Autonics

PULSE METER
MP5W SERIES
M A N U A L

CE c[UL]us

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

1. **In case of using this unit with machinery (Ex: nuclear power control, medical equipment, ship, vehicle, train, airplane, combustion apparatus, safety device, crime/disaster prevention equipment, etc) which may cause damages to human life or property, it is required to install fail-safe device.**
   It may cause a fire, human injury or damage to property.
2. **It must be mounted on panel.**
   It may cause electric shock.
3. **Do not repair or check this unit when it is power ON.**
   It may cause electric shock.
4. **Do not disassemble and modify this unit. Please contact us if it is required.**
   It may cause electric shock or a fire.
5. **Wire it properly after checking terminal numbers when connecting power cable and measuring input.**
   It may cause a fire.

⚠ Caution

1. **This unit shall not be used outdoors.**
   It might shorten the life cycle of the product or cause electric shock.
2. **When wiring connection for power input and measuring input, the tightening strength for screw bolt on terminal block should be over than 0.74N・m to 0.90N・m.**
   It may cause malfunction or a fire due to contact failure.
3. **Please observe the rated specification.**
   It might shorten the life cycle of the product and cause a fire.
4. **Do not use the load beyond the rated switching capacity of relay contact.**
   It may cause insulation failure, contact melt, contact failure, relay broken, fire, etc.
5. **In cleaning the unit, do not use water or an oil-based detergent.**
   It might cause electric shock or a fire.
6. **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.
7. **Do not inflow dust or wire dregs into this unit.**
   It may cause a fire or malfunction.
8. **Please connect properly after checking the polarity of measuring terminals.**
   It may cause a fire or explosion.

※**The above specifications are subject to change without notice.**

■ Ordering information

MP	5	W	-	4	N			Main output (Comparative value output)	Sub output (Display value output)

	Main output (Comparative value output)	Sub output (Display value output)
N	Indicator	-
A	Relay five-stage(HH, H, GO, L, LL)	-
1	Relay three-stage(H, GO, L)	-
2	NPN open collector quintuple output	BCD Dynamic
3	PNP open collector quintuple output	BCD Dynamic
4	NPN open collector quintuple output	PV transmission output (DC4-50mA)
5	PNP open collector quintuple output	PV transmission output (DC4-50mA)
6	NPN open collector quintuple output	Low speed serial output
7	PNP open collector quintuple output	Low speed serial output
8	NPN open collector quintuple output	RS485 communication
9	PNP open collector quintuple output	RS485 communication

Output

Power supply	
4	100 to 240VAC 50/60Hz

Size	
W	DIN W96× H48mm

Digit	
5	99999 (5 digit)

Item	
MP	Pulse meter

※**PNP open collector output is option.**

■ Specifications
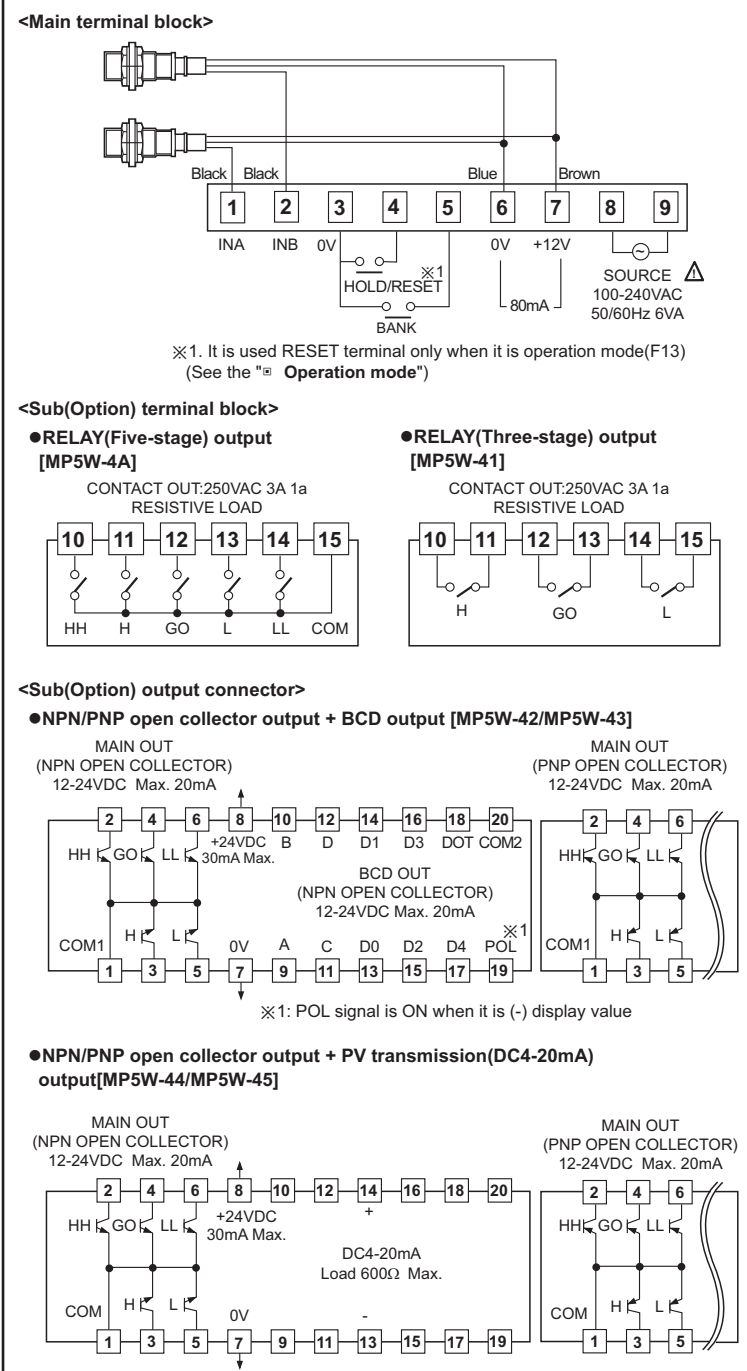
Series	MP5W
Display method	7 Segment LED(Zero Blanking)
Character size	W7 × H14mm
Max. indication	-19999 to 99999
Power supply	100-240VAC 50/60Hz
Allowable operation voltage	90 to 110% of the rated voltage
Power consumption	Approx. 6VA
Power for external sensor	12VDC ± 10%, 80mA
Input frequency	• Solid 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, [No-voltage input] Residual voltage:Max. 1V
Measuring range	• Mode F1, F2, F7, F8, F9, F10 : 0.0005Hz to 50kHz • Mode F3 : 0.02s to 3,200s • Mode F4, F5, F6 : 0.01s to 3,200s • Mode F11, F12, F13 : 0 to 4 × 10⁹Count
Measuring accuracy (23 ± 5°C)	• Mode F1, F2, F7, F8, F9, F10 : F.S. ± 0.05% rdg ± 1 digit • Mode F3, F4, F5, F6 : F.S.± 0.01% rdg ± 1 digit
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), Error ratio(F8), Density(F9), Error(F10), Length measurement(F11), Interval(F12), Integration(F13)
Prescale function	Direct input method(0.0001× 10⁻⁹ to 9.9999× 10⁹)
Hysteresis	0 to 9999 ※1
Other functions	• Lock setting function • Monitoring delay function • Auto-Zero time setting function • Time unit selection function • Current output range selection(Current output type only) • Comparative output function(HH, H, GO, L, LL) • Deviation memory function(F output mode applied only) • Peak value monitoring value • Remote/Local switching function(Communication output type only) • Data Bank switching function • Memory protection function(Mode F13 applied only)
Main output	Triple/Quintuple relay	250VAC 3A resistive load
	NPN open collector quintuple output	12-24VDC 20mA Max.
	PNP open collector quintuple output	
Sub output	BCD Dynamic	NPN open collector 12-24VDC 20mA Max.
	Low speed serial output	NPN open collector 12-24VDC 20mA Max.
	PV transmission	DC4-20mA Load 600Ω max.(Response time: Max. 800ms)
	RS485 com.	32 channels, Mutral direction communication function
Memory	Non-volatile memory(Input times : 100,000 times)
Insulation resistance	Min. 100MΩ (at 500VDC megger) between terminal and case
Dielectric strength	2000VAC 60Hz 1minute (between terminals of AC power and case, between terminals of AC power and measuring terminals
Noise resistance	2000V the square wave noise(pulse width:1μs) by the noise simulator
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/s² (Approx. 30G) in each of X, Y, Z directions for 3 times
	Malfunction	100m/s² (Approx. 10G) in each of X, Y, Z directions for 3 times
Relay life cycle	Mechanical	Min. 10,000,000 operations
	Electrical	Min. 100,000 times (250VAC 3A resistive load)
Environment	Ambient temperature	-10 to 50°C, storage: -20 to 60°C
	Ambient humidity	35 to 85%RH, storage: 35 to 85%RH
Approval	CE c[UL]us
Weight ※2	Approx. 301.5g(Approx. 177g)

※1: The hysteresis setting range is changed by the setting position of decimal point.
※2: This weight is with packaging and the weight in parentheses is only unit weight.
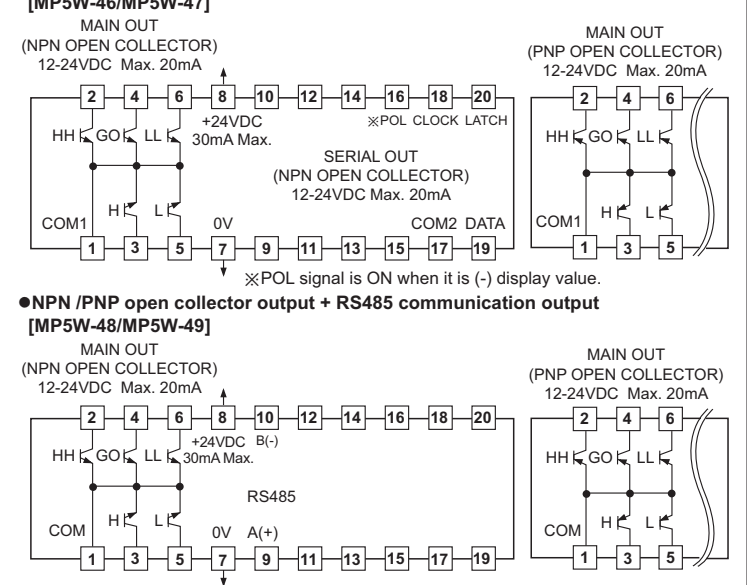※Condition for use in environment is no freezing or condensation.

■ Dimensions
(unit:mm)

[Terminal type]

[Connector type]

●Panel cut-out

Sub terminal (There is no connector for indicator.)

Hirose connctor : HIF3BA-20PA-2.54R (There is no connector for indicator.)

■ Connections

<Main terminal block>

1	2	3	4	5	6	7	8	9
INA	INB	0V				0V	+12V	

HOLD/RESET ※1
BANK
SOURCE 100-240VAC 50/60Hz 6VA
80mA

※1. It is used RESET terminal only when it is operation mode(F13)
(See the "■ **Operation mode**")

<Sub(Option) terminal block>

●RELAY(Five-stage) output [MP5W-4A]
CONTACT OUT:250VAC 3A 1a
RESISTIVE LOAD

10	11	12	13	14	15
HH	H	GO	L	LL	COM

●RELAY(Three-stage) output [MP5W-41]
CONTACT OUT:250VAC 3A 1a
RESISTIVE LOAD

10	11	12	13	14	15
	H		GO		L

<Sub(Option) output connector>

●NPN/PNP open collector output + BCD output [MP5W-42/MP5W-43]
MAIN OUT (NPN OPEN COLLECTOR) 12-24VDC Max. 20mA
MAIN OUT (PNP OPEN COLLECTOR) 12-24VDC Max. 20mA
BCD OUT (NPN OPEN COLLECTOR) 12-24VDC Max. 20mA
※1: POL signal is ON when it is (-) display value

●NPN/PNP open collector output + PV transmission(DC4-20mA) output[MP5W-44/MP5W-45]
MAIN OUT (NPN OPEN COLLECTOR) 12-24VDC Max. 20mA
MAIN OUT (PNP OPEN COLLECTOR) 12-24VDC Max. 20mA
DC4-20mA Load 600Ω Max.

●NPN/PNP open collector output + Low speed serial output [MP5W-46/MP5W-47]
MAIN OUT (NPN OPEN COLLECTOR) 12-24VDC Max. 20mA
MAIN OUT (PNP OPEN COLLECTOR) 12-24VDC Max. 20mA
SERIAL OUT (NPN OPEN COLLECTOR) 12-24VDC Max. 20mA
※POL signal is ON when it is (-) display value.

●NPN /PNP open collector output + RS485 communication output [MP5W-48/MP5W-49]
MAIN OUT (NPN OPEN COLLECTOR) 12-24VDC Max. 20mA
MAIN OUT (PNP OPEN COLLECTOR) 12-24VDC Max. 20mA
RS485

■ Input・Output

●Input specification

1. Input signal
   (1)Solid state input
   ①Input frequency: 50kHz(Max.)
      But, standard duty rate of input signal is 1:1,
      ON/OFF pulse width should be each over 10μs.
   ②Input voltage Level : High voltage → 4.5-24VDC, Low voltage → 0-1.0VDC

   Min. 10μs
   High
   Low
   ON OFF *T : 1cycle of input signal
   T

   (2)Relay contact input
   ①Input frequency : 45Hz(Max.)
      But, ON/OFF pulse width should be each over 11ms.
   ②Relay contact specification : Please use a contact that can switch reliably at 12VDC, 2mA min. of load current.

2. Input type
   MP5W has **NPN input and PNP input at the same time** and it is able to select it in Parameter 1 group.
   (1)Connection examples of NPN input type
   ①Contact ②NPN voltage output type sensor ③NPN O・C output type sensor
   +12V
   IN
   ≦4.5kΩ
   0V(COM)

   (2)PNP input type
   ①Contact ②PNP voltage output type sensor ③PNP O・C output type sensor
   +12V
   IN
   ≦4.5kΩ
   0V(COM)

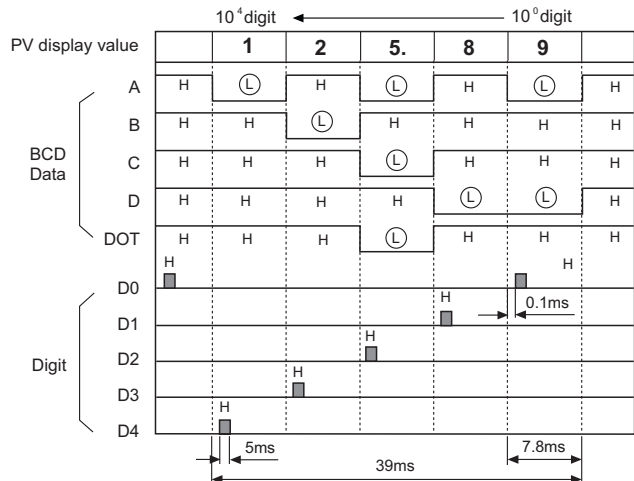   ※O・C is Open collector output.

●Output specification

1. Relay output
   ①Output : Comparative or alarm output(See the "■ **Output mode**")
   ②Output method : Relay
   ③Contact capacity : 250VAC 3A resistive load
   ④Life cycle : [Mechanical] 20,000,000 times(switch times 180 times/min.)
      [Electrical] Min.100,000 times(3A 250VAC at resistive load)
      (switching times : 20 times/min.)

2. Transistor output
   ①Output : Comparative or alarm output(See the "■ **Output mode**")
   ②Output method : NPN / PNP Open collector
   ③Rated load voltage : 12-24VDC
   ④Max. load current : 20mA

P−1

Column 1

3. BCD Dynamic output (negative logic)
① Output : Display value
② Output signal : BCD Data(A, B, C, D, DOT) ← A: Lowest bit, Dot: Highest bit
Digit Data(D0, D1, D2, D3, D4) ← D0: Lowest digit, D4: Highest digit
③ Output type : NPN Open Collector
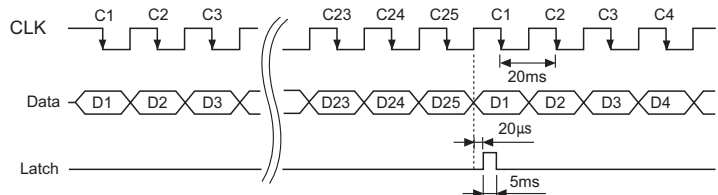④ Rated load voltage : 12-24VDC
⑤ Max. load current : 20mA
Ex) When display value is 125.89

4. Low speed serial output (negative logic)
① Output : Display value
② Output signal : Clock, Data, Latch
③ Clock cycle : 50Hz
④ Output CLK bit : 25 bit
⑤ Output Data bit : 25 bit
⑥ Output form: NPN Open Collector
⑦ Rated load voltage : 12-24VDC
⑧ Max. load current : 20mA
● Serial transmission time diagram

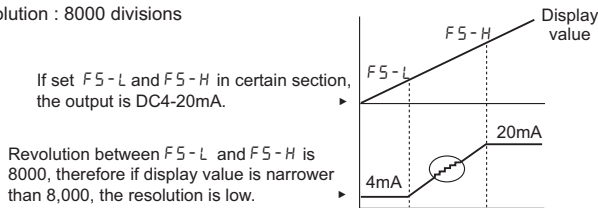● Data output sequence when it is serial transmission
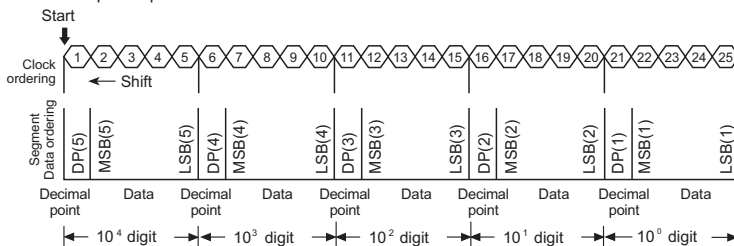
5. PV transmission output(DC4-20mA)
① Application : To transmit the measured value
② Function :
This function is to transmit DC4-20mA converted from measured display value between High limit output($F5-H$) and Low limit($F5-L$)
③ Range of High/Low limit output setting
• High limit setting range($F5-H$): within from min. to max. range of measurement
• Low limit setting range($F5-L$): within from min. to max. within range of measurement ($F5-H$ should be over "1" bigger than $F5-L$)
④ Resistive load : Max. 600Ω
⑤ Resolution : 8000 divisions

If set $F5-L$ and $F5-H$ in certain section, the output is DC4-20mA.

Revolution between $F5-L$ and $F5-H$ is 8000, therefore if display value is narrower than 8,000, the resolution is low.

6. RS485 communication output
① Address : 0 to 99 address
② Transmission speed(Baud rate) : 2400/4800/9600 bps
③ Transmission code : ASCII
④ Parity Bit : No
⑤ Data Bit : 8 Bit
⑥ Stop Bit : 1 Bit
⑦ Communication items
• MP5W ← PC : Comparative value of each bank data, Prescale value and Peak value, RESET control
• MP5W → PC : Comparative value of each bank data, Prescale value and Peak value, Display value

Column 2

■ Operation mode
● Select operation mode from $\bar{n}odE$(mode) of Parameter 1 group.
● There are 13 kinds of operation mode in this unit.

○ **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,
1) Frequency(Hz) = f × α (α = 1)
2) Number of revolution(rpm) = f × α (α = 60)
3) Speed(m/min) = f × α (α = 60L)
For several objects, α = $\dfrac{60L}{N}$
※ N= Number of detected objects(number of pulses per 1 revolution)
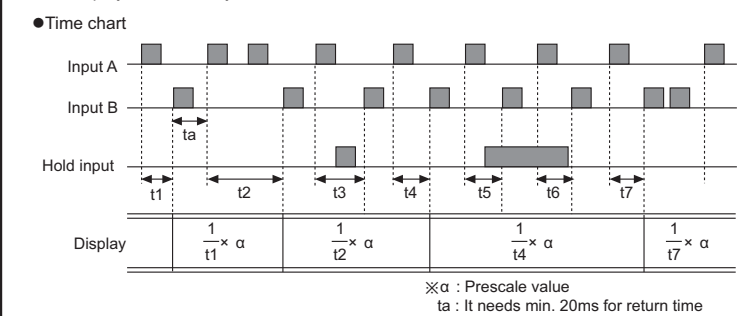L = The moved length of conveyor belt for 1 pulse [m]
● Display value and display unit

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 / sec	L
	m / min	60L
	km / hour	3.6L

※ Display unit of factory default : rpm

● Time chart

※α : Prescale value
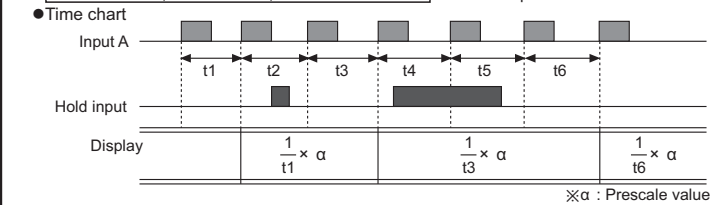
○ **F2 mode(Passing speed)**
It displays the passing speed between ON of input A and ON of input B.
Passing speed(V) = f × α (α = L[m])
※ f : This is reciprocal number of the time between ON of input A and ON of input B
L : The distance between input A and input B[m]
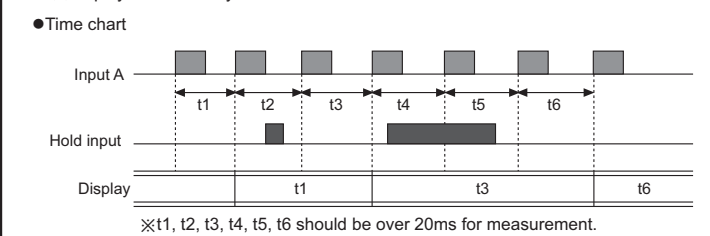● Display value and display unit

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
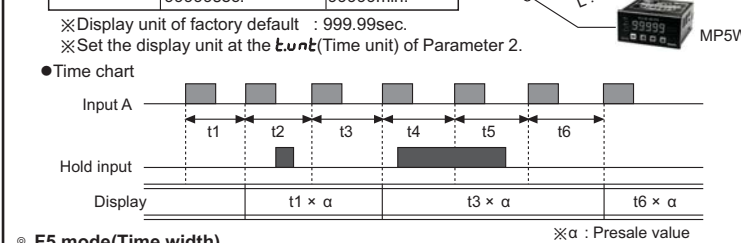
Display value	Display unit	
	SEC	MIN
Cycle	999.99sec.	999.99min.
	9999.9sec.	9999.9min.
	99min. 59.9sec.	99hour 59.9min.
	9hour 59min. 59sec.	999hour 59min.
	99999sec.	99999min.

※ Set the display unit at the $t.unt$(Time unit) of Parameter 2.
※ Display unit of factory default : 999.99sec.
● Time chart

※ t1, t2, t3, t4, t5, t6 should be over 20ms for measurement.

Column 3

○ **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.
Passing time[sec] = t × α (α = $\dfrac{L[m]}{\text{Moving distance within 1pulse cycle[m]}}$)
※ t:Measurement time[sec]
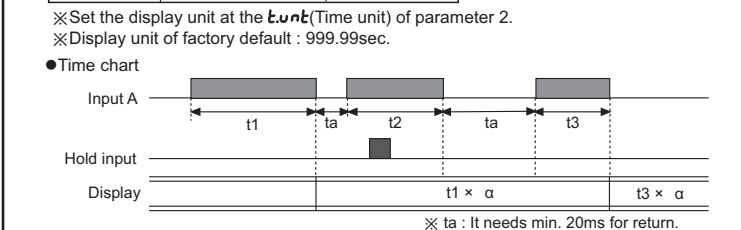L:Certain distance[m]
● Display value and display unit

Display value	Display unit	
	SEC	MIN
Passing time	999.99sec.	999.99min.
	9999.9sec.	9999.9min.
	99hour 59.9sec.	99hour 59.9min.
	9hour 59min. 59sec.	999hour 59min.
	99999sec.	99999min.

※ Display unit of factory default : 999.99sec.
※ Set the display unit at the $t.unt$(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	
	SEC	MIN
Time width	999.99sec.	999.99min.
	9999.9sec.	9999.9min.
	99hour 59.9sec.	99hour 59.9min.
	9hour 59min. 59sec.	999hour 59min.
	99999sec.	99999min.

※ Display unit of factory default : 999.99sec.
※ Set the display unit at the $t.unt$(Time unit) of parameter 2.
※ Display unit of factory default : 999.99sec.
● Time chart

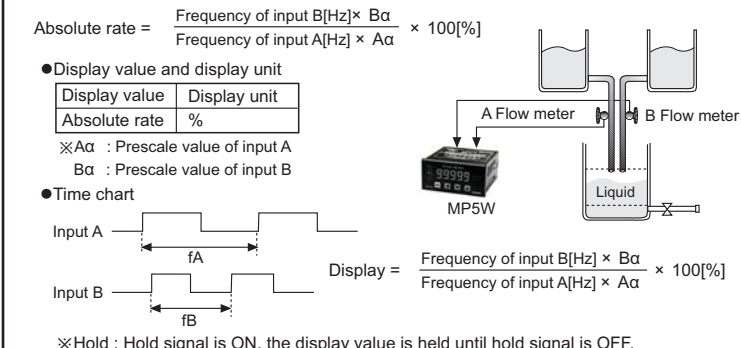※ ta : It needs min. 20ms for return.

○ **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	
	SEC	MIN
Time interval	999.99sec.	999.99min.
	9999.9sec.	9999.9min.
	99hour 59.9sec.	99hour 59.9min.
	9hour 59min. 59sec.	999hour 59min.
	99999sec.	99999min.

※ Display unit of factory default : 999.99sec.
※ Display unit can be set at $t.unt$(Time unit) of Parameter 2.
● Time chart

※ ta : It needs min.20ms for return time.
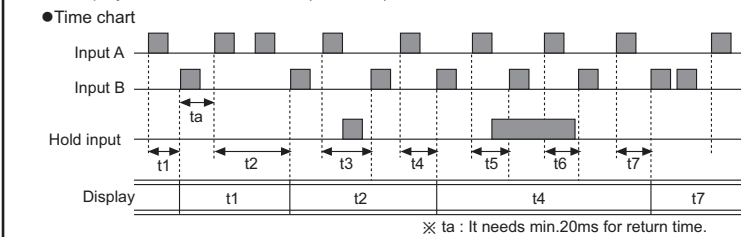
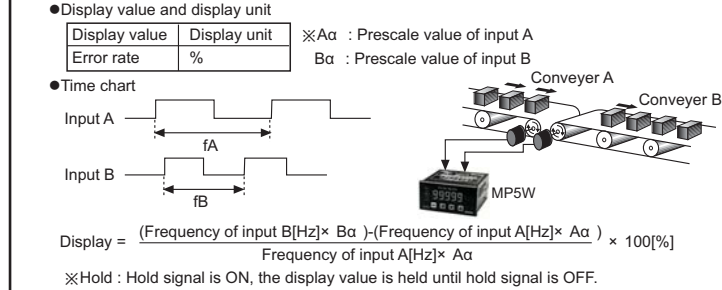○ **F7 mode(Absolute rate)**
It displays how many percentage(%) faster or late, speed, volume etc. of Input B against input A)
Absolute rate = (Input B / Input A) × 100%
Absolute rate = $\dfrac{\text{Frequency of input B[Hz]× Bα}}{\text{Frequency of input A[Hz] × Aα}}$ × 100[%]
● Display value and display unit

Display value	Display unit
Absolute rate	%

※ Aα : Prescale value of input A
Bα : Prescale value of input B
● Time chart

Display = $\dfrac{\text{Frequency of input B[Hz] × Bα}}{\text{Frequency of input A[Hz] × Aα}}$ × 100[%]

※ Hold : Hold signal is ON, the display value is held until hold signal is OFF.

Column 4

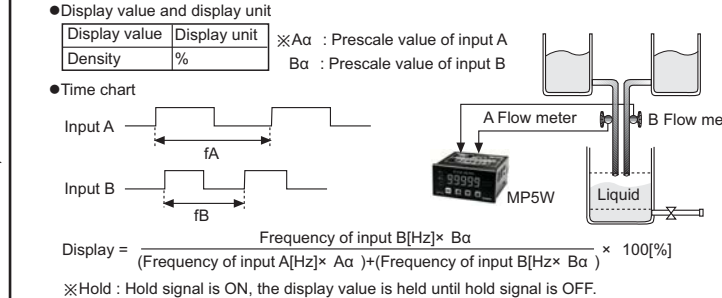○ **F8 mode(Error ratio)**
It displays how many percentage(%) faster or late of Input B against Input A.
Absolute rate = $\dfrac{\text{Input B-Input A}}{\text{Input A}}$ × 100[%]
Error rate = $\dfrac{\text{(Frequency of input B[Hz]× Bα)-(Frequency of input A[Hz]× Aα)}}{\text{Frequency of input A[Hz]× Aα}}$ × 100[%]
● Display value and display unit

Display value	Display unit
Error rate	%

※ Aα : Prescale value of input A
Bα : Prescale value of input B
● Time chart

Display = $\dfrac{\text{(Frequency of input B[Hz]× Bα)-(Frequency of input A[Hz]× Aα)}}{\text{Frequency of input A[Hz]× Aα}}$ × 100[%]

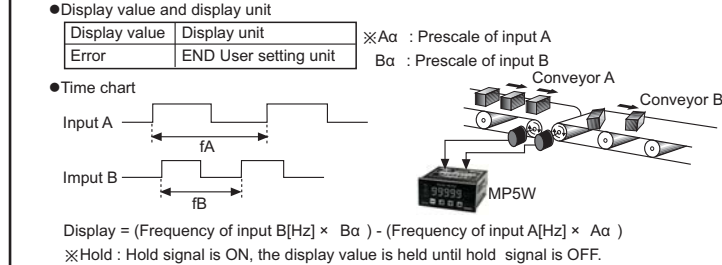※ Hold : Hold signal is ON, the display value is held until hold signal is OFF.

○ **F9 mode(Density)**
It displays the density rate of input B against total sum of input A and input B.
Density = $\dfrac{\text{Input B}}{\text{Input A + Input B}}$ × 100[%]
Density = $\dfrac{\text{Frequency of input B[Hz]× Bα}}{\text{(Frequency of input A[Hz]× Aα) + (Frequency of input B[Hz]× Bα)}}$ × 100[%]
● Display value and display unit

Display value	Display unit
Density	%

※ Aα : Prescale value of input A
Bα : Prescale value of input B
● Time chart

Display = $\dfrac{\text{Frequency of input B[Hz]× Bα}}{\text{(Frequency of input A[Hz]× Aα)+(Frequency of input B[Hz]× Bα)}}$ × 100[%]

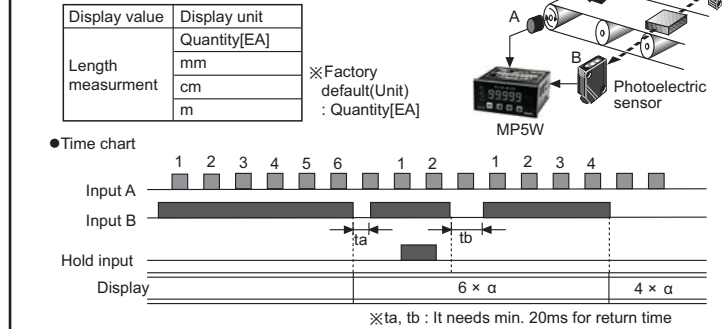※ Hold : Hold signal is ON, the display value is held until hold signal is OFF.

○ **F10 mode(Error)**
It displays the error between standard Input A and comparing Input B.
Error = Input B - Input A
Error = (Frequency of input B[Hz]× Bα) - (Frequency of input A[Hz]× Aα)
● Display value and display unit

Display value	Display unit
Error	END User setting unit

※ Aα : Prescale of input A
Bα : Prescale of input B
● Time chart

Display = (Frequency of input B[Hz]× Bα) - (Frequency of input A[Hz]× Aα)
※ Hold : Hold signal is ON, the display value is held until hold signal is OFF.

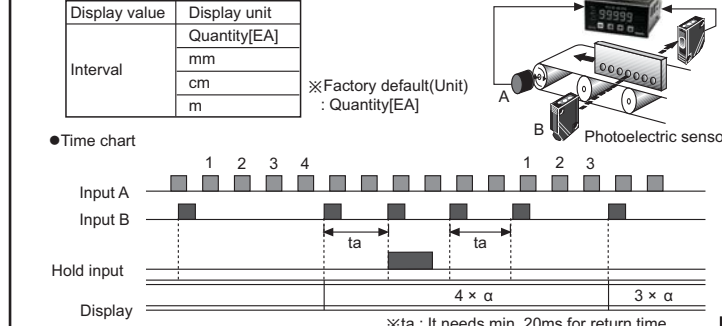○ **F11 mode(Length measurment)**
It displays the number of Input A pulse while Input B is ON.
Length measurment = P × α (※ P : Number of input A pulse, α : Prescale value)
● Display value and display unit

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

※ Factory default(Unit) : Quantity[EA]

● Time chart

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

○ **F12 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]

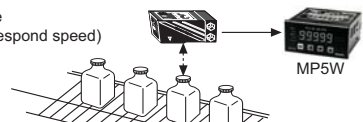● Time chart

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

F13 mode(Integration)

It displays the counting value against pulses of Input A.

Integration = P × α

※P : Pulse number of input A, α : Prescale value
※ Max. counting speed: 50kcps (same as max. respond speed)

● Display value and display unit

Display value	Display unit
Integration	Quantity[EA]

MP5W

● Operation and Time chart

①It counts the number of input A pulse.
②As 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.
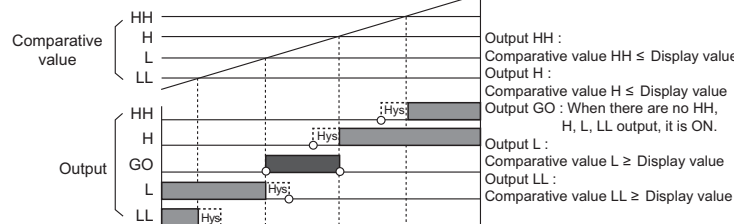

*α =1 display value
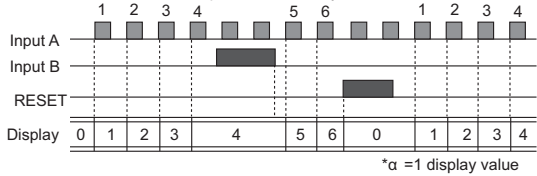
■ Output mode

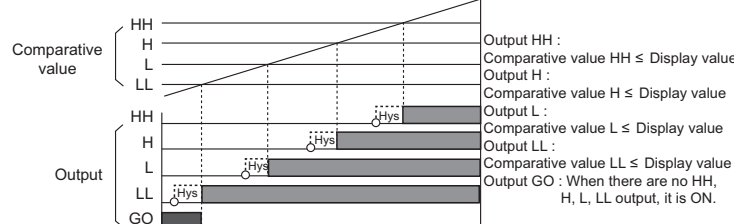● Select output mode in **out-t**(output type) of Parameter1 group.
● There are 5 stages output(HH, H, GO, L, LL) and 3 stage output(H, GO, L).
● There are 6 kinds of output mode such as S(Standard) output mode, H(High) output mode, L(Low) output mode, B(Block) output mode, I(One shot)output mode, F(Deviation)output mode.
● Comparative value(HH, H, L, LL) can be set as LL<L<H<HH in B output mode and the other outputs can be operated separately in output(S,H, L, I) mode regardless of comparative (HH, H, L, LL) set value.
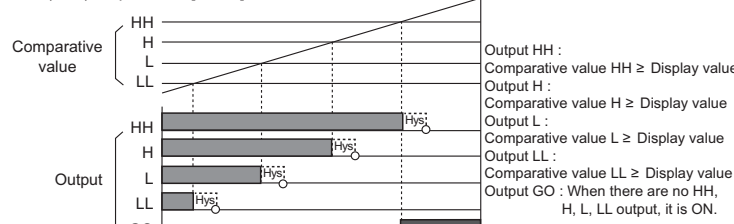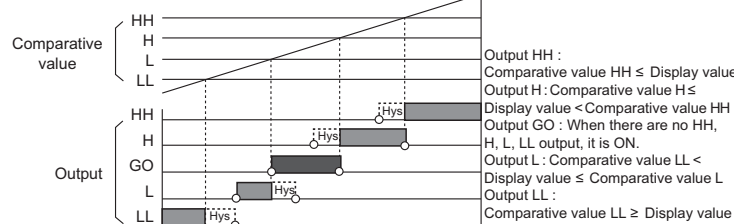
◉ S(Standard) output mode[**StArd**]

Output HH :
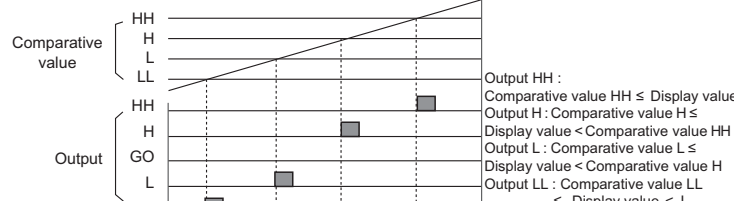Comparative value HH ≤ Display value
Output H :
Comparative value H ≤ Display value
Output GO : When there are no HH, H, L, LL output, it is ON.
Output L :
Comparative value L ≥ Display value
Output LL :
Comparative value LL ≥ Display value

◉ H(High) output mode[**out-h**]

Output HH :
Comparative value HH ≤ Display value
Output H :
Comparative value H ≤ Display value
Output L :
Comparative value L ≤ Display value
Output LL :
Comparative value LL ≤ Display value
Output GO : When there are no HH, H, L, LL output, it is ON.

◉ L(Low) output mode[**out-L**]

Output HH :
Comparative value HH ≥ Display value
Output H :
Comparative value H ≥ Display value
Output L :
Comparative value L ≥ Display value
Output LL :
Comparative value LL ≥ Display value
Output GO : When there are no HH, H, L, LL output, it is ON.

◉ B(Block) output mode[**out-b**]

Output HH :
Comparative value HH ≤ Display value
Output H : Comparative value H ≤ Display value < Comparative value HH
Output GO : When there are no HH, H, L, LL output, it is ON.
Output L : Comparative value LL < Display value ≤ Comparative value L
Output LL :
Comparative value LL ≥ Display value

◉ I(One Shot) output mode[**out-I**]

Output HH : Comparative value HH ≤ Display value
Output H : Comparative value H ≤ Display value < Comparative value HH
Output L : Comparative value L < Display value < Comparative value H
Output LL : Comparative value LL ≤ Display value < L

※There is no GO output in output I mode.
※One Shot(■) output time has been fixed 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 the front (MD+▲) keys at the same time.
● Display the setting value : Check the memorized the setting value by the (▲) key. (Display the memorized setting value for pressing the ▲ key continuously.)
● Deviation setting : Set H deviation [**PSt. h**], L deviation[**PSt. L**], by setting value. (The set deviation is memorized until set the next deviation again when power off.)
● Deviation setting range : 0.0001 to 99999(The setting range is changed by decimal point setting parameter. If set decimal point as 0000.0, the setting range is 0.1 to 9999.9.)
● Operation : Display value ≤ L deviation SV → L deviation output ON,
Display value ≤ H deviation SV → H deviation output ON

Press the (MD+▲) keys at the same time for memorizing the setting value
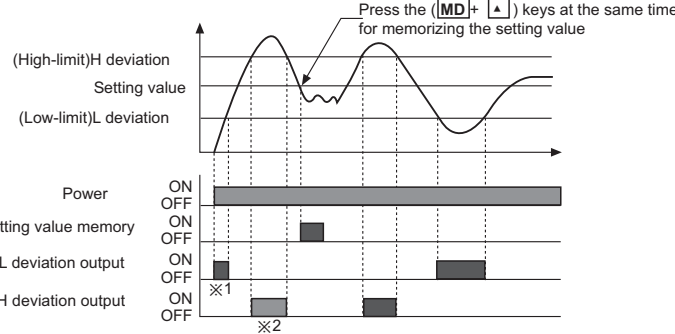
※1: When select the comparative output limit function, output does not come.
※2: Output position may different from above graph as output coming under assuming the setting value memory is before the setting value memory point on above graph.
※There are no HH, GO, LL outputs in F output mode.
※Even thought you set the deviation as "0(Zero)", it works as setting "1".

■ Operation chart by each Parameter group

● The display parameter are different by each operation mode, please see "◉ **Parameter**".
● ◐ : When select the operation mode, the parameter is displayed.
  X : When select the operation mode, the parameter is not displayed.

● Parameter 0 group

Parameter	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13
PSthh	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐
PSt. h	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐
PSt. L	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐
PStLL	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐
hPEU	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	X
LPEU	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	X

● Parameter 1 group

Parameter	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13
ñodE	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐
In-A	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐
In-b	X	◐	X	X	◐	◐	◐	◐	◐	◐	○	○	○
out-t	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	X
hYS	◐	X	X	X	X	X	◐	◐	◐	◐	X	X	X
GuArd ↔ F.dEFY	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	X
GuArd ↔ StArt	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	X
AutoA	◐	X	◐	X	◐	◐	◐	◐	◐	◐	X	X	X
Autob	X	X	X	X	◐	◐	◐	◐	◐	◐	X	X	X
ñEño	X	X	X	X	X	X	X	X	X	X	X	X	◐

※"○ " : IN-b sensor is set as nPn, h, F or PnP, h, F in mode F11, F12, F13.

● Parameter 2 group

Parameter	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13
PbAnt	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐
dot	◐	◐	X	X	X	X	◐	◐	◐	◐	◐	◐	◐
tunt	X	X	◐	◐	◐	◐	X	X	X	X	X	X	X
PSthh	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐
PSt. h	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐
PSt. L	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐
PStLL	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐
PSCAH[1]	◐	◐	X	◐	X	X	◐	◐	◐	◐	◐	◐	◐
PSCAY[1]	◐	◐	X	◐	X	X	◐	◐	◐	◐	◐	◐	◐
PSCbH	X	X	X	X	X	X	◐	◐	◐	◐	X	X	X
PSCbY	X	X	X	X	X	X	◐	◐	◐	◐	X	X	X
di SPt	◐	X	X	X	X	X	◐	◐	◐	◐	X	X	X

※1 : PSC. H, PSC. Y are displayed in mode F1, F2, F4, F11, F12, F13.

● Parameter 3 group

Parameter	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13
FS-h					Operates all operation modes (F1 to F13)								
FS-L					(PV transmission output)								
Addr					Operates all operation modes (F1 to F13)								
bPS					(RS485 communication output)								
rEñot													
LoC	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐

● Monitoring delay function operation chart by each output mode

out-t	StArd	out-h	out-L	out-b	out-I	out-F
Comparative output adjustment function.	◐	X	X	◐	X	◐
Starting correction timer function	◐	◐	◐	◐	◐	◐

■ Parameter

● Parameter 0 group

	Menu and Parameter display	Parameter	Setting range	Setting key
RUN — MD Touch — MD Touch ※1	**PSt.hh** → MD → **PSt.hh 99999**	Set HH comparative value	● F1, F2, F7, F9, F11, F12, F13 : 0 to 99999	◄ : Moves the setting digit
	PSt. h → MD → **PSt. h 99999**	Set H comparative value	● F3 to F6 : 0 to Setting time range	▼, ▲ : Changes the setting value
	PSt. L → MD → **PSt. L 00000**	Set L comparative value	● F8, F10 : -19999 to 99999	MD : Fixes and moves to the next parameter
	PSt.LL → MD → **PSt.LL 00000**	Set LL comparative value		
	h.PEU → MD → **h.PEU 99999**	Displays high peak value among measuring values		● Reset: If you press the ◄ key for 2sec. while h.PEU or L.PEU flashes, the Peak value display is reset to the current measuring value and it flashes continually. If you touch the MD key once again, it returns to L.PEU or RUN.
	L.PEU → MD → **L.PEU -19999**	Displays low peak value among measuring values		

※1: If pressing the MD key in RUN mode, it enters into PSt.hh(F output mode:PSt. h) at comparative output mode and h.PEU at indication type.
※When entering into parameter 0, the parameter and data flash by 1 sec. then moving the setting digit and changing the setting value are available.
※It displays the set data to flash by 1sec., then move to next Parameter with touching the MD key once.

● Parameter 1 group

	Menu and Parameter display	Parameter	Setting range	Setting key
MD press 3sec. **RUN**	**PArA. 1** After displaying PArA.1 for 2sec. then advance to ñodE automatically. Pressing the MD key before 1sec. it moves to ñodE.	This is parameter 1 group.		
	ñodE → **ñodE F1**	Select operation mode.	F1 to F13	▼,▲ : Changes the setting mode F1→F2 to F13 ; MD : Fixes and moves to the next parameter
	In-A → **In-A nPn.h.F**	Set the sensor type of input A.	• PNP transistor output type : PnP.h.F • Contact output type(L output) : PnP.L.F • NPN transistor output type : nPn.h.F • Contact output type(H output) : nPn.L.F	▼,▲ : Changes the sensor type nPn.h.F→nPn.L.F→PnP.h.F→PnP.L.F ; MD : Fixes and moves to the next parameter
	In-b → **In-b nPn.h.F**	Set the sensor type of input B.		
	out-t → **out-t StArd**	Select the output mode. (※1)	StArd / out-h / out-L out-b / out-I / out-F	▼,▲ : Changes the setting mode StArd→out-h→out-L; out-F←out-I←out-b ; MD : Fixes and moves to the next parameter
	hYS → **hYS 0001**	Set the hysteresis for the output. (※2)	0 to 9999 (If decimal point is set in 0000.0, the range is 0. to 999.9)	◄ : Moves the setting digit ; ▼,▲ : Changes the setting value ; MD : Fixes and moves to the next parameter
	GuArd → **GuArd F.dEFY** ◄► **GuArd StArt** ① → **StArt 99.9**	Select the start compensating timer function or comparative output(L, LL) limit function. (※3)	①F.dEFY / StArt ②When selecting StArt, When StArt 99.9 flashes by 1sec. cycle, set the starting correction time 0.0 to 99.9.	①▼,▲ : Changes the setting mode F.dEFY→StArt ; MD : Fixes and moves to the next parameter ; ②◄ : Moves the setting digit ; ▼,▲ : Changes the setting value ; MD : Fixes and moves to the next parameter
	Auto.A → **Auto.A 9999.9**	Set the Auto-zero time of INA input.	0.1 to 9999.9	◄ : Moves the setting digit ; ▼,▲ : Changes the setting value ; MD : Fixes and moves to the next parameter
	Auto.b → **Auto.b 9999.9**	Set the Auto-zero of INB input.	0.1 to 9999.9	◄ : Moves the setting digit ; ▼,▲ : Changes the setting value ; MD : Fixes and moves to the next parameter
	ñEño → **ñEño oFF**	It sets the memory retention. The measuring value is memorized when the power off. (Mode F13 only)	oFF : No memory retention on : Memory retention	▼,▲ : Changes the setting mode oFF→on ; MD : Fixes and moves to the next parameter ñodE.

※If pressing the MD key for 3 sec. in RUN, it enters into parameter 1 group.
※1: It is not be displayed in indication type.
  The output mode is fixed as out-h type in F13 operation mode.
※2: Hysteresis operation mode is able to be set in F1, F7 to F10 operation mode.
※3: You are able to select the comparative output[F.dEFY] limit function or starting correction[StArt] timer in monitoring delay function mode.
  When selecting the comparative output limit[F.dEFY] function, it moves to the next parameter[Auto.A] and when selecting the starting correction timer[StArt] you need to be set the starting correction time[0.0 to 99.9] so that it moves to the next parameter[Auto.A].
※If pressing the MD key for over 2 sec. in every setting mode, data is set and returned to RUN.
※When entering into parameter 1 group, the parameter name and data flash by 1 sec. then move setting digit by the ◄ key or change the setting value by ▼,▲ key.
※All data set by users are displayed to 1sec. it moves to the next parameter by pressing the MD key.

● Parameter 2 group

MD Press for 4sec. **RUN**

Menu and Parameter display	Parameter	Setting range	Setting key
PAr.A.2 → After displaying PAr.A.2 for 2sec. then advance to P.bAnk automatically. Pressing MD key before 1sec. it moves to P.bAnk.	This is parameter 2 group.		
P.bAnk → P.bAnk 1	Select Data bank.	1 : Data bank 1 2 : Data bank 2	▼,▲ : Changes the setting value 1→2 MD : Fixes and moves to the next parameter
dot → dot 00000	Set decimal point position of display value	00000 00.000 0000.0 0.0000 000.00	◄ : Moves the decimal point MD : Fixes and moves to the next parameter
t.unt → t.unt t.SEC ⇄ t.unt t.ñin ①	It is displayed in F3, F4, F5, F6 operation mode and set the time unit. (※1)	SEC / MIN 999.99sec. / 999.99min. 9999.9sec. / 9999.9min. 99min.59.9sec. / 99hour59.9min. 9hour59min.59sec. / 999hour59min. 99999sec. / 99999min.	①▼,▲ : Changes the setting mode t.SEC→t.ñin ②▼,▲ : Changes the setting mode -999.99→9999.9→99.59.9→99999→9.59.59(sec.) 999.59(min.) ①Select the time unit ②Select the time range MD : Fixes and moves to the next parameter
t.SEC 999.99 → t.ñin 999.99 ②			
PSt.hh → PSt.hh 99999	Set the comparative value HH.		
PSt. h → PSt. h 99999	Set the comparative value H.	●F1, F2, F7, F9, F11, F12, F13 : 0 to 99999	◄ : Moves the setting digit
PSt. L → PSt. L 00000	Set the comparative value L.	●F3 to F6 : 0 to Setting time range	▼,▲ : Changes the setting value
PSt.LL → PSt.LL 00000	Set the comparative value LL.	●F8, F10 : -19999 to 99999	MD : Fixes and moves to the next parameter
PSC.AH → PSC.AH 6.0000	Set the prescale value of input A mantissa(X).	0.0000 to 9.9999	◄ : Moves the setting digit ▼,▲ : Changes the setting value MD : Fixes and moves to the next parameter
PSC.AY → PSC.AY 10 01	Set the prescale value of input A an exponent(y).	10-9 to 10 09 (10⁻⁹ to 10⁹)	◄ : Moves the setting digit ▼,▲ : Changes the setting value MD : Fixes and moves to the next parameter
PSC.bH → PSC.bH 6.0000	Set the prescale value of input B mantissa(X).	0.0000 to 9.9999	◄ : Moves the setting digit ▼,▲ : Changes the setting value MD : Fixes and moves to the next parameter
PSC.bY → PSC.bY 10 01	Set the prescale value of input B an exponent(y).	10-9 to 10 09 (10⁻⁹ to 10⁹)	◄ : Moves the setting digit ▼,▲ : Changes the setting value MD : Fixes and moves to the next parameter
dI SP.t → dI SP.t 0.05	Select the display cycle.	0.05, 0.5, 1, 2, 4, 8	▼,▲ : Changes setting value 0.05-0.5-1 / 8-4-2 MD : Fixes and moves to the P.bAnk

※It enters into parameter 2 if pressing the MD key for 4sec in RUN mode
※1. It is displayed in F3, F4, F5, F6 operation mode only and enable to set the time until as sec.[t.SEC] or min.[t.ñin] in t.unt parameter.
　Select the time range after selecting the time unit as sec.[t.SEC] or min. [t.ñin].
※If pressing the MD key for over 2 sec. in every setting mode, data is set and return to RUN.
※When entering into the parameter 2 group, the parameter name and data value flash by cycle(1sec.). Then to move the setting digit by the ◄ key and change the setting value by the ▼▲ keys.
※The fixed data value set by user in each parameter flashes by cycle(1sec.) and move to the next parameter by pressing the MD key.
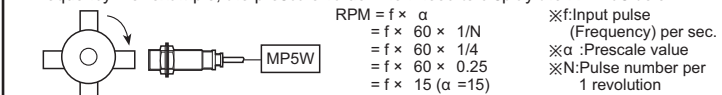
● Parameter 3 group

MD Press for 5sec. **RUN**

Menu and Parameter display	Parameter	Setting range	Setting key
PAr.A.3 → Display PAr.A.3 for 2sec. then move to FS-h automatically. Move to FS-h, if press the MD key before 1sec.	This is parameter 3 group.		
FS-h → FS-h 99999	Set the High-limit value of PV transmission output.	●F1, F2, F7, F9, F11, F12, F13 : 0 to 99999	◄ : Move the setting digit
FS-L → FS-L 00000	Set the Low-limit value of PV transmission output.	●F3 to F6 : 0 to Setting time range	▼,▲ : Change the setting value
		●F8, F10 : -19999 to 99999	MD : Fix and move to the next parameter
Addr → Addr 00	Set the communication Address.	00 to 99 (32 channel)	◄ : Move the setting digit ▼,▲ : Change the setting value MD : Fix and move to the next parameter
bPS → bPS 2400	Select the communication speed.	2400 / 4800 / 9600	▼,▲ : Change the setting mode 2400→4800→9600 MD : Fix and move to the next parameter
rEñot → rEñot oFF	Select the Remote and the Local. ※1	on : Use oFF : Not use	▼,▲ : Change the setting mode oFF → on MD : Fix and move to the next parameter
LoC → LoC oFF	Enable to lock the key for each parameter group	oFF : There is no key lock in all mode LoC.0 : Parameter0 to 3 Lock LoC.1 : Parameter1 to 3 Lock LoC.2 : Parameter2 to 3 Lock LoC.3 : Parameter3 only	▼,▲ : Change the setting mode oFF → LoC.0 → LoC.1 / LoC.3 ← LoC.2 MD : Fix and move to the next FS-h.

※It enters into parameter 3 if pressing the MD key for 5sec. in RUN mode.
※1: It is enable to set the remote or local function in communication output type. When select the remote[rEñot] function, the front keys are disabled.
※2: Pressing the MD key at parameter 3, it enters into FS-h or Addr(option function), LoC(Indication type only).
※If pressing the MD key for over 2 sec. in every setting mode, data is set and return to RUN.
※When entering into the parameter 3 group, the parameter name and data value flash by cycle(1sec.). Then move the setting digit by the ◄ key and change the setting value by the ▼ ▲ keys.
※The fixed data value by user in each parameter flashes by cycle(1sec.) and move to the next parameter by pressing the MD key.

■ Function

● Prescale function
This prescale function allows you to multiply the number of pulse or pulse length by a variable(X × 10⁻⁹) then display a specific unit or a certain double number. It displays frequency or RPM from prescale value(α) by measuring the input A frequency. For example, the prescale value means need to display the RPM as below.

RPM = f × α
= f × 60 × 1/N
= f × 60 × 1/4
= f × 60 × 0.25
= f × 15 (α =15)

※f:Input pulse (Frequency) per sec.
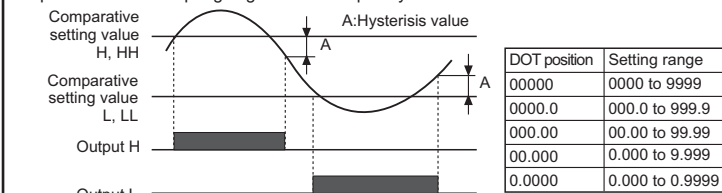α :Prescale value
N:Pulse number per 1 revolution

● How to set prescale value(α =15)
Set prescale value separating as a mantissa(X) and an exponent(Y) at PSC.AH, PSC.AY (or PSC.b.H, PSC.bY). For example, prescale value(α)=15, a mantissa(X):1.5000, an exponent(Y):10¹. Or if set α value as PSC.AH=0.1500, PSC.AY=10² then also get the same display value.

● Monitoring function
This function is to save High Peak value(h.PEk) or Low Peak value(L.PEk) against display value.
● User can check saved value in Parameter 0 group. And High Peak value(h.PEk) or Low Peak value(L.PEk) is continuously saved during checking.
● See Parameter 0 for Reset.

● Hysteresis function
Set the Hysteresis value(A) for comparative setting value in order to prevent unstable operation due to output going ON/OFF frequently.

DOT position	Setting range
00000	0000 to 9999
0000.0	000.0 to 999.9
000.00	00.00 to 99.99
00.000	0.000 to 9.999
0.0000	0.000 to 0.9999

※You are able to set "0", but when set "0", the actual operation is as "1".
※The initial setting value is 0001.
※You are able to set in the Parameter 1 group.

● Monitoring delay time function
This function is for the stable control to limit L, LL outputs until certain output is come or to limit all outputs while the equipment is reaching a stable status against various change of input such as the staring current when the motor is running after power on.
There are the starting correction timer function and comparative output limit function in the monitoring delay function.
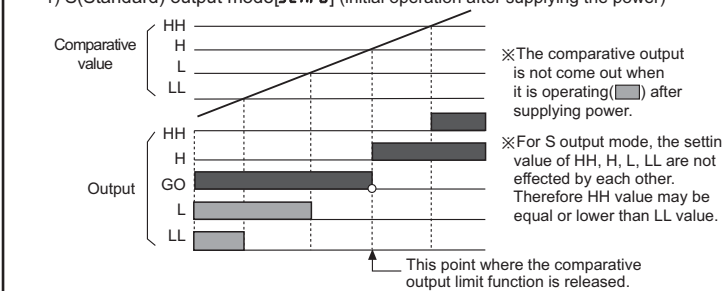● The starting correction timer function
This function is to make the output not come out during the setting time. (Time setting range 0.0 to 99.9sec.)
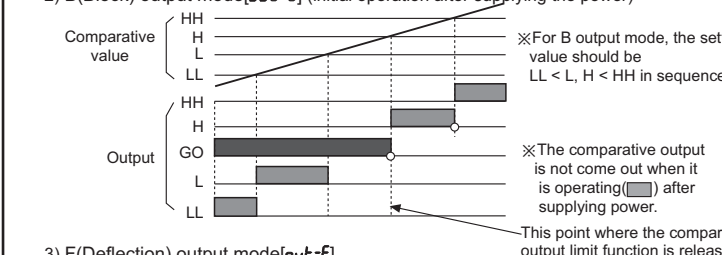● Comparative output limit function(LL, L output limit function)
Applicable output mode: S,B,F mode(See ※ Output mode)
This function is to limit the LL, L output before H or HH output.

1) S(Standard) output mode[StArd] (initial operation after supplying the power)

※The comparative output is not come out when it is operating(■) after supplying power.
※For S output mode, the setting value of HH, H, L, LL are not effected by each other. Therefore HH value may be equal or lower than LL value.

This point where the comparative output limit function is released.

2) B(Block) output mode[out-b] (initial operation after supplying the power)

※For B output mode, the setting value should be LL < L, H < HH in sequence.

※The comparative output is not come out when it is operating(■) after supplying power.

This point where the comparative output limit function is released.

3) F(Deflection) output mode[out-f] (initial operation after supplying the power)

※For F output mode, the comparative output limit function is released at the setting value(Standard setting).
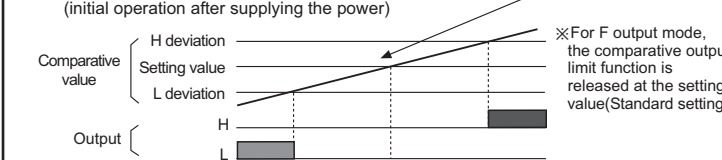
● Auto-Zero time setting function
This function is to set zero for display value forcibly when input signal is not entered within the auto-zero set time. Set the auto-zero set time longer than the longest input signal. When the set time is longer, it takes longer time to turn to zero.
For comparative value output type, respond speed for output is slow.
● Auto-zero set time range(factory default: 9999.9sec)
● When display value turns to zero, comparative output operates by display value "00000".

● Lock setting function
This function is to set the enable or disable of each Parameter and mode changes in MP5W.

Parameter	Parameter 0 group	Parameter 1 group	Parameter 2 group	Parameter 3 group
oFF	-	-	-	-
LoC 0	●	●	●	●
LoC 1	-	●	●	●
LoC 2	-	-	●	●
LoC 3	-	-	-	●

※ -: Unlock, ● : Lock
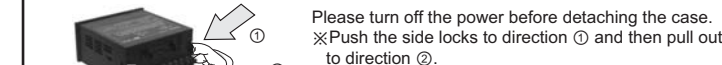※Lock setting is available in Parameter 3 group.

● Inner hardware Lock setting function
This function is to lock LoC in Parameter 3 group by Inner hardware Lock mode in order to prevent from parameter wrong setting.

	Pin	LoC Mode	Remark
H0 mode (Hardware Lock0)	Front	Check: ○ , Change: ○	Factory default
H1 mode (Hardware Lock1)	Front	Check: ○ , Change: ×	
H2 mode (Hardware Lock2)	Front	Check: × , Change: ×	

※Setting pin for Lock setting is located on internal PCB.
※Case datachment

Please turn off the power before detaching the case.
※Push the side locks to direction ① and then pull out to direction ②.

● Display cycle selection function
This function is to change the display cycle in range of 0.05/0.5/1/2/4/8 sec., and displays the average value of measuring value for the setting cycle.

● Time unit selection function
Enable to display PV value with firmed time unit in range of various time.
● Time unit selection function can be set in parameter 2 group.
● Applicable mode : Mode 3 to 6
※When selecting F3 to F6 mode, "dot" parameter of PA2 is not displayed.

SEC	MIN
999.99sec.	999.99min.
9999.9sec.	9999.9min.
99min.59.9sec.	99hour59.9min.
9hour59min.59sec.	999hour59min.
99999sec.	99999min.

● Data Bank switching function
This function is to use the values by switching Data Bank 1, 2 after registering comparative setting value and prescale value into Data Bank1 and Data Bank2.
● When the 3 and 5 terminals are open circuited, the comparative value and prescale of Data Bank 1 are used.
● When the 3 and 5 terminals are short-circuited, the comparative value and prescale of Data Bank 2 are used.
● After selecting the Data Bank for saving the comparative setting value and prescale value, set the comparative setting value and prescale value then it is saved at Data Bank.

● Factory default

●Parameter 1 group

Mode	SV	Mode	SV
ñodE	F1	InGuArd	FdEFY
In-AnPnhF	AutoA	99999
out-t	StArd	Autob	99999
hYS	0001	ñEño	oFF

●Parameter 2 group

Mode	SV	Mode	SV
PbAnk	1	PStLL	00000
dot	00000	PSCAH	6.000
PSthh	99999	PSCAY	10 01
PSt. h	99999	dI SP.t	0.05
PSt. L	00000	–	–

●Parameter 3 group

Mode	SV
FS-h	99999
FS-L	00000
Addr	01
bPS	9600
rEñot	oFF
LoC	oFF

※The specification may not be displayed due to the operation mode and output specification.

■ Caution for using
1. Installation environment
　①It shall be used indoor　⑤Pollution Degree 2
　④Altitude Max. 2000m　②Installation Category Ⅱ.
2. Please use separated line from high voltage line or power line in order to avoid inductive noise.
3. Please install power switch or circuit breaker in order to cut the power supply.
4. The switch or circuit breaker should be installed near by users for safety.
5. Do not use this unit at below places.
　①Place where there are severe vibration or impact.
　②Place where there are direct ray of the sun.
　③Place where strong magnetic field or electric noise are generated.
6. Storage method
　When storing this unit for a long time, please avoid the direct ray of the sun and keep this unit under circumstances as -20 to +60℃, 35 to 85RH.
7. Input line
　Shield wire must be used when the measuring input line is getting longer or there are lots of noises.
8. Please put enough space between power line and terminal of measuring input.

●Using shield with two wires

※It may cause malfunction if above instructions are not followed.

■ Main products