

## Plug-in Signal Conditioners M-UNIT

### PULSE ISOLATOR

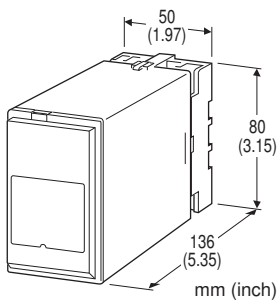
(built-in excitation; rotary encoder use)

#### Functions & Features

- Galvanically isolating two pulse rate signals from a rotary encoder
- Various outputs (relay, open collector, voltage pulses and RS-422 line driver)
- Different I/O specs can be specified
- Converting RS-422 line driver input into an open collector pulse
- Excitation
- Isolation up to 2000 V AC
- High-density mounting

#### Typical Applications

- Isolating field pulse signals in order to reduce noises



## MODEL: RPPD-[1][2][3][4][5][6][7] -[8][9]

### ORDERING INFORMATION

- Code number: RPPD-[1][2][3][4][5][6][7]-[8][9]
- Specify a code from below for each [1] through [9].
- Code number (e.g. RPPD-DD4AA3N-R/CE/Q)
- Output pulse width (e.g. 75 msec.)
- Use Ordering Information Sheet (No. ESU-1693). Default setting will be used if not otherwise specified. Refer to the factory default setting.
- Specify the specification for option code /Q (e.g. /C01/S01)

#### [1] INPUT 1

- A: Dry contact
- B: Voltage pulse (Specify sensitivity)
- C: 5 V pulse (sensitivity 2 V)
- D: 12 V/24 V pulse (sensitivity 5 V)
- H: Two-wire current pulse
- J: RS-422 line driver pulse

#### [2] INPUT 2

Must be the same code as the one chosen for Input 1.

#### [3] EXCITATION

- 1: 5 V DC @ 120 mA
- 4: 12 V DC @ 60 mA
- 7: 24 V DC @ 25 mA

Excitation is not provided with input code J, but select code 1.

#### [4] OUTPUT 1

- 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. frequency 50 kHz)
- H: High power photo MOSFET relay (max. 20 Hz) (Option /CE Not available)
- J: RS-422 line driver pulse (max. 100 kHz)
- ( ) = Max. frequency

#### [5] OUTPUT 2

- A: Open collector (max. frequency 100 kHz)
- M: 5 V pulse (max. frequency 100 kHz)
- N: 12 V pulse (max. frequency 100 kHz)
- P: 24 V pulse (max. frequency 50 kHz)
- J: RS-422 line driver pulse (max. 100 kHz)
- The max. frequency is in parentheses.

#### OUTPUT COMBINATIONS

The table below shows the selectable type of Output 1 for each Output 2 type.

With the Output 2 other than code A, the Output 1 must be the same type.

OUTPUT2	OUTPUT1
A	A, M, N, P, H
M	M
N	N
P	P
J	J

#### [6] OUTPUT PULSE WIDTH

- 1: Equal to the input
- 3: One-shot output (std. pulse width 50 ms) (Specify when optional pulse width is required.)

#### [7] OUTPUT LOGIC (both Output 1 & 2)

- N: The same as the input
- R: Inverted



## [8] POWER INPUT

### AC Power

**K:** 85 - 132 V AC

(Operational voltage range 85 - 132 V, 47 - 66 Hz)

(CE not available)

### DC Power

**S:** 12 V DC

(Operational voltage range 12 V  $\pm$ 10 %, ripple 10 %p-p max.)

(Option /CE Not available)

**R:** 24 V DC

(Operational voltage range 24 V  $\pm$ 10 %, ripple 10 %p-p max.)

**V:** 48 V DC

(Operational voltage range 48 V  $\pm$  10 % , ripple 10 % p-p max.)

(CE not available)

**P:** 110 V DC

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

(CE not available)

## [9] OPTIONS (multiple selections)

### Standards & Approvals

**blank:** Without CE

**/CE:** CE marking

### Other Options

**blank:** none

**/Q:** Option other than the above (specify the specification)

### SPECIFICATIONS OF OPTION: Q (multiple selections)

#### COATING (For the detail, refer to M-System's web site.)

**/C01:** Silicone coating

**/C02:** Polyurethane coating

**/C03:** Rubber coating

#### TERMINAL SCREW MATERIAL

**/S01:** Stainless steel

## FACTORY DEFAULT SETTING

### ■ SETTINGS FOR PULSE INPUT

INPUT 1, 2

#### •Dry Contact

Input	Semiconductor contact
Filter	No filter
Detecting level 0 - 15 V	2 V
Hysteresis 0 - 5 V	0.5 V

#### •Voltage pulse

Input waveform	Square wave
Input coupling	DC
Input amplitude	0.5 - 50 Vp-p
Input offset	$\leq$ 50 V
Filter	No filter
Detecting level 0 - 15 V	Adjusted to 1/2
Hysteresis 0 - 5 V	0.5 V

#### •5 V voltage pulse

Filter	No filter
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#### •12 V, 24 V voltage pulse

Filter	No filter
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#### •2-wire current pulse

ON current (H) 0-25 mA	14.5 mA
OFF current (L) 0-25 mA	9.5 mA
Filter	No filter

### ■ SETTINGS FOR PULSE OUTPUT

INPUT 1, 2

Output pulse width	50 ms
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## 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 1 or input 2 or sensor exc. to output 1 or output 2 to power

**DIP SW1 & SW2:** Used for input spec. setting

#### Input monitor LED

**PL1:** Red LED blinks according to input 1.

**PL2:** Red LED blinks according to input 2.

**Excitation adjustment:** 5 - 24 V DC

**Input pulse sensing:** DC coupled standard or AC coupled

**Sensitivity adjustments:**  $V_H$  pot. for Hi level;  $V_L$  pot. for Lo level

## INPUT SPECIFICATIONS

**Excitation:** Shortcircuit protection; approx. 440 mA at shortcircuit

**Pulse width time requirement:**  $\geq$  5  $\mu$  sec.



The detecting levels shown below are default value. Refer to the manual for adjustment.

## ■ Dry Contact

**Max. frequency:** 100 kHz

### Detecting Conditions

**Exc. code:** 1

**Sensing:** 5 V DC / 0.5 mA

### Detecting level:

OFF:  $\geq 2.25 \text{ V} / \geq 8.2 \text{ k}\Omega$

ON:  $\leq 1.75 \text{ V} / \leq 5.3 \text{ k}\Omega$

**Exc. code:** 4

**Sensing:** 12 V DC / 1.2 mA

### Detecting level:

OFF:  $\geq 2.25 \text{ V} / \geq 2.3 \text{ k}\Omega$

ON:  $\leq 1.75 \text{ V} / \leq 1.7 \text{ k}\Omega$

**Exc. code:** 7

**Sensing:** 24 V DC / 2.4 mA

### Detecting level:

OFF:  $\geq 2.25 \text{ V} / \geq 1 \text{ k}\Omega$

ON:  $\leq 1.75 \text{ V} / \leq 0.8 \text{ k}\Omega$

Sensing voltage means the excitation supply to the sensor and the current value indicates that at shortcircuit.

Detecting level means the threshold used to determine ON or OFF status of the pulses and the resistance values indicated that of the sensor.

## ■ Voltage Pulse

**Maximum frequency:** 100 kHz

• **Customised pulse:** Specify DC offset and amplitude.

**Waveform:** Square or sine

**Input impedance:**  $\geq 10 \text{ k}\Omega$

**Input amplitude:** 0.5 - 50 Vp-p

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

• 5 V, 12 V, 24 V Pulse

**Waveform:** Square or sine

**Input impedance:**  $\geq 10 \text{ k}\Omega$

### Detecting level

**5 V Pulse:**  $V_H \geq 2.25 \text{ V}, V_L \leq 1.75 \text{ V}$

**12 V / 24 V Pulse:**  $V_H \geq 5.25 \text{ V}, V_L \leq 4.75 \text{ V}$

( $V_H - V_L \geq 500 \text{ mV}$ )

## ■ Two-wire Current Pulse

**Max. frequency:** 100 kHz

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

**Input range:** 0 - 25 mA

**Hi/Lo level:**  $\leq 9.5 \text{ mA}$  for Lo,  $\geq 14.5 \text{ mA}$  for Hi

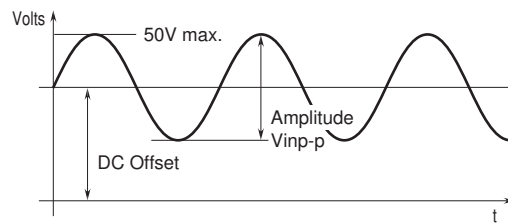
## ■ RS-422 Line Driver Pulse

**Maximum frequency:** 100 kHz

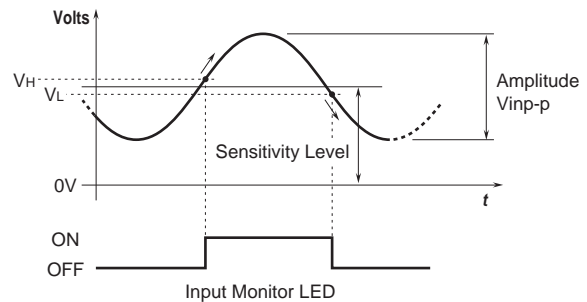
**Receiver:** Conforms to RS-422

(No receiving resistor incorporated)

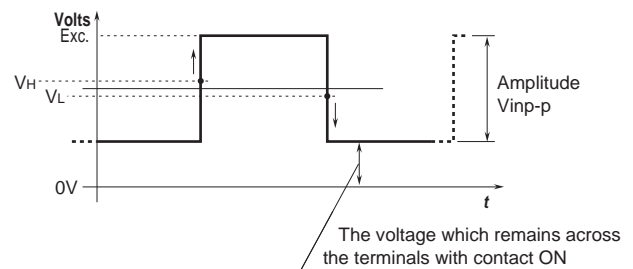
## Voltage pulse waveform



## ■ Voltage pulse (example)



## ■ Dry contact (example)



## OUTPUT SPECIFICATIONS

### ■ High Power Photo MOSFET Relay

**Maximum frequency:** 20 Hz

• **Rise time:** 5 msec.

• **Sink time:** 3 msec.

**Rating:** 120 V AC or 120 V DC @ 200 mA (resistive load)

**On resistance:** 3  $\Omega$

### ■ Open Collector

**Maximum frequency:** 100 kHz

50 V DC @ 50 mA (resistive load)

**Saturation voltage:** 0.5 V DC

■ **Voltage Pulse:** Rating (5, 12 or 24 V)  $\pm 10 \%$

**Maximum frequency:** 100 kHz (50 kHz for 24 V)

**Load resistance:**  $\geq 1.2 \text{ k}\Omega$

**Low level:**  $\leq 0.5 \text{ V}$

■ **RS-422 Line Driver Pulse:** Conforms to RS-422

**Output current:**  $\pm 20 \text{ mA}$

## OUTPUT PULSE WIDTH

• **Equal to the Input:** no pulse width conversion; difference by the length of response time



## ■ One-shot Output

This unit detects a pulse sink and outputs [input pulse width  $\pm 20\%$ ]; 50 msec. standard

Note: 2 types of one-shot detection are available: pulse rise or sink. Refer to the table on the "Output Logic" section and specify when ordering.

**Optional pulse width:** 30  $\mu$ sec. - 300 msec.

## INSTALLATION

### Power consumption

- AC: Approx. 5.5 VA
- DC: 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:** 200 g (0.44 lb)

## PERFORMANCE

### Response time

1 - 4  $\mu$ sec. delay occurs when the pulse rises and falls.

•**Open collector:** The delay could be much longer for certain types of load.

•**High power photo MOSFET relay:** The output is delayed by 10 msec. at the rise, by 3 msec. at the fall.

**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)

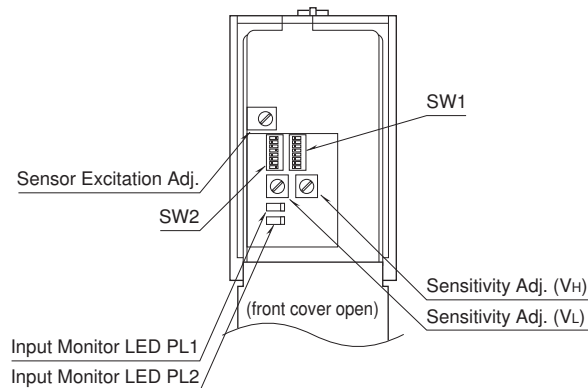
EMI EN 61000-6-4: 2007

EMS EN 61000-6-2: 2005



## EXTERNAL VIEW

Note: This unit is factory calibrated according to the Ordering Information. If you need to change hardware & software setting, refer to the instruction manuals of the transmitter.



There is no need of hardware adjustment for RS-422 line driver pulse input. Unnecessary switches or LEDs are not provided.

## OUTPUT LOGIC

Applicable for both Output 1 and 2.

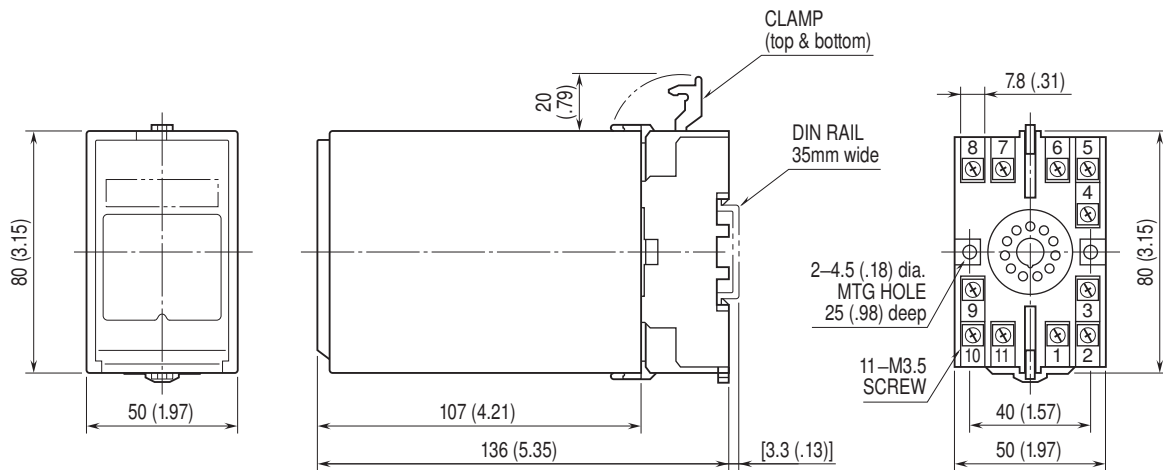
OUTPUT WAVEFORM		INPUT WAVEFORM	VOLTAGE PULSE, 2-WIRE CURRENT PULSE or RS-422 LINE DRIVER PULSE		DRY CONTACT		
			CH1	CH2	CH1	CH2	
VOLTAGE PULSE or RS-422 LINE DRIVER PULSE	Non Inverted	No pulse width conversion	H		OFF		
		One-shot, detecting input pulse rise	CH1	H		CH1	H
		CH2	L		CH2	L	
	Inverted	No pulse width conversion	CH1	H		CH1	H
		CH2	L		CH2	L	
		One-shot, detecting input pulse rise	CH1	H		CH1	H
OPEN COLLECTOR or PHOTO MOSFET RELAY	Non Inverted	No pulse width conversion	CH1	OFF		CH1	OFF
		CH2	ON		CH2	ON	
		One-shot, detecting input pulse rise	CH1	OFF		CH1	OFF
	Inverted	No pulse width conversion	CH1	OFF		CH1	OFF
		CH2	ON		CH2	ON	
		One-shot, detecting input pulse rise	CH1	OFF		CH1	OFF

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

\*Pulse rise for RS-422 line driver pulse can not be detected.

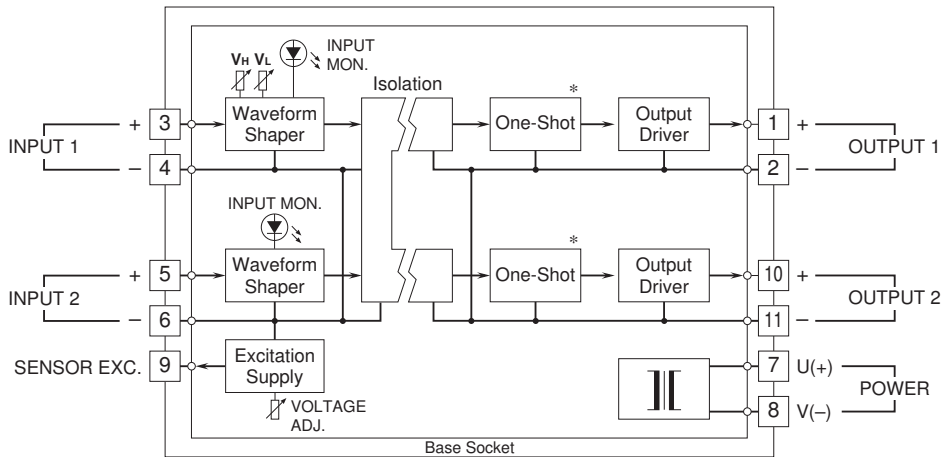


**EXTERNAL DIMENSIONS & TERMINAL ASSIGNMENTS unit: mm (inch)**



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

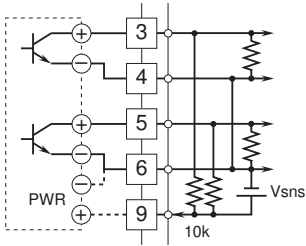
## SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM



\*Deleted with no pulse width conversion type.  
 Remark: With 24V excitation and dry contact input, the voltage across the terminals 3 - 4, 5 - 6, divided in the waveform shaper, is of approx. 16V.

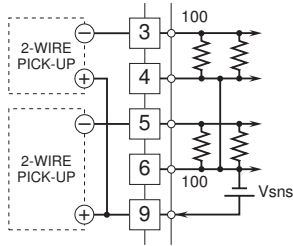
### Input Connection Examples

**Dry Contact**



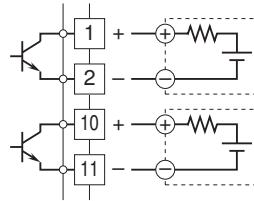
### 2-Wire Current Pulse

•Built-in Excitation

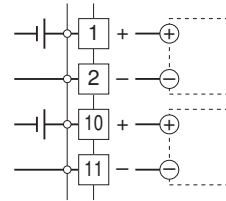


### Output Connection Examples

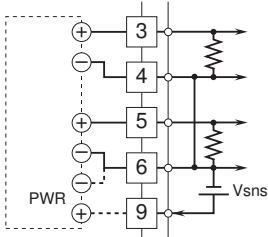
**Open Collector**



### Voltage Pulse

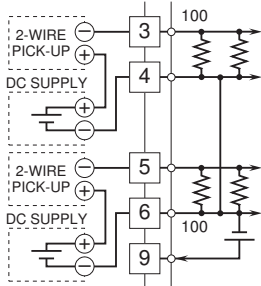


### Voltage Pulse



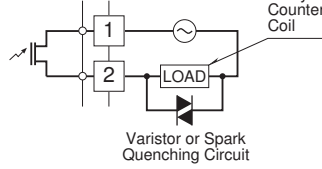
### External DC Supply

•External DC Supply

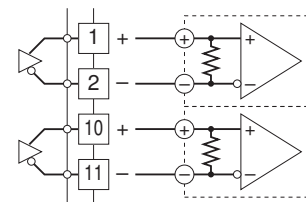


### Power Photo MOSFET Relay

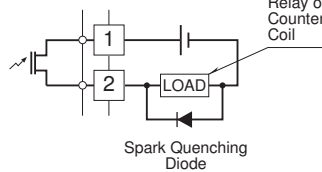
•AC Powered



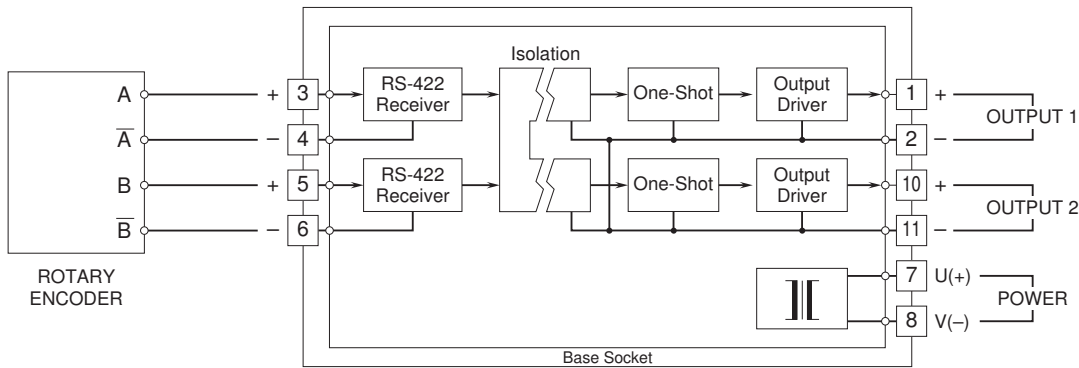
### RS-422 Line Driver Pulse



### DC Powered



### RS-422 LINE DRIVER INPUT



Sensor excitation not provided for RS-422 line driver input.





Specifications are subject to change without notice.

