Pressure Development of Korea

User Manual

MODEL : PCS-P100

Portable Pneumatic Pressure Calibrator

CE / RoHS compliant

PDK CO., LTD.
www.pdk.co.kr

V. 20230504

Table of Contents

1. General Introduction

1.1 Introduction

PCS-P100 is Portable pressure calibrator for Pneumatic pressure calibration up to 100 bar with pressure generation and precise control. An independent pressure calibration system combining electrical signal measuring and loop power to quickly and easily calibrate for a large amount of on-site calibration.

Using Dual-Stage lever type hand pump to generate up to 100 bar and quickly and easily, and then use the built-in volume controller to precisely adjust the pressure with the secondary fine pressure control.

PCS-P100 also has Pressure/vacuum switching valve to generate up to -0.97 bar in vacuum mode which has the best degree of a vacuum in its class.

Add an optional precision barometric pressure module for full range absolute pressure calibration.

Full-graphic touchscreen display with intuitive menu selection makes it high visibility and operability.

Upper side of PCS-P100 can equipped quick connectors and adaptors for quick and easy to connect UUT.

1.2 Features

1) Dual-Stage lever type hand pump to generate and control up to 100 bar
2) Dual-Stage lever type hand pump to generate and control up to -0.97 bar for vacuum
3) 0.02% F.S Accuracy
4) Electrical connection for Transmitter
   - Measure up to ±15 V, ±24 mA
   - Supply up to 0 ~ 10 Vdc, 0 ~ 24 mA
   - Power 24 Vdc
   - Loop Power
5) Pressure switch test, Help functions

6) Included carrying case

7) Available to apply pressure quick fittings (Optional)

8)CE, ROHS Certificated

1.3 Use

1) Portable pressure calibration (Gauge, Absolute and Compound calibration)

2) Simple calibration for common calibration lab

3) Calibrate pressure gauge for pressure measuring instruments retail business

4) Pressure generating and controlling for pressure test lab

5) Pressure calibration for laboratories

6) Pneumatic high pressure calibration

7) Easy & quick calibration for pressure transmitters, analog pressure gauges, digital pressure gauges

8) Pressure switch test, Leak test, Safety valve test

1.4 Calibrator Interface

No.	Description	No.	Description
①	Test port	⑦	Pressure / Vacuum Switching valve
②	On / Off	⑧	Lever type hand pump
③	Select absolute pressure /gauge pressure	⑨	Hand strap
④	Full color touch screen display	⑩	Electrical connections for measuring mA, V and detecting switch contacts.
⑤	Fine pressure adjustment	⑪	Vent / release valve
⑥	Pressure range		

1.5 General Specifications

Pressure range	-0.97 to 2...100 bar, -0.35 bar to 0.35 bar, -0.7 bar to 0.7 bar, -0.9 bar to 1 bar
Accuracy	± 0.02% F.S
Electrical measurement and source	±15 V.dc, ±24 mA.dc, Accuracy ±(0.01% of Reading + 1digit), Loop Power
Electrical supply	0~10 Vdc, 0~24 mA, Accuracy ± (0.015% of Reading + 1digit), Loop Power
Display	Full color touch screen LCD, 110 mm(4.3") diagonal, 480 x 272 pixels., Resolution ±999999 (Available to select 4 to 6 digits.)
Power	Lithium-ion rechargeable battery, Charger 9V, 6A (5 hrs charge, 30 hrs battery life)
Workable Temperature Range	0 to 70 ℃
Storage Temperature Range	-30 to 80 ℃
Temperature Compensated Range	0 to 50 ℃
Pressure units	Pa, hPa, kPa, MPa, bar, mbar, kgf/cm^2, psi, mm$H_2$0, cm$H_2$0, in$H_2$0, mmHg, inHg, mSW, fSW (mSW and fSW units are applied on a water temperature of 15°C with reference to U.S. Navy Dividing Manual, Revision 7, Table 2-10. Pressure Equivalent.)
Test Port	1/8" BSPP Female
Weight	4.2 kg including batteries
Size	210 mm(W) x 360 mm(D) x 110 mm(H)
Option	
Barometric pressure module (Easy calibration and Zeroing)	Range : 800 hPa ~1100 hPa a
	Accuracy : 0.2 hPa (0.02 %)

⚠ CAUTION

Please fully charge the battery of PCS-P100 properly before storing it.
Long-term storage while not charged can cause full battery discharge.
The battery may not be recharged when fully discharged and may need to be replaced.

1.6 Ordering Information

Model (PCS-P100_Range)	Description (Pressure Range)
0.35 bar	-0.35 bar to 0.35 bar
0.7 bar	-0.7 bar to 0.7 bar
1 bar	-0.9 bar to 1 bar
2 bar	-0.97 bar to 2 bar
3.5 bar	-0.97 bar to 3.5 bar
7 bar	-0.97 bar to 7 bar
10 bar	-0.97 bar to 10 bar
20 bar	-0.97 bar to 20 bar
35 bar	-0.97 bar to 35 bar
70 bar	-0.97 bar to 70 bar
100 bar	-0.97 bar to 100 bar

1.7 Accessories

①	②	③	④
			

Item	Quantity
① Carrying case	1
② Rechargeable battery	1
③ Battery charger	1
④ Test lead set	4

1.8 Optional Items

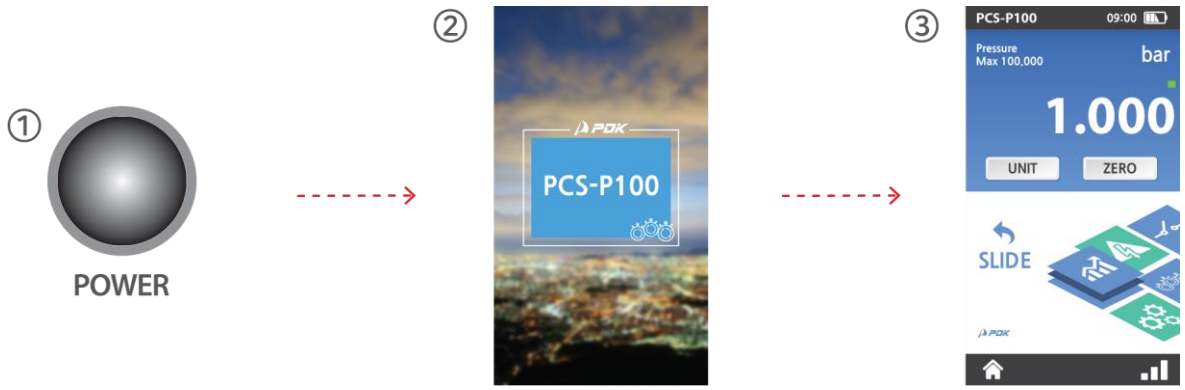
①	②	③	④	⑤	⑥
					

Item	Description
① Dirt / Moisture Trap	Up to 35 bar, 100 bar
② Pneumatic Quick-connection adaptor set	CA-P Series (1/4", 3/8", 1/2", 1/8" BSPT & BSPP, NPT)
③ Flexible tubes	FTH Series(30 cm to 300 cm)
④ Traceable calibration report with data	KOLAS CALIBRATION CERTIFICATE
⑤ External Pressure Manifold	Calibrate 2ea of UUT at once with hand-tight quick-connection
⑥ Barometric pressure module	Absolute pressure mode

2. Main Menu

2.1 Power on / off / main screen

2.1.1 Power on



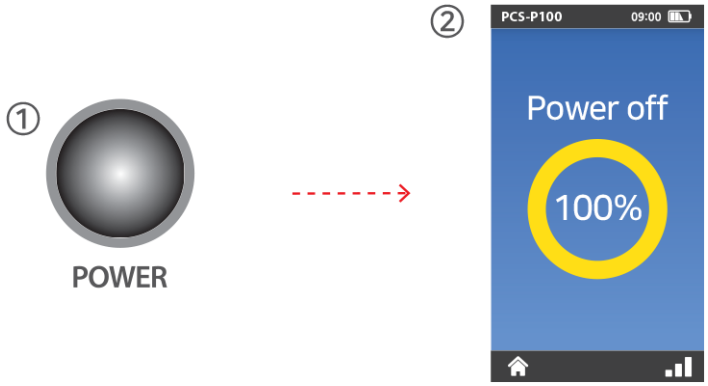
① Press and hold down Power button until ② screen shows.

** 1. If short pressed the power button, the power will not turn on.

2. Read this manual before use.

It will changes ② screen to ③ screen.

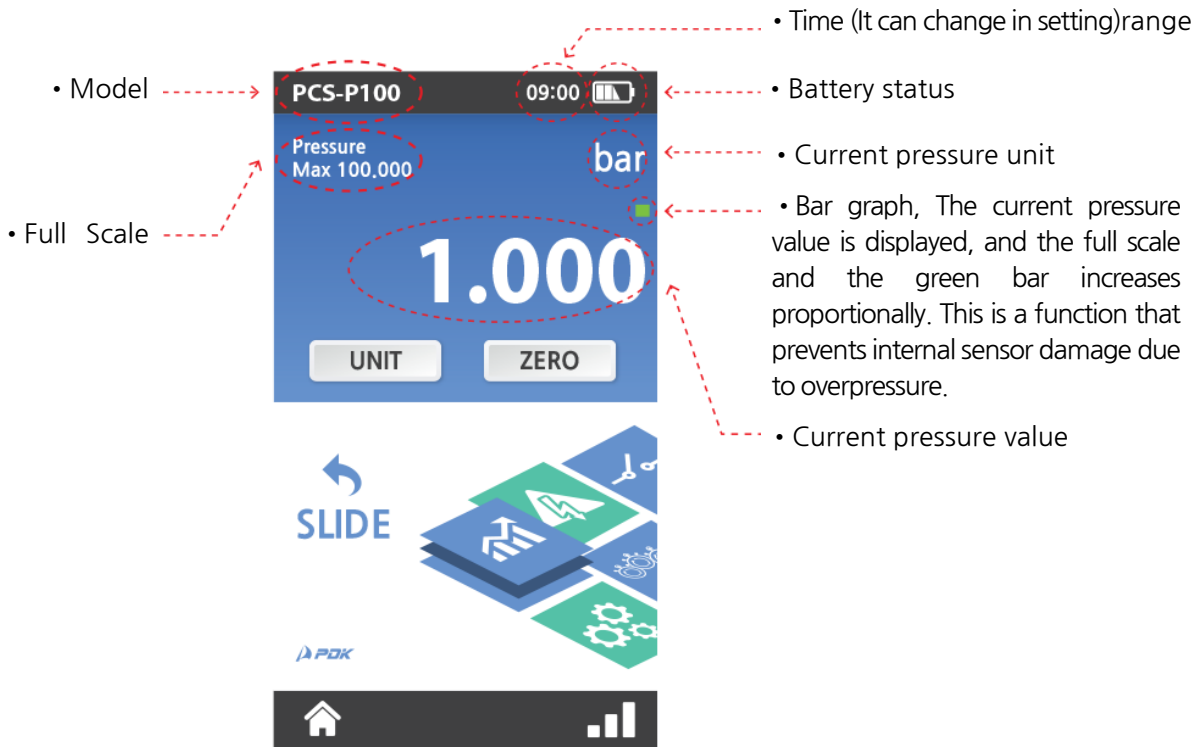
2.1.2 Power off



① Press and hold down Power button until in 0% to 100% on ② screen.

2.1.3 Main screen

When powered on, the main screen is displayed. This screen is fixed as the default screen, and it always boots to the main screen even if it turns off and turn on again after using another menu.

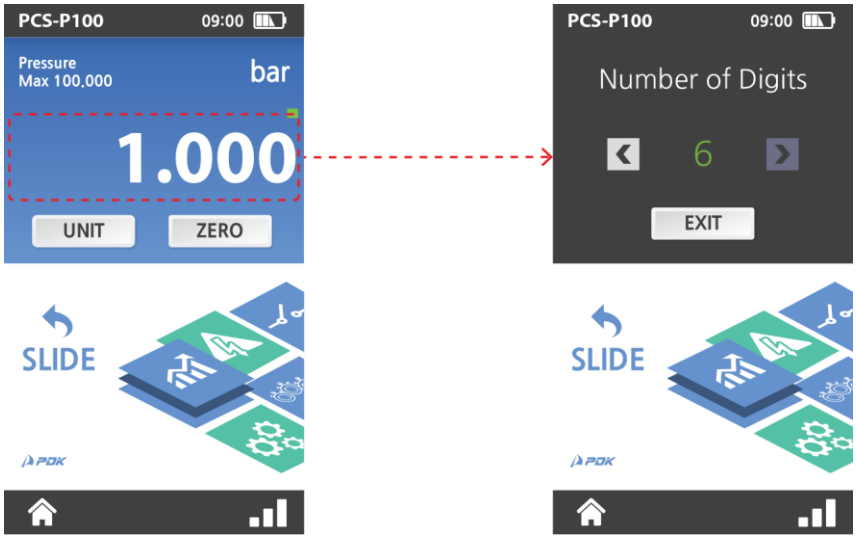


2.2 Unit / Resolution / Zero Cal.

2.2.1 Unit

Touch UNIT and scroll to change units Pa > hPa > kPa > MPa > bar > mbar > kg/cm^2 > psi > mmH_20 > mH_20 > inH_20 > mmHg > inHg.
(If user has high pressure range, small units may will not be indicated. For example, when user has 100 bar unit, mmH_2O will not indicates because after converted the unit, 7 digits cannot indicate on display.)
** Sea of Water unit supported in Navy use version.

2.2.2 Resolution



User can select to digit number 4, 5 or 6.
(Only in the units of pressure indicates in decimal point.)
(It is convenient to minimize resolution when calibrating analog pressure gauges.)

2.2.3 Zero cal.

If pressure does not indicate zero when fully vented condition, touch ZERO to zeroing.
Zeroing function only works when 0 ± 5% F.S. range.

⚠ WARNING

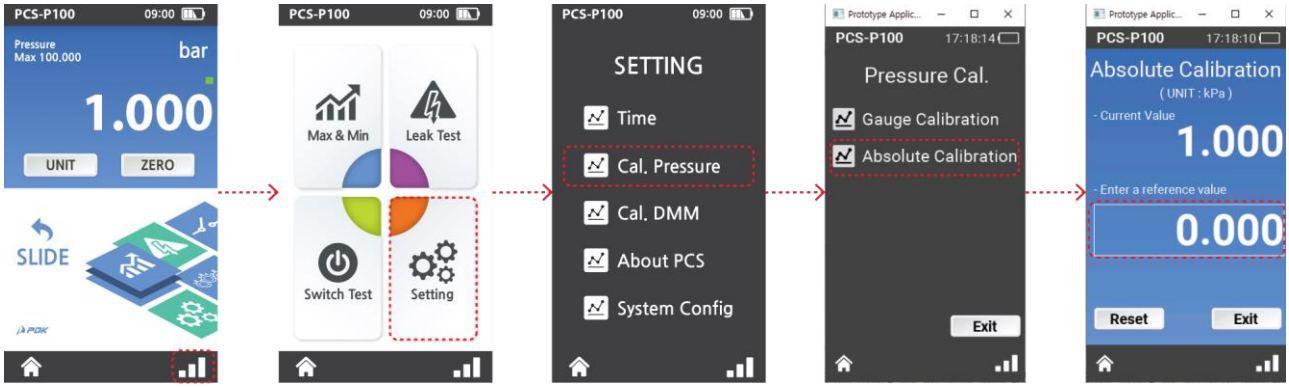
Always open the Vent valve and press the Zero key after approximately 10 seconds as it may affect calibration when there is residual pressure. If the zero function not works even pressed zero button, please contact the manufacturer or authorized agent.

2.2.4 Absolute/Gauge mode change (When Absolute option installed)

Touch the “Pressure” in the upper left to select Absolute more and Gauge mode. When Absolute is selected, the combined output of the internal absolute pressure sensor and the gauge pressure sensor is shown, and when Gauge is selected, only the values of the gauge pressure sensor excluding the absolute pressure sensor are output.

2.2.5 Absolute pressure offsetting (When Absolute option installed)

When Absolute pressure option installed, the absolute pressure sensor can make offsetting from the absolute calibration menu, and if touch the white square box, it can make offsetting the current value to reference standard value. Enter the standard value to offsetting the absolute value. If the offset adjustment value needs to be initialized, it can be initialized by touching the Reset button.

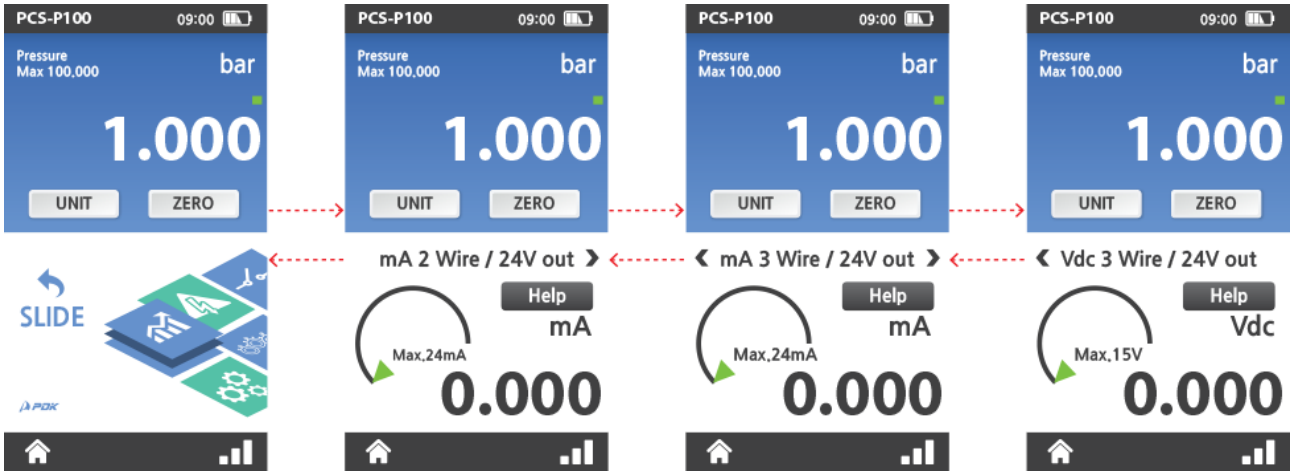


2.3 Electrical Signal measurements for pressure transmitter

To measure electrical signals from the pressure transmitter and power the transmitter, slide your finger to the lower screen and slide to the right to move the screen with a "click" sound (relay working). Change the order of the screens as shown below. The content is explained in Chapter 2.4.

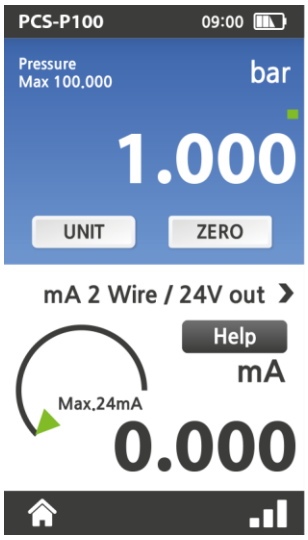
⚠ WARNING

The pressure transmitter's electrical measurement mode screen provides power to the transmitter, which reduces battery life. If not using the electrical measurement of the pressure transmitter, you should return to the default screen, which is the main screen.



2.4 mA 2 wires , 24V out / mA 3 wires , 24V out

2.4.1 mA 2 wires , 24V out



Help

Touch Help to see the reference connection.

Exit

Touch Exit to change the screen back.

Loop Power, Measure up to ±24mA, Supply up to 24 VDC. The electrical wiring connection of the pressure transmitter, connect **"—"** or **"Output +"** connect to mA V and **"+"** or **"Power +"** connect to the **24V**.

⚠ WARNING

The signal wires should be correctly connected by referring to the manufacturer's manual of the pressure sensors and transmitters. Incorrect connection may result in pressure sensors and transmitters failure.

2.4.2 mA 3 wires , 24V out

Help

Touch Help to see the reference connection.

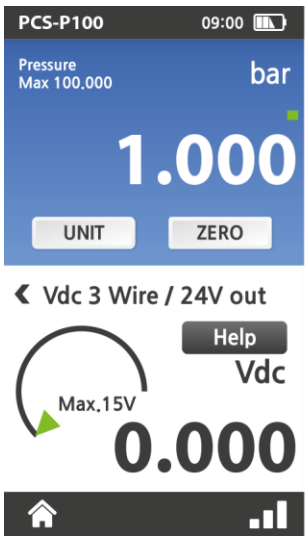
Exit

Touch Exit to change the screen back.

Measure up to ±24mA, Supply up to 24 VDC for 3 wires DC current output transmitters. The electrical wiring connection of the pressure transmitter, connect Output(OUT) "+" or Signal(SIG) "+" to mA V , Common "-" to COM, and Input"+" or Power"+" to 24V.

2.5 Vdc 3 wires , 24V out / Screen switching

2.5.1 Vdc 3 wires , 24V out



Help

Touch Help to see the reference connection.

Exit

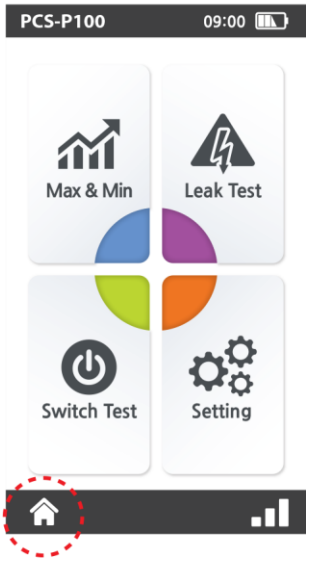
Touch Exit to change the screen back.

Measure up to ±15V, Supply up to 24 VDC for 3 wires DC voltage output transmitters. The electrical wiring connection of the pressure transmitter, connect Output(OUT) "+" or Signal(SIG) "+" to mA V , Common "-" to COM, and Input"+" or Power"+" to 24V.

2.5.2 Screen switching

Task Menu Setup

Return to Main Screen

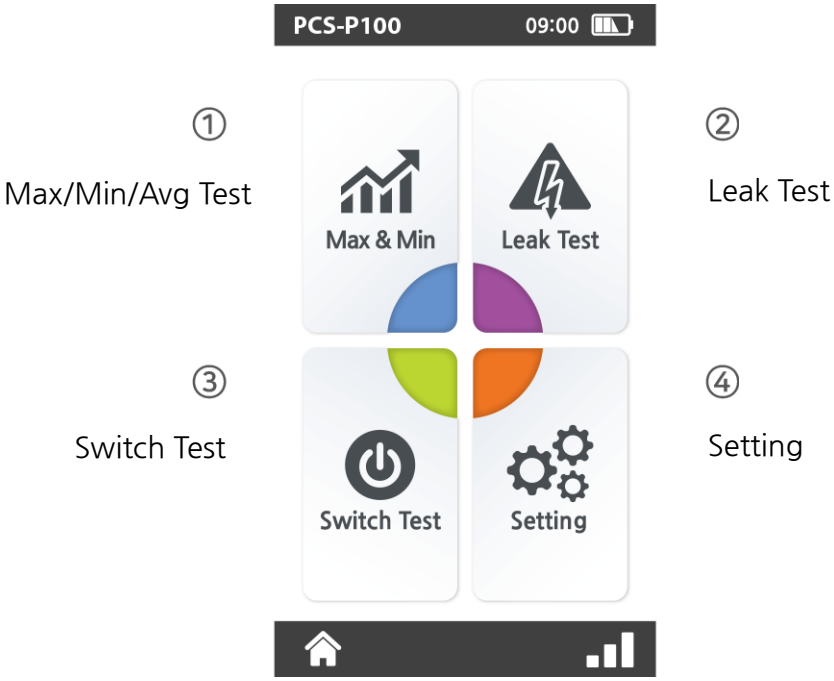


3. TASK Menu

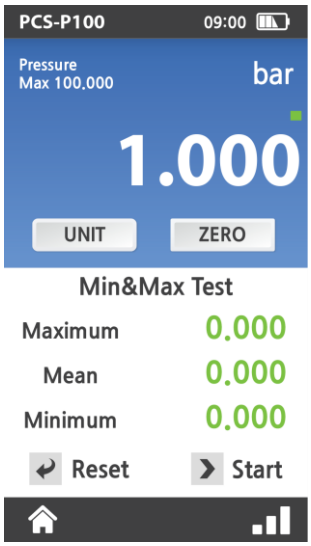
3.1 TASK menu

Touch to go to task set up menu.

Max / Min test, Leak test, Switch test and Setting can be selectable.



3.2 Max / Min / Avg



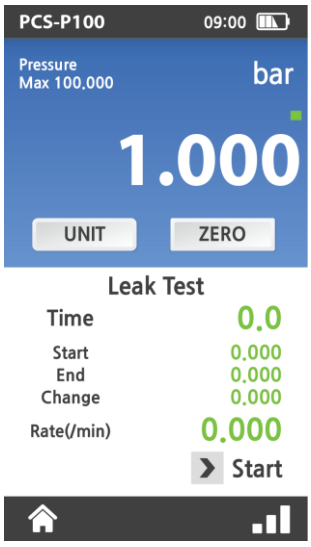
This function is available in measurement mode.

To make measurement mode, close the vent valve completely clockwise after zeroing and connecting the plumbing to the pressure port. Press 'Start' to see the accumulated maximum, minimum and Average for the time being measured, and press 'Start' once more displays the current accumulated value and no longer displays the accumulated value.

Press 'Reset' to initialize all values indicating "0". If 'reset' is pressed with Start enabled, it will 'reset' and immediately start the maximum/minimum measurement mode again.

1) Touch then select Max & Min
2) Touch Start to start measure
3) Touch Reset to reset the values

3.3 Leak Test

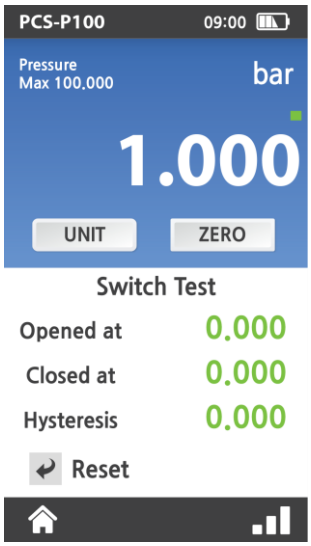


This function is available in measurement mode.

Leak test needs to perform after confirming that there is no leak in PCS-P100. Connect sample to test port and close the vent valve then pressurize until tested pressure. Wait until the pressure stabilizes and press Start. The start button is activated green to start the leak test. The test time, start pressure, end pressure, changed pressure, and rate of change per minute are displayed. Press start button to stop the test and it displays the test result. Press start button again will reset the current test value and start the new leak test.

1) Touch then select Leak Test
2) Touch Start to start and stop the leak test.

3.4 Switch Test



The pressure switch test shows the pressure at which the pressure switch is operated (on or close), the pressure at which it is released (off or open) and the hysteresis while increasing the pressure.

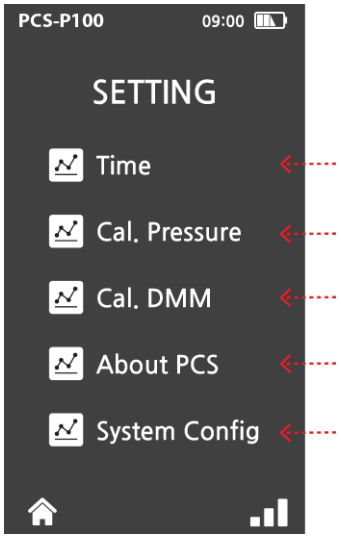
Both Normal Close and Normal Open can be measured automatically without selection, and mechanical and electronic pressure switches are also available, but an external power supply is required if electronic.

To start the test, close the vent valve and pressurize slowly. When the pressure switch is activated during pressurization, the activated pressure is displayed, and stop pressurize and slowly open the vent valve to reduce the pressure. The switch operates at specific pressure to show the pressure value and hysteresis. After pressed reset button, it can test again.

To set pressure or switch contact pressure, using the hand pump with volume controller to precise pressure control. Adjust the pressure switch to verify that the switch is operating.

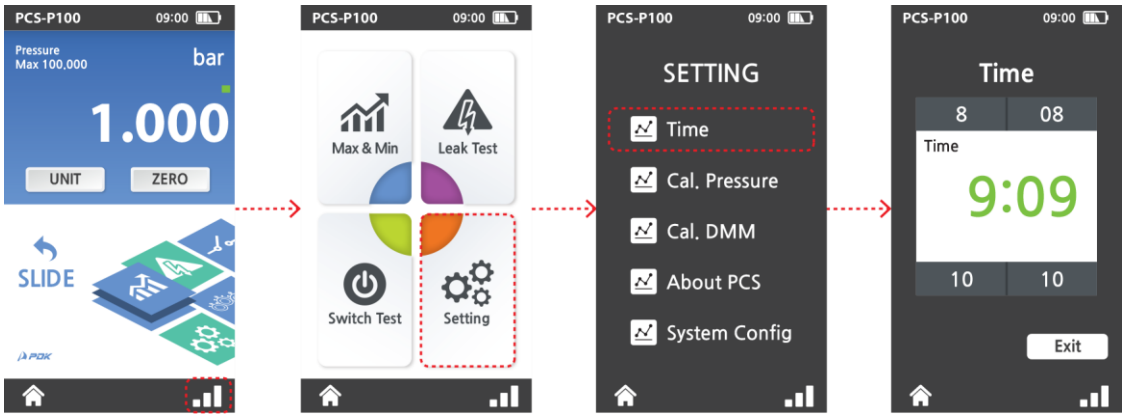
1) Touch then select Switch Test
2) Touch Reset to reset the values

3.5 Setting



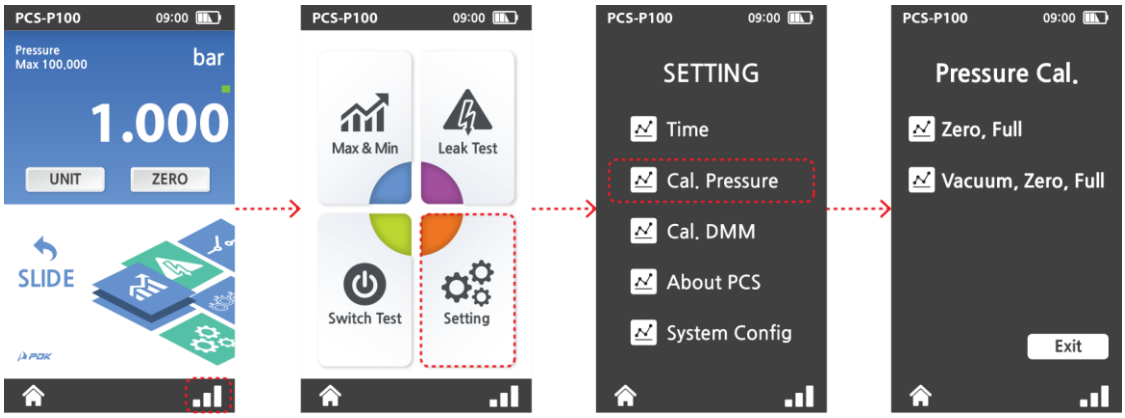
1) Time : Set time
2) Cal. Pressure : Pressure Calibration
3) Cal. DMM : DMM Calibration (Manufacture management mode)
4) About PCS : Current PCS information
5) System Config : System Configuration (Manufacture management mode)

3.5.1 Time



User can set time in Time page.

3.5.2 Cal.Pressure



User can calibrate the pressure values in Cal.Pressure page.

When pressed touch Zero, Full button, the current pressure value is displayed, the Zero button is activated in dark black. Open the Vent valve and press the Zero button to zero in 5 to 6 seconds. If it does not get zero, press the Zero button one more time.

** If the zero value is more than 5% outside the maximum pressure, the Zero button will not work and should be sent to the PDK or a service center.

After zeroing, closed the vent valve then pressurize to the PCS-P100. If more than 95% pressure is applied, the Full button is activated.

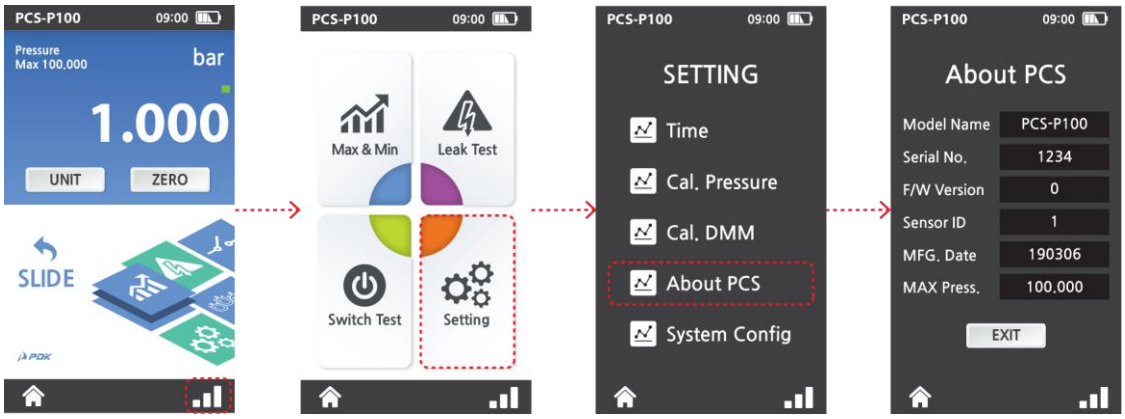
Once the correct pressure corresponding to the maximum pressure has been applied and the pressure has stabilized without leakage, press the Full button to complete the calibration after several seconds. If it shows other value, press Full button one more time to finish the calibration.

If there is a leak or the standard pressure is not correct, the calibration may be incorrect and the PCS-P100 should be calibrated by a calibration specialist.

*** For accuracy of standards, 0.005% F.S. products are recommended within the same range, and a minimum of 0.01% standard should be used.

*** If 2 MPa is the maximum pressure, the standard pressure must be a stable pressure within a minimum of 2.0000 MPa.

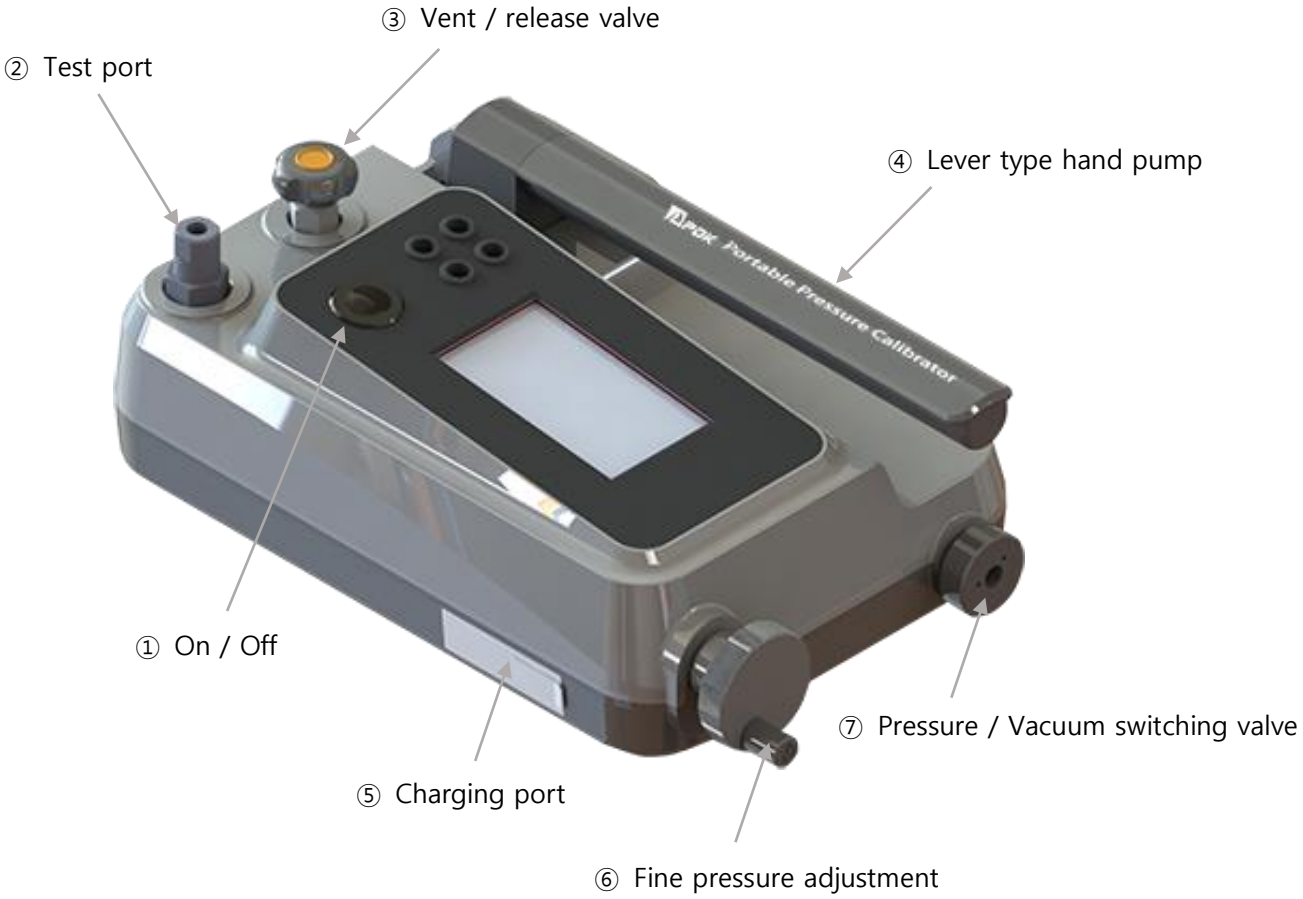
3.5.3 About PCS



User can see the current PCS information in About PCS page.

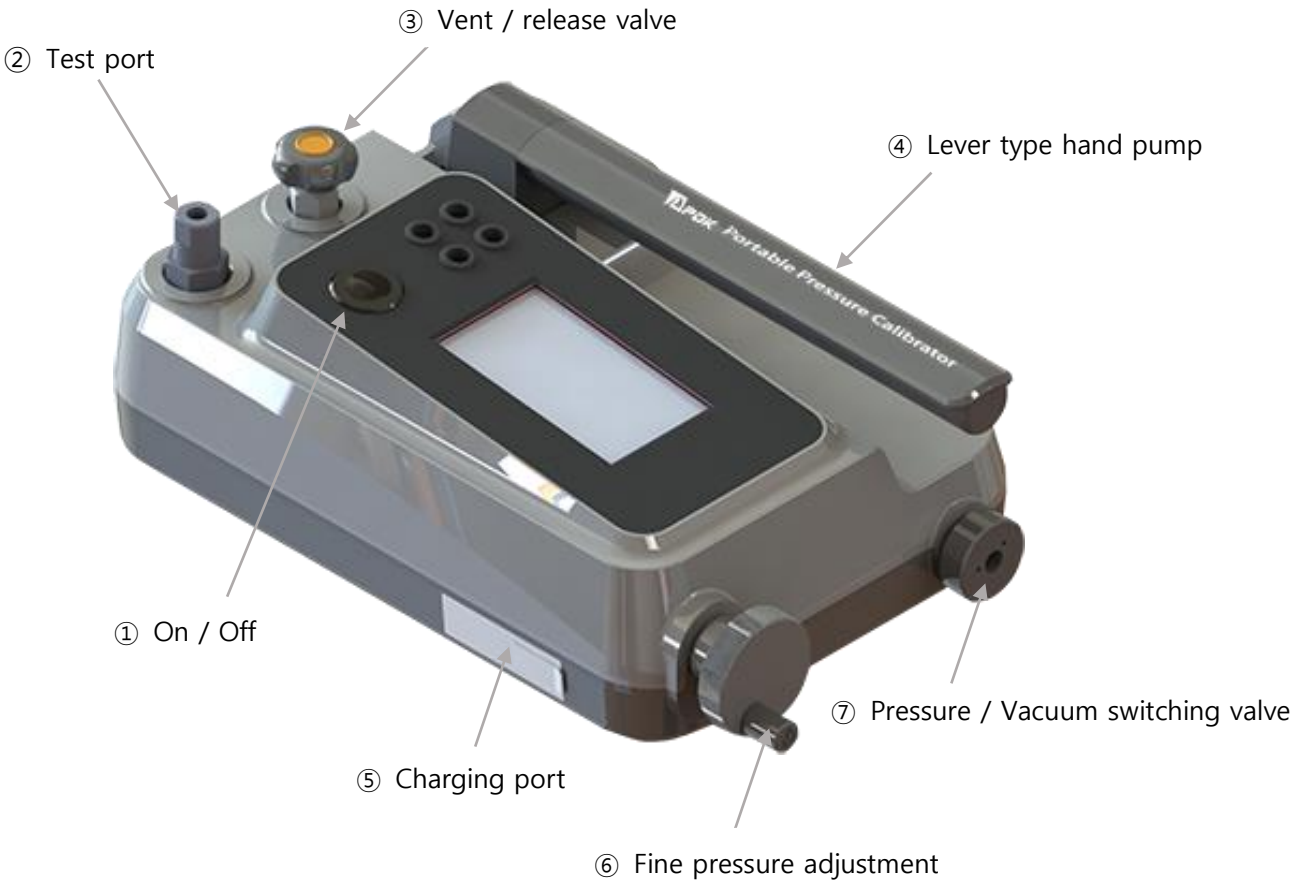
4. Operation

4.1 Basic Structure



No.	Description
①	On / Off
②	Test port
③	Vent / release valve
④	Lever type hand pump
⑤	Charging port
⑥	Fine pressure adjustment
⑦	Pressure / Vacuum switching valve
⑧	Hand Strap

4.2 Pressurize



⚠ WARNING

PCS-P100 is a pneumatic-only device. Please check and remove particles and liquid in UUT and thread before connecting to PCS-P100.
It may cause failure if contaminated with particle and liquid

Pneumatic
Quick Connection
Adaptor (CA-P Series)

Test port

* Test port is 1/8” PF Female and it connected 1/4” Lok Male. 1/4: Lok Male can connect CA-P series. 1/4” Lok Male fitting can be separable from 1/8” PF Female.

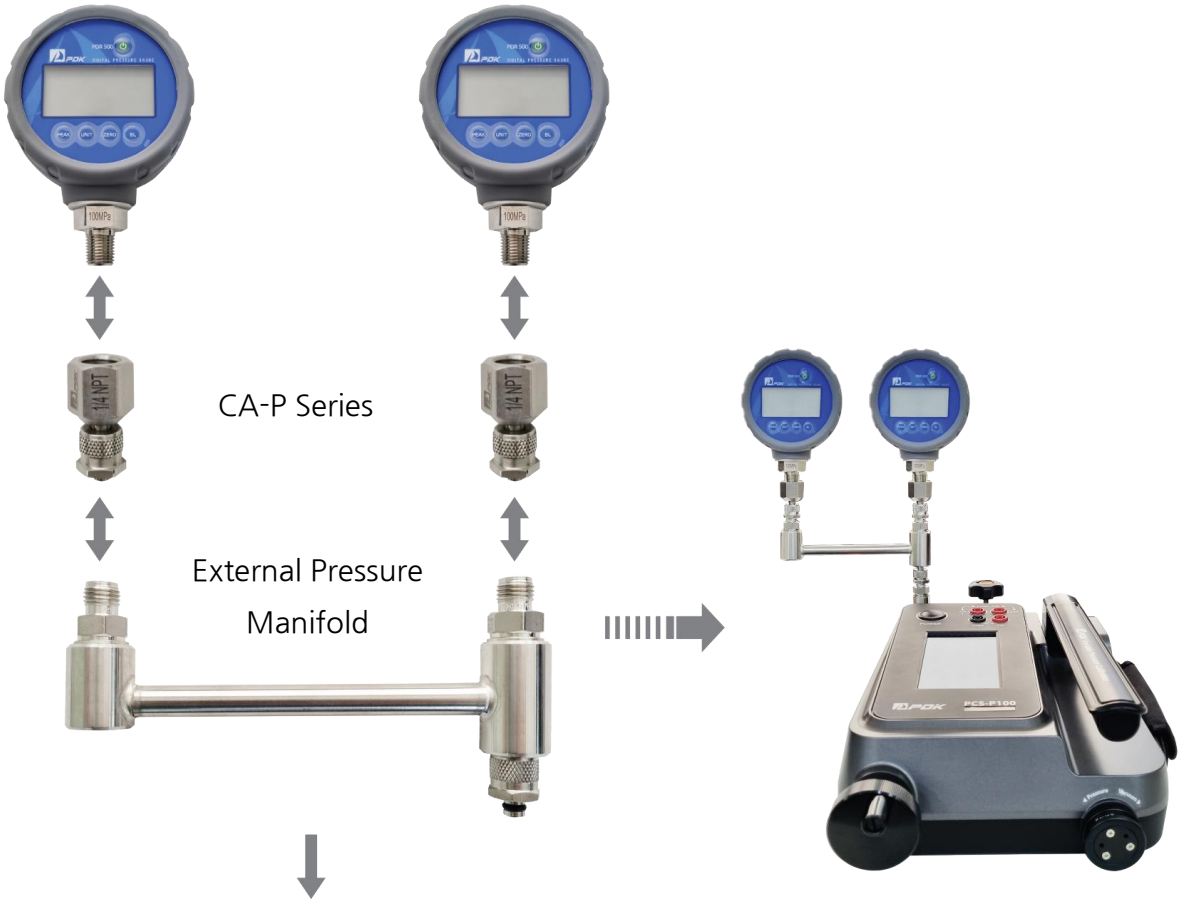
1) Connect the UUT to test port ②.

* Using CA-P series (Optional, Hand tighten fitting) to connect UUT to test port will be much faster and easier.

* Dirt / Moisture Trap can connect test port directly with Bonded seal and it can connect CA-P series with UUT.

* Test port

1-1) For UUTs suspected to be contaminated, connect UUT, CA-P, Dirt / moisture trap, bonded seal and test port (1/8” PF) in order.



* External Pressure Manifold can connect test port directly with 1/4” Lok and it can connect CA-P series with UUT.

* Test port

1-2) When calibrating two UUTs of the same range at the same time, use External pressure manifold.

connect UUT, CA-P, External pressure manifold and test port (1/4” Lok) in order.

*When there is one UUT, another standard can be connected to the other pressure port for calibration. At this time, use equipment with a lower pressure range than the PCS-P100 as the standard.

2) ⑦ Turn Pressure / Vacuum switching valve to CCW to Switching to ‘ P ’.

3) ③ Turn Vent / Release valve to CW to close the Vent / Release valve.

⚠ WARNING

Make sure it must be vented condition when it operates Pressure / Vacuum switching valve.

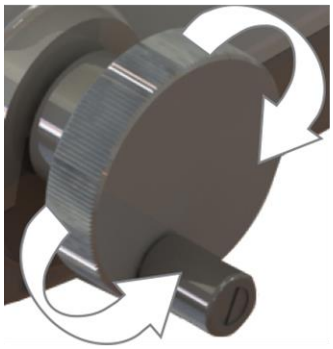
Normal pressure generation

Low pressure generation

4) ④ Generate the target pressure with Hand pump Pressing the pump up once without volume will apply approximately 1.6 to 2.0 bar of pressure. Short stroke will generate small pressure. Vacuum mode also.

⚠ WARNING

During low pressure calibration (approximately 200 kPa or less) it needs short stroke pressure generation for hand pump will need to prevent overpressure to UUT and PCS-P100. Vacuum generation also.



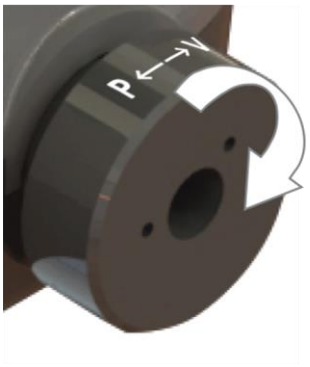
5) At the beginning of calibration, it is recommended to turn the fine pressure adjustment counterclockwise to the maximum position before closing the pressure vent valve, and then rotate 4 to 5 turns clockwise.
⑥ Using Fine adjust handle to control the target pressure.(CW to increase, CCW to decrease pressure)
Fine pressure adjustment controls the pressure by reducing or increasing the volume.
If it needs to change the pressure quickly at a low pressure, turn it using a small handle. To adjust high pressure or fine pressure, turn the handle with a large outer diameter slowly to adjust the pressure.
Repeat the number of steps 4) and 5) to calibrate (Pressurize).

7) When calibrating while depressurize, open the vent valve very slowly to see that the pressure decreases, close the vent valve when it reaches the target pressure, and adjust the pressure again using ⑥ Fine Pressure Adjustment.
Repeat the number of steps 6) and 5) to calibrate (Depressurize).
Zero calibration is fully releases pressure by turning the vent valve counterclockwise.

⚠ WARNING

1. PCS-P100 is pneumatic test and calibration purpose only.
   Recommended to use Dirt / Moisture Trap to prevent the contamination.
2. Do not switch between pressure and vacuum mode under pressure.
   Open the vent valve before switching between positive to vacuum pressures.
3. Low pressure gauges can very easily be over pressured if not careful. Please take caution when applying pressure.
4. Store the PCS-P100 in a dry non-corrosive environment.
5. PDK is not responsible for problems or damage resulting from improper use or operation of the equipment.

4.3 Vacuum



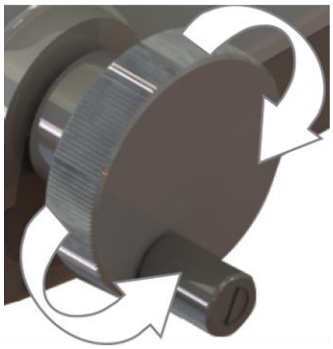
3) ⑦ Turn Pressure / Vacuum switching valve to CW to Switching to ‘ V ’.

4) ③ Turn Vent / Release valve to CW to close the Vent / Release valve.

⚠ WARNING

Make sure it must be vented condition when it operates Pressure / Vacuum switching valve.

5) ④ Generate the target pressure (Vacuum) with Hand pump Pressing the pump up once without volume will apply a lot of Vacuum. Short stroke will generate small Vacuum.



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Zero calibration is fully releases pressure by turning the vent valve counterclockwise.

⚠ WARNING

1. PCS-P100 is pneumatic test and calibration purpose only.
2. Recommended to use Dirt / Moisture Trap to prevent the contamination.
3. Do not switch between pressure and vacuum mode under pressure.
   Open the vent valve before switching between positive to vacuum pressures.
4. Low pressure gauges can very easily be over pressured if not careful. Please take caution when applying pressure.
5. Store the PCS-P100 in a dry non-corrosive environment.
6. PDK is not responsible for problems or damage resulting from improper use or operation of the equipment.

5. Troubleshooting

5.1 Introduction

PCS-P100 is a sophisticated pressure setting and measuring instrument with advanced on-board features and functions. Before assuming that unexpected behavior is caused by a system defect or breakdown, the operator should use this manual and other training facilities to become thoroughly familiar with PCS-P100 operation. This troubleshooting guide is intended as an aid in identifying the reason for PCS-P100 behavior and determining whether the behavior is due to normal operation or an internal or external problem.

If the failure cannot be fixed, please stop system operation immediately and contact the manufacturer or authorized agent.

5.2 Symptom, Possible cause and Solution

Symptom	Possible cause	Solution
Product does not turn on	No battery	Charge the battery.
	Battery fully discharge	Replace the battery.
	Power button failure	contact the manufacturer or authorized agent.
	Others	contact the manufacturer or authorized agent.
Unable to use touch screen	Transient program error	Cycle power
	Display panel failure	contact the manufacturer or authorized agent.
	Below zero ambient temperature	Turn off the PCS-P100 then turn of after above zero ambient temperature.

Symptom	Possible cause	Solution
Pressure value failure during measuring	PCS-P100 have been over-pressured or other failure	contact the manufacturer or authorized agent.
While using measure mode, pressure is leaking	Test port leak	Verify Test port is leak tight.
	UUT leak	Verify UUT is leak tight.
	Internal leak	contact the manufacturer or authorized agent.
Poor pressure control	Pressure supply too low	Verify pressure supply.
	External leak	Verify Test port and UUT are leak tight.
	Internal leak	contact the manufacturer or authorized agent.
Test port and Adaptor damage	Test port damaged	contact the manufacturer or authorized agent.
	Adaptor damage	Replace the adaptor
Others	-	contact the manufacturer or authorized agent.

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