



INSTRUCTIONS FOR USE

SOCKET AND EARTH LOOP TESTER

- Compatible with 30 mA RCD.
- Pivot head.
- For power sockets, 2P+E, TT, France.
- Ergonomically designed.



Tohm-e
by electro-PJP

QUICK USAGE :

Grasp Tohm-e.



Connect it to the selected power socket.



Observe the indications displayed by Tohm-e to identify the connection of the power socket, the phase-neutral voltage and the impedance of the earth electrode of the installation .

A USAGE :

- Hold Tohm-e in one hand ($\pm 90^\circ$ pivot head)
- If needed, turn the head of Tohm-e to make connection easier.
- Connect it to the selected power socket.
- Tohm-e initialises for a few moments.
- If needed, turn Tohm-e to make reading easier (thanks to the $\pm 90^\circ$ pivot head)
- Tohm-e displays the information below .

B INDICATIONS OF TOHM-E :

B1 - indicator LED showing voltage in the power socket. If on ; **caution!** voltage is present in the power socket, even if the other indications are off ;

B2 - Measurement timer of earth electrode impedance ;

B3 - Earth electrode impedance ;

B4 - Phase - neutral voltage (true RMS value) ;

B5 - Representation of contacts of the power socket .

If the indications are red, then there is a fault.



2 CASE 2. P AND N REVERSED :



Indications of Tohm-e.

- Caution! Voltage in socket.
- Earth electrode impedance OK, 37.6Ω ($< 100 \Omega$).
- Phase-neutral voltage OK, 231 V ($> 195 \text{ V}$ and $< 253 \text{ V}$).
- Note, power socket, phase and neutral reversed (phase to left, neutral to right, PE on top) .

C IMPEDANCE MEASUREMENT :

To measure the impedance of the earth electrode, Tohm-e allows the occurrence of weak current between the phase and the PE of the power socket. It controls that current. That current does not trip the 30 mA RCD (except if significant leakage currents are already present between phase and PE).

The timer B2 is related to the B3 earth electrode impedance measurement.

A few moments after connection, if the power socket is fault-free, Tohm-e indicates a first earth electrode impedance measurement and displays the complete timer.

The timer then counts down every second, over a cycle of approximately 20 seconds. During that cycle, Tohm-e saves several earth electrode impedance measurements. It regularly updates the indicated value. That indicated value is the mean of all the values saved since the start of the cycle. Once it reaches the end of the 20-second cycle, Tohm-e repeats a new cycle with new measurements and new mean values.

That cycle and the mean values allow Tohm-e to observe the electrical system over a certain time and indicate earth electrode impedance that is as accurate as possible in spite of the disturbances on the phase, neutral and PE conductors.

The measurements indicated may change due to the connection in parallel of additional circuits or transient currents.

3 CASE 3. NOT CONNECTED TO EARTH :



Indications of Tohm-e.

- Caution! Voltage in socket.
- Earth electrode fault, PE broken.
- Phase-neutral voltage OK, 231 V ($> 195 \text{ V}$ and $< 253 \text{ V}$).
- Power socket fault, PE absent .

1 CASE I. NORMAL SOCKET AND EARTH :



Indications of Tohm-e.

- Caution! Voltage in socket.
- Earth electrode impedance OK, 37.6Ω ($< 100 \Omega$).
- Phase-neutral voltage OK, 231 V ($> 195 \text{ V}$ and $< 253 \text{ V}$).
- Power socket OK, correctly connected (phase to right, neutral to left, PE on top).

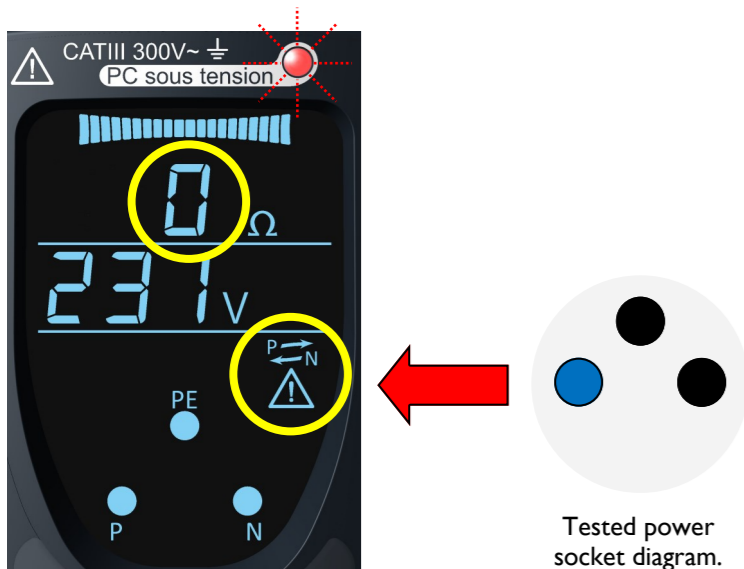
4 CASE 4. EARTH NOT CORRECT :



Indications of Tohm-e.

- Caution! Voltage in socket.
- Earth electrode impedance fault, 175Ω ($< 100 \Omega$).
- Phase-neutral voltage OK, 231 V ($> 195 \text{ V}$ and $< 253 \text{ V}$).
- Power socket OK, correctly connected (phase to right, neutral to left, PE on top).

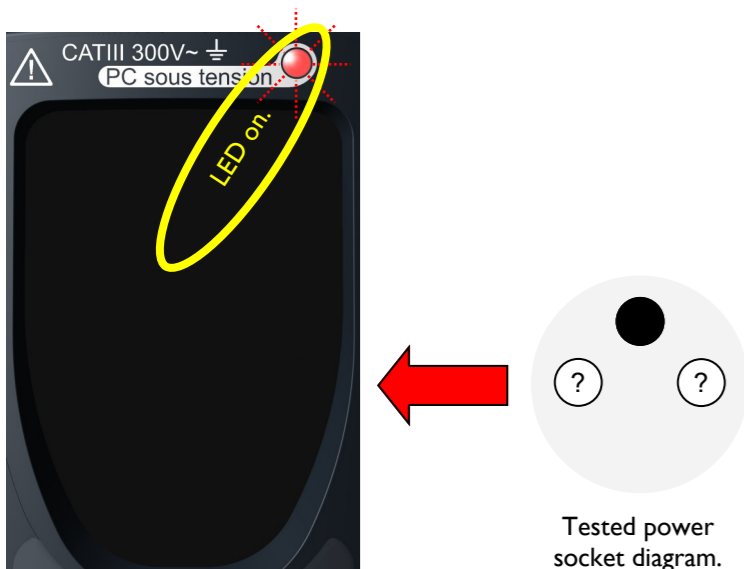
5 CASE 5. HAZARD. PHASE ALSO ON PE :



Indications of Tohm-e.

- Caution! Voltage in socket.
 - Earth electrode impedance indicated as zero, 0 Ω .
 - Indication of phase-neutral inversion.
- This is a particular case. Even if Tohm-e does not directly indicate a fault, EXERCISE CAUTION. THERE IS A HAZARD AS THE PHASE CAN BE TOUCHED on the pin of the power socket. The phase is connected to its contact and also the PE contact.
- Take all the usual precautions before working on the installation or the power socket.

7 CASE 7. HAZARD :

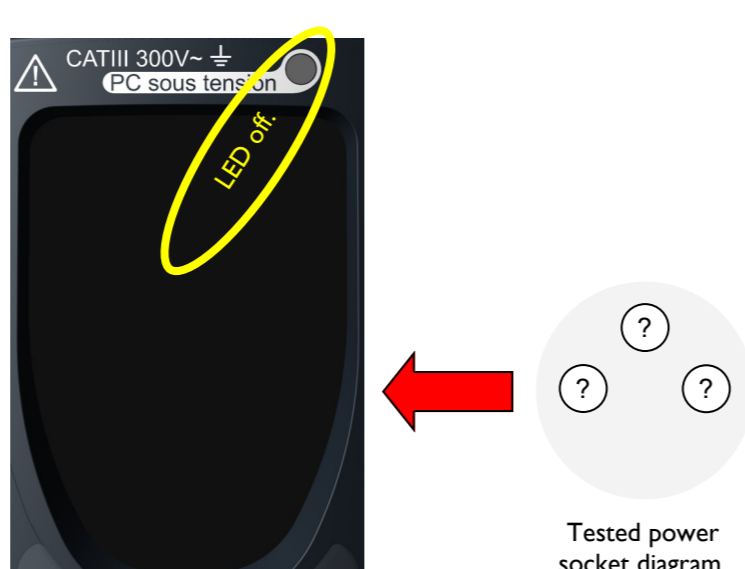


Indications of Tohm-e.

- Caution! Voltage in socket.
- The power socket is incorrectly connected. In principle phase and PE reversed. EXERCISE CAUTION. THERE IS A HAZARD AS THE PHASE CAN BE TOUCHED on the pin of the power socket.

→Take all the usual precautions before working on the installation or the power socket.

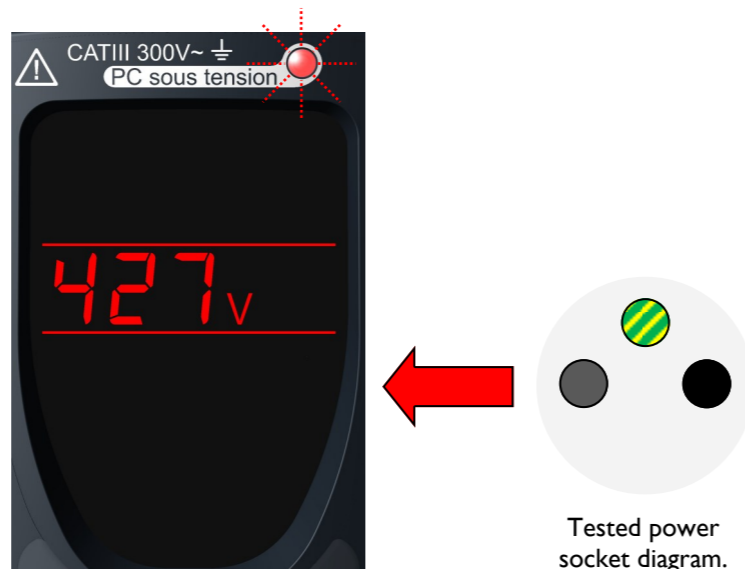
6 CASE 6. INCORRECTLY CONNECTED :



Indications of Tohm-e.

- The power socket is incorrectly connected. In principle, there is no voltage in the power socket contacts. Tohm-e may have deliberately tripped a 30 mA RCD .
- Check that the Tohm-e is not malfunctioning. Connect Tohm-e to a socket known to be OK. If it stays off, then Tohm-e is malfunctioning.
- Otherwise, take all usual precautions, even though Tohm-e has not gone on, before working on the installation or the power socket (because, for example, it may happen that a contact of the power socket is connected to the phase and the two others are not connected).

8 CAS N°8. TWO PHASES :



Indications of Tohm-e.

- Caution! Voltage in socket.
 - Voltage fault, 427 V~ (> 253 V~), probably a second phase instead of neutral.
- Take all the usual precautions before working on the installation or the power socket.

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SAFETY INFORMATION AND SPECIFICATIONS :

Protection is compromised if the instructions are not followed.

Device protection : 400 V~ according to EN/IEC 61557-3:2007. IK07 according to EN/IEC 62262.

Operator protection (reference to the earth): 300 V~ CAT III, reinforced insulation, class 2, pollution degree 2, according to EN / IEC 61010-1:2010. IP2X according to EN / IEC 60529.

'~' means alternating current (AC).

'P', 'N' and 'PE' mean Phase, Neutral and Protective Earth respectively.

'Socket' means power socket.

⚠ means caution, please refer to these instructions.

⚡ means caution, possibility of electric shock.

🛡 means device fully protected by reinforced insulation.

⏚ means earth connection conductor.

CAT III (measurement category III). This is the environment of building wiring installations including socket outlets, fuse panels, ...

Pollution degree 2. Only non-conductive pollution occurs except that occasionally a temporary conductivity caused by condensation is expected. The normal environment is in pollution degree 2.

Operator : person operating equipment for its intended purpose.

Responsible body : individual or group responsible for the safe use and maintenance of equipment.

Environmental conditions : pollution degree 2 (normal environment) ; storage and operating temperature range, from -20 °C to +55 °C ; maximum relative humidity 80 % for temperatures up to 31 °C decreasing linearly to 50 % relative humidity at 40 °C ; don't submerge the device ; protect it from liquids, rain, and any precipitation ; do not use it in wet or explosive atmospheres.

Power socket test. The 'Mains Power On' indicator LED shows that there is hazardous voltage in reference to the earth, even if the impedance, voltage and power socket indications are absent. In some cases where power sockets are incorrectly connected, Tohm-e does not directly indicate the anomaly :

- Tohm-e deliberately trips a 30 mA RCD. These are cases where there is no other way to indicate the fault, e.g. a power outlet with reversed neutral and PE.
- Tohm-e displays earth connection impedance equal to 0 Ω. These are cases, like case 5 opposite, where the phase is on two contacts at the same time or the neutral is on two contacts at the same time.
- Tohm-e remains fully switched off if the phase is present but if the two other contacts of the power outlet are not connected. Tohm-e is not a voltage detector; do not use it for that purpose.

If Tohm-e remains off even though it is connected to a power socket, check its working, for example by connecting it to a power socket known to be in working condition, before starting work on the power socket.

Power supply : power supply from tested power socket (no cell, accumulator or battery).

Compliance with standards EN / IEC 61010-1:2010, EN / IEC 61557-1:2007, EN / IEC 61557-3:2007, EN / IEC 62262, EN / IEC 60529. Compatible with standard NF C 15 -100.

Compliance with European Directives 2011/65/EU 'RoHS', 2006/95/EC 'LVD', 2006/96/EC 'WEEE', 2004/108/EC 'EMC'.

Earth electrode impedance measuring method : method compatible with standard NF C 15-100 and standards EN / IEC 61557-1:2007, EN / IEC 61557-3:2007.

Intrinsic uncertainties and tolerances of earth electrode impedance measurements :

Measurement ranges	Tolerances	Intrinsic uncertainties
From 0.0 Ω to 19.9 Ω	±0.7 Ω	±0.41 Ω
From 20.0 Ω to 99.9 Ω	±6.1 Ω	±3.53 Ω
From 100 Ω to 999 Ω	±7.0 Ω	±4.1 Ω
From 1.00 kΩ to 2.00 kΩ	±16.0 Ω	±9.24 Ω

Earth electrode impedance measuring range : 0.0 Ω to 2000 Ω.

Earth electrode impedance display resolution : 0.0 Ω to 2.00 kΩ.

Measurement intensity : compatible with 30 mA~ RCD.

Phase-neutral voltage measurement tolerances : ±4 V~.

Phase-neutral voltage measurement range : 50 V~ to 440 V~ (values in true RMS voltage).

If Tohm-e indicates that the power socket is faulty or if the indications of Tohm-e are inconsistent, take all the usual precautions before starting to work on the electrical system or power socket.

Compatible power sockets : single-phase 2 poles + earth E-type power sockets (typically installed in France), 230 V~ -15 % +10 %, 50 Hz/60 Hz, connected to a TT earth system.

Maximum phase angle : 18 °.

Tohm-e needs the power socket to be correctly connected to the electrical installation in order to measure the impedance of the earth electrode of the electrical installation. The measurement results may be distorted by the impedance values of additional circuits connected in parallel or transient currents .



USAGE :

Tohm-e is a socket and earth loop tester. It is a portable device that is connected directly. It is designed for use by an operator. A responsible authority must take responsibility for its maintenance and use. See the previous pages on instructions for use.

The operator uses it to test power sockets, measure the impedance of earth electrodes and measure the phase - neutral voltage. The operator holds it in the hand and connects it to a power socket. The electrical installations are live when the operator carries out tests and measurements with Tohm-e.

Do not connect anything to Tohm-e. It is only designed for connecting to power sockets.

Tohm-e is to be used by a qualified operator who can recognize hazardous situations, and who is trained in the necessary safety conditions for avoiding injury during use.

Regularly clean the different parts with a soft cotton cloth that is moistened with water and detergent solution after fully disconnecting Tohm-e. Dry the parts fully before energizing.

Before each use, check the integrity of Tohm-e. If an insulator is damaged (even in part), Tohm-e must be locked out and scrapped.

Tohm-e is not a voltage detector, do not use it for that purpose.

Checking electrical continuity before testing power sockets and measuring earth connection impedance is highly recommended. Tohm-e cannot be used instead of a continuity tester such as Wheel-e from Electro-PJP.

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