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Digitalmultimeter, 750V AC/DC, 20A AC/DC, 2000MΩ, 200µF, 10MHz, 20H, -20…1000°C

07029-12

PHYWE Systeme GmbH & Co. KG
Robert-Bosch-Breite 10
37079 Göttingen
Germany
Tel.   +49 (0) 551 604-0
Fax   +49 (0) 551 604-107
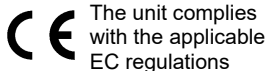E-mail   info@phywe.de

Operating Instructions

CE   The unit complies with the applicable EC regulations

Fig. 1: Digitalmultimeter, 750V AC/DC, 20A AC/DC, 2000MΩ, 200µF, 10MHz, 20H, -20…1000°C, 07029-12

TABLE OF CONTENTS

1   SAFETY INSTRUCTIONS

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- Do not store or use it in environments of high temperature, high humidity, high flammability or strong magnetic fields.
- Use only safety connecting cords.
- Wipe the meter with a damp cloth and soft detergent, and avoid abrasive and drastic cleaning agents such as alcohol.
- Take out the battery to prevent the meter from being corroded by a leaking battery if the meter is not going to be used for a long time.
- Be careful of the status of batteries. When "🔋" is displayed on LCD, replace batteries.
- This series of device is designed according to the EN61010-1 standard (safety standard issued by International Electro technical Committee). Read these safety notices before using it.
- Do not input current higher than 20A when measuring current.
- Never input DC higher than 1000V or AC higher than 750V virtual voltage as measuring voltage.
- Verify the correct earthing, connection and insulation of test leads to avoid electric shock when measuring the voltage of DC higher than 36V or AC higher than 25V.
- Test leads should be away from test points when switching the functions or measurement ranges.
- Select the correct functions and measurement ranges and beware of improper operation. You may still be careful to ensure safety even even though the device has range protection functions.

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Safety symbol

⚡ Dangerous voltage

⏚ GND

回 Dual insulation

⚠ Refer to safety instructions

🔋 Low battery

2 PURPOSE AND CHARACTERISTICS

This product is a stable and battery-driven $3^1/_2$ digital multimeter with high reliability. It has an LCD screen with character height of 28mm; with functions including unit sign/backlight and overload protection.

This device can be used to measure DCV, ACV, DCA, ACA, resistance, capacitance, inductance, diode, triode, continuity, temperature and frequency, as well as hold the peak value. As an instrument with excellent performance it adopts a double integral A/D converter as its core.

3 GENERAL CHARACTERISTICS

3.1. Display mode: LCD;

3.2. Max display: 1999 ($3^1/_2$) digits automatic polarity display;

3.3. Measurement method: double integral A/D conversion;

3.4. Sampling rate: about 3 time per second;

3.5. Above-range display: the highest digit displays "OL" or "-OL"

3.6. Low voltage display: "🔋";

3.7. Working environment: (0~40°C), relative humidity: <80%;

3.8. Power supply: one 9V battery (6F22 or equivalent model);

3.9. Dimension: 189mm * 97mm * 35mm (length*width*height);

3.10. Weight: about 400g (including 9V battery).

4 TECHNICAL DESCRIPTION

4.1. Accuracy: ±(a% × reading data + digit), ensuring the accuracy environment temperature: (23±5)□, relative humidity <75%, and the calibration warranty period lasts for one year from the date of leaving the factory.

4.2. Performance (▲ indicates the function is available for this model)

Function	
DCV	▲
ACV	▲
DCA	▲
ACA	▲
Resistance Ω	▲
Diode/ Open circuit	▲
Triode hFE	▲
Capacitance C	▲
Temperature □	▲
Frequency f	▲
Inductance L	▲
Auto power off	▲
Backlight	▲
Peak value holding	▲

4.3. Technical index
4.3.1. DCV

Range	Accuracy	Resolution
200 mV	±(0.5%+3)	100 µV
2 V		1 mV
20 V		10 mV
200 V		100 mV
1000 V	±(1.0%+5)	1 V

- Input impedance: All ranges: 10MΩ;
- Overload protection: 250V DC or AC peak value for range 200mV; 1000V DC or AC peak value for other range.

4.3.2. ACV

Range	Accuracy	Resolution
200 mV	±(1.2%+3)	100 µV
2 V	±(0.8%+5)	1 mV
20 V		10 mV
200 V		100 mV
750 V	±(1.2%+5)	1 V

- Input impedance: All ranges: 10MΩ;
- Overload protection: 250V DC or AC peak value for range 200mV; 1000V DC or AC peak value for other ranges.
- Frequency response: 40~400Hz for range under 200V; 40~100Hz for range 750V;
- Display: Sine wave RMS (AVG value response).

4.3. DCA

Range	Accuracy	Resolution
2 mA	±(0.8%+3)	1 µA
20 mA		10 µA
200 mA	±(1.2%+4)	100 µA
20 A	±(2.0%+5)	10 mA

- Max. measurement voltage drop: 200mV;
- Max. input current: 20A (no more than 10 seconds);
- Overload protection: 0.2A / 250V quick-action fuse for ranges under 20A, 12A / 250V quick-acting fuse for range 20A.

4.3.4. ACA

Range	Accuracy	Resolution
2 mA	±(1.0%+5)	1 µA
20 mA		10 µA
200 mA	±(2.0%+5)	100 µA
20 A	±(3.0%+10)	10 µA

- Max. measurement voltage drop: 200mV;
- Max. input current: 20A (no more than 10 seconds);
- Overload protection: 0.2A / 250V quick-action fuse for ranges under 20A, 12A / 250V quick-acting fuse for range 20A.
- Frequency response: 40~200Hz;
- Display: Sine wave RMS (AVG value response).

4.3.5. Resistance (Ω)

Range	Accuracy	Resolution
200 Ω	±(0.8%+5)	0.1 Ω
2 kΩ		1 Ω
20 kΩ	±(0.8%+3)	10 Ω
200 kΩ		100 Ω
2 MΩ		1 kΩ
20 MΩ	±(1.0%+15)	10 kΩ
2000 MΩ	±[5%(reading –10)+ 20]	1 MΩ

- Open circuit voltage: lower than 3V;
- Over load protection: 250V DC or AC peak value.

Notes:

a) If in range 200Ω, short the test leads and measure wire resistance, and then subtract the resistance from the value measured.

b) It is standard to display 10MΩ when the test leads shorted in range 2000MΩ, it will not effect the accuracy and shall be subtracted from the value measured. For example: The object resistance is 1000MΩ, the reading value is 1010MΩ, then the correct value shall be 1010 – 10 = 1000MΩ.

c) Take the tagged display of value into consideration when the measuring resistance is higher than 1MΩ. Please wait until the display is stable.

4.3.6. Capacitance (C)

Range	Accuracy	Resolution
20 nF		10 pF
200 nF	±(2.5%+20)	100 pF
2 µF		1 nF
20 µF		10 nF
200 µF	±(5.0%+5)	100 nF

- Testing frequency: 100Hz;
- Over load protection: 36V DC or AC peak value.

4.3.7. Inductance (L)

Range	Accuracy	Resolution
2 mH		1 µH
20 mH		10 µH
200 mH	±(2.5%+20)	100 µH
2 H		1 mH
20 H		10 mH

- Testing frequency: 100Hz;
- Over load protection: 36V DC or AC peak value.

4.3.8. Temperature (□)

Range	Accuracy	Resolution
(-20 ~ 1000)□	±(1.0%+4) < 400□ ±(1.5%+15) ≥ 400□	1□

- Thermocouple (plug of banana type).

4.3.9. Frequency (f)

Range	Accuracy	Resolution
2 kHz		1 Hz
20 kHz		10 Hz
200 kHz	±(1.0%+10)	100 Hz
2000 kHz		1 KHz
10M Hz		10 KHz

- Input sensitivity: higher than 3.5VV_{P-P};
- Overload protection: 250V DC or AC peak value (less than 10 seconds).

4.3.10. Diode and open circuit test

Range	Value displayed	Test condition
▸▪◂ ·))	Diode forward voltage drop (Unit: mV)	Forward DC: about 1mA, reverse voltage: about 3V.
	Buzzer sounds continuously, resistance between two test points is less than 70Ω±20Ω.	Open circuit voltage is approx. 3V.

- Overload protection: 250V DC or AC peak value;
- Warning: Do not input voltage in this range.

4.3.11 Transistor hFE data test

Range	Display range	Test condition
h_{FE}, NPN or PNP	0 ~ 1000	Base electrode current is approx 10µA, and Vce is approx 3V

5   OPERATING INSTRUCTIONS

5.1. Operation panel introduction

Refer to the figure:

1. LCD: display the measured value and the unit;
2. Function keys
2.1. Power switch: turn on / off power;
2.2. PK HOLD: Pressing this key will hold the max value measured on LCD showing sign "PH"; press again, "PH" will disappear and exit the status of peak value holding.
2.3. B/L switch to enable backlight which will be turned off automatically after about 5 seconds.
2.4. DC/AC: select DC/AC working mode.
3. Range knob: to select measurement function and range;
4. Jack for measurement of voltage, resistance and frequency;
5. GND ground: positive input for capacitance (Cx), inductance (Lx), triode and temperature.
6. Positive jack for current
   - lower than 200mA; cathode
   - input for capacitance (Cx)
   - inductance (Lx), transistor
   - temperature.
7. Jack for current 20A.
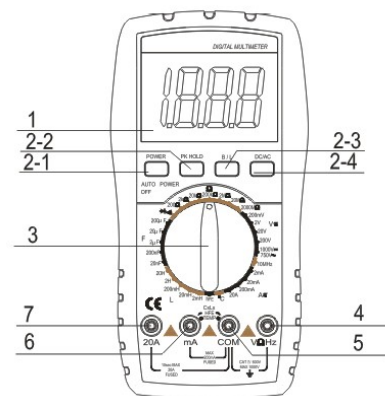
5.2. Voltage measurement

1. Insert the black test leads into the "COM" jack, and the red one into the "V/Ω/Hz" jack;

2. Turn the switch to position "V". If the level of voltage to be measured is unknown then select the highest range and then decrease the range step by step until getting the value with the highest resolution.

3. Make the key "DC/AC" pop up to enter into DC mode if measuring DCV; Press down the key "DC/AC" to set into ACV measuring.

4. The LCD will display the voltage measured when touching the testing point using the test leads; the point touched by the red test leads is in positive voltage if the value shown is positive.

Notes:

⚠️

1. "OL" indicates the range is overshot and switching to a higher range is therefore necessary.

2. The voltage to be tested must NOT be above DC 1000V or AC 750V. The test leads shall be away from the testing point when switching functions or measurement ranges.

3. When measuring high voltage circuits, any parts of your body must NOT touch the high voltage circuit to avoid personal harm.

5.3. Current measurement

1. Insert the black pencil into the "COM" jack and the red one into the "mA" or "20A" jack.

2. Turn the switch to position "A". If the level of current to be measured is unknown then select the highest range and then decrease the range step by step until getting the value with the highest resolution.

3. Pop up the key "DC/AC" to enter into DC mode if measuring DC; press down the key "DC/AC" to set into AC mode.

4. The displays show the value of current measured if the text leads are connected in parallel to the circuit to be tested; the point touched by the red test lead is in positive voltage if the value shown is positive.

Notes:

⚠️

1. "OL" indicates the range is overshot and switching to a higher range is therefore necessary.

2. The input in "mA" jack shall not above 200mA and "20A" not above 20A (less than 10 seconds of testing duration) as measuring current; the test leads must be away from the testing points when switching function or measurement range.

5.4 Resistance measurement

1. Insert the black test lead into the "COM" jack, and the red one into the "V/Ω/Hz" jack;

2. Turn the range switch to the resistance position, then connect the test leads at the two ends of the resistor.

Notes:

⚠️

1. "OL" will be displayed on the screen if the resistance is above the current range. Wwitching to a higher range is therefore necessary;

2. When the input is an open circuit, it will display the status of overload;

3. When measuring resistance on line, ensure that power of the circuit tested is turned down and all capacitors are discharged completely;

4. Never input voltage if in resistance measurement mode;

5. Please keep in mind that for resistance higher than 1MΩ the data is not stable for the first several seconds.

5.5. Capacitance measurement

1. Switch to a proper range and insert the test leads into the "mA" and "COM" jacks.

2. Connect the test leads in parallel to the two ends of the capacitor. Please pay attention to the polarity, "COM" for positive and "mA" for negative.

Notes:

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1. If capacitance exceeds the range selected, "OL" will be displayed on the display. In this case switch to the next higher measurement range.

2. Take into consideration that the display may show excess digits when starting capacitance measurement. It will not affect the testing result.

3. If there is serious creepage or a capacitor broken down in a high-capacitance range, the digits shown will be random and unstable.

4. Discharge the capacitor completely to avoid device damage before measuring capacitance.

5.6. Inductance measurement

1. Switch to a an appropriate measurement range, and insert test leads into the "mA" and "COM" jacks.

2. Connect the test leads diagonally to the two ends of the inductor.

Notes:

⚠️

1. If inductance exceeds the range selected, "OL" will be displayed on the screen and it is necessary to switch to the next higher measurement range.

2. The inductance value measured for identical inductors may be different if there is different impendence;

3. If in range 2mH, please short-test leads and measure lead inductance, then subtract the inductance from the value measured.

4. Avoid measuring small inductors in high range, otherwise the accuracy is not guaranteed.

5.7. Temperature measurement

Turn range switch to "°C", insert the cathode (black pin) of the cold end (free end) of the thermocouple into the "mA" jack, the anode (red pin) into the "COM" jack, put the working end (temperature measurement end) of the thermocouple onto the surface or inside the object to be tested. The temperature reading is display in degree Centigrade (°C).

Notes:

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1. Do not replace the temperature sensor, otherwise the accuracy is not guaranteed.
2. Do not input voltage if in temperature mode.

5.8. Frequency measurement

1. Insert the test leads or shielded cable into the "COM" and "V/Ω/Hz" jacks;

2. Turn the range switch to frequency position and connect the test leads or shield cables diagonally to the signal source or load tested.

Notes:

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1. It is possible to get a reading for input voltages higher than 10V RMS, but the accuracy is not guaranteed;

2. In a noisy environment, you'd better use a shielded cable to measure small signals;

3. When measuring a high voltage circuit, any parts of your body must NOT touch the high voltage circuit as it may cause personal harm.

4. Never input voltage higher than 250V DC or AC peak value, otherwise it may damage your multimeter.

5.9. Transistor hFE

1. Turn the range switch to "hFE" position;

2. Insert test leads into "mA" and "com" jack. Please pay attention to the polarity, as the "com" for positive and "mA" for negative.

3. To determine the transister's type, NPN or PNP, insert the emitting, base and collector electrode into the corresponding jacks in testing accessory.

5.10. Diode and open circuit test

1. Insert the black test leads into the "COM" jack, and the red one into the "V/Ω/Hz" jack (Notice: the red test lead tip is the anode);

2. Turn the range switch to position "→⊢·))", connect test leads to the diode tested, with the red test lead tip to the positive side of the diode and the black to the negative side, then the reading value will approximately be identical to the forward voltage drop of the diode;

3. Connect the test lead tips to two points of the circuit to be tested. If the buzzer sounds, then the resistance between the two points is lower than (70±20)Ω.

5.11. Peak value holding

Press HOLD, and the peak value of current data will be displayed permanently on the screeen. Press it again to cancel this function.

5.12. Auto power off

After about (20±10) minutes of not being used, the multimeter will be powered off automatically and enter into dormant state. Press "POWER" again twice to turn on the power.

5.13. Backlight

Press "B/L" key to turn on the backlight. After 5 seconds, the backlight will be turned off automatically.

5.14. Replacing the battery and the fuses

- Remove the holster, screw out the nut that is fixing the battery lid and remove the battery case.
- Replace the 9V batteries resp. fuses. It is recommended to use an alkaline battery for long-time operation.
- Close the battery case and tighten the screws.
- Put on the holster.
- Spare parts:
  - Fuses: F200mA/250V, Φ5*20mm, F20A/250V, Φ5*20mm
  - Battery: 9V battery

Notes:

⚠

When the backlight is bright, working current becomes higher, and it will shorten life of the battery and the error for some other functions will increase.

6   TROUBLESHOOTING

If your device does not work properly, the methods below may help you to solve general problems. If these methods do not work, please contact the service center.

Conditions	Way to solve
No reading on display	●Turn on the power ●Set the HOLD key to correct mode ●Replace battery
⊡ signal appears	●Replace battery
No current or temperature input	●Replace fuse
Measurement value completely off	●Replace battery

Specifications are subject to change without notice.

The content of this manual is regarded as correct, in case of errors or omissions please contact the service center.

We hereby will not be responsible for accidents and damage caused by improper operation.

The functions described for this user manual cannot be the reason of special usage which exceeds the standard measurement methods for which this multimeter was designed.

7   SCOPE OF DELIVERY

- Multimeter
- Battery (9V)
- Holster
- Thermocouple (banana type)
- Testing accessory
- Test leads (20A)
- User's manual

8   WARRANTY

We give a warranty of 24 months for units supplied by us inside the EU, and a warranty of 12 months outside the EU. The following is excluded from the warranty: Damage that is due to non-compliance with the operating instructions, improper use, or natural wear.

The manufacturer can only be held liable for the function and safety-relevant properties of the unit, if the maintenance, ser-

vice, and modifications of the unit are performed by the manufacturer or by an institution that is expressly authorised by the manufacturer.

9 PRODUCER

Xi'An BeiCheng Electronics Co., Ltd.
LiuHeng Road, JingHe Industrial Park, North District, Xi'An, China (Model 88C)

10 WASTE DISPOSAL

The packaging consists predominately of environmentally compatible materials that can be passed on for disposal by the local recycling service.

Should you no longer require this product, do not dispose of it with the household refuse. Please return it to the address below for proper waste disposal.

PHYWE Systeme GmbH & Co. KG

Abteilung Kundendienst (Customer Service)

Robert-Bosch-Breite 10

D-37079 Göttingen

Phone	+49 (0) 551 604-274
Fax	+49 (0) 551 604-246