

Autonics

PULSE METER MP5M SERIES

M A N U A L



Thank you very much for selecting Autonics products.
For your safety, please read the following before using.

Caution for your safety

- ※ Please keep these instructions and review them before using this unit.
- ※ Please observe the cautions that follow:
 - Warning** Serious injury may result if instructions are not followed.
 - Caution** Product may be damaged, or injury may result if instructions are not followed.
- ※ The following is an explanation of the symbols used in the operation manual.
 - Caution:** Injury or danger may occur under special conditions.

Warning

- In case of using this unit with machineries (Nuclear power control, medical equipment, vehicle, train, airplane, combustion apparatus, entertainment or safety device etc), it requires installing fail-safe device, or contact us for information on type required.**
It may result in serious damage, fire or human injury.
- It must be mounted on panel.**
It may give an electric shock.
- Do not repair or check up when power on.**
It may give an electric shock.
- Do not disassemble and modify this unit, when it requires. If needs, please contact us.**
It may give an electric shock and cause a fire.
- Please check the number of terminal when connect power line or measuring input.**
It may cause a fire.

Caution

- This unit shall not be used outdoors.**
It might shorten the life cycle of the product or give an electric shock.
- When wire connection for power input and measuring input, the tightening strength for screw bolt on terminal block should be over than 0.74N · m ~ 0.90N · m.**
- Please observe specification rating.**
It might shorten the life cycle of the product and cause a fire.
- Do not use the load beyond rated switching capacity of Relay contact.**
It may cause insulation failure, contact melt, contact failure, relay broken, fire etc.
- In cleaning the unit, do not use water or an oil-based detergent.**
It might cause an electric shock or fire that will result in damage to this product.
- Do not use this unit at place where there are flammable or explosive gas, humidity, direct ray the sun, radiant heat, vibration, impact etc.**
It may cause a fire or explosion.
- Do not inflow dust or wire dregs into inside of this unit.**
It may cause a fire or mechanical trouble.
- Please connect properly after checking the polarity of measuring terminals.**
It may cause a fire or explosion.

※ The above specification are changeable without notice anytime.

Ordering information

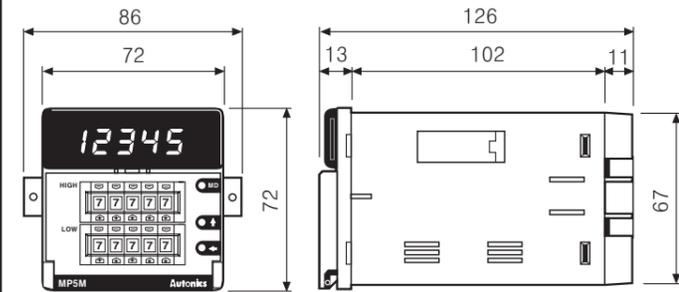
MP	5	M	-	4	N
Item	Digit type	Size	Power supply	Output	
	5	M	100~240VAC 50/60Hz	1	Main output(Comparative value output)
	99999(5 Digit)	DIN W72 × H72mm		2	Indication type only
				1	Relay first-stage(High-limit) output + NPN open collector output
				2	Relay two-stage(High/Low-limit) output + NPN open collector output
				4	100~240VAC 50/60Hz
				M	DIN W72 × H72mm
				5	99999(5 Digit)
				MP	Pulse meter

Specifications

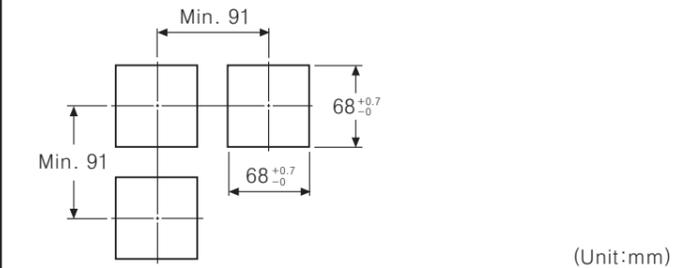
Model	MP5M-4N	MP5M-41	MP5M-42
Indicator	Indicator	High-limit setting type	High/Low-limit setting type
Display method	7 Segment LED(Zero Blanking), Display Size: W4×H8mm		
Max. indication	5Digit(0.0001 to 99999)		
Power supply	100~240VAC 50/60Hz		
Allowable operation voltage	90 to 110% of rated voltage		
Power consumption	Approx. 7.5VA(240VAC)	Approx. 8VA(240VAC)	
Power for external sensor	12VDC ±10%, 80mA		
Input frequency	<ul style="list-style-type: none"> Solid state input : Max. 50kHz(Pulse width:Min. 10μs) Contact input : Max. 45Hz(Pulse width:Min. 11ms) 		
Input level	[Voltage input] High: 4.5~24VDC, Low: 0~1VDC, Input impedance : 4.5kΩ [No-voltage input] Short-circuit impedance : Max. 300Ω, Residual voltage : Max. 1V, Open-circuit impedance : Min. 100kΩ		
Measuring range	<ul style="list-style-type: none"> Mode F1, F2, F7, F8 : 0.0005Hz to 50kHz Mode F3 : 0.02s to 3,200s Mode F4, F5, F6 : 0.01s to 3,200s Mode F9, F10, F11 : 0 ~ 4 × 10⁹ Count 		
Measuring accuracy (23 ±5°C)	<ul style="list-style-type: none"> Mode F1, F2, F7, F8 : F.S. ±0.05% rdg ±1Digit Mode F3, F4, F5, F6 : F.S. ±0.01% rdg ±1Digit 		
Display accuracy	0.05 / 0.5 / 1 / 2 / 4 / 8sec.(The same as update output cycle)		
Operation mode	Number of revolution/Speed/Frequency(F1), Passing speed(F2), Cycle(F3), Passing time(F4), Time width(F5), Time difference(F6), Absolute rate(F7), Density(F8), Length measurement(F9), Interval(F10), Integration(F11)		
Prescale function	Direct input method(0.0001 × 10 ⁻⁹ to 9.9999 × 10 ⁹)		
Hysteresis	0 to 9999 *1		
Other functions	<ul style="list-style-type: none"> Lock setting function Auto-Zero time setting function Time unit selection function Display value monitoring function Memory retention function(Mode F11 applied only) 	<ul style="list-style-type: none"> Lock setting function Monitoring delay function Auto-Zero time setting function Time unit selection function Display value monitoring function Memory retention function(Mode F11 applied only) Comparative output function(H) 	<ul style="list-style-type: none"> Lock setting function Monitoring function Auto-Zero time setting function Time unit selection function Display value monitoring function Memory retention function(Mode F11 applied only) Comparative output function(H, L) Output mode selection function(S, H, L, B, I, F) Deviation memory function(F output mode)
Main output	Relay output	250VAC 3A resistive load 1c	250VAC 3A resistive load 1a × 2
	NPN open collector output	30VDC 100mA max.	30VDC 100mA max. × 2
Current transmission output response time	Max. 800ms		
Memory	Non-volatile memory(Input times : 100,000 times)		
Insulation resistance	Min. 100MΩ (at 500VDC megger)		
Dielectric strength	2000VAC 60Hz 1minute(Between terminals of AC power and case, Between terminals of AC power and measuring terminals)		
Impulse noise strength	±2000V the square wave noise(pulse width:1μs) by the noise simulator R/S phase, repetition frequency 60Hz		
Vibration	Mechanical	0.75mm amplitude at frequency of 10 to 55Hz in each of X, Y, Z directions for 2 hour	
	Malfunction	0.5mm amplitude at frequency of 10 to 55Hz in each of X, Y, Z directions for 10 minutes	
Shock	Mechanical	300m/s ² (Approx. 30G) 3 times at X, Y, Z direction	
	Malfunction	100m/s ² (Approx. 10G) 3 times at X, Y, Z direction	
Relay life cycle	Mechanical	Min. 10,000,000 operations	
	Electrical	Min. 100,000 times at 250VAC 3A(resistive load)	
Environment	Ambient temperature	-10 to 50°C, Storage temperature: -20 to 60°C	
	Ambient humidity	35 to 85%RH, Storage humidity: 35 to 85%RH	
Approval	CE, UL, US		
Weight	Approx. 275g	Approx. 310g	Approx. 330g

※ Condition for use in environment is no freezing or condensation.
※ 1: The hysteresis setting range is changed by the setting position of decimal point.

Dimensions



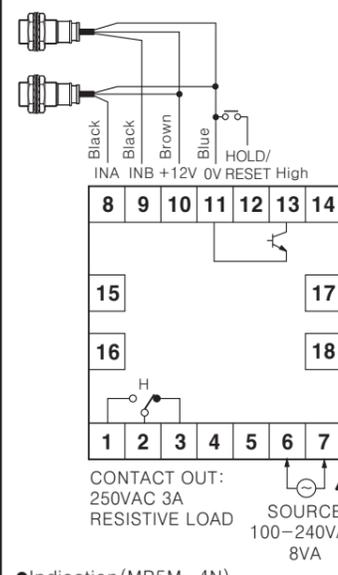
Panel cut-out



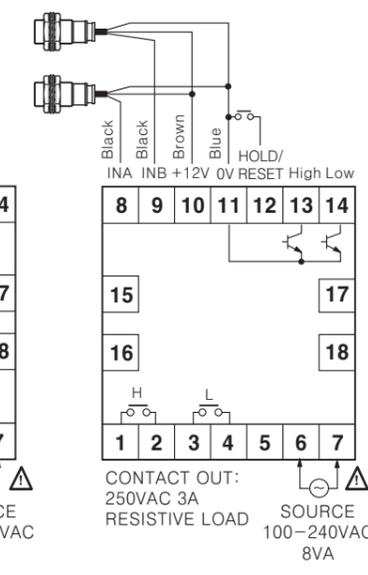
(Unit:mm)

Connection

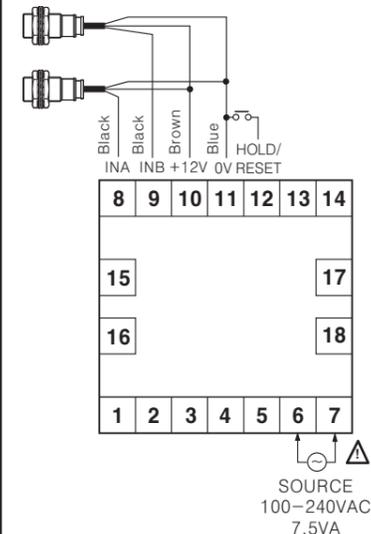
High-limit setting(MP5M-41)



High/Low-limit setting(MP5M-42)



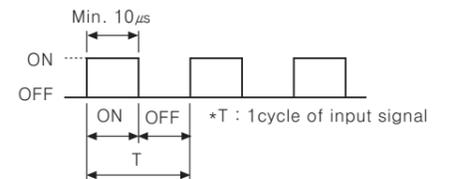
Indication(MP5M-4N)



Input specification

1. Input signal

- Solid state input
 - Input frequency: 50kHz(Max.)
Standard duty rate of input signal is 1:1, ON/OFF pulse width should be each over 10μs.
 - Input voltage Level : ON voltage→4.5~24V, OFF voltage→0~1.0V



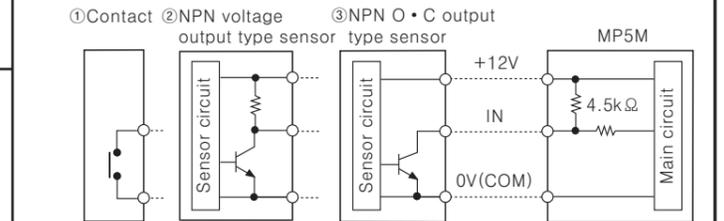
(2) Relay contact input

- Input frequency : 45Hz(Max.)
ON/OFF pulse width should be each over 11ms.
- Relay contact specification: Please use a contact that can switch reliably at 12VDC, 2mA min. of load current.

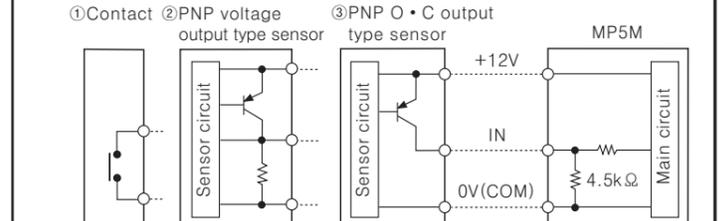
2. Input type

MP5M has **NPN input and PNP input** and it is able to select it in Parameter 1 group.

(1) NPN input type



(2) PNP input type



※ O·C is Open collector output

Operation mode

- Select operation mode from **Mode** of Parameter 1 group.
- There are 11 kinds of operation mode.

F1 Mode (Frequency/Number of revolution/Speed)

This mode is to display calculated frequency or number of revolution, speed by measuring frequency of Input A,

- Frequency(Hz) = $f \times \alpha$ ($\alpha = 1[\text{sec}]$)
- Number of revolution(rpm) = $f \times \alpha$ ($\alpha = 60[\text{sec}]$)
- Speed(m/min) = $f \times \alpha$ ($\alpha = 60L[\text{sec}]$)

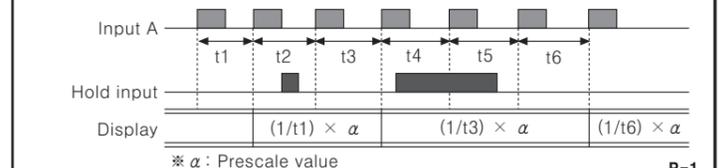
※ L = The length of conveyor moved for 1 pulse cycle[m]

Display value and display unit

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

※ Display unit of factory default : rpm

Time chart



※ α : Prescale value

●F2 Mode(Passing speed)

It displays the passing speed between ON of input A and ON of input B.
 Passing speed(V) = $f \times \alpha$ ($\alpha = L[m]$)

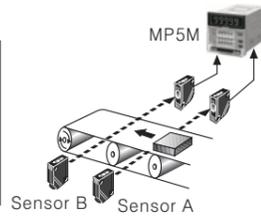
*f : This is reciprocal number of the time between ON of input A and ON of input B.

L : The distance between input A and input B[m]

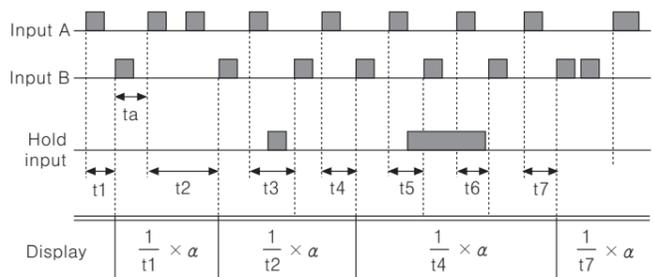
●Display value and display unit

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

*Display unit of factory default : m/sec



●Time chart



* α : Prescale value
 ta : It needs min. 20ms for return time

●F3 Mode(Cycle)

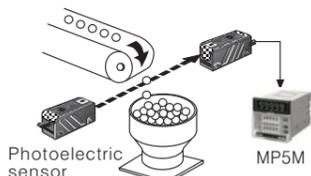
It displays the time from when input A is ON to the next ON of input A.
 Cycle(T) = t

*t : Measurement time[sec]

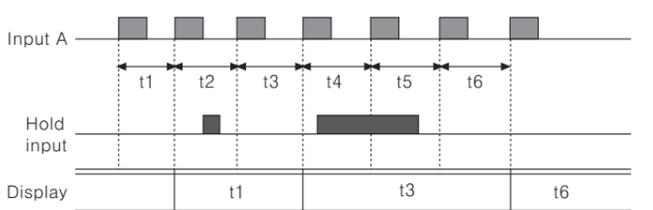
●Display value and display unit

Display value	Display unit
Cycle	SEC
	MIN
	999.99sec.
	9999.9min.
	9999.9sec.
	99999min.

*Set the display unit at the **Unit**(Time unit) of Parameter 2.
 *Display unit of factory default : 999.99sec.



●Time chart



*t1, t2, t3, t4, t5, t6 should be over 20ms then able to measure.

●F4 Mode(Passing time)

It displays the passing time of certain distance as measuring the time between ON and the next ON of Input A.

$$\text{Passing time[sec]} = t \times \alpha = \frac{L[m]}{\text{Moving distance within 1 pulse cycle[m]}}$$

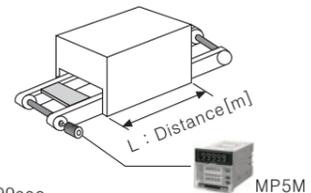
*t: Measurement time[sec], L: Certain distance[m]

●Display value and display unit

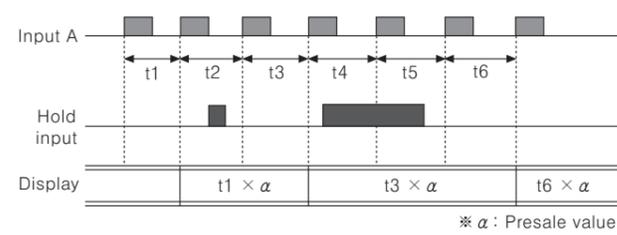
Display value	Display unit
Passing time	SEC
	MIN
	999.99sec.
	9999.9min.
	9999.9sec.
	99999min.

*Display unit of factory default : 999.99sec.

*Set the display unit at the **Unit**(Time unit) of Parameter 2.



●Time chart



* α : Presale value

●F5 Mode(Time width)

It displays the ON time of input A.

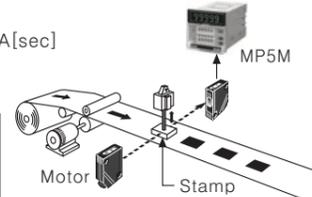
Time width[T] = t

*t : ON measurement time of input A[sec]

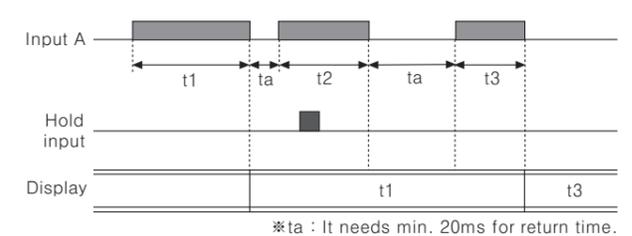
●Display value and display unit

Display value	Display unit
Time width	SEC
	MIN
	999.99sec.
	9999.9min.
	9999.9sec.
	99999min.

*Set the display unit at the **Unit**(Time unit) of parameter 2.
 *Display unit of factory specification : 999.99sec.



●Timing charts



*ta : It needs min. 20ms for return time.

●F6 Mode(Time interval)

It displays the time from input A is ON to input B is ON.

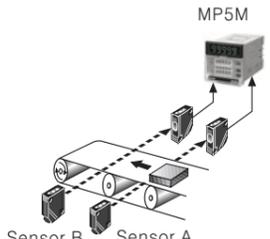
Time difference(T) = t(ta to tb)

*t(ta to tb) : The measurement time from input A is ON to input B is ON[sec].

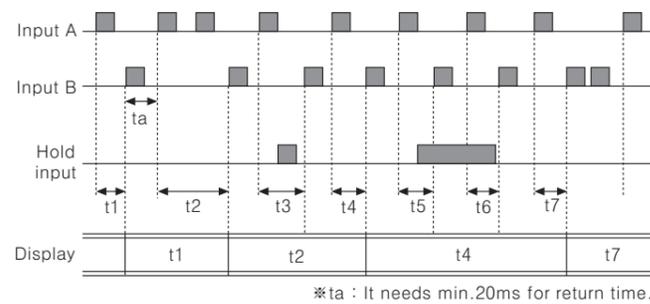
●Display value and display unit

Display value	Display unit
Time interval	SEC
	MIN
	999.99sec.
	9999.9min.
	9999.9sec.
	99999min.

*Display unit of factory default : 999.99sec.
 *Display unit can be set at **Unit** (Time unit) of Parameter 2.



●Time chart



*ta : It needs min.20ms for return time.

●F7 Mode(Absolute rate)

It displays how many percentage(%) faster or late, speed, volume etc. of Input B against input A.

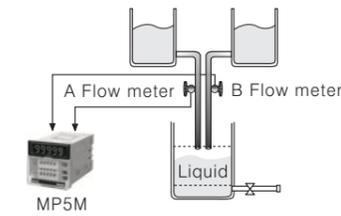
Absolute rate = (Input B / Input A) × 100%

$$\text{Absolute rate} = \frac{\text{Frequency of input B[Hz]} \times B\alpha}{\text{Frequency of input A[Hz]} \times A\alpha} \times 100[\%]$$

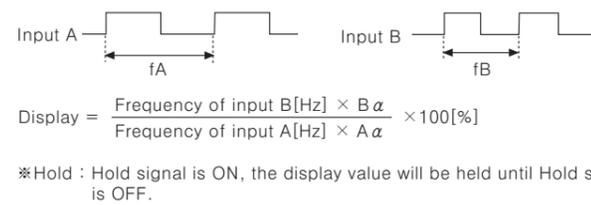
●Display value and display unit

Display value	Display unit
Absolute rate	%

*A α : Prescale value of input A
 B α : Prescale value of input B



●Time chart



*Hold : Hold signal is ON, the display value will be held until Hold signal is OFF.

●F8 Mode(Density)

It displays the density ratio of input B against total sum of input A and input B.

$$\text{Density} = \frac{\text{Input B}}{\text{Input A} + \text{Input B}} \times 100[\%]$$

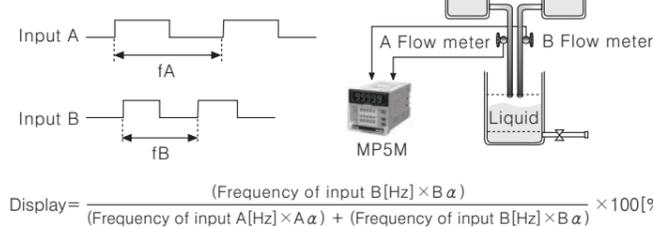
$$\text{Density} = \frac{\text{Frequency of input B[Hz]} \times B\alpha}{(\text{Frequency of input A[Hz]} \times A\alpha) + (\text{Frequency of input B[Hz]} \times B\alpha)} \times 100[\%]$$

●Display value and display unit

Display value	Display unit
Density	%

*A α : Prescale value of input A
 B α : Prescale value of input B

●Timing chart



*Hold : Hold signal is ON, the display value will be held until Hold signal is OFF.

●F9 Mode(Length measurement)

It displays the number of Input A pulse while Input B is ON.

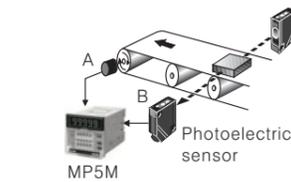
Length measurement = P × α

(*P : Number of input A pulse, α : Prescale value)

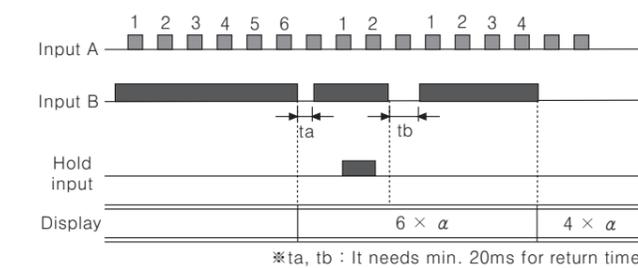
●Display value and display unit

Display value	Display unit
Length measurement	Quantity[EA]
	mm
	cm
	m

*Factory default(Unit) : Quantity[EA]



●Time chart



*ta, tb : It needs min. 20ms for return time

●F10 Mode(Interval)

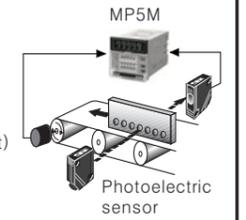
It displays the number of Input A pulse from Input B is ON to the time Input B is ON next.

Interval = P × α (*P : Number of input A pulse, α : Prescale value)

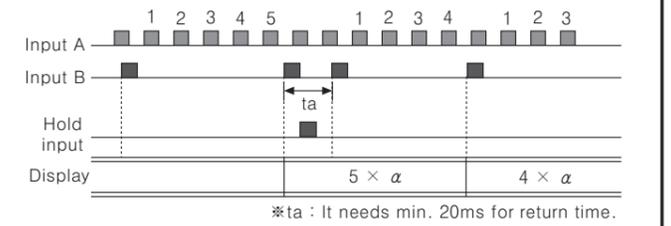
●Display value and display unit

Display value	Display unit
Interval	Quantity[EA]
	mm
	cm
	m

*Factory default(Unit) : Quantity[EA]



●Time chart



*ta : It needs min. 20ms for return time.

●F11 Mode(Integration)

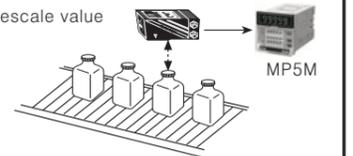
It displays the counting value against pulses of Input A.

Integration = P × α

*P : Pulse number of input A, α : Prescale value

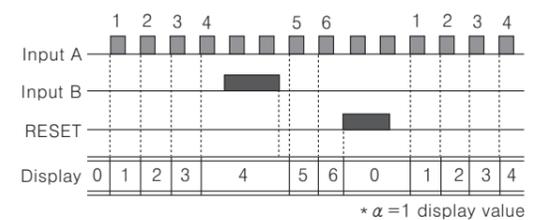
●Display value and display unit

Display value	Display unit
Integration	Quantity[EA]



●Operation and Time chart

① It counts the number of Input A pulse.
 ② As input B is an enable input signal it stops the counting and display value of input A when it is ON and then it counts input A continuously when it is OFF.

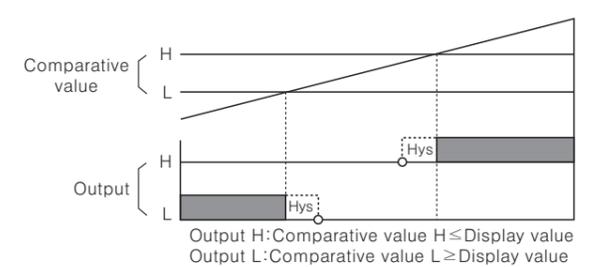


* $\alpha = 1$ display value

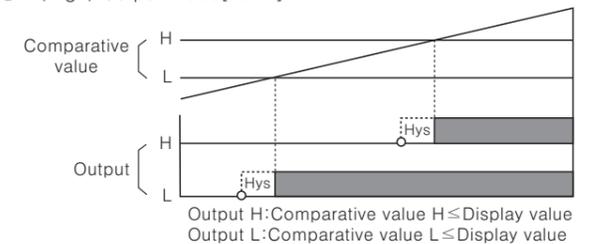
■ Output mode

- Select output mode in **out-t**(Output type) of Parameter1 group.
- MP5M-41: S Output mode supported only
- MP5M-42: S, B, H, L, I, F Output mode supported.
- Display value is H>L in B(Block) output mode and F(deviation) output mode and the other output mode can be operated separately regardless of display value.

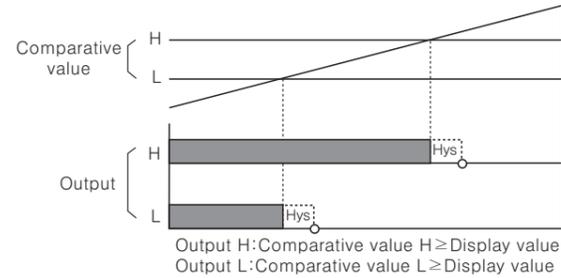
● S(Standard) output mode[5tArd], B(Block) output mode[out-b]



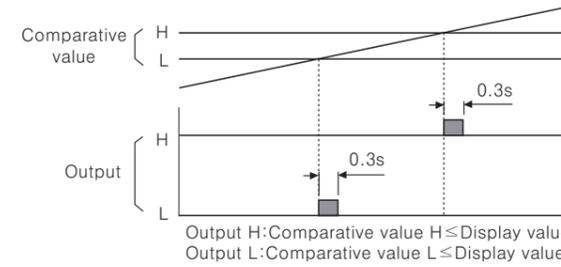
● H(High) Output mode[out-h]



● L(Low) output mode[*out-L*]



● I(One Shot) output mode[*out-I*]

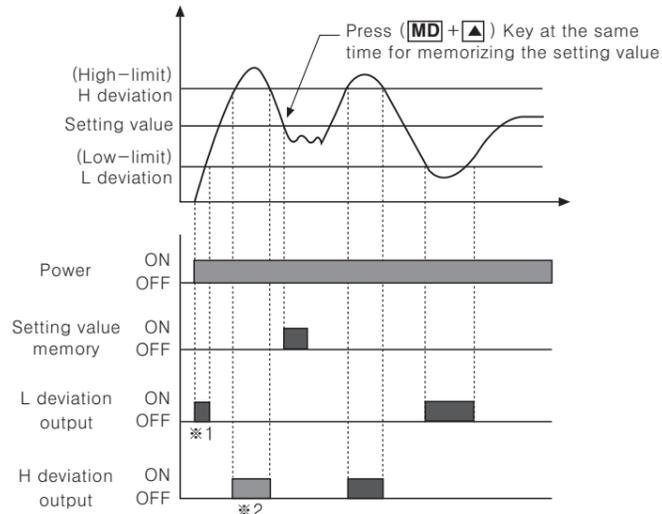


※One Shot(■) output time is fixed as 0.3sec.
※There is no Hysteresis in I(One shot) comparative output mode.

● F(Deflection) output mode[*out-F*]

This function is to memorize the setting value and provide outputs when it exceeds the deviation of H, L.

- The setting value memory : Memorize the current display value as the setting value by pressing (MD + ▲) key in front.
- Displays the setting value : Check the memorized the setting value by (▲) key. (It displays the memorized setting value for pressing ▲ key continuously.)
- Deviation setting : Set H, L deviation by setting value. (The set deviation will be memorized until setting the next deviation again even though power off.)
- Deviation setting range : 0.0001 to 99999(The setting range will be changed by decimal point setting parameter. If set decimal point as 0000.0, the setting range will be 0.1 to 9999.9.)
- Operation



※1: When select the initial comparative output limit function, output will not be come out.
※2: Output position may be different from above graph.
※Even though you set the deviation as "0(Zero)", it will actually work as setting "1".

■ Operation chart by each Parameter group

●The display parameter are different by each operation mode, please see "Parameter" below.
●● : When select the operation mode, the parameter will be displayed.
X : When select the operation mode, the parameter will not be displayed.

●Parameter 0 group

Parameter 0	Sub mode	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11
<i>hPEV</i>		●	●	●	●	●	●	●	●	●	●	X
<i>LPEV</i>		●	●	●	●	●	●	●	●	●	●	X

●Parameter 1 group

Parameter 1	Sub mode	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11
<i>nodE</i>		●	●	●	●	●	●	●	●	●	●	●
<i>in-A</i>		●	●	●	●	●	●	●	●	●	●	●
<i>in-b</i>		X	●	X	X	X	●	●	●	○	○	○
<i>out-t</i>		●	●	●	●	●	●	●	●	●	●	X
<i>hys</i>		●	X	X	X	X	X	●	●	X	X	X
<i>GuAr.d</i>	<i>F.dEFY</i>	●	●	●	●	●	●	●	●	●	●	X
	<i>StAr.t</i>	●	●	●	●	●	●	●	●	●	●	X
<i>Auto.A</i>		●	X	X	●	X	X	●	●	X	X	X
<i>Auto.b</i>		X	X	X	X	X	X	●	●	X	X	X
<i>NEo</i>		X	X	X	X	X	X	X	X	X	X	●

※"○" : *in-b* sensor will be set as *nPnhF* or *PnPhF* type only in mode F9, F10, F11.

●Parameter 2 group

Parameter 2	Sub mode	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11
<i>dot</i>		●	●	X	X	X	X	●	●	●	●	●
<i>t.unE</i>		X	X	●	●	●	X	X	X	X	X	X
<i>P5C.A.H</i> ※1		●	●	X	●	X	X	●	●	●	●	●
<i>P5C.A.Y</i> ※1		●	●	X	●	X	X	●	●	●	●	●
<i>P5C.b.H</i>		X	X	X	X	X	X	●	●	X	X	X
<i>P5C.b.Y</i>		X	X	X	X	X	X	●	●	X	X	X
<i>dI.SP.t</i>		●	X	X	X	X	X	●	●	X	X	X

※1 *P5C.H*, *P5C.Y* are displayed in mode F1, F2, F4, F9, F10, F11.

●Parameter 3 group

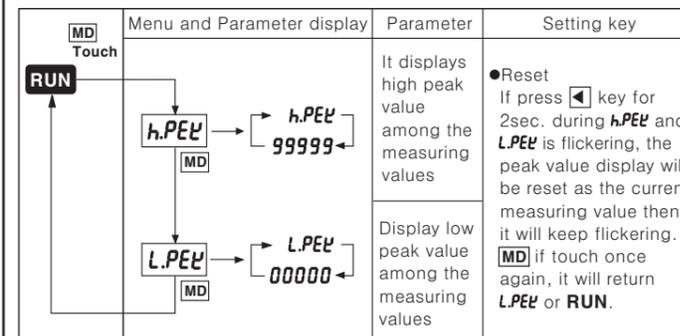
Parameter 3	Sub mode	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11
<i>LoC</i>		●	●	X	X	X	X	●	●	●	●	●

●Monitoring delay operation function chart by each output mode

	<i>out-t</i>	<i>StAr.d</i>	<i>out-h</i>	<i>out-L</i>	<i>out-b</i>	<i>out-I</i>	<i>out-F</i>
Comparative output adjustment function.	●	X	X	●	X	●	●
Starting correction timer function	●	●	●	●	●	●	●

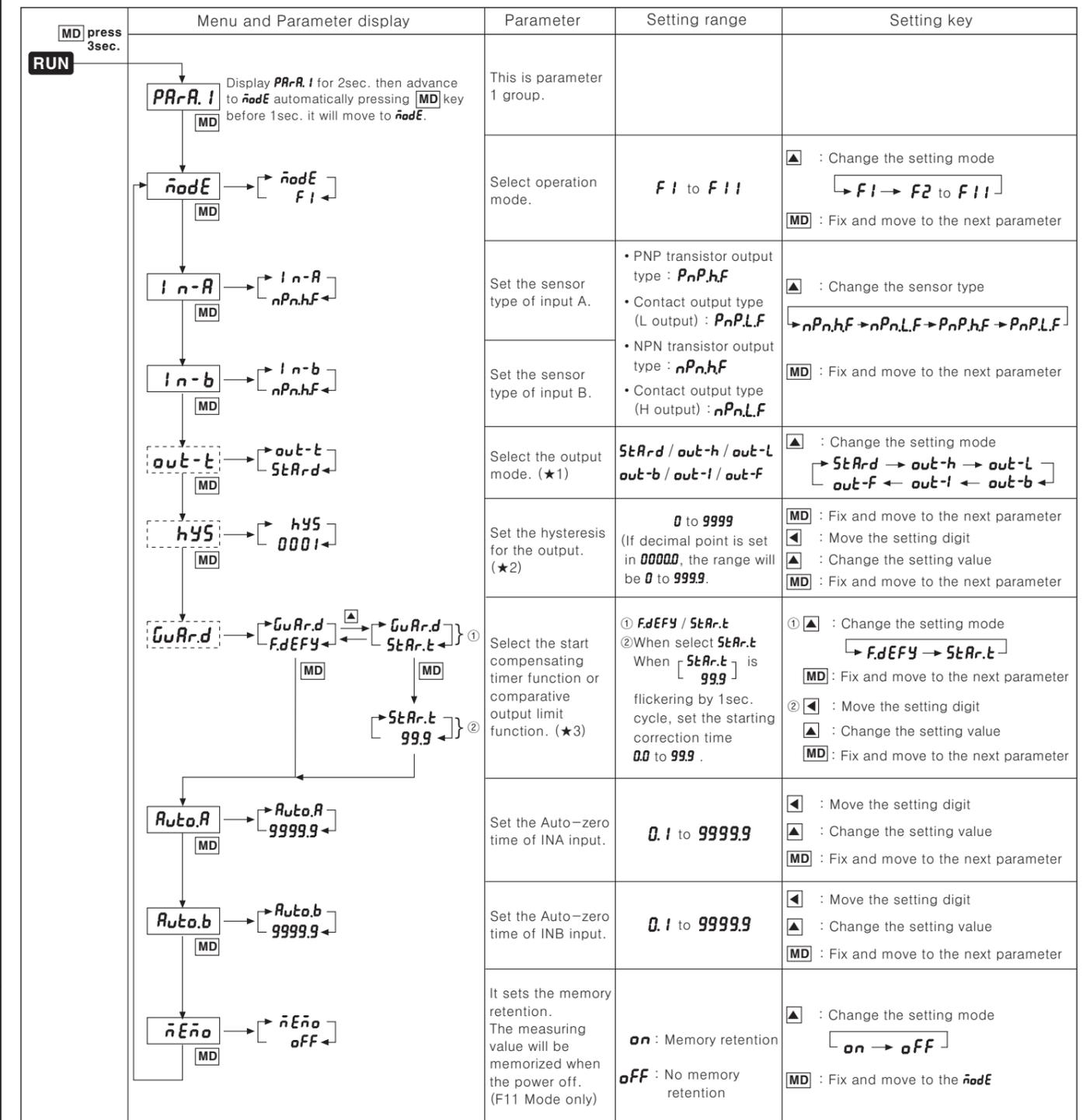
■ Parameter

●Parameter 0 group



※If press MD key in RUN it will enter into *hPEV*.
※If pressing MD key for 2sec. in all setting, data will be saved then return to RUN mode. If no key is touched for 60sec. data will be held as previous value and return to RUN mode.
※When entering into parameter 0 the parameter name and data will be flickering by 1sec..
※It will show the set data to flicker by 1sec., then move to next Parameter with touching MD key once.

●Parameter 1 group



※If you press MD key for 3 sec. in RUN, it will enter into parameter 1 group.
※The output mode is fixed as *out-h* type in F11 operation mode.
※(★1) is not shown in MP5M-41 and indicate type. But, MP5M-41 is fixed by S output mode. Output mode *out-h* type in F11 mode of MP5M-42 is fixed.
※(★2)Hysteresis operation mode is able to be set in F1, F7 to F8 operation mode.
※(★3)It is able to select the comparative output [*F.dEFY*] limit function or starting correction [*StAr.t*] timer in monitoring delay function mode [*GuAr.d*].
When select the comparative output limit [*F.dEFY*] function, it will move to the next parameter [*Auto.A*] and when select the starting correction time [*StAr.t*] you need to be set the starting correction time [*0.0 - 99.9*] so that it moves to the next parameter [*Auto.A*].
When entering into parameter 1 group, the parameter name and data will be flickering by 1 sec. then move setting digit by ◀ key or change the setting value by ▲ key.
※All data set by users will be shown [displayed] to 1sec. cycle then move to the next parameter by pressing MD key.
※ [] parameter is not shown in MP5M-4N, MP5M-41. But, [*hys*] at [] parameter is shown in MP5M-41.

