MP5M Series

High Performance, Digital Pulse Meter

◉ Features

- Total 14 types of operation modes
  Frequency/Revolutions/Speed, Passing speed, Cycle, Passing time, Time interval, Time differential, Absolute ratio, Density, Length measurement 1, Length measurement 2, Interval, Accumulation, Addition/Subtraction-individual input, Addition/ Subtraction-phase difference input
- Shorten 32% of rear size than previous MP5M Series
- Various output models
  Relay single (high-limit)/dual (high/low-limit)+ NPN open collector
- Various functions: Selectable NPN solid state/contact input, PNP solid state/contact input, prescale, delay monitoring function, hysteresis, auto-zero time, Lock setting
- Max. display range: -19999 to 99999
- Various display units
  rpm, rps, Hz, kHz, sec, min, m, mm, mm/s, m/s, m/min, m/h, ℓ/s, ℓ/min, ℓ/h, %, counts, etc.

⚠ **Please read "Safety Considerations" in the instruction manual before using.**

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◉ Ordering Information

MP	5	M	–	4	N

		Main output (comparative value output)
	N	Indicator
	1	Relay single (high-limit) output+NPN open collector output
	2	Relay dual (high/low-limit) output+NPN open collector output
Power supply	2	24VAC 50/60Hz, 24-48VDC
	4	100-240VAC 50/60Hz
Size	M	DIN W72×H72mm
Digit	5	99999 (5-digit)
Item	MP	Pulse meter

◉ Specifications

Model	MP5M-2N	MP5M-4N	MP5M-21	MP5M-41	MP5M-22	MP5M-42
	Indicator		High-limit setting		High/Low-limit setting	
Display method	7-segment LED (zero blanking method)					
Character size	W4×H8mm					
Display range	-19999 to 99999					
Power supply — AC voltage	100-240VAC∼ 50/60Hz					
Power supply — AC/DC voltage	24VAC∼ 50/60Hz, 24-48VDC⎓					
Power consumption — AC voltage	Max. 9VA (100-240VAC∼ 50/60Hz)					
Power consumption — AC/DC voltage	Max. 6.5VA (24VAC∼ 50/60Hz), Max. 5W (24-48VDC⎓)					
Permissible voltage range	90 to 110% of rated voltage					
External power supply	Max. 12VDC⎓ ±10% 80mA					
Input frequency	·Solid state input 1: max. 50kHz (pulse width: min. 10μs) ·Solid state input 2: max. 5kHz (pulse width: min. 100μs) ※For F7, F8 operation mode, max. 1kHz (pulse width: min. 500μs) ·Contact input: Max. 45Hz (pulse width: min. 11ms)					
Input method	[Voltage Input] High: 4.5-24VDC⎓, Low: 0-1VDC, input impedance: 3.9kΩ [No-voltage Input] Short-circuit impedance: max. 80Ω, Residual voltage: max. 1VDC, Open-circuit impedance: min. 100kΩ					
Measurement range	·Operation mode F1, F2, F7, F8 : 0.0005Hz to 50kHz ·Operation mode F3, F4, F5, F6 : 0.01 to max. of each time range ·Operation mode F9, F10, F11, F14 : 0 to 99999 ·Operation mode F12, F13 : -19999 to 99999					
Measurement accuracy (23℃±5℃)	·Operation mode F1, F2, F7, F8 : F.S.±0.05%rdg±1-digit ·Operation mode F3, F4, F5, F6 : F.S.±0.01%rdg±1-digit					
Display cycle	OFF (for F2, F14 operation mode), 0.05, 0.5, 1, 2, 4, 8 sec (same as update output cycle)					
Operation mode	Frequency/Revolutions/Speed (F1), Passing speed (F2), Cycle (F3), Passing time (F4), Time interval (F5), Time differential (F6), Absolute ratio (F7), Density (F8), Length measurement 1 (F9), Interval (F10), Accumulation (F11), Addition/Subtraction-individual input (F12), Addition/Subtraction-phase difference input (F13), Length measurement 2 (F14)					

Pulse Meter

▣ Specifications

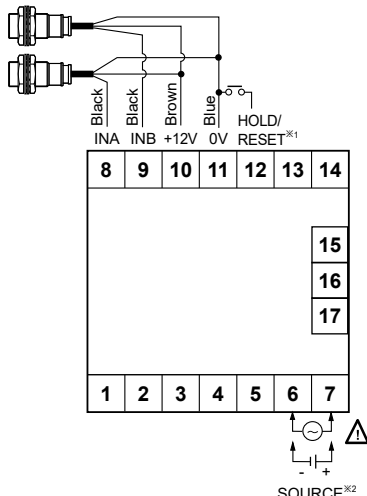| Model		MP5M-2N	MP5M-4N	MP5M-21	MP5M-41	MP5M-22	MP5M-42
		Indicator		High-limit setting		High/Low-limit setting	
Prescale function		Direct input method (0.0001×10^{-9} to 9.9999×10^{9})					
Hysteresis		—		0 to 9999[※1]			
Main output	Relay single	—		250VAC∼ 3A, 30VDC⎓ 3A, 1c resistive load		—	
	Relay dual			—		250VAC∼ 3A, 30VDC⎓ 3A, 1a resistive load×2	
	NPN open collector			Max. 30VDC⎓ 100mA		Max. 30VDC⎓ 100mA ×2	
Memory retention		Non-volatile memory (number of inputs: 100,000 operations)					
Insulation resistance		Over 100MΩ (at 500VDC megger)					
Dielectric strength		2,000VAC 60Hz for 1 min					
Noise immunity		±2kV the square wave noise (pulse width: 1μs) by noise simulator					
Vibration	Mechanical	0.75mm amplitude at frequency of 10 to 55Hz in each X, Y, Z direction for 1 hour					
	Malfunction	0.5mm amplitude at frequency of 10 to 55Hz in each X, Y, Z direction for 10 min					
Shock	Mechanical	300m/s² (approx. 30G) in each X, Y, Z direction for 3 times					
	Malfunction	100m/s² (approx. 30G) in each X, Y, Z direction for 3 times					
Relay life cycle	Mechanical	—		Min. 5,000,000 operations			
	Electrical	—		Min. 100,000 operations (250VAC 3A resistive load)			
Environ- ment	Ambient temp.	-10 to 50℃, storage: -20 to 60℃					
	Ambient humi.	35 to 85%RH, storage: 35 to 85%RH					
Approval		CE c �_UL us					
Weight[※2]		Approx. 243g (approx. 168g)		Approx. 256g (approx. 181g)		Approx. 265g (approx. 190g)	

※1: Setting range will vary depending on the decimal point.
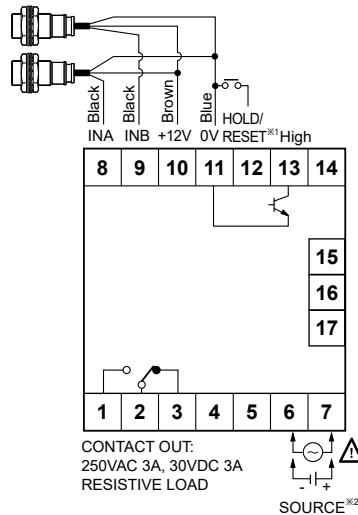※2: The weight includes packaging. The weight in parenthesis is for unit only.
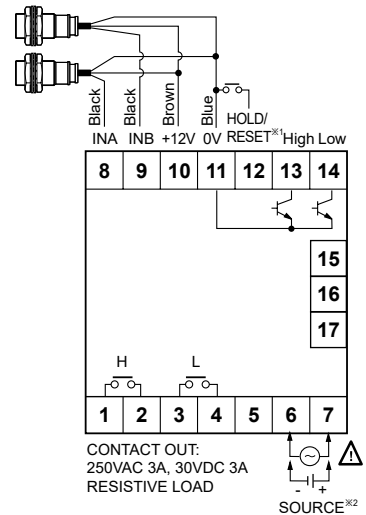※Environment resistance is rated at no freezing or condensation.

▣ Connections

● Indicator (MP5M-☐N)

Black Black Brown Blue HOLD/
INA INB +12V 0V RESET[※1]

8 9 10 11 12 13 14
15
16
17
1 2 3 4 5 6 7

SOURCE[※2]

● High-limit setting (MP5M-☐1)

Black Black Brown Blue HOLD/
INA INB +12V 0V RESET[※1] High

8 9 10 11 12 13 14
15
16
17
1 2 3 4 5 6 7

CONTACT OUT:
250VAC 3A, 30VDC 3A
RESISTIVE LOAD

SOURCE[※2]

● High/Low-limit setting (MP5M-☐2)

Black Black Brown Blue HOLD/
INA INB +12V 0V RESET[※1] High Low

8 9 10 11 12 13 14
15
16
17
H L
1 2 3 4 5 6 7

CONTACT OUT:
250VAC 3A, 30VDC 3A
RESISTIVE LOAD

SOURCE[※2]

※1: Operation mode F1 to F10
 : Display value HOLD
Operation mode F11 to F14
 : Display value RESET

※2:

Model	Source
MP5M-21	24-48VDC 24VAC 50/60Hz
MP5M-22	
MP5M-2N	
MP5M-41	100-240VAC 50/60Hz
MP5M-42	
MP5M-4N	

SENSORS

CONTROLLERS

MOTION DEVICES

SOFTWARE

(J) Temperature Controllers

(K) SSRs

(L) Power Controllers

(M) Counters

(N) Timers

(O) Digital Panel Meters

(P) Indicators

(Q) Converters

(R) Digital Display Units

(S) Sensor Controllers

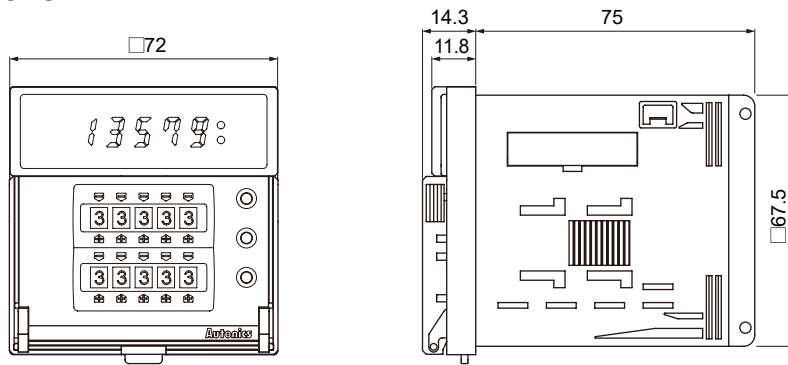(T) Switching Mode Power Supplies

(U) Recorders

(V) HMIs

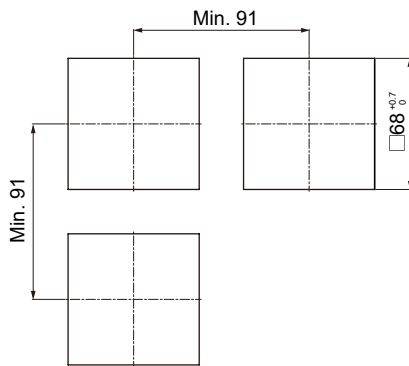(W) Panel PC

(X) Field Network Devices
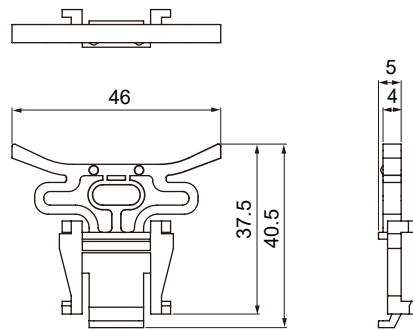
MP5M Series

◼ Dimensions

□72
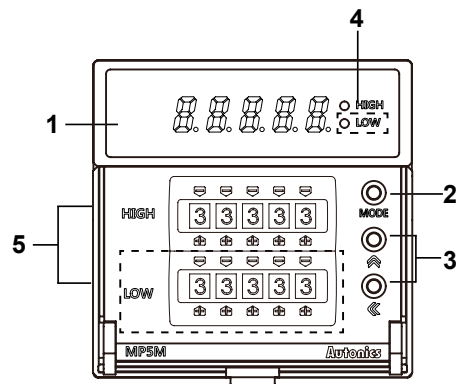
14.3
11.8
75
□67.5

● Panel cut-out

Min. 91

Min. 91

□68 +0.7 0

● Bracket

46

37.5
40.5

5
4

◼ Unit Description

1
4
2
3
5

HIGH
LOW

HIGH

LOW

MODE

MP5M   Autonics

※The high-limit setting model (MP5M-□1) does not include the dotted line parts.

1: Display
Displays current value in RUN mode.
Alternately displays setting parameters and corresponding value in SETTING mode.

2: MODE key
In RUN mode, press the key once to check max./min. value.
In RUN mode, hold the key for over 2 sec to enter parameter groups.

3: ⊼, ≪ key
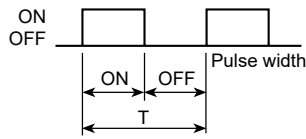Select parameter groups, and select or setting values in the corresponding parameters.

4: Output status indicator

5: Thumbwheel switch for HIGH/LOW setting value

Pulse Meter

■ Input Specifications

1. Input signal

Standard duty ratio of input signal is 1:1.

※T: Single cycle of input signal

(1) Solid state input 1
   Input frequency: Max. 50kHz (ON/OFF pulse width: min. 10μs of each)
(2) Solid state input 2
   Input frequency: Max. 5kHz (ON/OFF pulse width: min. 100μs of each)
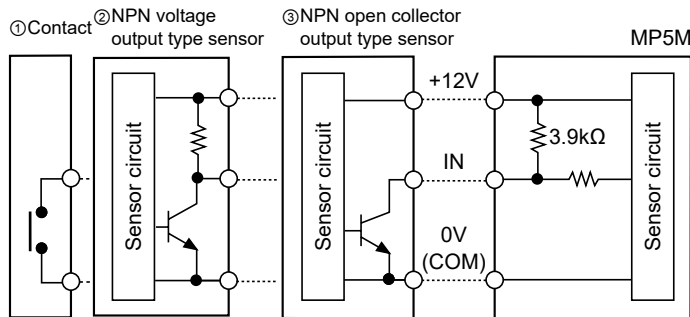   ※For F7, F8 operation mode, max. 1kHz (ON/OFF pulse width: min. 500μs of each)
(3) Contact input
   ① Input frequency: Max. 45Hz (when each ON/OFF pulse width is over 11ms)
   ② Contact specifications: 12VDC, stable switching of load current as small as 5mA
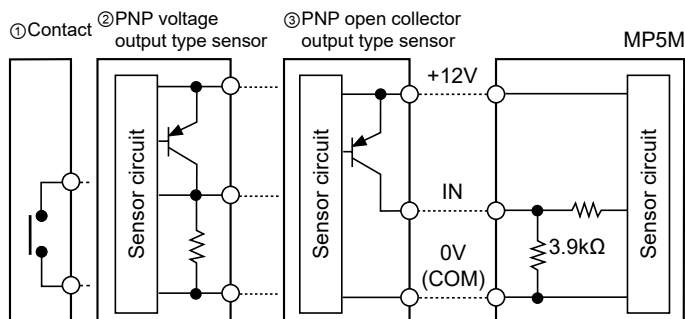
2. Input type [In-A, In-b]

MP5M allows selection between NPN input (solid state/contact) or PNP input (solid state/contact).

(1) NPN input type

(2) PNP input type

(J)
Temperature
Controllers

(K)
SSRs

(L)
Power
Controllers

(M)
Counters

(N)
Timers

(O)
Digital
Panel Meters

(P)
Indicators

(Q)
Converters

(R)
Digital
Display Units

(S)
Sensor
Controllers

(T)
Switching
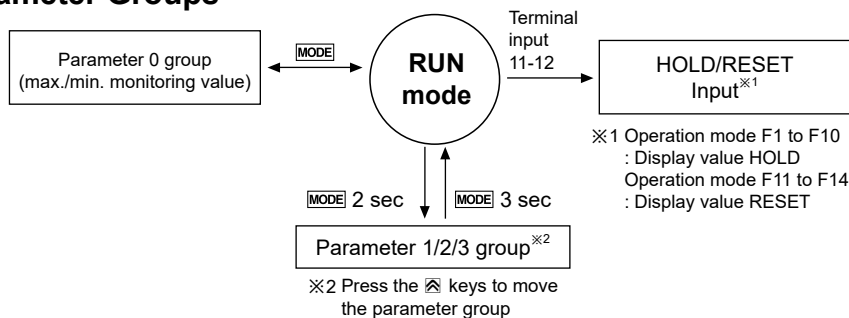Mode Power
Supplies

(U)
Recorders

(V)
HMIs

(W)
Panel PC

(X)
Field Network
Devices

▣ Parameter Groups

Parameter 0 group (max./min. monitoring value) ←[MODE]→ RUN mode → Terminal input 11-12 → HOLD/RESET Input[※1]

※1 Operation mode F1 to F10
: Display value HOLD
Operation mode F11 to F14
: Display value RESET

[MODE] 2 sec ↓ ↑ [MODE] 3 sec

Parameter 1/2/3 group[※2]

※2 Press the ⌷ keys to move the parameter group

- Press the ⌷, ⌷ keys to select or set the desired value.
- Press the [MODE] key once after changing the setting value, to save the setting value and move to the next parameter.
- Hold the [MODE] key for 1.5 sec at any parameters to return to the select parameter group mode.
- Hold the [MODE] key for 3 sec to save the setting value and return to RUN mode after changing the setting value.
- If there is no key input for 60 sec while setting the parameters, the new settings are ignored, and the unit will return to RUN mode with previous settings.
※Each parameter and corresponding setting value will flash alternately every 0.5 sec.
※Input operation mode setting range for each parameter is different.
   Please refer to '▣ Operation Mode by Parameter Groups'.

● Parameter 0 group

Parameter	Description	Setting range	Factory default	Note
H.PEH	Max. monitoring value	—	99999	Reset(current value): Hold ⌷key over 2 sec
L.PEH	Min. monitoring value	—	-19999	

● Parameter 1 group [PArA.1]

Parameter	Description	Setting range			Factory default	Note
ōodE	Operation mode	F1 to F14			F1	
In-A	Input sensor type	nPn.H.F : NPN solid state input 1 nPn.ō.F : NPN solid state input 2 nPn.L.F : NPN contact input PnP.H.F : PNP solid state input 1 PnP.ō.F : PNP solid state input 2 PnP.L.F : PNP contact input			nPn.H.F	
In-b						
oUt-t	Output mode	StArd : S (Standard) oUt-H : H (High) oUt-L : L (Low) oUt-b : B (Block) oUt-1 : I (One-shot) oUt-F : F (Deflection)			StArd	Only appears in High/Low-limit setting models
HYS	Output hysteresis[※1]	0000 to 9999			0001	Only appears in High-limit, High/Low-limit setting models
GUArd	Delay monitoring[※2]	F.dEFY	L Comparative output limit function	—		Only appears in High/Low-limit setting models
		StArt	Start compensation timer function	—		
			Compensation time (0.0 to 99.9 sec)	0.0		
AUto.A	Auto-zero time (unit: sec)	0.1 to 9999.9			9999.9	Input A
AUto.b						Input B
ōEōo	Memory retention	oFF, on			oFF	

● Parameter 2 group [PArA.2]

Parameter	Description	Setting range			Factory default	Note
dot	Decimal point location of display value	00000, 0000.0, 000.00, 00.000, 0.0000			00000	
t.Unt	Tim unit, time range	t.SEC (sec)	999.99 : 999.99s 9999.9 : 9999.9s 99999 : 99999s		999.99	
		t.ōin (min)	999.99 : 999.99m 9999.9 : 9999.9m 99999 : 99999m		999.99	
PSC.A.H	Input A prescale mantissa (x)	0.0001 to 9.9999			6.0000	
PSC.A.Y	Input A prescale exponent (y)	$10-9(10^{-9})$ to $10\ 09(10^{9})$			$10\ 01$	
PSC.b.H	Input B prescale mantissa (x)	0.0001 to 9.9999			6.0000	
PSC.b.Y	Input B prescale exponent (y)	$10-9(10^{-9})$ to $10\ 09(10^{9})$			$10\ 01$	
di.SP.t	Measured value display cycle (unit: sec)[※3]	0.05, 0.5, 1, 2, 4, 8			0.05	
CoUn.b	Input B setting value of operation mode F16 (INB)	1 to 99999			99999	Only appears in operation mode F16

Pulse Meter

● **Parameter 3 group [** $PAr.3$ **]**

Parameter	Description	Setting range	Factory default	Note
LoC	Lock	oFF : Unlock $LoC.0$: Lock all $LoC.1$: Parameter 1/2/3 lock $LoC.2$: Parameter 2/3 lock $LoC.3$: Parameter 3 lock	oFF	
$\bar{n}rSt$	Parameter reset	EnA (Enable), $diSA$ (Disable)	EnA	

※1: The setting range varies depending on the decimal point setting.
※2: Press ◁ keys to move parameters.
※3: Setting range oFF is available in operation mode F2, F16.

▣ Operation Mode by Parameter Groups

(◖: parameter display, X: no parameter display)

Operation mode / Parameter		F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14
0	$H.PEt$	◖	◖	◖	◖	◖	◖	◖	◖	◖	◖	X	◖	◖	X
	$L.PEt$	◖	◖	◖	◖	◖	◖	◖	◖	◖	◖	X	◖	◖	X
1	$\bar{n}odE$	Appears in all operation modes (F1 to F14).													
	$In-A$	Appears in all operation modes (F1 to F14).													
	$In-b$ ※1	X	◖	X	X	X	◖	◖	◖	◖	◖	◖	◖	X ※3	◖
	$oUt-t$ ※2	◖	◖	◖	◖	◖	◖	◖	◖	◖	◖	X	◖	◖	● ※4
	HYS ※1	◖	X	X	X	X	X	◖	◖	X	X	X	X	X	X
	$GuArd$	◖	◖	◖	◖	◖	◖	◖	◖	◖	◖	X	X	X	X
	$AutoA$	◖	X	X	X	◖	X	◖	◖	X	X	X	X	X	X
	$Autob$	X	X	X	X	X	X	◖	◖	X	X	X	X	X	X
	$\bar{n}E\bar{n}o$	X	X	X	X	X	X	X	X	X	X	◖	◖	◖	◖
2	dot	◖	◖	X	X	X	X	◖	◖	◖	◖	◖	◖	◖	◖
	$t.Unt$	X	X	◖	◖	◖	◖	X	X	X	X	X	X	X	X
	$PSC.A.H$	◖	◖	X	◖	X	X	◖	◖	◖	◖	◖	◖	◖	◖
	$PSC.A.Y$	◖	◖	X	◖	X	X	◖	◖	◖	◖	◖	◖	◖	◖
	$PSC.b.H$	X	X	X	X	X	X	◖	◖	X	X	X	X	X	X
	$PSC.b.Y$	X	X	X	X	X	X	◖	◖	X	X	X	X	X	X
	$diSP.t$	◖	◼ ※5	X	X	X	X	◖	◖	X	X	X	X	X	◼
	$CoUn.b$	X	X	X	X	X	X	X	X	X	X	X	X	X	◖
3	LoC	Appears in all operation modes (F1 to F14).													
	$\bar{n}rSt$	Appears in all operation modes (F1 to F14).													

※1: Only appears in high/low-limit setting models.
※2: Only appears in high-limit setting models, high/low-limit setting models.
※3: The settings for $In-b$ and $In-A$ are applied.
※4: (●) F output mode [$oUt-F$] cannot be set.
※5: (◼) setting range: oFF, 0.05, 0.5, 1, 2, 4, 8

● **Monitoring delay function by output mode**

Output mode	S mode	H mode	L mode	B mode	I mode	F mode
Parameter	$StArd$	$oUt-h$	$oUt-L$	$oUt-b$	$oUt-I$	$oUt-F$
Comparative output limit	◖	X	X	◖	X	◖
Start compensation timer	◖	◖	◖	◖	◖	◖

MP5M Series

▣ Operation Modes [$\bar{n}odE$]

- Select operation mode from operation mode[$\bar{n}odE$]of parameter 1 group.
- MP5M has 14 operation modes.

◎ F1 Mode: Frequency/Revolutions/Speed

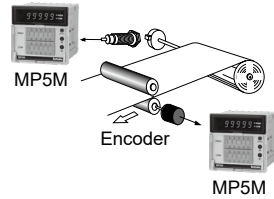Measures the frequency of input A and displays the calculated frequency, revolutions, and speed.

1) Frequency (Hz)	= f × α	(α= 1 [sec])
2) Revolutions (rpm)	= f × α	(α= 60 [sec])
3) Speed (m/min)	= f × α	(α= 60L [sec])

※L: travel distance of conveyor belt of 1 pulse cycle [m]
　α: prescale value

For multiple objects, α = $\dfrac{60L}{N}$

- Display value and display unit

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

MP5M

Encoder

MP5M

- Timing chart

Input A

Hold input

Display: $\dfrac{1}{t1}{\times}\alpha$　$\dfrac{1}{t2}{\times}\alpha$　$\dfrac{1}{t3}{\times}\alpha$　$\dfrac{1}{t5}{\times}\alpha$　$\dfrac{1}{t6}{\times}\alpha$
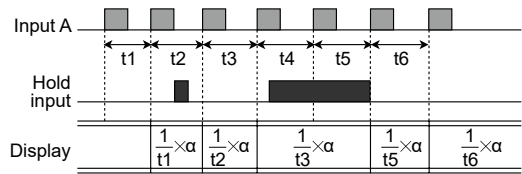
◎ F2 Mode: Passing Speed

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

Passing speed (V) = f × α (α = L [m])

※f : reciprocal of time [sec] between input A (sensor) ON and input B (sensor) ON.
　L: distance between input A (sensor) and input B (sensor) [m]
　α: prescale value

- Display value and display unit

Display value	Display unit	α (prescale value)
Passing speed	mm/sec	1,000L
	cm/sec	100L
	m/sec (default)	1L
	m/min	60L
	km/hour	3.6L

MP5M

Sensor B

Sensor A

- Timing chart

Input A
Input B
Hold input

ta

t1　t2　t3　t4　t5　t6　t7

Display: $\dfrac{1}{t1}{\times}\alpha$　$\dfrac{1}{t2}{\times}\alpha$　$\dfrac{1}{t3}{\times}\alpha$　$\dfrac{1}{t4}{\times}\alpha$　$\dfrac{1}{t6}{\times}\alpha$　$\dfrac{1}{t7}{\times}\alpha$
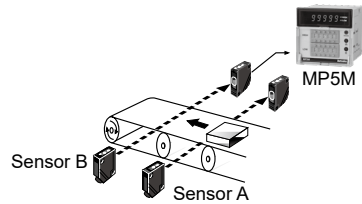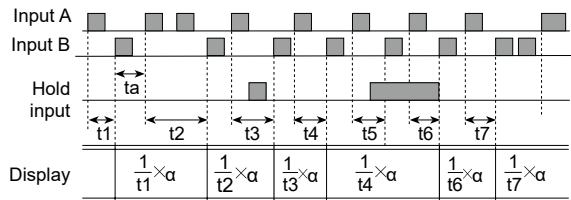
※ta: Return time (over 20ms)

◎ F3 Mode: Cycle

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

Cycle (T) = t　　　　　※t: measurement time[sec]

- Display value and display unit ([$t.Unt$] of parameter 2)

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

Photoelectric sensor

MP5M

- Timing chart

Input A

Hold input

t1　t2　t3　t4　t5　t6

Display: t1　t2　t3　t5　t6
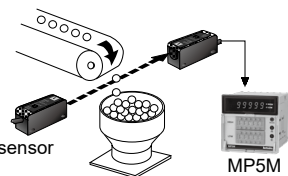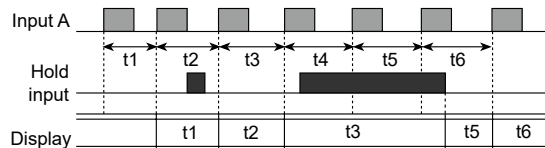
◎ **F4 Mode: Passing Time**

Measures the time from Input A ON to the next ON, and displays the passing time of the arbitrary distance.

Passing time [sec]= t × α

$$\left(\alpha = \frac{L\ [m]}{\text{Distance advanced in 1 pulse cycle [m]}}\right)$$
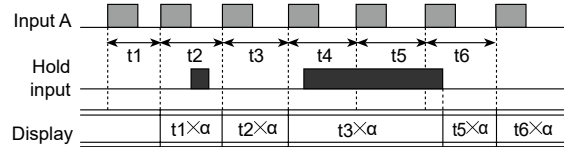
※t : measured time [sec], L : arbitrary distance [m]
α: prescale value

• Display value and display unit ([t.Unt] of parameter 2)

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

MP5M
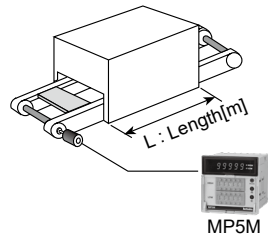
• Timing chart

◎ **F5 Mode: Time Interval**

Displays measured time of Input A ON

Time interval (T) = t

※t: measured time of input A ON [sec]

• Display value and display unit ([t.Unt] of parameter 2)

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

MP5M

Motor

Stamp
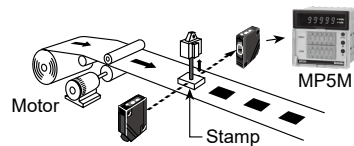
• Timing chart
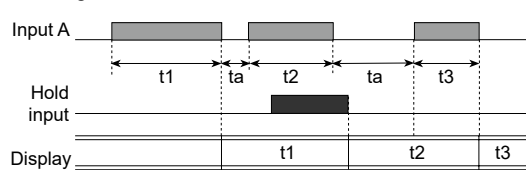
※ta: return time (over 20ms)

◎ **F6 Mode: 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 and display unit ([t.Unt] of parameter 2)

Display value	Display unit	
	SEC	MIN
Time difference	999.99s (default)	999.99m
	9999.9s	9999.9m
	99999s	99999m

MP5M

Sensor B

Sensor A

• Timing chart

※ta: return time (over 20ms)

MP5M Series

◎ F7 Mode: Absolute Ratio

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

Absolute ratio = (Input B / Input A) × 100%
Absolute ratio = $\dfrac{\text{Frequency of input B [Hz]} \times B\alpha}{\text{Frequency of input A [Hz]} \times A\alpha} \times 100[\%]$

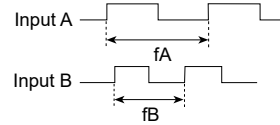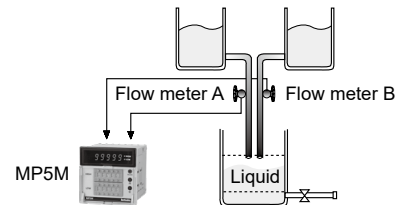※Aα: Prescale value of input A, Bα: Prescale value of input B

- Display value and display unit

Display value	Display unit
Absolute ratio	%

※Hold: When the hold signal turns ON, the display value is maintained until the display cycle turns to hold OFF.
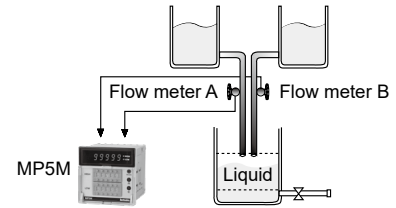
- Timing chart

$\text{Display} = \dfrac{\text{Frequency of input B [Hz]} \times B\alpha}{\text{Frequency of input A [Hz]} \times A\alpha} \times 100[\%]$

◎ F8 Mode: Density

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

Density = $\dfrac{\text{Input B}}{\text{Input A + Input B}} \times 100\ [\%]$
Density = $\dfrac{\text{Frequency of Input B [Hz]} \times B\alpha}{(\text{Frequency of input A [Hz]} \times A\alpha) + (\text{Frequency of input B [Hz]} \times B\alpha)} \times 100\ [\%]$

※Aα: Prescale value of input A, Bα: Prescale value of input B
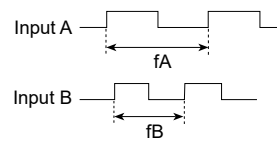
- Display value and display unit

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.

- Timing chart

◎ F9 Mode: Length Measurement 1

Measure and display the number of input A pulses during input B ON.
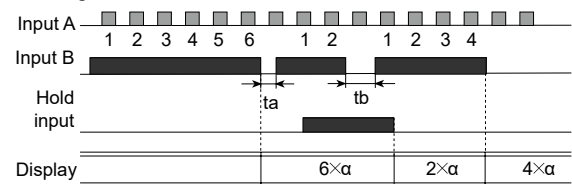
Length measurement = P × α

※P: Number of input A pulses, α: Prescale value

- Display value and display unit

Display value	Display unit
Length measurement	Quantity (default)
	mm
	cm
	m
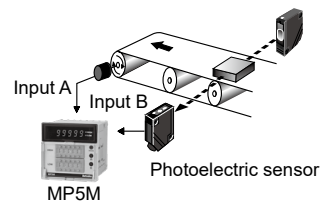
- Timing chart

※ta, tb: return time (over 20ms)

Pulse Meter

◎ F10 Mode: Interval
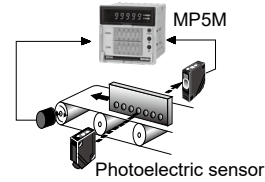
Measures and displays the number of input A pulses from Input B ON to the next ON.

Interval = P × α

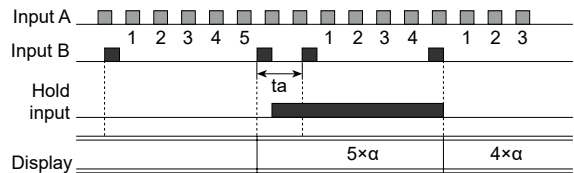※P: Number of input A pulses, α: Prescale value

• Display value and display unit

Display value	Display unit
Interval	Quantity (default)
	mm
	cm
	m

MP5M
Photoelectric sensor

• Timing chart

Input A
Input B   1 2 3 4 5   1 2 3 4   1 2 3
Hold input   ta
Display   5×α   4×α

※ta: return time (over 20ms)

◎ F11 Mode: Accumulation

Measures and displays the counted value of input A pulses.

Accumulation = P × α

※P: Number of input A pulses, α: Prescale value

• Display value and display unit

Display value	Display unit
Accumulation	Quantity [EA]

• Operation

①Counts the number of input A pulses.
②Input 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 re-counted.
③When RESET input is ON, the integrated counted value will be reset to "0".

MP5M

• Timing chart

Input A
Input B   1 2 3 4   5 6   1 2 3 4
RESET
Display 0 1 2 3 4 5 6 0 1 2 3 4
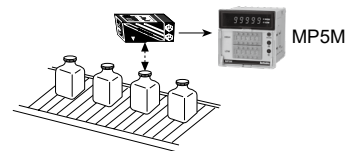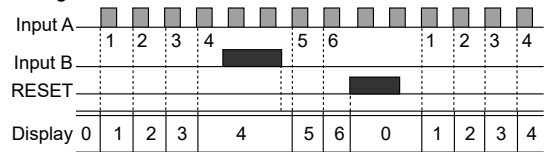
※α=1 display value

◎ F12 Mode: 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.

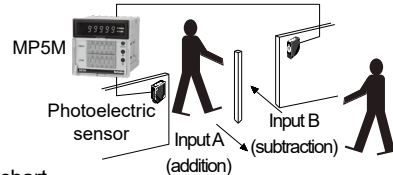Addition/Subtraction = Input A × α - Input B × α

※α: Prescale value of input A

• Display value and display unit

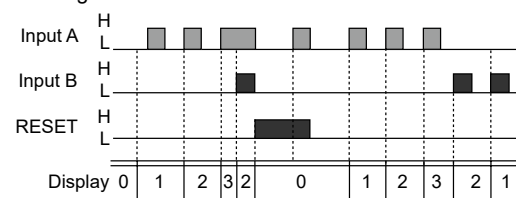| Display value	Display unit
Addition/Subtraction (individual input)	Quantity

• Operation and timing chart

Pulse of input A is added, and pulse of input B is subtracted.

MP5M
Photoelectric sensor
Input A (addition)
Input B (subtraction)

• Timing chart

Input A   H L
Input B   H L
RESET   H L
Display 0 1 2 3 2 0 1 2 3 2 1

※α=1 display value

## ◎ F13 Mode: 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.

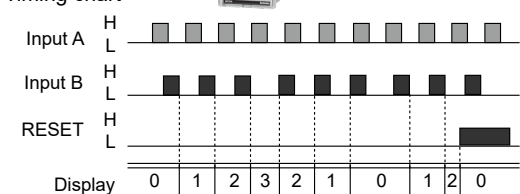Addition/Subtraction (phase difference)
= Detects position and speed using A and B phases of encoder outputs as input.

• Display value and display unit

Display value	Display unit
Up/Down counting (phase difference input)	Quantity
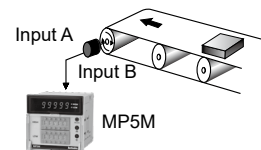
Input A
Input B
MP5M

• Timing chart

Input A   H L
Input B   H L
RESET   H L
Display 0 1 2 3 2 1 0 1 2 0

◎ F14 Mode: Length Measurement 2

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

| Length measurement 2 = P × α (until the setting value of Input B) |

※P: Number of input A pulses, α: Prescale value

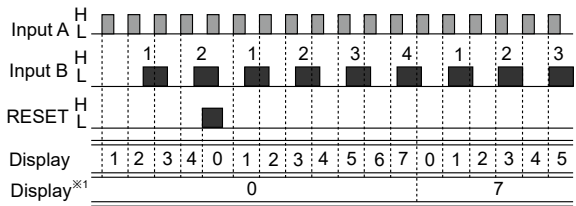● Display value and display unit

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 display cycle [dเ 5P.ะ] setting.

● Timing chart (e.g.) setting value of Input B=4

※1: When the display cycle[dเ 5P.ะ] setting is oFF, it will maintain the quantity of input A until the value of input B reaches the setting value B[CๆUn.b].
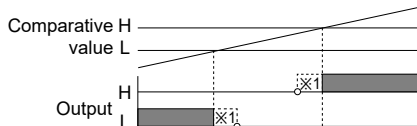
■ Output Modes [ๆUะ - ะ]

● MP5M-☐1: S output mode, MP5M-☐2: S, B, H, L, I, F output mode
● Requirement for setting comparative value: (B output mode) L<H, (F output mode) L<H, (other output modes) individual output operation regardless of size or order of set comparative values.

※1: hysteresis

◎ S (Standard) Output Mode [5ะAr d]
B (Block) Output Mode [ๆuะ - b]
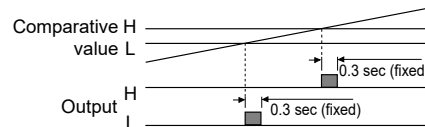

H output : Comparative value H ≤ Display value
L output : Comparative value L ≥ Display value

◎ I (One-shot) Output Mode [ๆuะ - เ]
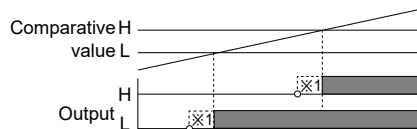
※No hysteresis for I output mode

H output : Comparative value H ≤ Display value
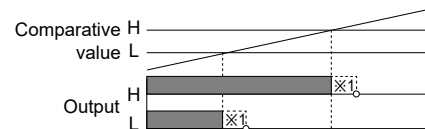L output : Comparative value L ≤ Display value

◎ H (High) Output Mode [ๆuะ - H]

H output : Comparative value H ≤ Display value
L output : Comparative value L ≤ Display value

◎ L (Low) Output Mode [ๆuะ - L]

H output : Comparative value H ≥ Display value
L output : Comparative value L ≥ Display value

◎ F (Deflection) Output Mode [ๆuะ - F]

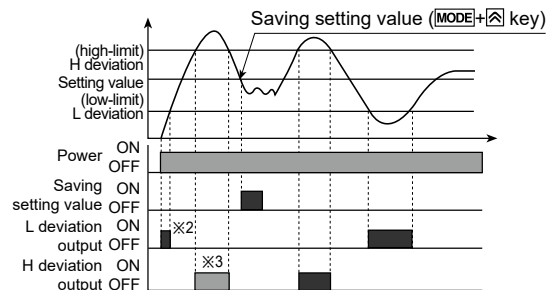Transmits outputs when the saved setting value exceeds H deviation or L deviation.
● Saving setting value: Press the MODE+⌃ keys to save as setting value.
● Checking setting value: Press the ⌃ key to check the setting value.
● Setting deviation: Based on the setting value, set H deviation, L deviation by the thumbwheel switches.
       (the set deviation value is saved during Power OFF until it is re-set.)
● Deviation setting range: 0.0001 to 99999 (setting range depends on the decimal point [dๆะ] setting.)
       E.g.)Decimal point[dๆะ]: "0000.0", Setting range: 0.1 to 9999.9

※2: When selecting initial comparative output limit function, it does not transmit outputs.
※3: 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.
※The deviation can be set to "0" but the actual operation will be the same as "1".

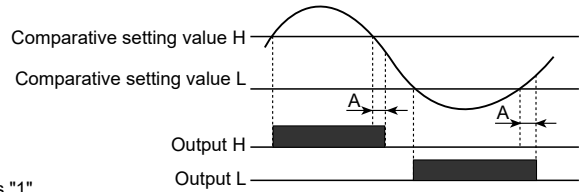# Pulse Meter

▣ Function

◎ Hysteresis [H 5]

Near the comparative setting value, the output may turn ON/OFF frequently and unstably.

To prevent this, the hysteresis value is set based on the comparative setting value.

※A: hysteresis value

※The hysteresis value can be set to "0" but the actual operation value is "1".

Comparative setting value H

Comparative setting value L

Output H

Output L

### ◎ Delay Monitoring [UAr.d]

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.

● Comparative output limit function [F.dEF]
: Only for S (Standard), B (Block), F (Deflection) output mode.
: Limits L output before H output.

1) During S (Standard), B (Block) output mode

Comparative value

Output

Comparative output limit function removal

2) During F (Deflection) output mode

Comparative output limit function removal

Comparative value
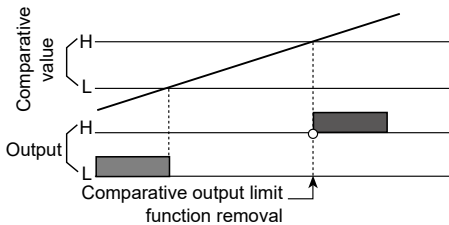
output

※After supplying power, there is no initial L comparative output (▬).

※Each setting value of H, L is not related to their relative sizes. Hence, H value may be lower or equal to L value.
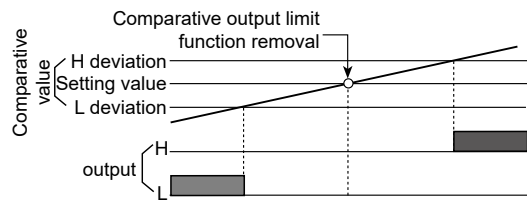
※After supplying power, there is no comparative output of L deviation (▬).

※H and L deviation are not related to their relative sizes.
(H deviation setting value > L deviation setting value,
H deviation setting value < L deviation setting value)

● Start compensation timer function [5 Ar.]

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

Monitoring delay time

L

No output

L output
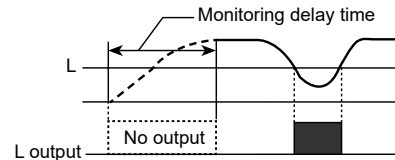
◎ Auto-Zero Time Setting [AU o.A, AU o.b]

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 [P5 .H, P5 .]

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).

MP5M
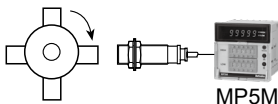
Number of revolutions (rpm) = f×α
= f×60× (1 / N)
= f×60× (1 / 4)
= f×60×0.25
= f×15

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

※f: The number of input pulses per second [Hz],
α: Prescale value
N: The number of pulses per revolution

▣ Proper Usage

⚠ Cautions during use

1. Follow instructions in 'Cautions during Use'. Otherwise, it may cause unexpected accidents.
2. 24VAC, 24-48VDC power supply should be insulated and limited voltage/current or Class 2, SELV power supply device.
3. Install a power switch or circuit breaker in the easily accessible place for supplying or disconnecting the power.
4. 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.
5. This unit may be used in the following environments.
   ① Indoors (in the environment condition rated in 'Specifications')
   ② Altitude max. 2,000m
   ③ Pollution degree 2
   ④ Installation category II