

DranTech PMIT

Precision Milliohm Insulation Resistance Tester
Digital Multimeter and Data Logger



- **All-in-one: Milliohm Resistance Meter, Digital Multimeter, Insulation Resistance Tester and Data Logger**

Compact and rugged for service applications under harsh conditions as well as laboratory use -- a single device for many applications

- **Kelvin connection (4-wire measurement)**

Suppresses influence from test leads and contact resistances on measurements of device under test

- **Insulation resistance tester**

Testing with 50 to 500 V on components, cables and conductors, for example on aircraft and in on-board electrical systems

- **Compact and multifunctional**

Can be used advantageously in aircraft cockpits as well as in other tight spaces, which would otherwise require the use of several individual instruments.

- **DATA Hold**

For quick, reliable measurement and storage of individual measured values, e.g. voltages at discrete cells of batteries and emergency power supplies

- **LCD panel with backlit display**

High contrast, even under adverse ambient light conditions



Applications

The DranTech PMIT is a compact, rugged and reliable instrument, which is equally suitable for precision measuring and recording tasks in the factory, for field service and in the laboratory:

- Adjustment of shunts in instrumentation
- Testing of electrical connections at conductor bars for open pit mining, in potential bonding systems, and for industrial and household applications
- Testing of cable resistance, wiring, shunt resistors in PCBs and thick-film circuits
- Measurement of contact resistance in relays, switches and power interrupters
- Testing of resistance in fuses, as well as conductor resistance in heavy current circuits
- Testing of winding resistance in transformers, coils, small motors etc.
- Testing of discharge resistance on aircraft, and at aircraft outer skin components
- Contact resistance testing in uninterruptible power supplies
- Measurement of cell voltages, for example in on-board batteries and emergency power supplies
- Contact resistance testing at welding seams

Features

The PMIT is a compact milliohm resistance meter plus multimeter and thermometer for the measurement of low-value contact resistance on aircraft outer skins (lightning protection, wick test), and for general low-resistance measurements. It is also used for service and repair work performed on airplane and helicopter electrical systems (voltage, insulation, milliohm and temperature measurement).

In addition to its Digital Multimeter functions for electrical quantities, the instrument also includes a mega-ohm measuring function with insulation test voltages of 50, 100, 250 and 500 V, as well as temperature measurement with Pt100 and Pt1000 sensors.

Milliohm Resistance

The PMIT milliohm resistance meters are the modern alternative for the well known TH2 (Thomson) and Wh2 (Wheatstone) measuring bridges. They provide an expanded measuring range, greater accuracy and easier reading. As universal measuring and test instruments, they acquire and record values to an

integrated memory module including resistance in the milliohm and micro-ohm ranges, as well as "normal multimeter resistance values" in the ohm to mega-ohm ranges by feeding a measuring current to the resistor, conductor or device under test DUT. The respective measuring current is determined by the rotary selector switch setting and lies within a range of 1 to 0.02 A in the milliohm ranges. The instrument also measures and records insulation resistance with test voltage selectable in steps, for example in order to test resistance in on-board electrical systems for aircraft, ocean vessels, etc., and for testing overvoltage arresters and much more.

Easy Operation

Operation is very easy. Simply connect the low-resistance device under test to the instrument with the included measurement cables, Kelvin clips or 4-wire probes (KC27), and select the proper measuring range.

Integrated Measured Value Memory and Interface

Each PMIT is equipped with a measured value memory module and can thus be utilized as a data logger or a recording instrument for all measuring functions. Measurement results can be transmitted to a PC either off-line via the optical interface which is furnished as standard equipment, or online with an optional bidirectional adapter. In this way, for example, characteristic voltage and temperature curves can be displayed and analyzed in chart recorder format relative to real-time, or individual measured values, e.g. voltages for each of the cells in a storage battery, can be saved with the DATA Hold function and analyzed at a PC in tabular form using the optional DranWin 10 software.

Offset Balancing

Automatic offset balancing is provided for the lower measuring ranges.

Protection Against Operator Error

The PMIT is protected by special circuitry against accidental short-term connection to devices under test with fault voltages of up to 600 V.

Test Functions and Automatic Functions

All instruments are equipped with diode and continuity test functions, as well as automatic and manual measuring range selection and automatic shut-off.

Protective Rubber Holster for Harsh Conditions

The device features a very compact, rugged design. In addition it is protected against damage in the event of impacts or dropping with a protective rubber holster that also serves as a tilt stand. The rubber material also prevents sliding if it is used on a vibrating surface.

DKD Calibration Certificate

The DranTech PMIT is 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 PMIT can be inexpensively recalibrated by any calibration laboratory.

Scope of Delivery

- PMIT Multifunction Meter with protective rubber holster
- Rechargeable NiMH batteries + Charger
- DranWin 10 Software
- CD with operating instructions,
- DKD calibration certificate
- HC30 Hardcase for Meter & Accessories

Optional: Kelvin Clips KC4 + KC27

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 3 ea. 1.2 V/2100 mAh NiMH cell (size AA), Service life depends on function
3-30 hours

Battery test: Battery capacity display with battery symbol

Recharging with NA5/600 charger: approx. 20 hours

Fuse

Fuse links for all mOhm measuring ranges FF (UR) 1.6 A/1000 V AC/DC, 6.3 mm x 32 mm, 10 kA switching capacity at 1000 V AC /DC and ohmic load

Acoustic Signals

For display > 610 V in 600 V range (intermittent tone, 250 ms on/off)

Electrical Safety

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

Measurement Category II

Operating voltage 600 V

Test voltage 3.5 kV~

Display

LCD panel (65 mm x 30 mm) with display of up to 3 measured values, unit of measure, type of current and various special functions.

Backlit display

Display/char height 7-segment characters / 12 mm

Resolution 4¼ digits, 30999 counts

Overflow display "OL" is displayed for ≥31,000 digits

Polarity display "-" (minus sign) is displayed if pos. lead is connected to "⊥"

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 40-60%, non condensing
Elevation to 2000m

Deployment Indoors only, except with specified ambient conditions

Electromagnetic Compatibility

Interference emission EN 61326: 2002, class B

Interference immunity EN 61326: 2002

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. 0.42 kg with batteries

Protection IP 54 (connector jacks IP 20)

Data Interface

With BD2323 interface adapter accessory:

Type RS232C Serial

Data Optical via infrared light through the housing

Baud rate 9600 baud

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Specifications

| Measuring Function | Measuring Range | Resolution at Upper Range Limit 4% 30 000 / 3% 3000 ¹⁾ | Input Impedance | | Intrinsic Error at Max. Resolution under Reference Conditions $\pm(\dots \% \text{ rdg.} + \dots \text{ d})$ | | Overload Capacity ³⁾ | |
|---------------------------------------|-------------------------------|----------------------------------------------------------------------|--------------------------------|----------------------------|-----------------------------------------------------------------------------------------------------------------|-------------------|----------------------------------|-----------|
| | | | DC | AC ⁶⁾ | DC | AC ⁶⁾ | Value | Time |
| | | | | | | | | |
| V | 3 V | 100 μV | 2.1 M Ω | 2.1 M Ω // < 50 pF | 0.1 + 10 ⁴⁾ | 0.2 + 10 (>500 d) | 600 V DC AC eff sine | Cont. |
| | 30 V | 1 mV | 2.1 M Ω | 2.1 M Ω // < 50 pF | 0.1 + 5 | 0.2 + 10 (>500 d) | | |
| | 300 V | 10 mV | 2.1 M Ω | 2.1 M Ω // < 50 pF | 0.1 + 5 | 0.2 + 10 (>500 d) | | |
| | 600 V | 100 mV | 2.1 M Ω | 2.1 M Ω // < 50 pF | 0.1 + 5 | 0.2 + 10 (>500 d) | | |
| | | | Open-Circuit Voltage | Measuring Current, Approx. | $\pm(\dots \% \text{ rdg.} + \dots \text{ d})$ | | | |
| mΩ @1A (4 L) | 3 m Ω | 0.001 m Ω | 3.5 ... 4 V | 1 A ⁷⁾ | 1 + 10 | | $\pm 0.6 \text{ V}^{11)}$ | Cont. |
| | 30 m Ω | 0.001 m Ω | 3.5 ... 4 V | 1 A ⁷⁾ | 0.5 + 10 | | | |
| | 300 m Ω | 0.01 m Ω | 3.5 ... 4 V | 1 A ⁷⁾ | 0.5 + 10 | | | |
| mΩ (4 L) | 30 m Ω | 0.01 m Ω | 3.5 ... 4 V | 200 mA | 0.25 + 10 | | $\pm 0.6 \text{ V}^{11)}$ | Cont. |
| | 300 m Ω | 0.01 m Ω | 3.5 ... 4 V | 200 mA | | | | |
| | 3 Ω | 0.1 m Ω | 3.5 ... 4 V | 20 mA | | | | |
| Ω (2 L) | 300 Ω | 10 m Ω | 3.5 ... 4 V | 1 mA | 0.1 + 10 ⁴⁾ | | 600 V DC AC eff sine | max. 10 s |
| | 3 k Ω | 100 m Ω | 3.5 ... 4 V | 100 μA | 0.1 + 5 ⁴⁾ | | | |
| | 30 k Ω | 1 Ω | 3.5 ... 4 V | 20 μA | 0.1 + 5 | | | |
| | 300 k Ω | 10 Ω | 3.5 ... 4 V | 20 μA | 0.1 + 5 | | | |
| | 3 M Ω | 100 Ω | 3.5 ... 4 V | 10 μA | 0.1 + 5 | | | |
| \varnothing) | 300 Ω | 0.1 Ω | 3 V | 1 mA | 1 + 5 | | | |
| $\rightarrow+$ | 3 V | 0.1 mV | 3 V | 1 mA | 1 + 5 | | | |
| | | | Test Voltage | Measuring Current | | | | |
| MΩ @ ... V | 30 M Ω | 0.01 M Ω | 50/100/250/500 V | < 1.5 mA | 2 + 10 | | 600 V DC/AC | max. 10 s |
| | 300 M Ω | 0.1 M Ω | 50/100/250/500 V | | 2 + 10 | | | |
| | 3000M Ω ¹⁰⁾ | 1 M Ω | 50/100/250/500 V | | 3 + 10 | | | |
| | | | f_{min} ²⁾ | | $\pm(\dots \% \text{ rdg.} + \dots \text{ d})$ | | | |
| Hz | 300 Hz | 0.01 Hz | 1 Hz | | 0.05 + 5 ⁹⁾ | | 600 V AC | Cont. |
| | 3 kHz | 0.1 Hz | | | | | | |

| | Temperature Sensor | Measuring Range | Resolution | Intrinsic Error at Max. Resolution under Reference Conditions $\pm(\dots \% \text{ rdg.} + \dots \text{ d})$ ⁸⁾ | | |
|---------------------------------------------------------|----------------------|--------------------------------------|------------------------|----------------------------------------------------------------------------------------------------------------------------|----------------------------------|-----------|
| $^{\circ}\text{C} / ^{\circ}\text{F}$ | Pt 100 ⁹⁾ | -200.0 ... +100.0 $^{\circ}\text{C}$ | 0.1 $^{\circ}\text{K}$ | 1 K + 5 | 600 V DC AC eff sine | max. 10 s |
| | | +100.0 ... +600.0 $^{\circ}\text{C}$ | | 0.5 + 5 | | |
| | Pt 1000 | -200.0 ... +100.0 $^{\circ}\text{C}$ | | 1 K + 5 | | |
| | | +100.0 ... +600.0 $^{\circ}\text{C}$ | | 0.5 + 5 | | |
| | Ni 100 | -60.0 ... +180.0 $^{\circ}\text{C}$ | | 0.5 + 5 | | |
| | Ni 1000 | -60.0 ... +180.0 $^{\circ}\text{C}$ | | 0.5 + 5 | | |

- 1) Display: 3 1/4 places in following ranges: 3 m Ω @ 1A, 30 m Ω , \varnothing), M Ω @...V, a different sampling rate can also be selected in the rAtE menu for saving and transmitting measured values.
- 2) Lowest measurable frequency for sinusoidal measuring signals symmetrical to the zero point
- 3) At 0 $^{\circ}$ to + 40 $^{\circ}$ C
- 4) ZERO is displayed for "zero balancing" function.
- 5) Range 3 V~: $U_E = 0.15 V_{\text{eff/rms}} \dots 3 V_{\text{eff/rms}}$
30 V~: $U_E = 1.5 V_{\text{eff/rms}} \dots 30 V_{\text{eff/rms}}$
300 V~: $U_E = 15 V_{\text{eff/rms}} \dots 300 V_{\text{eff/rms}}$
600 V~: $U_E = 300 V_{\text{eff/rms}} \dots 600 V_{\text{eff/rms}}$
For voltages > 100 V: power limiting of $1.8 \cdot 10^6 \text{ V} \cdot \text{Hz}$
- 6) 20 ... 45 ... 65 Hz ... 1 kHz sine, see influences on page 4.
- 7) Pulsating measuring current with interval of T = 1 s
- 8) Plus sensor deviation
- 9) Temperature value is based upon the characteristic curve per EN 60751.
- 10) In the case of high resistance values of greater than 300 M Ω , the capacitive influence of the person performing the measurement or the measurement cable may distort the measured value. Use short or shielded measurement cables for this reason.
- 11) In the event of an overcharge, the integrated FF 1.6 A/1000 V fuse blows.