

DranTech ISO

Insulation Tester

TRMS Digital Multimeter | Datalogger



- Insulation resistance measurement with interference voltage detection, test voltages: 50 V, 100 V, 250 V, 500 V, 1000 V
- Multimeter with diverse functions (V, Ω , F, Hz)
- TRMS measurements: TRMS AC / AC+DC for current/voltage up to 10 kHz
- Low-pass filter, 1 kHz/-3 dB in the V AC range
- Direct current measurement, 100 nA to 10 A
- Current measurement with clip-on current sensors – CLIP A transformation ratio of 1 mV:1 mA to 1 mV:1 A can be selected and is taken into consideration at the display.
- Precision temperature indicator, °C or °F, for Pt100/Pt1000 sensors and type K thermocouples
- Diode measurement ($I_k = 1$ mA, U_{flow} to 5.1 V) and continuity testing
- Display: 4 $\frac{3}{4}$ place, (31,000 counts), illumination can be activated
- Acoustic signals for: continuity testing, dangerous contact voltages, exceeded overload limits
- Min-Max value storage
- Data memory and internal clock, power pack adapter socket
- IP 54 Housing protection, dust and splash protected, protective cover
- Bidirectional infrared interface for exchanging data with a PC



Applications

The DranTech ISO multimeter is a rugged portable measuring instrument for use in the field. It is suitable for servicing household appliance, machines and systems. The instrument can be used in the field and is equipped with an internal, mains-independent power supply.

Features

Three Connector Jacks with patented Automatic Blocking Sockets *

All current ranges are implemented via a single connector jack 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 thus ruled out.

* Patented (patent no. DE 40 27 801 C2 and US 5,166,599)

Insulation Resistance | Interference Voltage Detection

Depending upon the utilized instrument variant, insulation resistance can be measured with an adjustable test voltage of 50 to 1000 V. If the instrument detects interference voltage greater than 15 V AC or 25 V DC during insulation testing, an error message is briefly displayed at the LCD panel. The instrument is then automatically switched to voltage measurement, and the currently measured voltage value is displayed.

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 Waveshape

The utilized measuring method allows for waveshape independent RMS measurement (TRMS AC and AC+DC) for voltage and current up to 10 kHz).

Activatable Filter for V AC Measurement

A 1 kHz low-pass filter can be activated if required, for example when measuring motor voltage at electronic frequency converters.

Power Saving Circuit

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 valid 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 the factory.

Included

- 1 multimeter with 1 pair of safety measurement cables (1.5 m) with 4 mm test probes, 1000 V CAT III, 600 V CAT IV (KS17-2)
- 2 batteries, 1.5 V, type AA
- 1 CD and 1 condensed 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 mignon cell (2 ea. size AA), alkaline manganese per IEC LR6 (2 ea. 1.2 V NiMH rechargeable battery also possible)
Service life with alkaline manganese: approx. 200 hours
Battery test Battery capacity display with battery symbol in 4 segments: .
Querying 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 the continuous operation 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 range.


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

Background illumination is switched off approximately 1 minute after it has been activated.

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 With automatic switching
Overflow display With the symbol 
Measuring rate 40 measurements per second and display refresh

Digital

Display/char 7-segment characters
Height 15 mm
Number of places 4 ¼ place 31,000 steps
Overflow display “OL” is displayed for ≥31,000 digits
Polarity display “-” (minus sign) is displayed if plus pole is connected to “⊥”
Measuring rate 10 and 40 measurements per second with the Min-Max function except for the capacitance, frequency and keying ratio 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
Safety class II
Operating voltage 1000 V
Test voltage 5.2 kV~

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 B 8 kV atmospheric discharge 4 kV contact discharge IEC 61000-4-3: Dec. 2001 Feature A 3 V/m

Ambient Conditions

Accuracy range	0 °C ... +40 °C
Operating temp. range	-10° C ... +50° C
Storage temp. range	-25° C ... +70° C (without batteries)
Relative humidity	Max.75%, no condensation allowed
Elevation	To 2000 m
Deployment	Indoors, except within specified ambient conditions

Mechanical Design

Housing	Impact resistant plastic (ABS)
Dimensions	200 x 87 x 45 mm (without protective rubber cover)
Weight	Approx. 0.35 kg with batteries
Protection Housing:	IP 54 (pressure equalization by means of the housing)

Characteristic Values

Meas. Function (input)	Measuring Range	Resolution at Upper Range Limit	Input Impedance		Intrinsic Error under Reference Conditions			Overload Capacity ²	
			∞	\sim / ∞	$\pm(\dots \% \text{ rdg.} + \dots \text{ d})$	$\pm(\dots \% \text{ rdg.} + \dots \text{ d})$	$\pm(\dots \% \text{ rdg.} + \dots \text{ d})$	Value	Time
V	300.0 mV	100 μ V	9 M Ω	9 M Ω // < 50 pF	0.2 + 3 ¹⁰	1 + 3 (> 100 d)	1.5 + 5 (> 100 d)	1000 V DC AC RMS Sine ⁶	Cont.
	3.000 V	1 mV	9 M Ω	9 M Ω // < 50 pF	0.15 + 2	1 + 3 (> 30 d)	1.5 + 5 (> 100 d)		
	30.00 V	10 mV	9 M Ω	9 M Ω // < 50 pF	0.15 + 2				
	300.0 V	100 mV	9 M Ω	9 M Ω // < 50 pF	0.15 + 2				
	1000 V	1 V	9 M Ω	9 M Ω // < 50 pF	0.2 + 2				
Voltage drop at approx. range limit			∞	$\sim 1,11$	$\approx 1,11$				
A	300.0 μ A	100 nA	18 mV	18 mV	0.5 + 5	1.5 + 5 (> 100 d)	1.5 + 5 (> 100 d)	0.3 A 10 A	Cont. 5 min ¹²
	3.000 mA	1 μ A	180 mV	180 mV	0.2 + 3	1.5 + 5 (> 30 d)	1.5 + 5 (> 100 d)		
	30.00 mA	10 μ A	32 mV	32 mV	0.5 + 3				
	300.0 mA	100 μ A	200 mV	200 mV	0.2 + 3				
	3.000 A	1 mA	120 mV	120 mV	1 + 5				
	10.00 A	10 mA	400 mV	400 mV	1 + 5				
Factor: 1:1/10/100/1000 Input			Input impedance		∞	$\sim 1,11$	$\approx 1,11$		
A \curvearrowright @ A	0.03, 0.3, 3, 30 A	30 mA	Current measurement input (jack A-)		—	1.5 + 5 (> 100 d)	—	0.3 A	Cont.
	0.3, 3, 30, 300 A 3, 30, 300, 3k A	300 mA 3 A			Plus clip-on current transformer error			3 A	5 min.
A \curvearrowright @ V	0.3, 3, 30, 300 A	300 mV	Voltage measurement input approx. 9 M Ω (X V socket)		0.5 + 3	1.5 + 3 (> 300 d)	1.5 + 5 (> 300 d)	Meas. input ¹⁴ :	
	3, 30, 300, 3k A 30, 300, 3k, 30k A	3 V 30 V			Plus clip-on current sensor error			1000 V RMS	Max. 10 s
			Open-circuit voltage	Meas. current at range limit	$\pm(\dots \% \text{ rdg.} + \dots \text{ d})$				
Ω	300.0 Ω	100 m Ω	< 1.4 V	Approx. 300 μ A	0.5 + 3 with ZBRO function active			1000 V DC AC RMS Sine	Max. 10 s
	3.000 k Ω	1 Ω	< 1.4 V	Approx. 200 μ A	0.5 + 2				
	30.00 k Ω	10 Ω	< 1.4 V	Approx. 30 μ A	0.5 + 2				
	300.0 k Ω	100 Ω	< 1.4 V	Approx. 3 μ A	0.5 + 2				
	3.000 M Ω	1 k Ω	< 1.4 V	Approx. 3 μ A	0.5 + 2				
	30.00 M Ω	10 k Ω	< 1.4 V	Approx. 33 nA	2.0 + 5				
\approx	300.0 Ω	100 m Ω	Approx. 10 V	Approx. 1 mA const.	2 + 5				
\rightarrow	5.1 V ^d	1 mV	Approx. 10 V		2 + 5				

Characteristic Values (cont'd)

		Discharge resist.		U_0 max	$\pm(\dots \% \text{rdg.} + \dots \text{d})$		
F	30.00 nF	10 pF	10 M Ω	0.7 V	$1 + 6^4$ with ZERO function active	1000 V DC AC RMS Sine	Max. 10 s
	300.0 nF	100 pF	1 M Ω	0.7 V	$1 + 6^4$		
	3.000 μ F	1 nF	100 k Ω	0.7 V	$1 + 6^4$		
	30.00 μ F	10 nF	12 k Ω	0.7 V	$1 + 6^4$		
	300.0 μ F	100 nF	3 k Ω	0.7 V	$5 + 6^4$		
				f_{min}^b	$\pm(\dots \% \text{rdg.} + \dots \text{d})$		
Hz (V)	300.0 Hz	0.1 Hz		1 Hz	$0.1 + 2^8$	Hz (V) ⁶ , Hz(A Ω) ⁶ , 1000 V	Max. 10 s
Hz (A)	3.000 kHz	1 Hz		10 Hz			
Hz (A Ω)	30.00 kHz	10 Hz		100 Hz			
Hz (V)	300.0 kHz	100 Hz		100 Hz			
		Range	Vpp	Frequency range			
					$\pm(\dots \% \text{rdg.} + \dots \text{d})^9$		
°C	Pt100	-200.0 ... +850.0 °C	0.1 °C		0.5% + 15	1000 V DC/AC RMS Sine	Max. 10 s
	Pt1000	-150.0 ... +850.0 °C			0.5% + 15		
	K	-250.0 ... +1372.0 °C			1% + 5K		
	(NiCr-Ni)						

- 1 15 ... 45 ... 65 Hz ... 10 (5) kHz sine. See page 6 regarding influence
- 2 At 0° ... + 40° C
- 3 Display of up to max. 5.1 V, "OL" in excess of 5.1 V.
- 4 Apply to measurements at film capacitors
- 5 Lowest measurable frequency for sinusoidal measuring signals symmetrical to the zero point
- 6 Overload capacity of the voltage measurement input: power limiting: frequency x voltage max. $8 \times 10^6 \text{ V} \times \text{Hz}$ at > 100 V
- 7 Overload capacity of the current measurement input: See current measuring ranges for maximum current values.
- 8 Input sensitivity, sinusoidal signal, 10% to 100% of voltage or current measuring range; limitation: up to 30% of the range at up to 100 kHz in the mV measuring range, 30% of the range in the 3 A measuring range. The voltage measuring ranges with max. 30 kHz apply in the A Ω measuring range.
- 9 Plus sensor deviation
- 10 With ZERO function active

- 11 With short circuited terminal tips
Exception: residual value of 1 to 10 digits, in the mV/ μ A range
1 to 35 d at zero point due to the TRMS converter
- 12 10 minute cool-down period

Key: d = digit(s), MR = measuring range, rdg. = reading



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Insulation Resistance Measurement ¹

Measuring Range	Resolution	Nominal Voltage U_{iso}^2	Intrinsic Error under Reference Conditions $\pm(\% \text{rdg} + \text{d})$
300 mV ... 1000 V \approx		Ri=1M Ω	3 + 30 > 100 digits
5 ... 310.0 k Ω	0.1 k Ω	50, 100, 250, 500	3 + 5
0.280 ... 3.100 M Ω	1 k Ω	50, 100, 250, 500, 1000 V	3 + 5
02.80 ... 31.00 M Ω	10 k Ω	50, 100, 250, 500, 1000 V	5 + 5
028.0 ... 310.0 M Ω	100 k Ω	50, 100, 250, 500, 1000 V	5 + 5
0280 ... 3100 M Ω	1 M Ω	500, 1000 V	5 + 5

¹ During insulation resistance measurement (M Ω_{GUISO}): If ERROR is displayed as „FEHL“ >> limits: $U_{\text{interference}} > 10 \dots 20 \text{ V}$ and $U_{\text{interference}} = U_{\text{ISO}}$, Ri < 50 k Ω @ Uiso 50 V, Ri < 100 k Ω @ Uiso 100 V, Ri < 250 k Ω @ Uiso 250 V, Ri < 500 k Ω @ Uiso 500 V, Ri < 1000 k Ω @ Uiso 1000 V

² The ability to select a test voltage depends upon the customer-specific variant.

Measuring Function	Nom. Voltage U_N	Open-Circuit Voltage U_0	Nom. Current I_N	Short-Circuit Current I_k	Acoustic Signal for	Overload Capacity Value	Time
$U_{\text{interference}}/M\Omega_{\text{GUISO}}$	—	—	—	—	$U > 1000 \text{ V}$	1000 V \approx	Cont.
$M\Omega_{\text{GUISO}}$	50, 100, 250, 500 V	Max. $1.1 \times U_{\text{ISO}}$	1.0 mA	< 1.2 mA	$U > 1000 \text{ V}$	1000 V \approx	10 s
$M\Omega_{\text{GUISO}}$	1000 V	Max. $1.1 \times U_{\text{ISO}}$	0.5 mA	< 1.2 mA	$U > 1000 \text{ V}$	1000 V \approx	10 s