Super-mini Signal Conditioners *Mini-M Series*

PULSE SCALER
(selectable range)

MODEL **M2PRU**

MODEL & SUFFIX CODE SELECTION

M2PRU–❑❑❑–❑❑

MODEL

INPUT
A1: Open collector
A2: Mechanical contact
C : 5V pulse (sensitivity 2V)
H : Two-wire current pulse

EXCITATION
4 : 12V DC @30mA
7 : 24V DC @30mA

OUTPUT
A : Open collector (max. frequency 100 kHz)
M : 5V pulse (max. frequency 100 kHz)
N : 12V pulse (max. frequency 100 kHz)
P : 24V pulse (max. frequency 100 kHz)
R : AC/DC switch (max. frequency 1 kHz)

POWER INPUT

AC Power	DC Power
M2: 100 – 240V AC	**R** : 24V DC
	R2: 11 – 27V DC *1
	P : 110V DC

*1 : Select '/N' for 'Standards & Approvals' code.

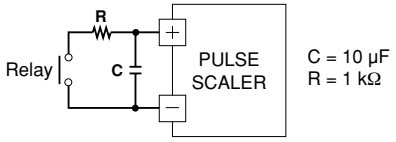
STANDARDS & APPROVALS
/N : Without CE
/CE: CE marking

ORDERING INFORMATION

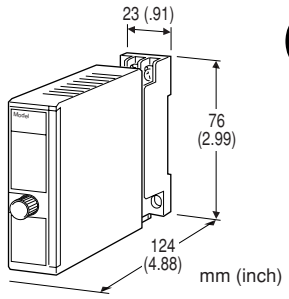
Specify code number. (e.g. M2PRU-A24A-M2/CE)

REMARKS

1) The M2PRU's output waveform is not uniform due to its scaling method. The user must be aware that it may be inconvenient for certain types of application.
2) The M2PRU is designed to accept at the maximum of 100 kHz, which may cause errors due to chatterings in the input pulses.
   A filter circuitry (time constant: approx. 1 msec.) is incorporated to eliminate unwanted chatterings when the mechanical contact input is specified. It is effective for most relay types, however, an external CR filter as indicated below, could be added if the user need improvement. Limit the input frequency to 10 Hz at maximum.



ISOLATION



CE

Functions & Features
- Converts pulse rate into convenient engineering unit for display on a totalizing counter or meter
- Excitation
- Scaling factor adjustable of 1.0000×10^{0} to 0.0001×10^{-6}
- Various outputs (open collector, voltage pulse and AC/DC switch)
- Three-way isolation
- High-density mounting

Typical Applications
- Positive displacement flowmeters and turbine flowmeters
- Magnetic tachometers

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
Input pulse sensing: DC coupled; capacitor coupling (automatic trigger*) is field selectable with the side DIP switch for the voltage pulse input.

*Capacitor coupling, with which the detecting levels are automatically set within two peaks of the waveforms, is effective way to detect those with DC offset. However, it may be ineffective if the duty ratio is extremely high or low. The automatic trigger method can compensate such irregular pulses.

Scaling factor adjustment: 10-position rotary switch (front); $1.0000 \times 10^{0} – 0.0001 \times 10^{-6}$; factory set to 1.0000×10^{0}

Output pulse width adjustment**: Single-turn screwdriver adjustment (front); 5 μsec. – 400 msec. (one-shot type);
Factory set to 5 μsec. except for the mechanical contact input set to 15 msec. or AC/DC switch output set to 500 μsec.
Output pulse width range selector: Double-throw SW (front)
Chattering protection: Filter provided for mechanical contact input (time constant: approx. 1 msec.)

**Min. 400 μsec. recommended for AC/DC switch output of which the internal voltage drop value may increase with a shorter pulse width.

INPUT & OUTPUT

■INPUT
Excitation: Shortcircuit protection; limited to approx. 40mA at shortcircuit

•Open Collector
Frequency range: 0 – 100 kHz
Pulse width time requirement: Min. 5 μsec. for ON and OFF
Sensing: Approx. 24V DC @2mA
Detecting levels: ≤400Ω for ON, ≥1200Ω for OFF

•Mechanical Contact
Frequency range: 0 – 30 Hz
Pulse width time requirement: Min. 10 msec. for ON and OFF
Sensing: Approx. 24V DC @2mA
Detecting levels: ≤400Ω for ON, ≥1200Ω for OFF

•5V Pulse: Square or sine waveforms
Frequency range: 0 – 100 kHz
(min. 10 Hz for sine waves)
Pulse width time requirement: Min. 5 μsec. for high and low levels
Detecting levels
DC coupled: ≥2V DC for high level
≤1V DC for low level
Capacitor coupled: ≥2V p-p
Max. input voltage across the terminals: ±50V DC
Input impedance: 10kΩ minimum

•Two-wire Current Pulse
Frequency range: 0 – 100 kHz
Pulse width time requirement: Min. 5 μsec. for high and low levels
Detecting levels: ≥10mA for high level
≤5mA for low level
Maximum current: ±30mA
Input resistance: Receiving resistor 200Ω

■OUTPUT
•Open Collector: 50V DC @200mA (resistive load)
Maximum frequency: 100 kHz
Saturation voltage: 0.6V DC

•Voltage Pulse
Maximum frequency: 100 kHz
High level: Rating (5, 12 or 24V) ±10%
Low level: ≤0.5V
Load resistance: 500Ω minimum for 5V;
1200Ω minimum for 12V;
4800Ω minimum for 24V

•AC/DC Switch: 132V AC @200mA (cosø=1)
30V DC @200mA (resistive load)
Maximum frequency: 1 kHz
Internal voltage drop: ≤3V

INSTALLATION

Power input
AC: Operational voltage range 85 – 264V
47 – 66 Hz; approx. 5VA at 100V
approx. 6VA at 200V
approx. 7VA at 264V
DC: Operational voltage range for R: 24V ±10%, R2: 11 – 27V, or P: 85 – 150V, ripple 10% p-p max.; approx. 3W
Operating temperature: -5 to +55°C (23 to 131°F)
Operating humidity: 30 to 90% RH (non-condensing)
Mounting: Surface or DIN rail
Dimensions: W23×H76×D124 mm (0.91"×2.99"×4.88")
See General Spec. Sheet Figure A-2.
Weight: 150 g (0.33 lbs)
Terminal assignment: See General Spec. Sheet Figure B-1.

PERFORMANCE

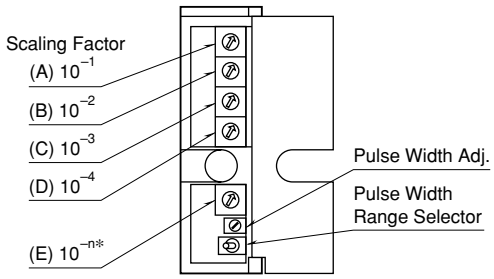
Response time: 25 μsec. + input cycle + output cycle (time required for the first pulse to be output from a train of pulse input)
Insulation resistance: ≥100MΩ with 500V DC
Dielectric strength: 2000V AC @1 minute
(input to output to power to ground)

STANDARDS & APPROVALS

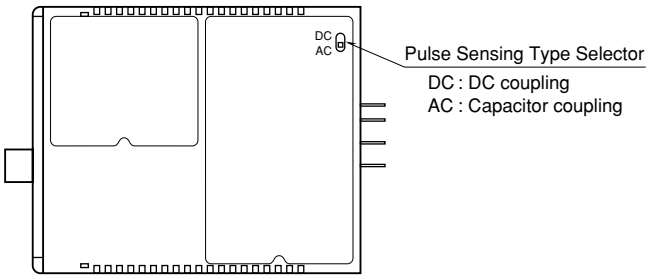
CE conformity: EMC Directive (89/336/EEC)
EMI EN61000-6-4
EMS EN61000-6-2
Low Voltage Directive (73/23/EEC)
EN61010-1
Installation category II
Pollution degree 2
Max. operating voltage 300V
Input or output to power – Reinforced insulation
Input to output
Open collector/voltage pulse output – Basic insulation
AC/DC switch output – Reinforced insulation

FRONT & SIDE VIEW

■ **FRONT VIEW (with cover open)**



■ **RIGHT SIDE VIEW**



*Settings 7 through 9 are invalid.
No pulse output with these settings.

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

■SCALING FACTOR

Positions for the rotary switches 10^{-1} through 10^{-n} apply respectively to each digit of the decimals and exponential as shown below.

Output Rate = Input Rate × 0. (A)(B)(C)(D) × $10^{-(E)}$
where the scaling factor is adjustable from
1.0000×10^{-0} thr. 0.0001×10^{-6}

[Examples]

Scaling factor 0.1440:
(A) = 1, (B) = 4, (C) = 4, (D) = 0, (E) = 0

Scaling factor 1.0000 is special:
(A) = 0, (B) = 0, (C) = 0, (D) = 0

■PULSE WIDTH

Factory adjusted to a suitable value. Use only when the output device (counter) is not able to read the output pulses.

OUTPUT TYPE	VOLTAGE PULSE	OPEN COLLECTOR AC/DC SWITCH
Bold section of the waveform is adjustable.	H L	OFF ON

■PULSE WIDTH RANGE

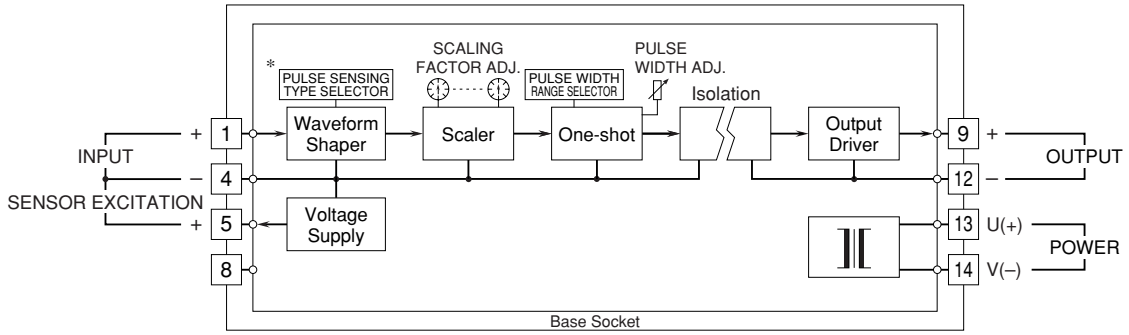
Selects adjustable range of the output pulse width.

L (Left) : Approx. 0.2 – 10 msec.
CTR (Center) : Approx. 5 – 200 μsec.
R (Right) : Approx. 10 – 400 msec.

■PULSE SENSING TYPE

Provided only when the voltage pulse input is selected.
Factory set to 'DC coupling.'
When the DC offset is too large to detect by DC coupling, switch to 'Capacitor coupling.'

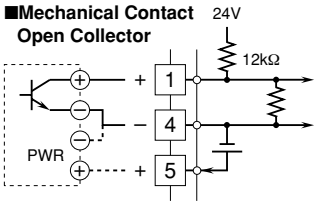
SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM



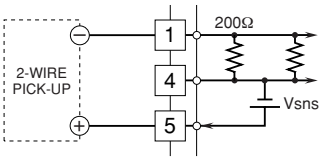
*Provided only for voltage pulse input.

Input Connection Examples

■Mechanical Contact
Open Collector

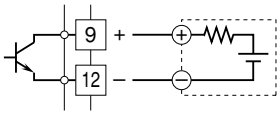


■2-Wire Current Pulse
•Built-in Excitation

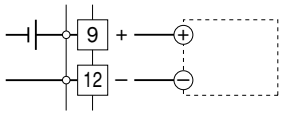


Output Connection Examples

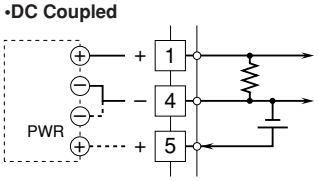
■Open Collector



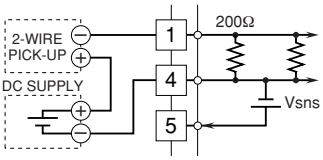
■Voltage Pulse



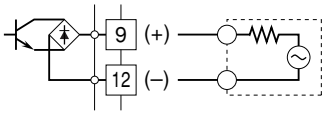
■5V Voltage Pulse
•DC Coupled



•External DC Supply



■AC/DC SWITCH



•Capacitor Coupled