



# Operation Manual

PRODUCT NAME

Compact Manometer

MODEL / Series / Product Number

*PPA10\**

**SMC Corporation**



# Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of “**Caution**,” “**Warning**” or “**Danger**.” They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)<sup>\*)</sup>, and other safety regulations.

\*1) ISO 4414: Pneumatic fluid power - General rules and safety requirements for systems and their components  
ISO 4413: Hydraulic fluid power - General rules and safety requirements for systems and their components  
IEC 60204-1: Safety of machinery - Electrical equipment of machines - Part 1: General requirements  
ISO 10218-1: Robots and robotic devices - Safety requirements for industrial robots - Part 1: Robots  
etc.



## **Danger**

**Danger** indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.



## **Warning**

**Warning** indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.



## **Caution**

**Caution** indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

## **Warning**

### **1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.**

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

### **2. Only personnel with appropriate training should operate machinery and equipment.**

The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

### **3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.**

1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

### **4. Our products cannot be used beyond their specifications. Our products are not developed, designed, and manufactured to be used under the following conditions or environments. Use under such conditions or environments is not covered.**

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Use for nuclear power, railways, aviation, space equipment, ships, vehicles, military application, equipment affecting human life, body, and property, fuel equipment, entertainment equipment, emergency shut-off circuits, press clutches, brake circuits, safety equipment, etc., and use for applications that do not conform to standard specifications such as catalogs and operation manuals.
3. Use for interlock circuits, except for use with double interlock such as installing a mechanical protection function in case of failure. Please periodically inspect the product to confirm that the product is operating properly.



# Safety Instructions

## Caution

**We develop, design, and manufacture our products to be used for automatic control equipment, and provide them for peaceful use in manufacturing industries.**

**Use in non-manufacturing industries is not covered.**

Products we manufacture and sell cannot be used for the purpose of transactions or certification specified in the Measurement Act.

The new Measurement Act prohibits use of any unit other than SI units in Japan.

## Limited warranty and Disclaimer/Compliance Requirements

The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”.

Read and accept them before using the product.

### Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first.\*2)

Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.

2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.

This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.

3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

**\*2) Vacuum pads are excluded from this 1 year warranty.**

A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.

Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty

### Compliance Requirements

1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.

2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

## Compact manometer Cautions(Read through before operation)

## CAUTIONS ON HANDLING

## ⚠Warning

① Compact manometer of Fluids are air and anticorrosive gas

For other fluid, the accuracy can not be guaranteed. This is not intrinsically safety structure. Do not use explosive gas.

② Keep rated pressure range

Pressure over specification lead to cause malfunction.

③ Do not swing the hand strap

Or the hand strap may be taken off or snapped and may hurt people or damage surrounding objects.

④ Ensure the fluid of the one touch tube fitting is at atmospheric state before removing the fitting

If remove the tube being supplied with pressure to the fluid, swelling tube may hurt people or damage surrounding objects. Ensure proper mounting.

## ⚠Caution

① Keep foreign material and fluid in the drain apart from operating fluid

If foreign materials and fluid in the drain enter the operating fluid, it lead to cause failure or air leakage. If these materials may enter, please use the filter or the mist separator.

② Do not drop nor hit

Do not drop, hit nor apply excessive impact(1000m/s<sup>2</sup>). They cause failure.

③ Perform zero-clear at atmospheric state

When performing zero-clear, release the connect tube to the atmosphere. Unless under atmospheric pressure, pressure value can not be adjusted proper.

④ Tighten one-touch tube fitting in as followings

After hand tightening, rotate the one touch tube fitting approx.1/6 turn for extra tightening with a tightening tool. Too much tightening may bend the screw and deform the gasket which cause air leakage.

Screw may be loose in case of inadequate tightening and lead to cause air leakage.

## OPERATING ENVIRONMENT

## ⚠Warning

① Never use in the atmosphere contain explosive gas  
The structure of the compact manometer is not an

intrinsically safety structure. Never use it in explosive environment. Otherwise it cause explosion accidents.

## ⚠Caution

① Don't use where exposed to moist or oil  
Compact manometer is not dust proof nor drop proof. Please do not use where exposed to moist and oil. They cause failure.

## MAINTENANCE, ETC.

## ⚠Warning

① Perform checking regularly in the maintenance  
If calibration is not made and unintended operation mistake is made, proper value may not be displayed and safety is not guaranteed.

② Prohibition of disassembling and remodeling

## ⚠Caution

① Use manganic R6(size AA) or alkali manganized LR6(size AA)  
Do not use any batteries other than batteries above. They cause failure

② Keep the dry battery direction ⊕ and ⊖ as marked direction on the body

Wrong direction of ⊕ and ⊖ may cause fluid leakage or burst and lead to cause failure.

③ Don't mix new battery, old battery and different type of battery

It cause fluid leakage and lead to cause failure.

④ When the manometer is not in use for long period, remove the battery.

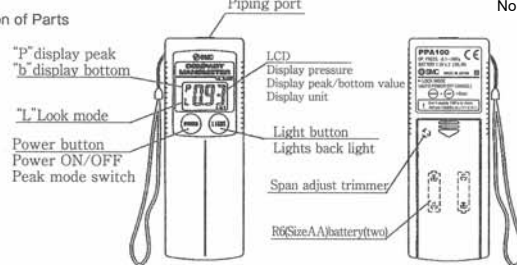
⑤ Don't use the dry battery short of voltage  
If keep using these, pressure value can not be adjusted properly

⑥ Don't touch the span calibration trimmer except when calibrating the span

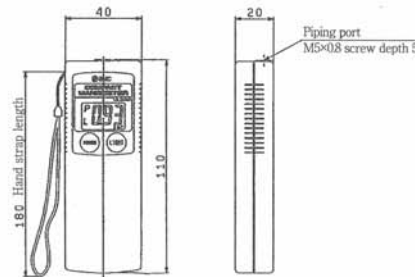
Touching the trimmer may cause error in measured pressure.  
Also, don't rotate hard(0.03N·m or less) nor push hard(5N or less)

⑦ Wipe off the dirt of the body with a soft cloth  
To wipe off the dirt of filthy body, use a cloth soaked in neutral detergent diluted with water and squeezed. Then finish with dry cloth.

## ●Description of Parts



## ●Exterior Dimension



## ●Specification

Type	For high pressure PPA100	For vacuum PPA101	For low pressure PPA102
Rated voltage range	-0.1~1MPa	-101~10kPa	-10~100kPa
Pressure display style	Back light equipped LCD 3 digits		
Pressure display resolution	1/100		
Display unit change	MPa, kgf/cm <sup>2</sup> , PSI, bar	kPa, kgf/cm <sup>2</sup> , mmHg, inHg, PSI, bar	kPa, kgf/cm <sup>2</sup> , PSI, bar
Error display	Excessive pressure, memory data error, battery change sign		
Function	Peak/bottom display, back light, auto power off, zero-clear and unit display change		
Proof pressure	1.5MPa	200kPa	200kPa
operating fluid	Air anticorrosive gas		
Power source	3V(DC), R6(Size AA) battery × 2		
Battery life	Continuous operation, 12 months, (Not lights back light)		
Response time	250mS		
Display accuracy	±2%F, S. or less(When 25°C)		
Repeatability	±1%F, S. or less(When 25°C)		
Temp characteristic	±3%F, S. or less(0~50°C originating 25°C)		
Piping port	M5×0.8		
Operating ambient temp	0~50°C (No dew drop)		
Operating ambient humidity	35~85%RH(No dew drop)		
Proof impact	100G X, Y, Z direction 3 times for each		
Protection structure	IP40 (IEC standard)		
Exterior dimension	40(W) × 20(D) × 110(H) (mm)		
Weight	About 100g(body : 50g, battery : 50g)		
Standards	CE marking (The variation of pressure display value is ±15% F.S. or less), RoHS		

## ●HOW TO OPERATE-FUNCTIONS

## INITIAL SETTING

"Err" is displayed at first operation and replacing battery. Please perform initial setting.

① "Err" is displayed on LCD.

Turn off the power.

② Keep pressing 6 seconds or more to perform zero-clear.

"CAL" is displayed on LCD.

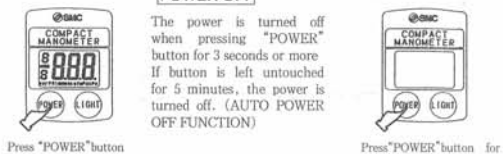
③ Zero-clear is completed and operation become possible.



## POWER ON

The power is turned on as soon as pressing "POWER" button.

Keep pressing 6 seconds or more to perform zero-clear.



## UNIT DISPLAY CHANGE

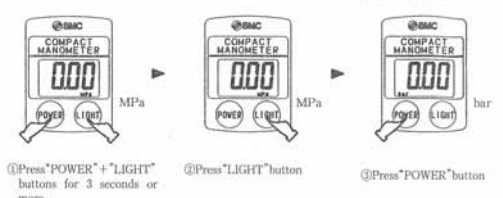
① The unit on display blinks ON and OFF when pressing buttons for 3 seconds or more.

② Change the unit.

For high pressure (PPA100)	For vacuum (PPA101)	For low pressure (PPA102)
MPa → bar	kPa → bar	kPa → bar
PSI → kgf	PSI → inHg	PSI → kgf
		→ mmHg

Note) inHg unit is not displayed

③ Set the unit and complete unit change.



## PEAK/BOTTOM DISPLAY

Perform when pressure is indicated  
Peak indication : The max, pressure is displayed and "P" is displayed on LCD. The display changes when pressure more than held one is applied.

Bottom indication : The min pressure is displayed and "b" is displayed on LCD. The display changes when pressure less than held one is applied.  
(These modes are useful to confirm fluctuation of pressure)

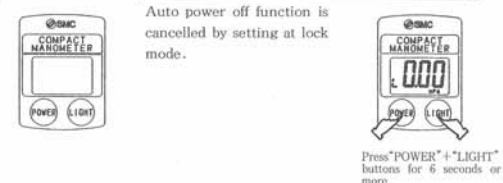
NOTE) This mode is used both as peak/bottoms and as power off. Release the button when "P" or "b" is displayed.



## AUTO POWER OFF FUNCTION

If the button is left untouched for 5 seconds or more, the power is turned off.

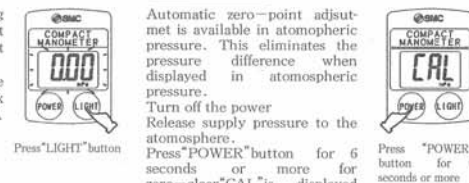
Note) Please refer the instruction on Lock mode function/operation (right) for cancellation operation.



## LIGHTS THE BACK LIGHT

The back light lights during pressing "LIGHT" button

At lock mode, the back light lights by pressing the button. And it puts out by pressing the button again. But the max lighting time is about 1 minute.

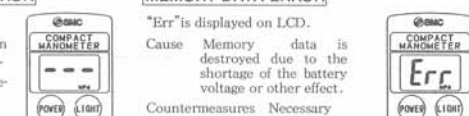


## ●ERROR AND REMEDIES

## EXCESSIVE PRESSURE ERROR

"—" is displayed on LCD.

Cause Pressure more than rated pressure is applied.  
Countermeasures Keep rated pressure.



## MEMORY DATA ERROR

"Err" is displayed on LCD.

Cause Memory data is destroyed due to the shortage of the battery voltage or other effect.  
Countermeasures Necessary to newly write in the memory data. Perform zero clear.

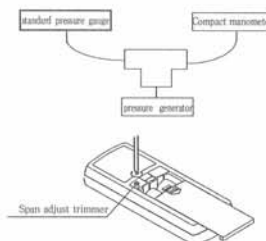
## ●Span calibration

⚠ Never touch the span calibration trimmer except when calibrating span!

① Perform zero-clear under atmospheric pressure

② Apply rated maximum pressure, and calibrate the span comparing with the standard pressure gauge.

③ Calibration is completed if compact manometer displays value "0" under atmospheric pressure.  
When the display value is not 0, perform by the procedure of ② from ①



## ●Battery change

Whole LCD starts to blink when battery is short of voltage.

Replace the battery when LCD blinks. Two R6(size AA) batteries are necessary.

⚠ Replace the battery within 30 minutes after turning off the power. If you can not, "Err" is displayed. Please perform zero-clear in this case.

If the manometer has gone out of control, leave it alone removing the battery for a minute or more, then place the battery again, perform zero-clear.

## ●Pressure unit conversion table(the rough estimate)

	bar	kgf/cm <sup>2</sup>	mmHg	PSI	Pa	inHg
1bar	1	1.020	750.062	14.50	1 × 10 <sup>5</sup>	29.530
1kgf/cm <sup>2</sup>	0.981	1	735.559	14.217	9.807 × 10 <sup>4</sup>	28.959
1mmHg	1.333 × 10 <sup>-3</sup>	1.359 × 10 <sup>-3</sup>	1	1.933 × 10 <sup>-2</sup>	1.333 × 10 <sup>2</sup>	3.937 × 10 <sup>-2</sup>
1PSI	0.069	0.070	51.715	1	6.895 × 10 <sup>3</sup>	2.037
1Pa	1 × 10 <sup>-3</sup>	1.019 × 10 <sup>-3</sup>	7.501 × 10 <sup>-3</sup>	1.45 × 10 <sup>-4</sup>	1	2.953 × 10 <sup>-3</sup>
1inHg	3.388 × 10 <sup>-2</sup>	3.453 × 10 <sup>-2</sup>	2.540 × 10 <sup>1</sup>	4.909 × 10 <sup>-1</sup>	3.385 × 10 <sup>3</sup>	1