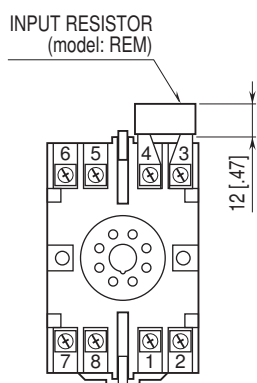
**Accuracy:**  $\pm 0.1 \%$   
**Temp. coefficient:**  $\pm 0.015 \%/^{\circ}\text{C}$  ( $\pm 0.008 \%/^{\circ}\text{F}$ )  
**Line voltage effect:**  $\pm 0.1 \%$  over voltage range  
**Insulation resistance:**  $\geq 100 \text{ M}\Omega$  with 500 V DC  
**Dielectric strength:** 2000 V AC @1 minute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

## EXTERNAL DIMENSIONS unit: mm [inch]



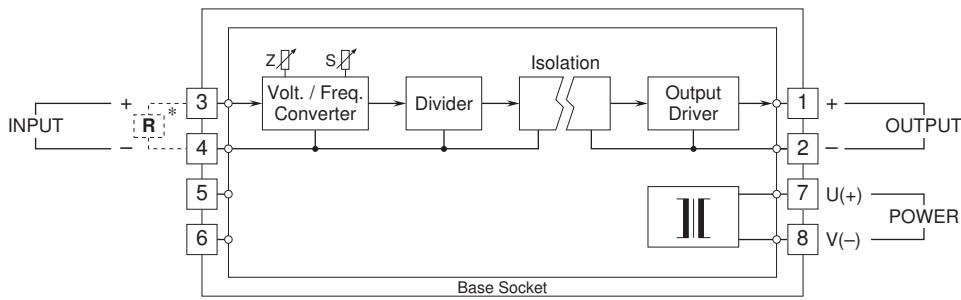
• When mounting, no extra space is needed between units.

## TERMINAL ASSIGNMENTS unit: mm [inch]



Input shunt resistor attached for current input.

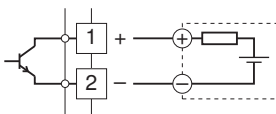
## SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM



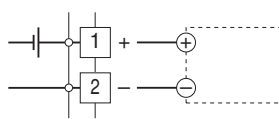
\* Input shunt resistor attached for current input.

### Output Connection Examples

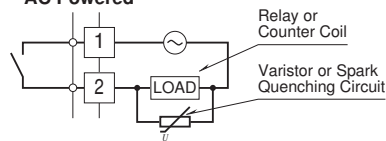
#### Open Collector



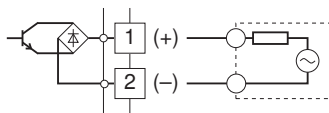
#### Voltage Pulse



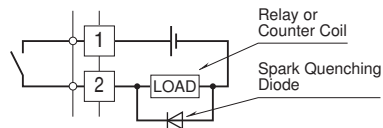
#### Relay Contact



#### AC/DC Switch



#### DC Powered



Specifications are subject to change without notice.