

## Plug-in Signal Conditioners MX-UNIT

### FREQUENCY TRANSMITTER

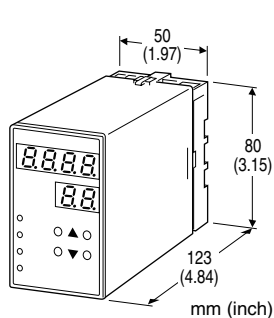
(front configurable)

#### Functions & Features

- Converts the output from a pulse-type transducer into a standard process signal
- Sensor excitation
- Field-programmable input frequency
- Easy programming via front UP-DOWN keys with a help of 4-digit and 2-digit displays
- Linearization
- Averaging non-uniform pulses
- Loop test output
- Isolation up to 2000 V AC

#### Typical Applications

- Positive displacement flowmeters, turbine flowmeters and vortex flowmeters
- Measures rotation or moving speed of a machine and converts the pulses into analog signals
- Converts non-uniform pulses from an Oval flowmeter into non-pulsating DC signals



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

### ORDERING INFORMATION

- Code number: MXPA-[1][2]-[3][4]
- Specify a code from below for each [1] through [4]. (e.g. MXPA-BZ1-M2/Q)
- Specify the specification for option code /Q (e.g. /SET)

#### [1] INPUT

- A: Open collector
- A2: Mechanical contact
- B: Voltage pulse
- H: Two-wire current pulse
- J: RS-422 line driver pulse

#### [2] OUTPUT

##### Current

Z1: Range 0 - 20 mA DC (Load resistance 600Ω max.)

##### Voltage

V1: Range -1 - +1 V DC (Load resistance 1000Ω min.)

V2: Range -10 - +10 V DC (Load resistance 10kΩ min.)

#### [3] POWER INPUT

##### AC Power

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

##### DC Power

R: 24 V DC

(Operational voltage range 24 V ±10 %, 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-1732)

### GENERAL SPECIFICATIONS

**Construction:** Plug-in

**Connection:** M3.5 screw terminals

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

**Isolation:** Input to output to power

**Linearization:** Max. 24 points

**Programming:** Via front keys

- Input frequency range
- Zero and span
- Low-end cutout
- Averaging non-uniform pulses
- Linearization
- Sensor excitation ON/OFF
- Chattering filter

etc...

(Refer to the instruction manual for details)

**Input pulse sensing:** Capacitor or DC coupled

**Averaging non-uniform input waveforms:** Input pulses are divided and then multiplied so that the output pulses are averaged.

**Low-end cutout:** 0 Hz equivalent output is forced during the low-end cutout; -15 to +115 % adjustable; deadband 1 %

#### ■ 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

**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.

**Input LED:** Red; the PL4 blinks in synchronization with the input pulse.

Note: LED response takes time when the input decreases from a very high frequency to a low frequency.

## INPUT SPECIFICATIONS

**Sensor excitation:** 5 - 24 V DC  $\pm 10\%$ ; 1 V increments (default setting: 5 V): Activated / deactivated via front control keys

**Max. current (mA):** 600 mW / Excitation voltage (V); 120 mA at 5 V, 50 mA at 12 V, 25 mA at 24 V

**Current limit protection:** Approx. 330 mA at shortcircuit (Overcurrent will appear at shortcircuit. If the device cannot withstand the overcurrent, be sure to turn off the sensor excitation for safety before wiring excitation to the device, and then turn it on after confirming the connection. The sensor excitation is factory set to ON. Turn it off when not used.)

**Frequency ranges:** 0 - 0.01 Hz through 100 kHz (up to 10 Hz for mechanical contact)

**Minimum pulse width requirements:** 4  $\mu$ sec. for both ON and OFF (Hi and Lo) except for the mechanical contact (40 msec. for ON and OFF)

Note: Minimum increments of 0 % and 100 % input frequency are 1/1000 of each frequency range.

### ■ Open Collector

**Detecting power/current:** Approx. 15 V DC @ 1.8 mA

**Detecting levels:**  $\leq 200 \Omega$  / 2.5 V for ON;  
 $\geq 100 \text{ k}\Omega$  / 4.0 V for OFF

### ■ Voltage Pulse

**Waveform:** Square or sine

**Input impedance:** 10 k $\Omega$  minimum

**Input amplitude:** Min. 0.5 Vp-p, max. 100 Vp-p

**Max. voltage between input terminals:** 50 V

#### • DC Coupling

Detecting levels (Manual)

$V_H$  : 1 - 10.0 V (0.1 V increments variable)

$V_L$  : 1 - 10.0 V (0.1 V increments variable)

Max. DC offset voltage: 9.9 V

Or 3 steps automatic setting available.

Automatic:

Low level:  $V_L$  approx. 1.0 V,  $V_H$  approx. 1.5 V

(Recommended input pulse levels: 2 V - 4 Vp-p, max. DC offset voltage: 1.2 V)

Mid Level:  $V_L$  approx. 2.0 V,  $V_H$  approx. 2.5 V

(Recommended input pulse levels: 4 V - 12 Vp-p, max. DC offset voltage: 2.2 V)

High level:  $V_L$  approx. 5.0 V,  $V_H$  approx. 6.0 V

(Recommended input pulse levels: 12 V - 50 Vp-p, max. DC offset voltage: 5.5 V)

( $V_H - V_L$ ) is so called hysteresis for detecting level.

$V_H$  detects rising edge,  $V_L$  detects sinking edge.

For manual setting, be sure to set  $V_H$  higher than  $V_L$ .

(ITEM No. blinks when setting error)

#### • Capacitor Coupling

Detecting levels

$V_H$  : 1 - 10.0 V (0.1 V increments variable)

$V_L$  : 1 - 10.0 V (0.1 V increments variable)

Max. DC offset voltage: 26 V

Or 1 step automatic setting available.

Automatic:  $V_L$  approx. 0.0 V,  $V_H$  approx. 0.5 V

With the capacitor coupling, sine or similar waveforms below 20 Hz and/or 1 Vp-p cannot be detected. The capacitor coupling can be used when the detecting levels do not match with DC coupling, such as when the DC offset voltage is  $\geq 9.9$  V or  $\leq 26$  V.

### ■ Two-wire Current Pulse

**Input resistance:** Receiving resistor 100  $\Omega$

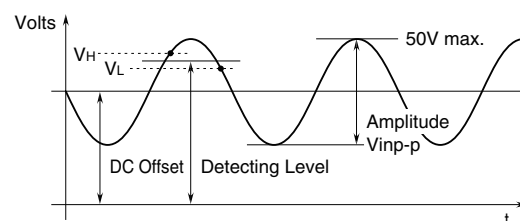
**Input range:** 0 - 25 mA

**Detecting levels:**  $\geq 13.6$  mA for Hi;  $\leq 7.2$  mA for Lo

### ■ RS-422 Line Driver Pulse

**Receiver:** Conforms to RS-422

### ■ VOLTAGE PULSE WAVEFORM



## OUTPUT SPECIFICATIONS

■ DC Current: 0.0 - 20.0 mA DC

**Operational range:** 0.0 - 24.0 mA DC

**Minimum increment:** 0.1 mA

**Default setting:** 4.0 - 20.0 mA DC

### ■ DC Voltage

**Code V1:** -1.00 - +1.00 V DC

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

**Minimum increment:** 10 mV

**Code V2:** -10.0 - +10.0 V DC

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

**Minimum increment:** 100 mV



Note: Set to the 100 % output with a larger value than the 0 % output value.

**Default setting:**

**Code V1:** -1.00 – +1.00 V DC

**Code V2:** -10.0 – +10.0 V DC

## INSTALLATION

### Power consumption

**•AC:**

Approx. 5.6 VA at 100 V

Approx. 7.6 VA at 200 V

Approx. 9.0 VA at 264 V

**•DC:** Approx. 5 W (210 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 max. span

**Accuracy:** Input + output

**Input:**  $\pm 0.05\%$  ( $\pm 0.2\%$  with a sinusoidal or similar waveform input less than 100 Hz.)

**Output:**  $\pm 0.05\%$

**Min. span required to ensure the accuracy:** 20 % of the nominal I/O range

**Display accuracy:** Input accuracy  $\pm 1$  digit (with 0.0 – 100.0 scaling)

**Display accuracy:** Input accuracy  $\pm 1$  digit (with 0.0 – 100.0 scaling)

**Temp. coefficient:**  $\pm 0.015\%/^{\circ}\text{C}$  ( $\pm 0.008\%/^{\circ}\text{F}$ )

**Response time:** 0.5 sec. + 1 pulse cycle (0 – 90 %)

**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)

## 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

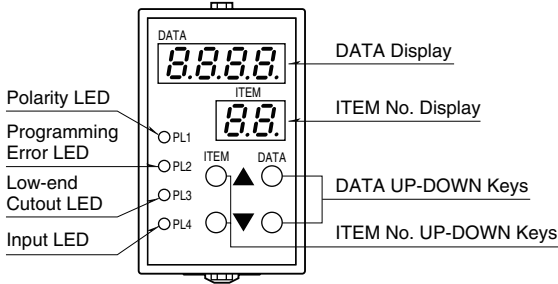
Installation Category II

Pollution Degree 2

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

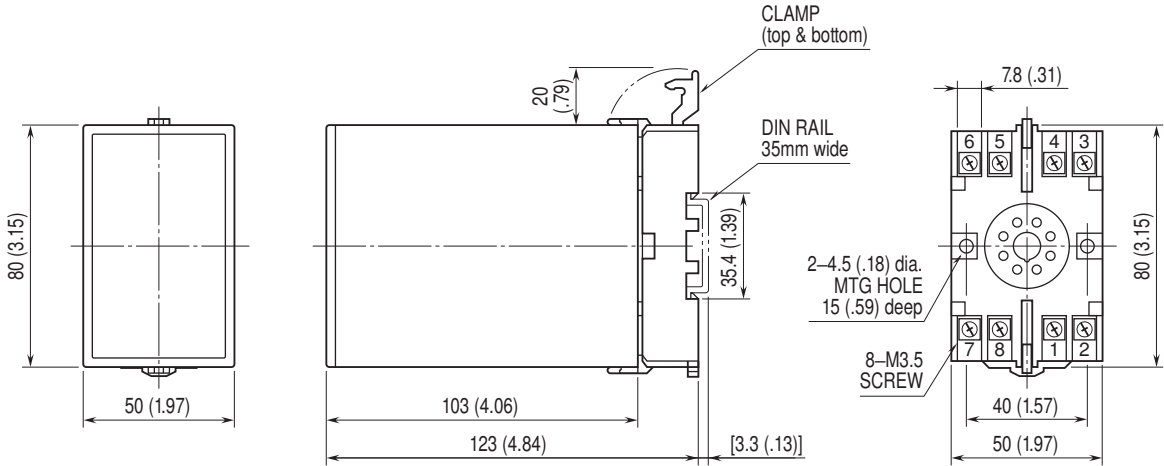


**EXTERNAL VIEW**



Refer to the instruction manual for detailed procedures.

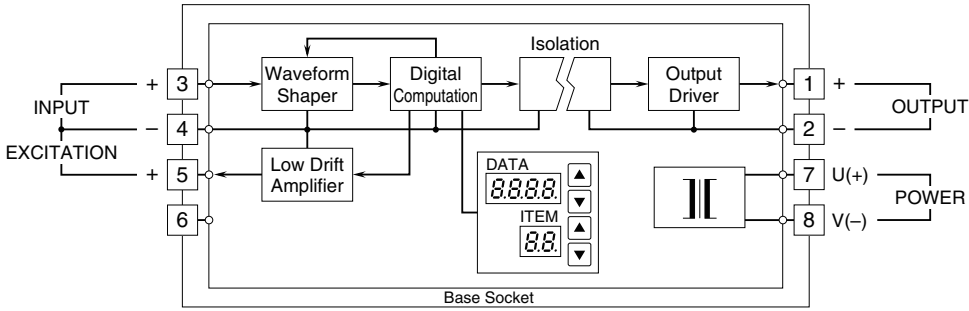
**EXTERNAL DIMENSIONS & TERMINAL ASSIGNMENTS unit: mm (inch)**



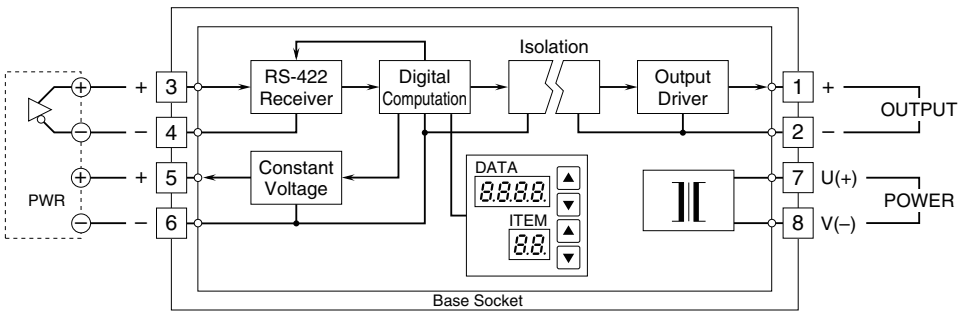
• When mounting, no extra space is needed between units.



**SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM**

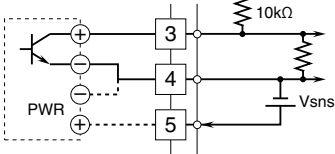


■RS-422 Line Driver Pulse

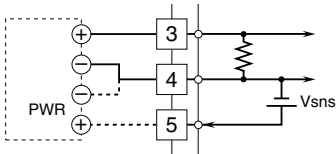


Input Connection Examples

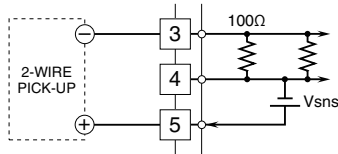
■Open Collector or Mechanical Contact



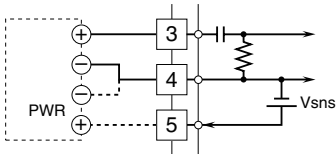
■Voltage Pulse



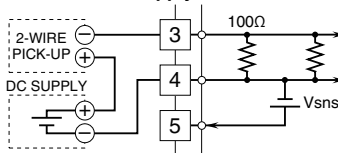
■2-Wire Current Pulse



• Capacitor Coupled



• External DC Supply



Specifications are subject to change without notice.

