# INSTRUCTION MANUAL

## Model 380224
## Heavy Duty Phase Indicator DMM

- High Accuracy
- Voltage, Resistance, Frequency, Capacitance, and Temperature functions
- Phase indication
- Low battery and over range indication



## *Introduction*

Congratulations on your purchase of Extech's Phase Indicator DMM. This professional meter, with proper care, will provide years of safe reliable service.

## *Specifications*

**General Specifications**

| | |
|---|---|
| Display | ±1999 (3-1/2 digit) count LCD with Auto Polarity |
| Sample Rate | Approx. 2 samples per second |
| Over-range Indication | "OL or -OL" is displayed |
| Low Battery Indication | Battery symbol appears on LCD |
| Power Supply | 9V battery (NEDA 1604 or equivalent) |
| Battery Life | Approx. 200 hours with carbon-zinc battery |
| Operating Temperature/Humidity | 32°F to 122°F (0°C to 50°C) / < 70% RH |
| Storage Temperature/Humidity | -4°F to 132°F (-20°C to 60°C) / < 80% RH |
| Dimension / Weight | 5.8 x 2.8 x 1.5" (147x70x39mm) 11.8 oz. (340g) |
| Supplied accessories | Test leads, temp. probe, fuse, battery, wrist-strap, and manual |

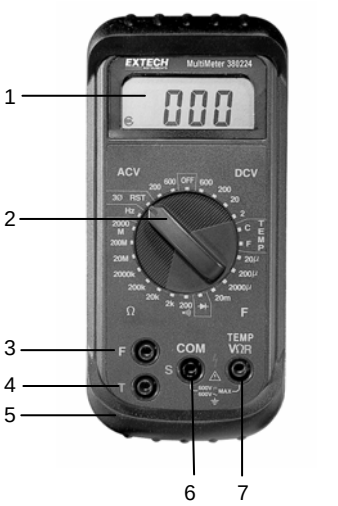
**Range Specifications**

Accuracy specified for a period of 1 year after calibration at 23°C ± 5°C

| Mode | Measurement Range | Resolution | Accuracy % Rdg. | Input Protection | Comments |
|---|---|---|---|---|---|
| DCV | 2,20,200,600V | 1mV | ±(1.2% + 1 d) | 600V AC/DC | Input Z = 10MΩ |
| ACV | 200, 600V | 100mV | ±(2.0% + 4 d) | 600V AC/DC | Input Z =4.5MΩ 50-500HZ |
| CAP | 20/200/2000µF, 20mF | | ±(4.0% + 10 d) | 0.1A/250V fast-blow fuse | Test freq.: 21Hz Test V.: <3.5V |
| Freq. | 10Hz to 100kHz | | ±(0.5% + 2 d) | 500VDC or AC | Sensitivity: 2Vrms min |
| Temp. | -4°F to 752°F (-20°C to 400°C) | | ±(2.0% + 2°C)<br>±(2.0% + 4°F) | 500VDC or AC | Sensor: K type thermocouple (incl.) |
| Phase | 45 to 450Hz; Voltage range: 80 to 480V | | | | 2V |
| Ω | 200Ω | .1Ω | ±1.0% + 4 dig | 500V DC/AC rms | $V_{OC}$: 3.0VDC |
| | 2/20/200kΩ | 1/10/100 Ω | | | $V_{OC}$: 0.3VDC |
| | 2MΩ | 1kΩ | | | $V_{OC}$: 0.3VDC |
| | 20MΩ | 10kΩ | ±(2.0% + 4 d) | | $V_{OC}$: 0.3VDC |
| | 200M/2GΩ | 100k/1GΩ | ±(5.0% + 10 d) | | $V_{OC}$: 3.0VDC |
| Diode | Test I: 1mA (±.6mA); Accy: ±(3.0% ± 1d); $V_{OC}$: 3VDC typ.; Overload Prot: 500VDC/AC | | | | |
| Cont. | Continuity Audio alert < 100Ω; Overload Protection: 500VDC/ACrms | | | | |

## *Front Panel Description*

1. LCD Display
2. Rotary Select Switch
3. ‘F’ (Farad) Capacitance input jack
4. ‘T’ input jack
5. Rubber Holster
6. COM and ‘S’ input jack
7. Voltage, Resistance, ‘R’, Hz, and Temperature input jack




## *Preparation for measurement*

**Safety Information**
The following information must be observed to insure maximum personal safety while operating this meter.

1. Do not use the meter if the meter/test leads appear damaged or if you suspect that the meter is not operating properly.
2. The user should never be grounded when taking measurements. Do not touch exposed metal pipes, outlets, fixtures, etc. which may be at ground potential. The user should be isolated from ground by using dry clothing, rubber soled shoes, rubber mats, or other approved insulating material.
3. Remove power to the circuit under test before cutting, unsoldering, or breaking the circuit. Small amounts of current can be dangerous.
4. Use caution when working above 60V DC or 30V AC rms. Such voltages pose a shock hazard.
5. When using the test leads or probes, keep fingers behind the probe's finger guard.
6. Measuring voltage which exceeds the limits of the multimeter may damage the meter and endanger the user. Always recognize the meter's limits as stated on the front of the meter.

**International Symbols**

| | | | |
|---|---|---|---|
| ⎓ | DC Voltage<br>DC Current | | Refer to explanation in owners manual |
| ∿ | AC Voltage<br>AC Current | | Dangerous voltage risk of electrical shock |
| ⏚ | Ground | | Double Insulation |

## *Operation*

**Voltage Measurements**

a. Connect the RED test lead to the "V/Ω" input jack and connect the BLACK test lead to the COM (-) input terminal.

b. Set the rotary switch to the desired AC or DC voltage range. If the magnitude of the voltage is not known, set the switch to the highest range and reduce until a satisfactory reading is obtained.

c. Connect the test leads to the unit under test (load, circuit, etc.) and observe reading on the LCD. For DC, negative polarity is automatically displayed.

**Resistance and Continuity Measurements**

a. Set the rotary switch to the desired resistance range or continuity position.

b. Remove power to the circuit under test (external voltage across device under test will cause invalid readings).

c. Connect the RED test lead to the "V/ " input terminal and the BLACK lead to the COM (-) input terminal.

d. Connect the other ends of the test leads to the circuit under test. For resistance measurements, the LCD reading is the value of resistance measured. In Continuity mode, the audible alert sounds if the resistance measured is below 100Ω.

**NOTE**: The 2000MΩ and 200MΩ ranges have a fixed 10-count offset. When the test leads are shorted together, the meter will indicate "10".
This residual values (10MΩ on the 2000MΩ and 1MΩ on the 200MΩ range) must be subtracted from readings taken in these ranges.

**Diode Measurements**

a. Set the rotary switch to the diode position.

b. Remove power to the circuit under test (external voltage across device under test will cause invalid readings).

c. Connect the RED test lead to the "V/ " input terminal.

d. Touch probes to the diode. A correct forward voltage drop is 0.6V (silicon diode) and 0.3V (germanium diode).

e. Reverse the probe connection to the diode. If the diode is good, "OL" (overload) will display. If the diode is shorted, a value near 0mV will be displayed.

f. If the diode is OPEN, "OL" will display in both measurement directions.

**Capacitance Measurements**

a. Set the rotary switch to the desired capacitance range.

b. Connect the RED test lead to the "F" input terminal and the BLACK test lead to the COM (-) input terminal.

c. Connect the test leads to the capacitor under test, observing polarity for polarized caps.

d. Read the capacitance value in farads on the meter's LCD.

**Temperature Measurements**

a. Set the rotary switch to the desired temperature range (C or F).

b. Connect a K-type thermocouple probe with banana jacks to the TEMP and COM input terminals. Observe proper polarity: The TEMP terminal is for the positive probe lead; COM is for the negative probe lead.

c. Read the temperature from the LCD display.

**Frequency Measurements**

a. Set the rotary switch to the "Hz" position.

b. Connect the RED test lead to the "V/ " input terminal and the BLACK test lead to the COM (-) input terminal.

c. Connect the test leads to the points of measurement and read the frequency value in hertz (Hz) on the meter's LCD.

**Phase Indicator Measurements**

a. Set the rotary switch to the "3 Ø RST" position.

b. Connect the RED test lead to the "R" input terminal, the BLACK test lead to the "S" input terminal, and the YELLOW test lead to the "T" input terminal.

c. Remove power to the 3Ø device before touching test leads to the measurement points.

d. Attach test leads to the measurement points and apply power to the device under test.

e. If the wiring is correct with regard to phase, the RST and "OK" LCD icons will appear and the audible tone will sound continuously. If the connection is incorrect, the "ER" LCD icon will appear. If the error icon (ER) is displayed, remove power to the device under test, reconfigure the wiring before applying power again, and test for correct phase. Repeat as necessary.

## *Maintenance*

**Battery Replacement**

The battery symbol on the LCD alerts the user of low battery voltage. Remove the test leads from the circuit under test before replacing battery.

a. Remove the test leads and turn the meter OFF

b. Remove the three (3) screws from the rear of the meter. Open the meter housing.

c. Replace the battery with a 9V NEDA 1604 or equivalent, reassemble meter, and replace screws.

**Electromagnetic Interference**

Electrical noise or intense EMF in the vicinity of the meter may disturb the measurement circuit. The meter may respond to unwanted signals that may be present within the measurement circuit. Users should exercise care and take appropriate precautions to avoid misleading measurements in the presence of electromagnetic interference.

## *Calibration and Repair Services*

Extech offers complete repair and calibration services for all of the products we sell. For periodic calibration, NIST certification or repair of any Extech product, call customer service for details on services available. Extech recommends that calibration be performed on an annual basis to insure calibration integrity.


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Support line (781) 890-7440

Technical support: Extension 200; E-mail: support@extech.com

Repair & Returns: Extension 210; E-mail: repair@extech.com


**Product specifications subject to change without notice**

For the latest version of this User's Guide, Software updates, and other up-to-the-minute product information, visit our website: www.extech.com


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## *Warranty*

EXTECH INSTRUMENTS CORPORATION warrants this instrument to be free of defects in parts and workmanship for one year from date of shipment (a six month limited warranty applies on sensors and cables). If it should become necessary to return the instrument for service during or beyond the warranty period, contact the Customer Service Department at (781) 890-7440 ext 210 for authorization. A Return Authorization (RA) number must be issued before any product is returned to Extech. The sender is responsible for shipping charges, freight, insurance and proper packaging to prevent damage in transit. This warranty does not apply to defects resulting from action of the user such as misuse, improper wiring, operation outside of specification, improper maintenance or repair, or unauthorized modification. Extech specifically disclaims any implied warranties or merchantability or fitness for a specific purpose and will not be liable for any direct, indirect, incidental or consequential damages. Extech's total liability is limited to repair or replacement of the product.
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