



## INSTRUCTION MANUAL

**MT478**

**1000V Voltage Tester**





## Index

<b>Contents</b>	<b>Page</b>
1. Safety.....	4
1.1. International Safety Symbols.....	4
1.2. Safety Notes.....	4
1.3. Warnings.....	5
1.4. Safety.....	6
1.5. Safety Advice.....	6
2. Appropriate Usage.....	7
3. Specifications.....	7
4. Voltage Tester Description.....	9
5. Operation.....	10
5.1. Preparing the Test.....	10
5.2. Voltage Test.....	10
5.3. Single-pole Phase Test.....	11
5.4. Continuity Test.....	11
5.5. Voltage Test with Switched Load, RCD trip test.....	11
5.6. Resistance Test.....	12
5.7. Rotary Field Indication.....	12
5.8. Measurement Point illumination.....	13
5.9. Maintenance.....	13
5.10. Cleaning.....	13
5.11. Battery Replacement.....	14

## 1. Safety

### 1.1. International Safety Symbols



Warning of a potential danger, comply with instruction manual.



Caution! Dangerous voltage. Danger of electrical shock.



Double insulation.



Important information. Consult the instruction sheet



Hazardous Voltage.



Suitable for live working.



This product complies with the WEEE Directive (2012/19/EU).



Conforms to European Union Directives.



TUV Association for Electrical, Electronic & Information Technologies; following rules of "Geprüfte Sicherheit"














**CAT III** Measurement Category III is applicable to test and measuring circuits connected to the distribution part of the building's low-voltage MAINS installation.

**CAT IV** Measurement Category IV is applicable to test and measuring circuits connected at the source of the building's low-voltage MAINS installation.

### 1.2 Safety Notes

- Please use utmost attention.
- Do not exceed the maximum allowable input range of any function.
- Insulated personnel body protective equipment up to 1000V.
- Unauthorized persons are not allowed to disassemble the voltage detector.

### 1.3. Warnings

-  In order to avoid electrical shock, the valid safety and VDE regulations regarding excessive contact voltages must receive utmost attention, when working with voltages exceeding 120V (60V) DC or 50V (25V) RMS AC. The values in brackets are valid for limited ranges (as for example medicine and agriculture).
-  Prior to measurement ensure that the test leads and the meter are in perfect condition.
-  When using this instrument only the handles of the probes may be touched - do not touch the probe lips.
-  This instrument may only be used within the ranges specified and within low voltage systems up to 1000V.
-  Prior to usage ensure perfect instrument function (e.g. on known voltage source).
-  The voltage detector is not to be used if the battery box is open.
-  The voltage detector has to be kept dry and clean.
-  The voltage tester may no longer be used if one or several functions fail or if no functionality is indicated.
-  Do not use this instrument under damp conditions.
-  A perfect display is only guaranteed within a temperature range of -10°C up to 55°C, at relative humidity question <85%.
-  If the operator's safety cannot be guaranteed, the instrument must be removed from service and protected against use.

### 1.4. The safely can no longer be insured if the instrument:

- Shows obvious damage.
- Does not carry out the desired measurements.
- Has been stored for too long under unfavorable conditions.
- Has been subjected to mechanical stress during transport.

All relevant statutory regulations must be adhered to when using this instrument.

## 1.5. Safety Advices

- Depending on the internal impedance of the voltage detector there will be a different capability of indicating the presence or absence of operating voltage in case of the presence of interference voltage.
- A voltage detector of relatively low internal impedance, compared to the reference value of 100k $\Omega$ , will not indicate all interference voltages having an original voltage value above the ELV level. When in contact with the parts to be tested, the voltage detector may discharge temporarily the interference voltage to a level below the ELV, but it will be back to the original value when the voltage detector is removed.
- When the indication "voltage present" does not appear, it is highly recommended installing earthing equipment before working.
- A voltage detector of relatively high internal impedance, compared to the reference value of 100k $\Omega$ , may not permit to clearly indicate the absence of operating voltage in case of presence of interference voltage.
- When the indication "voltage present" appears on a part that is expected to be disconnected of the installation, it is highly recommended confirming by another means (e.g. use of an adequate voltage detector, visual check of the disconnecting point of the electric circuit, etc.) that there is no operating voltage on the part to be tested and to conclude that the voltage indicated by the voltage detector is an interference voltage.
- A voltage detector declaring two values of internal impedance has passed a performance test of managing interference voltages and is (within technical limits) able to distinguish operating voltage from interference voltage and has a means to directly or indirectly indicate which type of voltage is present.

## 2. Appropriate Usage

- The instrument may only be used under those conditions and for those purposes for which it was designed. For this reason, in particular the safety references, the technical data including environmental conditions and the usage in dry environments must be followed.
- When modifying or changing the instrument, the operational safety is no longer ensured.
- The instrument may only be opened by an authorized service technician.
- The voltage detectors are designed to be used by skilled persons and in accordance with safe methods of work.

## 3. Specifications

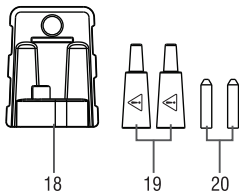
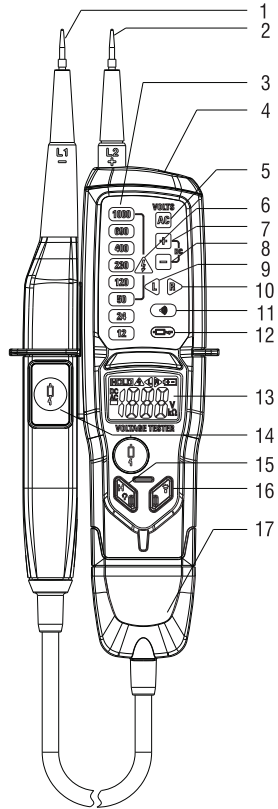
<b>LEDS</b>	
LED voltage range	12V to 1000V AC/DC
LED resolution	±12, 24, 50,120, 230, 400, 690,1000V AC/DC
Tolerances	Complies with EN 61243-3:2014
Frequency range	40Hz to 400Hz
Response times	≤1 second
Auto power on	Auto power on ≥12V AC/DC
<b>LCD</b>	
LCD Display	1999 count with bargraph & backlight
Voltage Range	6V to 1000V AC/DC
Resolution	1V AC/DC
Tolerances	±3.0% of reading ± 5 digits
Frequency Range	40Hz to 400Hz
Response Times	1 second
Auto Power ON	6V AC/DC
Voltage Detection	Automatic
Polarity Detection	Full range
Range Detection	Automatic
Internal Basic Load	Max 3.5mA at 1000V
Impedance Peak Current	350kΩ/ is <3.5mA (No RCD Tripping)
Operation Time	Duration Time = 30 seconds
Recovery Time	240 seconds

Switchable Load	-7K $\Omega$
Peak current	is (load)=150mA
RCD tripping	~30mA@230V
Continuity Test	0 to 400 k $\Omega$
Accuracy	nominal resistance +50%
Test currents	5 $\mu$ A
Resistance	0 $\Omega$ to1999 $\Omega$
Resolution	1 $\Omega$
Tolerance	$\pm$ (5 % rdg + 10 digits) @ 20°C
Temperature coefficient	$\pm$ 5 digits / 10K
Test current	$\leq$ 30 $\mu$ A
Single-pole Phase Test	100V to 1000V AC
Frequency range	50Hz to 60Hz
Rotary Field Indication	
Voltage range (LEDs)	100...1000V
Frequency range	50/60Hz
Measurement principle	Double-pole and contact electrode
Safety standards	EN61243-3:2014
Agency approvals	TÜV-GS
Overvoltage protection	1000V AC/DC
Measurement category	CAT III 1000V/CAT IV 600V
Protection degree	IP64
Power supply	2 x AAA Batteries
Power consumption	max.30mA / approx. 250mW
Temperature range	-10°C up to 55°C
Humidity	max.85% relative humidity



#### 4. Voltage Tester Description

1. Handle Test Probe - (L1)
2. Instrument Test Probe + (L2)
3. LEDs for Voltage Display
4. Measurement Point Illumination
5. LED for AC Voltage
6. LED for Warning Voltage
7. LED for Positive Voltage
8. LED for Negative Voltage
9. LED for Left Rotary Field
10. LED for Right Rotary Field
11. LED for Continuity
12. LED for Low Impedance Test
13. 2000 count LCD display
14. Low Impedance Switches
15. Button for hold and switch LCD display background
16. Button for Measurement Point Lighting and test resistance
17. Battery Case
18. Probe Tip Protective Cap (with storage compartments for probe tip cover and probe tip extension)
19. Probe Tip Cover
20. Probe Tip Extension (Diameter 4mm, screw on)



## 5. Operation

### 5.1. Preparing the test

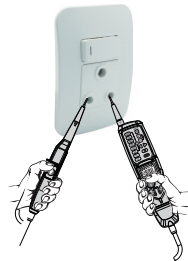
- Prior to every test, please ensure that the instrument is in perfect condition:
- For example, keep an eye out for a broken housing or leaking batteries.
- Always carry out a function test before using the voltage tester, see below.
- Check that the instrument is functioning properly (for example at a known voltage source) before and after every test.
- If the safety of the user can not be guaranteed, switch off the instrument and secure it to prevent unintentional usage.

### Carrying out a function test

- Connect the voltage tester probe tips for 4 to 10 seconds and then disconnect.
- All LEDs should light up and the indicator probe side vibrates. All segments are illuminated on the LCD display.

### 5.2. Preparing the test

- Connect both test probes with power source.
- From a voltage of  $>6V$  the tester switches on automatically.
- The voltage is displayed via LEDs.
- The different indicating signals of the voltage detector (including the ELV lim indication) are not to be used for measuring purposes.
- The voltage is also shown on the LCD display.
- For AC voltage, the "AC" is illuminated.
- For positive voltage, the "+" is illuminated.
- For negative voltage, the "-" is illuminated.
- In the case of DC voltage, the polarity of the indicated voltage relates to the voltage tester probe tip
- Once the safety extra-low voltage (50V AC /120V DC) is reached or exceeded, the "⚠" is illuminated, in the event of no battery power or main circuit failure, an acoustic signal is emitted.
- Once voltage is applied to the instrument, press the HOLD button, the LCD and LEDs display shows the recorded reading.
- To delete the recorded value, press the HOLD button once again. The LCD and LED displays once again indicates the voltage currently being applied to the probe tips.



### 5.3 Single-pole phase Test

- The single-pole phase test is only possible when batteries are installed and in good condition.
- The single-pole phase test starts at an AC voltage of approx. 100V (pole>100V AC).
- When using single-pole phase tests to determine external conductors the display function may be impaired under certain conditions (e.g. for insulating body protective equipment on insulation locations).
- The single-pole phase testing is not appropriate to determine whether a line is live or not. For this purpose, the double-pole voltage test is always required.
- Connect both test probes with power source.
- A signal sound indicates the phase.
- The " ⚠ " LED is illuminated in the display

### 5.4 Continuity Test

- The continuity test is only possible when batteries are installed and in good condition. A signal sound is audible for continuity and the LED for continuity LED (•) (6) is illuminated.

### 5.5 Voltage Test with Switched Load, RCD Trip Test

- During voltage tests, you can decrease the interference voltages from inductive or capacitive coupling by loading the Unit Under Test with a lower impedance than the Tester has in normal mode. In systems with RCD circuit breakers, you can trip an RCD switch with the same low impedance as when you measure voltage between L and PE.
- To do an RCD trip test during voltage measurement, push the two low impedance buttons (14) at the same time. If you have 10mA or 30mA RCDs between L and PE in a 230V system, it will trip.
- During load current, the indicator probe side vibrates and the low impedance LED is the indication for the flowing load current. This indication is not to be used for voltage test or measurement.
- If the two pushbuttons are not used, the RCDs will not trip, even in measurements between L and PE.

## 5.6 Resistance Test

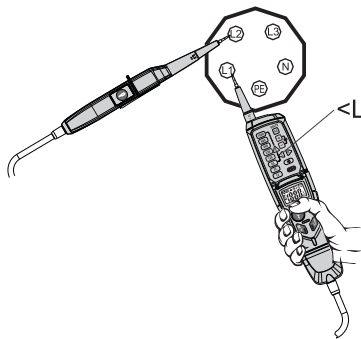
- The Tester measures low ohm resistance between  $1\Omega$  and  $1999\Omega$  at a resolution of 10.

### To do a resistance test:

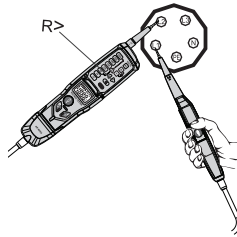
- Do a Voltage test to make sure the unit under test is not live.
- Push and hold the measurement point illumination button (15) for 2 seconds .
- Connect the two test probes with the unit under test and read value on the display.
- Push and hold the measurement point illumination button (15) for 2 seconds to turn the function off and save battery power the function automatically.

## 5.7 Rotary Field Indication

- The voltage testers are equipped with a double-pole rotary field indicator.
- The rotary phase indication is always active. The symbols "R" or "L" are always displayed. However, the rotary direction can only be determined within a three-phase system. Here, the instrument indicates the voltage between two external conductors.
- Connect the instrument test probe with the supposed phase L2 and the handle test probe with the supposed phase L1. The voltage and the rotary field direction are displayed. "R" signifies that the supposed phase L1 is the actual phase L1 and the supposed phase L2 is the actual phase L2.



"L" signifies that the supposed phase L1 is the actual phase L2 and the supposed phase L2 is the actual phase L1.



When re-testing with exchanged test probes the opposite symbol has to be illuminated.

### 5.8 Measurement Point Illumination

Voltage testers are equipped with a measurement point illumination feature. Thus, working under bad lighting conditions (e.g. division switch cabinets) is made easier. Press button for measurement point illumination (15) on instrument rear.

### 5.9 Maintenance

When using voltage testers in compliance with the instruction manual, no particular maintenance is required. If functional errors occur during normal operating, our service department will check your instrument without delay.

### 5.10 Cleaning

Prior to cleaning, remove voltage test from all measurement circuits. If the instruments are dirty after daily usage, it is advisable clean them by using a damp cloth and a mild household detergent. Never use acid detergents or dissolvents for cleaning. After cleaning, do not use the voltage tester for a period of approx. 5 hours.

### **5.11 Battery Replacement**

- If no signal sound is audible when short-circuiting the test probes or display battery symbols on the screen, proceed with the battery replacement.
- Completely disconnect voltage tester from the measurement circuit.
- Remove discharged screw, battery cover and batteries.
- Replace with new batteries, two type "AAA" by respecting correct polarity.
- Close the battery cover and re-screw the screw.





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***MAJOR TECH (PTY) LTD***

**South Africa**

🌐 [www.major-tech.com](http://www.major-tech.com)

✉ [sales@major-tech.com](mailto:sales@major-tech.com)

**Australia**

🌐 [www.major-tech.com.au](http://www.major-tech.com.au)

✉ [info@major-tech.com.au](mailto:info@major-tech.com.au)

