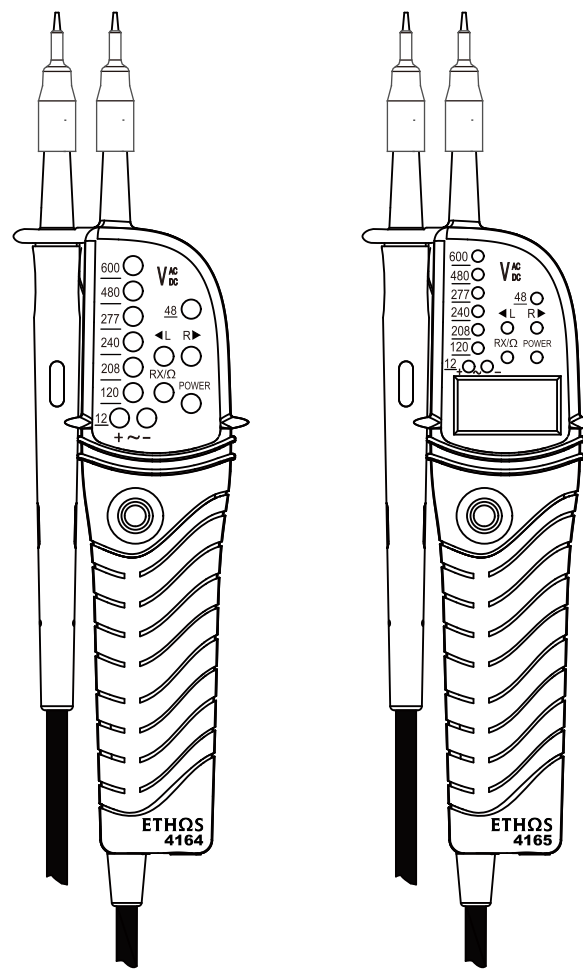


VOLTAGE TESTER



ETHOS

INSTRUCTION MANUAL

4164/4165

1. Features

- Self-Diagnostic test
- AC and DC voltage tests up to 690V for Europe and 600V for America with LED and LCD (only ETHOS 4165)
- Polarity indication
- High voltage indication
- Phase rotation test
- Continuity test
- Auto-power ON/OFF
- Pen light for illuminating measurement points
- Probe clip for adjustable spacing between probes.
- IP64
- Compact design (Light weight and portable)
- Use thick wire H07RNF for Europe
- Use thin wire GET6206 for America

2. Safety Warnings

This instruction manual contains warnings and safety rules which have to be noticed by the user to ensure safe operation of the instrument and to maintain it in safe condition. Therefore, read through these operating instructions before using the instrument.

WARNING is reserved for conditions and actions that are likely to cause serious or fatal injury.

CAUTION is reserved for conditions and actions that can cause injury or instrument damage.

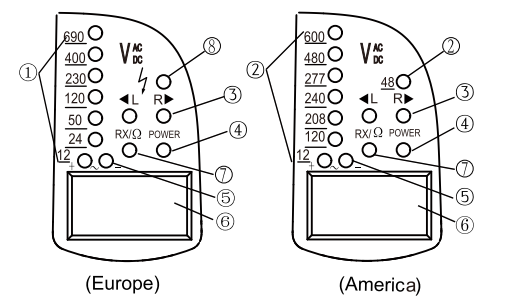
It is essential that the above instructions are adhered to. Failure to follow the above instructions may cause injury, instrument damage and/or damage to equipment under testing.

WARNING

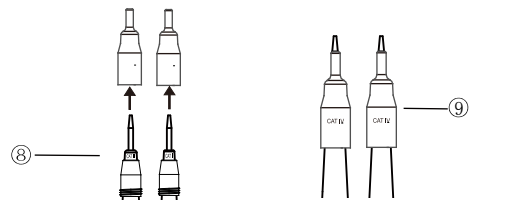
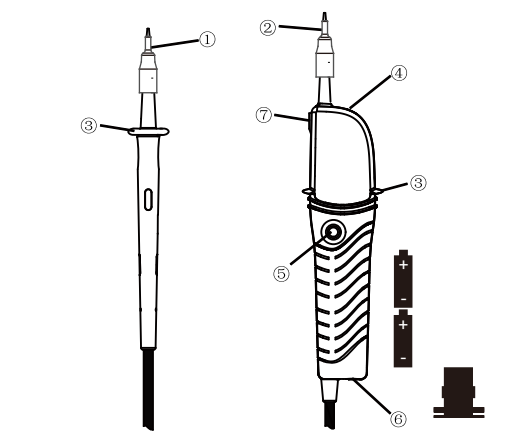
- After measuring AC/DC voltage source for 3 minutes, the tester must take a rest for 1 minute.
- Never make measurement on a circuit in which the electrical potential exceeds 690V, (while the measured voltage exceed 690V, all the voltage display LED light up)
- Do not attempt to make measurement in the presence of flammable gasses, as the use of the instrument may cause sparking, which could lead to an explosion.
- Never attempt to use the instrument if its surface or your hands are wet. (Do not use in rainfall.)
- Keep your hands and fingers behind the barriers during measurements.
- Never unlock and open the Battery case during measurements.
- Verify proper operation on a known source before taking action as a result of the indication.
- Never attempt to make any measurement in any abnormal conditions, such as a broken case or exposed metal parts are present on the instrument or test probes.
- Do not make any modification to the instrument.
- Extreme caution when *Live circuit* LED flashes or lights on.
- Correct indication of LEDs is only guaranteed within a temperature range of -10°C up to 55°C (-85% RH).



3. Instrument Layout



1. 12/24/50/120/230/400/690V LEDs for European voltage indication
2. 12/48/120/208/240/277/480/600V LEDs for American Voltage indication
3. L/R LEDs for phase rotation test
4. Power LED
5. Polarity indication LEDs for voltage
6. LCD (only ETHOS 4165)
7. Continuity test / Live circuit LED
8. High voltage indication $\geq 50V$, \downarrow LED will light up

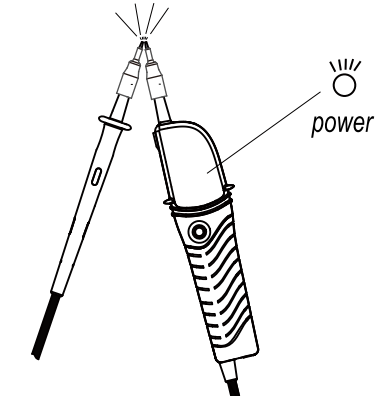


1. L1 probe -
2. L2 probe + (Instrument probe)
3. Barrier
4. Pen light
5. Pen light switch
6. Battery case
7. Probe clip
8. Protection 600V CAT II
9. Protection 600V CAT IV

4. Preparation for Measurement

4.1 Auto-power-on / Self-diagnostic test

- Auto-power-on
- ▶ Short-circuiting the probes as follows powers on the instrument automatically and goes into a Self-diagnostic test.



Instrument may power on due to the influence of static charge.

Self-diagnostic test

WARNING
Do not use the instrument when abnormality is found at Self-diagnostic test.

- ▶ Battery voltage is normal when *Power LED* is lighting up. When the battery voltage is below 2.4±0.1V, *Power LED* flashes or goes off. Replace batteries according to Clause 7.

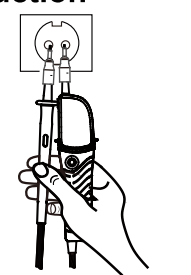
4.2 Trouble-shooting

If the following problems occur, unlock the Battery Case according to clause 7 in this manual, and then lock it again 5 seconds later. Then perform the self-diagnostic test (clause 4.1)

- Self-diagnostic test cannot be performed before/ after use of the instrument.
- Auto-power off doesn't operate.

5. Handy Construction

With the L1 probe on the probe clip, user can change the spacing between probes with one hand.



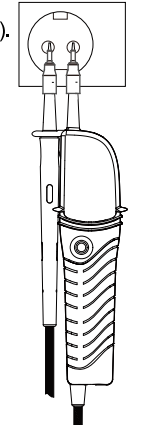
6. Measurement

WARNING

- Carefully check Clause 2 as well.
- Self-diagnostic test should be done prior to measurements and confirm LED and buzzer works properly.
- Before using a voltage detector with audible indicator at locations with a high background noise level, it has to be determined whether the audible signal is perceptible.
- Verify proper operation on a known source before and after use.
- Keep your hand and fingers behind the barriers on the probes during measurements.

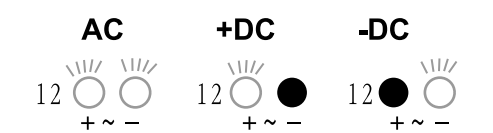
6.1 Voltage test (Double-pole test)

- ▶ Connect both probes to the object under test.
- ▶ The voltage is indicated by LEDs and LCD (only ETHOS 4165).



Live circuit LED lights up:
 $\geq 7V$

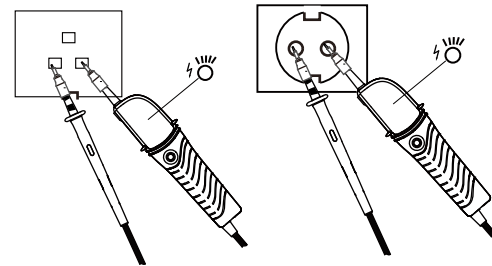
- ▶ Voltage polarity is indicated in following manner.



NOTE
• When the L2 probe + is the positive (negative) potential, the *Polarity indication LED* indicates "+DC" ("-DC").

6.2 High voltage indication

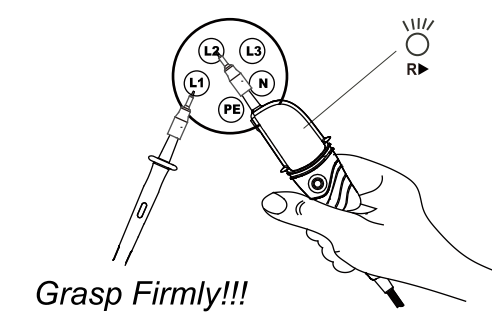
- ▶ Grasp the instrument firmly and connect both probes to the object under test.
- ▶ Live circuit LED \downarrow lights up when a voltage of approx. 50V AC or more exists in the object under test. (50V AC/DC)



6.3 Phase rotation test

L LED and R LED for Phase rotation test may operate on various wiring systems, but effective testing result can be obtained only on Three-phase 4-wire system.

- ▶ Grasp the instrument firmly and connect both probes to the object under test. (Grasp method show as below fig)
- ▶ Phase-to-phase voltage is indicated by each Voltage LED.
- ▶ R LED indicates that the field is rotating towards the right direction of the "probe -". With this connection, the motor will go positive rotation.



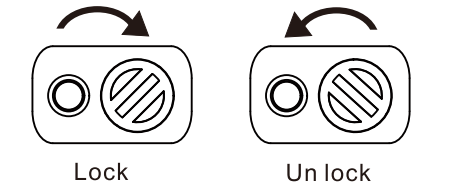
7. Battery Replacement

WARNING

- Remove the probes from any testing point when opening the Battery case.
- Please use new battery.
- Mark sure there are no damage on battery skin before insert it into the tester.

Batteries are dead when Power LED flashes or goes off at Self-diagnostic test defined in point 4.1. Follow the procedure below and replace batteries with new ones (Type AAA 1.5V x 2pcs).

- ▶ Unlock the Battery case with a coin-shaped object.



- ▶ Pull out the Battery case and replace the batteries. Insert new batteries according to the engraving on the Battery case.
- ▶ Insert the Battery case into the instrument and firmly lock the case again.

WARNING

Confirm that the Battery case is properly locked prior to measurements.

The principle of measurement

The instrument detects the phase rising order regarding the user as EARTH.

NOTE

Function of this test may not be fully achieved if the insulation condition of user or of the equipment under test is not enough.

6.4 Continuity test

WARNING
Make sure the object under test isn't live.

Instrument operates as follows when measuring continuity.

- ▶ LED RX/Ω should be lighted, and buzzer should sound continuously.

NOTE

In continuity mode the instrument works in the same way as the self-diagnostic test.

6.5 Pen light function

(Illuminating the Measurement Point)
Equipped Pen light illuminates the measurement point in dimly lit area.

- ▶ Pressing the Pen light switch turns on the light.

NOTE

- The light is available while the instrument is powered off.
- Using the Pen light shortens the battery life.

8. Specification

Voltage Test	
Voltage Range	12~690V AC/DC
LED (ETHOS4164 / 4165)	
Nominal Voltage	Europe: 12/24/50/120/230/400/690V America: 12/48/120/208/240/277/480/600V AC (0~70Hz), DC (±)
Tolerance (Threshold Voltage)	Light on at more than : 7±5V (12V LED) : 18±5V (24V LED) : 37.5±5V (50V LED) : 75%±5% of nominal voltage (120/230/400/690V LED)
Response Time	<0.5s at 100% of each nominal voltage
LCD (only ETHOS4165)	
Range/Resolution (Auto-range)	7~690V/1V
Accuracy (23±5°C)	±(3%+3) or 5V
Overrange indication	All voltage LED light up
Response Time	<1s at 90% of each voltage
Peak Current Is	<3.5mA (at 690V)
Internal Battery Consumption	Approx. 33mA (battery 3V, measuring 690V AC)
High voltage indication	
Voltage Range	50~690V AC
Phase rotation test	
System	Three-phase 4-wire system AC 50/60Hz
Phase Range	120±5 degree
Continuity test	
Detection Range	0~550KΩ
Test Current	Approx. 1.5μA (battery 3V, 0Ω)
Internal Battery Consumption	Approx. 30mA (battery 3V, 0Ω)
Reference condition	
Battery	3V (AAA 1.5V x 2pcs)
Temperature	-10~55°C operation -20~60°C storage No condensation
Humidity	max 85% RH
Used location	Altitude up to 2000m
Safety	
Standard category	GS: EN 61243-3/ IEC 61243-3 EN 61010-1/ IEC 61010-1 CAT III 690V/ CAT IV 600V ETL: UL 61010-1 CAT II 600V/ CAT IV 600V
Pollution degree	2
IP code	IP64

9. Cleaning and Storage

CAUTION

- Use a lightly damp cloth with neutral detergent for cleaning the instrument. Do not use abrasives or solvents.
- Do not expose the instrument to the direct sun, high temperature and humidity or dewfall.
- Put the Probe protection cover on the Tips while not in use. Otherwise it may cause an injury.
- Remove batteries when the instrument will not be in use for a long period.
- Do not install the Battery Case without batteries.
- Please operate this unit strictly according to the manual instruction.

10. Safety Symbol

- Always check proper operation of the device on a known working circuit before using.
- Suitable for live working
- Caution, risk of electric shock. Under normal use, hazardous voltages may be present.
- Alternating current.
- Both direct and alternating current.

11. Measurement Category

Category IV is for measurements performed at the source of the low-voltage installation.

Category III is for measurements performed in the building installation.

Category II is for measurements performed on circuits directly connected to the low voltage installation.

12. For Environment

- Do not dispose electrical appliances as unsorted municipal waste, use separate collection facilities.
- Contact your local government for information regarding the collection systems available.
- If electrical appliances are disposed of in landfills or dumps, hazardous substances can leak into the groundwater and get into the food chain, damaging your health and well-being.
- When replacing old appliances with new ones, the retailer is legally obligated to take back your old appliance for disposal at least for free of charge.

13. Ingress Protection (IP) Ratings

Ingress protection numbers are used to specify the environmental protection - electrical enclosure - of electrical equipment.

The IP rating normally has two numbers:
1. The first number - Protection against solid objects.
2. The second number - Protection against liquids.

IP64:

The instrument is totally protected against dust and against water sprayed from all directions.

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