Instruction Manual
(Quick manual for installation and specifications)

Reversible Counter Model 472A

I-02378

1. Preface

We thank you for your purchase of our product. For proper use of it, please carefully read these instructions before the initial operation of it. Please ensure that this instruction manual is delivered to the right person who is in charge of using this instrument.
When the product is delivered to you, please check that the following items are provided:

(1) Model 472A main unit.
(2) Bracket, 2 pieces.
(3) Waterproof packings.
(4) Instruction manual.(this manual)
(5) Label of units.
(6) Connector with 2m flat cable.(when provided with BCD output)

Also, please check that the specifications of the delivered product conform to your requirement.

For safe use of this product, please observe the following warning and caution.
In order to help the users' safe use of the products, the following symbol marks are used in this manual.

⚠ WARNING This is the warning to avoid the danger when it is assumed that such danger as may cause fatal accident or severe injure to a user occurs in case that the product is mishandled.

⚠ CAUTION This is the caution to avoid the danger when it is assumed that such danger as may cause minor injure to a user or generate only physical obstacle occurs in case that the product is mishandled.

⚠ WARNING

● There is no power on-off switch on the model 472A. It immediately starts to operate after turning the power.
● Do not touch terminals when turning the power on.

⚠ CAUTION

Preserve followings for your safety.
● Use this product indoor.
● The rated data is, however, defines with more than 15 minutes warming-up times.
● When the product is installed in the cabinet, perform the appropriate heat radiation to keep less than 50 ºC in it.
● Avoid the close-contacted mounting of the meter. The rise of internal temperature affects the life of product.
● Do not install under the following conditions.
●Where it is exposed to direct sunlight, dust, corrosive gases, rain, etc.
●Where ambient temperature or humidity is high.
●Where it is exposed to excessive noise or static electricity.
●Where there is constant vibration or shock
● Store the instrument within the specified temperature range for storage (-20~70ºC).
● 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.

2. Specifications

2.1 Specifications for installation

Power supply	: AC100V~AC240V 50/60Hz, DC24V, DC110V	
Power supply voltage tolerance range	: AC90~250V, DC24V±10%, DC100~170V	
Power consumption	: AC100~240V: Approx. 11VA at AC100V, approx. 15VA at AC200V DC24V: Approx. 250mA, DC110V: Approx. 50mA	
Operating ambient temperature	: 0~50°C (without dew condensation)	
Operating ambient humidity	: 40~85%RH	
Storage temperature	: -20~70 °C (without dew condensation)	
Weight	: Approx. 300g	
Mounting method	: From the product's rear side, by dedicated bracket.	
Insulation resistance	: DC500V, 100MΩ or more	
Withstanding voltage	: Input terminals / Case	AC2000V for 1 minute
	Power source terminals / Case	AC2000V for 1 minute
	Power source terminals / Input terminals	AC1500V for 1 minute
	Input terminals / BCD output	AC500V for 1 minute
	Input terminals / Analog output terminals	AC500V for 1 minute
Protection degree	: Front panel operating section IP65 Rear case IP20 Terminal block section IP00	

2.2 General specifications

●Performance

Display (LCD)	: Display-1 side (lower 6 digits): 7 segments display, red/green, character height 15.2mm Display-1 side (upper 2 digits), Display-2 side: 7 segments display, red, character height 7.6mm With zero suppress function
Display range	: Both Display-1 and display-2: -999999~999999 Display for number of times of over, for both display-1 and display-2: -99~99
Decimal point	: Arbitrarily selectable from 10^1,10^2 or 10^3 (not remote-controllable)
Over display	: At over of display-1: OVER is lit up At over of display-2: ・ is lit up When the number of times exceeds 99, the over display blinks. The display of value is fixed at 999999 or at -999999. Depending upon the counting system, the continuous count or not, at over, can be set.
Counting speed	: 10Hz/100Hz/1kHz/10kHz, switchable by setting
Display cycle	: Approx. 100ms
Pulse coefficient (m)	: 1×10^{-6}~9999 : Depending upon the counting system, IN-A or IN-B can separately be set, or only IN-A.
Pulse division ratio (n)	: Number of pulse per rotation 1/1~1/1000 : Depending upon the counting system, IN-A or IN-B can separately be set, or only IN-A.
Display value (d)	: Display value = Number of input pulse×pulse coefficient×pulse division ratio d = p×m×n p = number of input pulse : Depending upon the counting system, IN-A or IN-B can separately be set, or only IN-A.
Display accuracy	: ±0 digit at pulse coefficient 1 and pulse division ratio 1
Compensation for blackout	: The totalized value is memorized in non-volatile memory and retained. No count is made during the blackout. The data retaining duration is about 10 years.
Power source line interfusing noise	: 1000V (in case of AC power source)
Sensor power supply	: DC12V±5% 100mA or DC24V±5% 60mA

●Standard input, output specifications

Pulse input : For 472A-1 (no voltage contact or open collector NPN):
Minimum input signal amplitude, for both ON and OFF;
For input filter 10kHz, 50μs or more
For input filter 1kHz, 500μs or more
For input filter 100Hz, 5ms or more
For input filter 10Hz, 50ms or more
Residual voltage 3V or less
Contact capacity 12V 10mA
(In case of relay contact, pay attention to the erroneous count due to chattering.)
For 472A-2 (voltage pulse):
Input resistance approx. 24kΩ
Threshold value "H" = 4.5~30V "L" = 0~2V
Minimum pulse width: Same as those of open collector input.

Counting system : Standard
A :Count value corresponding to IN-A
B :Count value corresponding to IN-B
A+B :Addition of A and B
A-B :Reduction between A and B
Phase differential (90° phase differential)
Count up when IN-A is advanced from IN-B by 90°
Count down when IN-A is lag from IN-B by 90°
Command input
Count up or down the IN-A input pulse by the command of IN-B ON/OFF.
Batch-1 and batch-2 (option)
Selectable when provided with comparator output AL3, AL4.

Control input (P/L) C3, C1 : Selection of pause / latch function (make the terminals C3 and C1 to L level.)
Pause – Count is prohibited
Latch – Count is continued, display is retained
Active "L", $I_{IL} \leqq 10$mA L=0~6V, "H"=9~12V
Non-isolated with pulse input (COM C1 and COM A2 are common)

Reset terminal C2, C1 : Between the terminals C2 and C1 (L level input or no voltage contact input)
Active "L", $I_{IL} \leqq 10$mA L=0~6V, "H"=9~12V
Minimum pulse width 10ms
Non-isolated with pulse input (COM C1 and COM A2 are common)

Comparator output A5, A6, A2 : AL1~2 open collector (NPN)
Contact capacity DC30V 30mA
AL1 = between A5 and A2, AL2 = between A6 and A2

●Option

Comparator output D4, D5, D6 : AL3~4 photo MOS relay
Contact capacity AC/DC150V 80mA
AL3 = between D4 and D5, AL4 = between D6 and D5

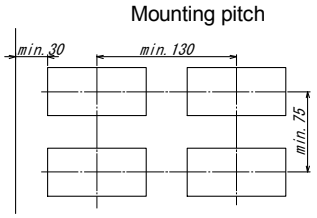
BCD output [B row terminals] : 6 digit open collector output
Contact capacity DC30V 10mA
Accessory: Mode 5808-05 (with connector on 472A side and 2m flat cable)

Analog output C5 — C6 Following analog outputs are available in open code.
DC0~5V, DC0~10V, DC1~5V, DC4~20mA (either one)
Accuracy ±(0.3% of F.S.) at 23°C

3. Installation

3.1 Panel cut-out

Panel cut-out dimension: $92^{+0.8}_{0}$ × $45^{+0.6}_{0}$ mm
Allowable panel thickness:0.6~3.5mm (protection degree IP65)
3.6~10mm (protection degree IP20)
Recommended thickness for the panel of aluminum is 1.5mm or more to avoid deformation of the panel.



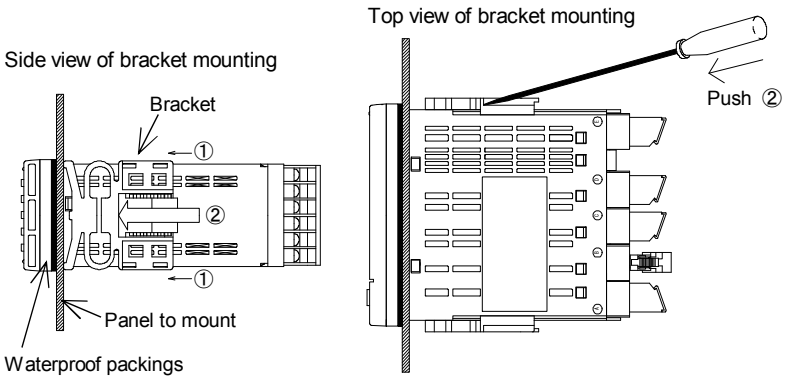
3.2 Mounting and dismounting

・ Mounting:

1. Insert the main unit fitted with the waterproof packings into the hole, from the panel front, and insert the attached bracket to the ditch on both sides of the main unit. Push the bracket as shown by arrow ① until the main unit is stably stays and fix the bracket. The packings functions as stopper too, so do not remove it. Refer to the side view of the bracket mounting.
2. To fix the main unit more firm, press the back part (center part) of the bracket indicated by arrow ② by screwdriver, which enhances the stopper strength.

⚠ CAUTION

- When pushing by screwdriver, apply it to the arrow ②.
  The pushing of other part may cause the damage of bracket.

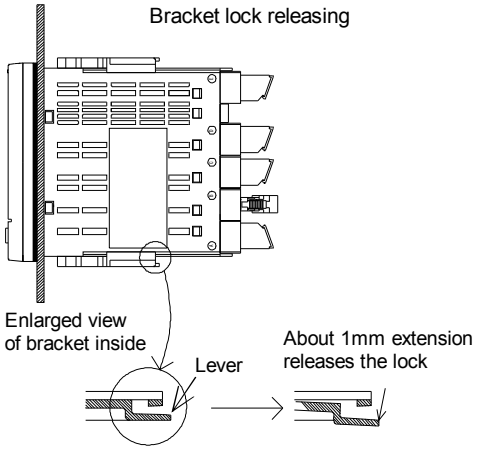


・ Dismounting:

1. By extending with fingers the lever outward by about 1mm, as shown in the bracket lock releasing figure, the lever lock can be released.
2. Keep extending the lever outward, slide the bracket backward of the main unit, and remove it from the ditch.

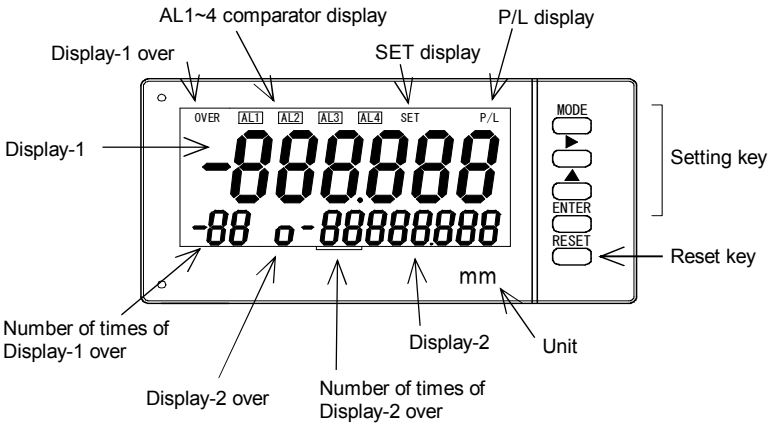
⚠ CAUTION

● The extension of the lever for long time or the stress to it by metallic piece like screwdriver may damage the lever.



4. Name of parts

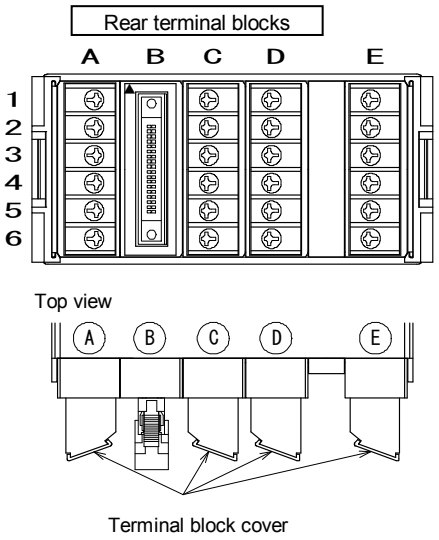
4.1 Front



4.2 Function of setting keys

MODE key	In measurement mode	:	Change-over to setting mode or adjustment mode
	In setting mode	:	Change-over of setting item
・ key	In measurement mode	:	Invalid
	In setting mode	:	Selection of digit of set value
▲ key	In measurement mode	:	Invalid (except at the change-over of self-diagnosis mode)
	In setting mode	:	Change of set value
ENTER key	In measurement mode	:	Invalid
	In setting mode	:	Determining of set value
RESET key	In measurement mode	:	Make the display to “0” (or to initial value when the reset totalizing function is set)
	In setting mode	:	Changes over to measurement mode from setting mode, without memorizing the set value.

4.3 Rear
About wiring

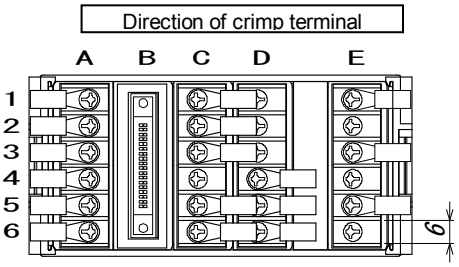


⚠ CAUTION

- Apply the source power voltage and the load within the rated values. Otherwise, it may damage the product.
- Apply the supply voltage so that it can reach the rated value within one second.
- When the power to the product is turned OFF and ON again, provide the downtime of about 10 seconds.
- Do not use the product with wrong wiring, which may cause the breakdown of the product.

⚠ WARNING

- To avoid an electrical shock, turn the power off when wiring.
- Do not wire with moistened hands. Locate away from the wet place.
- Do not touch terminals when turning the power on.



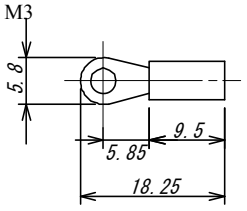
● Other cautions for wiring

- Be sure to wire the input line and source power line independently with each other. If they are wired in parallel, it may case an erroneous count.
- When the auxiliary relay is operated by the relay output to run the electro-magnetic switch or big size relay, take the noise preventive measures. In case that the noise is frequently occurred, it will be effective to store the product in the shielded housing or to insert the power source line filter or insulated transformer.

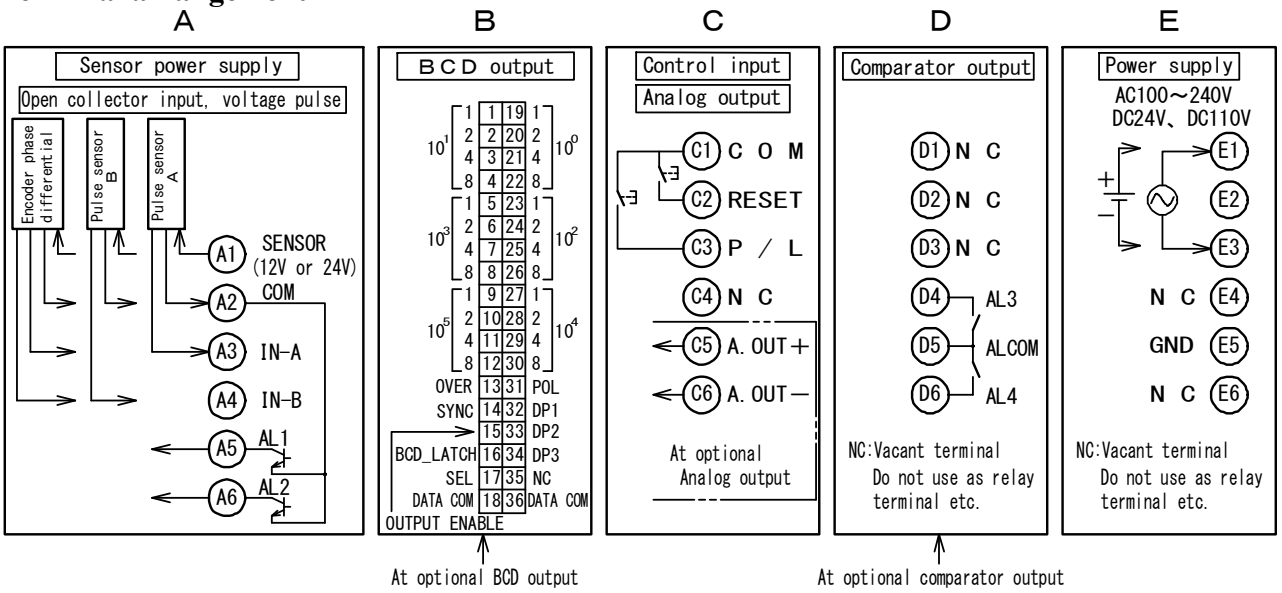
⚠ CAUTION

- For the C row and D row terminal blocks, apply one crimp terminal per one terminal block.
- Do not do the parallel connection, using two crimp terminals (overlaying) at the same terminal block. It stresses the internal PCB and so on and may cause the failure or trouble.
  As for the A row and E row terminal blocks, up to two crimp terminals per terminal block are acceptable.

Recommended crimp terminal: V1.25-FS3
(Made of Fuji Terminal Industry Co.,Ltd)
Ext. diameter of covered cable: Max. 3.3mm
Terminal screw: M3



Terminal arrangement

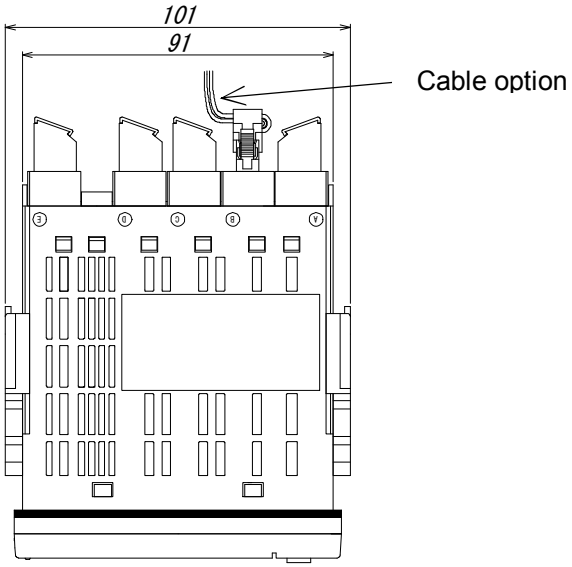


⚠ CAUTION

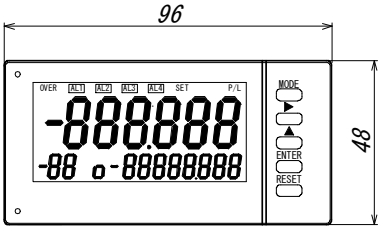
- Short-circuit failure mode of sensor power supply
  The erroneous short-circuit between sensor power supply terminal A1 and COM terminal A2 causes the failure mode, due to the abnormal writing, and in that case, the counter value is not warrantable
- GND (ground) terminal
  In case of fear that the noise is frequently generated on the power source line, it is effective to earth the ground terminal directly to the ground. If the instrument is not affected by environmental noise, the grounding can be omitted. In this case, take care for the ground terminal not to touch other input terminals, as it is charged with neutral electric potential of power source voltage.

5. Dimensions

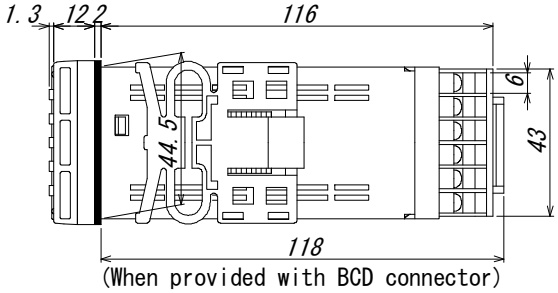
Top view



Front view



Side view



6. Table of explanations of functions and example of setting

● Display functions

Code No.	Function	Display-1	Adjustable range	Initial setting	
00	Key protect	・・・	OFF/ON	OFF	
01	Count setting	・・・・		0.0.1.0.0.0	*Note 2)*
	Counting system		Standard, phase diff., command, batch 1, batch 2	Standard *Note 1)*	
	Display-1 calculation system		A, B, A+B, A-B	Display-1 A	
	Display-2 calculation system		A, B, A+B, A-B	Display-2 B	
	IN-A up / down		Up, down	IN-A: Up	
	IN-B up / down		Up, down	IN-B: Up	
	Continuous count at over		0 (not continue), 1 (continue)	0 *Note 3)*	
02	Filter	・・・・	10. 1. 0.1, 0.01 (unit kHz)	10 (10.00)	
03	Display-1 decimal point	・・ ・	0, 0.0, 0.00, 0.000	0	
04	Display-2 decimal point	・・ ・	0, 0.0, 0.00, 0.000	0	
05	IN-A pulse coefficient	・・・・	9999E-0~0001E-6	1E0 (0001E-0)	*Note 2)*
06	IN-B pulse coefficient	・・・・	9999E-0~0001E-6	1E0 (0001E-0)	
07	IN-A pulse division ratio	・・・・	1/1~1/1000	1 (1/1)	
08	IN-B pulse division ratio	・・・・	1/1~1/1000	1 (1/1)	
09	Display-1 initial totalizing value	・・・・	-999999~999999	0	
10	Display-2 initial totalizing value	・・・・	-999999~999999	0	
11	Display-1 display color	・・・・	RR, RG, GR, GG	RG	※ R G
12	Totalizer reset function	・・・・	OFF/ON	OFF	
13	Display to be reset	・・・・	0 (both display-1 and -2), 1 (display-1 reset), 2 (display-2 reset)	0	
14	Action of reset key	・・・・	0 (prompt), 1 (1 sec.), 2 (2 sec.), 3 (no RESET)	1	
15	Power supply start-up reset	・・・・	OFF. ON	OFF	
16	Pause / latch	・・	0 (pause), 1 (latch)	0	
17	Display total turn-off function	・・・・	0 (invalid) / 1 (valid), 0~99 min.	0, 01	
18	Display-2 turn-off function	・・・・	0 (lit up) / 1 (turn off)	0	

Note 1) Batch 1 and 2 are adjustable when the optional comparator output AL3 and AL4 are provided.

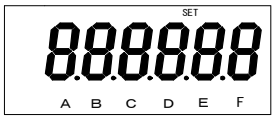
Note 2) When the setting is changed, the count value of display-1 and display-2 is cleared (to 0).

Note 3) Counting system that can be continuous at over is standard and display-2 of batch 1.

R: When either one of AL1~AL4 is ON, red display.

G: When all the AL1~AL4 are OFF, green display.

Detail of code No.1



A: Counting system	B: Display-1 calculation system	C: Display-2 calculation system	D: IN-A up / down setting	E: IN-B up / down setting	F: Continuous count setting, at over
0: Standard 1: Phase diff. 2: Command 3: Batch 1 4: Batch 2	0: A 1: B 2: A+B 3: A-B	0: A 1: B 2: A+B 3: A-B	0: Up 1: Down	0: Up 1: Down	0: Not continue 1: Continue

● Comparator output function (AL1, 2)

Code No.	Function	Display-1	Adjustable range	Initial setting	
40	Comparator data	・・・・	0 (display-1), 1 (display-2)	0 (display-1)	*Note 4)*
41	AL1 comparison value	・・　・	-999999~999999	999999	
42	AL2 comparison value	・・　・	-999999~999999	999999	
45	Comparison conditions	・・・・	GO (equals GO), NG (equals NG)	NG	*Note 4)*
46	AL1 comparison system	・・・・	LO, HI	HI	
47	AL2 comparison system	・・・・	LO, HI	HI	
50	AL1 output width	・・・・	0.00~2.00	0.01s	*Note 6)*
51	AL2 output width	・・・・	0.00~2.00	0.01s	*Note 6)*

● Comparator output function (AL3, 4) Option

Code No.	Function	Display-1	Adjustable range	Initial setting	
40	Comparator data	・・・・	0 (display-1), 1 (display-2)	0 (display-1)	*Note 4)*
43	AL3 comparison value	・・　・	-999999~999999	999999	*Note 5)*
44	AL4 comparison value	・・　・	-999999~999999	999999	*Note 5)*
48	AL3 comparison system	・・・・	LO, HI	HI	
49	AL4 comparison system	・・・・	LO, HI	HI	
52	AL3 output width	・・・・	0.00~2.00	0.01s	*Note 6)*
53	AL4 output width	・・・・	0.00~2.00	0.01s	*Note 6)*

Note 4) Comparator data and comparison conditions are common for AL1~AL4.
In batch, the comparator data and comparison conditions are fixed.
Note 5) 0~999999 at batch.
Note 6) When made to 0.00, continuous output.

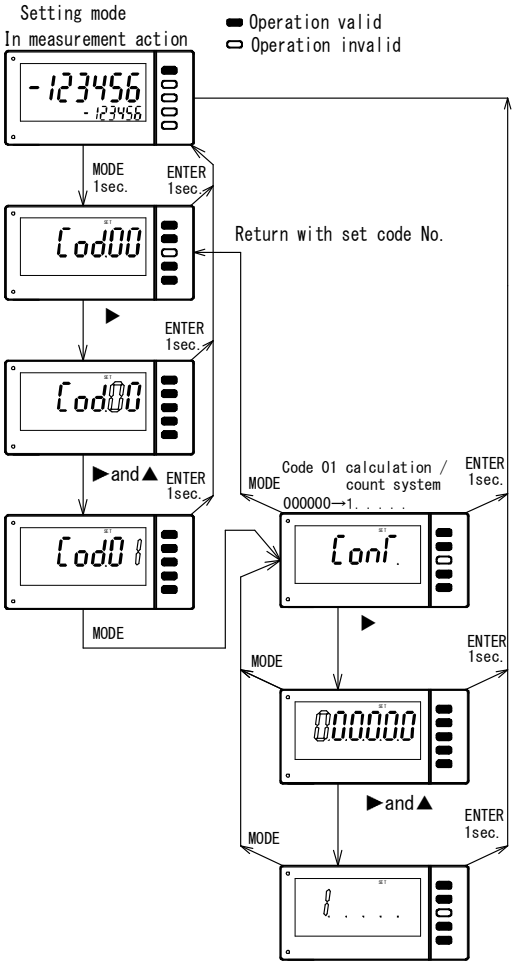
● BCD output option

Code No.	Function	Display-1	Adjustable range	Initial setting
70	Change-over of BCD output	・・・・	0 (display-1) 1 (display-2)	0 (display-1)
71	Change-over of POL logic	・・・	0 (+ polarity ON) 1 (- polarity ON)	0

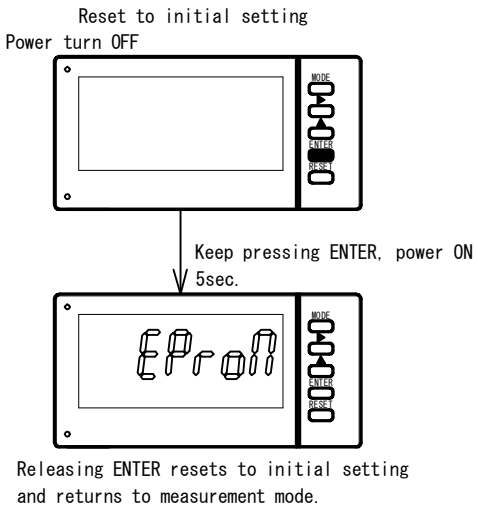
● Analog output option

Code No.	Function	Display-1	Adjustable range	Initial setting
75	Change-over of analog output	・・・・	0 (display-1) 1 (display-2)	0 (display-1)
76	Selection of digit	・・・・	0 (last 4 digit) 1 (middle 4 digit) 2 (first 4 digit)	0
77	Output system	・・・・	0 (valid latch input) 1 (invalid latch input)	0
78	Offset	・・・・	0~9999	0
79	Full scale	・・・・	0~9999	9999

● Example of setting
(count setting in code No.01)



7. Reset to initial setting



Note: <u>Pay attention that the measured values of display-1 and display-2 are reset to the initial value "0".The analog output is also reset to the initial value, so the adjustment for it has to be redone.</u>

8. Model name

472A-【1】-【2】-【3】-【4】-【5】-【6】

Suffix	Function	Code	Description	
【1】	Input signal	1	NPN open collector 2 input	
		2	Voltage pulse input 2 input	
【2】	Power supply	A	AC100~240V	
		9	DC24V	
		C	DC110V	
【3】	Sensor power supply	3	DC12V±5% 100mA	
		5	DC24V±5% 60mA	
【4】	Comparator output (AL3, AL4)	X	Nil (provided with open collector AL1, AL2)	
		1	Photo MOS relay 2 points expanded (AL3, AL4)	
【5】	Analog output	X	Blank	**Tolerable load resistance**
		04	DC0~5V	1kΩ or more
		05	DC0~10V	1kΩ or more
		09	DC1~5V	1kΩ or more
		29	DC4~20mA	510Ω or less
【6】	BCD output	X	Blank	
		DN	Open collector output (NPN)	

9. Error message

Error related to count over

Display	Description	Action
OVER blinks (display-1 side)	Display-1 exceeds ±999999 by 99 times	RESET and make the count value to the initial totalizing value
・ Blinks (display-2 side)	Display-2 exceeds ±999999 by 99 times	

Error related to setting

All setting mode

Display	Description	Action
・・・・	There is no number to correspond to the set code No.	Enter the correct code No.
・・・・	Setting is out of range, for the function having specific range	Set the value within the range

Error related to batch count

Display	Description	Action
・・・・ Note	Setting is AL3≦(display-1 initial totalizing value), while totalizer reset function is ON	Set the value to AL3>(display-1 initial totalizing value)
	Setting is (display-1 initial totalizing value)≦0, while totalizer reset function is ON	Set the value to (display-1 initial totalizing value)≧0
	AL3 is minus set value	Set to AL3>0
	AL4 is minus set value	Set to AL4>0

Note: Before setting the counting system to batch 1 or batch 2, clear the above error status.

Error related to analog output

Display	Description	Action
・・・・	When (analog output offset) = (analog output full scale)	Make setting so that (analog output offset) and (analog output full scale) are not equal.

Tsuruga Electric Corporation

Osaka Headquarters
1-3-23, Minamisumiyoshi, Sumiyoshi-ku, Osaka, Japan, 558-0041
TEL 81-6 -6692-6700, FAX 81-6 -6609- 8115
E-mail: ft.info@tsuruga.co.jp

Yokohama Office
1-29-15, Shinyokohama, Kohoku-ku, Yokohama, Kanagawa, Japan, 222-0033

Tokyo Office
5-25-16, Higashigotanda, Shinagawa-ku, Tokyo, Japan, 141-0022

Nagoya Office
Sun Park Higashi Betsuin Bld. 2F
5-19, Oicho, Naka-ku, Nagoya, Aichi, Japan, 460-0015

Osaka Plant
1-3-23, Minami Sumiyoshi, Sumiyoshi-ku, Osaka, Japan, 558-0041

Shiga Plant
122, Kawasaki-Cho, Nagahama, Shiga, Japan, 526-0846

www.tsuruga.co.jp