

Thumbwheel Switch Multi Pulse Meters



MP5M Series PRODUCT MANUAL

For your safety, read and follow the considerations written in the instruction manual, other manuals and Autonics website.

The specifications, dimensions, etc. are subject to change without notice for product improvement. Some models may be discontinued without notice.

Features

- 14 operation modes
 - Frequency / revolutions / speed, passing speed, cycle, passing time, time interval
 - Time differential, absolute ratio, density, length measurement 1 / 2, interval
 - Accumulation, addition / subtraction (individual input), addition / subtraction (phase difference input)
- Various output models
 - Relay single (high-limit) / double (high / low-limit) + NPN open collector output
- Various functions
 - Prescale, monitoring delay, hysteresis, auto-zero, parameter lock
- NPN input (non-contact / contact) or PNP input (non-contact / contact)
- Display range: -19999 to 99999
- Various display units
- Power supply
 - 100 - 240 VAC ~ 50 / 60Hz (AC type)
 - 24 VAC ~ 50 / 60 Hz, 24 - 48 VDC = (AC / DC type)

Safety Considerations

- Observe all 'Safety Considerations' for safe and proper operation to avoid hazards.
- ⚠ symbol indicates caution due to special circumstances in which hazards may occur.

⚠ Warning Failure to follow instructions may result in serious injury or death.

- 01. Fail-safe device must be installed when using the unit with machinery that may cause serious injury or substantial economic loss. (e.g. nuclear power control, medical equipment, ships, vehicles, railways, aircraft, combustion apparatus, safety equipment, crime / disaster prevention devices, etc.)**
Failure to follow this instruction may result in personal injury, economic loss or fire.
- 02. Do not use the unit in the place where flammable / explosive / corrosive gas, high humidity, direct sunlight, radiant heat, vibration, impact, or salinity may be present.**
Failure to follow this instruction may result in explosion or fire.
- 03. Install on a device panel to use.**
Failure to follow this instruction may result in fire or electric shock.
- 04. Do not connect, repair, or inspect the unit while connected to a power source.**
Failure to follow this instruction may result in fire or electric shock.
- 05. Check 'Connections' before wiring.**
Failure to follow this instruction may result in fire.
- 06. Do not disassemble or modify the unit.**
Failure to follow this instruction may result in fire or electric shock.

⚠ Caution Failure to follow instructions may result in injury or product damage.

- 01. When connecting the power / measurement input and relay output, use AWG 24 (0.20 mm²) to AWG 15 (1.65 mm²) cable and tighten the terminal screw with a tightening torque of 0.98 to 1.18 N·m.**
Use the wiring suitable for the load current capacity.
Failure to follow this instruction may result in fire or malfunction due to contact failure.
- 02. Use the unit within the rated specifications.**
Failure to follow this instruction may result in fire or product damage.
- 03. Use dry cloth to clean the unit, and do not use water or organic solvent.**
Failure to follow this instruction may result in fire or electric shock.
- 04. Keep the product away from metal chip, dust, and wire residue which from flowing into the unit.**
Failure to follow this instruction may result in fire or product damage.

Cautions during Use

- Follow instructions in 'Cautions during Use'. Otherwise, it may cause unexpected accidents.
- Power supply should be insulated and limited voltage / current or Class 2, SELV power supply device.
- Install a power switch or circuit breaker in the easily accessible place for supplying or disconnecting the power.
- Keep away from high voltage lines or power lines to prevent inductive noise. In case installing power line and input signal line closely, use line filter or varistor at power line and shielded wire at input signal line. Do not use near the equipment which generates strong magnetic force or high frequency noise.
- This unit may be used in the following environments.
 - Indoors (in the environment condition rated in 'Specifications')
 - Altitude max. 2,000 m
 - Pollution degree 2
 - Installation category II

Ordering Information

This is only for reference, the actual product does not support all combinations.
For selecting the specified model, follow the Autonics website.

MP 5 M - ① ②

① Power supply

2: 24 VAC ~ 50 / 60 Hz, 24 - 48 VDC =
4: 100 - 240 VAC ~ 50 / 60 Hz

② Output

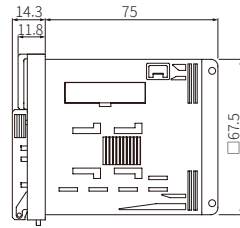
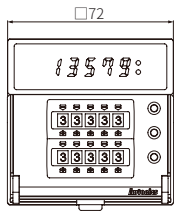
N: Indicator
1: Relay single (high-limit) +
NPN open collector output
2: Relay double (high / low-limit) +
NPN open collector output

Product Components

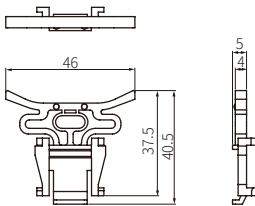
- Product (+ bracket)
- Instruction manual

Dimensions

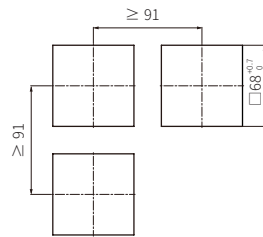
- Unit: mm, For the detailed drawings, follow the Autonics website.



■ Bracket



■ Panel cut-out

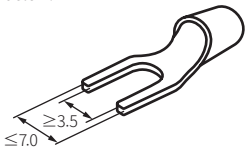


Connections

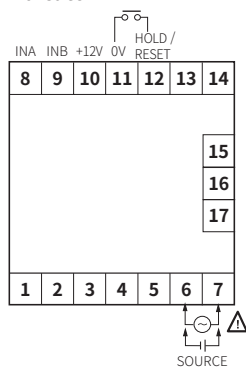
- HOLD / RESET terminal function is different depending on the operation mode. (F1 to F10: HOLD, F11 to F14: RESET)
- SOURCE: 100 - 240 VAC ~ 50 / 60 Hz 9 VA
24 VAC ~ 50 / 60 Hz 6.5 VA, 24 - 48 VDC = 5 W

■ Cautions during Wiring

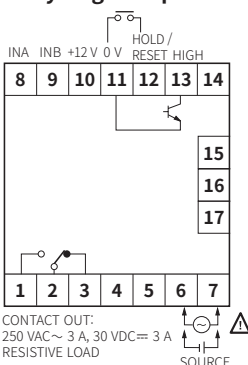
- Unit: mm, Use terminals of size specified below.



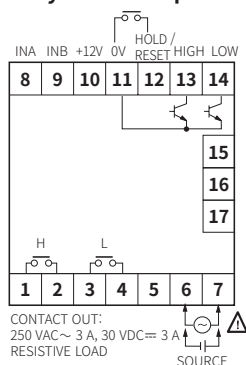
■ Indicator



■ Relay single output



■ Relay double output



Specifications

| Series | MP5M-□N | MP5M-□1 | MP5M-□2 |
|------------------------------------|--|---|---|
| Input signal⁽⁰¹⁾ | Solid state input 1: ≤ 50 kHz (pulse width: ≥ 10 μs) Solid state input 2 ⁽⁰²⁾ : ≤ 5 kHz (pulse width: ≥ 100 μs) Contact input: ≤ 45 Hz (contact: ≥ 12 VDC = 5 mA, pulse width: ≥ 11 ms) | | |
| Voltage input | Input impedance: 3.9 kΩ, [H]: 4.5 - 24 VDC =, [L]: 0 - 1 VDC = | | |
| No-voltage input | Short-circuit impedance: ≤ 80 Ω, residual voltage: ≤ 1 VDC =, open-circuit impedance: ≥ 100 kΩ | | |
| Display method | 7-segment LED (zero blanking method) | | |
| Character size | W 4 × H 8 mm | | |
| Prescale | 0.0001 × 10 ³ to 9.9999 × 10 ⁹ | | |
| Hysteresis | - 0 to 9999 ⁽⁰³⁾ | | |
| Display cycle | OFF ⁽⁰⁴⁾ , 0.05, 0.5, 1, 2, 4, 8 sec (same as update output cycle) | | |
| Display range | -19999 to 99999 | | |
| Contact control output | Relay | | |
| Type | - | 1c × 1 | 1a × 2 |
| Capacity | - | 250 VAC ~ 3 A, 30 VDC = 3 A resistive load | 250 VAC ~ 3 A, 30 VDC = 3 A resistive load |
| Solid-state control output | NPN open collector | | |
| Type | - | × 1 | × 2 |
| Capacity | - | ≤ 30 VDC = 100 mA | ≤ 30 VDC = 100 mA |
| Approval | CE, RoHS, ENEC | | |
| Unit weight (package) | ≈ 168 g (≈ 243 g) | ≈ 181 g (≈ 256 g) | ≈ 190 g (≈ 265 g) |

01) Standard duty ratio 1:1

02) Operation mode F7, F8: ≤ 1 kHz (pulse width: ≥ 500 μs)

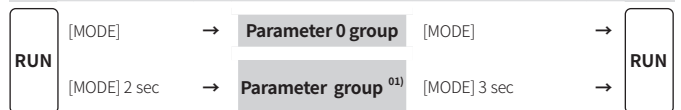
03) The hysteresis setting range varies according to the decimal point setting position.

04) Only available operation mode F2, F14

| | AC voltage | AC / DC voltage |
|--------------------------------|---|---|
| Power supply | 100 - 240 VAC ~ ± 10 % 50 / 60 Hz | 24 VAC ~ ± 10 % 50 / 60 Hz, 24 - 48 VDC = ± 10 % |
| Power consumption | ≤ 9 VA | AC: ≤ 6.5 VA, DC: ≤ 5 W |
| External power supply | ≤ 12 VDC = ± 10 % 80 mA | |
| Memory retention | Number of inputs: 100,000 operations (non-volatile semiconductor memory type) | |
| Relay life cycle | Mechanical: ≥ 5,000,000 operations Electrical: ≥ 100,000 operations (250 VAC ~ 3 A resistive load) | |
| Insulation resistance | ≥ 100 MΩ (500 VDC = megger) | |
| Dielectric strength | 2,000 VAC ~ 60 Hz for 1 min | |
| Noise immunity | ± 2 kV the square wave noise (pulse width: 1 μs) by the noise simulator | |
| Vibration | 0.75 mm double amplitude at frequency of 10 to 55 Hz in each X, Y, Z direction for 1 hour | |
| Vibration (malfunction) | 0.5 mm double amplitude at frequency of 10 to 55 Hz in each X, Y, Z direction for 10 min | |
| Shock | 300m / s ² (≈ 30G) in each X, Y, Z direction for 3 times | |
| Shock (malfunction) | 100m / s ² (≈ 30G) in each X, Y, Z direction for 3 times | |
| Ambient temperature | -10 to 50 °C, storage: -20 to 60 °C (no freezing or condensation) | |
| Ambient humidity | 35 to 85 %RH, storage: 35 to 85 %RH (no freezing or condensation) | |

| Operation mode | Measurement range | Measurement accuracy (± 3 % 5 °C) |
|---|---------------------------------|-----------------------------------|
| F1 Frequency / revolutions / speed | 0.0005 Hz to 50 kHz | F.S. ± 0.05 % rdg ± 1-digit |
| F2 Passing speed | | |
| F3 Cycle | 0.01 to max. of each time range | F.S. ± 0.01 % rdg ± 1-digit |
| F4 Passing time | | |
| F5 Time interval | | |
| F6 Time differential | | |
| F7 Absolute ratio | | |
| F8 Density | 0.0005 Hz to 50 kHz | F.S. ± 0.05 % rdg ± 1-digit |
| F9 Length measurement 1 | | |
| F10 Interval | 0 to 99999 | |
| F11 Accumulation | | |
| F12 Addition / subtraction-individual input | -19999 to 99999 | |
| F13 Addition / subtraction-phase difference input | | |
| F14 Length measurement 2 | 0 to 99999 | |

Mode Setting



01) Press [▲], [◀] key or [MODE] key for 1.5 sec after entering parameter; select parameter groups.

Parameter Setting

- Some parameters are activated / deactivated depending on the model or setting of other parameters. Refer to the description of each parameter.
- The parameter and setting value are cross-displayed on the display part.
- If any key is not entered for 60 sec in each parameter, it returns to RUN mode.
- [MODE] key: Saves current setting value and moves to the next parameter.
- [◀] key: Checks fixed value / Changes setting digits.
- [▲], [▶] key: Changes setting values.

■ Parameter 0 group

| Parameter | Display | Default | Setting range | Display condition |
|----------------------------|---------|---------|--------------------------------------|--|
| P0-1 Max. monitoring value | H.P.E.L | 99999 | • Reset (PV): [◀] key for over 2 sec | P1-1 Input operation mode: except F11, F14 |
| P0-2 Min. monitoring value | L.P.E.L | -19999 | | |

Parameter 1 group

| Parameter | Display | Default | Setting range | Display condition |
|-----------------------------|--------------------|---------|---|--|
| P1-1 Input operation mode | $\bar{n}odE$ | F1 | F1 to F14 | - |
| P1-2 Input A sensor type | $i n - A$ | $nPNHF$ | NPN.H.F: NPN non-contact input1 NPN.M.F: NPN non-contact input2 NPN.L.F: NPN contact input | - |
| P1-3 Input B sensor type | $i n - b$ | $nPNHF$ | PNP.H.F: PNP non-contact input1 PNP.M.F: PNP non-contact input2 PNP.L.F: PNP contact input | P1-1 Input operation mode: F2, F6 to 12, F14 ⁽⁰¹⁾ |
| P1-4 Output mode | $oUt - t$ | $StRrd$ | [Relay double output model] STARD: S (Standard) OUT-H: H (High) OUT-L: L (Low) OUT-B: B (Block) OUT-I: I (One-shot) OUT-F: F (Deflection) * | P1-1 Input operation mode: except F11 & *P1-1 Input operation mode: except F14 |
| P1-5 Output hysteresis | HYS | 0001 | [Relay single / double output model] 0000 to 9999 • Varies according to P2-1 Decimal point position of display value | P1-1 Input operation mode: F1, F7 to 8 |
| P1-6 Delay monitoring | $GUARD$ | $FdEFY$ | [Relay double output model] F.DEFY: L comparative output limit * STAR.T: Start compensation timer ⁽⁰²⁾ | P1-1 Input operation mode: F1 to 10 *P1-4 Output mode: S, B, F |
| P1-7 Compensation time | $StRrE$ | 00 | [Relay double output model] 0.0 to 99.9 sec | P1-6 Delay monitoring: STAR.T |
| P1-8 Input A auto-zero time | $RUt aR$ | 99999 | 0.1 to 9999.9 sec | P1-1 Input operation mode: F1, F4, F7 to 8 |
| P1-9 Input B auto-zero time | $RUt ab$ | 99999 | | P1-1 Input operation mode: F7 to 8 |
| P1-10 Memory retention | $\bar{n}E\bar{n}o$ | oFF | OFF, ON | P1-1 Input operation mode: F11 to 14 |

01) In case of P1-1 Input operation mode F13, input B sensor type is not displayed and IN-B setting is same as IN-A.
02) \blacktriangleleft key: Entering compensation time setting.

Parameter 2 group

| Parameter | Display | Default | Setting range | Display condition |
|--|------------|-----------|--|--|
| P2-1 Decimal point position of display value | $d o E$ | 00000 | 00000, 0000.0, 000.00, 00.000, 0.0000 | P1-1 Input operation mode: F1 to 2, F7 to 14 |
| P2-2 Time unit ⁽⁰¹⁾ | $tU n E$ | $t.S E C$ | T.SEC, T.MIN | |
| P2-3 Time range (unit: sec) ⁽⁰¹⁾ | $t.S E C$ | 99.999 | 999.99: 999.99 s 9999.9: 9999.9 s 99999: 99999 s | P1-1 Input operation mode: F3 to 6 |
| P2-4 Time range (unit: min) ⁽⁰¹⁾ | $t.m i n$ | 99.999 | 999.99: 999.99 m 9999.9: 9999.9 m 99999: 99999 m | |
| P2-5 Input A prescale mantissa (x) | $P5C.RH$ | 60000 | 0.0001 to 9.9999 | P1-1 Input operation mode: F1 to 2, F4, F7 to 14 |
| P2-6 Input A prescale exponent (y) | $P5C.RY$ | $10 0 1$ | 10^{-9} (10^0) to 10^{09} (10^9) | |
| P2-7 Input B prescale mantissa (x) | $P5C.bH$ | 60000 | 0.0001 to 9.9999 | P1-1 Input operation mode: F7 to 8 |
| P2-8 Input B prescale exponent (y) | $P5C.bY$ | $10 0 1$ | 10^{-9} (10^0) to 10^{09} (10^9) | |
| P2-9 Display cycle | $dI SPt$ | 0.05 | OFF ⁽⁰²⁾ or 0.05, 0.5, 1, 2, 4, 8 sec | P1-1 Input operation mode: F1 to 2, F7 to 8, F14 |
| P2-10 Input B setting value (INB) | $C oU n b$ | 99999 | 1 to 99999 | P1-1 Input operation mode: F14 |

01) To enter P2-3 time range (unit: sec) and P2-4 time range (unit: min) setting, press \blacktriangleleft key at P2-2 time unit.
02) Only available operation mode F2, F14

Parameter 3 group

| Parameter | Display | Default | Setting range | Display condition |
|----------------------|----------------|---------|---|-------------------|
| P3-1 Lock | $L o C$ | oFF | OFF: Unlock LOC.0: Lock All LOC.1: Lock parameter 1 / 2 / 3 LOC.2: Lock parameter 2 / 3 LOC.3: Lock parameter 3 | - |
| P3-2 Parameter reset | $\bar{n}r S t$ | $E n A$ | ENA: enable, DISA: disable | - |

Output Mode

Output mode is available to set.

The output modes supported by each model are different.

- Indicator : not support output mode, Relay single output model: S (Standard), Relay double output model: total output modes

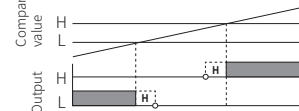
ON: **OFF:** **H:** hysteresis

S (Standard) / B (Block) output mode

- Comparative value setting condition

S (Standard): individual output operation regardless of size or order of set comparative values
B (Block): $L < H$

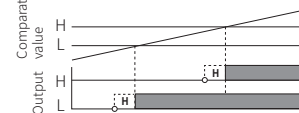
H output: Display value \geq Comparative value H
L output: Display value \leq Comparative value L



H (High) output mode

- Comparative value setting condition: individual output operation regardless of size or order of set comparative values

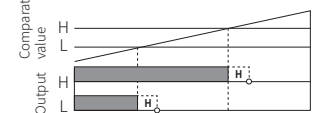
H output: Display value \geq Comparative value H
L output: Display value \geq Comparative value L



L (Low) output mode

- Comparative value setting condition: individual output operation regardless of size or order of set comparative values

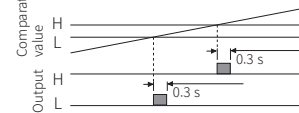
H output: Display value \leq Comparative value H
L output: Display value \leq Comparative value L



I (One-shot) output mode

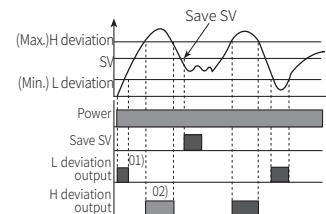
- Comparative value setting condition: individual output operation regardless of size or order of set comparative values
- One-shot output time: 0.3 sec (fixed)
- No hysteresis.

H output: Display value \geq Comparative value H
L output: Display value \geq Comparative value L



F (Deflection) output mode

- Transmits outputs when the saved setting value exceeds H deviation or L deviation.
- Comparative value setting
: Based on the set value, use the front HIGH / LOW set value thumbwheel switch to set the H / L deviation.
(The set deviation value is saved during Power OFF until it is re-set.)
- Comparative value setting range
: 0.0001 to 99999
The setting range is different according to the P2-1 Decimal point position of display value setting.
E.g. In case of P2-1 Decimal point position of display value = 0000.0, setting range = 0.1 to 9999.9
- Saving setting value: [MODE] + \blacktriangleleft
- Checking setting value: \blacktriangleleft
- The deviation can be set to "0" but the actual operation will be the same as "1".



01) When P1-6 Delay monitoring = F.DEFY is set, there is no output.

02) The graph is assuming that there is a saved setting value prior to the setting value save point. The actual output position may be different.

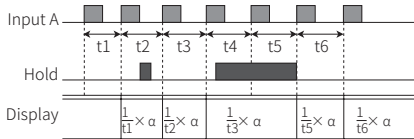
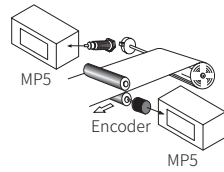
Operation Mode

F1: frequency / revolutions / speed

Measures the frequency of input A and displays the calculated frequency, revolutions, and speed.

| | | | |
|-------------------|---------------------|-------------------------|--|
| Frequency (Hz) | $= f \times \alpha$ | ($\alpha = 1$ [sec]) | • L: travel distance of conveyor belt of 1 cycle [m] |
| Revolutions (rpm) | $= f \times \alpha$ | ($\alpha = 60$ [sec]) | • α : prescale value |
| Speed (m / min) | $= f \times \alpha$ | ($\alpha = 60L$ [sec]) | (For multiple objects, $\alpha = 60L / N$) |

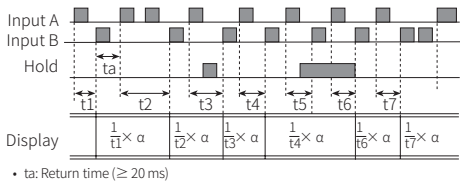
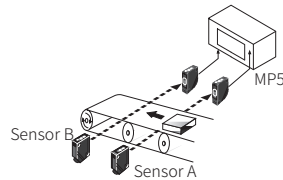
| Display value | Display unit | α |
|---------------|---------------|----------|
| Frequency | Hz | 1 |
| | kHz | 0.001 |
| Revolutions | rps | 1 |
| | rpm (default) | 60 |
| Speed | mm / sec | 1,000 L |
| | cm / sec | 100 L |
| | m / sec | 1 L |
| | m / min | 60 L |
| | km / hour | 3.6 L |



F2: passing speed

Displays the passing speed between input A ON and input B ON.

| | | | |
|-------------------|---------------------|---------------------|--|
| Passing speed (V) | $= f \times \alpha$ | ($\alpha = L$ [m]) | • f: reciprocal of time [sec] between input A (sensor) ON and input B (sensor) ON. |
| Passing speed | mm / sec | 1,000 L | • L: distance between input A (sensor) and input B (sensor) [m] |
| | cm / sec | 100 L | • α : prescale value |
| | m / sec (default) | 1 L | |
| | m / min | 60 L | |
| | km / hour | 3.6 L | |

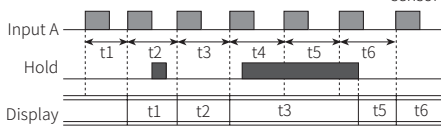
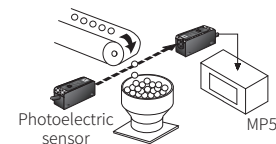


F3: cycle

Displays the measured time from input A ON to the next ON.

| | | |
|-----------|-------|-----------------------------|
| Cycle (T) | $= t$ | • t: measurement time [sec] |
|-----------|-------|-----------------------------|

| Display value | Display unit | |
|---------------|--------------------|----------|
| Cycle | SEC | MIN |
| | 999.99 s (default) | 999.99 m |
| | 9999.9 s | 9999.9 m |
| | 99999 s | 99999 m |

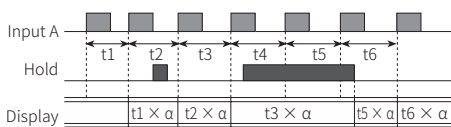
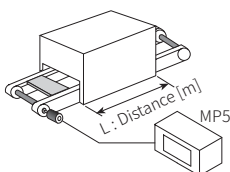


F4: passing time

Measure the time from input A ON to the next ON, and displays the passing time of the arbitrary distance.

| | | |
|--------------------|--|-----------------------------|
| Passing time [sec] | $= t \times \alpha$ | • t: measurement time [sec] |
| | $(\alpha = \frac{L \text{ [m]}}{\text{Distance advanced in 1 pulse cycle [m]}})$ | • L: arbitrary distance [m] |
| | | • α : prescale value |

| Display value | Display unit | |
|---------------|--------------------|----------|
| Passing time | SEC | MIN |
| | 999.99 s (default) | 999.99 m |
| | 9999.9 s | 9999.9 m |
| | 99999 s | 99999 m |

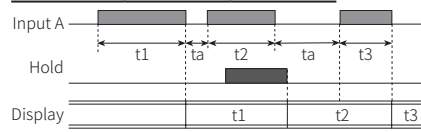
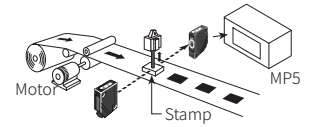


F5: time interval

Displays measured time of input A ON.

| | | |
|-------------------|-------|--|
| Time interval (T) | $= t$ | • t: measured time of input A ON [sec] |
|-------------------|-------|--|

| Display value | Display unit | |
|---------------|--------------------|----------|
| Time interval | SEC | MIN |
| | 999.99 s (default) | 999.99 m |
| | 9999.9 s | 9999.9 m |
| | 99999 s | 99999 m |



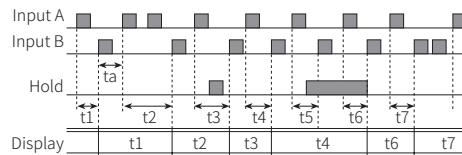
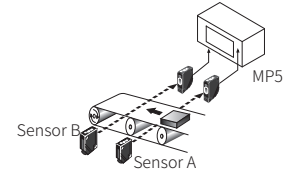
• ta: Return time (≥ 20 ms)

F6: time differential

Displays measured time from Input A ON to Input B ON.

| | | |
|-----------------------|------------------|---|
| Time differential (T) | $= t$ (ta to tb) | • t (ta to tb): measured time from input A ON to input B ON [sec] |
|-----------------------|------------------|---|

| Display value | Display unit | |
|-------------------|--------------------|----------|
| Time differential | SEC | MIN |
| | 999.99 s (default) | 999.99 m |
| | 9999.9 s | 9999.9 m |
| | 99999 s | 99999 m |



• ta: Return time (≥ 20 ms)

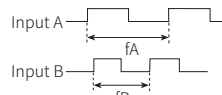
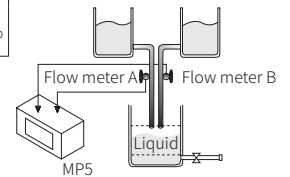
F7: absolute ratio

Measures and displays relative speed, amount, speed, etc. of input B against input A in percentage (%).

| | | |
|----------------|---|---------------------------------|
| Absolute ratio | $= \frac{\text{Input B}}{\text{Input A}} \times 100 \%$ | • Aa: prescale value of input A |
| Absolute ratio | $= \frac{\text{Frequency of input B [Hz]} \times Ba}{\text{Frequency of input A [Hz]} \times Aa} \times 100 \%$ | • Ba: prescale value of input B |

| Display value | Display unit |
|----------------|--------------|
| Absolute ratio | % |

Display = $\frac{\text{Frequency of input B [Hz]} \times Ba}{\text{Frequency of input A [Hz]} \times Aa} \times 100$ [%]



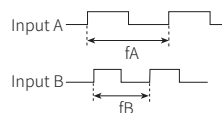
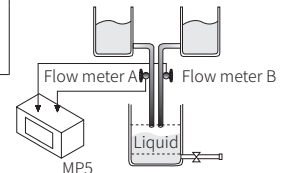
• Hold
When the hold signal turns ON, the display value is maintained until the display cycle turns to hold OFF.

F8: density

Measures and displays the density ratio (%) of input B against the total sum of input A and input B.

| | | |
|---------|---|---------------------------------|
| Density | $= \frac{\text{Input B}}{\text{Input A} + \text{Input B}} \times 100$ [%] | • Aa: prescale value of input A |
| Density | $= \frac{\text{Frequency of input B [Hz]} \times Ba}{(\text{frequency of input A [Hz]} \times Aa) + (\text{frequency of input B [Hz]} \times Ba)} \times 100$ [%] | • Ba: prescale value of input B |

| Display value | Display unit |
|---------------|--------------|
| Density | % |



• Hold
When the hold signal turns ON, the display value is maintained until the display cycle turns to hold OFF.

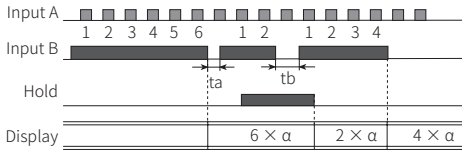
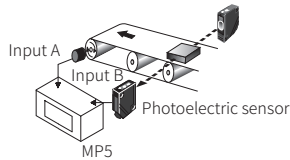
F9: length measurement 1

Measure and display the number of input A pulses during input B ON.

$$\text{Length measurement 1} = P \times \alpha$$

- P: number of input A pulses
- α : prescale value

| Display value | Display unit |
|-------------------------|--------------|
| Quantity [EA] (default) | |
| Length measurement 1 | mm |
| | cm |
| | m |



- t_a, t_b : Return time (≥ 20 ms)

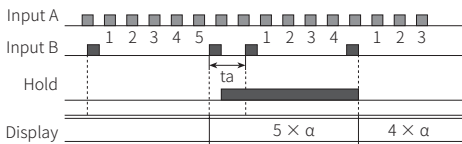
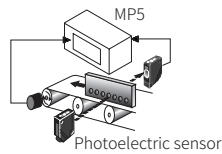
F10: interval

Measures and displays the number of input A pulses from input B ON to the next ON.

$$\text{Interval} = P \times \alpha$$

- P: number of input A pulses
- α : prescale value

| Display value | Display unit |
|-------------------------|--------------|
| Quantity [EA] (default) | |
| Interval | mm |
| | cm |
| | m |



- t_a : Return time (≥ 20 ms)

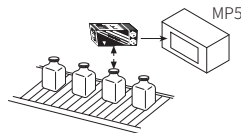
F11: accumulation

Measures and displays the counted value of input A pulses.

$$\text{Accumulation} = P \times \alpha$$

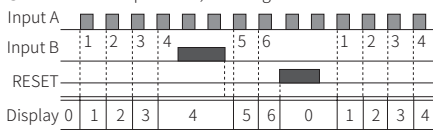
- P: number of input A pulses
- α : prescale value

| Display value | Display unit |
|---------------|---------------|
| Accumulation | Quantity [EA] |



• Operation

- ① Counts the number of input A pulses.
- ② Input B is an enable input signal. During ON, the quantity and display value of input A will be held, and during OFF input A will be recounted.
- ③ When RESET input is ON, the integrated counted value will be reset to "0"



- α = display value for 1

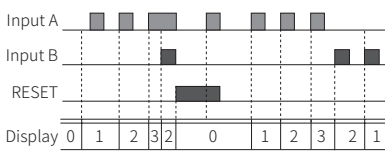
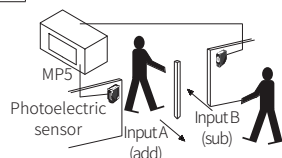
F12: addition / subtraction-individual input

Displays the counted value from added input A pulses and subtracted input B pulses. When there are two inputs simultaneously, it will not count.

$$\text{Add / Sub (individual)} = \text{input A} \times \alpha - \text{input B} \times \alpha$$

- α : prescale value of input A

| Display value | Display unit |
|-------------------------------------|---------------|
| Addition / Subtraction (individual) | Quantity [EA] |

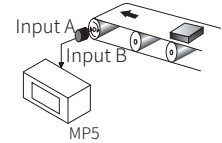


- α = display value for 1

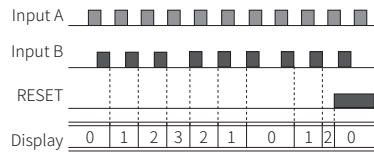
F13: addition / subtraction-phase difference input

When input A is Low, counting is added to the low of input B. When input A is Low, counting is subtracted from the high of input B.

Add / Sub (phase difference) = Detects position and speed using A and B phases of encoder outputs as input.



| Display value | Display unit |
|---|---------------|
| Addition / Subtraction (phase difference) | Quantity [EA] |



F14: length measurement 2

Measures and displays the number of pulses from input A until the value of input B reaches the setting value.

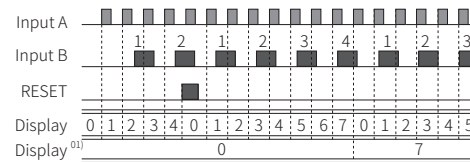
$$\text{Length measurement 2} = P \times \alpha \text{ (until the setting value of input B)}$$

- P: number of input A pulses
- α : prescale value

| Display value | Display unit |
|----------------------|---------------|
| Length measurement 2 | Quantity [EA] |

- If input A and input B are ON during initial power supply, it will not count and only count the number of rising edge.
- Display value is renewed depending on the P2-9. Display cycle.

(e.g.: input B = 4)

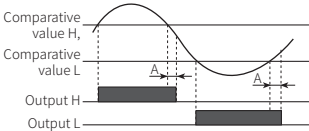


- 01) When P2-9 Display cycle is OFF, it will maintain the quantity of input A until the value of input B reaches the setting value of P2-10 Input B setting value (INB).

Functions

Hysteresis

Near the comparative setting value, the output may turn ON / OFF frequently and unstably. To prevent this, hysteresis value is set based on the comparative setting value.

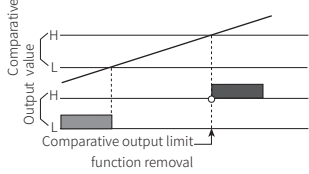


- A: hysteresis
- The hysteresis value can be set to "0" but the actual operation value is "1"

Delay monitoring: limit comparative output

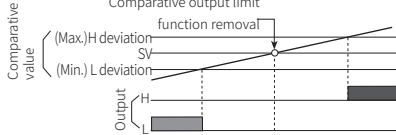
After supplying power, the starting current of motors and other inputs are changeable. This function allows stable control by limiting all outputs for a certain period of time, until the target measurement unit stabilizes. It may also control L outputs until a specific output is reached.

- After supplying power, there is no initial L comparative outputs.
- Each setting value of H, L is not related to their relative sizes.
- E.g.: S (Standard) output mode



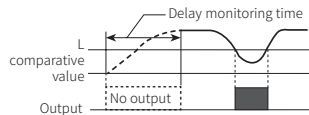
- E.g.: F (Deflection) output mode

The comparative output limiting function is removed at the set value (standard setting).



Delay monitoring: Start compensation timer

Set monitoring delay time so that there is no output during the delay time.



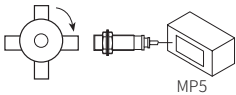
Auto-zero time

When there is no input signal during auto-zero setting time, the display value is automatically set to 0 (zero). Please set the auto-zero setting time so that it is longer than the interval of the slowest input signal. If the setting time is too long and there is no input signal, the rate at which the display value falls to 0 (zero) decrease, and output response rate may slow down.

Prescale

Displays values in required units or specific multiples by counting the number of input pulses, then multiplying the number of pulses or the length of pulses by variables (X×10y).

- E.g.: prescale value (α = 15) setting

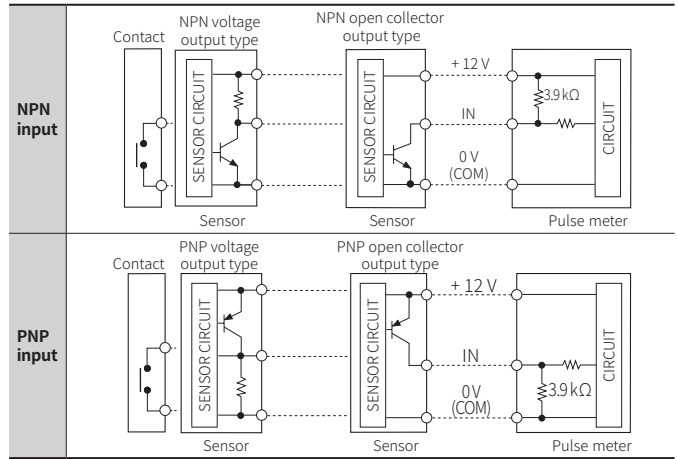


$$\begin{aligned} \text{Revolutions (rpm)} &= f \times \alpha \\ &= f \times 60 \times (1/N) \\ &= f \times 60 \times (1/4) \\ &= f \times 60 \times 0.25 \\ &= f \times 15 \end{aligned}$$

- f: the number of input pulses per second [Hz]
- α: prescale value
- N: the number of pulses per revolution

Set mantissa (X) as 1.5000, and exponent (Y) as 1 for prescale value (α)=15. The same display value can be obtained with a value set as X=0.1500, and Y=2

Example of Input Connection



Segment Table

The segments displayed on the product indicate the following meanings. It may differ depending on the product.

| 7 segment | | | | 11 segment | | | | 12 segment | | | | 16 segment | | | |
|-----------|---|---|---|------------|---|---|---|------------|---|---|---|------------|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 |
| 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 |
| A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A |
| b | B | b | T | b | B | b | T | b | B | b | T | B | B | T | T |
| C | C | C | U | C | C | C | U | C | C | C | U | C | C | C | U |
| d | D | d | V | d | D | d | V | d | D | d | V | D | D | V | V |
| E | E | E | W | E | E | E | W | E | E | E | W | E | E | E | W |
| F | F | F | X | F | F | F | X | F | F | F | X | F | F | F | X |
| G | G | G | Y | G | G | G | Y | G | G | G | Y | G | G | G | Y |
| H | H | H | Z | H | H | H | Z | H | H | H | Z | H | H | H | Z |