

CWY122 Precision Pressure Gauge

Instruction Manual



陕西创威科技有限公司

Shaanxi Creat Wit Technology Co., Ltd

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Overview

CWY122 digital pressure gauge is an intelligent micro-power consumption product, which adopts international leading measurement circuit, realizing precise and reliable temperature compensation function. It can truly and continuously measure the pressure values, very suitable for field and laboratory uses to complete precision pressure measurement and calibration of general pressure gauges, precision pressure gauges and other pressure gauges. It can also be widely used in occasions requiring precision pressure measurement.

Product selection

1. Gauge pressure ranges

Pressure range	Accuracy	Medium	Bursting pressure
(-2.5~0) kPa	0.05	gas	3x
(0~2.5) kPa	0.05	gas	3x
(-3.5~0) kPa	0.05	gas	3x
(0~3.5) kPa	0.05	gas	3x
(-4~0) kPa	0.05	gas	3x
(0~4) kPa	0.05	gas	3x
(-6~0) kPa	0.05	gas	3x
(0~6) kPa	0.05	gas	3x
(-7~0) kPa	0.05	gas	3x
(0~7) kPa	0.05	gas	3x
(-10~0) kPa	0.05	gas	3x
(0~10) kPa	0.05	gas	3x
(-16~0) kPa	0.05	gas	3x
(0~16) kPa	0.05	gas	3x

Pressure range	Accuracy	Medium	Bursting pressure
(-25~0) kPa	0.05	gas	3x
(0~25) kPa	0.05	gas	3x
(-35~0) kPa	0.05	gas	3x
(0~35) kPa	0.05	gas	3x
(-40~0) kPa	0.05	gas	3x
(0~40) kPa	0.05	gas	3x
(-50~0) kPa	0.02 (0.05)	gas	3x
(0~50) kPa	0.02 (0.05)	gas	3x
(-60~0) kPa	0.02 (0.05)	gas	3x
(0~60) kPa	0.02 (0.05)	gas	3x
(-70~0) kPa	0.02 (0.05)	gas	3x
(0~70) kPa	0.02 (0.05)	gas	3x
(-100~0) kPa	0.02 (0.05)	gas	3x
(0~100) kPa	0.02 (0.05)	gas	3x
(0~160) kPa	0.02 (0.05)	gas	3x
(0~200) kPa	0.02 (0.05)	gas	3x
(0~250) kPa	0.02 (0.05)	gas	3x
(0~350) kPa	0.02 (0.05)	gas	3x
(0~400) kPa	0.02 (0.05)	gas	3x
(0~600) kPa	0.02 (0.05)	gas	3x
(0~700) kPa	0.02 (0.05)	gas	3x
(0~1000) kPa	0.02 (0.05)	gas	3x
(0~1600) kPa	0.02 (0.05)	gas	3x
(0~2000) kPa	0.02 (0.05)	gas	3x
(0~2500) kPa	0.02 (0.05)	gas	3x
(0~3.5) MPa	0.02 (0.05)	gas /liquid	3x

Pressure range	Accuracy	Medium	Bursting pressure
(0~4) MPa	0.02 (0.05)	gas /liquid	2x
(0~6) MPa	0.02 (0.05)	gas /liquid	2x
(0~7) MPa	0.02 (0.05)	gas /liquid	2x
(0~10) MPa	0.02 (0.05)	gas /liquid	2x
(0~16) MPa	0.02 (0.05)	gas /liquid	2x
(0~20) MPa	0.02 (0.05)	gas /liquid	2x
(0~25) MPa	0.02 (0.05)	gas /liquid	2x
(0~35) MPa	0.02 (0.05)	gas /liquid	2x
(0~40) MPa	0.02 (0.05)	gas /liquid	1.5x
(0~60) MPa	0.02 (0.05)	gas /liquid	1.5x
(0~70) MPa	0.02 (0.05)	gas /liquid	1.1x

Compound pressure range

Pressure range	Accuracy	Medium	Bursting pressure
±1kPa	0.05	gas	10x
±2kPa	0.05	gas	10x
±2.5kPa	0.05	gas	10x
±3.5kPa	0.05	gas	10x
±4kPa	0.05	gas	5x
±6kPa	0.05	gas	5x
±7kPa	0.05	gas	5x
±10kPa	0.05	gas	3x
±16kPa	0.05	gas	3x
±20kPa	0.05	gas	3x
±25kPa	0.05	gas	3x
±35kPa	0.02 (0.05)	gas	3x

Pressure range	Accuracy	Medium	Bursting pressure
±40kPa	0.02 (0.05)	gas	3x
±50kPa	0.02 (0.05)	gas	3x
±60kPa	0.02 (0.05)	gas	3x
±70kPa	0.02 (0.05)	gas	3x
±100kPa	0.02 (0.05)	gas	3x
(-100~160) kPa	0.02 (0.05)	gas	3x
(-100~200) kPa	0.02 (0.05)	gas	3x
(-100~250) kPa	0.02 (0.05)	gas	3x
(-100~350) kPa	0.02 (0.05)	gas	3x
(-100~400) kPa	0.02 (0.05)	gas	3x
(-100~600) kPa	0.02 (0.05)	gas	3x
(-100~700) kPa	0.02 (0.05)	gas	3x
(-100~900) kPa	0.02 (0.05)	gas	3x
(-100~1000) kPa	0.02 (0.05)	gas	2x
(-100~1600) kPa	0.02 (0.05)	gas	2x
(-100~2000) kPa	0.02 (0.05)	gas	2x
(-100~2500) kPa	0.02 (0.05)	gas	2x

Double-range

Pressure range	Accuracy	Medium	Bursting pressure
±100kPa/±50kPa	0.02 (0.05)	gas	3x
-100kPa/-50kPa	0.02 (0.05)	gas	3x
100kPa/50kPa	0.02 (0.05)	gas	3x
160kPa/80kPa	0.02 (0.05)	gas	3x
200kPa/100kPa	0.02 (0.05)	gas	3x
250kPa/120kPa	0.02 (0.05)	gas	3x

Pressure range	Accuracy	Medium	Bursting pressure
350kPa/160kPa	0.02 (0.05)	gas	3x
400kPa/200kPa	0.02 (0.05)	gas	3x
600kPa/300kPa	0.02 (0.05)	gas	3x
700kPa/350kPa	0.02 (0.05)	gas	3x
1000kPa/500kPa	0.02 (0.05)	gas	3x
1600kPa/800kPa	0.02 (0.05)	gas	3x
2000kPa/1000kPa	0.02 (0.05)	gas	3x
2500kPa/1200kPa	0.02 (0.05)	gas	3x
3.5MPa/1.6MPa	0.02 (0.05)	gas/liquid	3x
4MPa/2MPa	0.02 (0.05)	gas/liquid	2x
6MPa/3MPa	0.02 (0.05)	gas/liquid	2x
7MPa/3.5MPa	0.02(0.05)	gas/liquid	2x
10MPa/4MPa	0.02(0.05)	gas/liquid	2x
16MPa/8MPa	0.02(0.05)	gas/liquid	2x
20MPa/10MPa	0.02(0.05)	gas/liquid	2x
25MPa/12MPa	0.02(0.05)	gas/liquid	2x
35MPa/16MPa	0.02(0.05)	gas/liquid	2x
40MPa/20MPa	0.02(0.05)	gas/liquid	1.5x
60MPa/30MPa	0.02(0.05)	gas/liquid	1.5x
70MPa/35MPa	0.02(0.05)	gas/liquid	1.1x

Differential pressure range

Pressure range	Accuracy	Medium	Bursting pressure
±100Pa	0.5	gas	5x
±160Pa	0.5	gas	5x
±250Pa	0.2	gas	5x
±600Pa	0.1	gas	5x
±1kPa	0.05	gas	5x
±2kPa	0.05	gas	5x
±2.5kPa	0.05	gas	5x
±3.5kPa	0.05	gas	5x
±4kPa	0.05	gas	5x
±6kPa	0.05	gas	5x
±7kPa	0.05	gas	5x
±10kPa	0.05	gas	5x
±16kPa	0.05	gas	3x
±20kPa	0.05	gas	3x
±25kPa	0.05	gas	3x
±35kPa	0.02 (0.05)	gas	3x
±40kPa	0.02 (0.05)	gas	3x
±50kPa	0.02 (0.05)	gas	3x
±60kPa	0.02 (0.05)	gas	2x
±70kPa	0.02 (0.05)	gas	2x

Absolute pressure range

Pressure range	Accuracy	Medium	Bursting pressure
(0~110) kPa.a	0.1	gas	3x
(0~160) kPa.a	0.05(0.1)	gas	3x
(0~200) kPa.a	0.05(0.1)	gas	3x
(0~250) kPa.a	0.05(0.1)	gas	3x
(0~350) kPa.a	0.05(0.1)	gas	3x
(0~400) kPa.a	0.05(0.1)	gas	3x
(0~600) kPa.a	0.05(0.1)	gas	3x
(0~700) kPa.a	0.05(0.1)	gas	3x
(0~1000) kPa.a	0.05(0.1)	gas	3x
(0~1600) kPa.a	0.05(0.1)	gas	3x
(0~2000) kPa.a	0.05(0.1)	gas	3x
(0~2500) kPa.a	0.05(0.1)	gas	3x
(0~3.5) MPa.a	0.02(0.05)	gas/liquid	3x
(0~4) MPa.a	0.02(0.05)	gas/liquid	3x
(0~6) MPa.a	0.02(0.05)	gas/liquid	3x
(0~7) MPa.a	0.02(0.05)	gas/liquid	3x
(0~10) MPa.a	0.02(0.05)	gas/liquid	2x
(0~16) MPa.a	0.02(0.05)	gas/liquid	2x
(0~20) MPa.a	0.02(0.05)	gas/liquid	2x
(0~25) MPa.a	0.02(0.05)	gas/liquid	2x
(0~35) MPa.a	0.02(0.05)	gas/liquid	2x
(0~40) MPa.a	0.02(0.05)	gas/liquid	1.5x
(0~60) MPa.a	0.02(0.05)	gas/liquid	1.5x
(0~70) MPa.a	0.02(0.05)	gas/liquid	1.5x

Caution: It is forbidden to enter liquid, especially the high viscosity oil for gas medium calibrator, or it will affect return difference and accuracy.

2 Specification


- ◆ Pressure range:-100kPa~70MPa,
- ◆ Accuracy: 0.02, 0.05, 0.1, 0.2
- ◆ Pressure units (12 units): kPa, psi, inHg, inH₂O, mmHg, mmH₂O, MPa, bar, mbar, atm, kg/cm², Pa. (According to the full range to judge which unit can be converted to display, because the display is not more than 5 digits).
- ◆ Pressure overload: When the pressure measurement value exceeds 105%FS, overpressure and alarm are displayed.
- ◆ Ambient conditions:
 - a. Ambient temperature: (-5~50) °C;
 - b. Relative humidity: < 95%;
 - c. Atmospheric pressure: (86~106) kPa.
- ◆ Compensated temperature: (-5~50) °C (accuracy guarantee) .
- ◆ Storage temperature: (-30~80) °C.
- ◆ Display: LCD screen, backlight, 5 digits.
- ◆ Power supply:1x3.7V replaceable Lithium ion battery or 1x9V battery
- ◆ Auto power-off: Automatic shutdown occurs when no keyboard is pressed and pressure changes are less than 1% of the range within 1 minute.
- ◆ Communication series port configuration: Baud rate: 57600; Calibration bits: no, data bits: 8 bits, stop bits: 1 bit; it can be used for CWY automatic pressure calibrator as its external pressure module and be connected with TMMS2000 to print verification report automatically.
- ◆ Dimension: Φ107mm×37mm, total length: 165mm
- ◆ Weight: approx. 0.48kg;


- ◆ Connection: M20×1.5 (or user defined e.g.NPT) .
- ◆ Additional function: temperature measurement resolution is ±0.1℃


3 Notes


- Installation should comply with the relevant provisions of electrical installations (except coal mines) in hazardous sites.
- Low power warning: if there is an automatic shutdown, please replace new battery; battery replacement should be carried out in well ventilated and no gas leak condition, and use the same model battery.
- It is prohibited to connect RS232 communication in the explosive gas environment.
- Forbidden to change or remove any components and structures which may affect the safe explosion-proof, such as the electronic batteries and the related components.
- It should not be used for long period if overload to avoid pressure sensor damage.
- In order not to damage CWY series mechanical part, don't apply torque between the shell and pressure connection.

4 Button description

“”power on/off: Power on/off the pressure gauge;

“”mode/calibration key: short press the key to switch display module, pressure display mode and basic parameter, ambient temperature display mode;

Long press “”to enter “calibration”, then correct accuracy; under this status, short press the key to calibrate pressure.

“”confirm button: In the "calibration status" short press the key to

calibrate the pressure;

“▶” Plus and minus button: In "verification state", the pressure unit can be switched; In the "calibration status" short press the key to change the calibration set value;

“ZERO”: “Zero” key: clear pressure data;



“💡”: “Backlight” key: Turn on/off backlight.

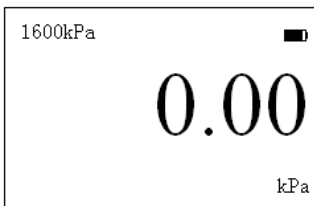
5 Basic functions

5.1 Power on/off

Make a long press “⏻” for 3 seconds to power on; in the state of power-on, long press it for 3 seconds to power off. The gauge will buzz when it powers on or off.

5.2 Pressure measurement

After startup, the instrument will display pressure measurement as following picture:




- pressure gauge
- battery power icon
- pressure measuring value
- Pressure unit

5.3 Pressure clearance

Place the pressure connection toward air. If the current pressure

measured value is within (-10% ~ 10%) of the full range, press "ZERO" button to clear the measured value.

5.4 Pressure unit conversion

Press “” button to convert pressure units.

- ① Precision digital pressure gauges(<2.5MPa) units are converted in the following order: kPa, psi、inHg, inH₂O, mmHg, mmH₂O, MPa, bar, mbar, atm, kg/cm²,Pa.
- ② Precision digital pressure gauges(>4MPa) units are converted in the following order: MPa, psi, inHg, inH₂O, mmHg, mmH₂O, kPa, bar, mbar, atm, kg/cm², Pa.

Notice: In order to ensure that under each optional unit, pressure measurement is not shortage or overflow of digits in length, so different range gauges have different pressure unit configuration, not all pressure units.

The conversion between units is as following table:




1	kPa	1	7	MPa	0.001
2	psi	0.1450377	8	bar	0.01
3	inHg	0.2953	9	mbar	10
4	inH ₂ O	4.01463	10	atm	0.0098692
5	mmHg	7.50061	11	kg/cm ²	0.010197
6	mmH ₂ O	102.047	12	Pa	1000

5.5 Double range switch


For double range digital pressure gauge, press "ZERO" button to switch two ranges. The current range is displayed in the top left corner of the screen.


If the pressure range is switched to a lower range status, the input pressure exceeds the low range, and then the high range is automatically switched to protect the sensor.

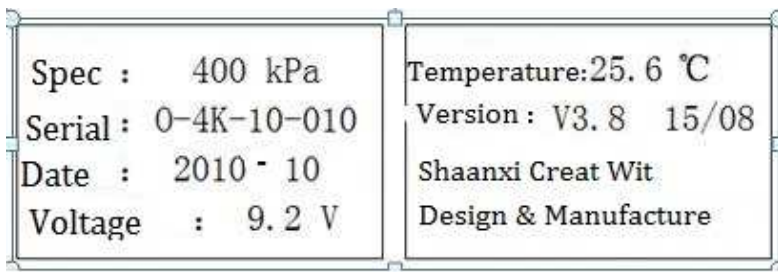
5.6 Backlight

Press  button to turn on backlight, and then press  to adjust brightness, press  again to turn it off. The backlight will turn on automatically when it is external module connected to CWY automatic pressure calibrator.

5.7 Basic parameter display

Press “” button to display basic parameter: Model, serial no., production date, battery voltage.

Press "" button again to switch to temperature and version as following photo at right.



6 Usage as external module of CWY series automatic pressure calibrator

The precision digital pressure gauge is installed on the left side of the pressure connection on the calibrator, using specialized communication

lines to connect to the left side of the external standard communication port of the calibrator; the gauge will automatically power on and turn on the backlight and automatic shutdown when the calibrator is powered off.

7 Use software TMMS-2000 to do calibration

CWY model precision pressure gauge can be connected with TMMS-2000 (automatic calibration software) to do real-time calibration, and then the data will be uploaded to computer and print calibration report automatically.

Automatic pressure calibrator can be used as pressure generation, and other hand pump or equipment will also be workable.

About calibration data uploading, please check data memory function.

8 Pressure sensor calibration

8.1 Calibration permissible condition

1) Ambient condition:

Ambient temperature: $20^{\circ}\text{C}\pm 2^{\circ}\text{C}$


Relative humidity: (45~75) %

Atmospheric pressure: (86~106) kPa

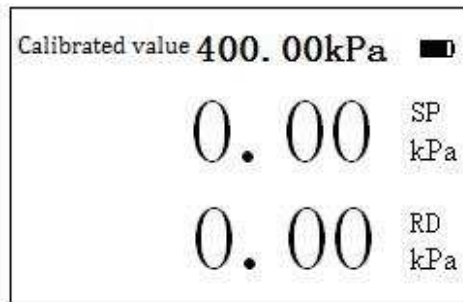
2) Standard pressure generation

It should meet requirement of verification regulation of digital pressure gauge JJG875.

8.2 Start calibration

Long press "" button to enter the calibration status, as shown below, the top row is set value, positive-negative pressure range using three point

to calibrate., use" ► "button to change Settings: the lower limit, 0, upper limit; Other ranges are calibrated at 2 points, and use" ► "button to change Settings : 0%, 100%. The bottom line displays reading value of actual pressure.



8.3 Calibration process

8.3.1 Positive and negative pressure range calibration process.

The following working steps are assumed: the range of calibration is (-60 ~ 60) kPa, and the pressure calibration points are -60kpa, 0kPa and 60kPa. The calibration can only be completed when the actual pressure value and the pressure setting value are 10 percent difference.

1) **Preparation:** turn on the power to warm up for 10 minutes.

Zero calibration: Set the pressure setting value to "0.000kPa"

and confirm the system pressure as "0", after the " **SET** "

calibration key and" ◀ "confirm key, the" pressure set value

"is 60.000kPa and" actual pressure value "is 0.000kPa (It indicates that the system has saved zero information. After calibration, the pressure value is still 0.000kpa, indicating that

the system does not accept calibration data. The error of actual pressure value and pressure setting value may exceed 10% of the range, and the other points are the same condition.)

2) **Upper limit of calibration:** Adjust the pressure setting to the upper limit (60 kPa), add pressure accurately to the maximum pressure value (60 kPa), press "SET" "◀" button, then the "pressure setting" displays 0.00 kPa, "actual pressure value" displays 60.00 kPa. Now, calibration is done.

3) **Lower limit of calibration:** Adjust the pressure setting to the lower limit value (-60 kPa), add the accurate pressure to the minimum pressure value (-60 kPa), press "SET" "◀" button, then the pressure setting displays 0.00 kPa, "actual pressure value" displays -60.00 kPa, the calibration is done.

8.3.2 Calibration instructions for other ranges

The following working steps are assumed: the range of calibration is (0~400) kPa, and the pressure calibration points are 0kpa, 400kPa. The calibration can only be completed when the actual pressure value and the pressure setting value are 10 percent difference.

1) **Preparation:** turn on the power to warm up for 10 minutes.

Zero calibration: Set the pressure setting value to "0.000kPa" and confirm the system pressure as "0", after pressing the "SET" calibration key and "◀"confirm key, the " pressure set value "is 400.000kPa and" actual pressure value "is 0.000kPa (It

indicates that the system has saved zero information.

After calibration, the pressure value is still 0.000kPa, indicating that the system does not accept calibration data.

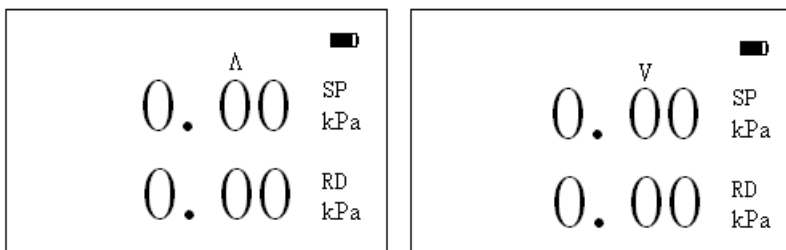
The error of actual pressure value and pressure setting value may exceed 10% of the range, and the other points are the same condition.).

2) **Calibration range:** Adjust the pressure setting to scale value (400 kPa), add pressure accurately to pressure value (400 kPa), press "SET" "◀" button, then the "pressure setting" displays 0.00 kPa, "actual pressure value" displays 400.00 kPa. Now, calibration is done.

8.3.3 Double range switch

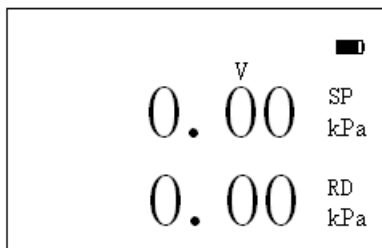
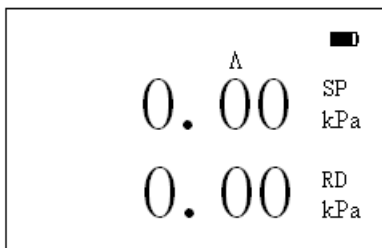
For double-range digital pressure gauges, in the calibration mode, short press "ZERO" key can switch two ranges. The current range is displayed in top right corner of the screen.

8.4 Change settings



When calibrating the pressure, sometimes it is necessary to modify the set value. For example, when the vacuum cannot be drawn to -100kPa in

a place, it is impossible to calibrate the -100kPa, and the setting value must be set artificially. If you want to modify settings, long press "▶" button to enter modify Settings status, as the picture below (left), where above the set value, there is "▲", "▲" indicating the digit can be modified, press "▶" button, the corresponding figures will add 1, if you want to minus 1, then press "SET" button to change the direction of value changes, as the picture on the right, "▲" into "▼", press "▼" button, the corresponding figures will minus 1, press "ZERO" key to change the modifying digit position, press "◀" button to complete modification, return to the calibration status, then adjust the standard pressure to the set value, press "SET", and "◀", The calibration data of the set value is saved.



8.5 Exit calibration

Long press "ZERO" to exit the calibration status, and then enter the measurement condition.

8.6 Notice

This function is used to modify the accuracy of pressure measurement, and the arbitrary operation of calibration function will affect the measurement accuracy, which can lead to the failure of normal work, possibly. If the measurement accuracy is deviated during the periodic verification, the calibration can be carried out. The calibration personnel must be the professional metrological verification personnel. In calibrating pressure measurement, the pressure should be pressurized to full range, then directly reduced to zero, and repeat the operation three times to make the pressure measurements to the optimum and then calibrate them.

Caution: Calibration must be operated in calibration condition!

9 Battery charging and replacement

When the instrument appears automatic shutdown, please charge in time, if it is rechargeable battery,

The instrument can use 9V battery or rechargeable battery with 9V charger. Replace the battery if the battery failed. When replacing the battery, remove the battery cover and place the new battery.

When replacing the battery, please note that if the positive and negative electrode of the battery is in accordance with the installation direction;

If the battery fails, it can be powered directly with a 4.2v-9v power adapter.

10 Fault analysis and solution

1) If the external pressure exceeds 5% of the full range, the overpressure alarms, and the pressure should be reduced immediately to avoid damaging the pressure sensor.

2) Replace the battery in time if the battery is abnormal.

11 Order list

No.	Description	Quantity
1	Precision digital pressure gauge	1pc
2	9V battery	1pc
3	Certification of approval	1pc
4	Delivery inspection report	1pc
5	Operating manual	1pc
6	Warranty card	1pc

陕西创威科技有限公司

Shaanxi Creat Wit Technology Co., Ltd

Address: No. 80, Gaoxin Road, Hi-Tech
zone, Xi'an, China

Tel: +86 02986690023

Fax: +86 89250364

Mobile: +86 18202956927

Email: sales@creatwit.com