

DranTech ULTRA

Precision Digital Multimeter



Bench DMM in a Hand-Held Housing

- Precision multimeter (V, mA, \dot{U} , Hz, °C/°F) and data logger
- **1,200,000 digit display, 6 ½ digit**
High resolution for:
DC/AC+DC voltage: 100 nV/1microV
DC and AC+DC Current: 100 picoA
- **TRMS AC+DC**
- **Milliohmmeter with 2 and 4-wire connection**
Resolution: 0.1 mOhm
Kelvin Connection
- **Precision temperature meter, °C and °F**
for Pt100/Pt1000 sensors with 2/4-wire connection,
Resolution: 0.01 °C/°F
for J and K thermocouples, resolution: 0.1 °C/°F,
internal or external reference junction can be selected
- **Large data memory:** 128 kB
- **DKD Calibration Certificate included**

- **Automatic or Manual Measuring Range Selection**



Applications

The ULTRA multimeter is a high performance, precision measuring instrument for R&D labs, industrial applications, universities, government authorities, testing stations, manufacturing and QA. With a display range of 1,200,000, as well as exceptional accuracy and long-term stability, it fulfills all of the demands of calibration and R&D labs.

Features

True RMS Measurement of Distorted Waveforms

The measuring method applied allows for waveform independent RMS measurement for voltage and current up to 100 kHz at crest factors of up to 10.

Sampling Rate

The sampling rate determines the interval at which the respective measurement value is saved to memory. Depending upon measured quantity and resolution, the interval can be set within a range of 0.01 s to 60 s.

Storing MIN-MAX Values to Memory

In addition to displaying the current measurement value, the minimum or maximum value can be continuously updated and stored to memory at the selected sampling rate.

Overload Protection

The instrument is safeguarded against overloading in all measuring functions. All current measuring ranges are equipped with a self-resetting, electronic fuse.

Averaging Filter for Noisy Measurement

A digital filter (1/2/4/8/16 measurement values) is used to smooth noisy measurement signals.

Battery Charging Status – Power Saving Circuit

Battery operation allows for mobile use of the instrument for demanding maintenance work and calibration tasks. An optional mains power pack can be utilized for stationary, long-term operation. If user selected, the device is switched off automatically if the measured value remains unchanged for a period of between 10 and 59 minutes (adjustable), and if none of the controls are activated during this time.

DKD Calibration Certificate

The multimeters are furnished with an internationally accepted DKD calibration certificate (recognized by EA and ILAC). After the specified calibration interval has elapsed (recommended interval: 1 to 3 years), the multimeters can be inexpensively recalibrated by any calibration laboratory.

Memory Mode

The instrument is equipped with a 128 kB data memory with backup battery. The memory can be divided in 1 to 15 blocks. New values can be written to memory, even after completion of a given measurement without loss of data, until the maximum capacity of 30,000 measurement values is used. The data can be stored to intermediate memory. The system records measurement values in relative time.

Depending upon the measured quantity, the interval can be set in steps of 10 ms, 100 ms, 1 s, 10 s and 60 s. Individual measurement values can also be saved to memory by pressing a key.

Measuring Cycle

Measuring Function	Interval Depending upon Resolution		
	1 200 000	120 000	12 000
V & I dc	1 sec	0.1 sec	0.01 sec
V & I ac	1 sec	0.1 sec	0.01 sec
Ohms	1 sec	0.1 sec	0.01 sec
Temp	1 sec	0.1 sec	0.01 sec
Freq	1 sec	0.1 sec	0.01 sec

Scope of Delivery

- Multimeter with protective rubber holster, 1 pair of safety test leads (1.5 m) with 4 mm diameter, 1000 V CAT III, 600 V CAT IV (KS17-2)
- 2 batteries, 1.5 V, type AA
- CD with operating instructions
- 1 DKD calibration certificate
- HC20 Hardcase

Applicable Regulations and Standards

IEC/EN 61010, part 1:2001/VDE 0411-1:2002	Safety requirements for electrical equipment for measurement, control and laboratory use
DIN EN 61326 VDE 0843, part 20	Electrical equipment for control technology and laboratory use – EMC requirements
DIN EN 60529 DIN VDE 0470, part 1	Test instruments and test procedures – degrees of protection provided by enclosures (IP code)

Warranty

24 months for materials and workmanship

1 to 3 years for calibration (depending upon application)

Internal Clock

Time format DD.MM.YYYY hh:mm:ss

Resolution 0.1 s

Accuracy ± 1 min. per month

Temperature Influence 50 ppm/K

Power Supply

Battery 2 ea. 1.5 V, size AA, alkaline manganese per IEC LR6

Service life: approx. 16 hours

Battery test: Battery capacity display with battery symbol

Power OFF function: Multimeter is switched off automatically

- If battery voltage drops to below approx. 1.8 V
- If none of the keys or the rotary switch are activated for an adjustable duration of 10 to 59 minutes, and the multimeter is not in the continuous operation mode

Fuse

All current measuring ranges are protected by an internal 250 mA fuse. A defective fuse may only be replaced by an authorized service center. Voltage at the measuring current circuit may not exceed 600Vrms

Electrical Safety

Per IEC 61010-1:2001/VDE 0411-1:2002

Measurement Installation Categories

Category II Operating voltage 600V

Category III Operating voltage 300 V

Test voltage 3.7 kV~

Display

LCD panel (65 mm x 30 mm) digital display

including unit of measure, type of current and various special functions.

Digital

Display/char height	7-segment characters / 12 mm
Resolution	6½ digits 1,200,000 counts
Overflow display	“OL” is displayed for ≥1,250,000 digits
Polarity display	“–” (minus sign) is displayed if pos. lead is connected to “⊥”
Refresh rate	1 times per sec.

Ambient Conditions

Operating temp. range	–5° C ... +50° C
Storage temp. range	–25° C ... +70° C (without batteries)
Relative humidity	Max.75%, non condensing

Electromagnetic Compatibility

Interference emission	EN 61326: May 2004, class B
Interference immunity	EN 61326: May 2004, appendix E
	IEC 61000-4-2: Dec. 2001
	Feature A
	8 kV atmospheric discharge
	4 kV contact discharge
	IEC 61000-4-3: Dec. 2001
	Feature B 3 V/m

Mechanical Design

Housing	Impact resistant plastic (ABS)
Dimensions	84 mm x 195 mm x 35 mm
Weight	Approx. 0.35 kg with batteries
Protection	IP 50 (terminals IP 20)

Specifications

Meas. Function	Measuring Range	Resolution at Measuring Range Upper Limit			Input Impedance		Inherent Deviation at Max. Resolution under Reference Conditions $\pm(\dots\% \text{ rdg.} + \% R)$		Frequency Range in Hz	Overload Capacity ³⁾	
		1,200,000 ¹⁾	120,000 ¹⁾	12,000 ¹⁾	—	∞	—	∞ ^{4) 5)}		Value	Duration
V	100 mV	0.1 μ V	1 μ V	10 μ V	> 1 G Ω	> 1 G Ω // < 50 pF	0.005 + 0.0006 ⁶⁾	0.08 + 0.06 ⁷⁾	45 ... 65	600 V eff sine	continuous
								0.1 + 0.1	10 ... 1 k		
								5 + 0.5	1 k ... 5 k		
	1 V	1 μ V	10 μ V	100 μ V	> 1 G Ω	10 M Ω // < 50 pF	0.0030 + 0.0004	0.08 + 0.06 ⁷⁾	45 ... 65		
								0.1 + 0.1	10 ... 1 k		
								0.2 + 0.1	1 k ... 10 k		
	10 V	10 μ V	100 μ V	1 mV	10 M Ω	10 M Ω // < 50 pF	0.0030 + 0.0004	0.08 + 0.06	45 ... 65		
								0.1 + 0.1	10 ... 1 k		
								0.2 + 0.1	1 k ... 10 k		
	100 V	100 μ V	1 mV	10 mV	10 M Ω	10 M Ω // < 50 pF	0.0030 + 0.0006	0.1 + 0.1	10 k ... 50 k		
3 + 0.1								50 k ... 100 k			
0.08 + 0.06								45 ... 65			
600 V ²⁾	1 mV	10 mV	100 mV	10 M Ω	10 M Ω // < 50 pF	0.0040 + 0.0010	0.2 + 0.1	10 ... 1 k			
							3 + 0.1	1 k ... 10 k			
							Approx. Voltage Drop at Upper R Limit				
mA	100 μ A	100 pA	1 nA	10 nA	150 mV	150 mV	0.02 + 0.002	0.08 + 0.06	45 ... 65	0.18 A	continuous
	1 mA	1 nA	10 nA	100 nA	1.5 V	1.5 V					
	10 mA	10 nA	100 nA	1 μ A	150 mV	150 mV					
	100 mA	100 nA	1 μ A	10 μ A	1.5 V	1.5 V					
Ω	100 Ω	0.1 m Ω	1 m Ω	10 m Ω	3 V	1 mA	$\pm(\dots\% \text{ rdg.} + \% R)$	0.005 + 0.001 ⁸⁾	600 V eff sine	10 min.	
	1 k Ω	1 m Ω	10 m Ω	100 m Ω	3 V	1 mA					0.005 + 0.001 ⁸⁾
	10 k Ω	10 m Ω	100 m Ω	1 Ω	3 V	100 μ A					0.005 + 0.001
	100 k Ω	0.1 Ω	1 Ω	10 Ω	3 V	10 μ A					0.005 + 0.001
	1 M Ω	1 Ω	10 Ω	100 Ω	3 V	1 μ A					0.05 + 0.002
	10 M Ω	10 Ω	100 Ω	1000 Ω	3 V	100 nA					0.5 + 0.02
Ω ⁴⁾	100 Ω			10 m Ω	3 V	1 mA	0.05 + 0.01				
Hz	1 Hz ²⁾ ...	0.000 001 Hz					0.05% rdg.				
	100 kHz	0.1 Hz									
$^{\circ}$ C/ $^{\circ}$ F					Sensor						
	-200.00 ... +850.00 $^{\circ}$ C	0.01 $^{\circ}$ C	0.1 $^{\circ}$ C	1 $^{\circ}$ C	Pt 100 / Pt 1000		$\pm(0.05\% \text{ rdg.} + 0.08 \text{ K})$ ⁹⁾		600 V eff sine	10 min.	
	-210.0 ... +1200.0 $^{\circ}$ C	0.1 $^{\circ}$ C	0.1 $^{\circ}$ C	1 $^{\circ}$ C	J (Fe-CuNi)		$\pm(0.7\% \text{ rdg.} + 0.3 \text{ K})$ ⁹⁾		600 V eff sine		
-270.0 ... +1372.0 $^{\circ}$ C	K (NiCr-Ni)										

- 1) Display places: 6% for DC and Ω , 5% for AC.
Resolution is adjustable for the storage and transmission of measurement values.
2) Smallest measurable frequency with sinusoidal measuring signal, combined period and frequency measurement
3) At 0 to + 40 $^{\circ}$ C
4) As of 10% of the measuring range. See page 3 for influences.
5) DC components: max. 10% of measurement value

- 6) ZERO appears at the display for active "zero balancing" function.
7) Range 100mV ∞ : $U_E = 10 \dots 30 \text{ mV}_{\text{eff}} + \text{additional error of } 0.5\% R$
1 V ∞ : $U_E = 0.1 \dots 0.3 \text{ V}_{\text{eff}} + \text{additional error of } 0.3\% R$
8) Plus sensor deviation
9) Plus sensor deviation, internal or external reference junction can be selected

Key: R = measuring range, rdg. = reading (measurement value)



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