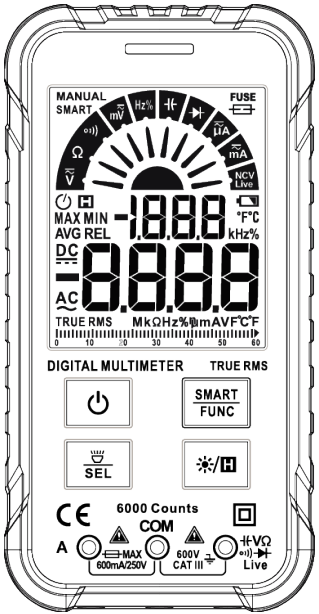


User Manual PCW02B

Digital Smart Multimeter

PCWork

EN User Manual

Copyright Statement

Safety Statement

 The “**Caution**” symbol refers to any condition or operation which might cause damage to the instrument or equipment.

Any such operation has to be performed with caution. If incorrectly performed or without following the procedures, the instrument and equipment might get damaged. In case that conditions are not fully met or not fully understood, do not continue to perform any operation flagged with the “Caution” symbol.

 The “**Warning**” symbol refers to any condition or operation which might cause damage to the user. Any such operation has to be performed with caution. If incorrectly performed or without following the procedures, personal injury or casualties might result. In case that conditions are not fully met or not fully understood, do not continue to perform any operation flagged with the “Warning” symbol.

General Notes

- It is not permitted to change the manual in any way or add additional content, without given permission in written form by the distributor.
- The operator of this multimeter is obliged to ensure that every other person using this device has read and understood the manual, especially the safety instructions.
- The operator is obliged to ensure proper usage, a functioning device prior usage, the provision of the manual, and that only qualified users operate the device.
- Any change related to the design or construction of the device is not permitted.
- Warranty and any liability in regards to material damage or personal injury are suspended in the following cases:
  - Improper usage and operation of the device
  - Not following the instructions and safety regulations provided by the manual
  - Operation and usage without wearing proper personal protection equipment
  - Usage and installation of non-approved spare parts
  - Improper maintenance and changes related to the design or construction of the device; removal of the type plate

Safety Instructions

The instrument is designed according to the requirements of the international electrical safety standard IEC61010-1, which defines the safety requirements for electronic testing instruments. The design and manufacturing of this instrument strictly comply with the requirements of the IEC61010-1 CAT.III 600V over voltage safety standards and pollution level 2.

⚠ Warning:

In order to avoid possible electric shock, personal injury, or any other safety accident, please abide by the following instructions:

- Please read this manual carefully before using the instrument, and pay special attention to safety warning information.
- Strictly follow this manual when using the instrument. In addition, pay attention to any safety information on the device itself. Otherwise, the protection function of the instrument may be damaged or weakened. Safe operation and safety for the user cannot be guaranteed in this case.

- Do not provide children access to the multimeter. Parents are fully responsible for any safety hazards caused by non-compliance.
- Please be careful if the measurement exceeds 30V AC True RMS, a 42V AC peak, or 60V DC. There might be the danger of getting an electric shock with this kind of voltage. Follow all relevant safety requirements.
- When measuring known voltage (in order to check if the multimeter works normally) results in the multimeter not working as it should or it being damaged, stop any measuring operation and do not continue using the multimeter.
- Before using the device, please check whether it has any crack or plastic damage. If so, do not use the device.
- Before using the instrument, please check whether the probes are cracked or damaged. If so, please replace them with the same type, having the same electrical specifications.
- The instrument shall be used in accordance with the specified measurement category, voltage, or current rating.
- Do not exceed the max. input values as specified in this manual / on the device.
- Never change the measurement function during a measuring operation on an object or circuit. Always disconnect the measuring object/circuit first.
- Opening, repairing, or maintenance should only be executed by trained/qualified professionals.

- Never look directly into the LED flashlight of the device. Non-compliance bears the risk of permanently damaging your eyesight.
- Please comply with the local and national safety code. Wear personal protection equipment to prevent any injury through being exposed to electrical shock or electrical arc caused by an exposed hazardous live conductor.
- When low battery is indicated, please replace the battery in time to prevent of any measurement error, electric shock, or injury.
- Do not use the instrument around explosive gas, steam, or in an wet environment.
- When using the probe, please put your fingers behind the finger protector of the probe.
- When measuring, please connect the zero (neutral) line/ ground line first, then connect the live wire; when measuring is done, please disconnect the live wire first, then disconnect the zero (neutral) line / ground line.
- Before opening the case or the battery cover, please remove the probes from the device. Do not use the device, when it is taken apart or the battery cover is open.
- The safety standards are only met when the instrument is used together with the supplied probes. If the probes are damaged and need to be replaced, only use probes with the same model number and the same electrical specifications for replacement.

Safety Symbols

	High voltage warning (dangerous voltage might be present)
	AC (Alternating current)
	DC (Direct current)
	AC or DC
	Warning, important safety information
	Ground
	Fuse

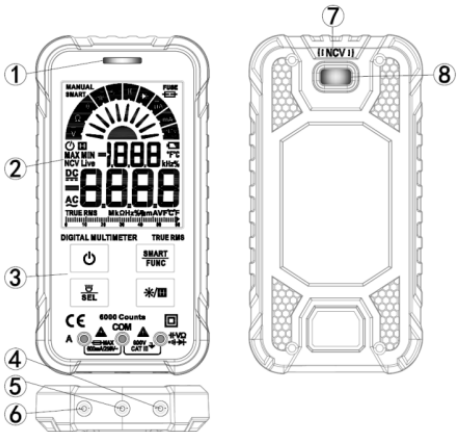
	Equipment with double insulation/reinforced insulation protection
	Low Battery
	Product complies with all relevant European directives
	Do not dispose of this electrical/electronic product as unsorted household garbage.

CAT. II	Suitable for testing and measuring circuits directly connected to power points (sockets and similar) of low voltage power installations.
CAT. III	Suitable for testing and measuring circuits connected to the distribution part of low voltage power supply devices in buildings.

Product Description

Instrument Panel Description

1. Indicator light
2. Display
3. Buttons (find descriptions below)
4. +HVΩ / Live input socket
5. COM input socket
6. Current input socket
7. NCV sensor
8. Flashlight



Power Button

Press the ⏻ button to turn the device on or off.

Measurement Mode / Measurement Function Selection Button

Press the SMART / FUNC button to switch between measurement modes. After turning the meter on, it defaults to the smart measurement mode. Press the function selection button once to switch to manual measurement mode. Then press the button to select among measurement function sections. Press the button again and hold it for 2 seconds to switch back to the smart measuring mode.

Function Selection / Flashlight Button:

If a measurement function section has the option to choose from different functions (e.g. choose DC or AC when measuring current), press the SEL button to switch between the functions. Hold the button for more than 2 seconds to turn the flashlight on or off.

Backlight / Data Hold Button:

Press the ☀/H button to turn on or off the data hold function. If you press the button for more than 2 seconds, you turn the display backlight on or off.

True RMS

This device measures values in “True RMS”.

Auto Range Function

When using the device, the correct range for each measurement function is chosen automatically by the device.

Auto Power Off

- If there is no operation for 15 minutes , the device will turn off automatically to save power. After an automatic shutdown, press any button to turn the device on again.
- If you press and hold the SMART FUNC button and turn on the device, the automatic shutdown function will be disabled. After turning off the device, the automatic shutdown function will be enabled again for the next measuring session. If the screen shows the ⏻ symbol, the auto power off function is enabled.

Burnt Fuse Warning

If the FUSE symbol is displayed, the fuse is burnt out and should be replaced. Do not continue to use the device bevor replacing the fuse!

Wrong Input Socket Warning

If the measuring probe is not inserted into the correct input socket when choosing the current measurement function, the LEAd symbol is displayed. Stop immediately the measurement operation, disconnect the probes from the testing object, and insert the probes into the correct input sockets.

Measurement Operation

Connect Measuring Probes

Do not operate the device before the test probes are not connected correctly. To ensure this, push the cables fully into the input sockets.

Smart Measurement Mode

The device features a smart measurement mode, through which the device can automatically choose and determine which measurement function use, without the operator choosing it manually. The smart measurement mode is enabled by default when turning on the device. The mode is applicable for **AC/DC voltage, resistance**, and **continuity measurement**. **Note: Minimum measurable voltage: 0.5V**

1. Press the ⏻ button to turn on the device. The display will show AUTO, indicating that the smart measurement mode is enabled
2. Insert the red probe into the 

input socket and the black probe into the "COM" input socket. Let the probe's tips touch one another, to check whether they are correctly connected. The indicator light should turn green and the buzzer sound.
3. Connect the probes' tips (red probe is the positive pole, black probe is the negative pole) in parallel to voltage source / resistor and the device will automatically recognize the signal and choose the correct measurement function.
4. When Measuring AC voltage, the frequency will be displayed at the same time.
5. When the measured resistance is less than 50Ω, the buzzer will sound and the indicator light will turn green. The device switches to continuity testing.
6. Results will be shown on the screen of the device.

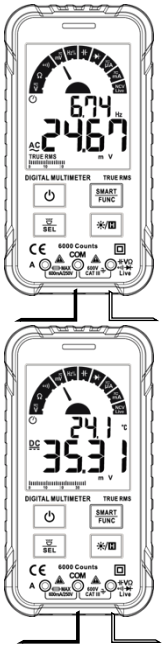
⚠ WARNING:

- **Do not measure voltage above 600V; otherwise the instrument might get damaged.**
- **If the display shows "OL", disconnect the probes' tips from the measuring circuit immediately (Overload)**
- **Never connect voltage if probes are in current measurement sockets. This could result in electric shock for the user and damage the device.**
- **Pay special attention to safety when measuring high voltage to avoid electric shock or personal injury.**
- **Always test known voltage before using the device, in order to ensure that the device functions properly.**
- **Do not touch the bare tips of the probes; when measuring is finished, always remove the probes from the measuring object and the device.**

When measuring resistance / testing for continuity on the line, disconnect the power supply, ensure there is no source of voltage, and discharge all capacitors. Otherwise, the instrument might get damaged and might be in danger of an electric shock. When measuring is finished, always remove the probes from the measuring object and the device.

AC/DC Voltage “mV" Measurement

1. Press the ⏻ button to turn on the device, press the SMART/FUNC button and choose the mV function. Press the SEL button to switch between AC or DC voltage.
2. Insert the red probe into the Live input socket and the black probe into the “COM” input socket. Let the probe’s tips touch one another, to check whether they are correctly connected. The indicator light should turn green and the buzzer sound
3. Connect the probes’ tips (red probe is the positive pole, black probe is the negative pole) in parallel to the measuring circuit, measure the voltage.
4. The measurement result is displayed on the screen.

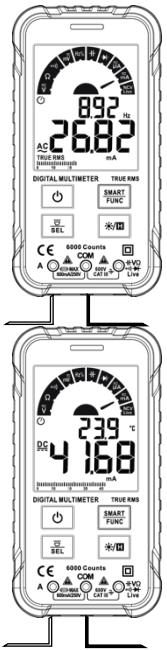


⚠ WARNING:

- **Do not measure voltage above 250V; otherwise the instrument might get damaged.**
- **If the display shows "OL", disconnect the probes' tips from the measuring circuit immediately (Overload)**
- **Never connect voltage if probes are in current measurement sockets. This could result in electric shock for the user and damage the device.**
- **Pay special attention to safety when measuring high voltage to avoid electric shock or personal injury.**
- **Always test known voltage before using the device, in order to ensure that the device functions properly.**
- **Do not touch the bare tips of the probes; when measuring is finished, always remove the probes from the measuring object and the device.**

AC/DC Current Measurement

5. Press the ⏻ button to turn on the device.
6. Insert the red probe into the current input socket (“A”) and the black probe into the “COM” input socket.
7. When the red probe is inserted into the current input socket (“A”), the device will automatically switch to the μA or mA function. Press the SMART FUNC button, in order to switch between the functions manually.
8. Press the SEL button to switch between AC or DC current.
9. Connect the probes’ tips in series to the measuring circuit, measure the current.
10. The measurement result is displayed on the screen.
11. When measuring AC current, the frequency is displayed at the same time



⚠ WARNING:

- **The voltage in the measured circuit cannot exceed 250V and the current cannot exceed 600mA; otherwise the device might get damaged.**
- **If the display shows "OL", disconnect the probes' tips from the measuring circuit immediately (current exceeds measurement range).**
- **Always test known current before using the device, to ensure that device functions properly**
- **When measuring is finished, always remove the probes from the measuring object and the device.**

⚠ Caution:

To avoid damaging the instrument or equipment, check the fuses before measuring and ensure that the measured current does not exceed the rated maximum current. If the fuses are released during measurement, stop the operation immediately. Always use the correct input sockets.

Frequency / Duty Measurement

1. Press the ⏻ button to turn on the device, press the SMART FUNC button and choose the Hz% function.
2. Insert the red probe into the Live input socket and the black probe into the “COM” input socket. Let the probe’s tips touch one another, to check whether they are correctly connected.
3. Connect the probes’ tips (red probe is the positive pole, black probe is the negative pole) in parallel to the measuring circuit, measure the frequency and duty.
4. The measurement result is displayed on the screen.

⚠ **WARNING:**

- **Do not measure voltage above 250V; otherwise the instrument might get damaged.**
- **Pay special attention to safety when measuring high voltage to avoid electric shock or personal injury.**
- **Always test known voltage before using the device, to ensure that device functions properly.**
- **Do not touch the bare tips of the probes; when measuring is finished, always remove the probes from the measuring object and the device.**

Diode Test

1. Press the button to turn on the device, press the SMART FUNC button and choose the function.
2. Insert the red probe into the VΩ Live input socket and the black probe into the “COM” input socket. Let the probe’s tips touch one another, to check whether they are correctly connected.
3. Connect the red probe’s tip with the anode and the black probe’s tip with the cathode of the diode.
4. The measurement result is displayed on the screen.
5. If the screen shows “OL”, the measuring diode is either in reverse direction or defective.

Note: The device shows an approximation of the diode forward voltage drop. In general, the forward voltage drop of a diode is between 0.3V to 0.8V.

⚠ WARNING:

When doing a diode test on the line, disconnect the power supply, ensure there is no source of voltage, and discharge all capacitors. Otherwise, the instrument might get damaged and might be in danger of an electric shock. When measuring is finished, always remove the probes from the measuring object and the device.

Capacitance Measurement

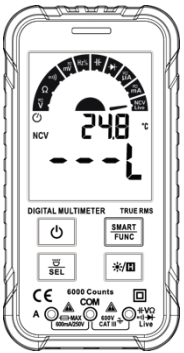
1. Press the ⏻ button to turn on the device, press the SMART/FUNC button and choose the ⊣⊢ function.
2. Insert the red probe into the ⊣⊢VΩ / Live input socket and the black probe into the “COM” input socket. Let the probe’s tips touch one another, to check whether they are correctly connected.
3. Connect the probes’ tips (red probe is the positive pole, black probe is the negative pole) in parallel to the measuring capacitor.
4. The measurement result is displayed on the screen (when measuring larger capacitance, it may take longer for the results to stabilize).

⚠ WARNING:

When measuring capacitance on the line, disconnect the power supply, ensure there is no source of voltage, and discharge all capacitors. Otherwise, the instrument might get damaged and might be in danger of an electric shock. When measuring is finished, always remove the probes from the measuring object and the device.

NCV Test

1. Press the ⏻ button to turn on the device, press the SMART / FUNC button and choose the NCV / Live function. The display will show “NCV”.
2. Gradually approach the voltage source with the NCV probe, which sits at the top of the device.
3. When the meter senses weak AC signals, the indicator lights up green, while the buzzer sends out slow-paced acoustic signals. The display will show "--- L".
4. When the meter senses strong AC signals, the indicator lights up red, while the buzzer sends out fast-paced acoustic signals. The display will show "--- H".

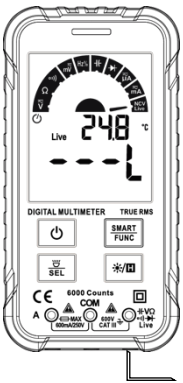


⚠ **WARNING:**

- **Do not measure voltage above 600V; otherwise the instrument might get damaged.**
- **Remove all probes from the input sockets.**
- **Pay special attention to safety when measuring high voltage to avoid electric shock or personal injury.**
- **The NCV test is only a first indication and cannot replace voltage measuring.**

Live-Test

1. Press the ⏻ button to turn on the device, press the SMART FUNC button and choose the NCV Live function. Then select the LIVE test function with the "SEL" button. The display will show “LIVE”.
2. Insert the red probe into the Live input socket and ensure that the black probe **is removed** from the “COM” input socket. Connect the red probe’s tip with the measuring voltage source.
3. When the meter senses weak AC signals, the indicator lights up green, while the buzzer sends out slow-paced acoustic signals. The display will show "--- L".
4. When the meter senses strong AC signals, the indicator lights up red, while the buzzer sends out fast-paced acoustic signals. The display will show "--- H".



⚠ **WARNING:**

- **Do not measure voltage above 600V; otherwise the instrument might get damaged.**
- **Remove the black probe from the input socket.**
- **Pay special attention to safety when measuring high voltage to avoid electric shock or personal injury.**
- **The Live test is only a first indication and cannot replace voltage measuring.**

General Technical Specifications

- Environmental conditions of using the device:
  CAT. III 600V； Pollution level 2, Altitude < 2000m
  Working environment temperature and humidity：0~40°C（<80% RH，<10°C non condensing);
  Storage environment temperature and humidity: -10~60°C（<70% RH, remove the batteries)
- Temperature coefficient 0.1× accuracy /°C（<18°C or >28°C)
- MAX. Voltage between input sockets and earth ground: 600V
- Fuse protection: mA: F600mA/250V fuse
- Sampling rate: about 3 times/second.
- Display: 6000 counts readout. Automatically shows the unit's symbol corresponding to the chosen measuring function and range.
- Exceeding measurement range indication: The screen displays "OL".
- Low battery indication: when the battery voltage is lower than the normal working voltage, "  " will be displayed.
- Input polarity indication: screen automatically displays "–".
- Power supply: 2 x 3V CR2032 batteries.

Accuracy Specifications

The accuracy is valid for one year after calibration. Reference conditions: the environment temperature is between 18°C and 28°C, the relative humidity is no more than 80%.

DC voltage

Range	Resolution	Accuracy
60mV	0.01mV	±(0.5% reading+3)
600mV	0.1V	
6V	0.001V	
60V	0.01V	
600V	0.1V	

Input impedance: 10MΩ;
Maximum Input voltage: 600V
Overload protection: 600V

AC voltage

Range	Resolution	Accuracy
60mV	0.01mV	±(1.0% reading+3)
600mV	0.1V	
6V	0.001V	
60V	0.01V	
600V	0.1V	

Input impedance: 10MΩ
Maximum input voltage: 600V
Overload protection: 600V
Frequency Response: 40Hz ~ 1kHz;
True-RMS

DC current

Range	Resolution	Accuracy
6000μA	1μA	±(1.2% reading+5)
60mA	0.01mA	
600mA	0.1mA	

Overload protection:

μA/mA: F600mA/250V fuse

Maximum input current: 600mA

AC current

Range	Resolution	Accuracy
6000μA	1μA	±(1.5% reading+5)
60mA	0.01mA	
600mA	0.1mA	

Overload protection:

μA/mA: F600mA/250V fuse

Maximum input current: 600mA

Frequency Response:40Hz ~ 1kHz;

True-RMS

Diode test

	Function	Open voltage: ca. 2.0V Overload protection:250V
	It displays the approximate forward voltage value of the diode.	

Continuity test

	Function	Open voltage is about 1V Overload protection:250V
	If the resistance is ca. 50Ω, the buzzer will sound.	

Resistance

Range	Resolution	Accuracy
600Ω	0.1Ω	±(1.0% reading+5)
6kΩ	0.001kΩ	
60kΩ	0.01kΩ	
600kΩ	0.1kΩ	
6MΩ	0.001MΩ	±(1.5% reading+3)
60MΩ	0.01MΩ	

Overload protection: 250V

Capacitance

Range	Resolution	Accuracy
6nF	0.001nF	±(4.0% reading+5)
60nF	0.01nF	
600nF	0.1nF	
6μF	0.001μF	
60μF	0.01μF	
600μF	0.1μF	±(5.0% reading+5)
6mF	0.001mF	

Overload protection: 250V

Frequency / Duty

Range	Resolution	Accuracy
10Hz	0.001Hz	±(1.0%+5)
100Hz	0.01Hz	
1000Hz	0.1Hz	
10kHz	0.001kHz	
100kHz	0.01kHz	
1000kHz	0.1kHz	
10MHz	0.001MHz	±(3.0%+5)
1~99%	0.1%	

Hz/% Position:

1) Range: 10Hz ~ 10MHz
2) Voltage response:0.5~10V AC
3) Overload protection:250V

ACV Position:

1) Range:10Hz ~ 2 kHz
2) Voltage response:≥ 0.5V AC
3) Overload protection:250V

μA or mA Position:

1) Range: 10Hz ~ 2 kHz
2) Current response: ≥ 2mA
3) Overload protection: F600mA/250V fuse

Maintenance

Cleaning

Clean the device with a dry cloth. When facing stronger contamination, use a slightly damp cloth. Only use water and never use any detergent or chemicals. Before using the device again, ensure that everything is dry and that there is no moisture.

⚠ **WARNING:**

- **Always switch off the device, disconnect it from any voltage source or power supply, and remove the test probes. Otherwise there might be the danger of damaging the device or personal injury.**
- **Ensure that after cleaning, the device is dry and that there is no moisture.**

Replacing Battery and Fuse

Replacing Battery

1. Turn off the power supply of the instrument, and remove the probes from the input sockets.
2. Use a screwdriver to unscrew the screw fixing the battery cover at the back of the device, then remove the battery cover.
3. Replace the old batteries with new ones having the same specifications.
4. Put the battery cover back in place and fix it with the screw.

⚠ WARNING:

- **Always switch off the device, disconnect it from any voltage source or power supply, and remove the test probes. Otherwise there might be the danger of damaging the device or personal injury.**
- **Only continue using the device, after the putting everything back together according to the instructions.**

Replacing Fuse

1. Turn off the power supply of the instrument, and remove the probes from the input sockets.
2. Use screwdriver to unscrew the screws fixing the back cover and remove the back cover.
3. Remove the burnt fuse, replace it with a new fuse of the same specifications, and ensure that the fuse is clamped in the safety clip.
4. Install the back cover, fix and lock it with the screws.

⚠ **WARNING:**

- **Always switch off the device, disconnect it from any voltage source or power supply, and remove the test probes. Otherwise there might be the danger of damaging the device or personal injury.**
- **Always replaces fuses with new ones having the same specifications.**
- **Only continue using the device, after the putting everything back together according to the instructions.**

Information regarding waste disposal:

You are not permitted to dispose of this device in household garbage. This multimeter corresponds to the EU-directive concerning the “Waste of Electrical and Electronic Equipment”. Please dispose of the device in your local collection point.
Please follow the decree related to the disposal of batteries. Used batteries are not permitted to be disposed of in household garbage. You are obliged to recycle them. Dispose of used batteries by bringing them to local collection points.