

Plug-in Signal Conditioners M-UNIT

FREQUENCY SCALER

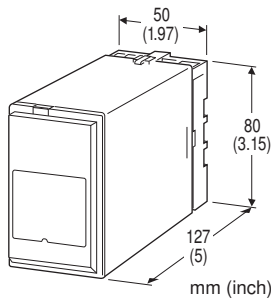
(field-programmable; built-in excitation)

Functions & Features

- Scales input frequency
- Various outputs (open collector, voltage pulse, Noncontact AC/DC switch, RS-422 line driver)
- Built-in 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

- Scaling frequency signals from a rotary encoder



MODEL: JFR2-[1][2][3]-[4][5]

ORDERING INFORMATION

- Code number: JFR2-[1][2][3]-[4][5]
- Specify a code from below for each [1] through [5]. (e.g. JFR2-4P1-K/Q)
- Use Ordering Information Sheet (No. ESU-1581). 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	Low
Detecting level *1	1V (5V excitation) 2V (12V/24V excitation)
Input span frequency	1000 Hz
Output span frequency	20 Hz (output code R) 1000 Hz (all other codes)
Low-end cutout	3 Hz
Non-uniform wave averaging	1 (No averaging)
One-shot pulse width	400 µsec. (20ms for output signal R)
One-shot pulse logic	H, OFF

*1. 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. 10 kHz)
- M: 5V pulse (max. 10 kHz)
- N: 12 V pulse (max. 10 kHz)
- P: 24 V pulse (max. 10 kHz)
- J: RS-422 line driver pulse (max. 10 kHz)
- R: Noncontact AC/DC switch (max. 20 Hz)

[3] OUTPUT PULSE WIDTH

- 1: Equal to the input
- 3: One-shot output (std. pulse width 400 µs (20ms for output signal R)) (Specify when optional pulse width is required.)

[4] 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

[5] 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 or sensor exc. to output to power
Input monitor LED: Red LED blinks according to the input.
Excitation adjustment: 5 - 24 V DC
Adjustments: Programming Unit (model: PU-2x); input range frequency, output range frequency, input span frequency, output span frequency, low-end cutout, non-uniform wave averaging, etc.
 (Refer to the users manual of JXCON for the adjustments configurable with JXCON.)
DIP and rotary switches: Pulse amplitude, input type, noise filter
 (Refer to the instruction manual for details)
Input pulse sensing: DC coupled
Averaging non-uniform input waveforms: Input pulses are divided and then multiplied so that the output pulses are averaged.
Low-end cutout: No pulse output for certain low level of input frequency; 0.3 - 100 % adjustable; deadband 1 %

INPUT SPECIFICATIONS

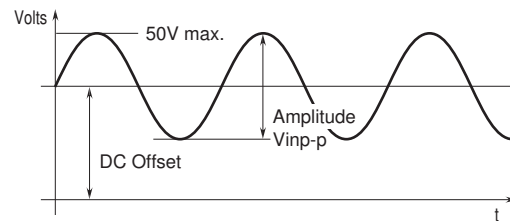
Excitation: Shortcircuit protection; approx. 440 mA (max.) at shortcircuit
Minimum pulse width time requirement: 5 μ sec.; 50 msec. for mechanical contact (for both ON and OFF)
Minimum frequency span requirement: 20 % of the selected input frequency range

■ **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 : \leq 200 Ω
Resistance at OFF : \geq 200 k Ω
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)

■ **Voltage Pulse**
Waveform: Square or sine
Input impedance: \geq 10 k Ω
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



OUTPUT SPECIFICATIONS

Output frequency: Input frequency \times scaling factor (scaling factor = output span frequency / input span frequency)
Minimum frequency span requirement: 20 % of the selected output frequency range

■ **Open Collector:** 50 V DC @ 50 mA (resistive load)
Saturation voltage: 0.6 V DC
Maximum frequency: 10kHz

■ **Voltage Pulse**
H level: Rating (5, 12 or 24 V) \pm 10 %
L level: \leq 0.5 V
Load resistance: \geq 1 k Ω (5V), \geq 2.4 k Ω (12 V), \geq 4.8 k Ω (24 V)
Maximum frequency: 10 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: 10 kHz

OUTPUT PULSE WIDTH

- **Equal to the Input:** Duty ratio approx. 50 % (Fixed duty ratio even when the output frequency changes.)
 - **One-shot Output:** Preset pulse width ± 20 %
- Optional pulse width: 30 μ sec. - 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 in percentage of span

Accuracy

Output 10 kHz range: ± 0.2 %

Output ≤ 1 kHz range: ± 0.1 %

Response time

Input ≥ 10 Hz range: 0.3 sec. + input cycle + output cycle

Input ≤ 1 Hz range: Two (2) input cycles + output cycle

Response time is defined as time required for the first output pulse to be provided for a step input (0 - 100 %).

Insulation resistance: ≥ 100 M Ω with 500 V DC

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

■ INPUT FREQUENCY RANGE

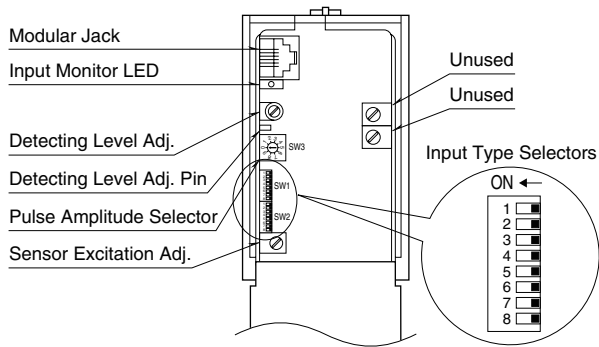
INPUT FREQUENCY RANGE	INPUT SPAN FREQUENCY
100 kHz	20 - 100 kHz
10 kHz	2 - 19.999 kHz
1 kHz	0.2 - 1.9999 kHz
100 Hz	20 - 199.99 Hz
10 Hz	2 - 19.999 Hz (2 - 10 Hz for Mechanical Contact)
1 Hz	0.2 - 1.9999 Hz
100 mHz	20 - 199.99 mHz
10 mHz	2 - 19.999 mHz

■ OUTPUT FREQUENCY RANGE

OUTPUT FREQUENCY RANGE	OUTPUT SPAN FREQUENCY
10 kHz	2 - 10 kHz
1 kHz	0.2 - 1.9999 kHz
100 Hz	20 - 199.99 Hz
10 Hz	2 - 19.999 Hz
1 Hz	0.2 - 1.9999 Hz
100 mHz	20 - 199.99 mHz
10 mHz	2 - 19.999 mHz
1 mHz	0.2 - 1.9999 mHz

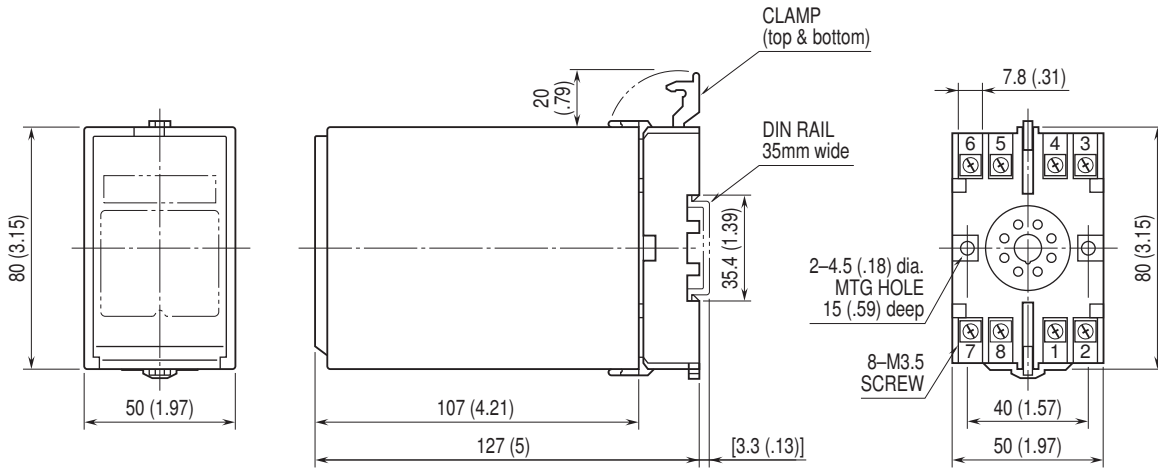


EXTERNAL VIEW



Refer to the instruction manual for detailed procedures.

EXTERNAL DIMENSIONS & TERMINAL ASSIGNMENTS unit: mm (inch)

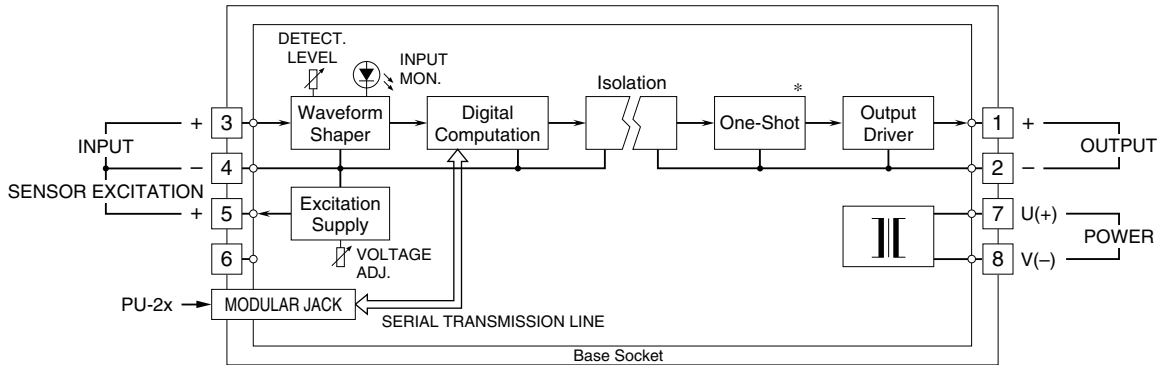


• When mounting, no extra space is needed between units.



SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM

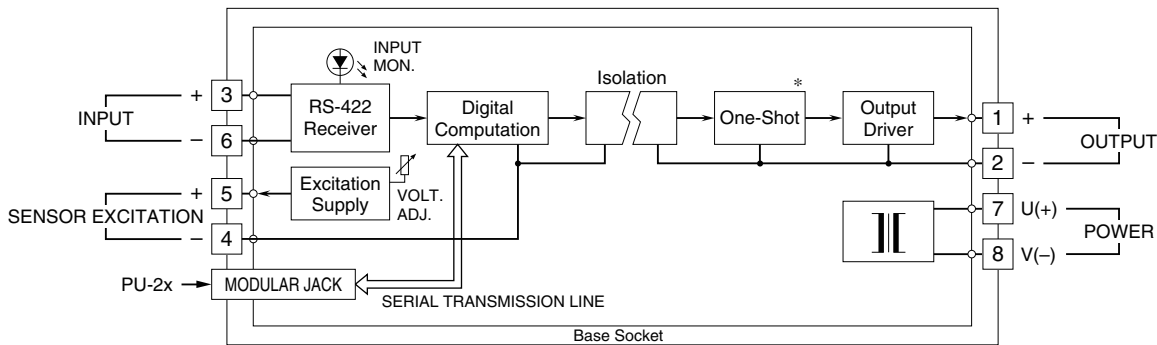
■ OPEN COLLECTOR, MECHANICAL SWITCH, VOLTAGE PULSE, 2-WIRE CURRENT PULSE INPUT



*Deleted with no pulse width conversion type.

Remark: 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.

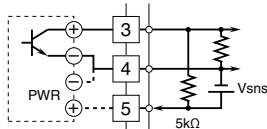
■ RS-422 LINE DRIVER PULSE INPUT



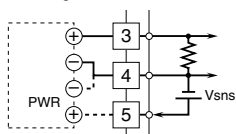
*Deleted with no pulse width conversion type.

Input Connection Examples

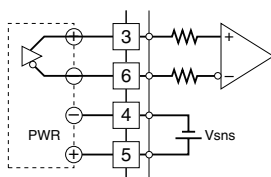
■ Open Collector or Mechanical Contact



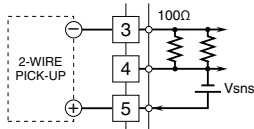
■ Voltage Pulse



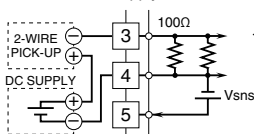
■ RS-422 Line Driver Pulse



■ 2-Wire Current Pulse

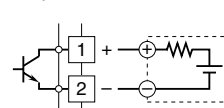


• External DC Supply

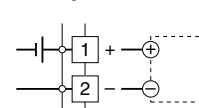


Output Connection Examples

■ Open Collector

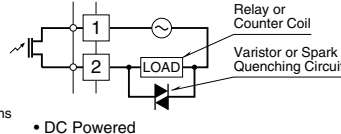


■ Voltage Pulse

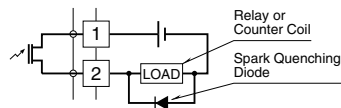


■ Noncontact AC/DC Switch

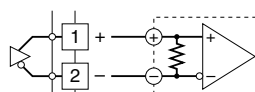
• AC Powered



• DC Powered



■ RS-422 Line Driver Pulse



Specifications are subject to change without notice.