

## Plug-in Signal Conditioners MX-UNIT

### DC/FREQUENCY CONVERTER

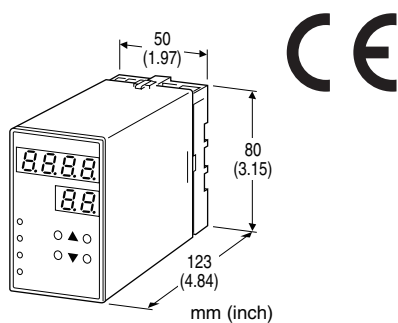
(front configurable)

#### Functions & Features

- Provides a pulse rate output in proportion to DC input signal
- Field-programmable output frequency and pulse width
- Easy programming via front UP-DOWN keys with a help of 4-digit and 2-digit displays
- Low-end cutout
- Pulse totalizing function (manual/auto reset)
- Loop test output
- Isolation up to 2000 V AC
- High-density mounting

#### Typical Applications

- Totalizing applications in combination with a counter



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

### ORDERING INFORMATION

- Code number: MXAP-[1][2]-[3][4]
- Specify a code from below for each [1] through [4].  
(e.g. MXAP-S1F-M2/Q)
- Specify the specification for option code /Q  
(e.g. /SET)

#### [1] INPUT

##### Current

**Z1:** Range 0 - 50 mA DC (Input resistance 100 Ω)

##### Voltage

**S1:** Range -1 - + 1 V DC (Input resistance 100 kΩ min.)

**S2:** Range -10 - +10 V DC (Input resistance 1 MΩ min.)

**S3:** Range -30 - +30 V DC (Input resistance 1 MΩ min.)

#### [2] OUTPUT

**A:** Open collector (10 kHz)

**F:** Voltage pulse (10 kHz)

**J:** RS-422 line driver pulse (10 kHz)

**R:** AC/DC switch (10 Hz)

( ) = Max. frequency conforming with the described accuracy.

#### [3] POWER INPUT

##### AC Power

**M2:** 100 - 240 V AC (Operational voltage range 85 - 264 V, 47 - 66 Hz)

##### DC Power

**R3:** 12 - 24 V DC

(Operational voltage range 10.8 - 26.4 V, ripple 10 %p-p max.)

**P:** 110 V DC

(Operational voltage range 85 - 150 V, ripple 10 %p-p max.)

#### [4] OPTIONS

**blank:** none

**/Q:** With options (specify the specification)

### SPECIFICATIONS OF OPTION: Q

#### EX-FACTORY SETTING

**/SET:** Preset according to the Ordering Information Sheet  
(No. ESU-1731)

### GENERAL SPECIFICATIONS

**Construction:** Plug-in

**Connection:** M3.5 screw terminals

**Housing material:** Flame-resistant resin (black)

**Isolation:** Input to output to power

#### ■ DISPLAY

**LED:** 8 mm (.31") 7 segment, red

**Number of display digits:** 4 digits for DATA display; 2 digits for ITEM display

**Scaling:** -9999 to 9999

**PV indication:** Input signal in engineering unit

**Totalized pulse count:** 0 - 99999999; Blinks at overflow.

**Overrange indication:** LEDs blinking

**Power saving mode:** Displays turn off if the keys are untouched for a preset time period

**Status LEDs:** Red; the PL1 turns on with negative polarity, the PL2 with programming error and the PL3 with low-end cutout.

**Output LED:** Red; the PL4 blinks in synchronization with the output pulse; remains on at 30 Hz or higher frequencies.

**Programming:** Via front keys

- Input range
- Low-end cutout



- Output frequency range
  - Pulse width
  - Output logic
- etc...

(Refer to the instruction manual for details)

**Low-end cutout:** Programmable within 0.3 – 100 %; deadband 0.1 %; Cancelled in the loop test output mode or when 0 % output frequency is set to a frequency other than 0 Hz.

## INPUT SPECIFICATIONS

• **DC Current:** 0 – 50 mA DC; shunt resistor attached to input terminals (0.5 W)

**Operational range:** 0 – 70 mA DC (with 100 Ω/0.5 W)

**Default setting:** 4.0 – 20.0 mA DC

• **DC Voltage**

**Code S1:** -1.00 – +1.00 V DC

**Operational range:** -1.15 – +1.15 V DC

**Minimum increment:** 10 mV

**Code S2:** -10.0 – +10.0 V DC

**Operational range:** -11.5 – +11.5 V DC

**Minimum increment:** 100 mV

**Code S3:** -30.0 – +30.0 V DC

**Operational range:** -34.5 – +34.5 V DC

**Minimum increment:** 100 mV

Note: 100 % input must be larger than 0 %.

**Default setting:**

**Code S1:** -1.00 – +1.00 V DC

**Code S2:** -10.0 – +10.0 V DC

**Code S3:** -30.0 – +30.0 V DC

## OUTPUT SPECIFICATIONS

100 % output frequency must be higher than 0 %.

Note: Minimum increments is 1/1000 of each frequency range.

• **Open Collector:** 50 V DC @ 50 mA (resistive load)

**Frequency range:** 0 – 10 pulses/hour through 10 kHz

**Saturation voltage:** 0.6 V DC

• **Voltage Pulse**

**Frequency range:** 0 – 10 pulses/hour through 10 kHz

**Lo level:** ≤ 0.5 V

**Hi level:** 5 – 24 V ±10 %

(selectable in 1 V increments)

**Load resistance:** 5 kΩ minimum

• **AC/DC Switch:** 120 V AC/DC @ 200 mA (resistive load)

**Frequency range:** 0 – 10 pulses/hour through 10 Hz

**On resistance:** 3 Ω

**Rise time:** 5 msec.

**Sink time:** 3 msec.

• **RS-422 Line Driver Pulse**

**Frequency range:** 0 – 10 pulses/hour through 10 kHz

Conforms to EIA/TIA-422-B

## OUTPUT PULSE WIDTH

■ **DUTY RATIO 50 % (approx.)**

The duty ratio remains at 50 % (approx.) even when the output frequency changes.

■ **ONE-SHOT OUTPUT**

The output pulse width varies by 10 % of the preset value. Selectable from 1 msec. up to 10 sec. (50 msec. – 10 sec. for AC/DC switch).

For 10 kHz and a part of 1 kHz ranges, the one-shot output is not selectable. Choose 50 % duty ratio for such cases.

If the preset value is wider than the cycle at 115 % output, this unit does not function properly related ITEM number blinks.)

[Example] 0 % output frequency = 50 Hz

100 % output frequency = 100 Hz

115 % output cycle = 9.3 msec.

The output pulse greater than 10 msec. is not appropriate.

## INSTALLATION

**Power Consumption**

• **AC:** Approx. 7 VA

• **DC:** Approx. 3.3 W (130 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 lbs)

## PERFORMANCE

**Accuracy:** Input + output

**Input:** ±0.05 %

**Output:** ±0.3 % at 10 kHz range

±0.05 % at 1 kHz or lower range

**Min. span required to ensure the accuracy:** 20 % of the selectable input and output range.

(selectable output range e.g. 0 – 10 kHz for 10 kHz range)

**Display accuracy:** Input accuracy ±1 digit

(with 0.0 – 100.0 scaling)

**Temp. coefficient:** ±0.015 %/°C (±0.008 %/°F)

**Response time:** 0.3 sec. + (one pulse cycle at 100 % output)

Time required from a step input (0 – 100 %) to the first pulse output.

**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

### CE conformity:

EMC Directive (2004/108/EC)

EMI EN 61000-6-4: 2007

EMS EN 61000-6-2: 2005

Low Voltage Directive (2006/95/EC)

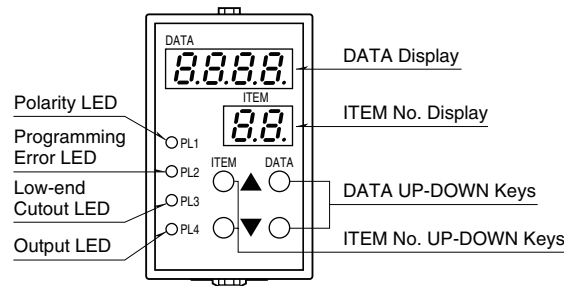
EN 61010-1: 2001

Installation Category II

Pollution Degree 2

Input to output to power - Basic insulation (300 V)

## EXTERNAL VIEW



Refer to the instruction manual for detailed procedures.

## OUTPUT LOGIC

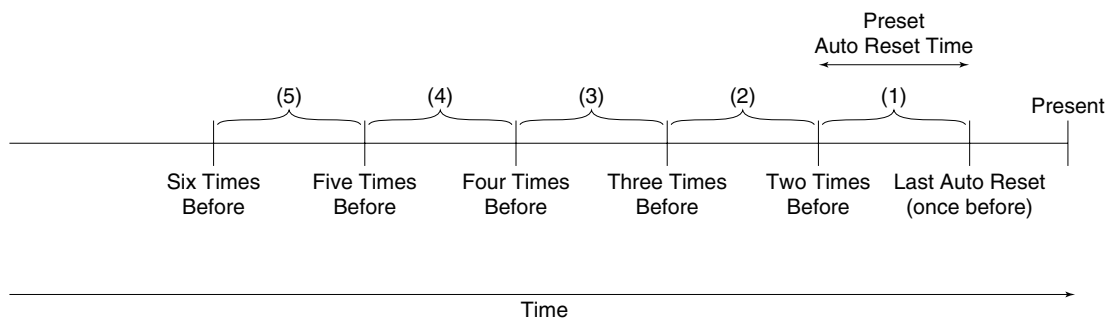
The output pulse logic is selectable. One-shot pulse width is applied at the bold line part of waveform. Arrows in the figure indicate the pulse edge which counts.

| PULSE LOGIC  | VOLTAGE PULSE OUTPUT | OPEN COLLECTOR AC/DC SWITCH OUTPUT | RS-422 LINE DRIVER OUTPUT |
|--------------|----------------------|------------------------------------|---------------------------|
| Non Inverted |                      |                                    |                           |
| Inverted     |                      |                                    |                           |

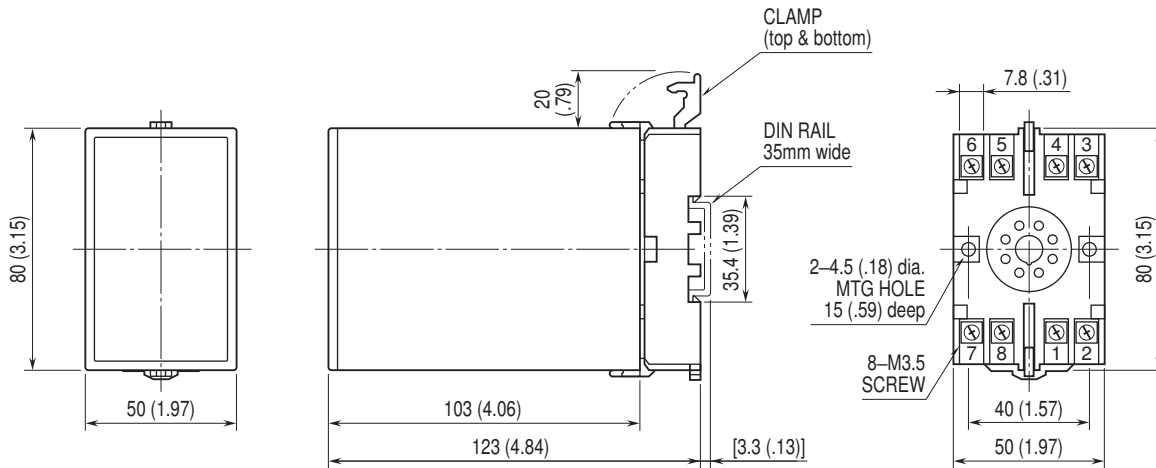
## RECALLING PAST TOTALIZED COUNT

Past totalized pulse counts at the moment of auto-reset can be recalled for five times.

For example, the totalized count during the period indicated with (5) in the figure below are recalled in one of the ITEM 27 (upper 4 digits) and 28 (lower 4 digits). Likewise, (1) through (4) are also recalled in ITEM 29 through 36. The displayed are renewed by every auto resetting. If the auto-reset is not specified, this function is not valid.

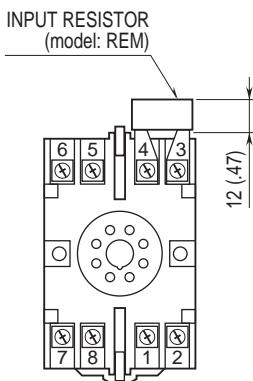


## DIMENSIONS unit: mm (inch)



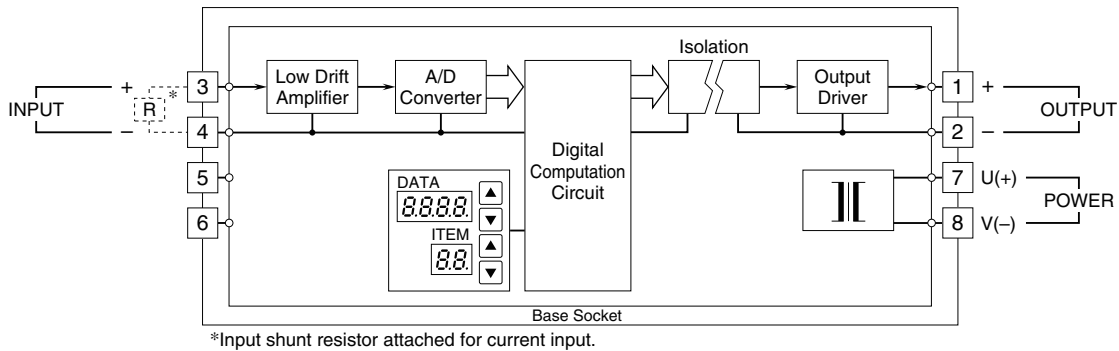
• When mounting, no extra space is needed between units.

## TERMINAL ASSIGNMENTS unit: mm (inch)



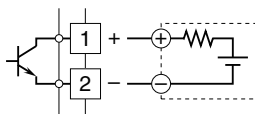
Input shunt resistor attached for current input.

## SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM

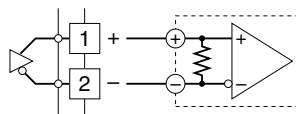


### Output Connection Examples

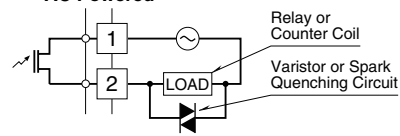
#### ■ Open Collector



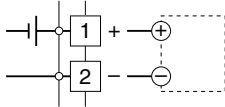
#### ■ RS-422 Line Driver Pulse



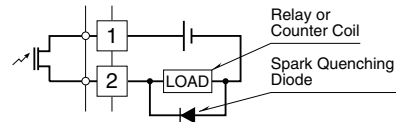
#### ■ AC/DC Switch • AC Powered



#### ■ Voltage Pulse



#### • DC Powered



Specifications are subject to change without notice.