## Plug-in Signal Conditioners M-UNIT

PULSE SCALER
(field-programmable; built-in excitation)

Functions & Features
• Converts pulse rate into convenient engineering unit for display on a totalizing counter or meter
• Various outputs
• Sensor excitation
• Scaling factor is user-programmable by simply setting input and output frequencies via handheld programmer PU-2x
• Isolation up to 2000 V AC

Typical Applications
• Positive displacement flowmeters or turbine flowmeters
• Converts dry contact pulse signals from a rotating machine into an engineering unit

50 [1.97]
80 [3.15]
127 [5]
mm [inch]
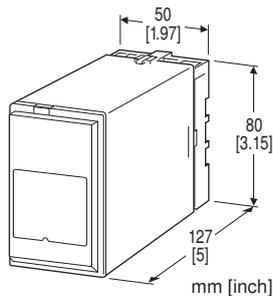
MODEL: JPR2–[1][2][3][4]–[5][6]

ORDERING INFORMATION
• Code number: JPR2-[1][2][3][4]-[5][6]
Specify a code from below for each of [1] through [6].
  (e.g. JPR2-4P1N-K/Q)
• Use Ordering Information Sheet (No. ESU-1580). Default setting (table below) will be used if not otherwise specified.
• Specify the specification for option code /Q
  (e.g. /C01/S01)

Factory default setting

PARAMETER	DEFAULT
Input	Open collector
Input pulse amplitude	---
Noise filter	None
Detecting level *	1V (5V excitation)
	2V (12V/24V excitation)
Input pulse set count	1
Output pulse set count	1
Sampling time	0.1 second
Max. output frequency	10 Hz
One shot output	50 milliseconds

* Internal voltage

INPUT – Field-selectable
Open collector
Mechanical contact
Voltage pulse
Two-wire current pulse
RS-422 line driver pulse

[1] EXCITATION
1: 5 V DC @ 120 mA
4: 12 V DC @ 60 mA
7: 24 V DC @ 25 mA

[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)
J: RS-422 line driver pulse (max. 100 kHz)
R: Noncontact AC/DC switch (max. 20 Hz)
( ) = Max. frequency

[3] OUTPUT PULSE WIDTH
1: No conversion to one-shot
3: One-shot output (std. pulse width 50 msec.)
(Specify when optional pulse width is required.)

[4] OUTPUT LOGIC
N: The same as the input
R: Inverted

[5] POWER INPUT
AC Power
K: 85 – 132 V AC
DC Power
S: 12 V DC
R: 24 V DC
V: 48 V DC
P: 110 V DC

[6] 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

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/**S01**: Stainless steel

CAUTION

1) The JPR2 is not designed to output uniform pulses even when the input wave is uniform. It is not applicable to certain types of application.
2) The JPR2 converts the pulse counts, not frequency. For the frequency conversion purpose, model JFR2 is recommended.

RELATED PRODUCTS

• Programming Unit (model: PU-2x)
• PC configurator software (model: JXCON)
Downloadable at our web site.
A dedicated cable is required to connect the module to the PC. Please refer to the internet software download site or the users manual for the PC configurator for applicable cable types.

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 or sensor exc. to output to power
Input monitor LED: Red LED blinks according to the input.
Excitation adjustment: 5 – 24 V DC
Software programming: Programming Unit (model: PU-2x);
(Refer to the users manual of JXCON for the adjustments configurable with JXCON)
• Input and output pulse set count (frequency)
• Sampling time
• Input pulse edge
• Max. frequency limit
• Others
Adjustments: With DIP and Rotary switches.
• Pulse amplitude
• Input type
• Noise filter
(Refer to the instruction manual for details)
Sampling time: 0.01 – 100 sec.
Buffer counter capacity: 4 294 967 295 counts
Input pulse sensing: DC coupled

INPUT SPECIFICATIONS

Excitation: Shortcircuit protection; approx. 440 mA (max.) at shortcircuit
Max. frequency: 100 kHz
(10 Hz for mechanical contact input)

Minimum pulse width time requirement: 5 μsec.; 50 msec. for mechanical contact (for both ON and OFF)
■ **Open Collector & Mechanical Contact**
Input requirements (Excitation: Sensing)
5 V: Approx. 4 V / 1.0 mA
12 V: Approx. 9 V / 2.3 mA
24 V: Approx. 16 V / 4.7 mA
Resistance at ON : ≤ 200 Ω
Resistance at OFF : ≥ 200 kΩ
Detecting level: 1 V with 5 V excitation
2 V with 12 V/24 V excitation.
(Detecting voltage in the internal circuit)
For open collector or mechanical contact input, be sure to re-adjust the voltage back to 1 V (excitation 5 V) or 2 V (excitation 12 V/24 V) if it has been changed for other input types.
Detecting pulse edge: OFF (input monitor LED ON) to ON (input monitor LED OFF) or ON to OFF
■ **Voltage Pulse**
Waveform: Square or sine
Input impedance: ≥ 10 kΩ
Pulse amplitude: 0.1 – 100 Vp-p (square)
1 – 100 Vp-p (sine or similar)
Max. voltage between input terminals: 50 V
Detecting level: 0 – 5 V (Detecting voltage in the internal circuit.)
Detecting pulse state: A pulse rise detected when the input voltage goes above the detecting level (input monitor LED ON); a pulse sink detected when it goes below the level (input monitor LED OFF).
■ **Two-wire Current Pulse**
Input resistance: Receiving resistor 100 Ω
Input range: 0 – 25 mA
Minimum pulse amplitude: 10 mA
**Detecting level**: 0 – 5 V
(Detecting voltage in the internal circuit.)
Detecting pulse state: The input resistor (100 Ω) converts the current signal (0 - 25 mA) into 0 – 2.5 V. A pulse rise detected when the voltage goes above the detecting level (input monitor LED ON); a pulse sink detected when it goes below the level (input monitor LED OFF).
■ **RS-422 Line Driver Pulse**
Receiver: Conforms to RS-422

■ **Voltage pulse waveform**

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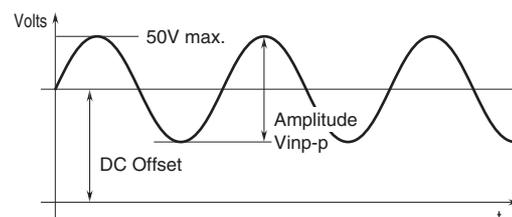
OUTPUT SPECIFICATIONS

Output pulse: No. of input pulse × scaling factor (scaling factor = output pulse set count / input pulse set count)

Scalable range: 1/1 000 000 to 1 000 000

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

Saturation voltage: 0.6 V DC

Maximum frequency: 100 kHz

■ **Voltage Pulse**

H level: Rating (5, 12 or 24 V) ±10 %

L level: ≤ 0.5 V

Load resistance: ≥ 1 kΩ (5 V), ≥ 2.4 kΩ (12 V), ≥ 4.8 kΩ (24 V)

Maximum frequency: 100 kHz

■ **Noncontact AC/DC Switch**: 120 V AC or 120 V DC @200 mA (resistive load)

ON resistance: 3 Ω

Maximum frequency: 20 Hz

Rise time: 5 msec.

Sink time: 3 msec.

■ **RS-422 Line Driver Pulse**

Transmitter: Conforms to RS-422

Maximum frequency: 100 kHz

OUTPUT PULSE WIDTH

• **No conversion to one-shot**: Duty ratio approx. 50 %; Internal digital computation calculates the pulse width.

• **One-shot Output**: Preset pulse width ±20 %

Optional pulse width: 30 µsec. – 300 msec.

INSTALLATION

Power input

•**AC**: Operational voltage range 85 – 132 V, 47 – 66 Hz, approx. 6 VA

•**DC**: Operational voltage range: Rating ±10 %, or 85 – 150 V for 110 V rating; ripple 10 %p-p max.; Approx. 3.3 W (140 mA at 24 V)

Operating temperature: -5 to +60°C (23 to 140°F)

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

Mounting: Surface or DIN rail
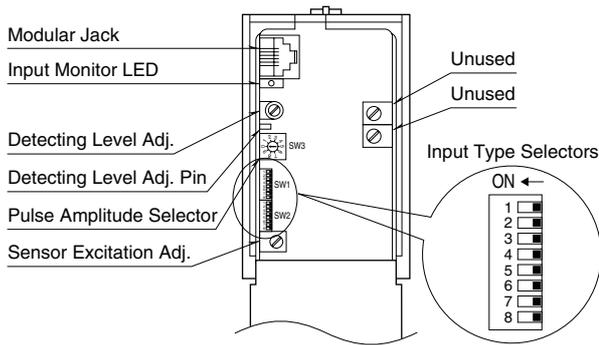
Weight: 400 g (0.88 lb)

PERFORMANCE

Response time: Sampling time + 50 msec.

The response time equals the interval between the first input pulse and the first output pulse.

Insulation resistance: ≥ 100 MΩ with 500 V DC

Dielectric strength: 2000 V AC @ 1 minute (input or sensor excitation to output to power to ground)
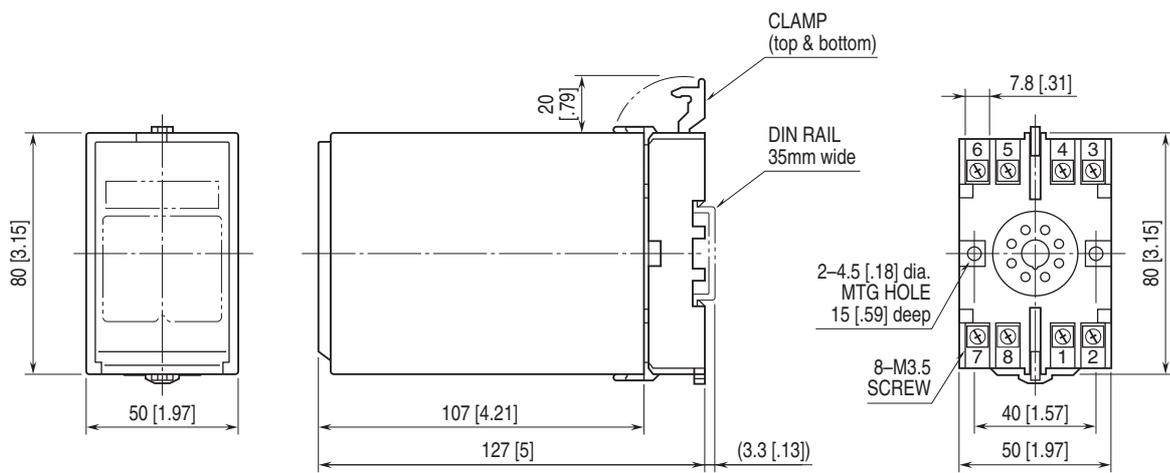
EXTERNAL VIEW

- Modular Jack
- Input Monitor LED
- Detecting Level Adj.
- Detecting Level Adj. Pin
- Pulse Amplitude Selector
- Sensor Excitation Adj.
- Unused
- Unused
- Input Type Selectors

ON ◄

1 2 3 4 5 6 7 8

SW3 SW1 SW2

Refer to the instruction manual for detailed procedures.

OUTPUT LOGIC

OUTPUT WAVEFORM		INPUT WAVEFORM	Voltage Pulse / 2-wire Current Pulse / RS-422 Line Driver Pulse	Open Collector or Mechanical Contact
			H / L	OFF / ON
Voltage Pulse or RS-422 Line Driver Pulse	Non Inverted	No conversion to one-shot	H / L	H / L
		One-shot, detecting input pulse rise	H / L	H / L
		One-shot, detecting input pulse drop	H / L	H / L
	Inverted	No conversion to one-shot	H / L	H / L
		One-shot, detecting input pulse rise	H / L	H / L
		One-shot, detecting input pulse drop	H / L	H / L
Open collector or Noncontact AC/DC Switch	Non Inverted	No conversion to one-shot	OFF / ON	OFF / ON
		One-shot, detecting input pulse rise	OFF / ON	OFF / ON
		One-shot, detecting input pulse drop	OFF / ON	OFF / ON
	Inverted	No conversion to one-shot	OFF / ON	OFF / ON
		One-shot, detecting input pulse rise	OFF / ON	OFF / ON
		One-shot, detecting input pulse drop	OFF / ON	OFF / ON

The pulse width in one-shot means the bold lined section of a pulse waveform.

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EXTERNAL DIMENSIONS & TERMINAL ASSIGNMENTS   unit: mm [inch]

CLAMP
(top & bottom)

DIN RAIL
35mm wide

20 [.79]

80 [3.15]

50 [1.97]

107 [4.21]

127 [5]

(3.3 [.13])

7.8 [.31]

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.

SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM

■ **OPEN COLLECTOR, MECHANICAL SWITCH, VOLTAGE PULSE, 2-WIRE CURRENT PULSE INPUT**
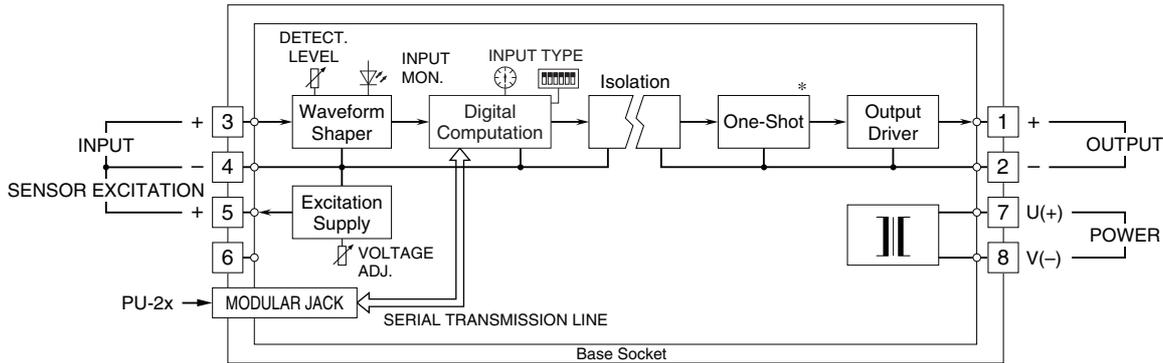
∗ Deleted with no conversion to one-shot type.
Note: With 24V excitation and open collector/mechanical contact input, the voltage across the terminals 3 – 4, divided in the waveform shaper, is of approx. 16V.

■ **RS-422 LINE DRIVER PULSE INPUT**
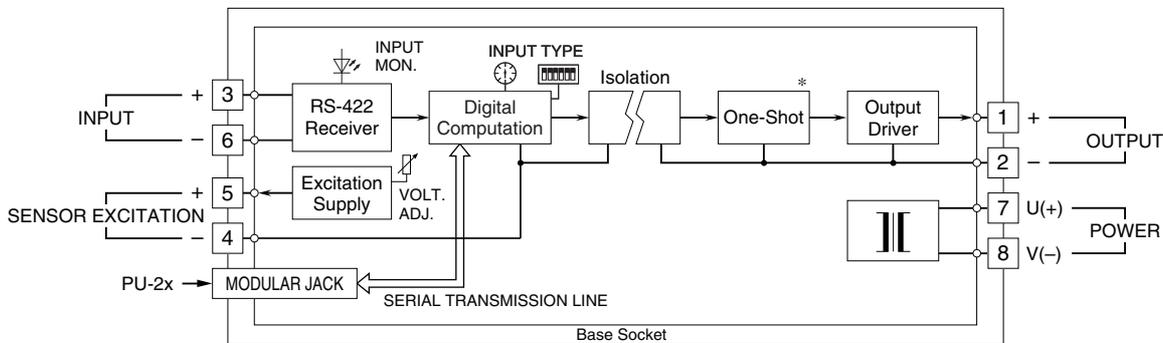
∗ Deleted with no conversion to one-shot type.

Input Connection Examples

Output Connection Examples

■ **Open Collector or Mechanical Contact**
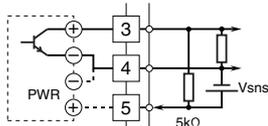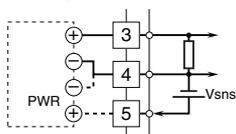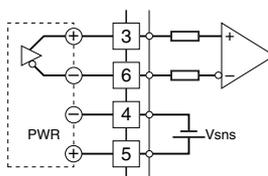
■ **2-Wire Current Pulse**
  • Built-in Excitation

■ **Open Collector**

■ **Voltage Pulse**
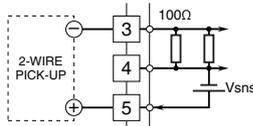
■ **Voltage Pulse**

  • **External DC Supply**
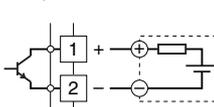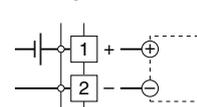
■ **Noncontact AC/DC Switch**
  • **AC Powered**
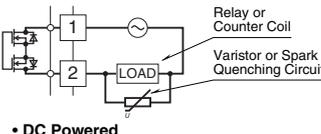
■ **RS-422 Line Driver Pulse**

■ **RS-422 Line Driver Pulse**

  • **DC Powered**

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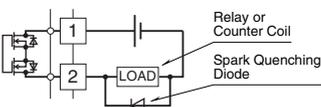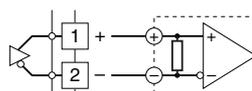
OPERATION

[Example]
Input frequency: 2 Hz
**Sampling time**: 0.5 sec.
Pulse rate: 3/2
Output pulse width: Duty ratio approx. 50 %
Max. output frequency: 1 kHz

1) The JPR2 counts the number of pulses during the sampling time (period). In the example, 1 count in 0.5 sec. time.

2) Converts the number in the preset rate. In the example, 1 pulse × 3/2 = 1.5 pulses

3) Outputs the converted pulses in the next sampling period.

If certain pulses are not output within the time frame due to a fraction or the max. output frequency limit, they are output in the following sampling period. In the example, 1 pulse is output in the second period, two pulses are output in the third to adjust the fraction.
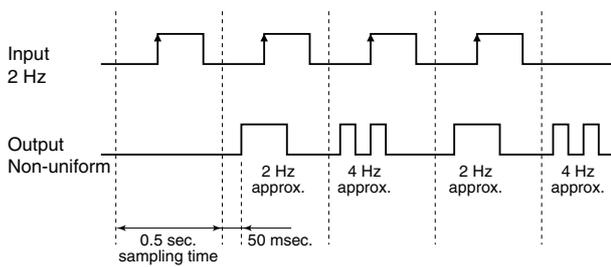
⚠ Specifications are subject to change without notice.

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