

## Plug-in Signal Conditioners M-UNIT

### ENCODER POSITION TRANSMITTER

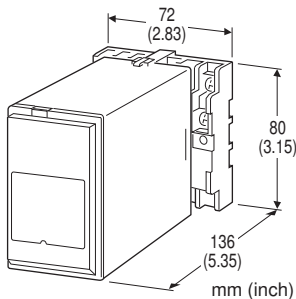
(field-programmable; built-in excitation)

#### Functions & Features

- Converts a two-phase forward and reverse rotation pulse signal with 90 degree phase difference into a forward and reverse position signal
- Built-in excitation
- Field-selectable input type and range
- Isolation up to 2000 V AC
- High-density mounting

#### Typical Applications

- Measuring moving distance of a machine with a rotary encoder



## MODEL: JRQ2-[1][2]-[3][4]

### ORDERING INFORMATION

- Code number: JRQ2-[1][2]-[3][4]
- Specify a code from below for each [1] through [4]. (e.g. JRQ2-76-K/Q)
- Special output range (For codes Z & 0)
- Use Ordering Information Sheet (No. ESU-1576). Factory setting (table below) will be used if not otherwise specified.
- Specify the specification for option code /Q (e.g. /C01/S01)

#### Factory Setting

Input type	Open collector
Pulse amplitude	----
Noise filter	None
Detecting level	1V * (5V excitation) 2V * (12/24V excitation)
Count mode	1 count / 1 pulse (Phase B by one pulse edge)
Input zero count	0
Input span count	1000
Alarm setpoint	100%
Alarm deadband	1.00%
Alarm mode	High alarm
Linearization	Without
Input count at power off	Not held (Cold Start)

\* Detecting voltage in the internal circuit

### INPUT - Field-selectable

Open collector  
Voltage pulse  
RS-422 line driver pulse  
Two inputs (phase A and B) are required for adequate operation of the this unit.

### [1] EXCITATION

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

### [2] OUTPUT

#### Current

- A: 4 - 20 mA DC (Load resistance 750 Ω max.)
- B: 2 - 10 mA DC (Load resistance 1500 Ω max.)
- C: 1 - 5 mA DC (Load resistance 3000 Ω max.)
- D: 0 - 20 mA DC (Load resistance 750 Ω max.)
- E: 0 - 16 mA DC (Load resistance 900 Ω max.)
- F: 0 - 10 mA DC (Load resistance 1500 Ω max.)
- G: 0 - 1 mA DC (Load resistance 15 kΩ max.)
- Z: Specify current (See OUTPUT SPECIFICATIONS)

#### Voltage

- 1: 0 - 10 mV DC (Load resistance 10 kΩ min.)
- 2: 0 - 100 mV DC (Load resistance 100 kΩ min.)
- 3: 0 - 1 V DC (Load resistance 100 Ω min.)
- 4: 0 - 10 V DC (Load resistance 1000 Ω min.)
- 5: 0 - 5 V DC (Load resistance 500 Ω min.)
- 6: 1 - 5 V DC (Load resistance 500 Ω min.)
- 4W: -10 - +10 V DC (Load resistance 2000 Ω min.)
- 5W: -5 - +5 V DC (Load resistance 1000 Ω min.)
- 0: Specify voltage (See OUTPUT SPECIFICATIONS)

### [3] 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

### [4] OPTIONS

blank: none  
/Q: With options (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

## RELATED PRODUCTS

- JX configurator connection kit (model: JXCON)
- Programming Unit (model: PU-2x)

## 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 DC output to alarm output to power

**Overrange output:** Approx. -15 to +115 % at 1 - 5 V

**Zero adjustment:** -5 to +5 % (front)

**Span adjustment:** 95 to 105 % (front)

**Alarm mode:** High or Low

**Alarm setpoint:** -15 - +115 %

**Alarm deadband:** 0 - 20 %

**Input monitor (PL1):** Red LED blinks according to the input phase A.

**Input monitor (PL2):** Red LED blinks according to the input phase B.

**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 count range
- Zero and span adjustment
- Linearization
- Alarm setpoint
- Output fine adjustment
- Others

**Adjustments:** With DIP and Rotary switches.

- Input Type
- Noise Filter
- Pulse amplitude

(Refer to the instruction manual for details)

**Modular jack:** Connecting the PU-2x

**Input pulse sensing:** DC coupled

**Reset input:** Resets the internal counter value (The transmitter output equivalent to 0 count when the reset input terminals are closed for 500 msec. or longer.)

**Output at input/zero/span count overflow**

- **Positive side:** Held at the max. of 115 %
- **Negative side:** Held at the min. of -15 %

## INPUT SPECIFICATIONS

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

**Maximum frequency:** 200 kHz

**Maximum count range:** -99999999 to +99999999

**Minimum pulse width time requirement:** 2.5  $\mu$ sec. for both ON and OFF

### ■ Open Collector

**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

**ON resistance:**  $\leq$  200  $\Omega$

**OFF resistance:**  $\geq$  200 k $\Omega$

**Detecting level:**

1 V (5 V excitation)

2 V (12/24 V excitation)

(Detecting voltage in the internal circuit. For open collector input, be sure to re-adjust the voltage back to 1 V (5 V excitation) or 2 V (12/24 V excitation) if it has been changed for other input types.)

**Detecting pulse edge:** OFF (input monitor LED ON) to ON (LED OFF)

### ■ Voltage Pulse

**Waveform:** Square or sine

**Input impedance:** 10 k $\Omega$  min.

**Pulse amplitude:** 0.1 - 100 V<sub>p-p</sub>

**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 (LED OFF).

### ■ RS-422 Line Driver Pulse

**Receiver:** Conforms to RS-422

### ■ Reset Input

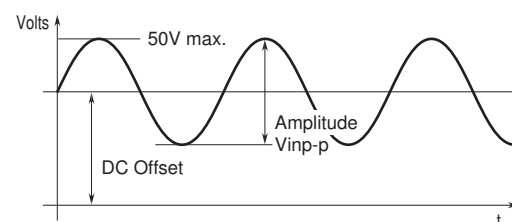
**Sensing voltage:** 4.5 V DC

**Detecting level**

**ON:**  $\leq$  1 V

**OFF:**  $\geq$  4 V

#### Voltage pulse waveform



## OUTPUT SPECIFICATIONS

■ **DC Current:** 0 – 20 mA DC

**Minimum span:** 1 mA

**Offset:** Max. 1.5 times span

**Load resistance:** Output drive 15 V max.

■ **DC Voltage:** -10 – +12 V DC

**Minimum span:** 5 mV

**Offset:** Max. 1.5 times span

**Load resistance:** Output drive 10 mA max.; 5 mA for negative voltage output; at  $\geq 0.5$  V

■ **Alarm Output:** Relay contact

**Rated load:** 125 V AC @ 0.5 A ( $\cos \phi = 1$ )

30 V DC @ 0.5 A (resistive load)

**Maximum switching voltage:** 250 V AC or 125 V DC

**Maximum switching power:** 62.5 VA or 60 W

**Minimum load:** 10 mV DC @ 1 mA

**Mechanical life:**  $5 \times 10^7$  cycles (300 cycles/minute)

For maximum relay life with inductive loads, external protection is recommended.

## INSTALLATION

### Power input

• **AC:** Operational voltage range 85 – 132 V, 47 – 66 Hz, approx. 7 VA

• **DC:** Operational voltage range: Rating  $\pm 10$  %, or 85 – 150 V for 110 V rating; ripple 10 %p-p max.; Approx. 4 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:** 350 g (0.77 lb)

## PERFORMANCE in percentage of span

**Accuracy:**  $\pm 0.1$  %

**Alarm setpoint accuracy:**  $\pm 0.1$  %

**Temp. coefficient:**  $\pm 0.015$  %/°C ( $\pm 0.008$  %/°F)

**Response time:**  $\leq 0.5$  sec. (0 – 90 %)

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

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

**Dielectric strength:**

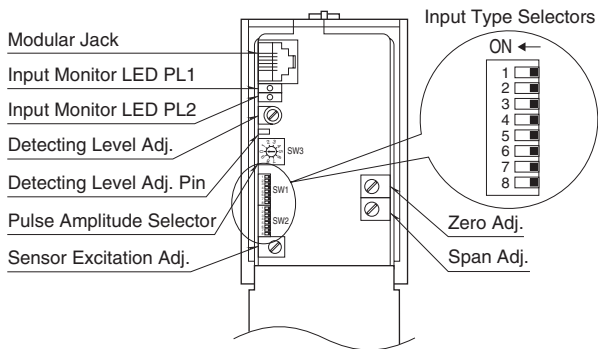
2000 V AC @ 1 minute (input to output to power)

1500 V AC @ 1 minute (input or output or power to alarm output)

2000 V AC @ 1 minute (circuit to ground)

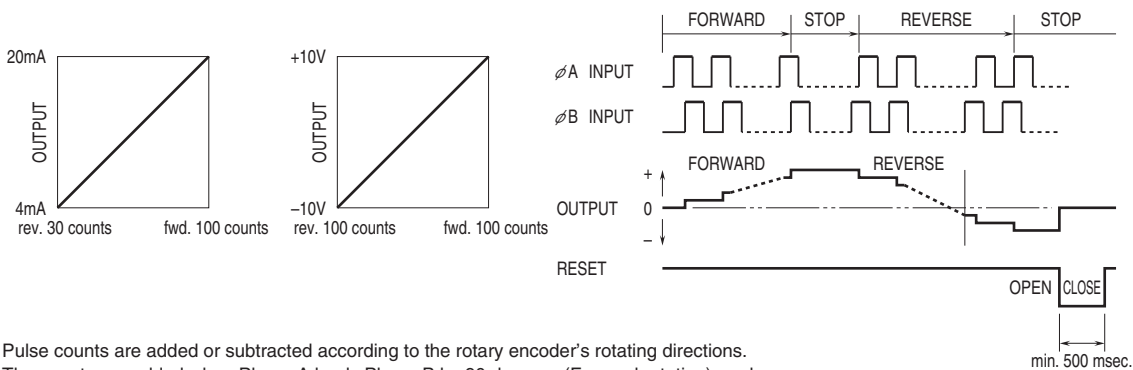


## EXTERNAL VIEW



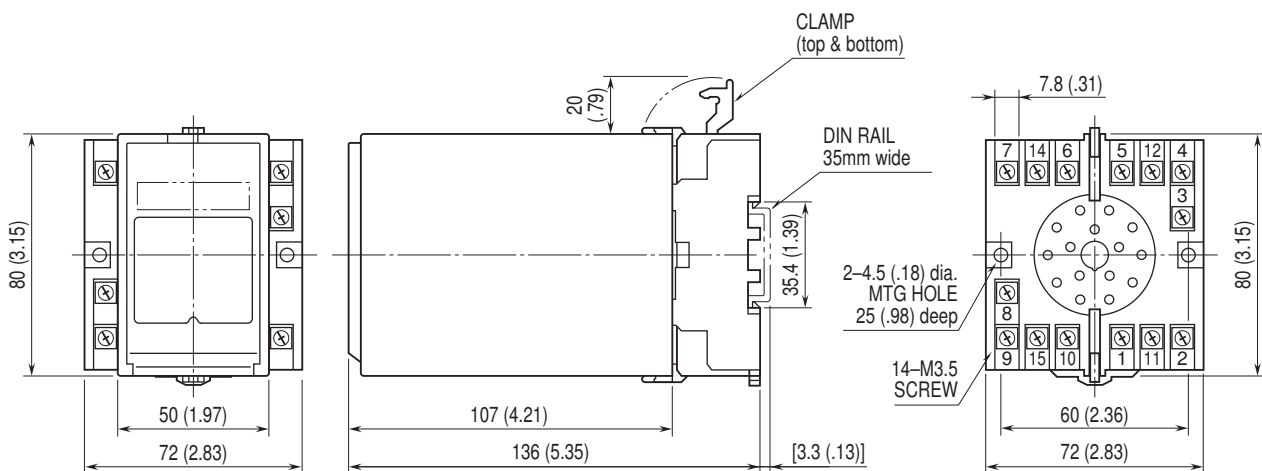
Refer to the instruction manual for detailed procedures.

## OPERATION



Pulse counts are added or subtracted according to the rotary encoder's rotating directions. The counts are added when Phase A leads Phase B by 90 degrees (Forward rotation), and subtracted when Phase A lags behind Phase B by 90 degrees (Reverse rotation).

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

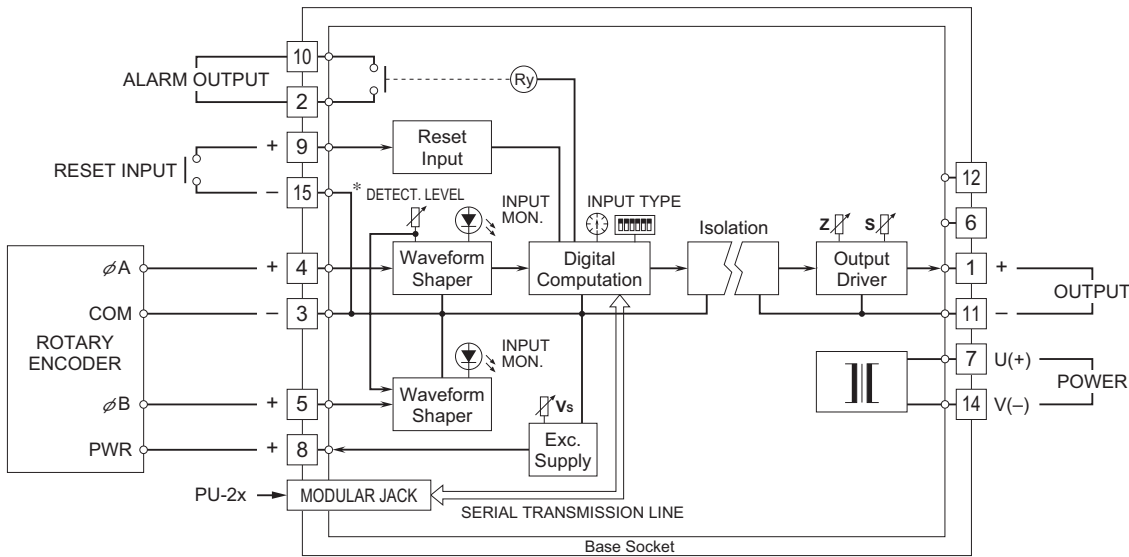


• When mounting, no extra space is needed between units.

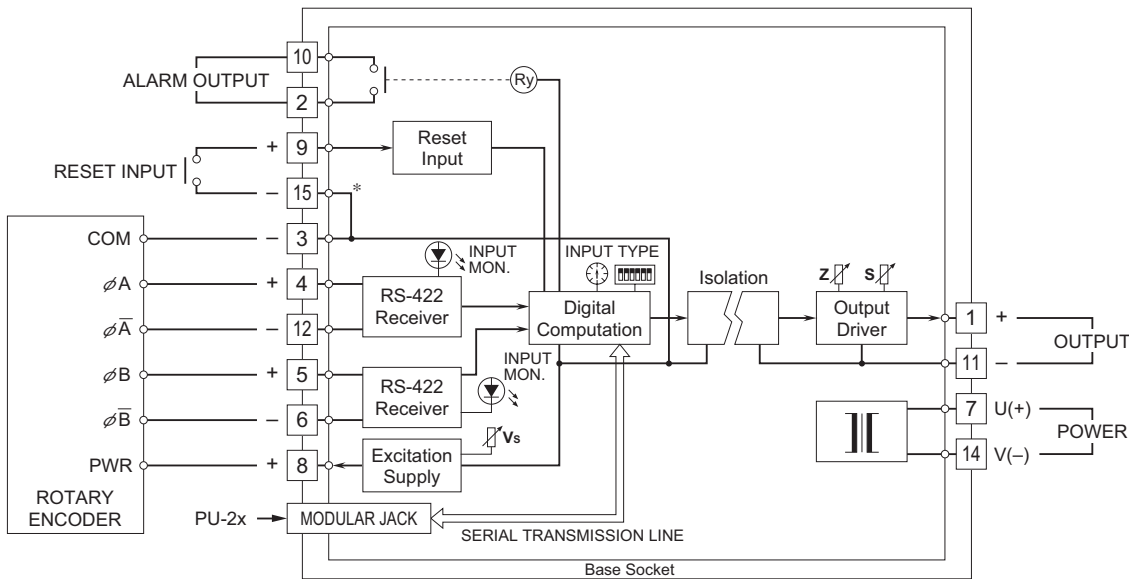


**SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM**

■ OPEN COLLECTOR or VOLTAGE PULSE INPUT



■ RS-422 LINE DRIVER INPUT



\*Terminals 3 and 15 are internally connected.  
COM terminals of the rotary encoder and the reset input can be connected to either one.



Specifications are subject to change without notice.

