

PeakTech®

Prüf- und Messtechnik

 Spitzentechnologie, die überzeugt



PeakTech® 1650

Bedienungsanleitung /

Operation manual /

Mode d'emploi /

Istruzioni per l'uso /

Manual de instrucciones

AC/DC True RMS

Digital Zangenmessgerät /

Digital Clamp Meter /

Pince de mesure digitale /

Apparecchio di misurazione a pinza digitale /

Pinza de medición digital

1. Safety Precautions

This product complies with the requirements of the following European Community Directives: 2004/108/EC (Electromagnetic Compatibility) and 2006/95/EC (Low Voltage) as amended by 2004/22/EC (CE-Marking). Overvoltage category III 600V; pollution degree 2.

- CAT I: For signal level, telecommunication, electronic with small transient over voltage
- CAT II: For local level, appliances, main wall outlets, portable equipment
- CAT III: Distribution level, fixed installation, with smaller transient overvoltages than CAT IV.
- CAT IV: Units and installations, which are supplied overhead lines, which are stand in a risk of persuade of a lightning, i.e. main-switches on current input, overvoltage-diverter, current use counter.

To ensure safe operation of the equipment and eliminate the danger of serious injury due to short-circuits (arcing), the following safety precautions must be observed.

Damages resulting from failure to observe these safety precautions are exempt from any legal claims whatever.

- * Do not use this instrument for high-energy industrial installation measurement.
- * Do not exceed the maximum permissible input ratings (danger of serious injury and/or destruction of the equipment).
- * The meter is designed to withstand the stated max voltages. If it is not possible to exclude without that impulses, transients, disturbance or for other reasons, these voltages are exceeded a suitable prescale (10:1) must be used.
- * Disconnect test leads or probe from the measuring circuit before switching modes or functions.
- * To avoid electric shock, disconnect power to the unit under test and discharge all capacitors before taking any resistance measurements.

- * Check test leads and probes for faulty insulation or bare wires before connection to the equipment.
- * To avoid electric shock, do not operate this product in wet or damp conditions. Conduct measuring works only in dry clothing and rubber shoes, i. e. on isolating mats.
- * Never touch the tips of the test leads or probe.
- * Comply with the warning labels and other info on the equipment.
- * Always start with the highest measuring range when measuring unknown values.
- * Do not subject the equipment to direct sunlight or extreme temperatures, humidity or dampness.
- * Do not subject the equipment to shocks or strong vibrations.
- * Do not operate the equipment near strong magnetic fields (motors, transformers etc.).
- * Keep hot soldering irons or guns away from the equipment.
- * Allow the equipment to stabilize at room temperature before taking up measurement (important for exact measurements).
- * Do not input values over the maximum range of each measurement to avoid damages of the meter.
- * Do not turn the rotary function switch during measurement, otherwise the meter could be damaged.
- * Use caution when working with voltages above 35V DC or 25V AC. These Voltages pose shock hazard.
- * Replace the battery as soon as the battery indicator appears. With a low battery, the meter might produce false reading that can lead to electric shock and personal injury.
- * Fetch out the battery when the meter will not be used for long period.
- * Periodically wipe the cabinet with a damp cloth and mild detergent. Do not use abrasives or solvents.
- * The meter is suitable for indoor use only
- * Do not operate the meter before the cabinet has been closed and screwed safely as terminal can carry voltage.
- * Do not store the meter in a place of explosive, inflammable substances.
- * Do not modify the equipment in any way
- * Opening the equipment and service- and repair work must only be performed by qualified service personnel
- * **Measuring instruments don't belong to children hands.**

Cleaning the cabinet

Clean only with a damp, soft cloth and a commercially available mild household cleanser. Ensure that no water gets inside the equipment to prevent possible shorts and damage to the equipment.

1.1. Safety information



Caution! Refer to accompanying documents.



Caution! Risk of electric shock.



Equipment protected throughout by double insulation (class II)



Alternating current



Direct current



Ground

However, electrical noise or intense electromagnetic fields in the vicinity of the equipment, may disturb the measurement circuit. Measuring instruments will also respond to unwanted signals that may be present within the measurement circuit. Users should exercise care and take appropriate precautions to avoid misleading results when making measurement in the presence of electromagnetic interference.

2. Introduction

2.1. Unpacking and inspection

Upon removing your new digital clamp meter from its packing, you should have the following items:

Digital clamp meter, Test lead set; 9-V battery (installed in meter), carrying case, Instruction manual, Thermocouple

If any of the above items are missing or are received in a damaged condition, please contact the distributor from whom you purchased the unit.

3. Specifications

Display	3 $\frac{3}{4}$ -digits, 12 mm large LCD, maximum reading 3999 with function and units sign annunciators; 41 segment analogue bar graph
Polarity indication	Automatic, positive implied, negative indicated
Overrange Indication	"OL" is displayed
Low battery Indication	Battery symbol is displayed when the battery voltage drops below accurate operating level
Display update Rate	2/Sec nominal and 20/sec analog display
Auto Power off	30 minutes
Operating environment	-5°C ... +40°C (-23°F ... +104°F); 0...80° RH
Storage environment	-20°C ... +60° C (-4°F ... +140°F); 0...80 % R.H. with battery removed from meter
Altitude	2000 m
Power	Standard 9-V battery
Jaw opening Capability	30 mm conductor
Size (HxWxD)	200 x 68 x 40 mm
Weight	190 g

3.1. Maximum input values

Function	Max. Input
A AC, D CA	400 A
V DC, V AC	600 V DC/AC
Resistance, diode, continuity test, frequency, work cycle, capacity	250 V DC/AC
Temperature (°C/°F)	250 V DC/AC

4. Specifications

4.1. DC Volts

Ranges	Resolution	Accuracy
400mV	100 μ V	$\pm 0,8\%$ rdg. + 2 dgt.
4 V	1 mV	$\pm 1,5\%$ rdg. + 2 dgt.
40 V	10 mV	
400 V	100 mV	
600 V	1 V	$\pm 2,0\%$ rdg. + 2 dgt.

Overload protection: 600V AC/DC

Input Impedance: 10 M Ω

4.2. AC Volts

Range	Resolution	Accuracy
400 mV	100 μ V	$\pm 1,0\%$ rdg. + 10 dgt.
4 V	1 mV	$\pm 1,5\%$ rdg. + 5 dgt.
40 V	10 mV	
400 V	100 mV	
600 V	1 V	$\pm 2,0\%$ rdg. + 5 dgt.

Overload protection: 600 V AC/DC

Frequency range: 50/60 Hz

Input Impedance: 10 M Ω

4.3. DC Current

Range	Resolution	Accuracy
40 A	10 mA	$\pm 2,5\%$ rdg. + 5 dgt.
400 A	100 mA	$\pm 2,8\%$ rdg. + 5 dgt.

Overload protection: 400 A

4.4. AC Current

Range	Resolution	Accuracy
40 A	10 mA	$\pm 2,5\%$ rdg. + 8 dgt.
400 A	100 mA	$\pm 2,8\%$ rdg. + 5 dgt.

Overload protection: 400 A

Frequency range: 50/60 Hz

4.5. Resistance

Range	Resolution	Accuracy
400 Ω	100 m Ω	$\pm 1,0\%$ rdg. + 4 dgt.
4 k Ω	1 Ω	$\pm 1,5\%$ rdg. + 2 dgt.
40 k Ω	10 Ω	
400 k Ω	100 Ω	
4 M Ω	1 k Ω	$\pm 2,5\%$ rdg. + 3 dgt.
40 M Ω	10 k Ω	$\pm 3,5\%$ rdg. + 5 dgt.

Overload protection: 250 V AC/DC

4.6. Capacitance

Range	Resolution	Accuracy
40 nF	10 pF	$\pm 5,0\%$ rdg. + 20 dgt.
400 nF	100 pF	$\pm 3,0\%$ rdg. + 5 dgt.
4 μ F	1 nF	
40 μ F	10 nF	
400 μ F	100 nF	$\pm 4,0\%$ rdg. + 10 dgt.
4 mF	1 μ F	$\pm 5,0\%$ rdg. + 10 dgt.

Overload protection: 250 V AC/DC

4.7. Frequency

Range	Resolution	Accuracy	Sensitivity
4 kHz	1 Hz	$\pm 1,2\%$ rdg.+2 dgt.	<0,3 V _{pp}
40 kHz	10 Hz		
400 kHz	100 Hz		
4 MHz	1 kHz		<1 V _{pp}
40 MHz	10 kHz		<3 V _{pp}

Overload protection: 250 V AC/DC

4.8. Temperature

Range	Resolution	Accuracy
-20 ... + 760°C	1 °C	± 3,0% rdg. + 5 °C
- 4... +1400°F	1 °F	± 3,0% rdg. + 9 °C

Overload protection: 250 V DC/AC

4.9. Continuity

Audible Threshold	Test current
< 50 Ω	<0,5 mA

Overload protection: 250 V AC/DC

4.10. Diode test

Test current	Open circuit voltage
0,3 mA	3,0 V

Overload protection: 250 V AC/DC

5. Instrument Layout



1. Current Clamp
2. Clamp trigger
3. Rotary function switch
4. DATA-Hold
5. backlight
6. LCD-display
7. MODE-button
8. PEAK-Hold-button
9. REL/DCA-Zero-button
10. COM-input socket
11. V/Ω/Hz/Temp-input socket

COM Terminal

This is the negative (ground) input for all measurement modes except current. Connection is made to it using the black test leads.

V/Hz/ Ω Input Terminal

This is the positive input terminal for voltage, capacitance, frequency, ohms and diode measurements. Connection is made to it using the red test lead.

Display

The display indicates the measured value of a signal, function mode symbols and bargraph.

Function/Range selector rotary switch

This rotary switch selects the function and selects the desired range (current measurements).

Hold Button

Press HOLD button to toggle in and out of the Data Hold mode. In the Data Hold mode, the "HOLD" annunciator is displayed and the last reading is frozen on the display. Press the HOLD button again to exit and resume readings.

REL- Button

Press ZERO button to enter the relative mode, the ZERO Δ annunciator turns on, zero the display and store the displayed reading as a reference value. Press and hold down the ZERO button for 2 seconds to exit the relative mode.

In the relative mode the value shown on the LCD is always The difference between the stored reference value and the present reading. For example, if the reference value is 24.000 V and the present reading is 12,50 V the display will indicate -11,50 V. If the new reading is the same as the reference value, the display will be zero. This feature also is made as DCA ZERO adjustment.

Transformer jaws

Pick up the AC or DC current flowing through the conductor.

Peak Button

This measurement function is used to measure the peak value of a signal. It is useable with AC current measurements. To use this function, select the function and range and press the peak hold switch. When this is done, the "P" will appear in the display. Next, by inputting a signal, the peak hold function operates. This peak hold value is held in digital memory for a long period. To cancel the function press the peak hold switch once again.

Trigger

Press the lever to open the transformer. When the lever is released, the jaws will close again.

6. How to make measurements

Before making any measurements read safety precautions. Always examine the instrument and accessories used with the instrument for damage, contamination (excessive dirt, grease, etc) and defects. Examine the test leads for cracked or frayed insulation and make sure the lead plugs fit snugly into the instrument terminals. If any abnormal conditions exist, do not attempt to make any measurements.

6.1. Voltage measurements

1. Turn off power to the device under test and discharge all capacitors.
2. Select the desired AC voltage range or DC voltage range by pressing the MODE-button.
3. Plug the black test lead into the COM input jack on the meter and connect the test lead tip to a grounded point (the reference point for measurement of voltage).

WARNING!

To avoid possible electric shock, instrument damage and/or equipment damage, do not attempt to take any voltage measurements if the voltage is above 600 V AC/DC are the maximum voltages that this instrument is designed to measure. The "COM" terminal potential should not exceed 600 V measured to ground.

4. Plug the red test lead into the V/ Ω -Input jack on the meter and connect the circuit where a voltage measurement is required. Voltage is always measured in parallel across a test point.
5. Turn on power the circuit/device to be measured and make the voltage measurement reduce the range setting if set too high until a satisfactory reading is obtained.

6.2. Current Measurements

WARNING! These Snap-arounds are designed to take current measurements on circuits with a maximum voltage difference of 600 V AC between any conductor and ground potential. Using the snap-around for current measurements on circuits above this voltage may cause electric shock, instrument damage and/or damage to the equipment under test. Before measuring current make certain that the test leads are removed from the instrument.

The snap-around is overload protected up to 600 V AC for up to 1 Min. Do not take current readings on circuits where the maximum current potential is not known. Do not exceed the maximum current that this instrument is designed to measure.

1. Set Function Switch to 40 A, 400 A AC or 40A, 400A DC.
2. Select the AC or DC-function by pressing the MODE-button. If you want to measure DCA, press the REL-button to set the display to 00.00.
3. Press the trigger to open the transformer jaws and clamp them around a conductor. Jaws should be completely closed before taking a reading.

4. The most accurate reading will be obtained by keeping the conductor across centre of the transformer jaws.
5. The reading will be indicated on the display.
6. Reduce the range setting if too high until a satisfactory best resolution reading is obtained.

6.3. Resistance measurements

WARNING! Attempting resistance or continuity measurements on live circuits can cause electric shock, damage to the instrument and damage to the equipment under test. Resistance measurements must be made on de-energized circuits only for maximum personal safety. The electronic overload protection installed in this instrument will reduce the possibility of damage to the instrument but not necessarily avoid all damage or shock hazard.

1. Turn off any power to the resistor to be measured. Discharge capacitors. Any voltage present during a resistance measurement will cause inaccurate readings and could damage the meter if exceeding the overload protection of 250 V DC or AC.
2. Insert the black and red test leads into the COM and V/ Ω input terminals respectively.
3. Select the desired ohm (Ω) range.
4. Select Ω by pressing MODE-button
5. Connect the black and red test probe tips to the circuit or device under test, making sure it is de-energized first.
6. Open circuits will be displayed as an overload condition (OL)
7. Test lead resistance can interfere when measuring low resistance readings and should be subtracted from resistance measurements for accuracy. Select lowest resistance range and make the test leads short together.

The display value is the test lead resistance to be subtracted.

8. After completing measurement, disconnect the test leads.

6.4. Continuity testing

CAUTION!

Measurements must only be made with the circuit power OFF.

1. Select the $\Omega \rightarrow \text{diode symbol}$ position by turning the rotary selector switch.
2. Select diode symbol by pressing MODE-button.
3. Follow step 2 and 5 as for resistance measurements.
4. An audible tone will sound for resistance less than approx. 50 Ω . After all measurements are completed, disconnect the test leads from the circuit and from the input terminals.

6.5. Diode testing

CAUTION!

Measurements must only be made with the circuit power OFF.

1. Set the rotary selector switch to the $\Omega \rightarrow \text{diode symbol}$ position.
2. Select diode symbol by pressing MODE-button
3. Follow steps 2 and 5 as for resistance measurements.
4. The red test lead should be connected to the anode and the black lead to the cathode. For a silicon diode, the typical forward voltage should be about 0,7 V or 0.4 V for a germanium diode.
5. If the diode is reverse biased or there is an open circuit the display shows "OL".

6.6. Capacitance measurement

CAUTION!

Measurements must only be made with the circuit power OFF.

WARNING!

Capacitors can carry very high voltages. Before measurement discharge the capacitor. To measure a charged capacitor could damage the clamp meter.

1. Turn off power to the device under test and discharge all capacitors.
2. Discharge all voltage from the capacitor before measuring its capacitance value.
Note: A safe way to discharge a capacitor is to connect a 100 k Ω resistor across the two capacitor leads.
3. Set the rotary selector switch to the capacitance range (CAP).
4. Plug the black and red test leads into the COM and V/ Ω input terminals respectively.
5. Touch the probes to the capacitor. Always observe polarity markings when measuring polarized capacitors.
6. For accurate results, press the ZERO key to perform zero calibration before the measurement.

Note:

Capacitors with residual voltage and capacitors with poor insulation resistance affect a negative test result.

7. Read capacitance value directly from the display.
8. After completing the measurement, disconnect the test leads from the instrument.

6.7. Frequency measurements

1. Set the rotary selector switch to the Hz position.
2. Plug the black and red test leads into the COM and Hz input terminals respectively.
3. Determine that the amplitude level of the signal to be measured is not greater than the input voltage limit (250 V AC/DC). The signal amplitude must also be greater than the sensitivity level.
4. Attach the probe tips to the points across which the frequency is to be measured, and read the result directly from the display.
5. Disconnect the test leads from the instrument.

6.8. Temperature measurements

1. Set the function switch to TEMP position. The meter automatically defaults to °C range.
2. Insert the meter's white temperature adaptor into the V/ Ω -input terminal and the COM-terminal. Ensure that the minus marking at the adaptor is inserted into the COM-terminal and the plus-marking is inserted into the V/ Ω -input terminal.
3. To change the measuring unit from °C to °F press the MODE-button to select the °F unit.
4. Connect the K-type probe into the meter adaptor and measure the temperature of the apparatus or area required.
5. Read the temperature directly from the display.

7. Replacing the battery

WARNING!

To avoid electrical shock, disconnect the test leads and any input signals before replacing the battery. Replace only with same type of battery.

This meter is powered by a NEDA type 1604 or equivalent 9 V-battery. When the meter displays the battery symbol the battery must be replaced to maintain proper operation. Use the following procedure to replacing the battery.

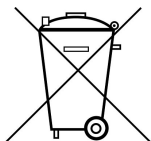
1. Disconnect test leads from any live source, turn the rotary switch to OFF and remove the test leads from the input terminals.
2. The battery cover is secured to the bottom case by a screw. Using a screwdriver, remove the screw from the battery cover and remove the battery cover.
3. Remove the battery and replace with a new equivalent 9 V-battery.
4. Replace the battery cover and reinstall the screw.

Note: Batteries which are used up, dispose duly. Used up batteries are hazardous and must be given in the for this being supposed collective container.

Statutory Notification about the Battery Regulations

The delivery of many devices includes batteries, which for example serve to operate the remote control. There also could be batteries or accumulators built into the device itself. In connection with the sale of these batteries or accumulators, we are obliged under the Battery Regulations to notify our customers of the following:

Please dispose of old batteries at a council collection point or return them to a local shop at no cost. The disposal in domestic refuse is strictly forbidden according to the Battery Regulations. You can return used batteries obtained from us at no charge at the address on the last side in this manual or by posting with sufficient stamps.



Batteries, which contain harmful substances, are marked with the symbol of a crossed-out waste bin, similar to the illustration shown left. Under the waste bin symbol is the chemical symbol for the harmful substance, e.g. „Cd“ for cadmium, „Pb“ stands for lead and „Hg“ for mercury.

You can obtain further information about the Battery Regulations from the Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit (*Federal Ministry of Environment, Nature Conservation and Reactor Safety*).

8. Maintenance

Maintenance consists of periodic cleaning and battery replacement. The exterior of the instrument can be cleaned with a dry clean cloth to remove any oil, grease or grime. Never use liquid solvents or detergents.

Repairs or servicing not covered in this manual should only be performed by qualified service personnel.

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This manual considers the latest technical knowing. Technical changings which are in the interest of progress, reserved.

We herewith confirm that the units are calibrated by the factory according to the specifications as per the technical specifications.

We recommend to calibrate the unit again, after 1 year.

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