GOSSEN METRAWATT

# METRAHIT | ISO AERO
# TRMS Multimeter with Insulation Measurement

3-349-557-03
4/4.14

- **Insulation resistance measurement** with interference voltage detection, test voltages: 10 V, 50 V, 100 V, 250 V, 500 V
- **Multimeter with diverse functions** (V, Ω, F, Hz)
- **TRMS measurements:** TRMS AC / AC+DC for current/voltage up to 10 kHz
- Activatable **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**: 4¾ place, 30000 digits, 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
- **Windows software** available as accessory for processing and graphic display of measured values via USB interface

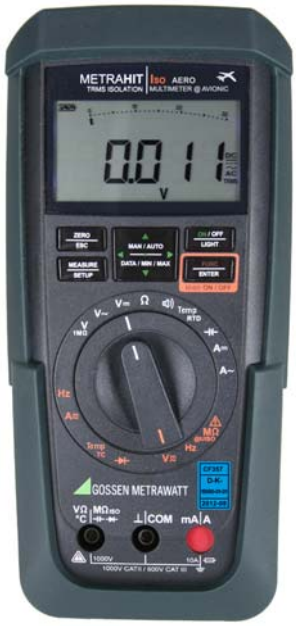
600 V CAT III
1000 V CAT II

CE

3 YEARS WARRANTY

MADE IN GERMANY

DAkkS
German Akkreditierungsstelle
D-K-15080-01-01
DAkkS Calibration Certificate as Standard Feature




## Application

The **METRAHIT** | **ISO AERO** multimeter is a rugged portable measuring instrument. It is suitable for servicing household appliance, machines (e.g. forklifts) and systems (e.g. photovoltaic). The instrument can be used in the field and is equipped with an internal, mains-independent power supply.

## Features

### RMS Value with Distorted Waveshape

The utilized measuring method allows for waveshape independent TRMS measurement of periodic quantities (AC) and pulsating quantities (AC and DC) for voltage and current at up to 10 kHz.

### Activatable Filter for V AC Measurement

A 1 kHz low-pass filter can be activated if required, e.g. for measurements at cables with parasitic external signals. The input signal is checked by a voltage comparator for dangerous voltages as long as the low-pass filter is activated, which are indicated at the display if present.

### Diode Testing with Constant Current $I_c$ = 1 mA

This function can be used to test the polarity of diodes, and to test electrical circuits for short-circuiting and interruptions. The test voltage source makes it possible to measure LEDs and reference diodes up to 5.1 V, e.g. also white LEDs.

### Fast Acoustic Continuity Test $I_k$ = 1 mA

Testing for short-circuiting and interruption is possible with the selector switch in the position. The threshold value for acoustic signaling can be set to 1, 10, 20, 30, 40 or 90 Ω.

### Insulation Resistance Measurement with Interference Voltage Detection

**Depending upon the utilized instrument variant, insulation resistance can be measured with an adjustable test voltage of 10 V ... 500 V.**

If the instrument detects interference voltage of 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 TRMS (AC + DC) with an input resistance of approximately 1 MΩ and the currently measured voltage value is displayed.

### Analog Scale for Quick Trend Display – Pointer

The analog scale (with additional negative axis range for zero-frequency quantities) allows for faster recognition of measured value fluctuation than is possible with a digital display.

### Automatic/Manual Measuring Range Selection

Measured quantities are selected with the rotary switch. The measuring range can be automatically matched to the measured value, or selected manually.

### High Resolution Mode

Via mem function „Set Resol“, the multimeter (in V DC and Ohm-function) can be switched to a high-resolution operating mode with 30,000 digits and enhanced accuracy.

# METRAHIT | ISO AERO
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### Automatic Storage of Measured Values

The DATA HOLD function automates the storage of measured values after they have settled in. A patented process assures that random values are not saved to memory in the case of rapidly changing measured quantities, but rather the actual measured value. The stored measured value appears at the digital display. The analog display continues to read out the current measured value.

### Overload Protection

Overload protection safeguards the instrument in all measuring functions against voltage of up to 1000 V. Voltages of greater than 1000 V and currents of greater than 10 A are indicated acoustically. FUSE appears at the display if the fuse for the current measuring input blows.

### IEC 61010-1, 2nd Issue

Multimeters manufactured as of 1 January 2004 may not be the source of any possible hazard, regardless of the utilized combination of input voltages, function settings and range selections. Possible hazards include electrical shock, fire, sparking and explosion.

### Battery Charging Status – Power Saving Circuit

The battery charging status is indicated by means of four symbols.

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. Automatic shutdown can be deactivated by switching the instrument to continuous operation.

### Three Connector Jacks with Automatic Blocking Sockets (ABS) *

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)

### Housing and Protective Cover for Harsh Conditions

- New housing design
- Separate battery and fuse compartments
- Intelligent key functions with SMD button

The instrument is protected against damage in the event of impacts or dropping by means of a soft rubber cover with tilt stand and test probe holder. The rubber material also assures that the instrument does not wander if it is set up on a vibrating surface.

### Infrared Data Interface

The device can be remote configured, and momentary and saved measurement data can be read out via the bidirectional infrared interface. The USB | X-TRA interface adapter and METRAwin 10 software are required to this end (see accessories). Interface protocol and device driver software for LabVIEW® (National Instruments™) are available upon request.

### Voluntary Manufacturer's Guarantee

36 months for materials and workmanship

1 to 3 years for calibration (depending upon application)

### DAkkS calibration certificate

**METRAHIT | ISO AERO** cable multimeters are furnished with an internationally valid DAkkS calibration certificate (recognized by EA and ILAC).

In addition to standard quantities, our DAkkS calibration lab is also accredited for high value ohmic resistance of up to 30 GΩ / 1000 V.

After the specified calibration interval has elapsed (recommended interval: 1 to 3 years), the multimeters can be inexpensively recalibrated at our own DAkkS calibration center.

## Selection List

| Function | METRAHIT \| ISO AERO |
|---|---|
| V AC+DC TRMS (Ri = 1 MΩ) | • |
| V AC / Hz TRMS (Ri ≥ 9 MΩ) | • 1 kHz filter |
| V AC+DC TRMS (Ri ≥ 9 MΩ) | • |
| V DC (Ri ≥ 9 MΩ) | • |
| Hz (V AC) | ... 300 kHz |
| Bandwidth, V AC | 15 Hz ... 10 kHz |
| A AC / Hz TRMS | 300 µA<br>3/30/300 mA<br>3 A / 10 A |
| A AC+DC TRMS | |
| A DC | |
| Fuses | 10 A / 1000 V |
| Transformation Ratio | mV/A, mA/A |
| Hz (A AC) | ... 30 kHz |
| $R_{ISO}$ MΩ@$U_{ISO}$ | 10 V / 50 V / 100 V / 250 V / 500 V |
| Resistance Ω | • |
| Continuity | • |
| Diode ... 5.1 V | • |
| Temperature TC (K) | • |
| Temperature RTD | • |
| Capacitance | • |
| Min-Max / data hold | • |
| 4 MBit memory 1) | • |
| IR Interface | • |
| Power pack socket | • |
| Protection | IP 54 |
| Measuring category | 1000 V CAT II, 600 V CAT III |

1) For 15,000 measured values, sampling rate adjustable from 0.1 seconds to 9 hours

## Scope of delivery

1 Insulation multimeter
1 Protective rubber cover
1 Condensed operating instructions
1 CD ROM with Operating instructions
1 DAkkS calibration certificate
2 Batteries, 1.5 V, type AA, installed
1 Power pack NA | X-TRA

# TRMS Multimeter with Insulation Measurement

## Technical Data

| Meas. Function (input) | Measuring Range | | Resolution at Upper Range Limit | | Input Impedance | | Intrinsic Error under Reference Conditions ±(... % rdg. + ... d) | | | | Overload Capacity [2] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 30000 | 3000 | 3000 | 3000 | | |
| | | | 30000 | 3000 | ⎓ | ~ / ≂ | ⎓ | ⎓ | ~ [1] [11] | ≂ [1] [11] | Value | Time |
| **V** | 300.0 | mV | 10 µV | 100 µV | 9 MΩ | 9 MΩ // < 50 pF | 0.15 + 15 [10] | 0.2 + 3 [10] | 1 + 3 (> 100 D) | 1.5 + 5 (> 100 D) | 1000 V DC AC RMS Sine [6] | Cont. |
| | 3.000 | V | 100 µV | 1 mV | 9 MΩ | 9 MΩ // < 50 pF | 0.15 + 15 | 0.15 + 2 | 1 + 3 (> 30 D) | 1.5 + 5 (> 100 D) | | |
| | 30.00 | V | 1 mV | 10 mV | 9 MΩ | 9 MΩ // < 50 pF | 0.15 + 15 | 0.15 + 2 | | | | |
| | 300.0 | V | 10 mV | 100 mV | 9 MΩ | 9 MΩ // < 50 pF | 0.15 + 15 | 0.15 + 2 | | | | |
| | 1000 | V | 100 mV | 1 V | 9 MΩ | 9 MΩ // < 50 pF | 0.15 + 15 | 0.2 + 2 | | | | |
| | | | | | **Voltage drop at approx. range limit** | | | ⎓ | ~ [1] [11] | ≂ [1] [11] | | |
| **A** | 300.0 | µA | | 100 nA | 18 mV | 18 mV | | 0.5 + 5 | 1.5 + 5 (> 100 D) | 1.5 + 5 (> 100 D) | 0.3 A | Cont. |
| | 3.000 | mA | | 1 µA | 160 mV | 160 mV | | 0.2 + 3 | 1.5 + 5 (> 30 D) | 1.5 + 5 (> 100 D) | | |
| | 30.00 | mA | | 10 µA | 32 mV | 32 mV | | 0.5 + 3 | | | | |
| | 300.0 | mA | | 100 µA | 200 mV | 200 mV | | 0.2 + 3 | | | | |
| | 3.000 | A | | 1 mA | 120 mV | 120 mV | | 1 + 5 | | | 10 A | 5 min [12] |
| | 10.00 | A | | 10 mA | 400 mV | 400 mV | | 1 + 5 | | | | |
| | Factor 1:1/10/100/1000 | | | **Input** | **Input impedance** | | | ⎓ | ~ [1] [11] | ≂ [1] [11] | | |
| **A ⋋ @ 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 | | 300 mA | | | | | | | | |
| | 3/30/300/3k | A | | 3 A | | | | Plus clip-on current transformer error | | | 3 A | 5 min |
| **A ⋋ @ V** | 0.3/3/30/300 | A | | 300 mV | Voltage measurement input approx. 9 MΩ (V socket) | | | 0.5 + 3 | 1.5 + 3 (> 300 D) | 1.5 + 5 (> 300 D) | Meas. input [6]: 1000 V RMS | max. 10 s |
| | 3/30/300/3k | A | | 3 V | | | | | 1.5 + 3 (> 30 D) | 1.5 + 5 (> 100 D) | | |
| | 30/300/3k/30k | A | | 30 V | | | | Plus clip-on current sensor error | | | | |
| | | | | | **Open-circuit voltage** | **Meas. current at range limit** | ±(... % rdg. + ... d) 30000 | 3000 | | | | |
| **Ω** | 300.0 | Ω | 10 mΩ | 100 mΩ | < 1.4 V | Approx. 300 µA | 0.5 + 15 with ZERO active | 0.5 + 3 with ZERO active | | | 1000 V DC AC RMS Sine | max. 10 s |
| | 3.000 | kΩ | 100 mΩ | 1 Ω | < 1.4 V | Approx. 200 µA | 0.5 + 15 | 0.5 + 2 | | | | |
| | 30.00 | kΩ | 1 Ω | 10 Ω | < 1.4 V | Approx. 30 µA | 0.5 + 15 | 0.5 + 2 | | | | |
| | 300.0 | kΩ | 10 Ω | 100 Ω | < 1.4 V | Approx. 3 µA | 0.5 + 15 | 0.5 + 2 | | | | |
| | 3.000 | MΩ | 100 Ω | 1 kΩ | < 1.4 V | Approx. 0.3 µA | 0.5 + 15 | 0.5 + 2 | | | | |
| | 30.00 | MΩ | 1 kΩ | 10 kΩ | < 1.4 V | Approx. 33 nA | 2.0 + 20 | 2.0 + 5 | | | | |
| 🔊 | 300.0 | Ω | | 100 mΩ | ca. 10 V | Approx. 1 mA const. | 3 + 5 | | | | | |
| ⏚ | 5.1 | V [3] | | 1 mV | ca. 10 V | | 2 + 5 | | | | | |
| | | | | | **Discharge resist.** | **$U_{0\ max}$** | ±(... % rdg. + ... d) | | | | | |
| **F** | 30.00 | nF | | 10 pF | 10 MΩ | 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 MΩ | 0.7 V | 1 + 6 [4] | | | | | |
| | 3.000 | µF | | 1 nF | 100 kΩ | 0.7 V | 1 + 6 [4] | | | | | |
| | 30.00 | µF | | 10 nF | 12 kΩ | 0.7 V | 1 + 6 [4] | | | | | |
| | 300.0 | µF | | 100 nF | 3 kΩ | 0.7 V | 5 + 6 [4] | | | | | |
| | | | | | | **$f_{min}$ [5]** | ±(... % rdg. + ... d) | | | | | |
| **Hz (V)/ Hz (A)** | 300.0 | Hz | | 0.1 Hz | | 1 Hz | 0.1 + 2 [8] | | | | Hz (V) [6]: Hz (A⋋) [6]: 1000 V Hz (A): [7] | max. 10 s |
| | 3.000 | kHz | | 1 Hz | | | | | | | | |
| **Hz (A)** | 30.00 | kHz | | 10 Hz | | 10 Hz | | | | | | |
| **Hz (V)** | 300.0 | kHz | | 100 Hz | | 100 Hz | | | | | | |
| | | | | | | | ±(... % rdg. + ... d) [9] | | | | | |
| °C | Pt 100 | – 200.0 ... + 850.0 °C | | 0.1 °C | | | 0.5 %+ 15 | | | | 1000 V DC/AC RMS Sine | max. 10 s |
| | Pt 1000 | – 150.0 ... + 850.0 °C | | | | | 0.5 %+ 15 | | | | | |
| | K (NiCr-Ni) | – 250.0 ... + 1372.0 °C | | | | | 1 % + 5 K | | | | | |

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 Applies to measurements at film capacitors and battery-operated
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. $3 \times 10^6$ V x 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 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/µA 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

# METRAHIT | ISO AERO

# TRMS Multimeter with Insulation Measurement

### Insulation Resistance Measurement [1]

| Measuring Range | Resolution | Nominal Voltage $U_{ISO}$ | Intrinsic Error under Reference Conditions ±(% rdg + d) |
|---|---|---|---|
| 0.3 V ... 1000 V ≂ [2] | | Ri = 1MΩ | 3 + 30 > 100 digits |
| 5 ... 310.0 kΩ | 0.1 kΩ | **10**//50/100/250/500 V | **5 + 30** // 3 + 5 |
| 0.280 ... 3.100 MΩ | 1 kΩ | **10**//50/100/250/500 V | **5 + 30** // 3 + 5 |
| 02.80 ... 31.00 MΩ | 10 kΩ | **10**//50/100/250/500 V | **5 + 30** // 5 + 5 |
| 028.0 ... 310.0 MΩ | 100 kΩ | **10**//50/100/250/500 V | **5 + 30** // 5 + 5 |
| 0280 ... 3100 MΩ | 1 MΩ | 500 V | 5 + 5 |

1) During insulation resistance measurement ($MΩ_{@UISO}$): If ERROR is displayed as „Error" >> limits: $U_{interference}$ > 10 ... 20 V and $U_{interference} ≠ U_{ISO}$, **Ri < 10 kΩ @ Uiso 10 V,** Ri < 50 kΩ @ Uiso 50 V, Ri < 100 kΩ @ Uiso 100 V, Ri < 250 kΩ @ Uiso 250 V, Ri < 500 kΩ @ Uiso 500 V

2) Interference voltage measurement TRMS (V AC + DC) with 1 MΩ input resistance, bandwidth 15 Hz ... 500 Hz, measuring error 3% + 30 Digit

| 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 | Overload Capacity Time |
|---|---|---|---|---|---|---|---|
| $U_{interference}$/ $MΩ_{@UISO}$ | — | — | — | — | U>1000V | 1000 V≂ | Cont. |
| $MΩ_{@UISO}$ | **10**, 50, 100, 250, 500 V | Max. 1.1x $U_{Iso}$ | 1.0 mA | < 1.5 mA | U>1000V | 1000 V≂ | 10 s |

### Internal Clock

| | |
|---|---|
| Time format | DD.MM.YYYY hh:mm:ss |
| Resolution | 0.1 s |
| Accuracy | ±1 min./month |

## Reference Conditions

| | |
|---|---|
| Ambient temperature | +23 °C ±2 K |
| Relative humidity | 40% … 75% |
| Measured qty. frequency | 45 Hz … 65 Hz |
| Measured qty. waveshape | Sine |
| Battery voltage | 3 V ±0.1 V |

## Influencing Quantities and Influence Error

| Influencing Quantity | Sphere of Influence | Measured Quantity / Measuring Range [1] | Influence Error (...% rdg. + ... d) / 10 K |
|---|---|---|---|
| Temperature | 0 °C ... +21° C and +25° C ... +40° C | V ⎓ | 0.2 + 5 |
| | | V ∼ | 0.4 + 5 |
| | | 300 Ω ... 3 MΩ | 0.5 + 5 |
| | | 30 MΩ | 1 + 5 |
| | | mA/A ⎓ | 0.5 + 5 |
| | | mA/A ≂ | 0.8 + 5 |
| | | 30 nF ... 300 µF | 1 + 5 |
| | | Hz | 0.2 + 5 |
| | | °C/°F (Pt100/Pt1000) | 0.5 + 5 |

1) With zero balancing

| Influencing Qty. | Measured Quantity / Measuring Range | | Sphere of Influence | Intrinsic uncertainty [3] ±( ... % rdg. + ... d) |
|---|---|---|---|---|
| Frequency | $V_{AC}$ [2] | 300 mV ... 300 V | > 15 Hz ... 45 Hz | 2 + 5 > 300 digits |
| | | | > 65 Hz ... 2 kHz | 2 + 5 > 300 digits |
| | | | > 2 kHz ... 10 kHz | 3 + 5 > 300 digits |
| | | 1000 V | > 65 Hz ... 5 kHz | 3 + 5 > 60 digits |
| | $A_{AC}$ | 300 µA ... 10 A | > 15 Hz ... 45 Hz | 3 + 10 > 300 digits |
| | | | > 65 Hz ... 10 kHz | |
| | $A_{AC}$ + DC | 300 µA ... 10 A | > 15 Hz ... 45 Hz | 3 + 30 > 300 digits |
| | | | > 65 Hz ... 10 kHz | |
| | $A_{AC}$ ⋊ | 300 mV / 3 V / 30 V [2] | > 65 Hz ... 10 kHz | 3 + 5 > 300 digits |
| | $A_{AC}$ ⋊ | 30 mA / 300 mA 3 A | > 65 Hz ... 10 kHz | 3 + 30 > 300 digits |

2) Power limiting: frequency x voltage max. 3 x $10^6$ V x Hz

3) The accuracy specification is valid as of a display value of 10% and up to 100% of the measuring range for both measuring modes with the TRMS converter in the A AC and A (AC+DC) ranges.

| Influencing Quantity | Sphere of Influence | Measured Quantity / Measuring Range | Influence Uncertainty [5] |
|---|---|---|---|
| Crest factor CF | 1 ... 3 | V ∼, A ∼ | ± 1% rdg. |
| | > 3 ... 5 | | ± 3% rdg. |

5) Except for sinusoidal waveshape

| Influencing Quantity | Sphere of Influence | Measured Quantity | Influence Error |
|---|---|---|---|
| Relative Humidity | 75%, 3 days, instrument off | V, A, Ω, F, Hz, °C | 1 x intrinsic uncertainty |
| Battery voltage | 1.8 to 3.6 V | ditto | Included in intrinsic uncertainty |

| Influencing Quantity | Sphere of Influence | Measured Qty. / Measuring Range | Damping |
|---|---|---|---|
| Common Mode Interference Voltage | Interference quantity max. 1000 V ∼ | V ⎓ | > 120 dB |
| | Interference quantity max. 1000 V ∼ 50 Hz ... 60 Hz, sine | 3 V ∼, 30 V ∼ | > 80 dB |
| | | 300 V ∼ | > 70 dB |
| | | 1000 V ∼ | > 60 dB |
| Series Mode Interference Voltage | Interference quantity: V ∼, respective nominal value of the measuring range, max. 1000 V ∼, 50 Hz ... 60 Hz sine | V ⎓ | > 50 dB |
| | Interference quantity max. 1000 V — | V ∼ | > 110 dB |

## Response Time (after manual range selection)

| Measured Quantity / Measuring Range | Response Time, Digital Display | Jump Function of the Measured Quantity |
|---|---|---|
| V ⎓, V ∼ A ⎓, A ∼ | 1.5 s | From 0 to 80% of upper range limit value |
| 300 Ω ... 3 MΩ | 2 s | From ∞ to 50% of upper range limit value |
| 30 MΩ, $MΩ_{@UISO}$ | Max. 5 s | |
| Continuity | < 50 ms | |
| °C (Pt 100) | Max. 3 s | |
| ⇻ | 1.5 s | |
| 30 nF ... 300 µF | Max. 5 s | From 0 to 50% of upper range limit value |
| >10 Hz | 1.5 s | |

# TRMS Multimeter with Insulation Measurement

## 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 pointer |
| Scaling | Linear:<br>∓ 5 ... 0 ... ±30 with 35 scale divisions for ⎓ , 0 ... 30 with 30 scale divisions in all other ranges |
| Polarity display | with automatic switching |
| Overflow display | With the ▶ symbol |
| Measuring rate | 40 measurements per second and display refresh |

### Digital

| | |
|---|---|
| Display / char. height | 7-segment characters / 15 mm |
| Number of places | 4¾ places, ≙ 30000 steps (V DC and Ω) switchable to<br>3¾ places, ≙ 3100 steps |
| Overflow display | "OL" is displayed for ≥ 30000 digits respectively ≥ 3100 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 measuring functions |
| Refresh rate | 2 times per second, every 500 ms |

## Electrical Safety

| | | |
|---|---|---|
| Safety class | II per EN 61010-1:2001/VDE 0411-1:2002 | |
| Measuring category | CAT II | CAT III |
| Nominal voltage | 1000 V | 600 V |
| Pollution degree | 2 | |
| Test voltage | 5.2 kV~ per EN 61010-1:2001/VDE 0411-1:2002 | |

## Fuses

| | |
|---|---|
| Fuse link | FF 10 A / 1000 V AC/DC;<br>10 x 38 mm;<br>Switching capacity:<br>30 kA at 1000 V AC/DC,<br>protects the current measurement input in the 300 µA through 10 A ranges |

## Power Supply

| | |
|---|---|
| Battery | 2 ea. 1.5 V mignon cell (2 ea. size AA), alkaline manganese per IEC LR6 |
| Service life | With alkaline manganese batteries: approx. 200 hours (without $M\Omega_{ISO}$ measurement) |
| Battery test | Battery capacity display with battery symbol in 4 segments: ▮.<br>Querying of momentary battery voltage via menu function. |
| Power OFF function | The multimeter is switched off automatically:<br>– If battery voltage drops to below approx. 1.8 V<br>– If none of the keys or the rotary switch are activated for an adjustable duration (10 to 59 min.) and the multimeter is not in the continuous operation mode |
| Power pack socket | If the power pack has been plugged into the instrument, the installed batteries are disconnected automatically.<br>Rechargeable batteries can only be recharged externally. |

| Measuring Function | Nominal Voltage $U_N$ | Resistance of the DUT | Service Life in Hours | Number of Possible Measurements with Nominal Current per VDE 0413 |
|---|---|---|---|---|
| V ⎓ | | | 200 [1] | |
| V ∼ | | | 150 [1] | |
| $M\Omega_{@UISO}$ | 10 V | 1 MΩ | 50 | |
| | 10 V | 10 kΩ | | 3000 |
| | 100 V | 1 MΩ | 50 | |
| | 100 V | 100 kΩ | | 3000 |
| | 500 V | 500 kΩ | | 600 |

[1] Times 0.7 for interface operation

## Electromagnetic Compatibility (EMC)

| | |
|---|---|
| Interference emission | EN 61326-1:2006, class B |
| Interference immunity | EN 61326-1:2006<br>EN 61326-2-1:2006 |

## 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 to 75%, no condensation allowed |
| Elevation | To 2000 m |
| Deployment | Indoors, except within specified ambient conditions |

# METRAHIT | ISO AERO
# TRMS Multimeter with Insulation Measurement

## 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<br>– Query momentary measurement data |

The USB | X-TRA 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. 15,000 measured values with indication of date and time |

## 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) |

Table Excerpt Regarding Significance of IP Codes

| IP XY (1st char. X) | Protection against penetration by solid particles | IP XY (2nd char. Y) | Protection against penetration by water |
|---|---|---|---|
| 0 | Not protected | 0 | Not protected |
| 1 | ≥ 50.0 mm dia. | 1 | Vertical dripping |
| 2 | ≥ 12.5 mm dia. | 2 | Dripping (15° inclination) |
| 3 | ≥ 2.5 mm dia. | 3 | Spray water |
| 4 | ≥ 1.0 mm dia. | 4 | Splashing water |
| 5 | Dust protected | 5 | Jet-water |

## Applicable Regulations and Standards

| | |
|---|---|
| **IEC/EN 61010-1:2010 VDE 0411-1:2011** | Safety requirements for electrical equipment for measurement, control and laboratory use – General requirements |
| **DIN EN 61326:2006 VDE 0843, part 20** | Electrical equipment for control technology and laboratory use – EMC requirements |
| **DIN EN 60529 VDE 0470, part 1** | Test instruments and test procedures – degrees of protection provided by enclosures (IP code) |

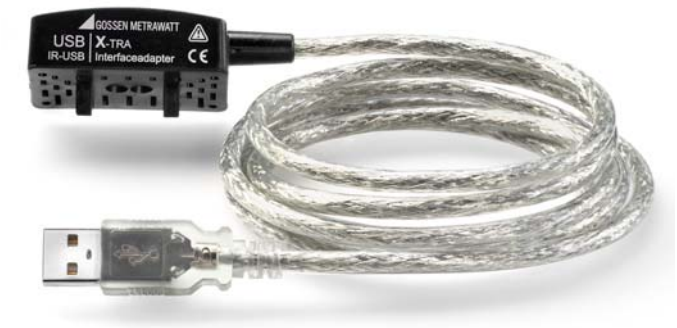
## Accessories for operation at a PC (METRAHIT | X-TRA only)

### Interface Adapter for USB Connection

The USB | X-TRA bidirectional interface adapter includes the following functions:

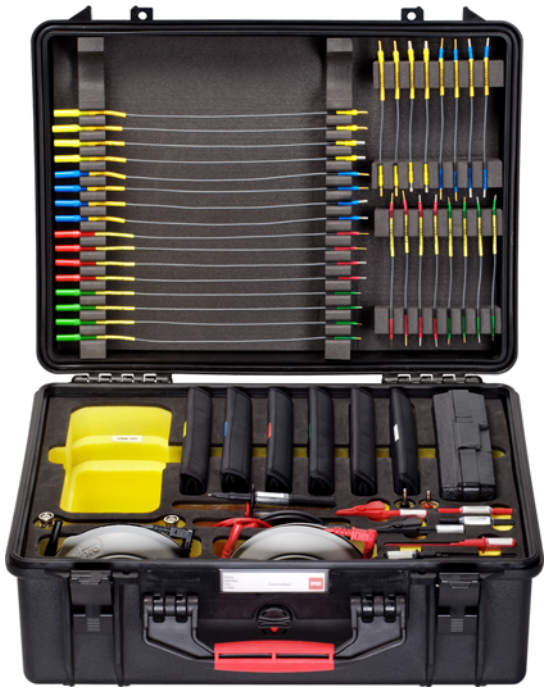
- Configure the METRAHIT | ISO AERO from a PC.
- Transmit live measurement data to the PC.
- Read data out of memory from the METRAHIT | ISO AERO.

The adapter does not require a separate power supply.
Its baud rate is 38,400 baud.
A CD ROM is included which contains current drivers for Windows operating systems.




## Accessory

### Aero MasterTest Kit I (Z246A)



## Order Information

| Designation | Type | Article Number |
|---|---|---|
| Special edition for avionic maintenance, consisting of METRAHIT TRMS-multimeter and insulation tester (10/50/100/250/ 500 V) and rubber holster, cable set KS17-2, set incl. power supply adapter NA-XTRA with a wide input range of 90 V..250 V AC, warranty 3 years und DAkkS-calibration certificate | **METRAHIT ISO AERO** | M246M |
| Avionic Service case incl. METRAHIT ISO AERO, power supply adapter NA-XTRA and special test & measurement accessories( 68 parts) for the avionic industries, inside a hard case | **Aero MasterTest Kit II** | M246N |
| Avionic Service case (like M246N, but without DMM), 68 parts, special test and measurement accessories for the avionic industries, includes measurement cables, hooks, clips, adapters and connectors for male and female MIL connections inside a hard case | **Aero MasterTest Kit I** | Z246A |
| Power pack: 90 ... 250 V AC / 5 V DC, 600 V CAT IV | NA \| X-TRA | Z218G |
| | | |
| **Accessory Cables and Adapters** | | |
| Cable set (1 pair of measurement cables), 1.2 m, with VDE-GS mark 600 V CAT IV 1 A [1], 1000 V CAT III 1 A [1] 1000 V CAT II 16 A [2] | KS17-2 | GTY3620034P0002 |
| Cable set with 2 mm ∅ steel tips with cable length 120 cm, 1000 V/CAT II | KS17-S | Z110H |
| Cable set incl. test probes, clips and USA test probes, (1000 V CAT II / III 20 A) | KS-NTS | Z110W |
| Cable set for telecommunication application (a-b-E) 1000 V CAT III 1 A [1] | KS21-T | Z110U |
| Alligator clips (1 pair) for KS17-2 1000 V CAT III 16 A | KY95-3 | Z110J |
| Clip-on current sensor, 10 mA … 100 A, 1 mV / 10 mA, clip opening: 15 mm dia. | WZ12B | Z219B |
| | | |
| **Accessories for Operation at a PC** | | |
| Bidirectional interface adapter, IR-USB | USB \| X-TRA | Z216C |
| METRAwin 10 software (available for **METRAHIT** \| ISO AERO | METRAwin 10 | GTZ3240000R0001 |
| | | |
| **Accessories for Temperature Measurement with Resistance Thermometer** | | |
| Pt100 temperature sensor for surface and emersion measurements, -40 … +600° C | Z3409 | GTZ3409000R0001 |
| Pt1000 temperature sensor for measurement in gases and liquids, -50 … +220° C (for servicing household appliances) | TF220 | Z102A |
| Pt100 oven sensor, -50 … +550 °C | TF550 | GTZ3408000R0001 |
| Ten adhesive Pt100 temperature sensors, -50 … +550 °C | TS Chipset | GTZ3406000R0001 |
| | | |
| **Protection and Transport Accessories** | | |
| Imitation leather carrying pouch | F829 | GTZ3301000R0003 |
| Cordura belt pouch | HitBag | Z115A |
| Ever-ready case for 2 instruments and accessories | F840 | GTZ3302001R0001 |
| Hard case for one instrument and accessories | HC20 | Z113A |
| Hard case for two instruments and accessories | HC30 | Z113A |
| | | |
| **Replacement Fuses** | | |
| Fuses (pack of 10) | FF 10 A/ 1000 V AC/DC | Z109L |

# METRAHIT | ISO AERO

## TRMS Multimeter with Insulation Measurement

Prepared in Germany • Subject to change without notice