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
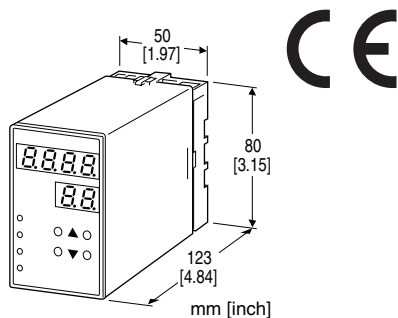
MODEL: MXPA–[1][2]–[3][4]

ORDERING INFORMATION
• Code number: MXPA-[1][2]-[3][4]
Specify a code from below for each of [1] through [4].
  (e.g. MXPA-BZ1-M2/Q)
• Specify the specification for option code /Q
  (e.g. /C01/S01/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 (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
EX-FACTORY SETTING
/SET: Preset according to the Ordering Information Sheet (No. ESU-1732)

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
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)

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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 ±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 overrcurrent, 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 μsec. 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, Mechanical Contact

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

Detecting levels: ≤ 200 Ω / 2.5 V for ON; ≥ 100 kΩ / 4.0 V for OFF

■ Voltage Pulse

Waveform: Square or sine

Input impedance: 10 kΩ 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 ≥ 9.9 V or ≤ 26 V.

■ Two-wire Current Pulse
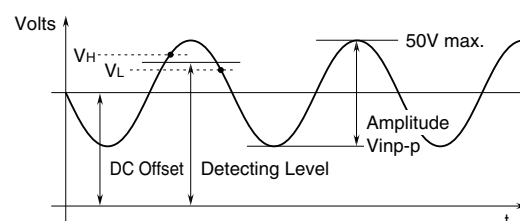
Input resistance: Receiving resistor 100 Ω

Input range: 0 – 25 mA

Detecting levels: ≥ 13.6 mA for Hi; ≤ 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 Category II
Pollution Degree 2
Input to output to power: Basic insulation (300 V)
RoHS Directive

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: ±0.05 % (±0.2 % with a sinusoidal
  or similar waveform input less than 100 Hz.)
  Output: ±0.05 %
Min. span required to ensure the accuracy: 20 % of the
nominal I/O range
Display accuracy: Input accuracy ±1 digit (with 0.0 – 100.0
scaling)
Display accuracy: Input accuracy ±1 digit
(with 0.0 – 100.0 scaling)
Temp. coefficient: ±0.015 %/°C (±0.008 %/°F)
Response time: 0.5 sec. + 1 pulse cycle (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)

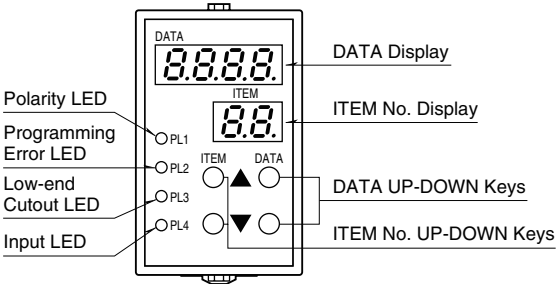## STANDARDS & APPROVALS

EU conformity:
EMC Directive
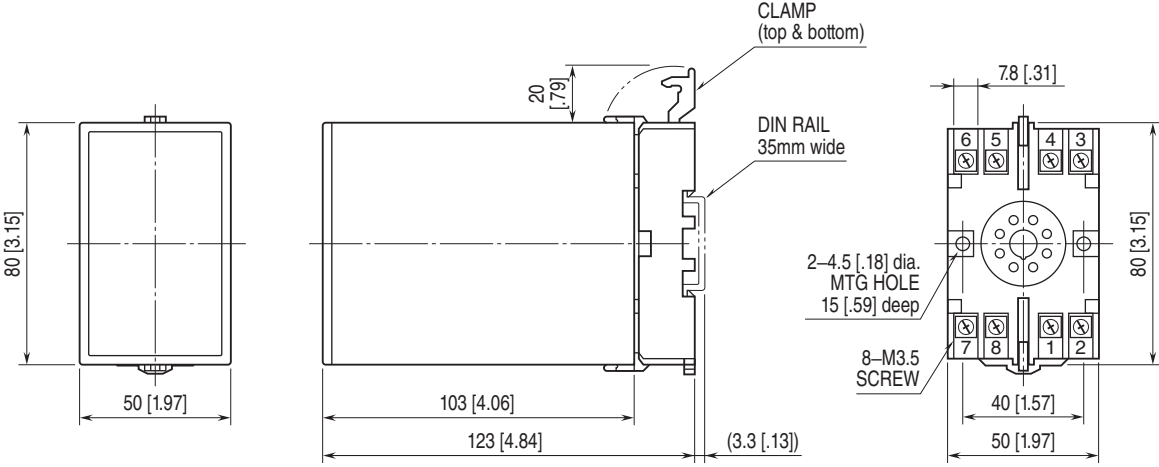 EMI EN 61000-6-4
 EMS EN 61000-6-2
Low Voltage Directive
  EN 61010-1

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EXTERNAL VIEW

Polarity LED
Programming Error LED
Low-end Cutout LED
Input LED

PL1
PL2
PL3
PL4

ITEM
DATA

DATA
ITEM

DATA Display
ITEM No. Display
DATA UP-DOWN Keys
ITEM No. UP-DOWN Keys

Refer to the instruction manual for detailed procedures.

EXTERNAL DIMENSIONS & TERMINAL ASSIGNMENTS   unit: mm [inch]

CLAMP
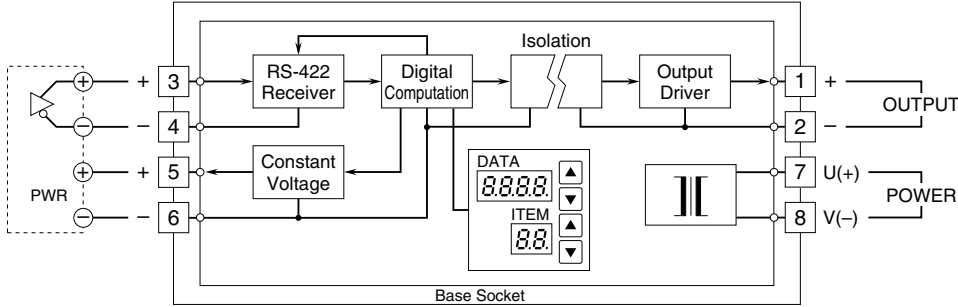(top & bottom)

DIN RAIL
35mm wide

20 [.79]

80 [3.15]

50 [1.97]

103 [4.06]

123 [4.84]

(3.3 [.13])

7.8 [.31]

6 5   4 3

7 8   1 2

80 [3.15]

2–4.5 [.18] dia.
MTG HOLE
15 [.59] deep

8–M3.5
SCREW

40 [1.57]

50 [1.97]

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

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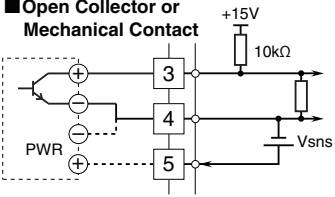## SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM
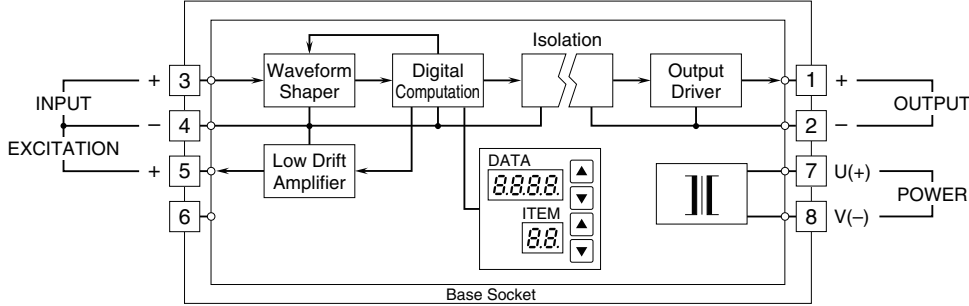
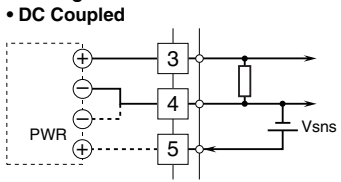**■RS-422 Line Driver Pulse**

Input Connection Examples

■Open Collector or Mechanical Contact

■Voltage Pulse
• DC Coupled

■2-Wire Current Pulse
• Built-in Excitation
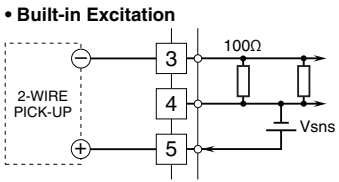
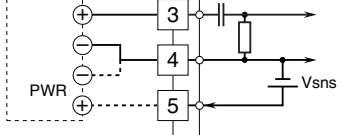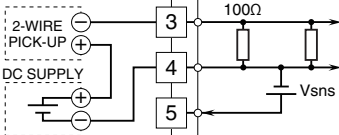**• Capacitor Coupled**

• External DC Supply

⚠ Specifications are subject to change without notice.

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