DranTech OUTDOOR

Weather-resistant TRMS Digital Multimeter

• Digital Hand-Held Multimeter with RMS Measurement: VAC TRMS, VAC+DC TRMS, VDC, Hz (V), Hz (A), Ω, V , °C/°F (TC)
• 4 ½ -digit display (12,000 counts), with backlit display

• Direct Current measurement with increased accuracy and Current measurement, via clip-on current transformer and sensors

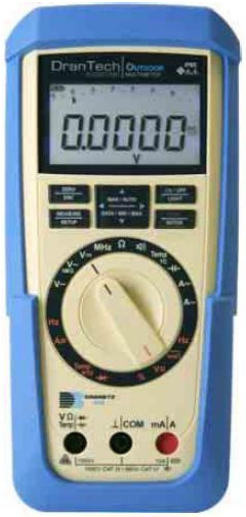
• Data Storage of Min-Max Values

• Automatic or Manual Measuring Range Selection

• Analog Scale for Quick Trend Indication – Bar Graph or Pointer

• Rugged IP65 Housing with Protective Rubber Holster

• Remote configured, and momentary and stored measurement data via the bidirectional infrared Interface with DranWin software



Applications

This multimeter is suitable for universal use in electrical engineering, electrical installation, laboratory applications, telecommunication, technical training, as well as for troubleshooting in the field in potentially wet environments with the housing rating of IP65.

Features

Three Connector Terminals with patented Automatic Blocking Sockets *
All current ranges are implemented via a single connector socket which prevents any possibility of operator error. Beyond this, the automatic blocking sockets prevent incorrect connection of the measurement cables, as well as selection of the wrong measured quantity. Danger to the user, the instrument and the device under test resulting from operator error is therefore eliminated.
* Patented (patent no. DE 40 27 801 C2 and US 5,166,599)

Overload Protection
The instrument is safeguarded for up to 1000 V in all measuring functions by overload protection. Voltages of greater than 1000 V and current of greater than 10 or 16 A are indicated acoustically.

RMS Value with Distorted Waveforms
The measuring method applied allows for waveform independent RMS measurement (TRMS AC and AC+DC) for voltage and current up to 20 kHz).

Selectable Filter for V AC Measurement
A 1 kHz low-pass filter can be activated if required, for example when measuring motor voltage at variable frequency drives (ASDs).

Battery Capacity Indication – Power Saving Circuit
The battery load capacity is indicated on the display. 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
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.

Scope of Delivery

- Multimeter with 1 pair of safety test leads (1.5 m) with 4 mm diameter, 1000 V CAT III, 600 V CAT IV (KS17-2)
- 2 alkaline batteries, 1.5 V, type AA
- CD with operating instructions,
- DKD calibration certificate
- Pack of 10 superfast Fuses 10A/1kV
- 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
(2 ea. 1.2 V NiMH rechargeable battery possible)

Service life with alkaline manganese: approx. 200 hours

Battery test: Battery capacity display with battery symbol in 4 segments: .

Display of momentary battery voltage via menu function.
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 continuous operating mode

Fuse

Fuse FF (UR) 10 A/1000 V AC/DC; 10 mm x 38 mm, Switching capacity: 30 kA at 1000 V AC/ DC, protects the current measurement input in the 100 µA through 10 A ranges

Display

LCD panel (65 mm x 36 mm) with analog and digital display including unit of measure, type of current and various special functions

Background illumination is switched off approximately

1 minute after it has been activated (backlit display)

Analog

Display	LCD scale with bar graph or pointer, depending on the selected parameter setting
Scaling	With 4 division lines each, 1 bar/pointer corresponds to 500 digits at the digital display
Polarity display	In auto-ranging mode
Overflow display	With the symbol ▶
Update rate	40 measurements per second and display refresh

Digital

Display/char height	7-segment characters / 15 mm
Resolution	4 1/2 digits, 12,000 counts
Overflow display	“OL” is displayed for ≥12,000
Polarity display	“–” (minus sign) is displayed if pos. lead is connected to “⊥”
Measuring rate	10 and 40 measurements per second with the Min-Max function except for the capacitance, frequency and duty cycle measuring functions
Refresh rate	2 times per sec., every 500 ms

Acoustic Signals

For voltage: Intermittent signal at above 1000 V

For current: Intermittent signal at above 10 A
Continuous signal at above 16 A

Electrical Safety

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

Cat. III 1000 V - Cat. IV 600 V

Test voltage 6.7 kV~

Electromagnetic Compatibility EMC

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

Ambient Conditions (to meet all specs)

Accuracy range	0 °C ... +40 °C
Operating temp. range	−10° C ... +50° C
Storage temp. range	−25° C ... +70° C (w/o batteries)
Relative humidity	Max.100%
Elevation	To 2000 m
Deployment	Indoors or Outdoors

Mechanical Design

Housing	Impact resistant plastic (ABS)
Dimensions	200 x 87 x 45 mm (without protective rubber holster)
Weight	Approx. 0.35 kg with batteries
Protection Housing:	IP 65

Specifications

Meas. Function	Measuring Range	Resolution at Upper Range Limit		Input Impedance		Intrinsic Error under Reference Conditions ±(... % rdg. + ... d)			Overload Capacity [2]	
		11,999	1199	⎓	~ / ≂	⎓	~ [4]	≂ [4]	Value	Time
V	100 mV	10 µV		≥ 9 MΩ	≥ 9 MΩ // < 50 pF	0.09 + 5 with ZERO	1 + 30 (> 300 d) [1]	1 + 30 (> 300 d) [1]	1000 V DC AC RMS sine [3]	Continuous
	1 V	100 µV		≥ 9 MΩ	≥ 9 MΩ // < 50 pF	0.05 + 3	0.5 + 9 (> 200 d)	1 + 30 (> 300 d)		
	10 V	1 mV		≥ 9 MΩ	≥ 9 MΩ // < 50 pF	0.05 + 3	0.5 + 9 (> 200 d)	1 + 30 (> 300 d)		
	100 V	10 mV		≥ 9 MΩ	≥ 9 MΩ // < 50 pF	0.05 + 3	0.5 + 9 (> 200 d)	1 + 30 (> 300 d)		
	1000 V	100 mV		≥ 9 MΩ	≥ 9 MΩ // < 50 pF	0.09 + 3	0.5 + 9 (> 200 d)	1 + 30 (> 300 d)		
				Voltage drop, approx. at upper range limit		⎓	~ [4]	≂ [4]		
A	100 µA	10 nA		12 mV	12 mV	0.5 + 5	1.5 + 10 (> 200 d)	1.5 + 30 (> 200 d)	0,2 A	dauernd
	1 mA	100 nA		120 mV	120 mV	0.5 + 3	1.5 + 10 (> 200 d)	1.5 + 30 (> 200 d)		
	10 mA	1 µA		16 mV	16 mV	0.5 + 3	1.5 + 10 (> 200 d)	1.5 + 30 (> 200 d)		
	100 mA	10 µA		160 mV	160 mV	0.5 + 3	1.5 + 10 (> 200 d)	1.5 + 30 (> 200 d)		
	1 A	100 µA		40 mV	40 mV	0.9 + 10	1.5 + 10 (> 200 d)	1.5 + 30 (> 200 d)	10 A: ≤ 5 min [5]	
	10 A	1 mA		600 mV	600 mV	0.9 + 10	1.5 + 10 (> 200 d)	1.5 + 30 (> 200 d)	16 A: ≤ 30 s [5]	
	Factor: 1:1/10/100/1000	Input		Input Impedance						
				Open-circuit voltage	Meas. curr. @ range limit	±(... % rdg. + ... d)				
Ω	100 Ω	10 mΩ		< 1.4 V	Approx. 300 µA	0.2 + 5 with active ZERO function			1000 V DC AC RMS sine	Max. 10 s
	1 kΩ	100 mΩ		< 1.4 V	Approx. 250 µA	0.2 + 5				
	10 kΩ	1 Ω		< 1.4 V	Approx. 100 µA	0.2 + 5				
	100 kΩ	10 Ω		< 1.4 V	Approx. 12 µA	0.2 + 5				
	1 MΩ	100 Ω		< 1.4 V	Approx. 1.2 µA	0.2 + 5				
	10 MΩ	1 kΩ		< 1.4 V	Approx. 125 nA	0.5 + 10				
	40 MΩ	10 kΩ		< 1.4 V	Approx. 20 nA	2.0 + 10				
⧈))	100 Ω	—	0.1 Ω	Approx. 8 V	Approx. 1 mA const.	1 + 5				
⧓	5,1 V [3]	—	1 mV	Approx. 8 V	Approx. 1 mA const.	0.5 + 3				

[1] Values of less than 200 digits are suppressed in the mV range.
15 (20) ... 45 ... 65 Hz ... 20 (1) kHz, sinusoidal. See influence error on page 54.
[2] At 0 ° ... + 40 °C
[3] Display up to max. 5.1 V, "OL" in excess of 5.1 V.
[4] Residual value deviates within 1 ... 30 d from the zero point due to TRMS converter when probe tips are short-circuited.
[5] Switch-off time > 10 min and Operating temp. range ≤ 40 °C

Specifications (cont'd)

Meas. Function	Measuring Range		Resolution at Upper Range Limit 11,999	Resolution at Upper Range Limit 1199	Input Impedance ⎓ Discharge resistance	Input Impedance ~ / ⎓ U_0 max	Intrinsic Error under Reference Conditions ±(... % rdg. + ... d)			Overload Capacity [2] Value	Overload Capacity [2] Time
F	10 nF			10 pF	10 MΩ	0.7 V	1 + 6 [5] with ZERO function active			1000 V DC AC RMS Sine	Max. 10 s
	100 nF			100 pF	1 MΩ	0.7 V	1 + 6 [5]				
	1 µF			1 nF	100 kΩ	0.7 V	1 + 6 [5]				
	10 µF			10 nF	12 kΩ	0.7 V	1 + 6 [5]				
	100 µF			100 nF	3 kΩ	0.7 V	5 + 6 [5]				
	1000 µF			1 µF	3 kΩ	0.7 V	5 + 6 [5]				
						f_{min} [7]	±(... % rdg. + ... d)				
Hz (V)	100.00 Hz		0.01 Hz			1 Hz	0.05 + 3 [10]			Hz (V) [8], Hz(A⏦C) [6], 1000 V Hz (A): [9]	Max. 10 s
Hz (A)	1.0000 kHz		0.1 Hz								
Hz (A⏦C)	10.000 kHz		1 Hz								
Hz (V)	100.00 kHz		10 Hz			10 Hz					
Hz (A)	30.00 kHz		10 Hz			10 Hz					
MHz	100 Hz ... 1 MHz		0.01 ... 100 Hz			1 ... 100 Hz	0.05 + 3	> 2 V ... 5 V		1000 V	Max. 10 s
%	2.0 ... 98%		—	0.01%	100 Hz ... 1 kHz	1 Hz	0.1 R per kHz	> 2 V ... 5 V			
	5.0 ... 95%		—	0.01%	... 10 kHz	1 Hz	0.1 R per kHz	> 2 V ... 5 V			
	10... 90%		—	0.01%	... 100 kHz	1 Hz	0.1 R per kHz	> 2 V ... 5 V			
							±(... % rdg. + ... d)				
°C/°F	Pt100	– 200.0 ... +850.0° C	0.1 °C				0.3 + 15 [11]			1000 V DC/AC RMS Sine	Max. 10 s
	Pt1000	– 150.0 ... +850.0° C					0.3 + 15 [11]				
	K (NiCr-Ni)	– 250.0 ... +1372.0° C					1% + 5 K [11]				

[2] At 0 ° ... + 40 °C
[6] Applies to measurements at film capacitors
[7] Lowest measurable frequency for sinusoidal measuring signals symmetrical to the zero point
[8] Overload capacity of the voltage measurement input:
power limiting: frequency x voltage, max. 3×10^8 V x Hz for U > 100 V
[9] Overload capacity of the current measurement input:
See current measuring ranges for maximum current values.
[10] Input sensitivity, sinusoidal signal, 10% to 100% of the measuring range
[11] Plus sensor deviation

Key: R = meas. range, d = digit(s), rdg. = measured value (reading)

Data Interface

Type	Optical via infrared light through the housing
Data transmission	Serial, bidirectional (not IrDa compatible)
Protocol	Device specific
Baud rate	38,400 baud
Functions	– Select/query measuring functions and parameters – Query momentary measurement data --Read out stored measurement data

The USB plug-in interface adapter (see accessories) is used for adaptation to the PC's USB port.

Internal Measured Value Storage

Memory capacity 4 MBit / 540 kB for approx. 15,400 measured values with date and time stamp

DRANETZ BMI

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CAT IV DKD Calibration Certificate