

METRAHIT | X-TRA | OUTDOOR | TECH | PRO | BASE

TRMS Digital Multimeters

3-349-350-03

10/4.14

- Digital Hand-Held Multimeters with RMS Measurement $V_{AC\ TRMS}$, $V_{AC+DC\ TRMS}$, V_{DC} , Hz (V), Hz (A), Ω , $V \rightarrow I$, $^{\circ}C/^{\circ}F$ (TC)
- 4½-place display (11,999 digits), with display illumination

METRAHIT | BASE

- Current measurement via clip-on current sensors:
The transformation factor is adjustable from 1 mV:1 mA to 1 mV:1 A and is accounted for by the display.

METRAHIT | TECH

- Direct Current measurement with increased accuracy and Current measurement, via clip-on current transformer and sensors
- Broad range capacitance measurement

METRAHIT | X-TRA | OUTDOOR | TECH | PRO

- Additional "low-resistance" (1 M Ω) alternating voltage measurement
- 1 kHz / -3 dB low-pass filter can be activated

METRAHIT | X-TRA | OUTDOOR

- Direct current measurement from 10 nA to 10 A, 16 A for short periods
- Temperature measurement with Pt100(0) resistance thermometer
- Broad range capacitance measurement
- Frequency and duty cycle measurement at 2 to 5 V signals or up to 1 MHz
- Data memory and bidirectional infrared interface

METRAHIT | OUTDOOR

- Extremely rugged, dust and water-proof variant with IP 65 protection



DAkkS Calibration Certificate included


CAT IV

Applications

The multimeter is suitable for universal use in electrical engineering, electrical installation, laboratory applications, telecommunication, training etc.

The instrument can be used in the field and is equipped with internal, mains-independent supply power.

Features

Three Connector Jacks with Automatic Blocking Sockets (ABS) ¹⁾

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.

¹⁾ Patented (patent no. DE 10 2005 062 624, US 7,439,725)

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. Dangerous contact voltages are indicated when the 1 kHz low-pass filter is activated.

The FUSE display appears at **METRAHIT | X-TRA**, **METRAHIT | OUTDOOR**, **METRAHIT | TECH** and **METRAHIT | PRO** instruments in order to indicate

RMS Value with Distorted Waveshape

The utilized measuring method allows for waveshape independent RMS measurement (TRMS AC and AC+DC) for voltage and current (**METRAHIT | X-TRA | OUTDOOR** up to 20 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. The input signal is checked by a voltage comparator for dangerous voltages as long as the low-pass filter is activated.

Measuring 5 V Square-Wave Signals with the METRAHIT | X-TRA | OUTDOOR

This function makes it possible to test circuits and transmission cables by measuring the frequency and the duty cycle of pulses with amplitudes of 2 to 5 V and frequencies of 100 Hz to 1 MHz.

Analog Scale for Quick Trend Display – Bar Graph or Pointer

The analog scale (with additional negative range for zero-frequency quantities) allows for faster recognition of measured value fluctuation than is possible with a digital display. The instrument can be switched back and forth between bar graph and pointer display.


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TRMS Digital Multimeters

Automatic or Manual Measuring Range Selection

Measured quantities are selected by means of a rotary switch and a function key. The measuring range is automatically matched to the measured values. The measuring range can also be selected and fixed manually with a key.

Fast Acoustic Continuity Test

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 .

Automatic Storage of Measured Values *

The DATA function automatically saves the digitally displayed measured value after settling in. Acoustic signaling is also used to indicate whether the new measured value deviates from the initial reference value by less or more than 0.1% of the measuring range.

* Patented

Storage of Min-Max Values

Comparable to the slave-pointer function of an analog instrument, the device saves the highest and lowest measured values after the MIN/MAX function has been activated or reset. These extreme values can be queried at the display.

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.

METRAHIT | X-TRA | OUTDOOR: The infrared interface can be switched off in the standby mode.

Protective Cover for Harsh Conditions

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 with METRAHIT | X-TRA | OUTDOOR

The device can be remote configured, and momentary and stored 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.









DAkKS Calibration Certificate

The multimeters are furnished with an internationally valid DAkKS 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 in our own DAkKS calibration laboratory.

Applicable Regulations and Standards

| | |
|-----------------------------------|--|
| IEC/DIN EN 61010 -1 VDE 0411-1 | Safety requirements for electrical equipment for measurement, control and laboratory use |
| DIN EN 61326-1 VDE 0843-20-1 | Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements |
| DIN EN 60529 | Test instruments and test procedures |

Overview

| Function | METRAHIT X-TRA / OUTDOOR | METRAHIT TECH | METRAHIT PRO | METRAHIT BASE |
|---|--------------------------------|--------------------------------|--------------------------------|-----------------------------------|
| V AC / Hz TRMS ($R_i \geq 9 \text{ M}\Omega$) | • & 1kHz \ Filter | • & 1kHz \ Filter | • & 1kHz \ Filter | • |
| V AC TRMS ($R_i = 1 \text{ M}\Omega$) | • & 1kHz \ Filter | • & 1kHz \ Filter | • & 1kHz \ Filter | — |
| V AC+DC TRMS ($R_i \geq 9 \text{ M}\Omega$) | • | • | • | • |
| V DC ($R_i \geq 9 \text{ M}\Omega$) | • | • | • | • |
| ... 1 MHz 5 V AC  | • | — | — | — |
| Duty cycle as % | • | — | — | — |
| Hz (V AC) | ... 100 kHz | ... 100 kHz | ... 100 kHz | ... 100 kHz |
| Bandwidth, V AC | 15 Hz ... 20 kHz | 15 Hz ... 10 kHz | 15 Hz ... 10 kHz | 15 Hz ... 1 kHz |
| A AC / Hz TRMS | 100 μ A | — | — | — |
| A AC+DC TRMS | 1/10/100 mA 1 A / 10 (16) A | 10/100 mA 1 A / 10 (16) A | 1 A / 10 (16) A | — |
| A DC | — | — | — | — |
| Fuse | 10 A/1000 V | 10 A/1000 V | 10 A/1000 V | — |
| Transformation factor  | — | • | — | • |
| A AC  / Hz TRMS | — | mV/A mA/A | — | mV/A $R_i = 1 \text{ M}\Omega$ |
| A AC+DC  TRMS | — | mV/A mA/A | — | mV/A $R_i = 1 \text{ M}\Omega$ |
| A DC  | — | mV/A mA/A | — | mV/A $R_i = 1 \text{ M}\Omega$ |
| Hz (A AC) | ... 30 kHz | ... 30 kHz | ... 30 kHz | ... 30 kHz |
| 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 adapter socket | • | — | — | — |
| Protection | IP52 / IP65 | IP52 | IP52 | IP52 |
| Measuring category | 1000 V CAT III 600 V CAT IV | 1000 V CAT III 600 V CAT IV | 1000 V CAT III 600 V CAT IV | 1000 V CAT III 600 V CAT IV |

¹⁾ For 15,400 measured values, sampling rate adjustable from 0.1 second to 9 hours

Included

- 1 multimeter
- 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 condensed operating instructions, English/German
- 1 CD ROM, content: operating instructions in English and German)
- 1 DAkKS calibration certificate
- 1 protective rubber cover (METRAHIT | X-TRA | OUTDOOR only)








Voluntary Manufacturer's Guarantee

36 months for materials and workmanship

METRAHIT | X-TRA | OUTDOOR | TECH | PRO | BASE

TRMS Digital Multimeters

Characteristic Values

| Meas. Function | Measuring Range | Resolution at Upper Range Limit | | Input Impedance | | Intrinsic Uncertainty under Reference Conditions | | | Overload Capacity ²⁾ | | | |
|---|---|---|--------|--|--|--|--------------------------------|--------------------------------|--|------------|--|--|
| | | 11,999 | 1199 | ≡ | ~ / ≈ | ±(... % rdg. + ... d) | ±(... % rdg. + ... d) | ±(... % rdg. + ... d) | Value | Time | | |
| | | | | | | ≡ | ~ ¹⁰⁾ | ≈ ¹⁰⁾ | | | | |
| 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 | 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 | | ≡ | ~ ¹⁰⁾ | ≈ ¹⁰⁾ | | | | |
| A X-TRA OUTDOOR PRO | <div><div>100 μA</div><div>1 mA</div><div>10 mA</div><div>100 mA</div><div>1 A</div><div>10 A</div></div> | 10 nA | | 12 mV | 12 mV | 0.5 + 5 | 1.5 + 10 (> 200 d) | 1.5 + 30 (> 200 d) | 0,2 A | Continuous | | |
| | | 100 nA | | 120 mV | 120 mV | 0.5 + 3 | 1.5 + 10 (> 200 d) | 1.5 + 30 (> 200 d) | | | | |
| | | 1 μA | | 16 mV | 16 mV | 0.5 + 3 | 1.5 + 10 (> 200 d) | 1.5 + 30 (> 200 d) | | | | |
| | | 10 μA | | 160 mV | 160 mV | 0.5 + 3 | 1.5 + 10 (> 200 d) | 1.5 + 30 (> 200 d) | | | | |
| | | 100 μA | | 40 mV | 40 mV | 0.9 + 10 | 1.5 + 10 (> 200 d) | 1.5 + 30 (> 200 d) | | | | |
| A TECH | <div><div>10 mA</div><div>100 mA</div><div>1 A</div><div>10 A</div></div> | 1 mV | | 16 mV | 16 mV | 0.1 + 5 | 1 + 10 (> 200 d) | 1.5 + 30 (> 200 d) | 0,2 A | Continuous | | |
| | | 10 μA | | 160 mV | 160 mV | 0.1 + 5 | 1 + 10 (> 200 d) | 1.5 + 30 (> 200 d) | | | | |
| | | 100 μA | | 40 mV | 40 mV | 0.9 + 10 | 1 + 10 (> 200 d) | 1.5 + 30 (> 200 d) | | | | |
| | | 1 mA | | 600 mV | 600 mV | 0.9 + 10 | 1 + 10 (> 200 d) | 1.5 + 30 (> 200 d) | | | | |
| | | 10 A | | 600 mV | 600 mV | 0.9 + 10 | 1 + 10 (> 200 d) | 1.5 + 30 (> 200 d) | | | | |
| | Factor: 1:1/10/100/1000 | Input | | Input impedance | | | | | | | | |
| A  TECH | 0,1/1/10/100 A | 100 mA | | Current measuring input  A socket) | | Specification see current ranges A (TECH) plus clip-on current sensor error | | | Measuring input 0,2 A continuous 10 A: 5 min | | | |
| | 1/10/100/1000 A | 1 A | | | | | | | | | | |
| | 10/100/1000/10000 A | 10 A | | | | | | | | | | |
| A  TECH BASE | 0,1/1/10/100 A | 100 mV | | Voltage measurement input TECH: (V socket) Ri = 1 MΩ/9 MΩ BASE: ( V socket) Ri ~ 1 MΩ | | ±(0.5% rdg. + 10 d) ±(1% rdg. + 30 d) > 300 d ±(1% rdg. + 30 d) > 300 d Plus clip-on current sensor error | | | Measurement input 1000 V RMS Max. 10 s | | | |
| | 1/10/100/1000 A | 1 V | | | | | | | | | | |
| | 10/100/1000/10000 A | 10 V | | | | | | | | | | |
| Ω | 100 Ω | 10 mΩ | | Open-circuit voltage | Meas. curr. @ range limit | ±(... % rdg. + ... d) | | | 1000 V DC AC RMS sine | Max. 10 s | | |
| | 1 kΩ | 100 mΩ | | < 1.4 V | Approx. 300 μA | 0.2 + 5 with active ZERO function | | | | | | |
| | 10 kΩ | 1 Ω | | < 1.4 V | Approx. 250 μA | 0.2 + 5 | | | | | | |
| | 100 kΩ | 10 Ω | | < 1.4 V | Approx. 100 μA | 0.2 + 5 | | | | | | |
| | 1 MΩ | 100 Ω | | < 1.4 V | Approx. 12 μA | 0.2 + 5 | | | | | | |
| | 10 MΩ | 1 kΩ | | < 1.4 V | Approx. 1.2 μA | 0.2 + 5 | | | | | | |
| | 40 MΩ | 10 kΩ | | < 1.4 V | Approx. 125 nA | 0.5 + 10 | | | | | | |
| | | | | < 1.4 V | Approx. 20 nA | 2.0 + 10 | | | | | | |
|  | 100 Ω | — | 0.1 Ω | Approx. 8 V | Approx. 1 mA const. | 3 + 5 | | | | | | |
|  | 5,1 V ³⁾ | — | 1 mV | Approx. 8 V | Approx. 1 mA const. | 0.5 + 3 | | | | | | |
| F X-TRA OUTDOOR TECH | | | | Discharge resist. | U ₀ max | ±(... % rdg. + ... d) | | | 1000 V DC AC RMS sine | Max. 10 s | | |
| | 10 nF | 10 pF | | 10 MΩ | 0.7 V | 1 + 6 ⁴⁾ with ZERO function active | | | | | | |
| | 100 nF | 100 pF | | 1 MΩ | 0.7 V | 1 + 6 ⁴⁾ | | | | | | |
| | 1 μF | 1 nF | | 100 kΩ | 0.7 V | 1 + 6 ⁴⁾ | | | | | | |
| | 10 μF | 10 nF | | 12 kΩ | 0.7 V | 1 + 6 ⁴⁾ | | | | | | |
| | 100 μF | 100 nF | | 3 kΩ | 0.7 V | 5 + 6 ⁴⁾ | | | | | | |
| | 1000 μF | 1 μF | | 3 kΩ | 0.7 V | 5 + 6 ⁴⁾ | | | | | | |
| | | | | | f _{min} ⁵⁾ | ±(... % rdg. + ... d) | | | | | | |
| Hz (V) Hz (A) Hz (A  Hz (V) Hz (A) MHz X-TRA OUTDOOR % X-TRA OUTDOOR | 100.00 Hz 1.0000 kHz 10.000 kHz 100.00 kHz 30.00 kHz 100 Hz ... 1 MHz 2.0 ... 98 % 5.0 ... 95 % 10 ... 90 % | 0.01 Hz 0.1 Hz 1 Hz 10 Hz 10 Hz 0,01 ... 100 Hz — — — | | | 1 Hz 10 Hz 10 Hz 1 ... 100 Hz 1 Hz 1 Hz 1 Hz | 0.05 + 3 ⁸⁾ 0.05 + 3 > 2 V ... 5 V > 2 V ... 5 V > 2 V ... 5 V | | 1000 V DC/AC RMS Sine | Max. 10 s | | | |
| | | | | | | ±(... % rdg. + ... d) | | | | | | |
| | Pt100 OUTD. Pt1000 OUTD. K (NiCr-Ni) | -200.0 ... +850.0 °C -150.0 ... +850.0 °C -250.0 ... +1372.0 °C | 0.1 °C | | | 0.3 + 15 ⁹⁾ 0.3 + 15 ⁹⁾ 1 % + 5 K ⁹⁾ | | | | | | |

¹⁾ Values of less than 200 digits are suppressed in the mV range

²⁾ At 0 ° ... + 40 °C

³⁾ Displays up to max. 5.1 V, "OL" in excess of 5.1 V

⁴⁾ Applies 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

⁸⁾ Input sensitivity, sinusoidal signal, 10% to 100% of the measuring range

⁹⁾ Plus sensor deviation

¹⁰⁾ Residual value deviates within 1 ... 30 d from the zero point due to TRMS converter when probe tips are short-circuited. See frequency influence on page 4

¹¹⁾ Off-time > 30 min. and T_A \leq 40 °C

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Internal Clock

Time format DD.MM.YYYY hh:mm:ss
 Resolution 0.1 s
 Accuracy ± 1 min. per month
 Temperature Influence 50 ppm/K

Influencing Quantities and Influence Error

| Influencing Quantity | Sphere of Influence | Measured Quantity / Measuring Range ¹⁾ | Influence Error (...% rdg. + ... d) / 10 K |
|----------------------|---|---|--|
| Temperature | -10 °C ... +21 °C and +25 °C ... +50 °C | V $\overline{\equiv}$ | 0.2 + 10 |
| | | V \sim | 0.4 + 10 |
| | | 100 Ω ... 1 M Ω | 0.5 + 10 |
| | | > 1 M Ω | 1 + 10 |
| | | mA/A $\overline{\equiv}$ | 0.5 + 10 |
| | | mA/A $\overline{\approx}$ | 0.8 + 10 |
| | | 10 nF ... 100 μ F | 1 + 5 |
| | | Hz | 0.2 + 10 |
| | | °C/°F (Pt100/Pt1000) | 0.5 + 10 |
| | | °C/°F thermocouple K | 0.2 + 10 |

¹⁾ With zero balancing

| Influencing Qty. | Meas. Qty. / Meas. Range | Sphere of Influence | Intrinsic Uncertainty ³⁾ ± (... % rdg. + ... d) | | |
|------------------|-----------------------------|-------------------------------|---|-----------------|--------|
| | | | METRAHIT X-TRA METRAHIT OUTDOOR METRAHIT TECH METRAHIT PRO | METRAHIT BASE | |
| Fre- quency | V _{AC} | 100.00 mV | > 15 Hz ... 45 Hz | 3 + 30 | 3 + 30 |
| | | | > 65 Hz ... 1 kHz | 2 + 30 | 3 + 30 |
| | | | > 1 kHz ... 10 kHz | 3 + 30 | — |
| | | 1.0000 V ... 100.00 V | > 15 Hz ... 45 Hz | 2 + 9 | 3 + 9 |
| | | | > 65 Hz ... 1 kHz | 1 + 9 | 3 + 9 |
| | | | > 1 kHz ...10/20kHz ⁴⁾ | 3 + 9 | — |
| | | 1000.0 V ²⁾ | > 15 Hz ... 45 Hz | 2 + 9 | 3 + 9 |
| | | | > 65 Hz ... 1 kHz | 2 + 9 | 3 + 9 |
| | | | > 1 kHz ... 10 kHz | 3 + 30 | — |
| | A _{AC} | 100.00 µA ... 10.0000 A | > 15 Hz ... 45 Hz | 3 + 10 | — |
| | | | > 65 Hz ... 10 kHz | | |
| | A _{AC} Σ | 100 mV / 1 V / 10 V | >65 Hz ... 1 kHz | — | 3 + 10 |

²⁾ Power limiting: frequency x voltage max. 3×10^6 V x Hz for U > 100 V

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

⁴⁾ METRAHIT | X-TRA | OUTDOOR: frequency response up to 20 kHz,
 METRAHIT | TECH: frequency response up to 10 kHz,
 METRAHIT | PRO: frequency response up to 10 kHz,
 METRAHIT | BASE: frequency response up to 1 kHz

| Influencing Quantity | Sphere of Influence | Measured Quantity / Measuring Range | Influence Error ⁵⁾ |
|----------------------|---------------------|-------------------------------------|-------------------------------|
| Crest factor CF | 1 ... 3 | V \sim , A \sim | ± 1 % rdg. |
| | > 3 ... 5 | | ± 3 % rdg. |

⁵⁾ Except for sinusoidal waveshape

| Influencing Quantity | Sphere of Influence | Measured Quantity | Influence Error |
|----------------------|---------------------|----------------------------|---------------------------|
| Relative humidity | 75% | V, A, Ω , F, Hz, °C | 1 x intrinsic uncertainty |
| | 3 days | | |

| Influencing Quantity | Sphere of Influence | Measured Quantity / Measuring Range | Damping |
|----------------------------------|---|-------------------------------------|----------|
| Common Mode Interference Voltage | Interference quantity max. 1000 V \sim | V $\overline{\equiv}$ | > 120 dB |
| | | 1 V \sim , 10 V \sim | > 80 dB |
| | Interference quantity max. 1000 V \sim 50 Hz ... 60 Hz, sine | 100 V \sim | > 70 dB |
| | | 1000 V \sim | > 60 dB |
| Series Mode Interference Voltage | Interference quantity: V \sim , respective nominal value of the measuring range, max. 1000 V \sim , 50 Hz ... 60 Hz, sine | V $\overline{\equiv}$ | > 50 dB |
| | Interference quantity max. 1000 V \sim | V \sim | > 110 dB |

Reference Conditions

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

Response Time (after manual range selection)

| Measured Quantity / Measuring Range | Response Time Digital Display | Measured Quantity waveshape |
|---|-------------------------------|---|
| V $\overline{\equiv}$, V \sim AV $\overline{\equiv}$, A \sim | 1.5 s | From 0 to 80% of upper range limit value |
| 100 Ω ... 1 M Ω | 2 s | From ∞ to 50% of upper range limit value |
| 10/40 M Ω | 5 s | |
| Continuity | < 50 ms | |
| °C (Pt 100) | Max. 3 s | |
| \rightarrow | 1.5 s | From 0 to 50% of upper range limit value |
| 10 nF ... 100 μ F | Max. 2 s | |
| 1 000 μ F | Max. 7 s | |
| > 10 Hz | 1.5 s | |

Data Interface (METRAHIT | X-TRA | OUTDOOR only)

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


Internal Measured Value Storage (METRAHIT | X-TRA | OUTDOOR only)

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

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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 prox. 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 |
| Power pack socket (METRAHIT X-TRA OUTDOOR only) | If the NA X-TRA power pack has been plugged into the instrument, the batteries are disconnected automatically. Rechargeable batteries can only be recharged externally. |

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. height | 7-segment characters / 15 mm |
| Number of places | 4½ place \triangleq 11,999 steps |
| Overflow display | “OL” is displayed for $\geq 12,000$ digits |
| Polarity display | “–” (minus sign) is displayed if plus pole is connected to “1” |
| 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 |

Fuse for METRAHIT | X-TRA | OUTDOOR | TECH | PRO

| | |
|------|--|
| 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 μ A through 10 A ranges |
|------|--|

Electrical Safety

Per IEC 61010-1:2010/VDE 0411-1:2011

| | |
|--------------------|--------------|
| Safety class | II |
| Measuring category | III IV |
| Operating voltage | 1000 V 600 V |
| Fouling factor | 2 |
| Test voltage | 6.7 kV~ |

Electromagnetic Compatibility (EMC)

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

Ambient Conditions

| | |
|-----------------------------|---|
| Accuracy range | 0 °C ... +40 °C |
| Operating temp. range T_A | –10 °C ... +50 °C |
| Storage temp. range | –25 °C ... +70 °C (without batteries) |
| Relative humidity | 40 ... 75%, no condensation allowed only METRAHIT OUTDOOR: max. 96% |
| 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 52 (pressure equalization by means of the housing) Extra for METRAHIT OUTDOOR: Housing: IP 65 |

Table excerpt regarding significance of the IP code

| IP XY (1 st digit X) | Protection against penetration of solid particles | IP XY (2 nd digit Y) | Protection against penetration by water |
|------------------------------------|---|------------------------------------|---|
| 5 | Dust protected | 2 | Dripping (15° inclination) |
| 6 | Dust-proof | 5 | Jet-water |

METRAHIT | X-TRA | OUTDOOR | TECH | PRO | BASE

TRMS Digital Multimeters

Accessories for Operation at a PC (METRAHIT | X-TRA | OUTDOOR only)

Interface Adapter for USB Connection

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

- Configure the **METRAHIT | X-TRA | OUTDOOR** from a PC.
- Transmit live measurement data to the PC.
- Read out data from memory at the **METRAHIT | X-TRA | OUTDOOR**.

The adapter does not require a separate power supply.

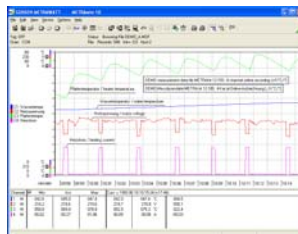
Its baud rate is 38,400 baud.

A CD ROM is included which contains current drivers for Windows operating systems.

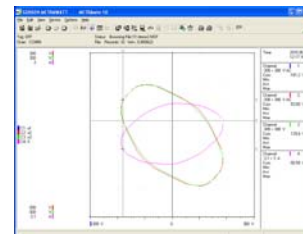


For purposes of analysis, data recorded online or read in from the device's memory can be displayed in various formats:

Y(t)-recorder display for up to 6 channels



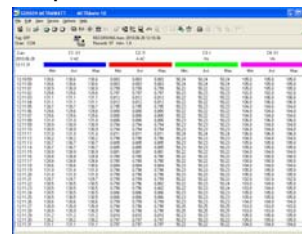
XY-recorder display for up to 4 channels



Multimeter-display for up to 4 channels



Tabular display for up to 10 channels



System Requirements

METRAwin 10 (as from version 6.0) can be run on IBM compatible PCs with Microsoft Windows® VISTA, 7 and 8.

METRAwin®10/METRAHit® Software

METRAwin®10/METRAHit® PC software is a multilingual, measurement data logging program for recording, visualizing and documenting measured values from **METRAHIT | X-TRA | OUTDOOR** multimeters.

Communication between the PC and the measuring instrument(s) is established via available interfaces and memory adapters. Telephone modems can be interconnected as well.

Depending upon device type, one or several of the following operating modes are possible:

• Device Configuration

Remote configuration and querying of device-specific functions and parameters, for example measuring function, measuring range and memory parameters. Frequently used device settings can be saved to configuration files for easy recall.

• Online Recording of Measurement Data

Read-in, display and recording of momentarily measured data from the interconnected device.

- Number of measuring channels up to 10
- Start recording manual, triggered by measured value, time triggered
- Recording mode
 - > time controlled with sampling interval of 0.05 s* ... 1 s ... 60 min
 - > manually controlled
 - > measured value controlled in event of exceeded limit/delta value
- Recording duration max. 10 million intervals

* Depending upon device type, measuring function, number of measuring channels and communication (e.g. via modem), sample intervals of less than 1 s cannot be used.

• Reading Out and Visualizing Stored Data

If supported by the device: read-in and display of offline data recorded to device memory

METRAHIT | X-TRA | OUTDOOR | TECH | PRO | BASE

TRMS Digital Multimeters

Order Information

| Designation | Type | Article Number |
|--|--|-----------------|
| METRAHIT X-TRA, METRAHIT OUTDOOR, METRAHIT TECH, METRAHIT PRO and METRAHIT BASE Multimeters | | |
| 4½-place (12,000 digits) TRMS multimeter with direct, alternating and pulsating voltage measurement (TRMS values), frequency measurement, resistance measurement, continuity test, diode measurement and temperature measurement with type K thermocouples LCD with 15 mm characters, analog bar graph and background illumination Measuring categories: 600 V/CAT IV, 1000 V/CAT III | | |
| All multimeters include the KS17-2 measurement cable set, two mignon batteries, condensed operating instructions, CD ROM, DAkS calibration certificate | | |
| Same as above but with direct, alternating and pulsating current measurement (TRMS values), additional broad range capacitance measurement, precision temperature measurement with Pt100 or Pt1000 platinum resistance thermometers, frequency and duty cycle measurement, with power pack socket and IR interface, 4 MB data memory, protective rubber cover | METRAHIT X-TRA | M240A |
| Special, limited edition model (100 pieces) with elegant silver finish in a wooden case | METRAHIT X-TRA limited edition | M240X |
| Extremely rugged water-proof multimeter for use in the field (IP 65) with the following functions: METRAHIT X-TRA | METRAHIT OUTDOOR | M2400 |
| Same as above but with direct, alternating and pulsating current measurement (TRMS values), additional broad range capacitance measurement, with additional current measurement via clip-on current transformers or sensors with current or voltage output, each with adjustable transformation factors | METRAHIT TECH | M243A |
| Same as above but with additional protective rubber cover | METRAHIT TECH+GH | M243E |
| Same as above but with additional direct, alternating and pulsating current measurement (RMS values), | METRAHIT PRO | M242A |
| HC20 measuring case with TRMS multimeter METRAHIT PRO and WZ12A AC current transformer | METRAHIT PRO Set | M242D |
| Same as above but with additional protective rubber cover | METRAHIT PRO+GH | M242E |
| Same as above but with current measurement via clip-on current sensor with voltage output (see accessories) instead of direct current measurement, and adjustable transformation factors. | METRAHIT BASE | M241A |
| Accessories for operation at a PC (for METRAHIT X-TRA OUTDOOR only) | | |
| IR-USB bidirectional interface adapter | USB X-TRA | Z216C |
| METRAwin 10 software | METRAwin 10 | GTZ3240000R0001 |
| Accessories for temp. measurement with resistance thermometer (METRAHIT X-TRA OUTDOOR only) | | |
| Pt100 temperature sensor for surface and immersion measurement, -40 to +600 °C | Z3409 | GTZ3409000R0001 |
| Pt1000 temperature sensor for measurement in gases and liquids, -50 to +220 °C | TF220 | Z102A |
| Pt100 oven sensor, -50 to +550 °C | TF550 | GTZ3408000R0001 |
| Ten adhesive Pt100 temperature sensors, -50 to +550 °C | TS Chipset | GTZ3406000R0001 |
| Replacement fuse (METRAHIT X-TRA OUTDOOR TECH PRO only) | | |
| Fuses (pack of 10) | FF (UR) 10 A / 1000 V AC/DC | Z109L |

| Designation | Type | Article Number |
|---|-------------------|----------------|
| Accessories | | |
| Power pack (for METRAHIT X-TRA OUTDOOR only) | NA X-TRA | Z218G |
| Protective rubber cover and carrying strap | GH X-TRA | Z104C |

Transport Accessories

HitBag Cordura Belt Pouch

For **METRAHIT |** multimeters (with/without protective rubber cover) and METRAport



HC20 Hard Case

For multimeter (with/without protective rubber cover) and accessories



F836 Ever-Ready Case

For multimeter (without protective rubber cover) and accessories



F829 Carrying Pouch

For multimeters (with/without protective rubber cover) and accessories



| Designation | Type | Article Number |
|--|--------|-----------------|
| Imitation leather without protective rubber cover for METRAHIT and METRAmax | F829 | GTZ3301000R0003 |
| Cordura belt pouch for METRAHIT multimeters and METRAport | HitBag | Z115A |
| Imitation leather ever-ready case with cable compartment | F836 | GTZ3302000R0001 |
| Ever-ready case for 2 METRAHIT , 2 adapters and accessories | F840 | GTZ3302001R0001 |
| Hard case for one METRAHIT and accessories | HC20 | Z113A |
| Hard case for two METRAHIT and accessories | HC30 | Z113A |

METRAHIT | X-TRA | OUTDOOR | TECH | PRO | BASE

TRMS Digital Multimeters

| Current Measuring Accessories | | | | | | | | | Suitable for METRAHIT | | |
|--|--|---|--------------------------------|----------------|-------------------------------------|-------------------------------------|---------------------------------------|---------------------|-----------------------|----------------------|-----------------|
| All current sensors and transformers are equipped with a connector cable (1.2 to 1.5 m long) with 4 mm safety banana plugs | | | | | | | | | | | |
| Type | Designation | Measuring Range | Meas. Category | Max. Wire Dia. | Transformation Factor | Frequency Range | Intrinsic Uncertainty ±(% rdg. + ...) | Article Number | BASE | X-TRA OUTD. TECH PRO | X-TRA OUTD. PRO |
| DC/AC Current Sensors with Voltage Output | | | | | | | | | | | |
| CP30 | DC/AC clip-on current sensor, with battery mode (30 h) | 5 mA to 30 A (DC / AC pk) | 300 V / CAT III | 25 mm | 100 mV/A | DC...20 kHz (-3 dB) | 1 % +2 mA | Z201B | ● | ● | ◆ |
| CP330 | DC/AC clip-on current sensor, with 2 measuring ranges, battery mode (50 h) | Range: 0.5 ... 30 A Range: 5 ... 300 A (DC / AC rms) | 300 V / CAT III | 25 mm | 10 mV/A; 1 mV/A | DC...20 kHz (-3 dB) | 1 % + 50 mA 1 % + 100 mA | Z202B | ● | ● | ◆ |
| CP1100 | DC/AC clip-on current sensor, with 2 measuring ranges, battery mode (50 h) | Range: 0.5 ... 100 A Range: 5 ... 1000 A (DC / AC rms) | 300 V / CAT III | 32 mm | 10 mV/A; 1 mV/A | DC...20 kHz (-1 dB) | 1 % + 100 mA 1 % + 500 mA | Z203B | ● | ● | ◆ |
| CP1800 | DC/AC current clamp sensor, with 2 measuring ranges, battery mode (50 h) | Range: 0.5 ... 125 A Range: 5 ... 1250 A (DC / AC rms) | 300 V / CAT III | 32 mm | 10 mV/A, 1 mV/A | DC ... 20 kHz (-1 dB) | 1% + 100 mA 1% + 500 mA | Z204A | ● | ● | ◆ |
| AC Current Sensors with Voltage Output | | | | | | | | | | | |
| WZ12B | AC clip-on current sensor | 10 mA~ ... 100 A~ | 300 V / CAT III | 15 mm | 100 mV/A | <u>45 ... 65</u> ... 500 Hz | 1.5% +0.1 mA | Z219B | ● | ● | ◆ |
| WZ12C | AC clip-on current sensor, with 2 measuring ranges | 1 mA~ ... 15 A~, 1 ... 150 A~ | 300 V / CAT III | 15 mm | 1 mV/mA, 1 mV/A | <u>45 ... 65</u> ... 400 Hz | 3% + 0.15 mA, 2% + 0.1 A | Z219C | ● | ● | ◆ |
| WZ11B | AC clip-on current sensor, with 2 measuring ranges | 0.5 ... 20 A~, 5 ... 200 A~ | 600 V / CAT III | 20 mm | 100 mV/A, 10 mV/A | <u>30...48 ... 65</u> ... 500 Hz | 1 ... 3% | Z208B | ● | ● | ◆ |
| Z3512A | AC clip-on current sensor, with 4 measuring ranges | 1 mA ... 1/10/100/ 1000 A~ | 600 V / CAT III | 52 mm | 1 V/A, 100 mV/A, 10 mV/A, 1 mV/A | <u>10...48 ... 65</u> ... 3 kHz | 0.5 ... 3%, 0.2 ... 1% | Z225A | ● | ● | ◆ |
| METRA-FLEX3000 | Flexible AC current sensor with 3 measuring ranges, battery mode (2000 h) | 0,5 ... 30 A, 0,5 ... 300 A, 5 ... 3000 A | 1000 V CAT III 600 V CAT IV | 176 mm | 100 mV/A, 10 mV/A, 1 mV/A | 10 Hz ... 20 kHz | 1% + 0.1 A 1% + 0.1 A 1% + 1 A | Z207E | ● | ● | ◆ |
| METRA-FLEX300M | Flexible AC miniature current sensor with 3 measuring ranges, battery mode (150 h) | 1 ... 3 A, 1 ... 30 A, 5 ... 300 A | 1000 V CAT III 600 V CAT IV | 50 mm | 1 V/A, 100 mV/A, 10 mV/A | 20 Hz ... 100 kHz | 1% + 0.2 A 1% + 0.2 A 1% + 1 A | Z207M | ● | ● | ◆ |
| AC Current Transformer with Current Output | | | | | | | | | | | |
| WZ12A | AC clip-on current transformer | 15 ... 180 A~ | 300 V / CAT III | 15 mm | 1 mA/A | <u>45 ... 65</u> ... 400 Hz | 3% | Z219A | — | ● | ◆ |
| WZ12D | AC clip-on current transformer | 30 mA ... 150 A~ | 300 V / CAT III | 15 mm | 1 mA/A | <u>45 ... 65</u> ... 500 Hz | 2.5% +0.1 mA | Z219D | — | ● | ◆ |
| WZ11A | AC clip-on current transformer | 1 ... 200 A~ | 600 V / CAT III | 20 mm | 1 mA/A | <u>48 ... 65</u> ... 400 Hz | 1 ... 3% | Z208A | — | ● | ◆ |
| Z3511 | AC clip-on current transformer | 4 ... 500 A~ | 600 V / CAT III | 30 x 63 mm | 1 mA/A | <u>48 ... 65</u> ... 1 kHz | 3% +0.4 A | GTZ3511 000R0001 | — | ● | ◆ |
| Z3512 | AC clip-on current transformer | 0.5 ... 1000 A~ | 600 V / CAT III | 52 mm | 1 mA/A | <u>30...48 ... 65</u> ... 5 kHz | 0.5% ... 0.7% | GTZ3512 000R0001 | — | ● | ◆ |
| Z3514 | AC clip-on current transformer | 1 ... 2000 A ~ | 600 V / CAT III | 64 x 150 mm | 1 mA/A | <u>30...48 ... 65</u> ... 5 kHz | 0.5% +0.1 A | GTZ3514 000R0001 | — | ● | ◆ |
| Shunt Resistors for Multimeters without Current Measuring Function | | | | | | | | | | | |
| NW300mA | Plug-in shunt resistor, encapsulated 1 Ω | 0 ... 300 mA | 300 V / CAT III | — | 1 mV/mA | DC ...10 kHz | 0.5% | Z205C | ● | ● | ◆ |
| NW3A | Plug-in shunt resistor, encapsulated 0,1 Ω | 0 ... 3 A | 300 V / CAT III | — | 100 mV/A | DC ...10 kHz | 0.5% | Z205B | ● | ● | ◆ |

● with adjustable transformation factor 1: 1 / 10 / 100 / 1000

◆ without adjustable transformation factor