# General Specifications

GS 77J04Q02-01E

Model MQ2
Pulse to Analog Converter
(Free Range Type)

JUXTA

## ■ General

*The MQ2 is a plug-in type pulse-to-analog converter receives pulse signals from the field and converts them into isolated DC current or DC voltage signals.*

- Input signals can be non-voltage contact (open collector), ON/OFF contact, voltage pulse, or current pulse.
- The transmitter power supply can be specified as 12 V DC or 24 V DC.
- The internal input filter (10 ms) can be turned ON/OFF to receive a signal with a lot of chattering.
- VJ77 PC-based Parameters Setting Tool (sold separately) can be used to change pulse rate and other parameters.
- Provided with power indicator lamp (RDY).

**Application examples**

- Convert pulse signals from a positive displacement flow meter, turbine flow meter, vortex flow meter, water meter, and other meters to instantaneous flow values (analog signals).
- Convert rotation pulse signals from a proximity switch to rotational speed signals (analog signals).

## ■ Model and Suffix Codes

MQ2-□□-□/□

Model

Transmitter power supply
1: 12 V DC ±10%
2: 24 V DC ±10%

Output signal
A: 0 to 20 mA DC, span is 2 mA or more
B: 0 to 5 mA DC, span is 1 mA or more
1: 0 to 10 V DC, span is 0.5 V or more
2: 0 to 100 mV DC, span is 10 mV or more
Z: Custom Order (DC current/voltage signal)

Power supply
3: 24V DC ±10%
4: 100-130V AC/DC (Operating range: 85 to 150 V)
5: 200-240V AC (Operating range: 170 to 264 V)

Options
/SN: No socket (with socket if not specified)
/C0: Coating
/FB: Fuse bypass

(Note 1) "/C0" option: Polyurethane coating. The "/C0" option does not guaranteed the coating effect though it is expected that the corrosion resistance for electric circuit is reinforced. And it is not able to submit coating test data.
(Note 2) "/FB" option: The primary power supply fuse is deleted, short circuit and ship it.


## ■ Ordering Information

Specify the model and suffix code, input frequency and output range.

- Model and Suffix Code: e.g. MQ2-21-3
- Input frequency: e.g. 50 to 1000 Hz
- Output range: e.g. 1 to 5 V DC

The low cut point and input filter will be configured per your specifications prior to shipping. Items that you do not specify will remain at the factory default values.

- Low cut point: e.g. 30 Hz
- Input filter: e.g. OFF

## ■ Initial Values (Factory-set Values)

Factory settings are as follows:

To change the setting value, it is necessary to use a personal computer (VJ77) or the front panel switch.

- Low cut point: 0.01 Hz
- Input filter: OFF
- Internal load resistance: none

## ■ Input Specifications

Input signal:
2-wire: Non-voltage contact (open collector), ON/OFF contacts, voltage pulse or current pulse (transmitter power supply available)
3-wire: Voltage pulses (transmitter power supply available)

Input frequency: 0.1 Hz ≤ $F_{100}$ ≤ 100 kHz
0 Hz ≤ $F_0$ ≤ $F_{100}$
$F_0$ is 0% input frequency
$F_{100}$ is 100% input frequency
The input frequency can be set in increments of 0.00001 (Hz or kHz) within 4 significant digits.

Input filter: Has an approx. 10 ms time constant, which can be turned on or off at the front switch (turned off at factory shipment). When the input filter is turned on, the upper limit of the input frequency range reduces to 100 Hz (requiring a pulse width of at least 3 ms).

Minimum input pulse width:
When input frequency is below 10 kHz: 30 µs
When input frequency is 10 kHz or more: 30% of pulse interval



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Input pulse width: 40 μs minimum for both ON-state and OFF-state durations
Input range unit: Either Hz or kHz is selectable.
Input signal type:

| Input signal | Detection level | |
|---|---|---|
| Non-voltage contact | ON-state | 200 Ω maximum |
| | OFF-state | 100 kΩ minimum |
| Open collector | ON-state | 600 Ω maximum / 1.8 V maximum |
| | OFF-state | 100 kΩ minimum / 3.5 V minimum |
| Voltage pulse | High level | 2 to 50 V DC |
| | Low level | -1 to +8 V DC |
| | Pulse amplitude | 2 to 50 V DC |
| Current pulse | High level | (2V/RL) to (50V/RL)mA |
| | Low level | (-1V/RL) to (+8V/RL)mA |
| | Pulse amplitude | (2V/RL) to (50V/RL)mA |

RL: Internal load resistor (kΩ)

Maximum allowable input voltage: 58 V DC or less
Low cut point: 0.01 Hz to 100% input frequency
If the input is less than or equal to the low cut point, the input is 0Hz.
Input resistance: 15 kΩ minimum for non-voltage contact (open collector), ON/OFF contact, and voltage pulse.
Value of the load resistor for current pulse.

Internal load resistor (RL):

| Load resistance setting switch | Resistance values |
|---|---|
| 0 | OPEN |
| 1 | 200 Ω |
| 2 | 500 Ω |
| 3 | 143 Ω |
| 4 | 1 kΩ |
| 5 | 167 Ω |
| 6 | 500 Ω |
| 7 | 143 Ω |

Power rating: For a 1 W current pulse input, set a resistance value by using the switch on the front panel (factory default setting is OPEN).
Set to OPEN for voltage pulse, ON/OFF contact, and non-voltage contact pulse.
Contact input signal rated supply:
Contact voltage: 24 V DC
Contact current: 1 mA
Input contact capacity: 30 V DC/10 mA minimum
Transmitter power supply (at 4 to 30mA output):
12 V DC ±10% or 24 V DC ±10%
(with current limit circuit: limit at 50mA)
Pulse count point:
Turning point from OFF input to ON input (non-voltage contact (open collector), ON/OFF contact)
Turning point from HIGH to LOW input (voltage pulse, current pulse)

## ■ Output Specifications

Output signal: DC voltage or DC current signal
Output range: Refer to “Table 1 Output range setting range”
Permissible load resistance: See “Table 1 Output range setting range”
Output resistance: Refer to “Table 1 Output range setting range”
Output adjustment range:
Zero adjustment range: ±5% of span
Span adjustment range: ±10% of span

**Table 1 Output range setting range**

| Output signal code | Output range | Conditions | Output resistance | Permissible load resistance | Accuracy limit |
|---|---|---|---|---|---|
| 1 | 0 to 10 V DC, span is 0.5 V or more | $V_{100} \leq 5$ V | 1 Ω or less | 2 kΩ or more | When the span is less than 2 V, ± 0.1 × (2 V/span V) [%]. |
| | | $V_{100} > 5$ V | | $(V_{100} - 5) \times 8/5 + 2$ kΩ or more | |
| 2 | 0 to 100 mV DC, span is 10 mV or more | --- | 100 Ω or less | 250 kΩ or more | When the span is less than 20 mV, ± 0.1 × (20 mV/span mV) [%]. |
| A | 0 to 20 mA DC, span is 2 mA or more | --- | 500 kΩ or more | $15/I_{100}$ Ω or less | When the span is less than 8 mA, ± 0.1 × (8 mA/span mA) [%]. |
| B | 0 to 5 mA DC, span is 1 mA or more | --- | | | When the span is less than 2 mA, ± 0.1 × (2 mA/span mA) [%]. |

$V_{100}$: Voltage value at 100% output (V)
$I_{100}$: Current value at 100% output (A)

## ■ Items Available to Be Set

The following items can be set via a PC (VJ77 PC-based Parameters Setting Tool).

Input frequency, input range unit, low cut point, input filter, output range

## ■ Standard Performance

Accuracy rating: ±0.1% of span; accuracy is not guaranteed for output levels less than 0.5% of the span of a 0 to X mA output range type.
When there is an accuracy limit for both input and output, the larger value is applied.

Input accuracy limit: When F0/F100 is 50% or more.

$$\text{Accuracy (\%)} = \frac{F_{100}/2}{F_{100} - F_0} \times 0.1$$

$F_0$: 0% input frequency
$F_{100}$: 100% input frequency

Output accuracy limit: Refer to “Table 1 Output range setting range”

Response speed: 2 intervals of input pulse + 50 ms
63% response (10% to 90%)

Effect of power supply voltage fluctuation: Within the accuracy range of span for power supply voltage fluctuation.

Effect of ambient temperature change: ±0.15% of span for change of 10°C

## ■ Power Supply and Isolation

Supply rated voltage range: 24 V DC ⎓ ±10%
100-130 V AC/DC ≂ 50/60 Hz
200-240 V AC ~ 50/60 Hz

Supply input voltage range: 24 V DC ±10%
100-130 V AC/DC (±15%) 50/60 Hz
200-240 V AC (−15, +10%) 50/60 Hz

Power consumption:
2.6 W at 24 V DC; 2.8 W at 110 V DC;
5.3 VA at 100 V AC, 6.8 VA at 200 V AC

Insulation resistance: 100 MΩ minimum at 500 V DC between input, output, power supply and grounding terminals mutually

Withstanding voltage: 2000 V AC for one minute between input, output, power supply and grounding terminals mutually

## ■ Environmental Conditions

Temperature: 0 to 50°C (0 to 40°C for multiple mounting)

Humidity: 5 to 90% RH (no condensation)

Ambient condition: Avoid installation in such environments as corrosive gas like sulfide hydrogen, dust, sea breeze and direct sunlight.

Magnetic field: 400 A/m or less.

Continuous vibration (at 5 to 9 Hz) Half amplitude of 3 mm or less (at 9 to 150 Hz) 9.8 m/s² or less, 1 oct/min for 90 minutes each in the 3-axis directions.

Impact: 98 m/s² or less, 11 ms, 3-axis 3 times each in 6 directions.

Altitude: 2000 m or less.

Warm-up time: At least 30 minutes after power on.

## ■ Transport and Storage Conditions

Ambient temperature: −25 to 70°C
Temperature change rate: 20°C per hour or less
Ambient humidity: 5 to 95%RH (no condensation)

## ■ Mounting and Appearance

Construction: Plug-in type

Material: PC resin (black), UL94 V-0 (case)
Modified PPO resin, glass fiber filled (black), UL94 V-1 (socket)

Mounting method: Wall or DIN rail mounting
More than 5 mm interval is required for side-by-side close mounting.

Connection method: M3.5 screw terminals

External dimensions: 86.5 (H)× 51 (W)× 123 (D) mm (including a socket)

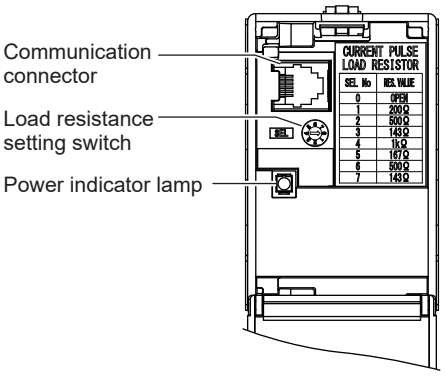
Weight: Main unit: 200 g or less
Socket: 60 g or less

## ■ Accessories

Spacer: 1 piece (used for DIN rail mounting)
Tag number label: 1 sheet
Range label: 1 sheet
Socket (A1653MR): 1 piece (when /SN option is not specified.)

## ■ Front Panel

The figure below shows the converter of which the front panel cover is open.

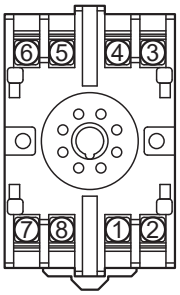



Communication connector: Connect the PC-based Parameter Setting Tool (VJ77).

Load resistance setting switch: Sets the resistance value for current pulse input.

Power indicator lamp: Turns on at power on.

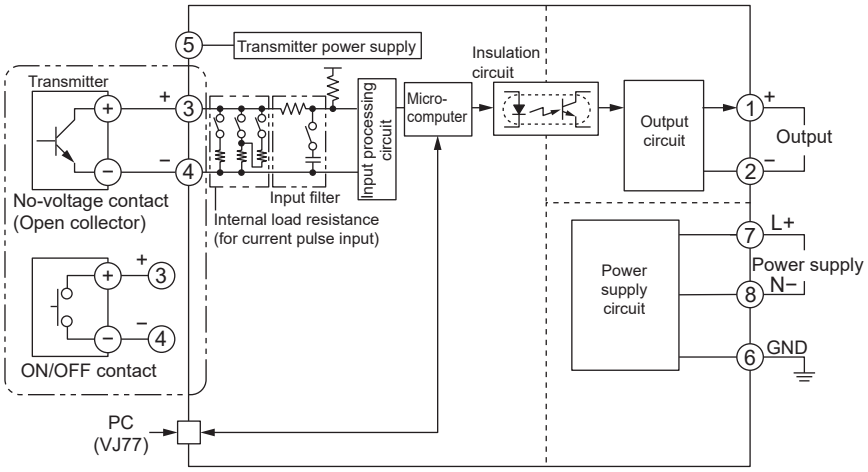
## ■ Terminal Assignments



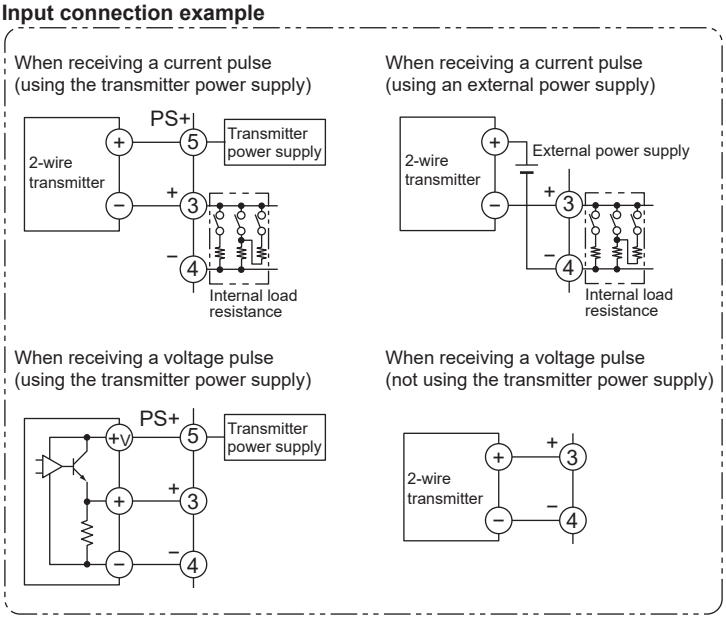

| | | |
|---|---|---|
| 1 | Output | (+) |
| 2 | Output | (−) |
| 3 | Input | (+) |
| 4 | Input | (−) |
| 5 | Input | (PS+) |
| 6 | GND | |
| 7 | Supply | (L+) |
| 8 | Supply | (N−) |

## ■ Block Diagrams

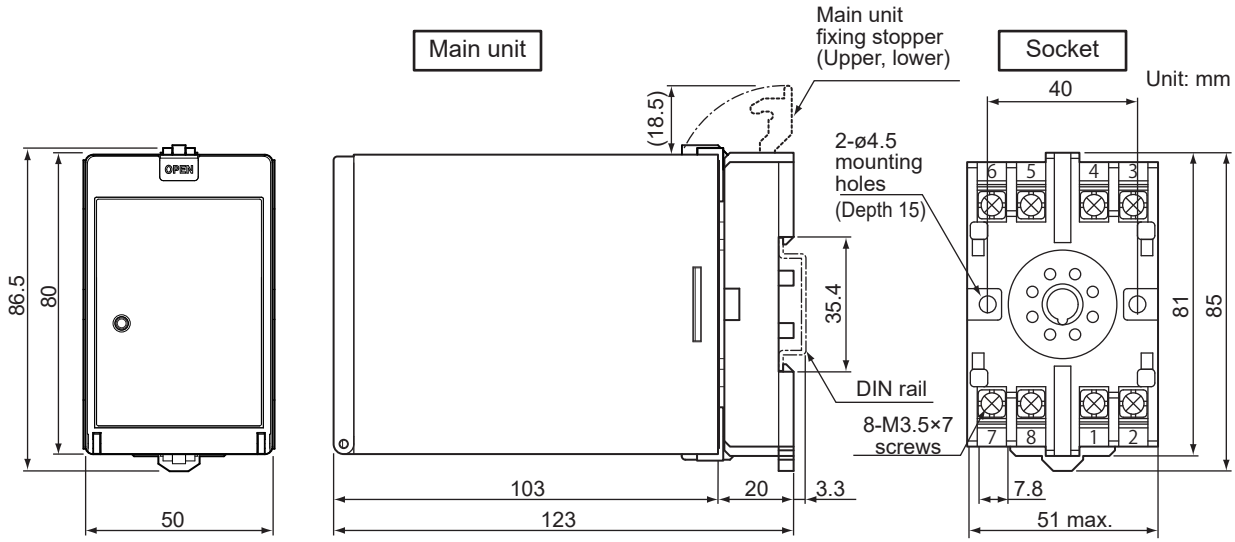
**When receiving non-voltage contact signals (open collector) or ON/OFF contact**



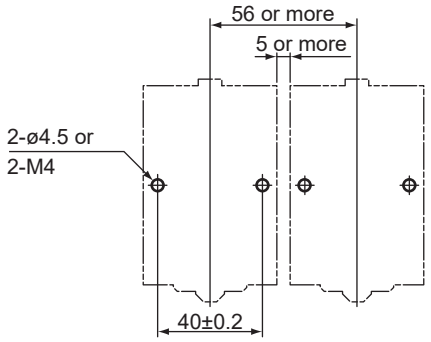

**Input connection example**



## ■ External Dimensions




<Mounting Dimensions>




Unit: mm

Note:
- When mounting the units close together, leave a space of at least 5 mm between them.
- Use the supplied spacer to keep a space of 5 mm for DIN rail mounting.

Normal Allowable Deviation= ± (Value of JIS B 0401-2016 tolerance grade IT18) / 2