



**DRAPER**<sup>®</sup>

# 400 SERIES **CLAMP METER**

41967



**IMPORTANT:** Please read these instructions carefully to ensure the safe and effective use of this product and save these instructions for future reference. This manual has been compiled by Draper Tools and is an integrated part of the product with which it is enclosed and should be kept with it for future references.

This manual describes the purpose for which the product has been designed and contains all the necessary information to ensure its correct and safe use. We recommend that this manual is read before any operation or, before performing any kind of adjustment to the product and prior to any maintenance tasks. By following all the general safety instructions contained in this manual, it will ensure both product and operator safety, together with longer life of the product itself.

All photographs and drawings in this manual are supplied by Draper Tools to help illustrate the operation of the product. Whilst every effort has been made to ensure accuracy of information contained in this manual, the Draper Tools policy of continuous improvement determines the right to make modifications without prior warning.

# 1. TITLE PAGE

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## 1.1 INTRODUCTION:

USER MANUAL FOR:

### SERIES 400 CLAMP METER

Stock no. 41967.

Part no. DCM402.

## 1.2 REVISIONS:

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Date first published July 2017

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As our user manuals are continually updated, users should make sure that they use the very latest version.

Downloads are available from: <http://www.drapertools.com/manuals>

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## 1.3 UNDERSTANDING THIS MANUALS SAFETY CONTENT:

**WARNING!** Information that draws attention to the risk of injury or death.

**CAUTION!** Information that draws attention to the risk of damage to the product or surroundings.

## 1.4 COPYRIGHT © NOTICE:

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## 3. GUARANTEE

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### 3.1 GUARANTEE

Draper tools have been carefully tested and inspected before shipment and are guaranteed to be free from defective materials and workmanship.

Should the tool develop a fault, please return the complete tool to your nearest distributor or contact Draper Tools Limited, Chandler's Ford, Eastleigh, Hampshire, SO53 1YF.

England.

Telephone Sales Desk: (023) 8049 4333 or Product Helpline (023) 8049 4344.

A proof of purchase must be provided with the tool.

If upon inspection it is found that the fault occurring is due to defective materials or workmanship, repairs will be carried out free of charge. This guarantee period covering parts/labour is 12 months from the date of purchase except where tools are hired out when the guarantee period is 90 days from the date of purchase. This guarantee does not apply to normal wear and tear, nor does it cover any damage caused by misuse, careless or unsafe handling, alterations, accidents, or repairs attempted or made by any personnel other than the authorised Draper warranty repair agent.

Note: If the tool is found not to be within the terms of warranty, repairs and carriage charges will be quoted and made accordingly.

This guarantee applies in lieu of any other guarantee expressed or implied and variations of its terms are not authorised.

Your Draper guarantee is not effective unless you can produce upon request a dated receipt or invoice to verify your proof of purchase within the guarantee period.

Please note that this guarantee is an additional benefit and does not affect your statutory rights.

Draper Tools Limited.

## 4. INTRODUCTION

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The Meter shall be designated for one year and recalibrated at 18°C to 28°C and a relative humidity of less than 75%.

### 4.1 GENERAL SPECIFICATIONS

Auto-ranging/Manual ranging.

Full-scale overload protection

The maximum allowable voltage between the measuring end and the earth:  
1000V DC or 750V AC

Display: LCD

Maximum display value: 5999 digits

Polarity indication: Automatic indication, '-' indicates negative polarity.

Over range display: '0L' or '-0L'.


Sampling time: about 3 times / sec

Unit display: with function, power unit display.

Automatic shutdown time: approx. 15 minutes after no signal

Power supply: DC power supply 4.5V

Battery type: 1.5V AAA battery

Battery under voltage indication: display symbol  on LCD.

Temperature coefficient: less than 0.1 x accuracy / °C

Working temperature: 18°C ~ 28°C

Storage temperature: -10°C ~ 50°C

Size: 208 x 78 x 35mm

Jaw opening maximum size: approx. 36mm

Clamp can measure the maximum diameter: approx. 26mm

Weight: approx. 240g (including battery)

### 4.2 TECHNICAL SPECIFICATIONS

Measuring range & accuracy

(Accuracy guaranteed at 23°C ± 5°C, humidity <75%)

Note: When measuring Sine waves with the true RMS method the meter may display a reading between 1-50A. This is normal and does not affect the accuracy of the meter.

## 4. INTRODUCTION

---

### AC Current

Range	Accuracy	Resolution
60A	$\pm(2.5\% \text{ rdg} + 8 \text{ digits})$	0.01A
600A		0.1A

Max. input current: 600A AC.  
Frequency range: 50Hz.

### DC Current

Range	Accuracy	Resolution
60A	$\pm(2.0\% \text{ rdg} + 8 \text{ digits})$	0.01A
600A		0.1A

Max. input current: 600A AC.

### INRUSH Current

Range	Accuracy	Resolution
60A	$\pm(5.0\% \text{ rdg} + 60 \text{ digits})$	0.01A
600A		1A

Inrush measurement time: 100ms.  
Amperage range: 20 ~ 600A.  
Frequency range: 40 ~ 400Hz.

### DC Voltage

Range	Accuracy	Resolution
600mV	$\pm(0.8\% \text{ rdg} + 5 \text{ digits})$	0.1mV
6V		0.001V
60V		0.01V
600V	$\pm(1.0\% \text{ rdg} + 5 \text{ digits})$	0.1V

Input impedance: 10M $\Omega$ .  
Max. input voltage: 600V AC (RMS) or 600V DC.  
Frequency range: 40 ~ 1000Hz.

#### Note:

In the low voltage range, with the test leads is not connected to the circuit under test, the Meter may have a fluctuating reading, this is normal, this it is caused by high sensitivity of the Meter, it does not affect the actual measurement results.

## 4. INTRODUCTION

---

### AC Voltage

Range	Accuracy	Resolution
6V	$\pm(1.0\% \text{ rdg} + 5 \text{ digits})$	0.001V
60V		0.01V
600V	$\pm(1.2\% \text{ rdg} + 5 \text{ digits})$	0.1V

Input impedance: 10M $\Omega$ .

Max. input voltage: 600V AC (RMS) or 600V DC.

Frequency range: 40 ~ 1000Hz.

Note:

In the low voltage range, with the test leads is not connected to the circuit under test, the Meter may have a fluctuating reading, this is normal, this is caused by high sensitivity of the Meter, it does not affect the actual measurement results.

### Frequency

#### By V range

Range	Accuracy	Resolution
99.99Hz	$\pm(1.5\% \text{ rdg} + 5 \text{ digits})$	0.01Hz
999.9Hz		0.1Hz
9.999kHz		0.001kHz

Range: 10Hz ~ 10kHz

Input voltage range:  $\geq 2\text{V AC (RMS)}$  (Higher frequencies require a larger input voltage)

Input impedance: 10M $\Omega$

Maximum/ input voltage: :600V AC (RMS)

#### By HZ/DUTY range:

Range	Accuracy	Resolution
9.999Hz	$\pm(3.0\% \text{ rdg} + 5 \text{ digits})$	0.001Hz
99.99Hz		0.01Hz
999.9Hz		0.1Hz
9.999kHz		0.001kHz
99.99kHz		0.01kHz
999.9kHz		0.1kHz
9.999MHz		0.001MHz

Overload protection: 250V DC or AC (RMS)

#### BY A range (Clamp Jaws):

Frequency response: 10 ~ 1 kHz

Input current range:  $\geq 20\text{A AC (RMS)}$

Max. input current: AC 1000A

Input voltage range:  $\geq 2\text{V}$  (Higher frequencies require a larger input voltage)

## 4. INTRODUCTION

---

### Duty cycle

Range	Accuracy	Resolution
0.1 – 99.9%	$\pm(3.0\% \text{ rdg} + 3 \text{ digits})$	0.1%

### BY A range (Clamp Jaws):

Frequency response: 10 ~ 1 kHz

Input current range:  $\geq 20\text{A AC (RMS)}$

Max. input current: AC 1000A

### By V range:

Frequency response: 10 ~ 10 kHz

Input voltage range:  $\geq 2\text{V AC}$

Input impedance: 10M $\Omega$

Maximum/ input voltage: 750V AC (RMS)

### By HZ/DUTY range:

Frequency response: 10 ~ 10MHz

Input voltage range:  $\geq 2\text{V AC (RMS)}$  (Higher frequencies require a larger input voltage)

Maximum/ input voltage: 250V AC (RMS)


### Resistance

Range	Accuracy	Resolution
600 $\Omega$	$\pm(0.8\% \text{ rdg} + 3 \text{ digits})$	0.1 $\Omega$
6k $\Omega$		0.001k $\Omega$
60k $\Omega$		0.01k $\Omega$
600k $\Omega$		0.1k $\Omega$
6M $\Omega$	$\pm(1.2\% \text{ rdg} + 3 \text{ digits})$	0.001M $\Omega$
60M $\Omega$	$\pm(2.0\% \text{ rdg} + 5 \text{ digits})$	0.1M $\Omega$

Open circuit voltage: about 0.4V

Overload protection: :250V DC or AC (RMS)

### Continuity Test

Range	Resolution	Function
	0.1 $\Omega$	If the measured circuit resistance is less than 50 $\Omega$ , the built-in buzzer inside the Meter may sound. Less than 10 $\Omega$ will be pronounced

Overload protection: 250V DC or AC RMS.



## 4. INTRODUCTION


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### Capacitance

Range	Accuracy	Resolution
9.999nF	$\pm(3.0\% \text{ rdg} + 5 \text{ digits})$	0.001nF
99.99nF		0.01nF
999.9nF		0.1nF
9.999 $\mu$ F		0.001 $\mu$ F
99.99 $\mu$ F		0.01 $\mu$ F
999.9 $\mu$ F		0.1 $\mu$ F
9.999mF	$\pm(5.0\% \text{ rdg} + 5 \text{ digits})$	0.001mF
99.99mF	Not calibrated	0.01mF

Overload protection: 250V DC or AC (RMS)

### Diode Test

Range	Resolution	Function
	0.001V	Displaying approximate forward voltage of diode.

Forward DC current ~ 1mA

Reversed DC voltage ~ 3.0V

Overload protection: 250V DC or rms AC

### Temperature Measurement

Range	Accuracy	Resolution
-50°C–300°C	$\pm(1.0\% + 4d)$	1°C
301°C–1000°C	$\pm(1.9\% + 5d)$	1°C
-58°F–600°F	$\pm(1.2\% + 6d)$	1°F
601°F–1832°F	$\pm(1.9\% + 6d)$	1°F

## 5. HEALTH & SAFETY INFORMATION

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### **Warning**

To avoid electrical shock or personal injury.  
Please read the safety information and “warnings and precautions” before use.

This is an AC-DC current digital clamp meter (hereinafter referred to as the clamp meter). The whole circuit design is based on LSI A / D converter with full-scale overload protection circuit and frequency measurement function.


The Clamp Meter can be used to measure the AC and DC voltage, AC and DC current, resistance, capacitance, frequency, duty cycle, diodes and temp.

### **5.1 SAFETY PRECAUTIONS**

The instrument strictly follows the GB4793 electronic measuring instrument safety requirements IEC61010-1 and IEC1010-2-032 safety standards for the design and production, in line with double insulation, over-voltage CAT III 600V and pollution level 2 safety standards.

#### **Safe working habits**

To avoid possible electric shock or personal injury, and to avoid damage to the instrument or the object to be measured, use the meter in the following ways:

- Inspect the instrument. Do not use the instrument if the case is damaged. Check for cracks or missing plastic parts. Pay particular attention to the insulating layer of the connector.
- Inspect the test leads for insulation damage or bare metal. Check the continuity of the test leads. If the test leads are damaged, replace them before using the instrument.
- Use the instrument to measure a known voltage to make sure the instrument operates normally. Do not use if the instrument is working abnormally. Protection facilities may have been damaged. If in doubt, the instrument should be sent for maintenance.
- Do not apply any voltage beyond the rated voltage indicated on the meter between any terminal and earth ground.
- Warning: When working above 30V use caution not to touch exposed contacts due to risk of electric shock. Only use the approved probes or clamps.
- Measurements must be made with the correct jack, function and range.
- Do not use the instrument near explosive gases, vapours or dust.
- When using the test leads, keep your fingers behind the test lead protector.
- When connecting, first connect the common test lead, and then connect the live test lead. When disconnect, the live test lead and then disconnect the common test lead.
- Before you test the resistance, continuity and diodes, you must first cut off the power, and discharge all the capacitors.
- If the meter is not used in accordance with the instructions, the safety protection provided by the instrument may be impaired or invalidated.
- Ensure the instrument is switched off when opening the battery cover.
- When the battery under voltage indicator “” lights up, immediately replace the battery. When the battery power is low, the meter may produce incorrect readings, resulting in electric shock and personal injury. DO NOT mix new and old batteries and do not use re-chargeable batteries.
- Before opening the battery cover, the test leads must be removed from the instrument.
- Please use a soft cloth to clean instrument case, do not use abrasives or solvents.

## 6. IDENTIFICATION

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- |   |                              |
|---|------------------------------|
| ① Measurement clamp head.   | ⑥ “SEL” function Button.     |
| ② Inspection light.   | ⑦ Function buttons.          |
| ③ Protection Guard: Protects the user's hand from touching the danger zone. | ⑧ Display.                   |
| ④ Clamp trigger.  | ⑨ Probe sockets.             |
| ⑤ Measuring function selection dial.  | ⑩ Current direction marking. |

# 6. IDENTIFICATION

## 6.1 LCD (Liquid-crystal display) - FIG. 1

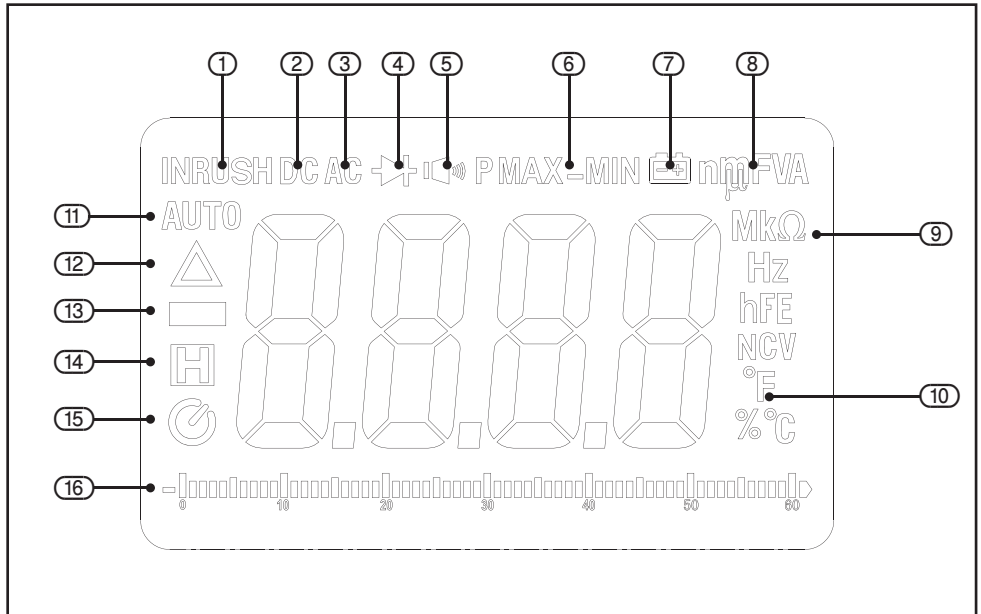


FIG.1

- |                                  |  |
|----------------------------------|--|
| ① Inrush Current Measurement.    | ⑩ Degrees Celsius, Degrees Fahrenheit. |
| ② Direct Current.                | ⑪ Auto range indicator.                |
| ③ Alternating Current.           | ⑫ Relative mode.                       |
| ④ Diode Check.                   | ⑬ Negative polarity indicator.         |
| ⑤ Continuity checking indicator. | ⑭ Data hold indicator.                 |
| ⑥ PEAK HOLD measuring status.    | ⑮ Automatic shutdown indicator.        |
| ⑦ Battery low indicator.         | ⑯ Linear Bar graph indicator.          |
| ⑧ Diode measurement indicator.   |  |
| ⑨ Measure capacity indicator.    |  |

# 7. UNPACKING & CHECKING

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## 7.1 PACKAGING

Carefully remove the product from the packaging and examine it for any sign of damage caused during shipping. Lay the contents out and check them. If any part is damaged or missing, do not attempt to use the tool and contact the Draper Helpline immediately (see back page for details).

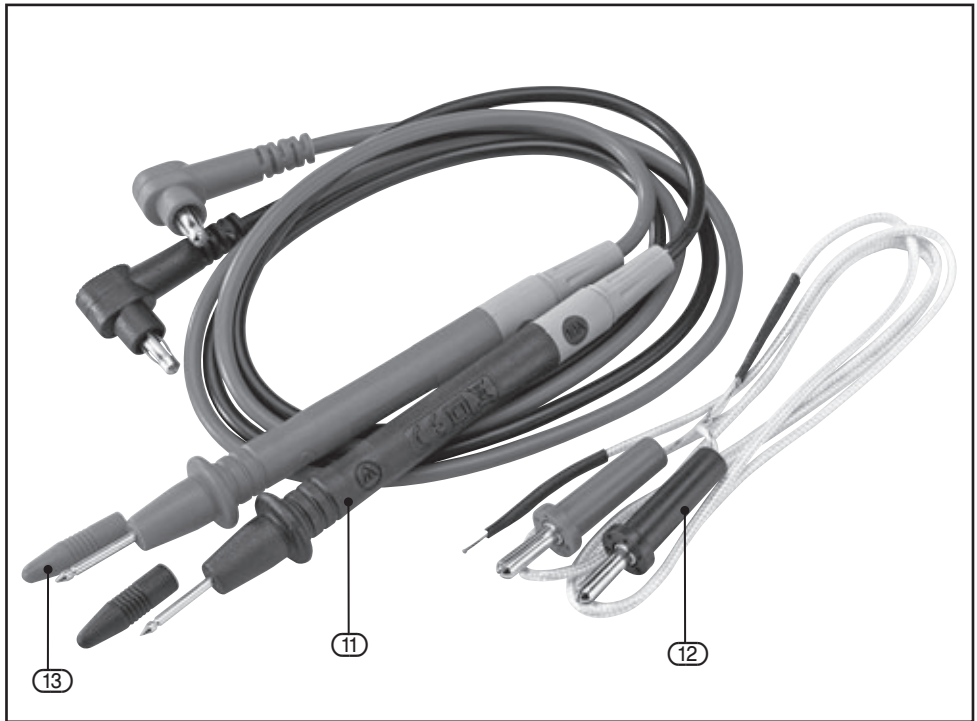
Retain the packaging material at least during the guarantee period: in case the machine needs to be returned for repair.

Warning! Some of the packaging materials used may be harmful to children, keep them out of reach from children.

Disposed of any packaging correctly and according to local regulations.

## 7.2 WHAT'S IN THE BOX?

As well as the product; there are several parts not fitted or attached to it.



⑪ Test probe.

⑬ Test probe caps.

⑫ Temperature probe.

# 8. OPERATING INSTRUCTIONS

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## 8.1 DATA HOLD

During the measurement, press the 'HOLD' function button, the data will be held on the display and a 'H' symbol will appear. Press the 'HOLD' function button to return to normal measurement mode.

## 8.2 SWITCHING FREQUENCY OR DUTY

1. During the voltage or current ranges, press the "Hz/Hz/ %" button to switch between, frequency of the voltage or current. Press the "Hz/Hz/ %" button twice, the Meter will change to duty range for measuring the duty cycle of the voltage or current.
2. Press "Hz/Hz/ %" button again, the Meter will change back to voltage or current measuring.

## 8.3 PEAK MEASUREMENT

1. Press the "PEAK HOLD" key to enter the manual range mode, display the Peak Max value; then press this key twice to display the Peak Min value; then press to display the difference between Peak Max-Peak Min. Press "PEAK HOLD" key for more than 2 seconds to exit this mode.
2. After entering the Peak Max mode, the maximum value of the measurement is automatically saved.
3. After entering the Peak Min mode, the minimum value of the measurement is automatically saved.
4. After entering the Peak Max-Peak Min mode, the measured difference is automatically saved
5. Press "PEAK HOLD" key for more than 2 seconds to exit this mode, the Meter will return to normal measurement state.

## 8.4 SWITCHING FUNCTIONS

1. In the resistance range, press the "SEL" key, to switch between resistance, diode, continuity, capacitance ranges.
2. In the voltage range, press the "SEL" key, to switch between the DC and AC.
3. In the temperature range, press the "SEL" key, to switch between degrees Celsius and Fahrenheit.

## 8.5 RELATIVE INRUSH MEASUREMENT

Press "REL/INRUSH" function button, the meter enters the relative value measurement mode, and the auto range mode is switched off. If the "REL/INRUSH" button is pressed again, the meter will return to auto range.

# 8. OPERATING INSTRUCTIONS

---

## 8.6 BACKLIGHT AND CLAMP HEAD LIGHTING

1. Press the “ ” function button for approx. 2 seconds to turn on and off the backlight.

Note: The light will turn off automatically after 60 seconds.

Note: The inspection light will only come on while in AC/DC current function.



## 8.7 AUTOMATIC SHUTDOWN FUNCTION

If the meter is not used for approx. 15 minutes the meter will automatically shut down. The meter will give a warning buzz approx. 1 minute before.

## 8.8 BUZZER

When any key is pressed or the function switch is activated, (if the function key is valid), the buzzer will sound; if the measured voltage or current is greater than the set value, such as the voltage is greater than 600V and the AC / DC current is greater than 600A, the buzzer will continue to sound as an over range warning.

## 8.9 PREPARATION FOR MEASUREMENT

1. Switch on the power by turning the measuring function selection dial.  
If the battery voltage is lower than  $\leq 3.9V$ , the “ ” symbol will appear and the batteries should be replaced.
2. If the “ ” symbol shows that the input voltage or current should not exceed the specified value in order to protect the internal circuit from damage.
3. Turn the measuring function selection dial to the required function and range to be measured.
4. Connect the black lead to the com probe socket and the red lead to the  $V\Omega$  probe socket.

## 8.10 AC AND DC CURRENT MEASUREMENT USING CURRENT CLAMP HEAD.

### Warning

**Risk of electric shock. YOU MUST NOT measure current using the probes.**

**Remove the test leads from the meter when measuring with the clamp head.**

1. Rotate the measurement function selection dial to the appropriate current.
2. Press the trigger to open the clamp, pass the wire to be measured into the centre of the clamp, and then slowly release the trigger until the clamp is fully closed.
3. Read the measurement result from the LCD.

Note: The instrument can only measure one current conductor at a time.

If two or more current conductors are measured at the same time, the measurement will be inaccurate.

## 8. OPERATING INSTRUCTIONS

---

### 8.11 AC VOLTAGE MEASUREMENT

**⚠ Warning**

**Risk of electric shock.**

**When measuring high voltage, extra care should be taken to avoid electrical shock.**

**Do not attempt to use this meter on a voltage higher than the AC600V rms value.**

1. Rotate the measurement function selection dial to the AC voltage measurement.
2. Connect the black lead to the COM probe socket and the red lead to the V $\Omega$  probe socket.
3. The measured value is read from the LCD.

### 8.12 DC VOLTAGE MEASUREMENT

**⚠ Warning**

**Risk of electric shock.**

**When measuring high voltage, extra care should be taken to avoid electrical shock.**

**Do not attempt to use this meter on a voltage higher than DC600V rms.**

1. Rotate the measurement function selection dial to the DC voltage measurement.
2. Connect the black lead to the COM probe socket and the red lead to the V $\Omega$  probe socket.
3. The measured value is read from the LCD. The polarity display will indicate the polarity of the terminals to which the red test is connected.

### 8.13 FREQUENCY MEASUREMENT CLAMP FREQUENCY MEASUREMENT

(THROUGH THE AC CURRENT RANGE)

**⚠ Warning**

**Risk of electric shock.**

**Remove the test leads from the meter when measuring with the clamp head.**

1. Rotate the measurement function selection dial to the current measurement level.
2. Press the trigger to open the clamp, pass the wire to be measured into the centre of the clamp, and then slowly release the trigger until the clamp is fully closed.
3. Press the "Hz %" button to select the frequency measurement function
4. The measurement result is read from the LCD.

Note: The instrument can measure only one current conductor at a time.

If two or more current conductors are clamped at the same time, the measurement result may be wrong. The frequency measurement range is 10Hz ~ 1kHz. If the measurement frequency is less than 10Hz, the LCD will display "00.0". It is possible to measure the frequency higher than 1kHz, but the measurement may not be accurate. The maximum input current is 600A AC (rms).



# 8. OPERATING INSTRUCTIONS

---

## 8.14 VOLTAGE MEASUREMENT

(THROUGH THE AC VOLTAGE RANGE)

### Warning

#### **Risk of electric shock**

**When measuring high voltage, extra care should be taken to avoid electrical shock.**

**Do not attempt to use this meter on a voltage higher than the AC600V rms value.**

1. Rotate the measurement function selection dial to the AC voltage measurement.
2. Connect the black lead to the COM probe socket and the red lead to the  $V\Omega$  probe socket.
3. Press the "Hz %" button to select the measurement function.
4. Connect the test leads to the signal.
5. The measurement result is read from the LCD.

Note: The frequency measurement range is 10Hz ~ 10 kHz. If the measurement frequency is lower than 10Hz, the LCD will display "00.0". It is possible to measure the frequency higher than 10kHz, but it cannot guarantee the accuracy of the measurement. The maximum input voltage is 600V AC (rms).

## 8.15 FREQUENCY MEASUREMENT BY HZ / DUTY

### Warning

#### **Risk of electric shock.**

**When measuring high voltage, extra care should be taken to avoid electrical shock.**

**Do not attempt to use this meter on a voltage higher than the AC250V rms value.**

1. Rotate the measurement function selection dial to the "Hz%" position.
2. Connect the black lead to the COM probe socket and the red lead to the  $V\Omega$  probe socket.
3. Press the "Hz %" button to select the measurement function.
4. Connect the test leads to the signal .
5. The measurement result is read from the LCD.

Note: The frequency measurement range is 10Hz ~ 10MHz. If the measurement frequency is lower than 10Hz, the LCD will display "00.0". It is possible to measure the frequency higher than 10MHz, but it cannot guarantee the accuracy of the measurement. The maximum input voltage is 250V AC (rms).

# 8. OPERATING INSTRUCTIONS

---

## 8.16 DUTY CYCLE MEASUREMENT

MEASURED BY AC CURRENT PROFILE DUTY CYCLE (FROM THE CLAMP HEAD)

### **⚠ Warning**

**Risk of electric shock.**

**Remove the test leads from the meter when measuring with the clamp head.**

1. Rotate the measurement function selection dial to the current measurement.
2. Press the trigger to open the clamp, pass the wire to be measured into the centre of the clamp, and then slowly release the trigger until the clamp is fully closed.
3. The measurement result is read from the LCD.

Note: The instrument can measure only one current conductor at a time. If two or more current conductors are clamped at the same time, the measurement result may be wrong. The duty cycle measurement range is 10 ~ 95%. If the measured duty cycle is less than 10%, the LCD will display "UL". If the duty ratio is higher than 94.9%, "OL" will be displayed. The input signal frequency measurement range is 10 ~ 1kHz, if the measurement is higher than 1kHz frequency the measurement accuracy cannot be guaranteed. The maximum input current is 600A AC (rms).

## 8.17 VOLTAGE MEASURED DUTY CYCLE

(THROUGH THE AC VOLTAGE RANGE)

### **⚠ Warning**

**Risk of electric shock.**

**When measuring high voltage, extra care should be taken to avoid electrical shock.**

**Do not attempt to use this meter on a voltage higher than the AC600V rms value**

1. Rotate the measurement function selection dial to the AC voltage measurement.
2. Connect the black lead to the COM probe socket and the red lead to the  $V\Omega$  probe socket.
3. Press the "Hz /%" button to select the duty cycle measurement function.
4. Connect the test leads to the signal source.
5. The measurement result is read from the LCD.

Note: The duty cycle measurement range is 10 ~ 95%. If the measured duty cycle is less than 10%, the LCD will display "UL". If the duty ratio is higher than 94.9%, "OL" will be displayed.

## 8. OPERATING INSTRUCTIONS

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### 8.18 MEASURE THE DUTY CYCLE IN HZ / DUTY

#### **⚠ Warning**

**Risk of electric shock.**

**When measuring high voltage, extra care should be taken to avoid electrical shock.**

**Do not attempt to use this meter on a voltage higher than the AC250V rms value**

1. Rotate the measurement function selection dial to the "Hz %".
2. Connect the black lead to the COM probe socket and the red lead to the  $V\Omega$  probe socket.
3. Press the "Hz /%" button to select the duty cycle measurement function.
4. Connect the test leads to the signal source.
5. The measurement result is read from the LCD.

Note: The duty cycle measurement range is 10 to 95%. If the measured duty cycle is less than 10%, the LCD will display "UL". If the duty ratio is higher than 99%, "OL" will be displayed. The input signal frequency measurement range is 10 ~ 10MHz, if the measurement frequency is higher than 10MHz the measurement accuracy is not guaranteed. The maximum input voltage is 250V AC (rms).

### 8.19 RESISTANCE MEASUREMENT

#### **⚠ Warning**

**Risk of electric shock.**

**When measuring the impedance on the line, make sure that the circuit power is off and the capacitors on the circuit are fully discharged.**

1. Rotate the measurement function selection dial to the resistance position and ensure that the power to the circuit under test is off.
2. Press the "SEL" button to select the resistance measurement function.
3. Connect the black lead to the COM probe socket and the red lead to the  $V\Omega$  probe socket.
4. The measured resistance value is read from the LCD

Note: When there is no input (e.g. open circuit), the display will show "OL" indicating that the measured value is out of range. If the measured resistance is greater than  $1M\Omega$ , it may take a few seconds for the meter to stabilize the reading. This is normal for high impedance measurements.

# 8. OPERATING INSTRUCTIONS

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## 8.20 DIODE TEST

### ⚠ Warning

**Risk of electric shock.**

**When measuring diodes on a line, make sure that the circuit power is off and the capacitors on the circuit are fully discharged.**

1. Rotate the measuring function selection dial to the Diode position and ensure that the power to the circuit under test is cut off
2. Press the "SEL" button to select the diode measurement function
3. Connect the black lead to the COM probe socket and the red lead to the V $\Omega$  probe socket.
4. The meter will display the value of the diode under test. If the test polarity is reversed, the meter will display "OL" this can be used to distinguish between the anode and cathode diodes.

Note: The instrument shows the forward voltage drop of the measured diode.

## 8.21 CONTINUITY TEST

### ⚠ Warning

**Risk of electric shock.**

**Make sure the circuit power is off, and the circuit capacitors completely discharged.**


1. Rotate the measuring function selector dial to the continuity position and ensure that the power to the circuit under test is off.
2. Press the "SEL" button to select the continuity measurement function
3. Connect the lead to the COM input jack and red lead to the V $\Omega$  probe socket.
4. If the measured resistance of the line is less than 40 $\Omega$ , the buzzer will sound.

## 8.22 MEASURING TEMPERATURE

### ⚠ WARNING

**Risk of electric shock.**

**Do not input a voltage of over DC 30V and AC 60V voltage in the temperature measurement range to avoid harm or damage to the instrument.**

1. Rotate the function range switch to the temperature measurement range (select Celsius or Fahrenheit as needed).
2. Connect the negative and positive terminals of the K-type thermocouple to the COM input jack and  jack.

## 8.23 MEASURING INRUSH CURRENT

### ⚠ WARNING

**Risk of electric shock.**

**Before removing the current clamp, remove the watch from the instrument.**

1. Rotate the measurement function selection dial to the appropriate current.
2. Press the trigger to open the clamp, pass the wire to be measured into the centre of the clamp, and then slowly release the trigger until the clamp is fully closed.
3. Press the "REL / INRUSH" key for more than 2 seconds to enter the inrush current measurement mode. The LCD displays "- - -" until the motor is detected.
4. Read the measurement result from the LCD.

# 9. MAINTENANCE

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## 9.1 REPLACEMENT BATTERY

### Warning

**To avoid false readings that may result in electric shock or personal injury, replace the battery as soon as the “” symbol appears on the meter display.**

**To avoid electrical shock or personal injury, shut down and check to make sure that the test lead has been disconnected from the measuring circuit before opening the battery cover and replacing it with a new one.**
















Follow these steps to replace the battery:

1. Turn off the instrument.
2. Remove all test leads from the input jacks.
3. Loosen the screws that secure the battery cover with a screwdriver.
4. Remove the battery cover.
5. Disconnect and remove the old battery
6. Replace with three new AAA batteries, pay attention to the battery positive and negative. Do not mix new with old batteries and do not use re-chargeable batteries.
7. Attach the battery cover and tighten the screws.

# 10. EXPLANATION OF SYMBOLS

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## 10.1 EXPLANATION OF SYMBOLS

	WEEE Do not dispose of Waste Electrical & Electronic Equipment in with domestic rubbish.		Voltage AC.
	For indoor use. Do not expose to rain.		Voltage DC.
	Class II construction (Double insulated).		Current AC.
	Conforms to all relevant safety standards.		Current DC.
	Earth.		Resistance in Ohms.
	Attention.		Continuity test buzzer.
	Temperature.		Data hold / Screen lock.
	Back light.		Auto power off.
	Warning! Read instruction manuals before operating and servicing this equipment.		Inspection light Work light.
	Diode test.		Clamp size.
	Low battery display.		Capacitance.
	Bar graph.		Frequency.

## 11.1 DISPOSAL

- At the end of the machine's working life, or when it can no longer be repaired, ensure that it is disposed of according to national regulations.
- Contact your local authority for details of collection schemes in your area.

In all circumstances:

- Do not dispose of power tools with domestic waste.
- Do not incinerate.
- Do not abandon in the environment.
- Do not dispose of WEEE\* as unsorted municipal waste.



\* Waste Electrical & Electronic Equipment.

## CONTACT US

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