

Super-mini Signal Conditioners *Mini-M Series*

ENCODER SPEED TRANSMITTER
(PC programmable; built-in excitation)

MODEL **M2XRP2**

MODEL & SUFFIX CODE SELECTION

M2XRP2-□□□□

MODEL _____
INPUT _____

0 : User-calibrated
(Factory default: open collector, 0 – 1 kHz)

If the unit is to be factory-calibrated to a specific input type, please select from the following:

- A** : Open collector
- B** : Voltage pulse
- J** : RS-422 line driver pulse

EXCITATION _____

0 : User-calibrated
(Factory default: 12V DC / 5mA)

If the unit is to be factory-calibrated to a specific voltage value, please select from the following:

- 1** : 5V DC / 5mA
- 4** : 12V DC / 5mA

OUTPUT _____

0 : User-calibrated (Factory default: 4 – 20mA)

If the unit is to be factory-calibrated to a specific output type, please select from the following:

- Current**
- Z1** : Range 0 – 20mA DC
- Voltage**
- V1** : Range -2.5 – +2.5V DC
 - V2** : Range -10 – +10V DC

POWER INPUT _____

- | | |
|---------------------------|--------------------|
| AC Power | DC Power |
| M2 : 100 – 240V AC | R : 24V DC |
| | P : 110V DC |

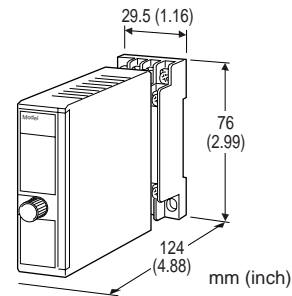
ORDERING INFORMATION

Non-specified orders will be shipped at default factory settings (M2XRP2-000: open collector input/12V excitation/4 – 20mA output). However, a power suffix code **must** be specified.

If you specify a full code number without specific calibration ranges, the input frequency and the output are set to the default ranges (table to the right). Use Ordering Information Sheet (No. ESU-5059).

Ordering example:

- Code number (e.g. M2XRP2-000-M2)



Functions & Features

- Converts a two-phase forward and reverse rotation pulse signal with 90 degree phase difference into a forward and reverse speed signal
- Built-in excitation
- PC programmable input and output ranges
- Input pulse monitoring LED
- Direct RS-422 input
- Isolation up to 2000V AC
- High-density mounting

Typical Applications

- Measuring moving speed of a machine with a rotary encoder

INPUT CODE	DEFAULT
A	0 Hz – 1 kHz
B	0 Hz – 1 kHz
J	0 Hz – 1 kHz
OUTPUT CODE	DEFAULT
Z1	4 – 20mA DC
V1	0 – 1V DC
V2	1 – 5V DC

RELATED PRODUCTS

- JX configurator connection kit** (model: JXCON)

GENERAL SPECIFICATIONS

- Construction:** Plug-in
- Connection:** M3 screw terminals (torque 0.8 N·m)
- Housing material:** Flame-resistant resin (black)
- Isolation:** Input to output to power
- Pulse sensing:** DC coupled or capacitor coupled selectable with DIP SW
- Overrange output:** Approx. -15 – +115% at 1 – 5V
- Low-end cutout:** 100 msec. – 100 sec. or no cutout programmable
- Input monitor LED (PL1):** Green LED flashes according to the input phase A.
- Input monitor LED (PL2):** Green LED flashes according to the input phase B.
- Excitation adjustment:** 5V or 12V DC
- Zero and span adjustments:** ±5% (front)

Configurator connection: 2.5 dia. miniature jack;
RS-232C level

Configuration: Via PC Configurator Software
(model: JXCON) on the Windows PC
connected to the front jack.

Programmable features include:

- I/O type and range
- Zero and span adjustments
- Low-end cutout
- Linearization

INPUT & OUTPUT

INPUT

Maximum frequency: 200 kHz*

Frequency ranges: 0 Hz through 100 kHz*

*Choose 100 kHz range to set the zero/span frequencies lower than -100 kHz (higher than 100 kHz in the reverse direction) or higher than 100 kHz (higher than 100 kHz in the forward direction).

Excitation: Shortcircuit protection; 20mA max. at shortcircuit

Minimum pulse width time requirement: 2.5 μ sec.

Minimum span: 10% of the selected frequency range

• Open Collector

Input requirements

EXCITATION	SENSING	OFF	ON
5V	Approx. 5V	$\geq 200k\Omega$	$\leq 200\Omega$
12V	Approx. 10V	$\geq 200k\Omega$	$\leq 200\Omega$

Detecting level: 1V (5V excitation) **

2V (12V excitation) **

Detecting pulse edge: OFF to ON

**Detecting voltage in the internal circuit.

For open collector input, be sure to re-adjust the voltage back to 1V (5V excitation) or 2V (12V excitation) if it has been changed for other input types.

• Voltage Pulse

Waveform: Square or sine

Input impedance: 10k Ω minimum

Pulse amplitude: 0.1 – 30V p-p

Max. voltage between input terminals: 30V

Detecting level: -2 – +4V

Detecting pulse state: A pulse rise detected when the input voltage goes above the detecting level; a pulse sink detected when it goes below the level.

• RS-422 Line Driver

Receiver: Conforms to RS-422

OUTPUT

• DC Current: 0 – 20mA DC

Operational range: 0 – 24mA DC

Minimum span: 1mA

Offset: Lower range can be any specific value within the input range provided that the minimum span is maintained.

Load resistance: Output drive 12V maximum
(e.g. 4 – 20mA: 600 Ω [12V/20mA])

• DC Voltage: -2.5 – +2.5V DC for V1;
-10 – +10V DC for V2

Operational range: -3 – +3V DC for V1;
-11.5 – +11.5V DC for V2

Minimum span: 250mV for V1; 1V for V2

Offset: Lower range can be any specific value within the input range provided that the minimum span is maintained.

Load resistance: Output drive 1mA maximum
(e.g. 1 – 5V: 5000 Ω [5V/1mA])

INSTALLATION

Power input

AC: Operational voltage range 85 – 264V AC;
47 – 66 Hz; approx. 4VA at 100V
approx. 5VA at 200V
approx. 6VA at 264V

DC: Operational voltage range for R: 24V \pm 10%
or P: 85 – 150V;
approx. 3W (ripple 10% p-p max.)

Operating temperature: -5 to +55 $^{\circ}$ C (23 to +131 $^{\circ}$ F)

Operating humidity: 30 to 90% RH (non-condensing)

Mounting: Surface or DIN rail

Dimensions: W29.5 \times H76 \times D124 mm (1.16 \times 2.99 \times 4.88")
See General Spec. Sheet Figure C-1.

Weight: 150 g (0.33 lbs)

Terminal assignment: See General Spec. Sheet Figure D-1.

PERFORMANCE

Accuracy: Input accuracy + output accuracy

Input accuracy: $\leq \pm 0.03\%$ of the selected freq. range

Output accuracy: $\leq \pm 0.03\%$ of the selected output range

The input accuracy is inversely proportional to the input span; while the output accuracy is likewise inversely proportional to the output span. With [Input Range / Input Span] ≤ 1 , the input accuracy is fixed at $\pm 0.03\%$.

[Example] Open collector input, 0 – 50 kHz; 1 – 5V output.

$$\frac{\text{Selected Freq. Range (100 kHz)}}{\text{Input Span (50 kHz)}} \times \text{Accuracy (0.03\%)} \\ = 0.06\% \text{ (Input Accuracy)}$$

$$\frac{\text{Selected Output Range (20V)}}{\text{Output Span (4V)}} \times \text{Accuracy (0.03\%)} \\ = 0.15\% \text{ (Output Accuracy)}$$

$$\text{Overall Accuracy} = 0.06 + 0.15 = 0.21\%$$

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

at -5 to +55 $^{\circ}$ C (23 to 131 $^{\circ}$ F) of I/O range

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

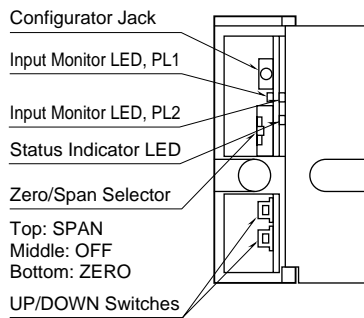
Line voltage effect: $\pm 0.1\%$ over voltage range

Insulation resistance: $\geq 100M\Omega$ with 500V DC

Dielectric strength: 2000V AC @1 minute
(input to output to power to ground)

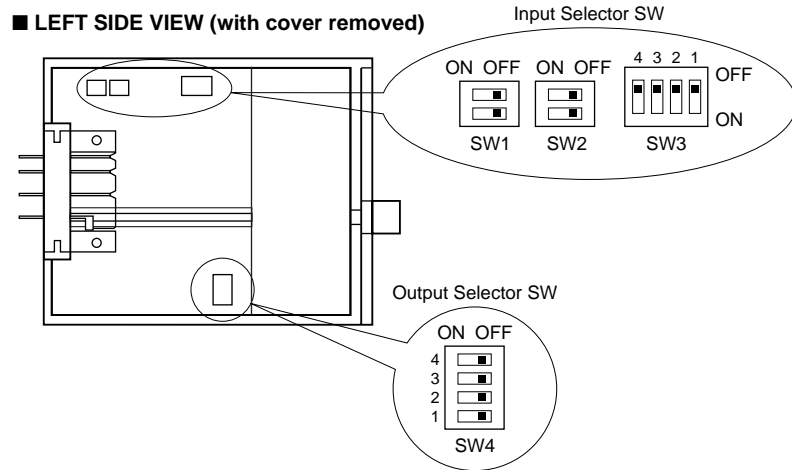
FRONT & SIDE VIEW

FRONT VIEW (with cover open)



The front cover cannot be opened to 180 deg. when flush with neighboring units.

LEFT SIDE VIEW (with cover removed)



DETECTING LEVEL

When the parameters have been set with DIP switches and the PC Configurator Software (model: JXCON), a specific sensitivity scale is applied according to the pulse amplitude setting. The scaled input voltage is then compared to the preset detecting level (-2.00 to +4.00V).

With DC coupling, the scaled maximum voltage must be higher than the detecting level and the minimum voltage must be lower than that so that the pulse state is accurately detected. (Refer to the instruction manual for detailed information about adjusting the detecting level.)

Maximum Frequency Range, Pulse Amplitude

INPUT	MAX. FREQ. RANGE	MIN / MAX. AMPLITUDE
Open collector	0 – 100 kHz	5V / 12V
Voltage pulse	0 – 100 kHz	0.1 V / 30V
RS-422 line driver	0 – 100 kHz	----

Sensitivity Scale

PULSE AMPLITUDE RANGE	MAX. INPUT VOLTAGE	SENSITIVITY SCALE
10 – 30 Vp-p	30V	1 / 6
5 – 20 Vp-p	10V	1 / 2
1 – 5 Vp-p	5V	1
0.1 – 1 Vp-p *1	1V	5

*1. Input frequency within ± 50 kHz

DIP SWITCH SETTING (*) Factory setting

Pulse sensing and noise filter settings are invalid for RS-422 line driver input.

Input Type

INPUT TYPE	SW1-2	SW1-1	SW2-2	SW2-1
Open collector (*)	OFF	OFF	OFF	OFF
Voltage pulse	OFF	OFF	OFF	OFF
RS-422 line driver	ON	ON	ON	ON

Pulse Sensing

PULSE SENSING	SW3-4	SW3-2
Capacitor coupled *2	OFF	OFF
DC coupled (*)	ON	ON

*2. Frequency range must be 0 – 100 Hz or higher. 0 – 1 kHz or higher for sinusoidal waveform input. Frequencies lower than ± 10 Hz may be out of accuracy conformance.

Noise Filter

NOISE FILTER	SW3-3	SW3-1
With	ON	ON
W/O (*)	OFF	OFF

Be sure to apply the noise filter appropriate for the selected frequency range as shown in the table below. The accuracy may not be assured if no filter is applied.

FREQUENCY RANGE	NOISE FILTER TYPE
0 – 10 mHz	With
0 – 100 mHz	With
0 – 1 Hz	With
0 – 10 Hz	W/O
0 – 100 Hz	W/O
0 – 1 kHz	W/O
0 – 10 kHz	W/O
0 – 100 kHz	W/O

Output Type

OUTPUT TYPE	SW4-4	SW4-3	SW4-2	SW4-1
0 – 20mA DC (*)	OFF	ON	OFF	OFF
-2.5 – 2.5V DC	ON	OFF	OFF	ON
-10 – +10V DC	ON	OFF	ON	OFF

MANUAL ZERO/SPAN ADJUSTMENTS

Zero/span selector

ZERO: UP/DOWN switches usable for zero adjustment.

OFF: UP/DOWN switches unavailable.

SPAN: UP/DOWN switches usable for span adjustment.

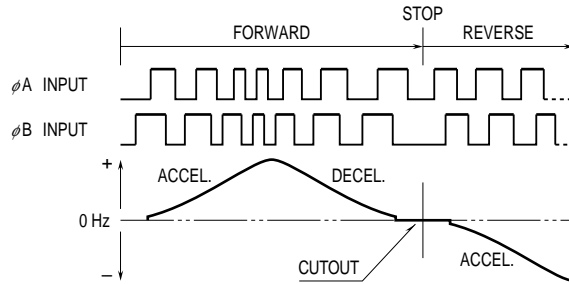
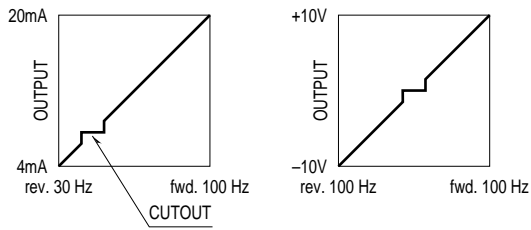
UP/DOWN switches

UP: Pressing UP increases adjusted values.

DOWN: Pressing DOWN decreases adjusted values.

(Press both switches at once for resetting zero/span adjustments.)

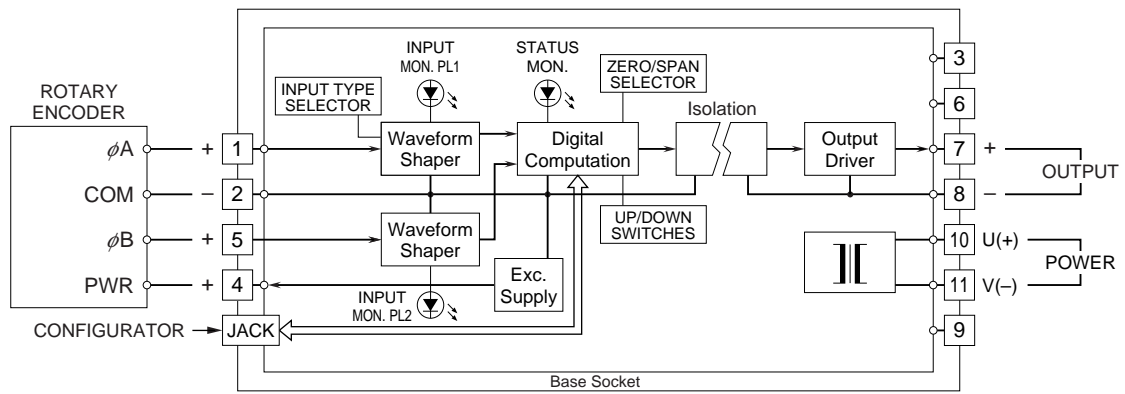
OPERATIONS



Forward Rotation: Phase A leads the Phase B by 90 degrees.
Reverse Rotation: Phase A lags behind Phase B by 90 degrees.

SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM

■ OPEN COLLECTOR, VOLTAGE INPUT



Remark: The sensor excitation voltage is supplied also across the terminals 3 – 6.

■ RS-422 LINE DRIVER INPUT

