Instruction Manual

Digital Tachometer Model 460C

I-01866

1. Preface

- Please take care that this instruction manual is certainly delivered to the person in charge of operating this instrument.
- Unpack the product and confirm that the following items are included.
  (1) 460C main unit (2) Stickers of units (3) Instruction manual

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 460C. It immediately starts to operate after turning the power.
● Do not touch terminals when turning the power on.

⚠ CAUTION

Preserve followings for your safety.
● 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 °C 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 (-20~70°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.

2. Standard Specifications

2.1 Model Name 460C

2.2 General Specifications

Input	: OC	Open collector (NPN) Contact capacity 12V DC., 10mA/ Frequency 0.1Hz to 30kHz/ Min. pulse width 15μs or more.
	: RY	No-voltage contact Contact capacity 12V DC., 10mA/ Frequency 0.1Hz to 30Hz/ Min. pulse width 15ms or more.
	: RE	Voltage pulse "L"= 0 to 2.0V "H"=4.5 to 30V/ Frequency 0.1Hz to 30kHz/ Min. pulse width 15μs or more.
	: MG	Sine wave (Magnetic sensor) 100Hz or less 0.3Vp-p or more/ 1kHz or less 1.5V p-p or more/ 10kHz or less 6 to 30Vp-p.
Display	: 0~99999 5 digits, RED LED (character height 15mm) with zero-suppress function.	
Decimal point	: Selectable by setting operation.	
Over-range indication	: When exceeded 99999.blinking with -----.	
Signal indication	: This light is lit when inputting the signal.	
Sensor power supply	: 12V±5%,100mA.	
Display cycle	: approx. 1 sec.	
Accuracy	: ±0.01% ±1digit (at 23℃ ±5℃)	
Measuring method	: Periodic computation method.	
Power supply	: 100 to 240V AC., 50/60Hz	
Tolerance of source voltage	: 90 to 250 AC.	
Power consumption	: Approx.7VA at 100V AC. Approx.9VA at 200V AC.	
Operation temperature	: 0 to 50℃	
Storage temperature	: -20 to 70℃	
Power source line penetrating noise	: 1000V	
Insulation resistance	: 500V DC., 100MΩ or more.	
Withstanding voltage	: Input terminals – Case	: 1500V AC. each for 1 min.
	Power supply terminals – Case	: 1500V AC. each for 1 min.
	Power supply terminals – Input terminals	: 1500V AC. each for 1 min.
Weight	: Approx. 300g.	
Mounting method	: Fastening from rear of the panel by metal brackets.	

2.3 Unit Labels (attached)

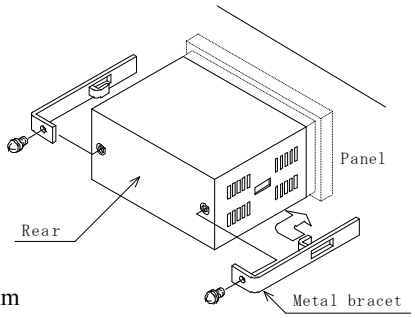
Labels of different units are attached to the instruments.Select and adhere the label of required unit:

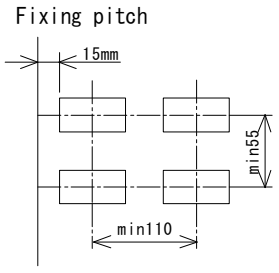
l, k*l*, *l*/min, *l*/h, mm, cm, m, km, mm/s, mm/min, cm/s, cm/min, m/s, m/min, m/h, km/h, cc, cc/s, cc/min, Hz, 個, 回, 本, BPM, rps, rpm

Note: Actual characters of the units printed on the stickers may be different from the above characters.

2.4 Installation

Remove the metal brackets at both sides,
Insert the instrument from the
front and fix it by the brackets.





Panel cut-out dimension: $92^{+0.8}/_{0}$ × $45^{+0.6}/_{0}$ mm
Allowable panel thickness: 0.6~6mm

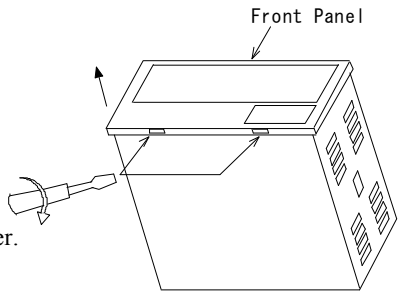
Note: Recommended thickness for the panel of aluminum is 1.5mm or more to avoid deformation of the panel.
Optimum torque of fixing screws: 0.25~0.39N・m

⚠ CAUTION

- **Do not overtighten the mounting bracket.**
- **When plural mounting, pay attention to ventilation to cool down in the panel.**

2.5 Removal of Front Panel

Insert (-) screwdriver into the dips at the low end of instrument and remove the front panel.



Wrench the panel open with (-) screwdriver.

3. Function

3.1 Scaling

By setting parameter, free scaling is available. Refer to 4.3.3 for scaling procedure.

3.2 Field Adjustment

By setting parameter, calibrating indication freely. No complex calculation for scaling is required.

Example) When the indication is 1500 rpm and the real value is 1450rpm, the indication is changed to real value by providing 1450. Refer to 4.3.4 for setting procedure.

3.3 Auto Zero time setting

Time setting till the indication goes to 0 from the last pulse input.
Setting range: 1 to 10 sec. (1 sec. step)
Refer to 4.3.3 for setting procedure.

3.4 Moving average

Using this function when the display is flicking caused by unstable input.
Cycle: 2,3,4, or 16 times.
Refer to 4.3.3 for setting procedure.

3.5 Peak/Bottom memory

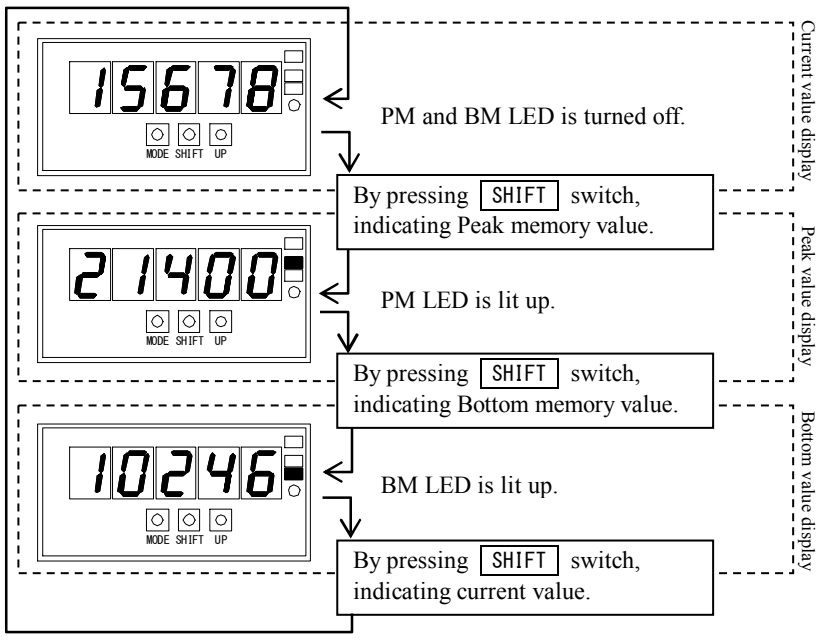
At power ON, start measuring of Peak and Bottom value. At power OFF, resetting these values. By front key operation, indication switching of peak and bottom value is available.

Peak memory: measuring maximum value
Bottom memory: measuring minimum value

[Peak/Bottom memory resetting]

When measuring peak/bottom value, rest peak/bottom memory. Press UP and SHIFT switch at the same time for 3 sec., Peak and bottom memory is set to current value. At this time, the indication is blinking once.

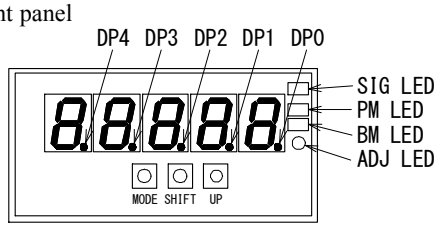
3.6 Change of display



4. Setting procedure

4.1 Explanation of each part

●Front panel



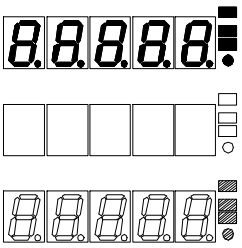
●Function of Each Switches

Mode switch [MODE] : Switching Measuring mode and Field Adjustment mode, and Changing setting parameters at Setting mode.
(Setting mode at pressing UP and SHIFT key at the same time for 3sec.)

Shift switch [SHIFT] : Digit setting at Setting mode
(Current value, PM/BM indication switching)

Up switch [UP] : Changing setting parameter at Field Adjustmen mode and Setting mode.
(Memory reset at pressing UP and SHIFT key at the same time for 3sec.)

●Status of LED

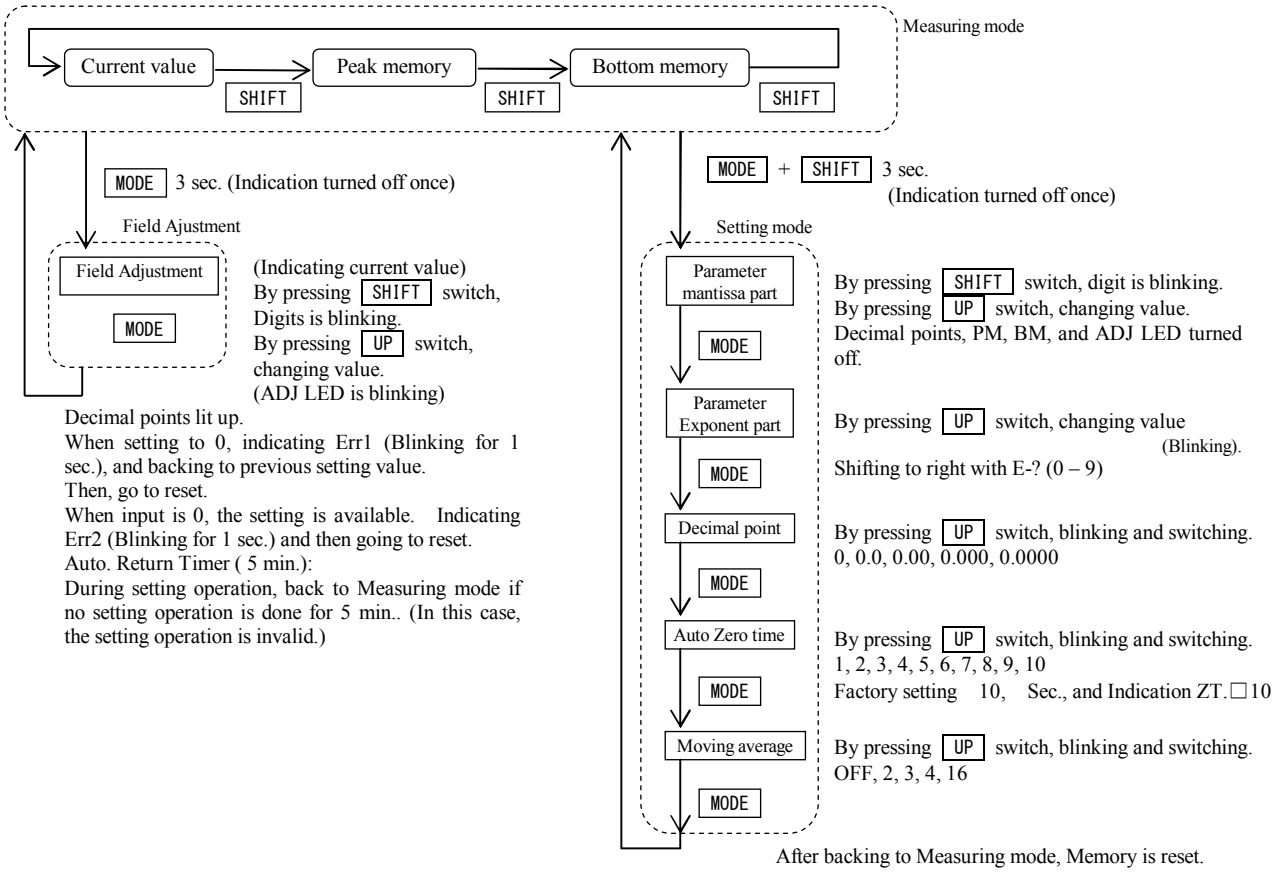


Lit up

Turned off

Blinking

4.2 Setting frow



4.3 Scaling setting

4.3.1 Factory setting

Function		Setting	Display
Scaling	mantissa part	1	0000 1
	Exponent part	10^0	E-0
Decimal point		DP0	0
Auto. Zero time		10 sec	Zr. 10
Moving average		none	n. oFF

4.3.2 Parameter calculation

To indicate rotational speed, parameter (α) is found out from rotational speed or numbers of pulse per cycle and set.

Equation)

$$\alpha = \frac{D}{r \times p}$$

D: The indicating value at r
r : rpm to be set(rpm)
p : number of pulse per cycle
α : Setting range $1 \times 10^{-9} \sim 16666 \times 10^{0}$

note) Delete decimal point if any when D has a decimal point at calculation.
Example) If an indication required is 123.45, calculate it with 12345.
Decimal point setting "DP2" does the decimal point setting.

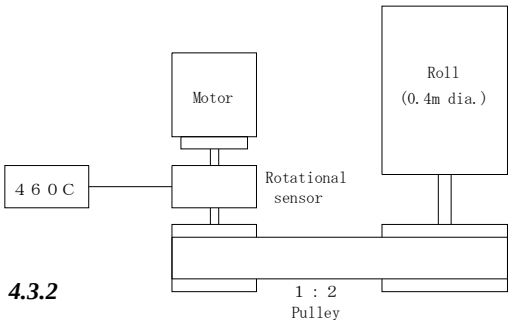


Fig. 4.3.2

Motor rotation number (r) : 3000rpm
Rotational sensor (p) : 60p/r
Pulley rate (c) : 1/2
Roll diameter (d) : 0.4m

example 1) Roll rotation number indication (rpm)
At 3000 rpm, the indication required for roll rotation number is being 1500 rpm Since pulley ratio is being 1/2.

$$\alpha = \frac{D}{r \times p} = \frac{1500}{3000 \times 60} = 0.0083333$$

mantissa part: 83333
exponent part: 10^{-7}

reference) If a decimal indication under one digit (ie. 123.4) is required,
①Set a parameter to 10 times. (Set an exponent part to 10^{-6})
②Set a decimal point by decimal setting "DP1".

example 2) Roll cycle speed indication (m/min)
The rotation of role is being 1500 rpm from example 1), the equation is as follows.
$D = d \times \pi \times r = 0.4 \times 3.1415 \times 1500 = 1884.9$

$$\alpha = \frac{18849}{3000 \times 60} = 0.10472$$

mantissa part: 10472
exponent part: 10^{-5}

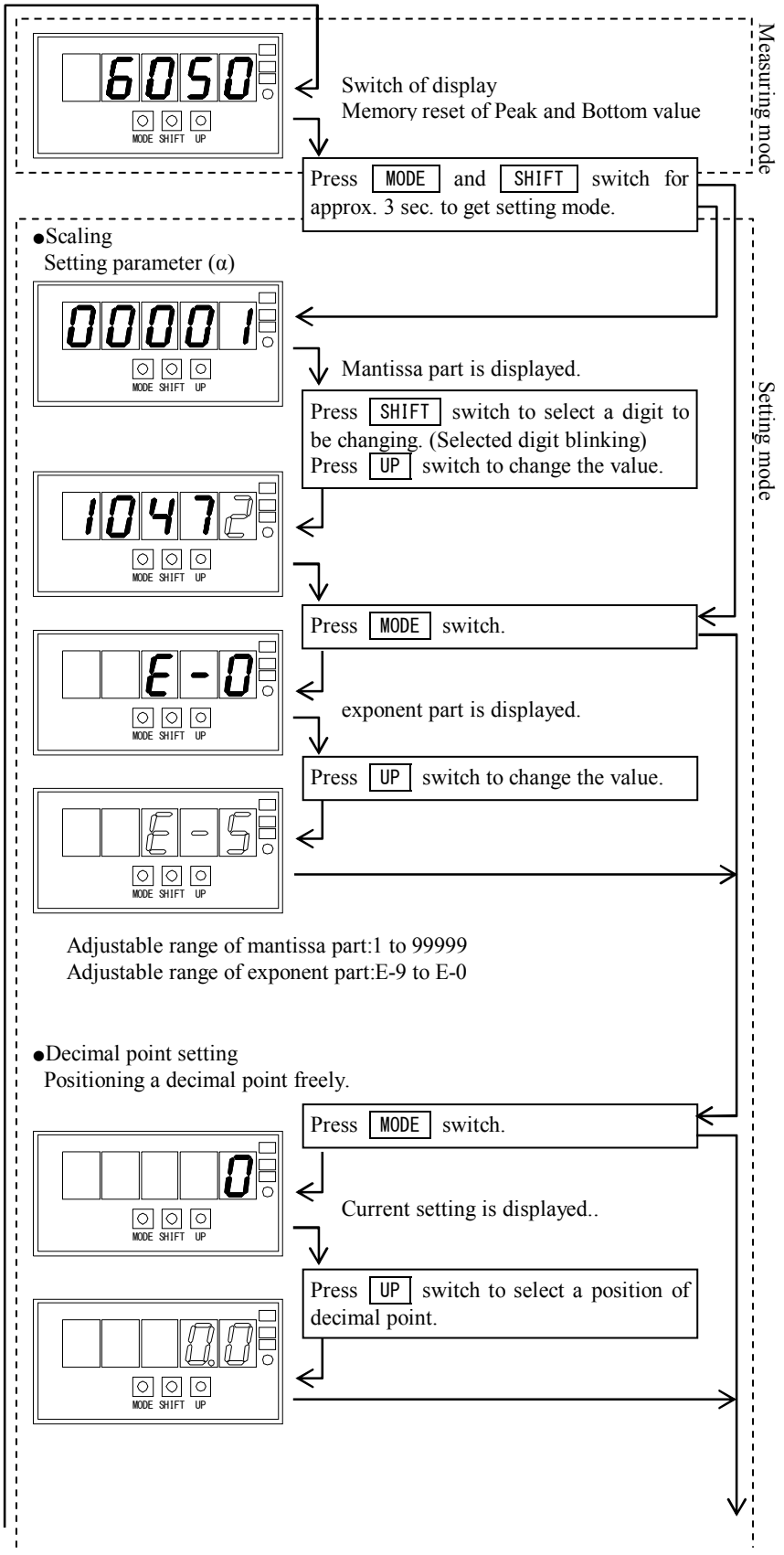
Decimal point setting "DP1" sets a decimal point.

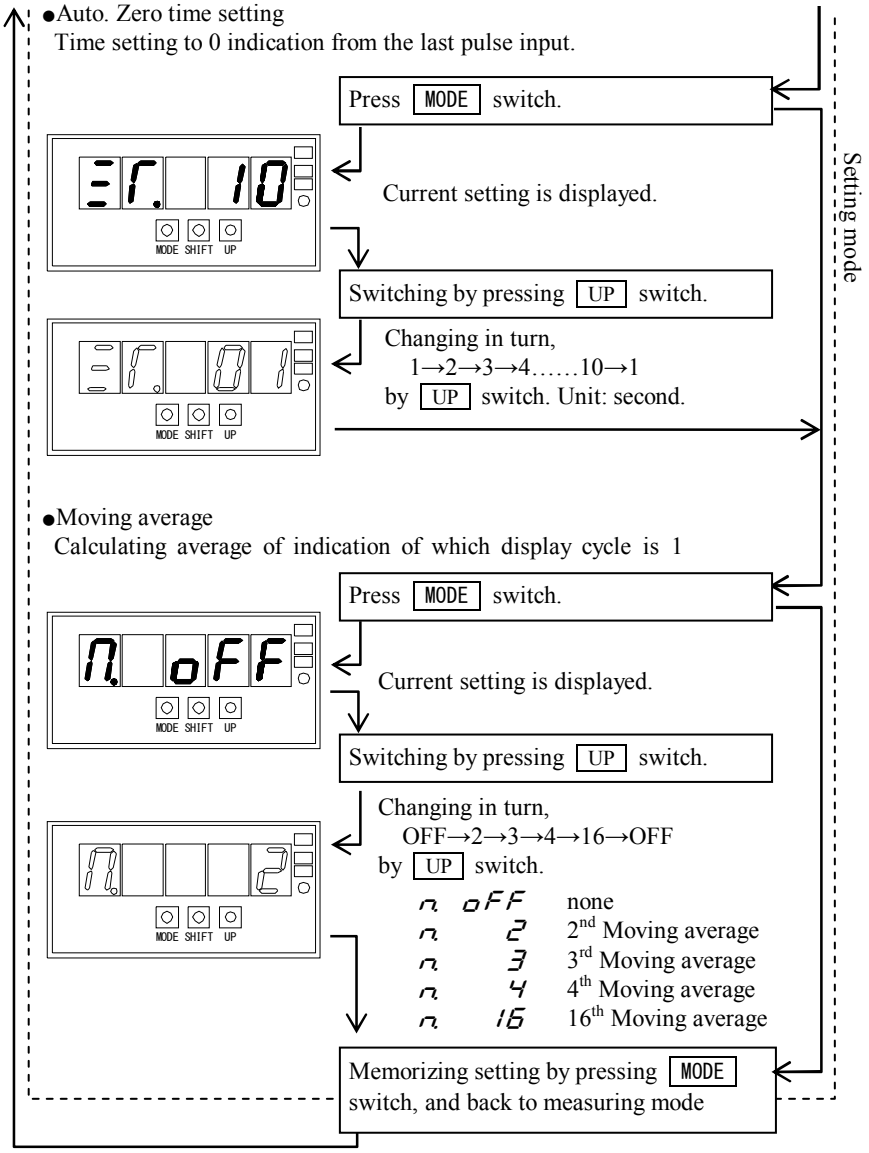
Example 3) Input pulse frequency indication (Hz, kHz)
At Hz α = 1/60 = 0.016666 — mantissa part: 16666, exponent part: 10^{-6}

At kHz α = 1/60000 = 0.000016666 — mantissa part: 16666, exponent part: 10^{-9}

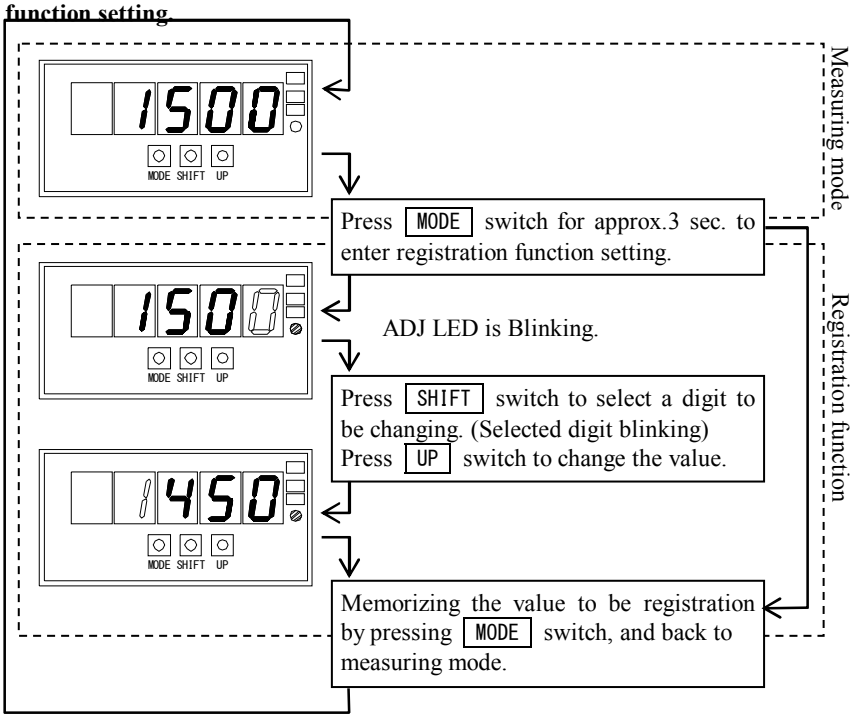
note) When adjusting calculation error of parameter, adjust real value by registration function.

4.3.3. Scaling, Decimal point, Auto. Zero, and Moving average setting





4.3.4. Registration function setting



5. Terminal Arrangement

⚠ WARNING

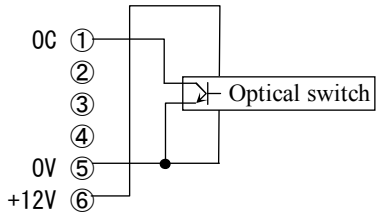
- **To avoid an electrical shock, turn the power off when wiring.**
- **Do not wire with moistened hands. Locate away from the wet place.**
- **Do not touch terminals when turning the power on.**

⚠ CAUTION

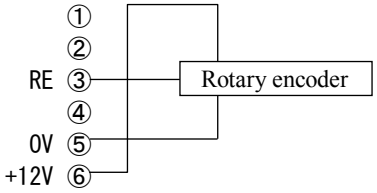
- **Power supply and load should be within the suitable range.**
- **Do not miswiring.**

Terminal Code	OC	RY	RE	MG	0V	+12V	NC	P2(+)	P1(-)
	1	2	3	4	5	6	7	8	9
Function	Input				Common	Sensor	NC	Power Supply	

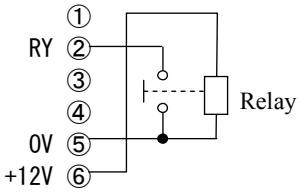
●Open collector input



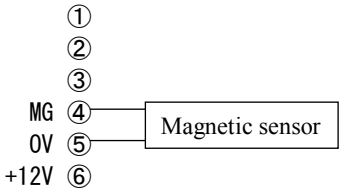
●Voltage pulse input



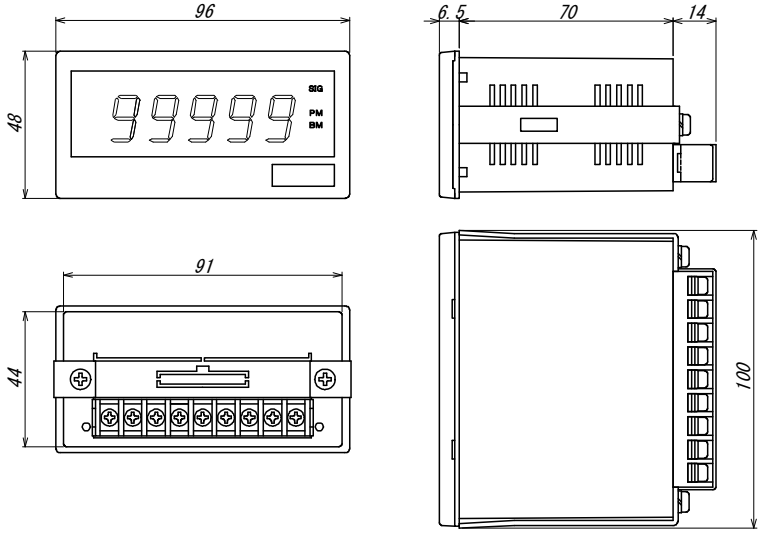
●Relay input



●Magnetic sensor



6. Dimensions



Unit : mm

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