

PeakTech[®]

Prüf- und Messtechnik

 **Spitzentechnologie, die überzeugt**



PeakTech[®] 3441

**Bedienungsanleitung /
Operation Manual**

Digital-Multimeter

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 1000V; overvoltage category IV 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: Supplied from a cable under earth; fixed installed switches, automatic cut-off or main plugs

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 place the equipment on damp or wet surfaces.
- * 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 presale (10:1) must be used.
- * Replace a defective fuse only with a fuse of the original rating. Never short-circuit fuse or fuse holding.
- * Disconnect test leads or probe from the measuring circuit before switching modes or functions.
- * Do not conduct voltage measurements with the test leads connected to the $\mu\text{A}/\text{mA}/\text{A}$ - and COM-terminal of the equipment.
- * The 10A-range is protected by fuse 10A/1000V.
- * To avoid electric shock, disconnect power to the unit under test and discharge all capacitors before taking any resistance measurements.
- * Do not conduct current measurements with the leads connected to the V/ Ω -terminals of the equipment.
- * Check test leads and probes for faulty insulation or bare wires before connection to the equipment.
- * Please use only 4mm-safety test leads to ensure immaculate function.
- * 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.
- * The measurement instrument is not to be operated unattended.
- * 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 voltage or current measurement, otherwise the meter could be damaged.
- * Use caution when working with voltages above 35V DC or 25V AC. These Voltages pose shock hazard.
- * Charge the battery as soon as the battery indicator "BAT" 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
- * Do not place the equipment face-down on any table or work bench to prevent damaging the controls at the front.
- * 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. Introduction

The new PeakTech 3441 is a handy digital multimeter for high loads with many useful measurement functions.

The measurement display of the device can be switched from 3 5/6 digit to 4 5/6 digits high-resolution by keystroke, where all measurements are made as True RMS.












In addition to the comprehensive measurement functions for current, voltage, capacity, resistance and more, this new developed device has among other things a 4-20mA% current loop measurement, a low-pass filter and an Auto-Hold function.

Through these many technical qualities, this device for every electronics engineer, technician and engineer is ideal for daily use in the service, construction or industrial sector.

1.2. Input Limits

Function	Overload protection
DCV / ACV	1000V DC/AC rms
DCA / ACA (μ A/mA)	800mA / 1000V
DCA / ACA (10 A)	10 A / 1000V
Resistance	1000V DC/AC rms
Diode / Continuity	1000V DC/AC rms
Capacity	1000V DC/AC rms
Frequency	1000V DC/AC rms
Temperature	1000V DC/AC rms
Overload protection: 8kV peak as in EN 61010	

1.3. Safety Symbols

	TÜV/GS approved; TÜV-Rheinland
	Attention! Read the corresponding Section in the manual. Failure to comply entails risk of injury and / or the risk of damage to the device.
	max. allowable voltage difference of 1000 V DC/ACrms between COM / V or ohm input and earth does not exceed for safety reasons.
	Dangerous high voltage is applied between the inputs. Extreme caution in the measurement. Do not touch inputs and measuring tips. Safety instructions in the user manual note!
	AC (Alternating Current)
	DC (Direct Current)
	AC or DC
	Earth ground
	Doppelt isoliert
	Fuse
	Conforms to European Union directives

**Warning /
Caution**

This WARNING / CAUTION symbols indicate a potentially hazardous situation, which if not avoided, may result in minor or moderate injury, or damage to the product or other property.

2. Front Panel Description



1. TFT / LCD display with an indication of max. 60,000
2. RANGE-Key: To switch measurement ranges manually
3. HIRES/ Backlight-Key: To select display resolution and switch backlight
4. MODE-Key: To switch the measurement functions
5. Rotation Switch: To select the desired measurement
6. 10A Socket: AC/DC current measurements up to 10A
7. μ A/mA Socket: AC/DC current measurements up to 800mA
8. COM Socket: To connect the corresponding measuring line at the reference point.
9. V/ Ω /CAP/Hz%/Temp- Socket: Input connector for red test lead for all measurement functions except current measurements.
10. Hz% / Δ REL –Key: Switches duty cycle, frequency measurement and relative value function.
11. AUTO / HOLD- Key: Activate Data-Hold or Auto-Hold function.

3. Operating instructions

Warning!

Risk of electrocution! High-voltage circuits, both AC and DC are very dangerous and should be measured with great care.

Always push the power switch to the OFF position when the meter is not in use. This meter has Auto OFF that automatically shuts the meter OFF if max. 30 minutes elapse between uses.

If "OL" appears in the display during a measurement, that value you are measuring exceeds the range you have selected. Change to higher range.

3.1. Preliminary Note

1. Check the supply voltage by setting the DMM switch to ON. If the voltage is weak, a "BAT" sign will appear on the right of display and you have to charge the battery.
2. The warning sign next to the test leads jack is for warning, that the input voltage or current should not exceed the indicated values. This is to prevent damage to the internal circuitry.
3. The function switch should be set to the range, which you want to test before operation.

Note:

On some low AC and DC voltage ranges, with the test leads not connected to a device, the display may show a random, changing reading. This is normal and is caused by the high-input sensitivity. The reading will stabilize and give a proper measurement when connected to a circuit.

3.2. Autoranging / manual range selection

When the meter is first turned on, it automatically goes into Auto-Ranging. This automatically selects the best range for the measurements being made and is generally the best mode for most measurements. For measurement situations requiring that the range be manually held, perform the following:

1. Press the "RANGE" button. The "AUTO" indicator will extinguish and the currently selected range will be held.
2. Press the "RANGE" button to step through the available ranges until you select the range you want.
3. Press and hold the "RANGE" button for 2 seconds to exit the manual ranging mode and return to "AUTO" mode.

4. Features

4.1. Understanding the Push Buttons

RANGE: The manual range is selected in the current measurement function by pressing the RANGE button. When the RANGE button is held for 2 seconds, the unit will return to autoranging.

MODE: Can switch in a range between different electrical functions by pressing the MODE button. In current and voltage range measurement it is switched between AC and DC. When you select the Ω / CAP / diode / continuity tester range with the MODE key can be switched between these measurement functions.

- Hz / REL:** Pressing the Hz% / ΔREL-button switches in AC voltage measuring range or frequency range between the voltage measurement, frequency measurement and display of the duty cycle. Hold and keep pressed the REL button for about 1 sec. and the relative value function turns on, so the meter display will be reset to "zero". This can e.g. be used in the DC range to eliminate negative influences by phantom values.
- HIRES:** The backlighting is turned on by pressing the button. Pressing and holding switches the base resolution of the device from 3 5/6 -digit to 4 5/6 digits.
- AUTO:** The displayed value will be "frozen" by pushing the
HOLD HOLD key. Pressing the AUTO / HOLD button for about 2 seconds, the unit enters the auto-hold function and keeps the next stable reading in the display.
- MAX/** By briefly repeatedly pressing the MAX / MIN key you can
MIN cycle through the maximum value holding function, the minimum value holding function and the AVG Average value acquisition. Hold down the button, to turn on the PeakMAX and PeakMIN function. The maximum and minimum peak is detected with 1ms sampling and held in the display. Hold down the button again to turn this function off again.

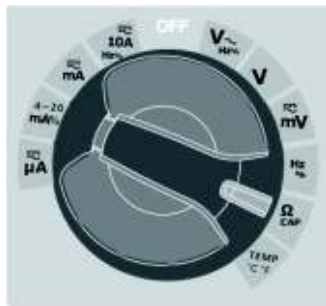
4.2. Understanding the Display



~)	Continuity Tester
→	Diode Tester
⊞	Batterie Status
n	Nano (10^{-9})
μ	Micro (10^{-6})
m	Milli (10^{-3})
A	Ampere (Current)
k	Kilo
F	Farad (Capacity)
M	Mega (10^6)
Ω	Ohm (Resistance)
PEAK	Peak detection
Hz	Hertz (Frequency)
V	Volt (Voltage)
%	Duty Cycle
REL	Relative function
AC	Alternating Current
AUTO	Automatic Range
DC	Direct Current
HOLD	Data Hold function
°F	Fahrenheit
°C	Celsius
MAX	Maximum value function
MIN	Minimum value function

4.3. Understanding the Rotary Switch

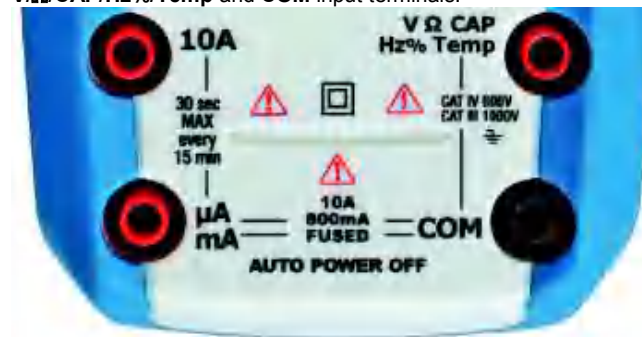
Select a primary measurement function by positioning the rotary switch to one of the icons around its perimeter. For each function, the Meter presents a standard display for that function (range, measurement units, and modifiers). Button choices made in one function do not carry over into another function.



V~	AC voltage measurements
V-	DC and AC+DC voltage measurements
mV	DC/AC milli-volts measurements
Ω / \rightarrow / \rightarrow / CAP	Resistance, Diode test, capacitance and continuity measurements
Hz%	Frequency measurements
TEMP	Temperature measurements
A	AC/DC amps measurements
mA	AC/DC milliamps measurements
4 - 20 mA%	% 4-20mA measurements
μA	AC/DC microampere measurements up to 6,000 μA

4.4. Using the Input Terminals

All functions except the current measurement function use the **V/Ω/CAP/Hz%/Temp** and **COM** input terminals.



10A	Input for 0 A to 10.00 A current (20VA overload for 30 seconds on, 10 minutes off)
μA mA	Input for 0 A to 600 mA current measurements
COM	Ground-terminal for all measurements
V / Ω / →† ·») / Hz% / CAP / TEMP	Input for voltage, continuity, resistance, diode test, frequency, capacitance and temperature

5. Operation

5.1. DC Voltage measurements



1. Set the function switch to the green position.
2. Insert the black test lead into the negative **COM** - jack. Insert the red test lead into the positive **V/Ω/CAP/Hz%/Temp** - jack.
3. Read the voltage in the display. When the value is negative, a “-“ symbol is displayed.

5.2. Voltage measurement (mV)

Caution!

Do not measure DC voltages if a motor on the circuit is being switched ON or OFF. Large voltage surges may occur during the ON or OFF operations that can damage the meter.

Caution!

Understanding Phantom readings:

In some DC and AC voltage ranges, when the test leads are not connected to any circuit, the display might show a phantom reading. This is normal. The meter's high input sensitivity produces a wandering effect. When you connect the test leads to a circuit, accurate reading appears.



1. Set the function switch to the $mV\overline{\sim}$ -position.
2. Press the push-button labeled MODE to select $mV\overline{\text{---}}$ (DC) or $mV\sim$ (AC).
3. Insert the black test lead into the negative **COM** - jack. Insert the red test lead into the positive **V/Ω/CAP/Hz%/Temp** - jack.
4. Read the mV voltage in the display. When the values is negative, a “-” symbol is displayed.

5.3. AC Voltage measurements

Warning:

Risk of Electrocutation. The probe tips may not be long enough to contact the live parts inside some 230 V outlets for appliances because the contacts are recessed deep in the outlets. As a result, the reading may show 0 volts when the outlet actually has voltage on it. Make sure the probe tips are contacting the metal contacts inside the outlet before assuming that no voltage is present.

Caution:

Do not measure AC voltages if a motor on the circuit is being switched ON or OFF. Large voltage surges may occur during the ON or OFF operations that can damage the meter.

Low Pass Filter:

To avoid false AC voltage measurements with pulse width modulated signals or disturbances of the mains frequency, you can turn on the low pass filter when making an AC voltage measurement.



1. Set the function switch to the "V~" position.
2. Press "F2" button to select AC "~".
3. Insert the black test lead into the negative **COM** jack and the red test lead into the positive **V/Ω/CAP/Hz%/Temp** jack.
4. Touch the test probe tips to the circuit under test.
5. Read the voltage in the display. The display will indicate the proper decimal point, value and symbol.
6. Press the MODE button in the AC voltage measurement, to switch to a "low pass filter" measurement.

5.4 Frequency measurements

1. Set the function switch to the "Hz%" position.
2. Use the MODE key to switch between Frequency (Hz) and Duty Cycle (%)
3. Insert the black test lead into the negative **COM**-jack and the red test lead banana plug into the positive **V/Ω/CAP/Hz%/Temp** jack.
4. Touch the test probe tips to the circuit under test.
5. Read the frequency in the display. The digital readings will indicate the proper decimal point, symbols (Hz, kHz, MHz, %) and value.





5.5. Resistance measurements

Warning:

To avoid electric shock, disconnect power to the unit under test and discharge all capacitors before taking any resistance measurements. Remove the batteries and unplug the line cords.



1. Set the function switch to the " Ω /  / 
" position.2. Insert the black test lead into the negative **COM** jack and the red test lead into the positive **V/ Ω /CAP/Hz%/Temp** jack.
3. Touch the test probe tips across the circuit or part under test. It is best to disconnect one side of the part under test so the rest of the circuit will not interfere with the resistance reading.
4. Read the resistance in the display. The display will indicate the proper decimal point, value and symbol.

Caution!

When you short the test leads in the 600 Ω range, your meter display a small value (no more than 0.2 ...1 Ω). This value is due to your meter's and test leads internal resistance. Make a note of this value and subtract it from small resistance measurements for better accuracy.

5.6. Continuity Test

Caution!

To avoid electric shock, disconnect power to the unit under test and discharge all capacitors before taking any resistance measurements. Remove the batteries and unplug the line cords.

Perform continuity tests on idle circuits and components and unplug it from the outlet. In the circuit located capacitors should be absolutely discharged before measuring.



1. Set the function switch to the " Ω →|/CAP" position.
2. Press the push button MODE to select the continuity-test.
3. Insert the black test lead into the negative **COM** jack and the red test lead into the positive **V/Ω/CAP/HZ%/Temp** jack.
4. If the resistance is less than approximately 30Ω , the audible signal will sound. If the circuit is open, the display will indicate "OL".

5.7. Diode-Test

The diode test feature allows the determination of the usability of diodes and other semiconductor elements defined in circuits as well as the determination of the continuity (short-circuit) and the voltage drop in the forward direction.

Warning:

To avoid electric shock, do not test any diode that has voltage on it.



1. Set the function switch to " Ω —▶—/CAP" position.
2. Press the MODE button until the "▶—" symbol appears in the display.
3. Insert the black test lead into the negative **COM** jack and the red test lead banana plug into the positive **V/ Ω /CAP/Hz%/Temp** jack.
4. Touch the test probe tips to the diode or semiconductor junction you wish to test. Note the meter reading.
5. Reverse the probe polarity by switching probe position. Note this reading.
6. The diode or junction can be evaluated as follows:
 - A: If one reading shows a value and the other reading shows OL, the diode is good.
 - B: If both readings are OL, the device is open.
 - C: If both readings are very small or 0, the device is shorted.

Note: The value indicated in the display during the diode check is the forward voltage.

5.8. Capacitance measurements

Warning:

To avoid electric shock, disconnect power to the unit under test and discharge all capacitors before taking any capacitance measurements. Remove the batteries and unplug the line cords.



1. Set the function switch to the " $\Omega \rightarrow \text{CAP}$ " - position.
2. Press the MODE button until the "CAP" symbol appears in the display.
3. Insert the black test lead into the negative **COM** jack and the red test lead into the positive **V/ Ω /CAP/Hz%/Temp**-jack.
4. Touch the test leads to the capacitor to be tested. The display will indicate the proper decimal point, value and symbol.

5.9. Temperature measurements

Warning:

To avoid electric shock, disconnect both test probes from any source of voltage before making a temperature measurement.



1. Set the function switch to “TEMP °C/°F” position.
2. Pres the push button MODE to select °C or °F.
3. Insert the multi-function adaptor in the input socket for **V/Ω/CAP/Hz%/Temp (+)** and **COM (-)** for temperature measurements.
4. Insert the K-type thermocouple into the multi-function adaptor, making sure to observe the correct polarity.
5. Touch the temperature probe head to the part whose temperature you wish to measure. Keeps the probe touching the part under test until the reading stabilizes (about 30 seconds).
6. Read the temperature in the display. The digital reading will indicate the proper decimal point and value.

Warning:

To avoid electric shock, be sure the thermocouple has been removed before changing to any other measurement function.

5.10. DC Current measurements

Warning:

To avoid electric shock do not measure DC current on any circuit whose voltage exceeds 1000V DC/AC_{RMS}.

Caution:

Do not make current measurements on the 10A scale for longer than 30 sec. Exceeding 30 sec. may cause damage to the meter and / or the test leads.



1. According to the current to be measured rotate function selector switch to either position of μA , mA or 10A.
2. Set the device to the DC measurement function (DC "----") by pressing the MODE key. In the LCD display the operation icon (DC "----") appears
3. For current measurements up to 6000 μA DC, set the function switch to the " μA " position and insert the red test lead banana plug into the mA/ μA jack.
4. For current measurements up to 600 mA DC, set the function switch to the "mA" position and insert the red test lead banana plug into the mA/ μA jack.
5. For current measurements up to 10 A DC, set the function switch to the 10 A position and insert the red test lead banana plug into the 10 A jack.
6. For safety reasons in case of unknown current magnitudes always choose the 10A range and corresponding measured value display switch to a mA measurement range.
7. Remove power from the circuit under test and open the circuit at the point where you wish to measure current. (Ensure correct polarity).
8. Touch the black test probe tip to the negative side of the circuit and touch the red test probe tip to the positive side of the circuit.
9. Apply power to the circuit.
10. Read the current in the display. The display will indicate the proper decimal point, value and symbol.

5.11. AC Current measurements

Warning:

To avoid electric shock do not measure AC-current on any circuit whose voltage exceeds 1000V DC/AC_{RMS}.

Caution:

Do not make current measurements on the 10A scale for longer than 30 sec. Exceeding 30 sec. may cause damage to the meter and/or the test leads.



Attention!

Current Measurements 10A and μA / mA range are protected by fuses against over-current. Blown fuses must be replaced for other measurement with new fuses of the same type. With blown fuses no current measurement is possible. Do not exceed the maximum current range, in order to avoid triggering the fuse!

1. Insert the black test lead into the negative COM jack.
2. For current measurements up to $5000\mu\text{A}$ AC, set the function switch to the " μA " position and insert the red test lead into the $\mu\text{A}/\text{mA}$ -jack.
3. For current measurements up to 500mA AC, set the function switch to the "mA" position and insert the red test lead into the $\mu\text{A}/\text{mA}$ -jack.
4. For current measurements up to 10A AC, set the function switch to the 10A position and insert the red test lead into the 10A -jack.
5. Press the MODE-button until AC " \sim " appears in the display.
6. Remove power from the circuit under test and open the circuit at the point where you wish to measure current.
7. Touch the black test probe tip to the negative side of the circuit and touch the red test probe tip to the positive side of the circuit.
8. Apply power to the circuit.
9. Read the current in the display. The display will indicate the proper decimal point, value and symbol.

5.12. 4 – 20mA % measurements

4 - 20 mA circuits represent an analog electrical transmission standard for industrial instruments and the communication. In such a circuit, a level corresponding to 0% of 4 mA and 20 mA, a level of 100% of the signal. The zero position at 4 mA allows the receiving instrument to distinguish between a zero signal and a broken wire or faulty appliance. The advantage of the 4-20 mA transmission are low implementation costs and the possibility of excluding many forms of electrical noise.

1. Set up and connect as described for DC mA measurements.
2. Set the rotary function switch to the "4-20mA%"-position.
3. The meter will display loop current in % as follows:

0 mA	-25%
4 mA	0%
20 mA	100%
24 mA	125%

6. Replacing the battery

Refer to figure and replace the batteries as follows:

1. Turn the Meter off and remove the test leads from the terminals.
2. Remove the battery door assembly by using a screwdriver to turn the battery door screw one-half turn counterclockwise.
3. Replace the batteries with 4 x 1,5V AAA batteries. Pay regard to the proper polarity.
4. Reinstall the battery door assembly and secure it by turning the screw one-half turn clockwise.



7. Replacing the fuses

Warning:

To avoid electric shock, disconnect the test leads from any source of voltage before removing the back cover or the battery/fuse door.

1. Turn the screw on the battery compartment half a turn counter-clockwise to open the battery compartment.
3. Remove the blown fuse from the fuse holder.
4. Insert the new fuse into the fuse holder - appropriate to the value and the dimensions of the original fuse. Make sure that the fuse is centred in the holder.
5. After replacing the appropriate backup, attach the battery cover back to the device and secure it by turning the screw by half a turn clockwise

Warning:

To avoid electric shock, do not operate your meter until the back cover and the battery door is in place and fastened securely

Note:

If your meter does not work properly, check the fuses and battery to make sure that they are still good and properly inserted.

800mA/1000V F (fast acting) 6,3 x 32mm

10 A/1000V F (fast acting) 10 x 38 mm


8. Technical Data

8.1. Specifications

Display	TFT-LCD-display with max display of 59999
Overload protection	on all ranges
Operating Temperature	5°C to 40°C < 80 % RH
Storage Temperature	-20...+60° C < 80 % RH
Altitude	< 2000 m
Accuracy temperature	18°C...28°C (64°F to 82°F) to maintain guaranteed accuracy

8.2. General Specifications

Enclosure	Double molded, waterproof
Shock (Drop Test)	6.5 feet (2 meters)
Diode Test	Test current of 0.9mA maximum, open circuit voltage 2.8V DC typical
Continuity Check	Audible signal will sound if the resistance is less than 30 Ω, test current <0.35mA
PEAK	Captures peaks >1ms
Temperature Sensor	Requires type K thermocouple
Input Impedance	>10MΩ VDC

AC Response	True RMS
AC True RMS	The term stands for "Root-Mean-Square," which represents the method of calculation of the voltage or current value. Average responding multi-meters are calibrated to read correctly only on sine waves and they will read inaccurately on non-sine wave or distorted signals. True rms meters read accurately on either type of signal.
ACV Bandwidth	50Hz ~ 5000Hz
Overrange indication	"OL" is displayed
Auto Power Off	approx 15 min.
Polarity	Automatic (no indication for positive); Minus (-) sign for negative
Measurement Rate	3 times per second, nominal
Low Battery Indication	"  is displayed if battery voltage drops below operating voltage
Battery	4 x 1,5V AAA battery
Fuse	mA, μ A ranges: 0.8A/1000V (6,3x32mm) ceramic fast blow A-range: 10A/1000V (10x32mm) ceramic fast blow

Safety	This meter is intended for origin of installation use and protected, against the users, by double insulation per EN61010-1 and IEC61010-1 2nd Edition (2001) to Category IV 600V and Category III 1000V; Pollution Degree 2. The meter also meets UL 61010-1, 2 nd Edition (2004), CAN/CSA C22.2 No. 61010-1 2 nd Edition (2004), and UL 61010B-2-031, 1st Edition (2003)
Dimensions (W x H x D)	80 x 175 x 50 mm
Weight	400 g

8.3. Specifications

AC Voltage

Range	Resolution	50 Hz – 1kHz	1kHz - 5kHz
600 mV	0,01 mV	± 1%+ 5 St.	± 3,0% + 5 dgt.
6 V	0,0001V		
60 V	0,001V		
600 V	0,01V		
1000 V	0,1V		Not specified

Accuracy >10% of range

DC Voltage

Range	Resolution	Accuracy
600 mV*	0,01 mV	± 0,9% + 5 dgt.
6 V	0,0001 V	
60 V	0,001 V	
600 V	0,01 V	
1000 V	0,1 V	± 1,2% + 5 dgt.

*When using the relaiiv mode (REL Q) to compensate for offsets.

Resistance (Ω)	Range	Resolution	Accuracy
	600 Ω *	0,01 Ω	$\pm 2\% + 9$ dgt.
	6 k Ω	0,0001 k Ω	$\pm 1,2\% + 5$ dgt.
	60 k Ω	0,001 k Ω	
	600 k Ω	0,01 k Ω	
	6 M Ω	0,0001 M Ω	
60 M Ω	0,001 M Ω	$\pm 2,0\% + 10$ dgt.	
*When using the relative mode (REL Q) to compensate for offsets.			
Temperature (type-K)	Range	Resolution	Accuracy
	-50 ~ 760 $^{\circ}\text{C}$	0,1 $^{\circ}\text{C}$	$\pm 2,0\% + 3,0$ $^{\circ}\text{C}$
	-58 ~ 1400 $^{\circ}\text{F}$	0,1 $^{\circ}\text{F}$	$\pm 2,0\% + 5,5$ $^{\circ}\text{F}$
	1. Does not include error of the thermocouple probe. 2. Accuracy specification assumes ambient temperature stable to $\pm 1,0$ $^{\circ}\text{C}$		
Capacitance	60 nF	0,01 nF	$\pm 3,5\% + 10$ dgt.
	600 nF	0,1 nF	
	6 μF	0,001 μF	$\pm 2,5\% + 10$ dgt.
	60 μF	0,01 μF	
	600 μF	0,1 μF	
	6000 μF	1 μF	$\pm 3,5\% + 10$ dgt.
*With a film capacitor or better, using relative mode (REL Δ) to zero residual.			
Duty Cycle	0,001~99,90%	0,0001 %	$\pm 1.2\% + 50$ dgt.
	Pulse width: 100 μs – 100ms Frequency: 5 Hz – 10 kHz		

Frequency (Square)

60 Hz	0,001 Hz	± 1.0% + 2 dgt.
600 Hz	0,01 Hz	
6 kHz	0,0001 kHz	
60 kHz	0,001 kHz	
600 kHz	0,01 kHz	
10 MHz	0,001 MHz	not specified
Sensitivity: 2,0V rms min.@20% to 80% duty cycle and <100kHz 5Vrms min@20% to 80% duty cycle and > 100kHz.		

Frequency (Sinusoidal)

40 Hz ~ 10 kHz	0.01 Hz	± 0.5% of reading
Sensitivity: 15Vrms		

DC Current (DCA)

600 µA	0,01 µA	± 1,5% + 5 dgt.
6000 µA	0,1 µA	
60 mA	0,001 mA	
600 mA	0,01 mA	
10 A	0,001 A	
(20A: 30 sec. max. with reduced accuracy)		

AC Current (ACA)

		< 1 kHz	< 5 kHz
600 µA	0,01 µA	± 2,5% + 5 dgt.	± 3,5% + 5 dgt.
6000 µA	0,1 µA		
60 mA	0,001 mA		
600 mA	0,01 mA		
10 A	0,001 A		Not specified
(20A: 30 sec. max. with reduced accuracy)			
All AC current ranges are specified from 5% of range to 100% of range			

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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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