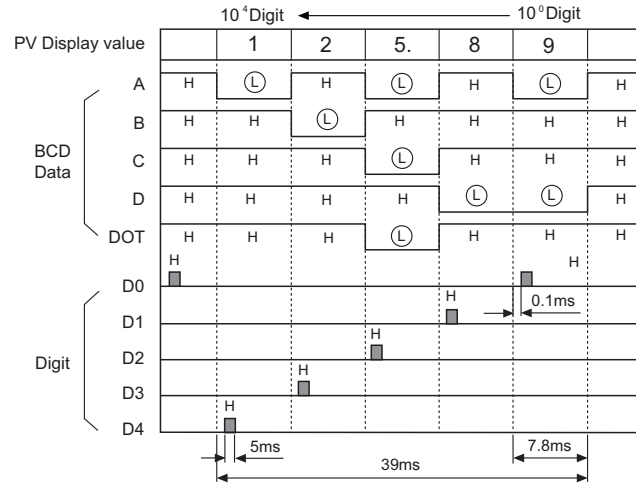


3. BCD Dynamic output

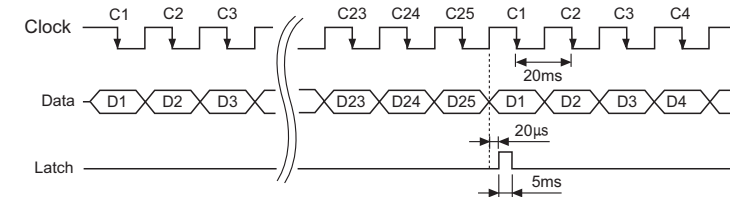
- Output: Display value
 - Output signal: BCD Data(A, B, C, D, DOT) ← A: Lowest bit, Dot: Highest bit
Digit Data(D0, D1, D2, D3, D4) ← D0: Lowest digit, D4: Highest digit
 - Output type: NPN Open Collector
 - Rated load voltage: 12-24VDC
 - Max. load current: 20mA
- Ex) When display value is 125.89



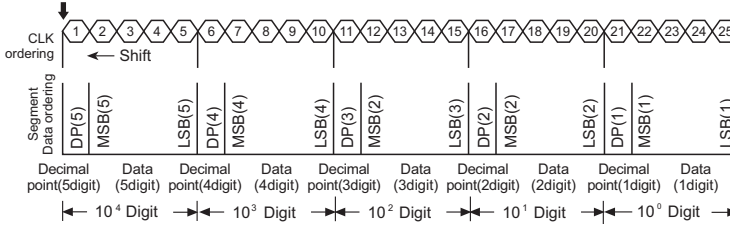
4. Low speed serial output

- Output: Display value
- Output signal: Clock, Data, Latch
- Clock cycle: 50Hz
- Output Clock bit: 25 bit
- Output Data bit: 25 bit
- Output form: NPN Open Collector
- Rated load voltage: 12-24VDC
- Max. load current: 20mA

Serial transmission time diagram



Data output sequence when it is serial transmission Start

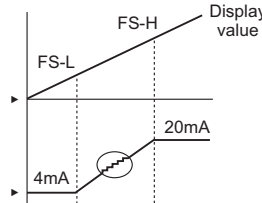


5. PV transmission output(4-20mADC)

- Application : To transmit the measured value
- Function : This function is to transmit 4-20mADC converted from measured display value between High limit output(FS-H) and Low limit(FS-L).
- Range of High/Low limit output setting
-High limit setting range(FS-H):From min. to max within range of measurement
-Low limit setting range(FS-L):From min. to max within range of measurement (FS-H should be over "1" bigger than FS-L)
- Resistive load : Max. 600Ω
- Resolution : 8000 division

If set FS-L and FS-H in certain section, the output will be 4-20mADC.

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



6. RS485 communication output

- Address: 0 ~ 99 address(32 channel)
- Transmission speed(Baud rate): 2400/4800/9600 bps
- Transmission code: ASCII
- Parity Bit: No
- Data Bit: 8 Bit
- Stop Bit: 1 Bit
- 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

Operation mode

- Select operation mode from **mode**(mode) of Parameter 1 group.
- There are 13 kinds of operation mode in this unit.

Mode F1(Frequency/Number of revolution/Speed)

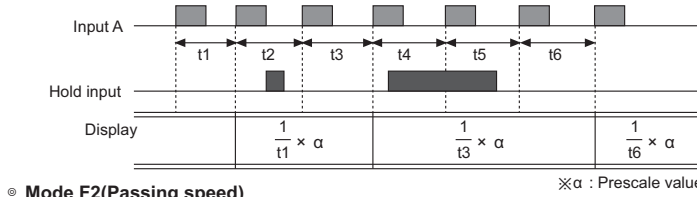
This mode is to display calculated frequency or number of revolution, speed by measuring frequency of Input A,

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

Time chart



Mode F2(Passing speed)

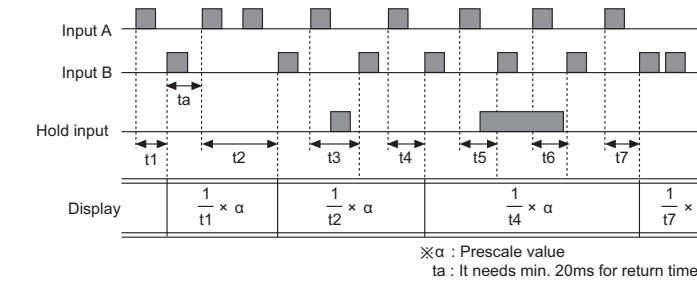
It displays the passing speed between ON of input A and ON of input B.
Passing speed(V) = $f \times \alpha$ ($\alpha = L[\text{m}]$)
※f : This is reciprocal number of the time between ON of input A and ON of input B
L : The distance between input A and input B[m]

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



Mode F3(Cycle)

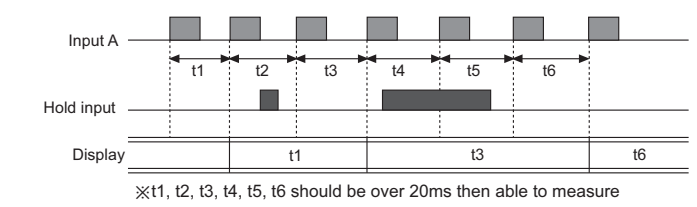
It displays the time from when input A is ON to the next ON of input A.
Cycle(T) = t
※t: Measurement time[sec]

Display value and display unit

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

Mode F4(Passing time)

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

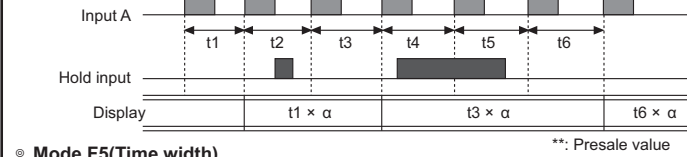
$$\text{Passing time[sec]} = t \times \alpha \quad (\alpha = \frac{L[\text{m}]}{\text{Moving distance within 1 pulse cycle[m]}})$$

Display value and display unit

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

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

Time chart



Mode F5(Time width)

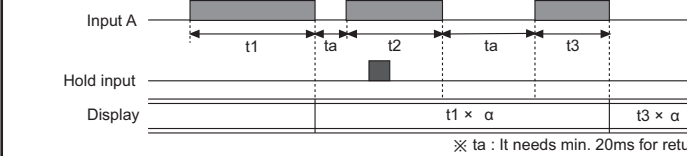
It displays the ON time of input A.
Time width(T) = t
※t : ON measurement time of input A[sec]

Display value and display unit

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

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

Time chart



Mode F6(Time interval)

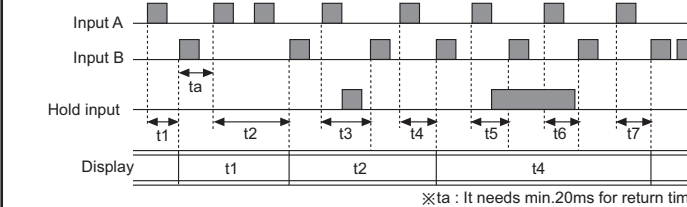
It displays the time from input A is ON to input B is ON.
Time difference(T) = t(ta to tb)
※t(ta to tb):The measurement time from input A is ON to input B is ON[sec]

Display value and display unit

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

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

Time chart



Mode F7(Absolute rate)

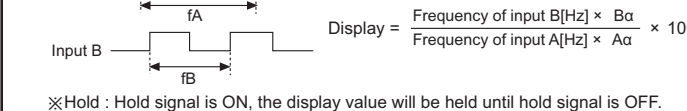
It displays how many percentage(%) faster or late, speed, volume etc. of Input B against input A)
Absolute rate = $(\text{Input B} / \text{Input A}) \times 100\%$
Absolute rate = $\frac{\text{Frequency of input B[Hz]} \times \text{Ba}}{\text{Frequency of input A[Hz]} \times \text{Aa}} \times 100\%$

Display value and display unit

Display value	Display unit
Absolute rate	%

※Aa : Prescale value of input A
Ba : Prescale value of input B

Time chart



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

Mode F8(Error ratio)

It displays how many percentage(%) faster or late of Input B against Input A.

$$\text{Absolute rate} = \frac{\text{Input B} - \text{Input A}}{\text{Input A}} \times 100\%$$

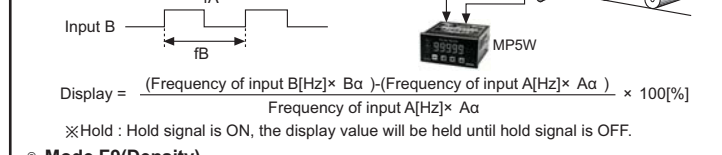
$$\text{Error rate} = \frac{(\text{Frequency of input B[Hz]} \times \text{Ba}) - (\text{Frequency of input A[Hz]} \times \text{Aa})}{\text{Frequency of input A[Hz]} \times \text{Aa}} \times 100\%$$

Display value and display unit

Display value	Display unit
Error rate	%

※Aa : Prescale value of input A
Ba : Prescale value of input B

Time chart



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

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

Mode F9(Density)

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

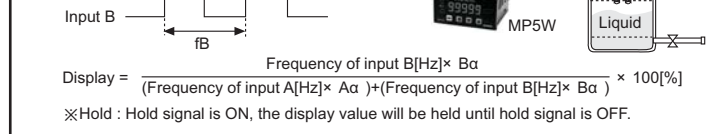
$$\text{Density} = \frac{\text{Input B}}{\text{Input A} + \text{Input B}} \times 100\%$$

Display value and display unit

Display value	Display unit
Density	%

※Aa : Prescale value of input A
Ba : Prescale value of input B

Time chart



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

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

Mode F10(Error)

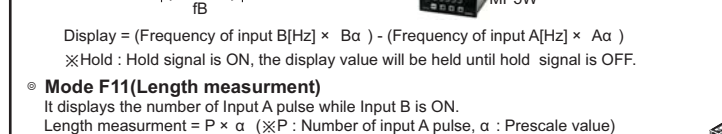
It displays the error between standard Input A and comparing Input B.
Error = Input B - Input A
Error = $(\text{Frequency of input B[Hz]} \times \text{Ba}) - (\text{Frequency of input A[Hz]} \times \text{Aa})$

Display value and display unit

Display value	Display unit
Error	END User setting unit

※Aa : Prescale of input A
Ba : Prescale of input B

Time chart



$$\text{Display} = (\text{Frequency of input B[Hz]} \times \text{Ba}) - (\text{Frequency of input A[Hz]} \times \text{Aa})$$

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

Mode F11(Length measurement)

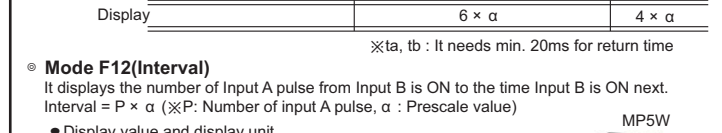
It displays the number of Input A pulse while Input B is ON.
Length measurement = $P \times \alpha$ (※P : Number of input A pulse, α : Prescale value)

Display value and display unit

Display value	Display unit
Length measurement	Quantity[EA]

※Factory default(Unit) : Quantity[EA]

Time chart



$$\text{Display} = (\text{Frequency of input B[Hz]} \times \text{Ba}) - (\text{Frequency of input A[Hz]} \times \text{Aa})$$

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

Mode F12(Interval)

It displays the number of Input A pulse from Input B is ON to the time Input B is ON next.
Interval = $P \times \alpha$ (※P : Number of input A pulse, α : Prescale value)

Display value and display unit

Display value	Display unit
Interval	Quantity[EA]

※Factory default(Unit) : Quantity[EA]

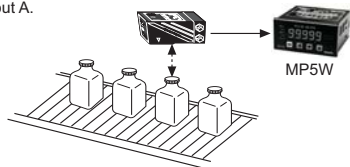
Time chart



※Hold : Hold signal is ON, the display value will be held until hold signal is OFF. P-2

Mode F13(Integration)

It displays the counting value against pulses of Input A.
Integration = P × α
※P: Pulse number of input A, α: Prescale value

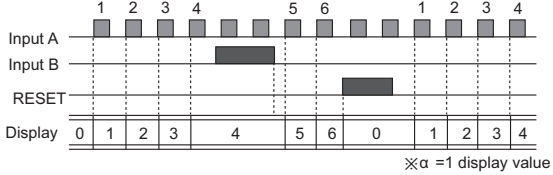


Display value and display unit

Display value	Display unit
Integration	Quantity[EA]

Operation and Time chart

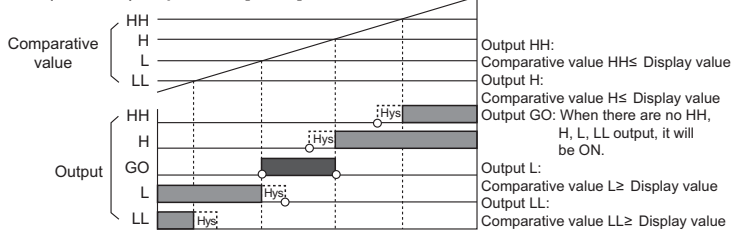
- ① It counts the number of input A pulse.
- ② As input B is an enable input signal it stops the counting and display value of input A when it is ON and then it counts input A continuously when it is OFF.



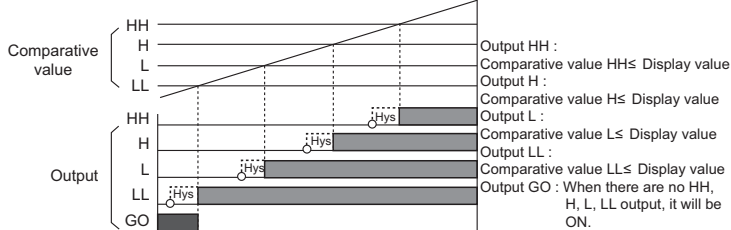
Output mode

- Select output mode in **out-t** (output type) of Parameter 1 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.

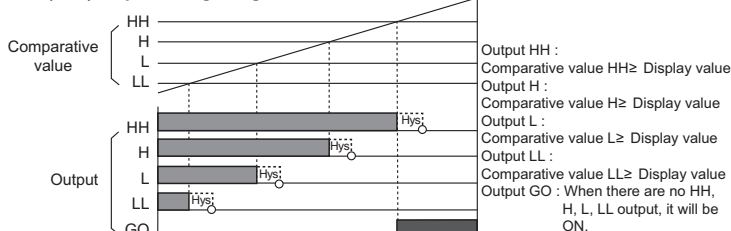
S(Standard) output mode[StAr-d]



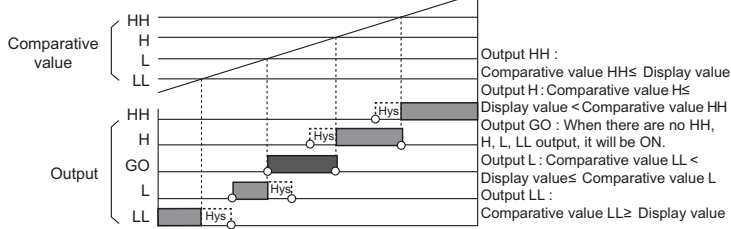
H(High) output mode[out-h]



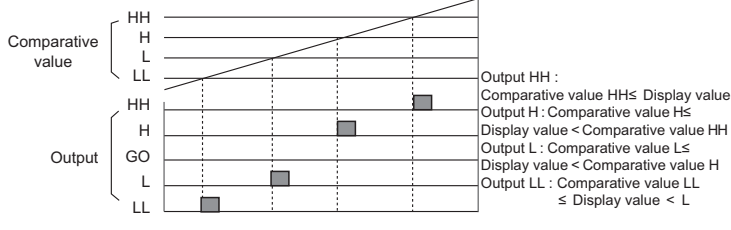
L(Low) output mode[out-L]



B(Block) output mode[out-b]



I(One Shot) output mode[out-I]

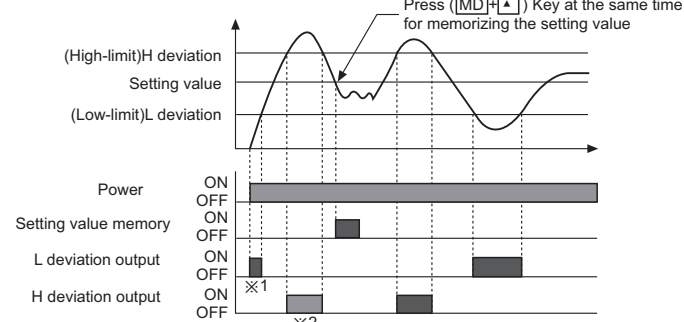


- ※There is no GO output in output I mode.
- ※One Shot (I) output time has been fixed 0.3sec.
- ※There is no Hysteresis in I(One shot) comparative output mode.

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 (MD) + (▲) key in front.
- Display the setting value: Check the memorized setting value by (▲) key. (Display the memorized setting value for pressing (▲) key continuously.)
- Deviation setting: Set H, L deviation by setting value. (The set deviation will be memorized until set the next deviation again when 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 comparative output limit function, output will 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 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".
- : When select the operation mode, the parameter will be displayed.
- : 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	F12	F13
PSt.hh		●	●	●	●	●	●	●	●	●	●	●	●	●
PSt.h		●	●	●	●	●	●	●	●	●	●	●	●	●
PSt.L		●	●	●	●	●	●	●	●	●	●	●	●	●
PSt.LL		●	●	●	●	●	●	●	●	●	●	●	●	●
h.PEY		●	●	●	●	●	●	●	●	●	●	●	●	○
L.PEY		●	●	●	●	●	●	●	●	●	●	●	●	○

Parameter 1 group

Parameter 1	Sub mode	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13
naoE		●	●	●	●	●	●	●	●	●	●	●	●	●
in-A		●	●	●	●	●	●	●	●	●	●	●	●	●
in-b		○	○	○	○	○	○	○	○	○	○	○	○	○
out-t		●	●	●	●	●	●	●	●	●	●	●	●	●
hys		○	○	○	○	○	○	○	○	○	○	○	○	○
GuAr.d	F.dEFY	●	●	●	●	●	●	●	●	●	●	●	●	○
GuAr.d	StAr.t	●	●	●	●	●	●	●	●	●	●	●	●	○
Auto.A		○	○	○	○	○	○	○	○	○	○	○	○	○
Auto.b		○	○	○	○	○	○	○	○	○	○	○	○	○
nao		○	○	○	○	○	○	○	○	○	○	○	○	○

※"○": in-b sensor will be set as nPn.h.F or PnPh.F in mode F11, F12, F13.

Parameter 2 group

Parameter 2	Sub mode	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13
PbAnE		●	●	●	●	●	●	●	●	●	●	●	●	●
dat		○	○	○	○	○	○	○	○	○	○	○	○	○
tonE		○	○	○	○	○	○	○	○	○	○	○	○	○
PSt.hh		●	●	●	●	●	●	●	●	●	●	●	●	●
PSt.h		●	●	●	●	●	●	●	●	●	●	●	●	●
PSt.L		●	●	●	●	●	●	●	●	●	●	●	●	●
PSt.LL		●	●	●	●	●	●	●	●	●	●	●	●	●
PSt.RH		○	○	○	○	○	○	○	○	○	○	○	○	○
PSt.RY		○	○	○	○	○	○	○	○	○	○	○	○	○
PSt.bH		○	○	○	○	○	○	○	○	○	○	○	○	○
PSt.bY		○	○	○	○	○	○	○	○	○	○	○	○	○
dI SPt		○	○	○	○	○	○	○	○	○	○	○	○	○

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

Parameter 3 group

Parameter 3	Sub mode	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13
F5-h		○	○	○	○	○	○	○	○	○	○	○	○	○
F5-L		○	○	○	○	○	○	○	○	○	○	○	○	○
AdDr		○	○	○	○	○	○	○	○	○	○	○	○	○
bP5		○	○	○	○	○	○	○	○	○	○	○	○	○
rEnoE		○	○	○	○	○	○	○	○	○	○	○	○	○
LoC		○	○	○	○	○	○	○	○	○	○	○	○	○

Monitoring delay function operation chart by each output mode

Comparative output adjustment function.	StAr.d	out-h	out-L	out-b	out-I	out-F
Comparative output adjustment function.	●	○	○	○	○	○
Starting correction timer function	○	○	○	○	○	○

Parameter

Parameter 0 group

Menu and Parameter display	Parameter	Setting range	Setting key
<pre> RUN ├── PSt.hh → PSt.hh 99999 │ └── MD ├── PSt.h → PSt.h 99999 │ └── MD ├── PSt.L → PSt.L 00000 │ └── MD ├── PSt.LL → PSt.LL 00000 │ └── MD ├── h.PEY → h.PEY 99999 │ └── MD └── L.PEY → L.PEY -19999 └── MD </pre>	<ul style="list-style-type: none"> Set HH comparative value Set H comparative value Set L comparative value Set LL comparative value Display high peak value among measuring values Display low peak value among measuring values 	<ul style="list-style-type: none"> F1, F2, F7, F9, F11, F12, F13 : 0 to 99999 F3 to F6 : 0 to Setting time range F8, F10 : -19999 to 99999 	<ul style="list-style-type: none"> ◀ : Move the setting digit ▶, ▲ : Change the setting value MD : Fix and move to the next parameter

- ※1: If you press MD key in RUN mode, it will enter into PSt.hh(F output mode:PSt.h) at comparative output mode and h.PEY at indication type.
- ※When entering into parameter 0, the parameter and data will be flickering by 1 sec. then moving the setting digit and changing the setting value are available.
- ※It will show the set data to flicker by 1sec., then move to next Parameter with touching MD key once.

Parameter 1 group

Menu and Parameter display	Parameter	Setting range	Setting key
<pre> RUN ├── PAR.1 → PAR.1 │ └── MD ├── naoE → naoE │ └── MD ├── in-A → in-A │ └── MD ├── in-b → in-b │ └── MD ├── out-t → out-t │ └── MD ├── hys → hys │ └── MD ├── GuAr.d → GuAr.d │ └── MD ├── Auto.A → Auto.A │ └── MD ├── Auto.b → Auto.b │ └── MD └── nao → nao └── MD </pre>	<ul style="list-style-type: none"> This is parameter 1 group. Select operation mode. Set the sensor type of input A. Set the sensor type of input B. Select the output mode. ※1 Set the hysteresis for the output. ※2 Select the start compensating timer function or comparative output(L, LL) limit function. ※3 Set the Auto-zero time of INA input. Set the Auto-zero of INB input. It sets the memory retention. The measuring value will be memorized when the power off. (Mode F13 only) 	<ul style="list-style-type: none"> F1 to F13 0 to 9999 (If decimal point is set in 0000.0, the range will be 0 to 9999.) 0.1 to 9999.9 0.1 to 9999.9 on : Memory retention off : No memory retention 	<ul style="list-style-type: none"> ▶, ▲ : Change the setting mode → F1 → F2 to F13 MD : Fix and move to the next parameter ▶, ▲ : Change the sensor type MD : Fix and move to the next parameter ▶, ▲ : Change the setting mode StAr.d → out-h → out-L out-F ← out-I ← out-b MD : Fix and move to the next parameter ▶ : Move the setting digit ▶, ▲ : Change the setting value MD : Fix and move to the next parameter ▶ : Move the setting digit ▶, ▲ : Change the setting value MD : Fix and move to the next parameter ▶, ▲ : Change the setting mode MD : Fix and move to the next parameter naoE

- ※If press MD key for 3 sec. in RUN, it will enter into parameter 1 group.
- ※1: It will 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[StAr.t] timer in monitoring delay function mode.
- When selecting the comparative output limit[F.dEFY] function, it will move to the next parameter[Auto.A] and when selecting the starting correction timer[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].
- ※If press MD key for over 2 sec. in every setting mode, data will be set and return to RUN.
- ※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.

