MODEL **461B**

Digital Panel Meter With Totalizer Function

Instruction Manual

I-01609

TSURUGA ELECTRIC CORPORATION

Contents

1. Preface

We thank you for your purchase of our Model 461B series.
The Model 461B is the digital panel meter which receives a pulse signal from the various sensors, flow meter etc. and displays the instantaneous or totalizing measurement value
For proper use of this instrument, please read these instructions before the initial operation.
Please also take care that this instruction manual is certainly delivered to the person in charge of operation of this instrument.

2. For safety use

● **Check at delivery**

When the model 461B is delivered,

- Please check whether it conforms to the required specifications and has not been damaged in transit. The instrument is carefully tested before the delivery from factory under our strict quality control program, but if any defect or inconvenience in quality or specifications is found, please inform us of the model name and serial number.
- Unpack the instrument and confirm that the followings are included.
  (1) Instrument main unit, (2) Stickers of units, (3) Instruction manual.

● **Cautions for use**

For safety in use of the instrument, please observe the following cautions.

⚠ CAUTION

- **No power on/off switch is provided on the Model 461B, so it immediately starts to work when connected to the power source. The specified data are defined, however, with the pre-heating for 15 minutes.**
- **When the Model 461B is mounted into the system cabinet, take care for ventilation so that the temperature inside the cabinet will not exceed 50°C.**
- **Do not use the instrument in such places as follows as it may cause break-down or malfunction of the instrument.**
  Places where: - exposed to rain, water drops or direct sunlight.
  - high temperature or humidity, much dust or corrosive gas.
  - affected by external noise, radio waves or static electricity.
  - vibration or shock is applied or they are big.

3. Initial setting at factory

Unless particularly requested, each function of the FUNCTION switches is set with the set values in the following table at the delivery from factory.

No.	Function	Setting	Display	User's set value
0	Totalizer pulse coefficient	1	0001E0	
1	Initial totalizing value	0	000000	
2	Instantaneous pulse conversion value	1	0001E0	
3	Instantaneous time unit	sec.	Unit.1	
4	Instantaneous indication period	3.3 times/sec.	SP.1	
5	Decimal point of instantaneous and totalized value	No DP	0	
6	Change-over of input	Input 1, HF range	CH1-HF	
7	Cut-off	No Cut-off	CUT0	
8	Totalization-synchronized pulse	50ms, 1/1	Pole-1	
9	RS-232C Note)	9600bps, no parity, 8	9600n8	
A	Analog output constant	200	0.0.2.0.0.	
B	Alarm･batch output mode	Alarm output	-AL.---	
C	AL1 value	0	000000	
D	AL2 value	999999	999999	
E	AL3 value	999999	999999	
F	AL4 value	999999	999999	

Note) FUNCTION switch 9 shows that the totalizer is with RS-232C output.
When provided with RS-485 output, the product code is 00.

Other functions

Function	Setting	Display	User's set value
Change-over of pause/latch	Pause function	PAUSE	
With or without blinking at over-range of totalized value	Without blinking	oF.oFF	
Change-over of totalizer reset function	OFF	InToFF	

Change-over of totalizer cut-off function	OFF	CA toFF	

4. Standard specifications

4.1 Model designation

461B-□-□-□-□-□-□

1 2 3 4 5 6

1 Power source voltage

Code	Power Source Voltage
A	AC90~264V 50/60Hz
9	DC24V±10%

2 Power source for sensor

No.	Power Source Voltage	Output Current	Ripple
Blank	Not available		
3	12V±5%	150mA	5% or less
5	24V±5%	50mA	5% or less

3 Analog output ..... Optional specifications

No.	Analog Output		Output Impedance	Tolerable Resistive Load
Blank	Not available			
03	Instantaneous value output	DC0~1V	Approx. 0.1Ω	200Ω or more
04		DC0~5V		1kΩ or more
05		DC0~10V		2kΩ or more
09		DC1~5V		1kΩ or more
29		DC4~20mA	5MΩ or more	0~600Ω
03T	Totalized value output	DC0~1V	Approx. 0.1Ω	200Ω or more
04T		DC0~5V		1kΩ or more
05T		DC0~10V		2kΩ or more
09T		DC1~5V		1kΩ or more
29T		DC4~20mA	5MΩ or more	0~600Ω

4 BCD output, RS-232C output, RS-485 output ..... Optional specifications

Refer to the respective instruction manual of BCD output, RS-232C output and RS-485 output.

5 Preset output ..... Optional specifications

Code	Content
Blank	No preset output
R	Instantaneous : H･L Totalizing : With change-over of H･HH or 2 batch steps setting

6 Display colour

Code	Colour
Blank	Red LED
G	Green LED

4.2 General specifications

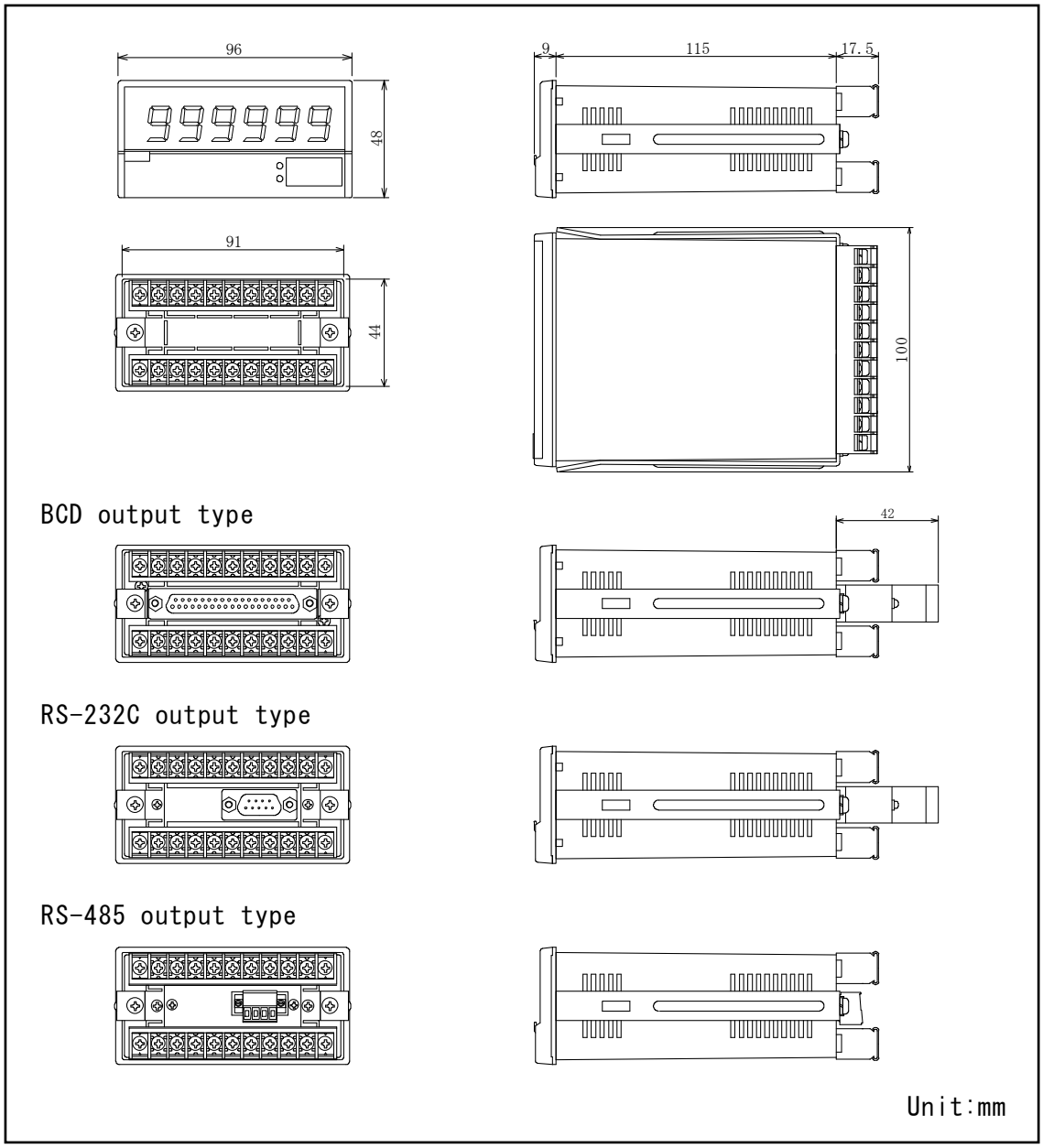
Instantaneous value measurement		
	Converts the input frequency into a quantity per time unit and displays it. The instantaneous display is: Frequency×Instantaneous time unit×Instantaneous pulse conversion	
	Instantaneous value display	0~999999, red or green LED, character height 15mm With zero-suppress function Decimal point display : Front switch setting Over-range display : Blinking with 000000
	Display cycle	3.3 times/sec., 1 time/sec., 0.2 times/sec., selection by front switch
	Pulse conversion value	1×10^{-6}～1000, front switch setting
	Time unit	Hour, minute and second, selection by front switch
	Accuracy	±(0.05% +1digit)
Totalized value measurement		
	Displays the value obtained by multiplying the numbers of input pulse by an index of totalizing pulse. When the totalizer initial value is set, the totalizer count is started from the totalizer initial value.	
	Totalized value display	0~999999, red or green LED, character height 15mm With zero-suppress function Decimal point display : Front switch setting Over-range display : When exceeded 999999, the count starts from 0 in blinking. Function to select with or without blinking is
	Totalizer pulse coefficient	1×10^{-9}～1, front switch setting
	Initial totalizing value	0～999999, front switch setting
Input signal		Input 1 : No voltage contact or open collector (NPN) Contact capacity DC12V 10mA Input 2 : Voltage pulse "H"= 4.5～30V "L"= 0～2.0V Input resistance Approx.5kΩ Either input, input 1 or input 2, is to be selected with the front switch.
Input rated frequency		HF : 5Hz～1kHz, LF : 0.0166Hz～100Hz, change-over by front switch
Minimum pulse width		HF : 0.5ms, LF : 5ms
Cut off		0~10%, front switch setting.
Pause/Latch (switchable)		Pause: Hold of display and data output of instantaneous and totalized value. Count of totalizing is temporarily stopped. Latch: Hold of display and data output of instantaneous and totalized value. Count of totalizing is continued. No voltage contact or open collector (NPN) Output capacity : 5V 10mA Minimum pulse width : 10ms
Totalization-synchronized pulse output (P.O.)		Output isolated from input. Output signal : Open collector (NPN) Output capacity : 30V 200mA
Reset		RESET switch inside the front panel or RESET terminals on the rear terminal blocks allow to reset the totalized count (to 0) or to the initial totalizing value. It also clears the incomplete batch of pulses of P.O. output. No voltage contact or open collector (NPN) Output capacity : 5V 10mA Minimum pulse width : 10ms
Solutions for power cut		Totalized value is memorized and retained by EEPROM. No count is made during the electricity failure or power turn-off. Data storage duration about 10 years.
Noise rejection		Power source line penetrating noise 1000V
Withstanding voltage		Power terminal - Case DC2100V for 1 min. Terminals - Case AC1500V for 1 min. Terminals - Power source AC1500V for 1 min. Input - Data output AC500V for 1 min.
Insulation resistance		DC500V, 100MΩ or more
Power source		AC90~264V (50/60Hz) or DC24V±10%
Power consumption		AC power source ... approx. 16VA, DC power source ... approx. 300mA
Operating ambient temp.		0~50°C
Storage temperature		-20~70°C
Weight		Approx. 500g
Mounting		Fastening with metal brackets from the rear of the panel.

Stickers of units (attached):

m^3/s, m^3/min, m^3/h, *N*m^3/s, *N*m^3/min, *N*m^3/h, *l*/s, *l*/min, *l*/h, k*l*/min, *Nl*/min, *Nl*/h, W/h, kW/h, kg/s, kg/min, kg/h, t/s, t/min, t/h, g/h, m/s, A, m^3, *N*m^3, *l*, k*l*, *Nl*, *Nk*l, W, kW, W･s, W･h, kW･h, ca*l*, kca*l*, Mca*l*, Gca*l*, T, t, kg, g, m, km, A･h, Pa, kPa, MPa, kA･h, N/m^2, bar

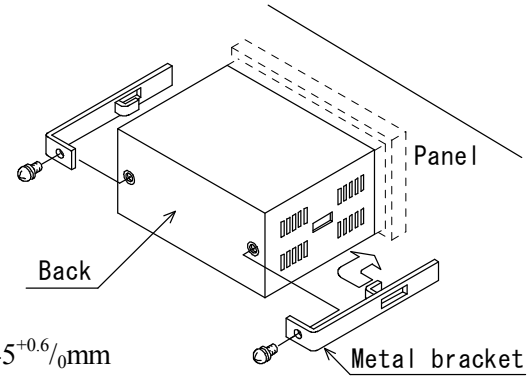
Note: Actual characters of the stickers may be different from the above printings.

4.3 Dimensions



5. Installation

Remove the metal brackets at the both sides, insert the instrument from the front. and fix it with the brackets

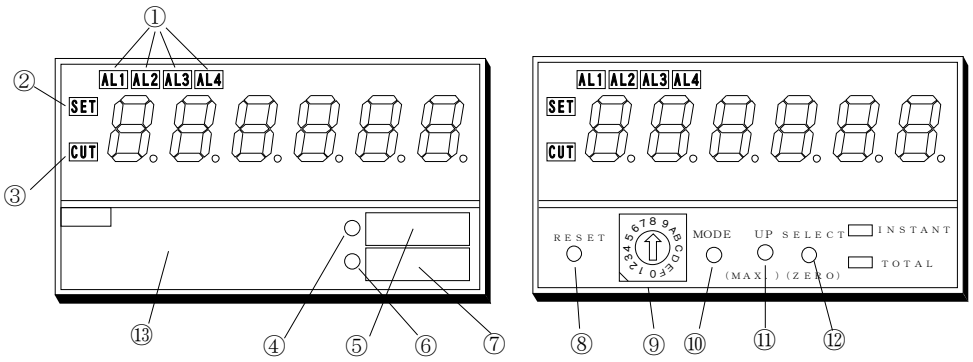


Panel cut-out dimension : $92^{+0.8}_{0} \times 45^{+0.6}_{0}$mm
Applicable panel thickness : 0.6~6mm
Optimum fastening torque : 0.25~0.39N·m

⚠ CAUTION
●**Do not fasten the screws too tight as it may cause a deformation of the case.**

6. Setting of each function

6.1 Name of parts



Front cover closed Front cover opened

Name	Function
①Alarm channel display	Monitor of alarm output.
②SET display	Lit up in setting mode.
③CUT display	Lit up when cut off is set.
④Instantaneous value display	Lit up when the instantaneous value is displayed.
⑤Instantaneous value unit	Place to apply a sticker of unit for the instantaneous value.
⑥Totalizing display	Lit up when the totalized value is displayed.
⑦Totalized value unit	Place to apply a sticker of unit for the totalized value.
⑧RESET switch	Switch to reset (to 0) the totalized value.
⑨FUNCTION switch	Selection switch of each setting mode.
⑩MODE switch	Switch to select the measuring or setting mode.
⑪UP switch	Numeral adjustment switch in setting mode.
⑫SELECT switch	Switch to select the instantaneous or totalized value display. Switch to change a set in setting mode.
⑬Front cover	Pull-open front cover.

6.2 Function of setting switches

Number	Functions (parameter to set)		Item No.
0	Totalizer pulse coefficient		6.6
1	Initial totalizing value		6.7
	*Change-over of pause/latch		6.3.1
2	Instantaneous pulse conversion value		6.8
	*With or without blinking at over-range of totalized value		6.3.2
3	Instantaneous time unit (hour, minute and second)		6.9
	*Change-over of totalizer reset function		6.3.3
4	Instantaneous indication period (3.3, 1 or 0.2 times/sec.)		6.10
5	Decimal point for instantaneous and totalizing value		6.11
6	Change-over of input		6.12
7	Cut off		6.13
	*Change-over of totalizer cut-off function		6.3.4
8	Pulse synchronized with totalizing		6.14
9	RS-232C output, RS-485 output	Note 2	
A	Analog output constant	Note 3	6.15
B	Change-over of totalizing alarm or batch output mode	Note 4	6.16
C	AL1 - low limit of instantaneous alarm	Note 4	6.17
D	AL2 - High limit of instantaneous alarm	Note 4	6.18
E	AL3 - High limit of totalizing alarm or pre-warning batch output	Note 4	6.19
F	AL4 - Higher high limit of totalizing alarm or stop batch output	Note 4	6.20

* The function is allocated when the power supply is turned ON, simultaneously pressing the MODE switch.

Note 1: Function switch is ineffective during the setting mode.
Note 2: Function switch 9 is ineffective when the RS-232C or RS-485 are not optionally provided.
Note 3: Function switch A is ineffective when the analog output is not and instantaneous value optionally provided.

Note 4: Functions switches B, C, D, E, F are ineffective when the alarm output is not optionally provided.
Note 5: When no key is pressed for 5 minutes or more in setting mode, the unit returns to the measuring mode.

6.3 Function and change method

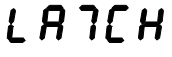
6.3.1 Change-over of pause (temporary stop input) / Latch function

No voltage contact or open collector (NPN)
Contact capacity : 5V 10mA (ON voltage 1.5V or less)
Input pulse width : 10ms or more

Pause function : When making a short-circuit between PA/LA and D.COM terminals on the rear panel, display and BCD data of instantaneous and totalized value are held, and the totalizing count is paused. Analog output is also held.
Latch function : When making a short-circuit between PA/LA and D.COM terminals on the rear panel, display and BCD data of instantaneous and totalized value are held, but the totalizing count is continued. Analog output is held.

● How to change:
① Set FUNCTION switch to 1, keep pressing MODE switch, turn the power ON.
SET display enters the state of blinking.
② Change with UP switch.

: PAUSE function



: LATCH function

③ Turn the power OFF.

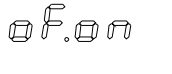
(Note) Totalization-synchronized pulse (P.O.) is retained during the pause is functioning but not retained during the latch is functioning.

6.3.2 Selection of blinking at over-range of totalized value display

It is possible to select a recommenced count from 0, with or without blinking when the totalized value display exceeded 999999.

● How to change:
① Set FUNCTION switch to 2, keep pressing MODE switch, turn the power ON.
SET display enters the state of blinking.
② Change with UP switch.

: Recommence a count from 0 without blinking when the totalized value exceeded 999999.



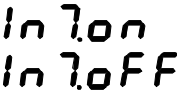
: Recommence a count from 0 with blinking when the totalized value exceeded 999999.

③ Turn the power OFF.

6.3.3 Change-over of totalizer reset function

When the totalizer reset function is ON, the totalized value is reset to the initial totalizing value. When the function is OFF, the totalized value is reset to 0.

● How to change:
① Set FUNCTION switch to 3, keep pressing MODE switch, turn the power ON.
SET display enters the state of blinking.
② Change with UP switch.



: Totalizer reset function ON.

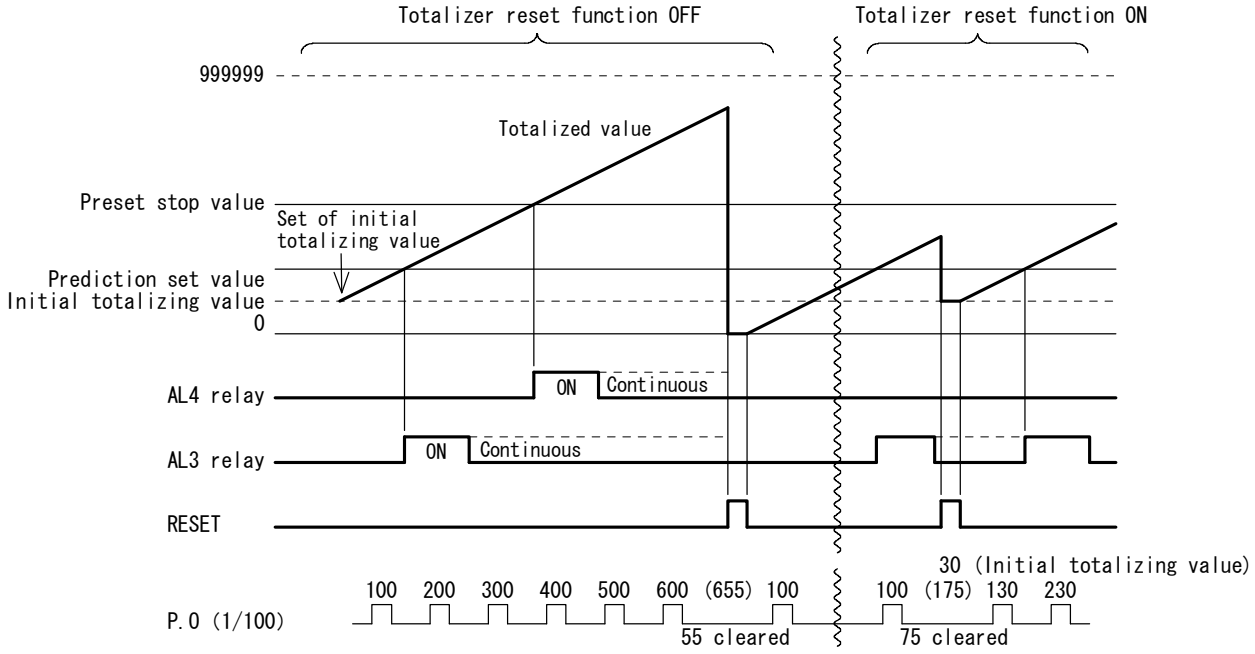
: Totalizer reset function OFF.

③ Turn the power OFF.

- Action when the totalized value is over-ranged
  When the totalized value has exceeded 999999, the count is re-started from 0, whichever the totalizer reset function is set, ON/OFF.

● Action at the totalized value batch output

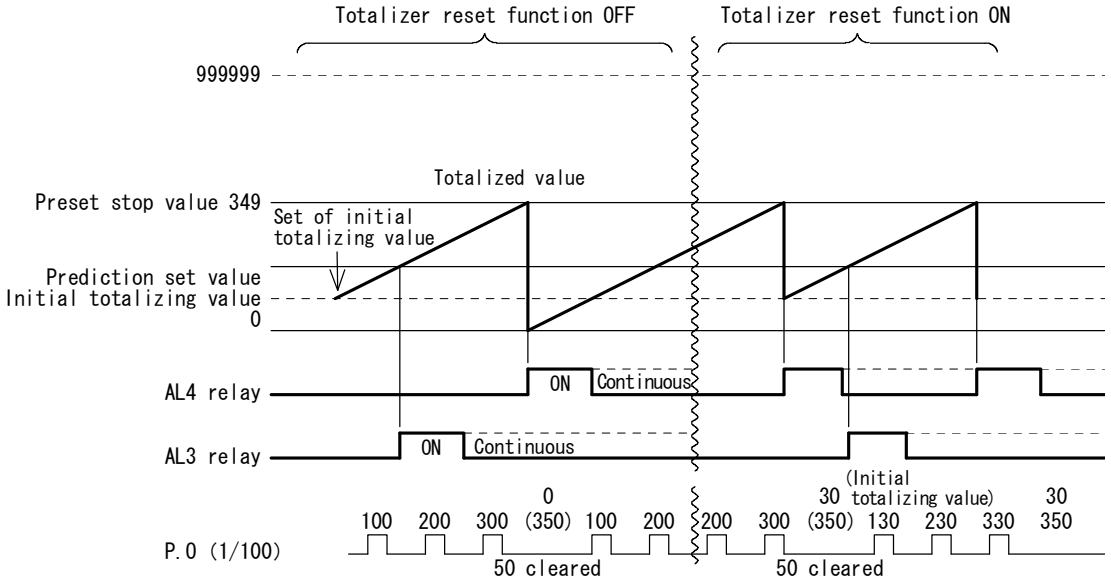
When the auto-reset is OFF (ineffective)



Note-1) When the totalizer reset function is OFF, the totalized value is reset to 0 with reset input, and the incomplete batch of pulses of P.O. output is also cleared.

Note-2) When the totalizer reset function is ON, the totalized value and the incomplete batch of pulses of P.O. output are reset to the initial totalizing value with reset input.

When the auto-reset is ON (effective)



Note-3) When the totalizer reset function is OFF, the totalized value is reset to 0 and the incomplete batch of pulses of P.O. output is cleared when the auto-reset is turned ON.

Note-4) When the totalizer reset function is ON, the totalized value and the incomplete batch of pulses of P.O. output are reset to the initial totalizing value when the auto-reset is turned ON.

Note-5) Adjustable range for the preset stop value: Initial totalizing value ＜ AL4
(If the setting is made out of the range, the display shows Err2.)

6.3.4 Change-over of totalizer cut-off function

When the totalization cut-off function is ON, no count is made in the cur-off area.
When it is OFF, the totalizing count is made even in the cut-off are.
(It is set when only the display of instantaneous value is required to be 0.)

● How to change:

① Set FUNCTION switch to 7, keep pressing MODE switch, turn the power ON.
SET display enters the state of blinking.

② Change with UP switch.

CA7on : Totalizer cut-off function ON.
CA7oFF : Totalizer cut-off function OFF.

③ Turn the power OFF.

6.4 Preset output (AL1~4OUT, ALCOM) ..... Optional specifications

Preset output is the output of instantaneous value alarm (AL1 low limit alarm output, AL2 high limit alarm output) and totalized value alarm (high and higher high limit alarm outputs or two stage batch output).

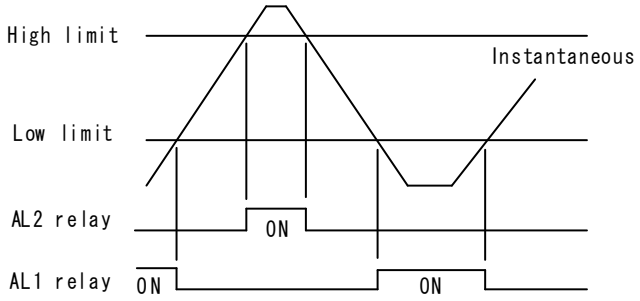
Contact capacity of output relay : AC250V 0.3A resistive load
(photo MOS relay, "a" contact output, common terminal)
Delay of relay output : Max. 20ms.

1) Instantaneous value alarm output

High and low limit alarm output of instantaneous value
(with alarm output monitor on the front panel).
Adjustable range of comparison value is 0~999999 for both high and low alarm output.
The output is synchronized with the display cycle.

○ Refer to **(6.17)**, **(6.18)** respectively for the setting of high and low limit.

● Conditions for comparison
Instantaneous value＞high limit ..... AL2OUT ON (Front panel monitor AL2 lit up)
Instantaneous value＜low limit ..... AL1OUT ON (Front panel monitor AL1 lit up)



Judgement / Output	AL1OUT-AL.COM	AL2OUT-AL.COM
High limit alarm	OFF	ON
Low limit alarm	ON	OFF

Note: Alarm output is not reset by RESET.

2) Totalized value alarm output

For the totalized value alarm output, high and higher high limit alarm outputs, and two stage batch output are switchable.
Regardless of display, a comparison is made with the counter data one after another.

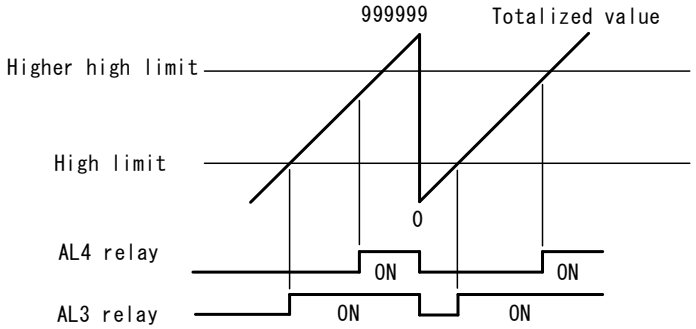
○ Refer to **(6.16)** for the change of mode.

a) High and higher high limit alarm output (with alarm output monitor on the front panel).
Adjustable range of comparison value is 0~999999 for both high and higher high limit.

○ Refer to **(6.19)**, **(6.20)** respectively for the setting method.

● Conditions for comparison
Totalized value＞high limit ..... AL3OUT ON (Front panel monitor AL3 lit up)

Totalized value＞higher high limit ..... AL4OUT ON (Front panel monitor AL4 lit up)



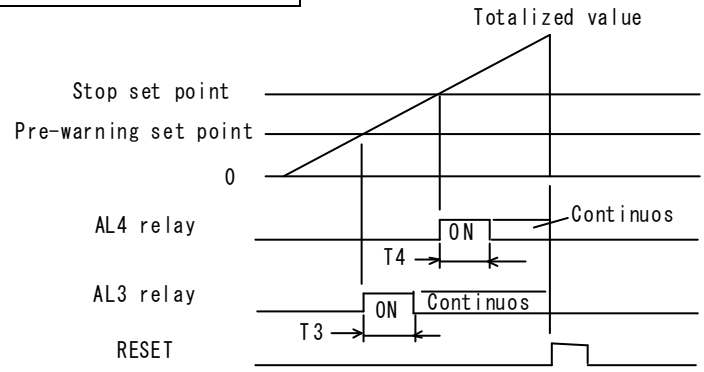
Judgement / Output	AL3OUT-AL.COM	AL4OUT-AL.COM
High limit alarm	ON	OFF
Higher high limit alarm	OFF	ON

Example: When making a 1000 batch count, set to 999, less by 1.

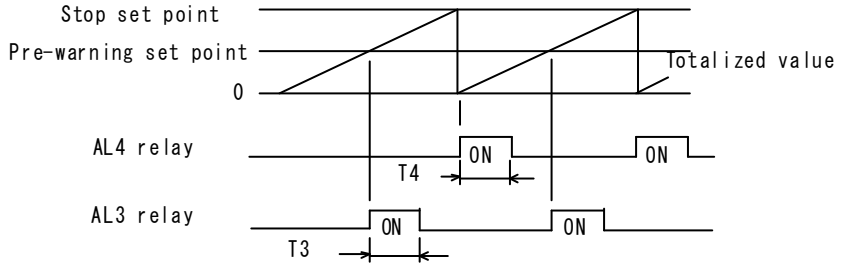
b) Totalized value batch output
When the totalized value exceeds the set values at two steps, pre-warning (AL3OUT) and stop (AL4OUT), ON pulse of the relay is output.
Pulse width can be set respectively for pre-warning (T3) and stop (T4).
Stop output is provided with On/Off function for the auto-reset of totalized value.
Pulse width : 0.1 sec., 0.2 sec., 0.5 sec., 1 sec., continuous output.
Note: Continuous output turns OFF with RESET input.

○ Refer to **(6.16)** for the selection method.
For the setting of numerals, refer to **(6.19)**, **(6.20)**.
Note: When the mode is changed from the totalized value alarm output to the totalized value batch output, make a reset.
In case that the totalized value is smaller than the pre-warning and stop value, no reset is necessary.

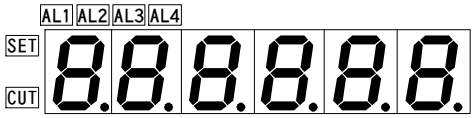
When Auto-reset is OFF



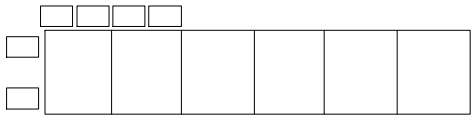
When Auto-reset is ON



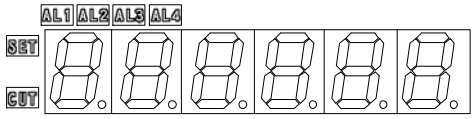
6.5 LED display mode



Lit up



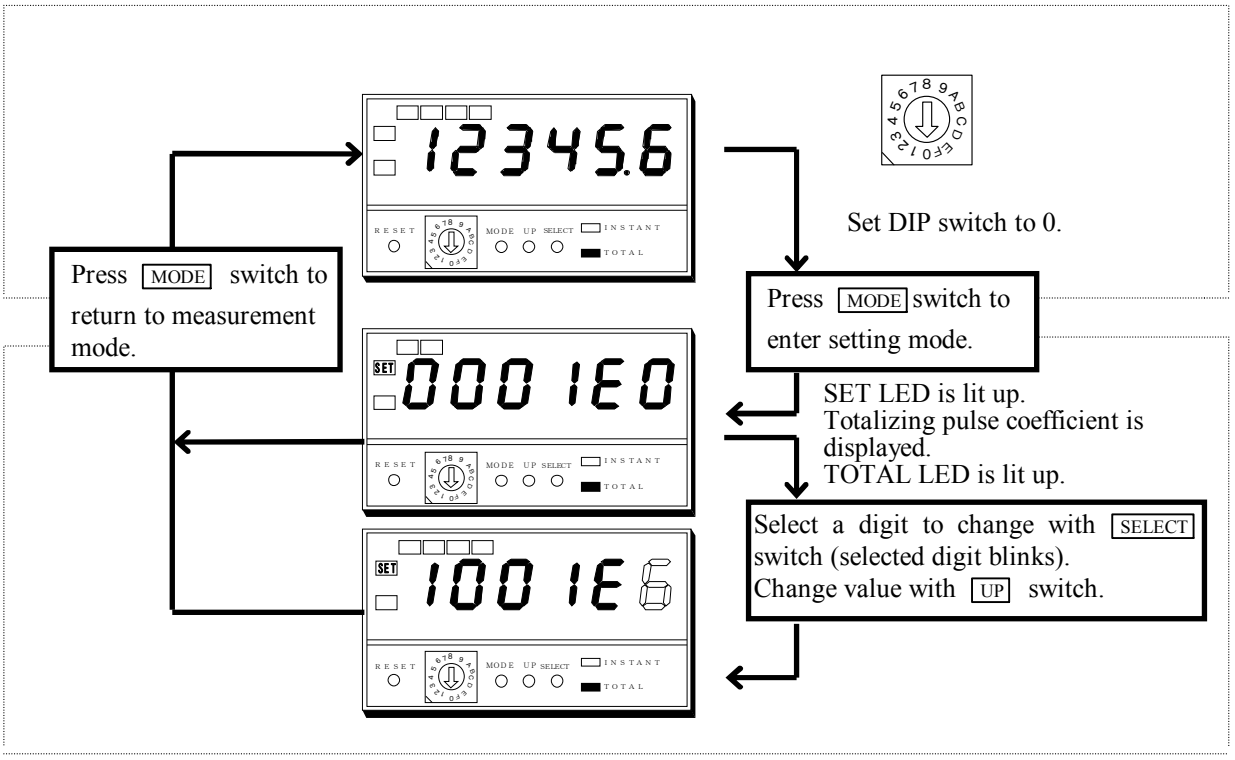
Turned off



Blinking

6.6 Totalizer pulse coefficient·····switch "0"

Index of totalizing pulse is set with maximum 4 digits at the numeral section and 1 digit at the index number section.
Adjustable range : 1×10^{-9}~1×10^{0}
Index section does not display a minus.



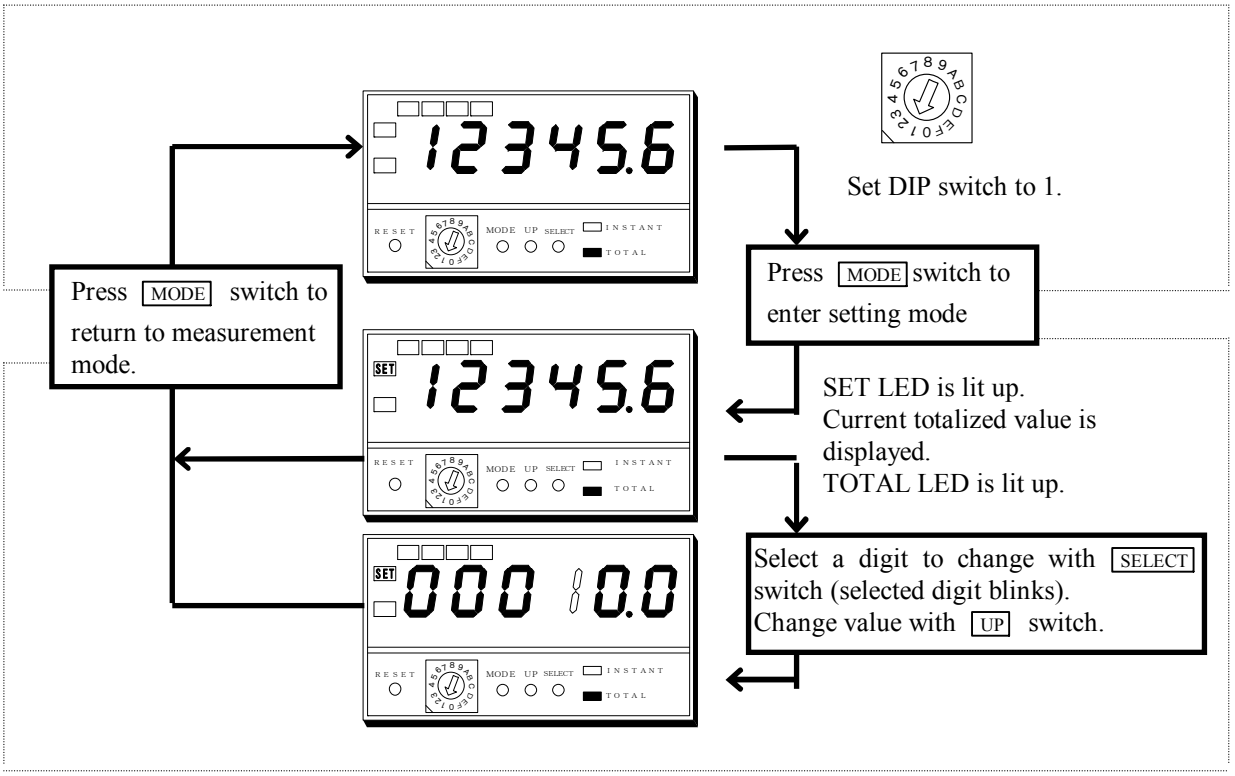
9999E6 (9999×10^{-6})

Index number section (minus)

Number section

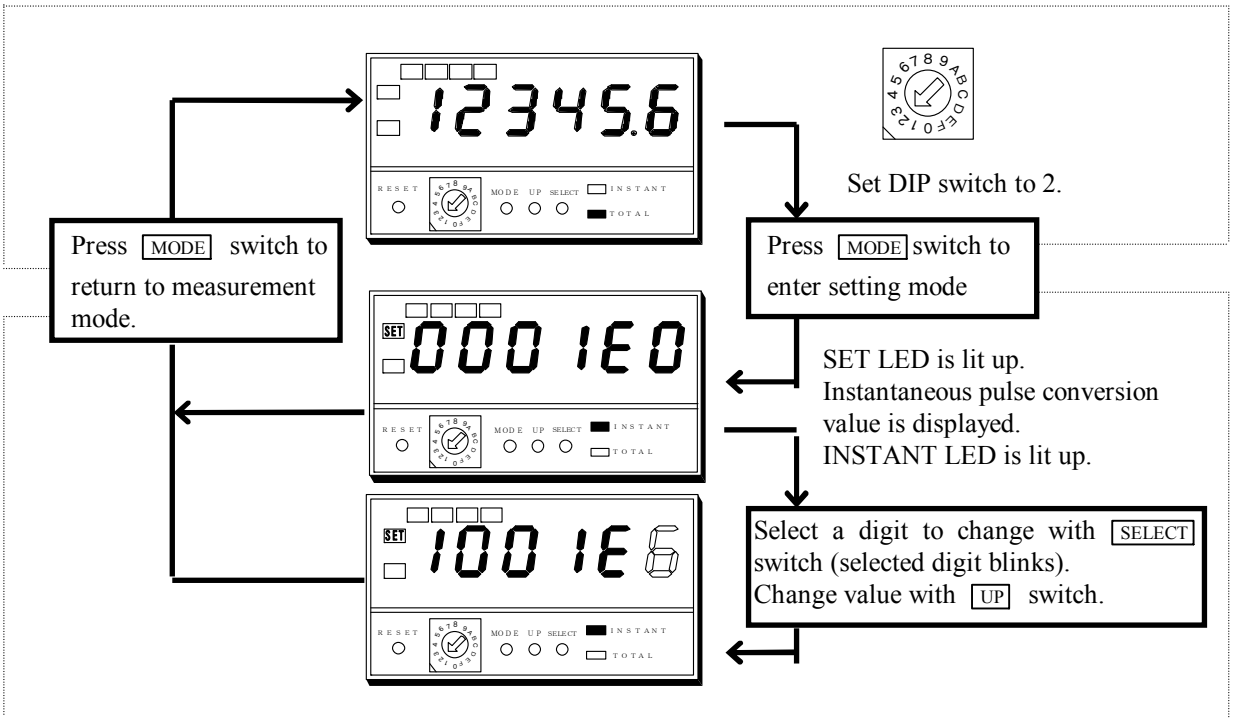
6.7 Initial totalizing value·····switch "1"

Totalizer initial value is set when the particular starting display value is required.
Adjustable range: 0~999999



6.8 Instantaneous pulse conversion value·····switch "2"

Instantaneous pulse conversion value, the weight per pulse, is set with maximum 4 digits at the numeral section and 1 digit at the index number section. Index section does not display a minus.
Adjustable range : 1×10^{-6}~1000×10^{0}



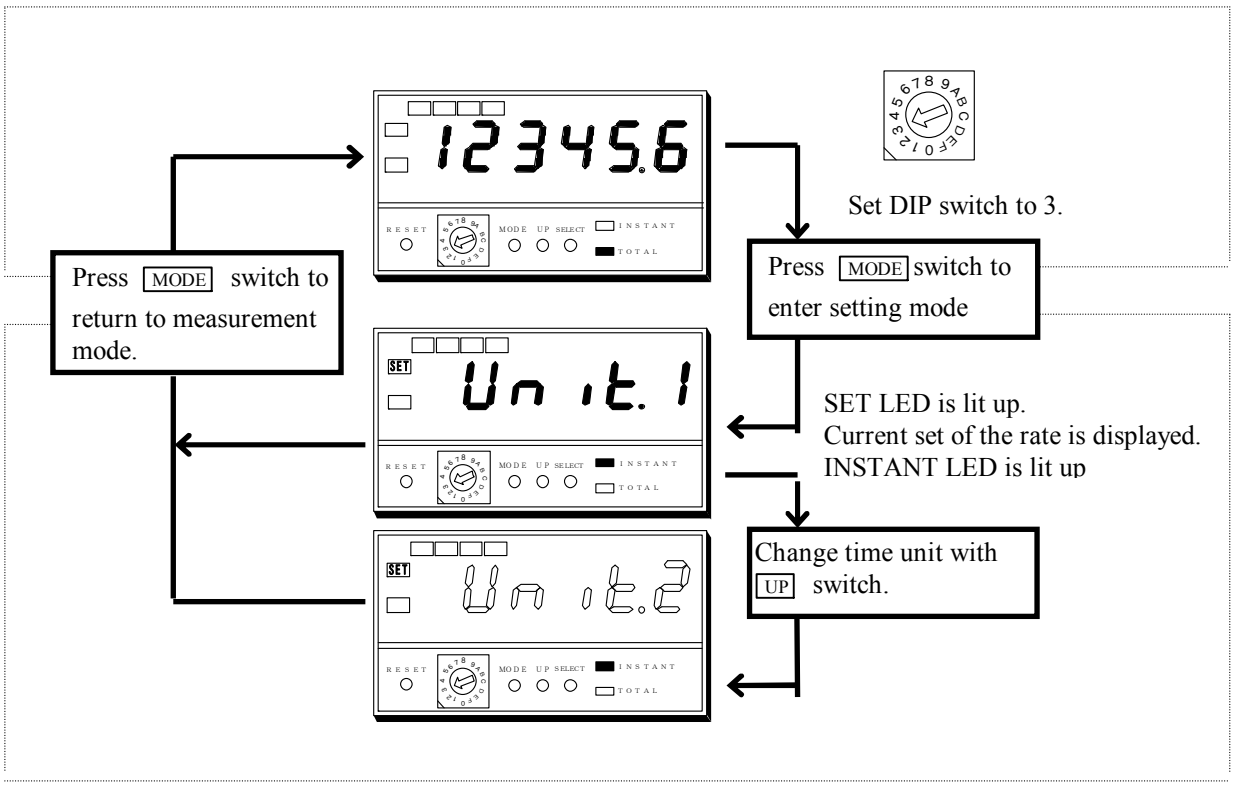
9999E6 (9999×10^{-6})

Index number section (minus)

Number section

6.9 Instantaneous time unit·····switch "3"

Time unit required for the instantaneous value of flow volume and so on is set with hour, minute and second. When the minute is set, flow volume per minute is displayed.

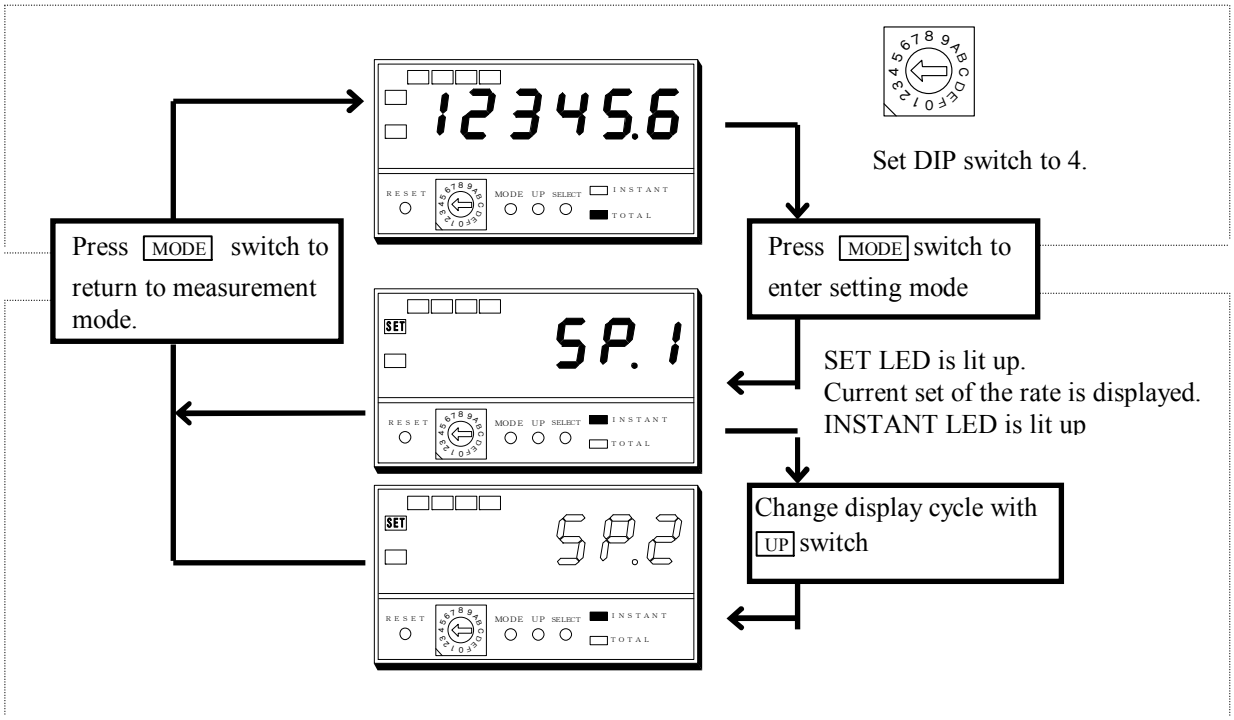


UP switch: Changes in the order of unit1→unit2→unit3→unit1.

unit.1: second unit.2: minute unit.3: hour

6.10 Instantaneous indication period·····switch "4"

Display cycle of the instantaneous value is set from among 3.3 times, 1 time or 0.2 times per second.

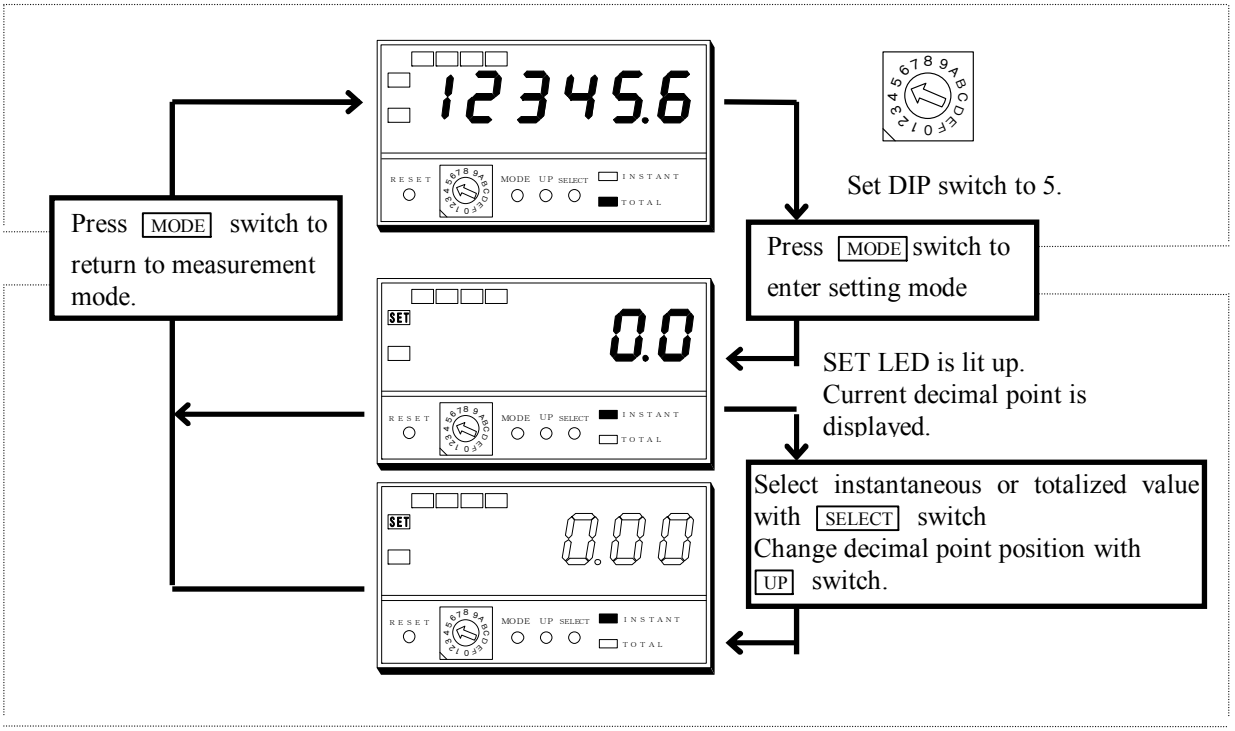


UP switch: Changes in the order of SP1→SP2→SP3→SP1.

SP1: 3.3 times/sec. (300ms) SP2: 1 time/sec. (1s) SP3: 0.2 times/sec. (5s)

6.11 Decimal point of instantaneous and totalized value·····switch "5"

Decimal point position of instantaneous and totalized value can be set by the following switch operation.



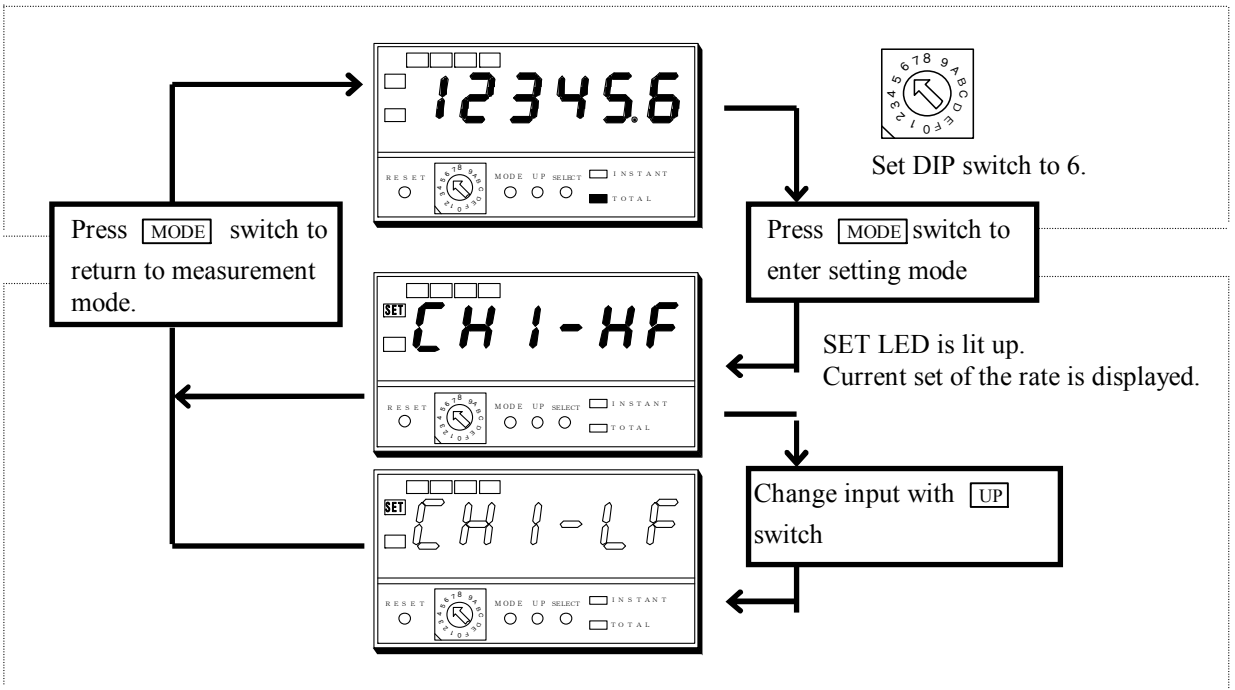
UP switch: Changes in the order of NoDP→DP1→DP2→DP3→DP4→DP5→NoDP.

0 : No DP	0.00 : DP2	0.0000 : DP4
0.0: DP1	0.000: DP3	0.00000: DP5

6.12 Change-over of input·····switch "6"

Selection of input terminal 1 or 2, and the change-over of input frequency range are made.

- Selection of input terminal CH1: Input 1 (ON/OFF pulse input) is enabled.
  CH2: Input 2 (voltage pulse input) is enabled.
- Change-over of frequency range HF range: 5Hz~1kHz
  LF range: 0.0166Hz~100Hz



UP switch: Changes in the order of CH1-HF→CH1-LF→CH2-HF→CH2-LF→CH1-HF.
CH1-HF : Use input 1 with HF range. CH2-HF : Use input 2 with HF range.

CH1-LF : Use input 1 with LF range. CH2-LF : Use input 2 with LF range.

6.13 Cut-off·····switch "7"

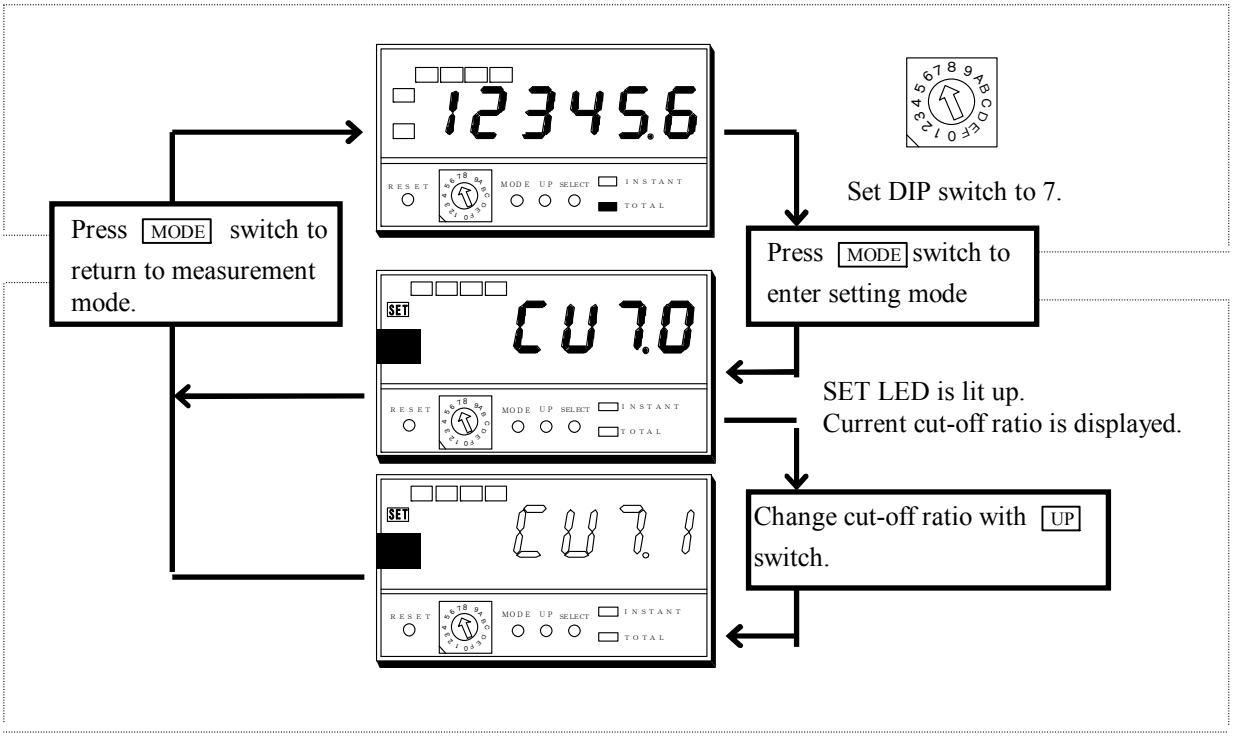
Input signal in the unstable area of the low level signal can be cut off. In the cut-off zone, the display of instantaneous value becomes 0, and in case that the totalization cut-off function is ON, the totalizing count is not made either.

When it is functioning, the letters CUT on the front panel is lit up.

Adjustable range: 0~10% (Select from 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10)

(Example) 5% setting at frequency range HF : 1kHz×0.05=50Hz

5% setting at frequency range LF : 100Hz×0.05=5Hz



UP switch: Changes in the order of CUT.0→CUT.1→CUT.2→CUT.3→CUT.4→CUT.5→CUT.6→CUT.7→CUT.8→CUT.9→CUT.10→CUT.0.

Setting	Cutting frequency		
		HF range	LF range
CUT.0	0% (no cut) CUT turns off		
CUT.1	1%	0～10Hz	0～1Hz
CUT.2	2%	0～20Hz	0～2Hz
CUT.3	3%	0～30Hz	0～3Hz
CUT.4	4%	0～40Hz	0～4Hz
CUT.5	5%	0～50Hz	0～5Hz
CUT.6	6%	0～60Hz	0～6Hz
CUT.7	7%	0～70Hz	0～7Hz
CUT.8	8%	0～80Hz	0～8Hz
CUT.9	9%	0～90Hz	0～9Hz
CUT.10	10%	0～100Hz	0～10Hz

6.14 Totalization-synchronized pulse (P.O) ·····switch "8"

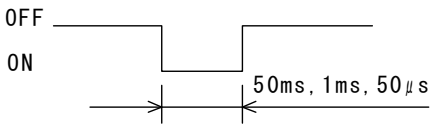
The width and coefficient of the totalization-synchronous pulse is set.

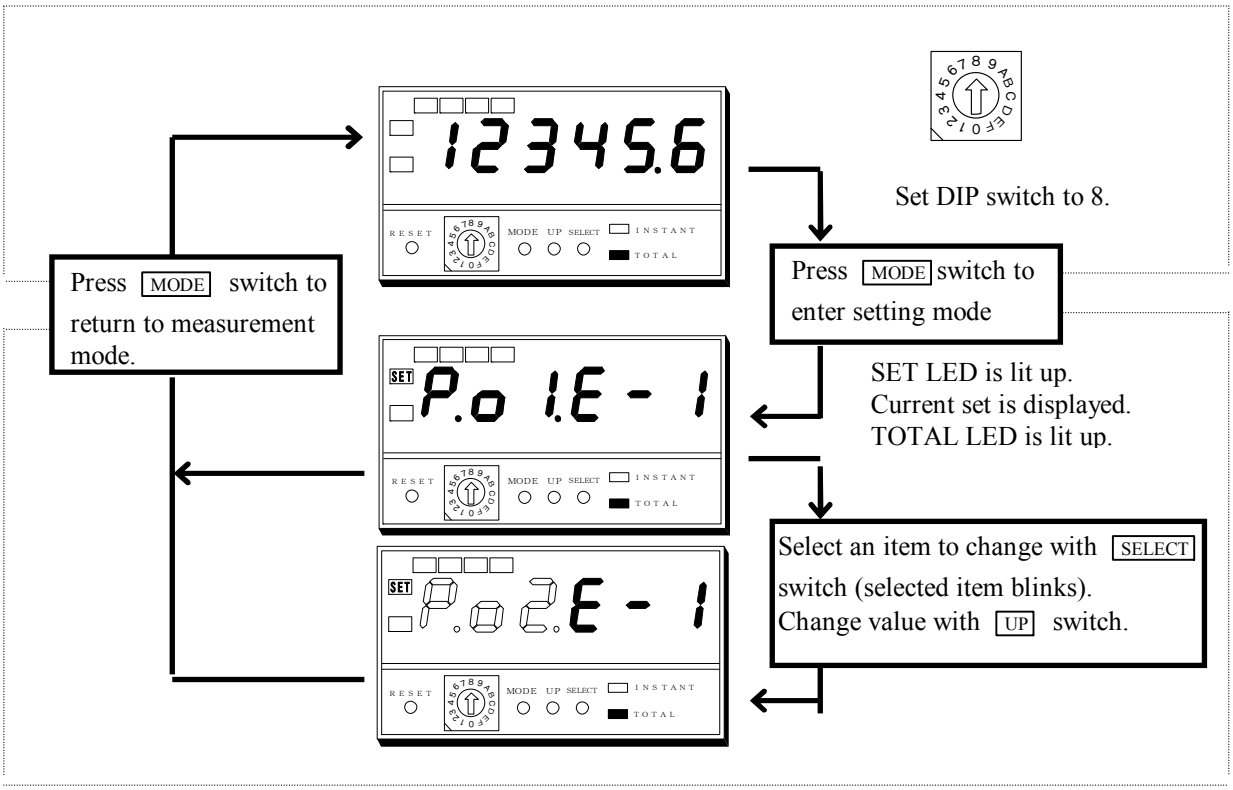
Output capacity : Open collector output (NPN) DC30V, 200mA

Pulse coefficient : Synchronized pulse output can be set to 1/1, 1/10 or 1/100 of the totalized value by changing the sampling ratio.

Output pulse width : Select a pulse width according to the output frequency.
50ms (when the output frequency is 0Hz~10Hz)
1ms (when the output frequency is 10Hz~500Hz)
50μs (when the output frequency is 500Hz~1kHz)

Note : Select the output pulse width so that it will not be wider than the output cycle (1÷output frequency).
In case that the output cycle is narrower than the output pulse width, the output becomes continuously ON (pulse output is not formed).





P.o1 E-1 →

Item 1. Pulse coefficient

Display	Pulse coefficient
E-1	1/1
E-2	1/10
E-3	1/100

UP switch: Changes in the order of E-1→E-2→E-3→E-1

Item 2. Pulse width

Display	Output pulse width
P.o1	50ms
P.o2	1ms
P.o3	50μs

UP switch: Changes in the order of P.o1→P.o2→P.o3→P.o1

6.15 Analog output constant·····switch "A" (Option specifications)

Analog output is isolated from the input and input/output signal.
Analog output constant of the instantaneous value or totalizing value can be arbitrarily set respectively for the instantaneous value output type, totalizing value output type.

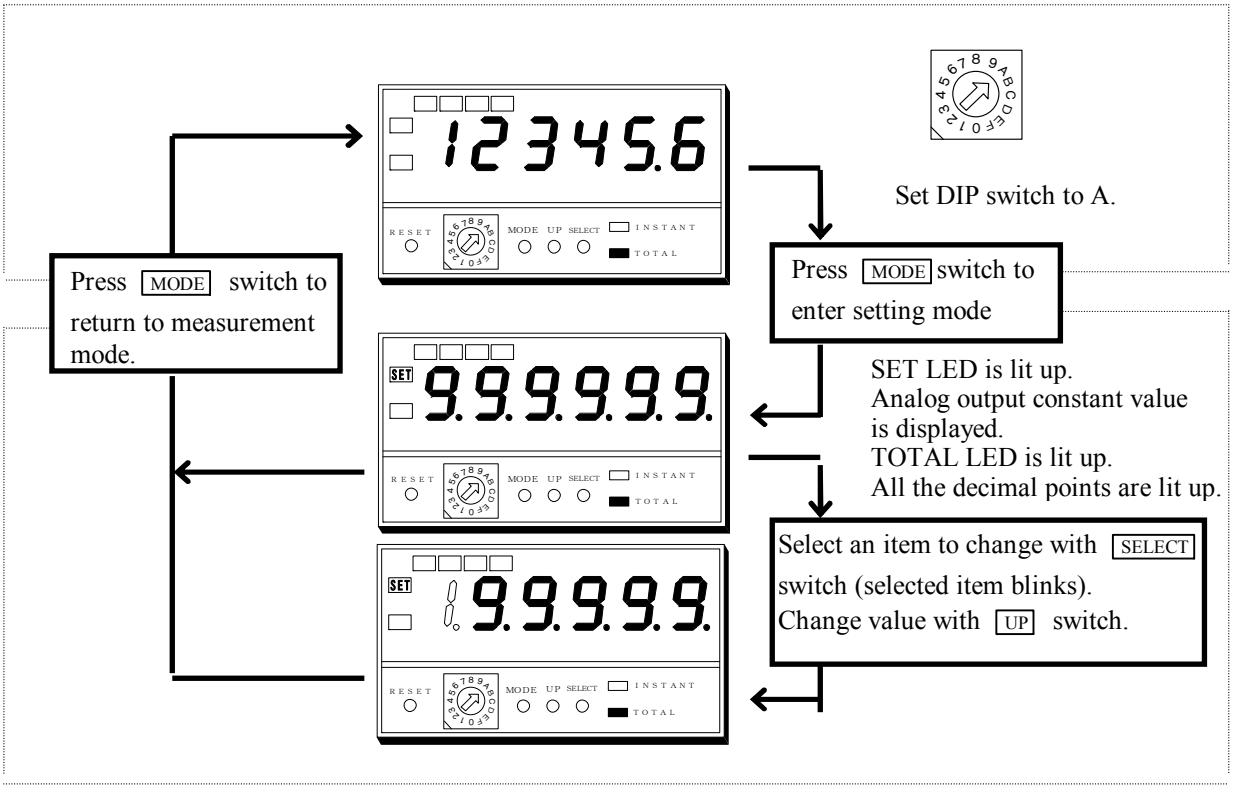
Analog output constant : 200~999999 (in case of totalized value output type)
When the instantaneous value or totalized value reaches the analog output constant value, the analog output gives MAX output.

Accuracy : Instantaneous value analog output type ±0.1% of SPAN (23 ºC±5 ºC)
Totalized value analog output type ±0.5% of SPAN (23 ºC±5 ºC)

Resolution : 1/2000

Output response : 30ms to instantaneous value or totalized value display.

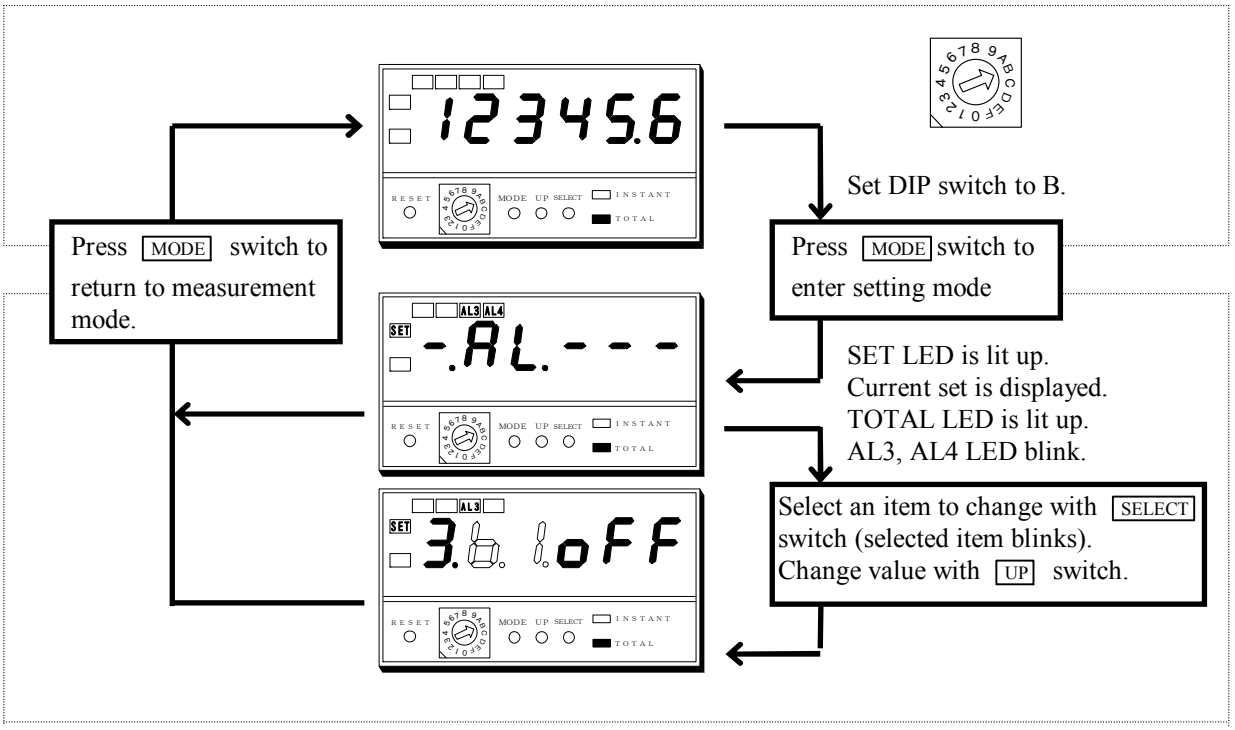
Note: The output it retained during the PAUSE input or LATCH input.



6.16 Change of totalized value alarm output and batch output mode

・・・・・switch "B" (Option specifications)

Change-over of totalized value alarm output and batch output, auto reset ON/OFF and pulse width can be set by the following switch operation.



3. b1. oFF

Item 1. Auto reset of batch stop output

Display	Auto reset
on	ON (auto reset)
oFF	OFF (no auto reset)

UP switch: Changes in the order of on→oFF→on

Item 2. Change-over of alarm/batch-output, and pulse width of batch output

Display	Content
-.AL.---	AL3 is high and AL4 is higher high alarm output.
b.1.	Pulse width of batch output 0.1s
b.2.	Pulse width of batch output 0.2s
b.3.	Pulse width of batch output 0.5s
b.4.	Pulse width of batch output 1.0s
b.-.	Continuous batch output

UP switch: Changes in the order of -.AL.---→b.1.→b.2.→b.3.→b.4.→b.-.→-.AL.---

Item 3. Change-over of pre-warning/stop output at pulse width setting

Display	Content
3.	Pre-warning batch output (AL3)
4.	Stop batch output (AL4)

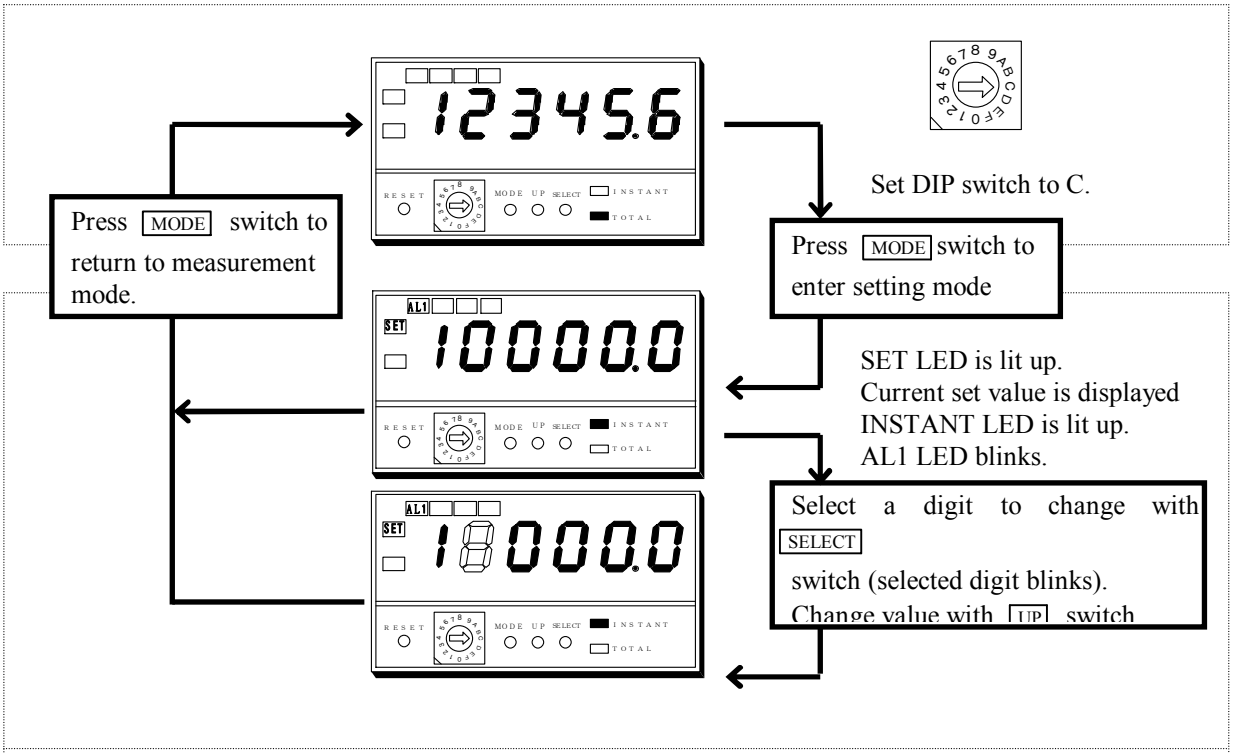
UP switch: Changes in the order of 3.→4.→3.

Note: Setting of auto-reset ON/OFF for the stop batch output is possible in both pre-warning and stop mode.

6.17 AL1 Low alarm limit of instantaneous value·····switch "C" (Option specifications)

Low alarm limit of instantaneous value can be set to an arbitrary value by the following switch operation.

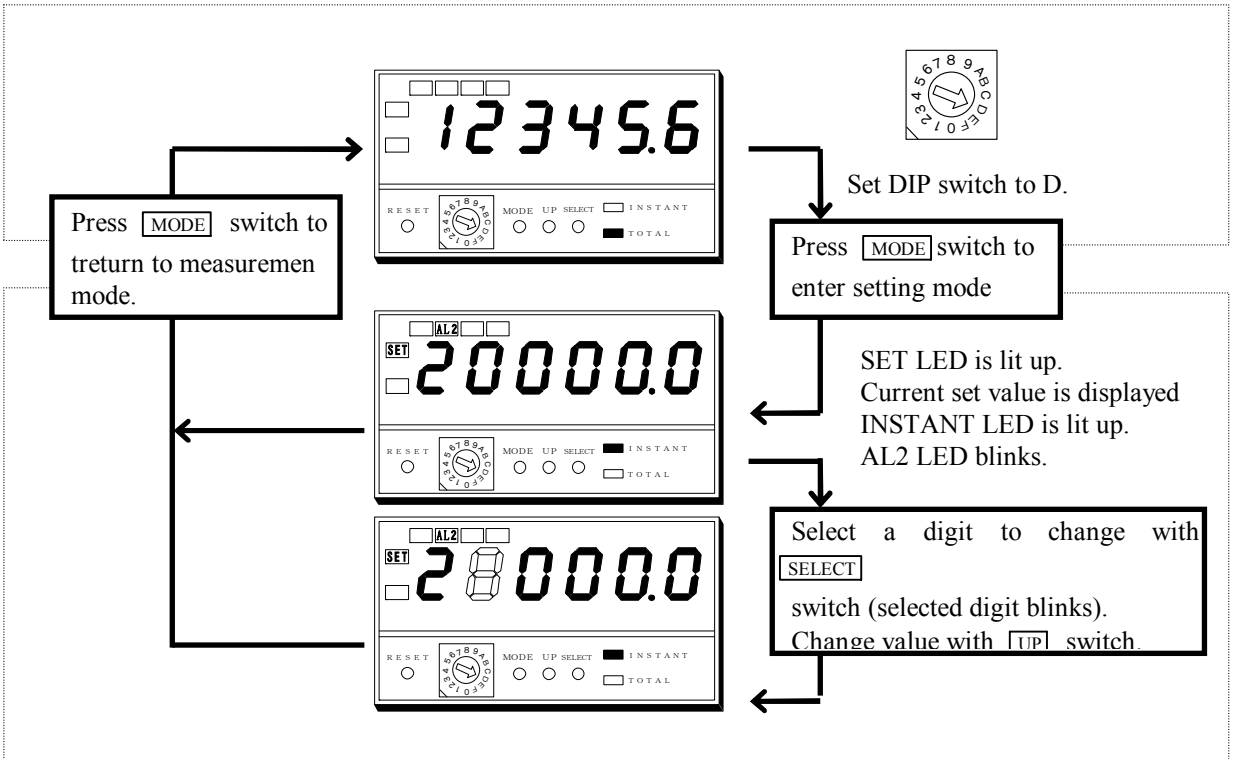
Adjustable range: 0~999999



6.18 AL2 High alarm limit of instantaneous value·····switch "D" (Option specifications)

High alarm limit of instantaneous value can be set to an arbitrary value by the following switch operation.

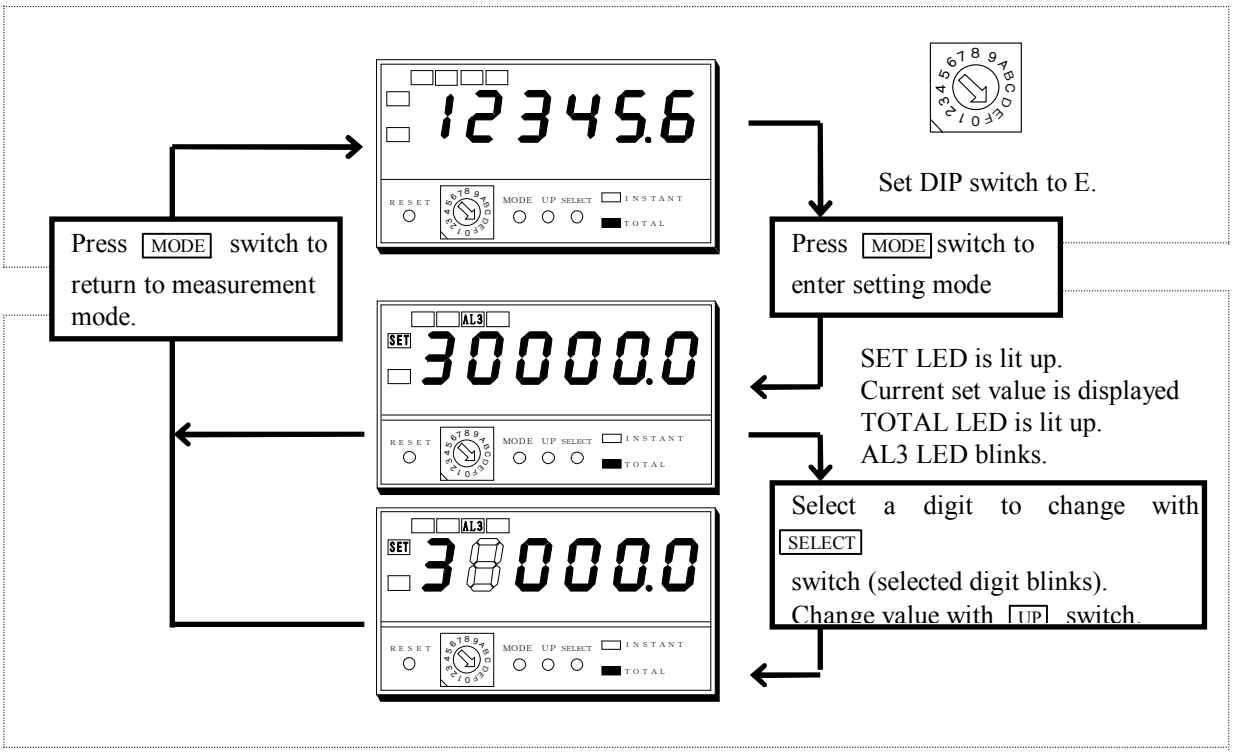
Adjustable range: 0~999999



6.19 AL3 High alarm limit of totalized value, or pre-warning batch output

·····switch "E" (Option specifications)

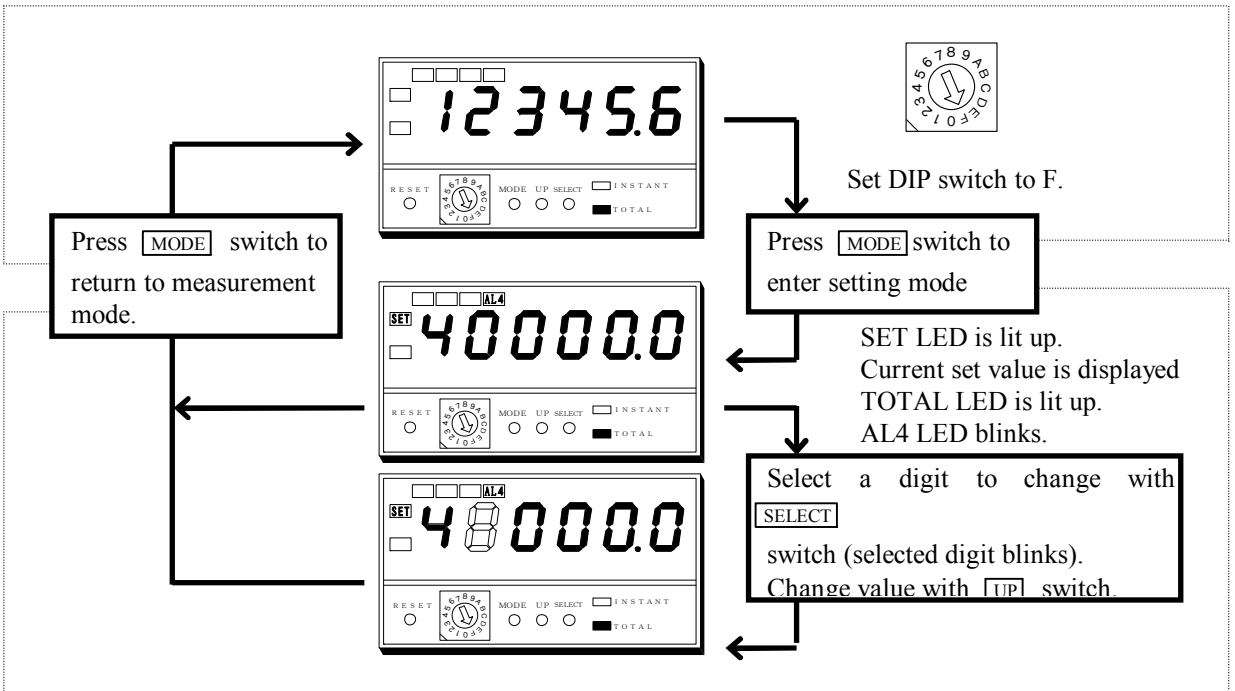
High alarm limit or pre-warning batch output value of totalized value can be set to an arbitrary value by the following switch operation.
Adjustable range: 0~999999



6.20 AL4 Higher High alarm limit of totalized value, or stop batch output

·····switch "F" (Option specifications)

Higher high alarm limit or stop batch output value of totalized value can be set to an arbitrary value by the following switch operation.
Adjustable range: 0~999999



6.21 Example of setting

Conditions: Output of flow volume sensor 1 pulse 1*l* open collector
Max. display value of instantaneous value 36000*l* /h=36m^3/h
The example of setting with the above conditions and the examples of display when the instantaneous time unit is set to *l* /s, *l* /min and *l* /h are explained.

[Setting example 1]
Instantaneous value min. display 1*l*, Instantaneous time unit *l* /h
Totalizing value min. display 1*l*

	No.	Function	Setting	Display	
Note 1	0	Totalizer pulse coefficient	1	000 1E0 or 00 10E 1, 0 100E2	Magnification per pulse
	1	Initial totalizing value	0	000000	
Note 2	2	Instantaneous pulse conversion Value	1	000 1E0 or 00 10E 1, 0 100E2	1, as 1 pulse 1*l*
Note 3	3	Instantaneous time unit	Hour	Un it.3	
	4	Instantaneous indication period	3.3 times/sec.	SP. 1	
	5	Decimal point of instantaneous	No DP	0	
		Decimal point of totalized value	No DP	0	
Note 4	6	Change-over of input	Input 1, LF range	CH 1-LF	LF range= 0.016～100Hz
Note 5	7	Cut-off	1%	CUT 1	

Note 1) Instantaneous value min. display 1*l* and sensor output 1 pulse = 1*l*, so the pulse index is 1.
Display 000lE0 means $1\times10^{-0}=1$

> Originally in numerical way of expression, 0.1 is indicated by index as "$1E^{-1}$" but no - (minus) code is available on LED display, so it is expressed on this meter as follows:
> Example: 0.1→0001E1(1×10^{-1}), 0010E2(10×10^{-2}) or 0100E3(100×10^{-3})

In the same way, $0010E1=10\times10^{-1}=1$, $0100E2=100\times10^{-2}=1$ are also "1".

Note 2) Weight per pulse is input as same as the totalizing pulse index.

Note 3) When 36000*l* /h=10*l* /s (10Hz):
Instantaneous display per hour is 36000 (When set to Hour UNIT. 3)
Instantaneous display per minute is 600 (When set to Minute UNIT. 2)
Instantaneous display per second is 10 (When set to Second UNIT. 1)

Note 4) Select the input 1 as it is open collection, and LF range as it is 10Hz.

Note 5) When cut-off is set to 1% in LF range, 100Hz×1%=1Hz.
Consequently, for the input of 1Hz or less, the instantaneous display is "0" and the totalizing display does not count up.

[Setting example 2]

With the same sensor as setting example 1.

Instantaneous value min. display 0.1*l*, Instantaneous time unit *l* /min.

Totalizing value min. display 1m^3

	No.	Function	Setting	Display	
Note 1	0	Totalizer pulse coefficient	0.001	000 1E3 or 00 10E4	1*l* =0.001m^3
	1	Initial totalizing value	0	000000	
Note 2	2	Instantaneous pulse conversion Value	10	00 10E0 or 0 100E 1	1 pulse = 1*l*
Note 3	3	Instantaneous time unit	Minute	Un it.2	
	4	Instantaneous indication period	3.3 times/sec.	SP. 1	
Note 4	5	Decimal point of instantaneous	DP1	0.0	
		Decimal point of totalized value	No DP	0	
	6	Change-over of input	Input 1, LF range	CH 1-LF	LF range= 0.016～100Hz
	7	Cut-off	1%	CUT 1	

Note 1) Totalizing value min. display 1m^3 and sensor output 1 pulse = 1*l*, so the pulse index is set to 0.001. (1*l* = 0.001 m^3)
In this case, one count is made per every 1000 times of pulse input.
Display count 1 = 1000×0.001 (Totalizing pulse index)
Display 000lE3 is 1×10^{-3}=0.001
In the same way, 00l0E4 is 10×10^{-4}=0.001

Note 2) Weight per pulse "1.0" (as min. display is 0.1*l*) is input but the position of decimal point is set by FUNCTION switch 5 - decimal point of totalizing time, so make an input of only the numeral excepting the decimal point.
Consequently, make an input: instantaneous pulse conversion value = 1.0→10(0010E0=10×10^0)

Note 3) When 36000.0*l* /h=10.0*l* /s (10Hz):
Instantaneous display per hour is 36000.0 (When set to Hour UNIT. 3)
Instantaneous display per minute is 600.0 (When set to Minute UNIT. 2)
Instantaneous display per second is 10.0 (When set to Second UNIT. 1)

Note 4) Instantaneous value min. display is 0.1*l*, so make a setting of DP1 (0.0).

7. Terminal arrangement

● Upper row

(without preset output)

Terminal	NC	NC	NC	NC	NC	P.O	RESET	PA/LA	D.COM
	1	2	3	4	5	6	7	8	9
Function	NC					Pulse output	Reset	Pause/Latch	Common

(with preset output)

Terminal	AL1OUT	AL2OUT	AL3OUT	AL4OUT	AL.COM	P.O	RESET	PA/LA	D.COM
	1	2	3	4	5	6	7	8	9
Function	Preset output					Pulse output	Reset	Pause/Latch	Common

● Lower row Note: ( ) at ground and power source terminals are for DC power source types.

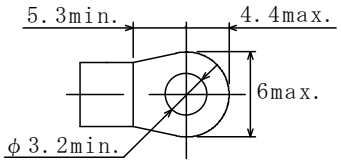
(without sensor power source or analog output)

Terminal	Hi (1)	Hi (2)	COM	NC	NC	NC	GND(NC)	P2(+)	P1(-)
	1	2	3	4	5	6	7	8	9
Function	Input		Common	----------			Ground	Power source	

(with sensor power source and analog output)

Terminal	Hi (1)	Hi (2)	COM	SENSOR	A.OUT+	A.OUT-	GND(NC)	P2(+)	P1(-)
	1	2	3	4	5	6	7	8	9
Function	Input		Common	Sensor power	Analog output		Ground	Power source	

Terminal screws : M3
Fastening torque : 0.46~0.62N·m
Crimped terminal : Refer to the figure at the right.



⚠ WARNING

- **Do not use the meter with wrong wiring as it may cause breakage of the meter.**
- **To avoid an electric shock;**
  - **Turn off the power when the wiring work is done.**
  - **Do not do the wiring work in the humid environment or with the wet hands.**
  - **Do not touch the power source terminals while the meter is powered.**
- **Be careful with the polarity in case of the DC power source types.**
  Incorrect polarity causes a malfunction of the meter.

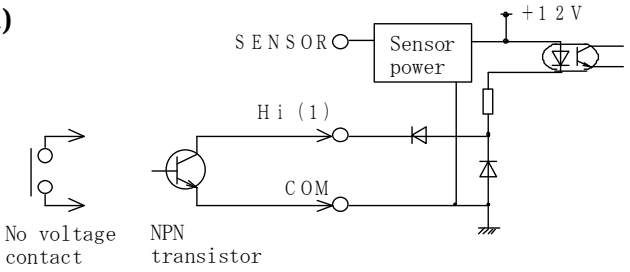
8. Lower row terminals

● **Input (Hi (1), Hi (2))**

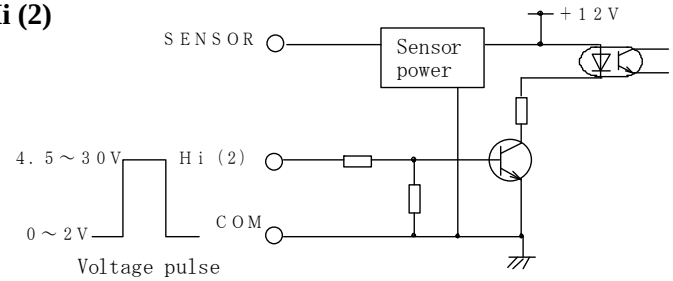
When the meter is used with no voltage contact or open collector (NPN), make a connection to input 1, and when used with voltage pulse, to input2. Select the input 1 or input 2 with the front panel switch.

For the setting of frequency range, only the LF range (low speed) is applicable when the meter is used with the contact. When it is used with HF range (high speed), use the open collector.

Input 1 : Hi (1)



Input 2 : Hi (2)



● **Common (COM)**

Common terminal for the input 1, input 2, sensor power source.

● **Sensor power source (SENSOR)**

Make a connection with correct polarity and without short-circuit. COM terminal is the 0V side.

● **Analog output (A.OUT+, A.OUT-)**

Analog signal which is proportional to the instantaneous value (instantaneous value output type) whose full scale is analog output constant value, or the totalized value (totalized value output type) is output.

⚠ CAUTION
● **Do not apply the voltage externally to the analog output terminals as it may cause breakage of the meter.**

● **NC**

NC are the open terminals but do not use these terminals as a relay terminal.

● **Ground (GND)**

In case of fear that the noise is frequently generated on the power source line, it is effective to earth the ground terminal directly to the ground. If the meter is not affected by environmental noise, the earthing can be omitted. In this case, take care that the ground terminal does not touch other terminals, as it is charged with the neutral electric potential of power source voltage.

● **Supply power source (P1(+), P2(-))**

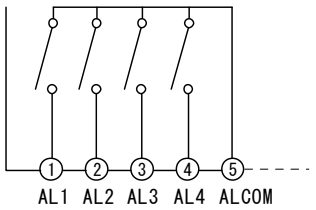
The power source voltage to be supplied is specified on the terminal plate when delivered from factory.

○ AC power source ..... Use the meter within the range AC90~264V.

○ DC24V ..... Use the meter with DC24V±10%.
Connect +24V of DC power source to P2(+) and 0V side to P1(-).

9. Upper row terminals

● **Preset output (AL1OUT, AL2OUT, AL3OUT, AL4OUT, AL.COM)**
Preset output outputs, with 4 points of AL1~AL2, the instantaneous value alarm output (AL1 low limit output, AL2 high limit output) and totalizing value alarm output (high alarm limit, upper high alarm limit, or two steps batch output).



● **Pulse output (P.O)**
Outputs the totalization-synchronized pulse in open collector (NPN).

● **Reset input (RESET)**
Totalized value, totalizing initial value are reset by making a short-circuit between RESET terminal and D.COM terminal.
Note: Preset output is not reset, while the continuous totalizing batch output is reset.

● **Pause/latch input (PA/LA)**
Short-circuit between PA/LA terminal and D.COM terminal makes pause or latch action.

● **Data common (D.COM)**
COM terminal of P.O, RESET, PA/LA.

10. Error message

When an abnormality occurs during the setting, etc., the following error display appears.
Apply the respective remedy.

Display	Cause	Remedy
Err 1	When the setting of totalizing pulse index, instantaneous pulse conversion value or analog output constant value is out of range.	Press MODE switch and make a setting again.
Err 2	In case of totalizer reset function ON Auto-reset ON at batch output When the relation is initial totalizing value ≧ AL4	Press MODE switch and make a setting again.

11. Maintenance

Store the instrument within the specified temperature range for storage (-20~70°C).
When the front panel or the case becomes dirty, wipe it with soft cloth.
For heavy dirt, wipe it lightly with the soft cloth wetted with the neutral cleaner thinned by water, and finish the cleaning with dry cloth. Do not use organic solvent like benzene or paint thinner as they may deform or discolor the case.