

METRAHIT | EXTRA | ETECH | ESPECIAL | EBASE

TRMS Digital Multimeters

3-349-454-03
4/7.09

- Digital Hand-Held Multimeters with RMS Measurement amongst other features including:
 $V_{AC\ TRMS}$, $V_{AC+DC\ TRMS}$, V_{DC} , Hz (V), Hz (A), Ω , V \rightarrow †, °C/°F (TC)
- Resolution of 60,000 counts, can be changed to 6000 via the menu, display illumination can be activated for difficult lighting conditions

METRAHIT EBASE

- Current measurement via clamp current sensors:
The transformation factor is adjustable from 1 mV:1 mA to 1 mV:1 A and the factor is calculated for the display.

METRAHIT ETECH

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

METRAHIT EXTRA/ETECH/ESPECIAL

- Special low-impedance alternating voltage measurement (1 M Ω)
- 1 kHz / -3 dB low-pass filter can be activated

METRAHIT EXTRA

- Direct current measurement from 10 nA to 10 A, 16 A for short periods
- Temperature measurement with Pt100/Pt1000 resistance thermometer
- Broad range capacitance measurement
- TRMS AC and AC + DC bandwidth 100 kHz

METRAHIT ESPECIAL

- Special instrument for the performance of measurements at current transformer circuits



CAT IV



DKD

Calibration Certificate included

QUALITY MANAGEMENT SYSTEM



DQS Certified per
DIN EN ISO 9001:2000
reg. no.1262

Applications

The instruments of the E- and high resolution series are extremely rugged, reliable digital multimeters with housings made of impact resistant ABS.

With a resolution of 60,000 counts and up to 26 different measuring functions, they've been developed for professional use.

Features

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. Auto-ranging is available in all current measuring ranges.

Also the automatic blocking sockets prevent incorrect connection of the measurement cables, as well as selection of the wrong measured values. Danger to the user, the instrument and the device under test resulting from operator error is eliminated.

* 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 EXTRA** and **METRAHIT ETECH** instruments in order to indicate that the fuse for the current measuring input has blown.

RMS Value with Distorted Waveshape

The utilized measuring method allows a waveshape independent RMS measurement (TRMS AC and AC+DC) for voltage and current (**METRAHIT EXTRA** up to 100 kHz).

Selectable Filter for V AC Measurement

A 1 kHz low-pass filter can be selected if required, for example to measure the 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. A high-voltage symbol appears at the display if dangerous voltage is present.

Measuring 5 V Square-Wave Signals with the METRAHIT EXTRA

This function allows 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 via the menu.

Automatic or Manual Measuring Range Selection

Measurement functions are selected by a rotary dial and a function key. The measurement range selection is done automatically according to the input signal. Manual measurement range selection is possible via function key.

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TRMS Digital Multimeters

Measurement with current clamps and sensors

Current clamps and sensors are used for current measurements without interrupting the circuit under test and for high currents above 16 Amps. All E series multimeters offer convenient measurement with current clamps.

The measured current value is automatically calculated for the user with the help of the adjustable clamp factor.

Fast Acoustic Continuity Test

Testing for short circuit connection and circuit interruption is possible with the selector switch in the \square position. The threshold value for acoustic response can be set to 1, 10, 20 ... 500 Ω in 10 Ohm steps.

Automatic Storage of Measured Values *

The DATA function automatically saves the digitally displayed measured value after stabilisation 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

Min-Max Data Storage

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.

The standby mode of the infrared interface can be switched off.

Protective Rubber Holster for Rugged Conditions

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

Infrared Data Interface

The device can be remotely configured, and momentary and stored measurement data can be read out via the bidirectional infrared interface. The USB X-TRA interface adapter and METRAWIN10 software are required (see accessories). Interface protocol and device driver software for LabVIEW[®] (National Instruments[™]) are available upon request.

DKD Calibration Certificate

Each multimeter is individually adjusted, subjected to final inspection and calibrated. Adherence to the specification is confirmed by means of the included DKD calibration certificate, which is valid worldwide (recognized by EA and ILAC). If any type of DMM is due to recalibration (recommended intervals: 1 to 3 years) the multimeters can inexpensively be recalibrated at the factory or at any calibration laboratory.

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 61326-1 VDE 0843-20-1 | Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements |
| DIN EN 60529 DIN VDE 0470, part 1 | Test instruments and test procedures – degrees of protection provided by enclosures (IP code) |

Functional overview

| Function | EXTRA | ETECH | ESPECIAL | EBASE |
|--|--------------------------------|-----------------|-----------------|--------------------------------|
| Voltage V_{DC} ($R_i \geq 9 M\Omega$) | ✓ | ✓ | ✓ | ✓ |
| Voltage V_{AC} TRMS ($R_i \geq 9 M\Omega$) | ✓ | ✓ | ✓ | ✓ |
| Voltage $Lo^{(1)}$ V_{AC} TRMS ($R_i = 1 M\Omega$) | ✓ | ✓ | ✓ | — |
| Voltage V_{AC+DC} TRMS ($R_i \geq 9 M\Omega$) | ✓ | ✓ | ✓ | ✓ |
| Frequency Hz @ V_{AC} bzw. @ $Lo^{(1)}$ V_{AC} | ... 300 kHz | ... 300 kHz | ... 300 kHz | ... 300 kHz |
| Low-pass filter 1 kHz | @ V_{AC} / @ LoV_{AC} | | | — |
| Bandwidth @ V_{AC+DC} bzw. V_{AC} | 100 kHz | 20 kHz | | 1 kHz |
| Frequency MHz @ 5V TTL | 0.1 Hz...1 MHz | — | — | — |
| Duty cycle % | 2.0 % ... 98 % | — | — | — |
| Voltage level measurement dB | ✓ | ✓ | ✓ | ✓ |
| Resistance Ω | ✓ | ✓ | ✓ | ✓ |
| Continuity test @ $I_{CONST} = 1 mA$ | ✓ | ✓ | ✓ | ✓ |
| Diode measurement @ $I_{CONST} = 1 mA$ | ✓ | ✓ | ✓ | ✓ |
| Temperature measurement $^{\circ}C/^{\circ}F @ T_C$ | Typ K | | | |
| Temperature measurement $^{\circ}C/^{\circ}F R_{TD}$ | Pt100/Pt1000 | | — | — |
| Capacitance measurement F | ✓ | ✓ | — | — |
| Current A_{DC} | 600 μA /6 mA | 60 mA/600 mA | 6 A/10 A (16 A) | ∞ A |
| Current A_{AC+DC} TRMS | 60 mA/600 mA | 6 A/10 A (16 A) | 6 A/10 A (16 A) | ∞ A |
| Current A_{AC} TRMS | 6 A/10 A (16 A) | 6 A/10 A (16 A) | 6 A/10 A (16 A) | ∞ A |
| Bandwidth @ A_{AC+DC} bzw. A_{AC} | 10 kHz | | | — |
| Frequency Hz @ A_{AC} | ... 60 kHz | | | — |
| Measurement with clamp ammeter with adjustable transfer factor | mV / A mA / A | | mV / A A / A | mV / A — |
| Data logger function ²⁾ (memory) | 16 Mbit | — | — | — |
| Relative value measurement ΔREL | ✓ | ✓ | ✓ | ✓ |
| Zero point ZERO | ✓ | ✓ | ✓ | ✓ |
| MIN/MAX/DATA Hold | ✓ | ✓ | ✓ | ✓ |
| IR-interface (38.4 kBd) | ✓ | ✓ | ✓ | ✓ |
| Power pack connector socket | ✓ | — | — | — |
| Protective rubber holster | ✓ | ✓ | ✓ | ✓ |
| Fuse | 10 A / 1000 V | 10 A / 1000 V | — | — |
| Protection ³⁾ | IP52 | IP52 | IP52 | IP52 |
| Measuring category | 1000 V CAT III 600 V CAT IV | | 600 V CAT II | 1000 V CAT III 600 V CAT IV |
| Calibration | DKD | DKD | DKD | DKD |

¹⁾ Alternating voltage measurement with specially reduced input impedance

²⁾ 16 Mbit = 2048 kByte = 61,600 measured values, sampling rate adjustable from 0.1 seconds to 9 hours

³⁾ IP 65 available with the METRAHIT OUTDOOR model

Included






- 1 multimeter in HC20 hard case
- 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 DKD calibration certificate
- 1 protective rubber holster

Voluntary Manufacturer's Guarantee

- 36 months for materials and workmanship
1 to 3 years for calibration (depending upon application)

METRAHIT | EXTRA | ETECH | ESPECIAL | EBASE TRMS Digital Multimeters

Specifications

| Meas. Function | Measuring Range | Resolution at Upper Range Limit | | Input Impedance | | Intrinsic Uncertainty under Reference Conditions for High Resol 59999 counts | | | Overload Capacity ²⁾ | | | |
|---|----------------------------|------------------------------------|---|--|--|--|--|--|--|-----------------------------------|--------------------------------|-----------|
| | | 59 999 | 5999 | \equiv | \sim / \approx | $\pm(\dots \% \text{ rdg.} + \dots \text{ d})$ | $\pm(\dots \% \text{ rdg.} + \dots \text{ d})$ | $\pm(\dots \% \text{ rdg.} + \dots \text{ d})$ | Value | Time | | |
| V | 600 mV | 10 μ V | 100 μ V | $\geq 9 \text{ M}\Omega$ | $\geq 9 \text{ M}\Omega // < 50 \text{ pF}$ | 0.09 + 5 with ZERO *) | 0.5 + 30 | 1 + 30 | 1000 V DC AC RMS Sine | continuous | | |
| | 6 V | 100 μ V | 1 mV | $\geq 9 \text{ M}\Omega$ | $\geq 9 \text{ M}\Omega // < 50 \text{ pF}$ | 0.05 + 5 | 0.5 + 9 | 1 + 30 | | | | |
| | 60 V | 1 mV | 10 mV | $\geq 9 \text{ M}\Omega$ | $\geq 9 \text{ M}\Omega // < 50 \text{ pF}$ | 0.05 + 5 | 0.5 + 9 | 1 + 30 | | | | |
| | 600 V | 10 mV | 100 mV | $\geq 9 \text{ M}\Omega$ | $\geq 9 \text{ M}\Omega // < 50 \text{ pF}$ | 0.05 + 5 | 0.5 + 9 | 1 + 30 | | | | |
| | 1000 V | 100 mV | 1 V | $\geq 9 \text{ M}\Omega$ | $\geq 9 \text{ M}\Omega // < 50 \text{ pF}$ | 0.09 + 5 | 0.5 + 9 | 1 + 30 | | | | |
| | | | | Display range for reference voltage $U_{REF} = 0.775 \text{ V}$ | | Intrinsic Uncertainty | | | | | | |
| dB | 600 mV \sim | 0.01 dB | | -48 dB ... -2 dB | | 0.1 dB (U > 10 % MB) | | | 1000 V DC AC RMS Sine | continuous | | |
| | 6 V \sim | | | -28 dB ... +18 dB | | | | | | | | |
| | 60 V \sim | | | -8 dB ... +38 dB | | | | | | | | |
| | 600 V \sim | | | +2 dB ... +58 dB | | | | | | | | |
| | 1000 V \sim | | | +22 dB ... +63 dB | | | | | | | | |
| A | | | Voltage drop, approx. at upper range limit | | \equiv | \sim ¹⁾ | \approx ¹⁾ | 0.7 A | continuous | | | |
| | EXTRA ETECH ESPECIAL | 600 μ A | 10 nA | 100 nA | 150 mV | 150 mV | 0.5 + 5 with ZERO *) | | | 1 + 10 | 1.5 + 30 | |
| | | 6 mA | 100 nA | 1 μ A | 200 mV | 200 mV | 0.5 + 5 | | | 1 + 10 | 1.5 + 30 | |
| | | 60 mA | 1 μ A | 10 μ A | 200 mV | 200 mV | 0.1 + 5 | | | 1 + 10 | 1.5 + 30 | |
| | | 600 mA | 10 μ A | 100 μ A | 300 mV | 300 mV | 0.2 + 5 | | | 1 + 10 | 1.5 + 30 | |
| | | 6 A | 100 μ A | 1 mA | 300 mV | 300 mV | 0.9 + 10 | | | 1 + 10 | 1.5 + 30 | |
| 10 A | 1 mA | 10 mA | 600 mV | 600 mV | 0.9 + 10 | 1.5 + 10 | 1.5 + 30 | | | | | |
| Factor 1:1/10/100/1000 | | Input | | Input impedance | | | | | | | | |
| A \succ | 0.06/0.6/6/60 A | 60 mA | | EXTRA / ESPECIAL / ETECH | | Specification see current ranges A \sim plus clamp current transformer error | | | Measuring input 0.7 A continuous 10 A: 5 min | | | |
| | 0.6/6/60/600 A | 600 mA | | Current measuring input | | | | | | | | |
| | 6/60/600/6 000 A | 6 A | | (A socket ) | | | | | | | | |
| A \succ | 0.6/6/60/600 A | 600 mV | | EXTRA / ESPECIAL / Voltage measurement input | | Specification see voltage measuring ranges V \sim ¹⁾ $\pm(0.5\% \text{ rdg.} + 10 \text{ d})$ $\pm(1\% \text{ rdg.} + 30 \text{ d})$ $\pm(1.5\% \text{ rdg.} + 30 \text{ d})$ plus clamp current sensor error | | | Measuring input 1000 V RMS max. 10 s | | | |
| | 6/60/600/6 000 A | 6 V | | ETECH: (V socket ) Ri = 1 M Ω /9 M Ω EBASE: (V socket ) Ri \sim 1 M Ω | | | | | | | | |
| Ω | | | Open-circuit voltage Meas. curr. @ range limit | | $\pm(\dots \% \text{ rdg.} + \dots \text{ d})$ | | | | | | | |
| | 600 Ω | 10 M Ω | 100 M Ω | < 1.4 V | approx. 250 μ A | 0.1 + 5 with active ZERO function*) | | | 1000 V DC AC RMS Sine | max. 10 s | | |
| | 6 k Ω | 100 M Ω | 1 Ω | < 1.4 V | approx. 65 μ A | 0.1 + 5 | | | | | | |
| | 60 k Ω | 1 Ω | 10 Ω | < 1.4 V | approx. 7.5 μ A | 0.1 + 5 | | | | | | |
| | 600 k Ω | 10 Ω | 100 Ω | < 1.4 V | approx. 0.75 μ A | 0.2 + 5 ... | | | | | | |
| | 6 M Ω | 100 Ω | 1 k Ω | < 1.4 V | approx. 0.1 μ A | 0.5 + 5 | | | | | | |
| 60 M Ω | 1 k Ω | 10 k Ω | < 1.4 V | approx. 30 nA | 5 + 10 | | | | | | | |
|  | 600 Ω | — | 0.1 Ω | approx. 9 V | approx. 1 mA const. | 3 + 5 | | | | | | |
|  | 6.0 V ³⁾ | — | 1 mV | approx. 9 V | approx. 1 mA const. | 0.5 + 3 | | | | | | |
| F | | | Discharge resist. | | $U_{0 \text{ max}}$ | | $\pm(\dots \% \text{ rdg.} + \dots \text{ d})$ | | | | | |
| | EXTRA ETECH | 60 nF | — | 10 pF | 10 M Ω | 0.7 V | 1 + 10 ⁴⁾ with active ZERO function*) | | | 1000 V DC AC RMS Sine | max. 10 s | |
| | | 600 nF | — | 100 pF | 1 M Ω | 0.7 V | 1 + 6 ⁴⁾ | | | | | |
| | | 6 μ F | — | 1 nF | 100 k Ω | 0.7 V | 1 + 6 ⁴⁾ | | | | | |
| | | 60 μ F | — | 10 nF | 12 k Ω | 0.7 V | 1 + 6 ⁴⁾ | | | | | |
| 600 μ F | — | 100 nF | 3 k Ω | 0.7 V | 5 + 6 ⁴⁾ | | | | | | | |
| | | | | f_{min} ⁵⁾ | | $\pm(\dots \% \text{ rdg.} + \dots \text{ d})$ | | | | | | |
| Hz (V) | 600.00 Hz | 0.01 Hz | 0.1 Hz | | | | | | Hz (V) ⁶⁾ | | | |
| Hz (A) | 6.0000 kHz | 0.1 Hz | 1 Hz | | | 1 Hz | | | Hz(A) ⁶⁾ | | | |
| Hz (A\succ) | 60.000 kHz | 1 Hz | 10 Hz | | | 10 Hz | | | 1000 V max. 10 s | | | |
| Hz (V) | 300.00 kHz | 10 Hz | 100 Hz | | | | | | Hz (A): ⁷⁾ | | | |
| MHz EXTRA | 600 Hz ... 1 MHz | 0.01 ... 100 Hz | 0.1 ... 1 kHz | | | 1 ... 100 Hz | 0.05 + 5 | > 2 V ... 5 V | | | | |
| | 2.0 ... 98 % | — | 0.01 % | 15 Hz ... 1 kHz | 1 Hz | 1 Hz | 0.1 R + 5 d | > 2 V ... 5 V | | | | |
| | 5.0 ... 95 % | — | 0.01 % | ... 10 kHz | 1 Hz | 1 Hz | 0.2 R per kHz + 5 d | > 2 V ... 5 V | 1000 V max. 10 s | | | |
| EXTRA | 10 ... 90 % | — | 0.01 % | ... 50 kHz | 1 Hz | 1 Hz | 0.5 R per kHz + 5 d | > 2 V ... 5 V | | | | |
| $^{\circ}$C/$^{\circ}$F | | | | | | | $\pm(\dots \% \text{ rdg.} + \dots \text{ d})$ | | | | | |
| | Pt 100 | -200.0 ... +850.0 $^{\circ}$ C | 0.1 $^{\circ}$ C | | | | | 0.3 + 15 ⁹⁾ | | | 1000 V DC/AC RMS Sine | max. 10 s |
| | Pt 1000 | -150.0 ... +850.0 $^{\circ}$ C | | | | | | 0.3 + 15 ⁹⁾ | | | | |
| | K | -250.0 ... +1372.0 $^{\circ}$ C | | | | | | 1% + 5 K ⁹⁾ | | | | |
| (NiCr-Ni) | | | | | | | | | | | | |

- Specified accuracy is valid as of 3% of the measuring range.
With short-circuited test probes: residual value of 1 to 30 d at zero point due to the TRMS converter (exception: mV AC range, 60 counts). See frequency influence on page 4.
- At 0 $^{\circ}$... + 40 $^{\circ}$ C
- Displays up to max. 6.0 V, "OL" in excess of 6.0 V.
- Applies to measurements at film capacitors and battery operated
- Lowest measurable frequency for sinusoidal measuring signals symmetrical to the zero point
- Overload capacity of the voltage measurement input:
power limiting: frequency x voltage max. $6 \times 10^9 \text{ V} \times \text{Hz}$ for U > 100 V

- Overload capacity of the current measurement input:
See current measuring ranges for maximum current values.
- Input sensitivity, sinusoidal signal, 10% to 100% of the measuring range
- Plus sensor deviation
- Off-time > 30 min and $T_A \leq 40 \text{ }^{\circ}$ C
- without ZERO max. ± 15 digit

Key:
d = counts, R = measuring range, rdg. = measured value (reading)

METRAHIT | EXTRA | ETECH | ESPECIAL | EBASE

TRMS Digital Multimeters

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 und +25 °C ... +40 °C | V $\overline{\overline{=}}$ | 0.2 + 10 |
| | | V \sim | 0.4 + 10 |
| | | 600 Ω ... 6 M Ω | 0.5 + 10 |
| | | > 6 M Ω | 1 + 10 |
| | | mA/A $\overline{\overline{=}}$ | 0.5 + 10 |
| | | mA/A $\overline{\overline{=}}$ | 0.8 + 10 |
| | | 60 nF ... 600 μ F | 1 + 5 |
| | | Hz, dB | 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⁾ \pm (... % rdg. + ... d) | | |
|------------------|---|---|--|----------------|-------|
| | | | METRAHIT EXTRA METRAHIT ETECH METRAHIT ESPECIAL | METRAHIT EBASE | |
| Fre- quency | 600.00 mV | > 15 Hz ... 45 Hz | 3 + 30 | 3 + 30 | |
| | | > 65 Hz ... 1 kHz | 2 + 30 | 3 + 30 | |
| | | > 1 kHz ... 20 kHz | 3 + 30 | — | |
| | | > 15 Hz ... 45 Hz | 2 + 9 | 3 + 9 | |
| | | > 65 Hz ... 1 kHz | 1 + 9 | 3 + 9 | |
| | | > 1 kHz ... 20 kHz ⁴⁾ | 3 + 9 | — | |
| | 6.0000 V ... 600.00 V ²⁾ | > 20 kHz ... 100 kHz ⁴⁾ | 3.5 + 30 | — | |
| | | > 15 Hz ... 45 Hz | 2 + 9 | 3 + 9 | |
| | | > 65 Hz ... 1 kHz | 2 + 9 | 3 + 9 | |
| | | > 1 kHz ... 10 kHz | 3 + 30 | — | |
| | | 1000.0 V ²⁾ | > 15 Hz ... 45 Hz | 2 + 9 | 3 + 9 |
| | | | > 65 Hz ... 1 kHz | 2 + 9 | 3 + 9 |
| A _{AC} | 600.00 μ A ... 10.0000 A | > 15 Hz ... 45 Hz > 65 Hz ... 10 kHz | 3 + 10 | — | |
| | A _{AC} $\overline{\overline{>}}$ EBASE | 600 mV / 6V / > 65 Hz ... 1 kHz | — | 3 + 30 | |

²⁾ Power limiting: frequency x voltage max. 6×10^6 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 EXTRA: frequency response up to 100 kHz, > 50 kHz plus 2.5 %
 METRAHIT ETECH: frequency response up to 10 kHz,
 METRAHIT ESPECIAL: frequency response up to 10 kHz,
 METRAHIT EBASE: 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, dB, °C | 1 x intrinsic uncertainty |
| | 3 days instrument off | | |
| Battery voltage | 1.8 to 3.6 V | V, A, Ω , F, Hz, dB, °C | Included in intrinsic uncertainty |

| Influencing Quantity | Sphere of Influence | Measured Quantity / Measuring Range | Damping |
|----------------------------------|---|-------------------------------------|--------------------|
| Common Mode Interference Voltage | Interference quantity max. 1000 V \sim 50 Hz ... 60 Hz, sine | V $\overline{\overline{=}}$ | > 120 dB |
| | | 6 V \sim , 60 V \sim | > 80 dB |
| | | 600 V \sim 1000 V \sim | > 70 dB > 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 $\overline{\overline{=}}$ | > 50 dB |
| | | V \sim | > 110 dB |

Reference Conditions

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

Response Time (after manual range selection)

| Measured Quantity / Measuring Range | Response Time Digital Display | Measured Quantity waveshape |
|--|-------------------------------|--|
| V $\overline{\overline{=}}$, V \sim , dB AV $\overline{\overline{=}}$, A \sim | 1.5 s | From 0 auf 80 % of upper range limit value |
| 600 Ω ... 6 M Ω | 2 s | From ∞ auf 50 % of upper range limit value |
| 60 M Ω | 5 s | |
| Continuity °C (Pt 100) | < 50 ms Max. 3 s | |
| \rightarrow | 1.5 s | |
| 60 nF ... 600 μ F | Max. 2 s | From 0 auf 50 % of upper range limit value |
| > 10 Hz | 1.5 s | |

Data Interface

Type Optical via infrared light through the housing
 Data transmission Serial, bidirectional (not IrDa compatible)
 Protocol Device specific
 Baud rate 38,400 baud
 Functions

- Select/query measuring functions and parameters
- Query momentary measurement data
- Read out stored measurement data

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


Internal Measured Value Storage (METRAHIT EXTRA only)

Memory capacity 16 MBit (2 MByte) for approx. 61,000 measured values with date and time stamp

METRAHIT | EXTRA | ETECH | ESPECIAL | EBASE

TRMS Digital Multimeters

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 EXTRA) | 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 counts 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 |
| Resolution | 59,999 counts |
| Overflow display | “OL” is displayed for $\geq 60,000$ counts |
| Polarity display | “–” (minus sign) is displayed if plus pole is connected to “⊥” |
| Measuring rate | 10 or 40 measurements per second with the Min-Max function except for the capacitance, frequency and duty cycle measuring functions |
| Refresh rate | 2 times per sec., every 500 ms |

Acoustic Signals

| | |
|-------------|--|
| For voltage | Intermittent signal at above 1000 V |
| For current | Intermittent signal at above 10 A continuous signal at above 16 A |

Fuse for METRAHIT EXTRA, METRAHIT ETECH

| | |
|------|--|
| 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 600 μ A through 10 A ranges |
|------|--|

Electrical Safety

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

METRAHIT EXTRA, METRAHIT ETECH, METRAHIT EBASE

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

METRAHIT ESPECIAL „for Current Transformers“

Special device for measurements at current transformers without fuse in the electrical circuit

| | | |
|--------------------|---------|--------|
| Safety class | II | |
| Measuring category | 600 V | CAT II |
| Pollution degree | 2 | |
| Test voltage | 3.5 kV~ | |

Electromagnetic Compatibility (EMC)

| | |
|-----------------------|--|
| Interference emission | EN 610326-1: 2006, class B |
| Interference immunity | EN 610326-1: 2006 EN 610326-2-1: 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 | 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 holster) |
| Weight | Approx. 0.35 kg with batteries |
| Protection | Housing: IP 52 (pressure equalization by means of the housing) 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) |

METRAHIT | EXTRA | ETECH | ESPECIAL | EBASE

TRMS Digital Multimeters

Accessories for Operation at a PC

Interface Adapter for USB Connection

The following functions can be executed with the USB X-TRA bidirectional interface adapter:

- Configure the **METRAHIT** Multimeter from a PC.
- Transmit live measurement data to the PC.
- Read out data from memory at the **METRAHIT EXTRA**.

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.



METRAwin[®]10/METRAHit[®] Software

METRAwin[®]10/METRAHit[®] PC software is a multilingual, measurement data logging program for recording, visualizing and documenting measured values of multimeters of the **METRAHIT e-series**.

Communication between the PC and the measuring instrument(s) is established via available interface adapters.

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

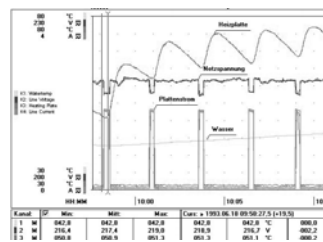
- **Device Configuration**
Remote configuration and querying of device-specific functions and parameters, for example measuring function, measuring range and memory parameters. Frequently used device settings can be saved to configuration files for easy recall.
- **Online Recording of Measurement Data**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

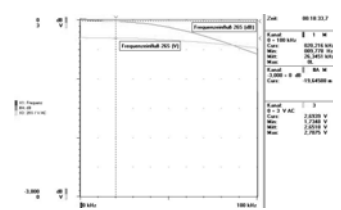
- **Reading Out and Visualizing Stored Data**
If supported by the device: read-in and display of offline data recorded to device memory.

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

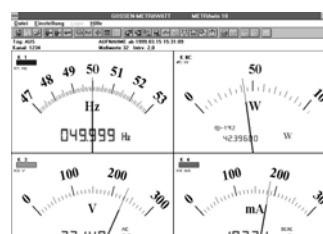
Y(t)-recorder display for up to 6 channels



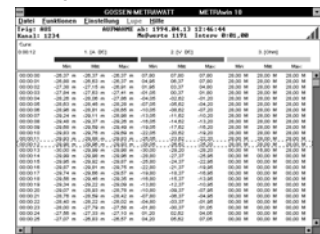
XY-recorder display for up to 4 channels



Multimeter-display for up to 4 channels



Tabular display for up to 10 channels



System Requirements

METRAwin 10 (as from version 5.3) can be run on IBM compatible PCs with Microsoft Windows[®] 98, ME, NT 4.0, 2000, XP or VISTA.

METRAHIT | EXTRA | ETECH | ESPECIAL | EBASE

TRMS Digital Multimeters

Order Information

| Designation | Type | Article Number |
|---|-----------------------------|-----------------|
| METRAHIT EXTRA, METRAHIT ETECH, METRAHIT ESPECIAL and METRAHIT EBASE Multimeters | | |
| 60,000 counts 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 Current measurement via clamp sensors with voltage output and adjustable clamp factor All multimeters include the KS17-2 measurement cable set, two mignon batteries, condensed operating instructions, CD ROM, DKD calibration certificate, hard case HC20 | | |
| 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 keying ratio measurement, clamp current transformer with current output, with power pack socket and IR interface, 2 MB data memory, protective rubber holster | METRAHIT EXTRA | M250A |
| Same as above but with direct, alternating and pulsating current measurement (TRMS values), additional broad range capacitance measurement, with additional current measurement via clamp current transformer with current output | METRAHIT ETECH | M253A |
| Same as above Special device without integrated fuse for use in current transformer circuits | METRAHIT ESPECIAL | M252A |
| Same as above but with current measurement via clamp current sensor with voltage output (see accessories) instead of direct current measurement, and adjustable transformation factors. | METRAHIT EBASE | M251A |
| Accessories for operation at a PC | | |
| IR-USB bidirectional interface adapter | USB X-TRA | Z216C |
| METRAwin 10 software | METRAwin 10 | GTZ3240000R0001 |
| Accessories for temp. measurement with resistance thermometer (METRAHIT EXTRA 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 EXTRA and METRAHIT ETECH only) | | |
| Fuses (pack of 10) | FF (UR) 10 A / 1000 V AC/DC | Z109L |
| Power pack (for METRAHIT EXTRA only) | NA X-TRA | Z218G |
| Protective rubber holster and carrying strap | GH X-TRA | Z104C |

Transport Accessories

HitBag Cordura Belt Pouch

For METRA HIT | multimeters (with/without protective rubber holster) and METRAport



HC30 Hard Case

For two multimeters (with/without protective rubber holster) and accessories



F836 Ever-Ready Case

For multimeter (without protective rubber holster) and accessories



F829 Carrying Pouch

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



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

For additional information regarding accessories please refer to:

- our Measuring Instruments and Testers catalog.
- our website www.gossenmetrawatt.com

METRAHIT | EXTRA | ETECH | ESPECIAL | EBASE

TRMS Digital Multimeters

| Current Measuring Accessories | | | | | | | | | Suitable for METRA HIT | |
|---|---|---|--------------------------------|--------------------|-------------------------------------|-----------------------------|---------------------------------------|---------------------|------------------------|----------------------------|
| All current sensors and transformers are equipped with a terminal with 4 mm safety banana plugs | | | | | | | | | EBASE | ETECH EXTRA ESPECIAL |
| Type | Designation | Measuring Range | Meas. Category | Max. Wire Dia. | Transformation Factor | Frequency Range | Intrinsic Uncertainty ±(% rdg. + ...) | Article Number | | |
| DC/AC Current Sensors with Voltage Output | | | | | | | | | | |
| Z201A | DC/AC clamp current sensor, with battery mode (30 h) | 0.01 ... 20 A~/30 A~ | 300 V CAT III | 19 mm | 100 mV/A | DC ... 400 Hz ... 20 kHz | 1% + 0.002 A | Z201A | ● | ● |
| Z202A | DC/AC clamp current sensor, with 2 measuring ranges, battery mode (50 h) | 0.1 ... 20 A~/30 A~; 1 ... 200 A~/300 A~ | 300 V CAT III | 19 mm | 10 mV/A, 1 mV/A | DC ... 2 kHz ... 10 kHz | 1% + 0.03 A, 1% + 0.3 A | Z202A | ● | ● |
| Z203A | DC/AC clamp current sensor, with 2 measuring ranges, battery mode (50 h) | 1 ... 200 A~/300 A~; 1 ... 1000 A~/A~ | 300 V CAT III | 31 mm | 1 mV/A | DC ... 10 kHz | 1% + 0.5 A | Z203A | ● | ● |
| Z13B | DC/AC clamp current sensor, with 2 measuring ranges, battery mode (50 h) | 0.2 ... 40 A~/60 A~; 0.5 ... 400 A~/600A~ | 300 V CAT IV | 50 mm | 10 mV/A, 1 mV/A | DC ... 65 Hz ... 10 kHz | 1.5% + 0.5 A 2.5% | Z13B | ● | ● |
| AC Current Sensors with Voltage Output | | | | | | | | | | |
| WZ12B | AC clamp current sensor | 10 mA~ ... 100 A~ | 300 V CAT III | 15 mm | 100 mV/A | 45 ... 65 ... 500 Hz | 1.5% + 0.1 mA | Z219B | ● | ● |
| WZ12C | AC clamp 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 | 45 ... 65 ... 400 Hz | 3% + 0.15 mA, 2% + 0.1 A | Z219C | ● | ● |
| WZ11B | AC clamp 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 | 30...48...65 ... 500 Hz | 1 ... 3% | Z208B | ● | ● |
| Z3512A | AC clamp 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 | 10...48...65 ... 3 kHz | 0.5 ... 3%, 0.2 ... 1% | Z225A | ● | ● |
| METRA-FLEX3000 | flexible AC current sensor, with 3 measuring ranges, batteries (2000 h) | 0.5 ... 30 A, 0.5 ... 300 A, 0.5 ... 3000 A | 1000 V CAT III 600 V CAT IV | Length: 610 mm | 100 mV/A, 10 mV/A, 1 mV/A | 10 ... 20 kHz | 1% | Z207E | ● | ● |
| AF033A | AmpFLEX flexible AC current sensor with 2 measuring ranges, battery (150 h) | 5 ... 30 A~, 5 ... 300 A~ | 1000 V CAT III | Length: 600 mm | 100 mV/A, 10 mV/A | 10 ... 100 Hz ... 20 kHz | 1% + 0.5 A, 1% + 0.5 A | Z207A | ● | ● |
| AF11A | AmpFLEX flexible AC current sensor, battery (150 h) | 5 ... 1000 A~ | 1000 V CAT III | Length: 450 mm | 1 mV/A | 10 ... 100 Hz ... 20 kHz | 1% + 2 A | Z207D | ● | ● |
| AF33A | AmpFLEX flexible AC current sensor with 2 measuring ranges, battery (150 h) | 5 ... 300 A~, 5 ... 3000 A~ | 1000 V CAT III | Length: 900 mm | 10 mV/A, 1 mV/A | 10 ... 100 Hz ... 20 kHz | 1% + 0.5 A, 1% + 2 A | Z207B | ● | ● |
| AF101A | AmpFLEX flexible AC current sensor with 2 measuring ranges, battery (150 h) | 5 A~... 1 k A~, 50 A~... 10 k A~ | 1000 V CAT III | Length: 1200 mm | 1 mV/A, 0.1 mV/A | 10 ... 100 Hz ... 20 kHz | 1% + 2 A, 1% + 10 A | Z207C | ● | ● |
| AC Current Transformer with Current Output | | | | | | | | | | |
| WZ12A | AC clamp current transformer | 15 ... 180 A~ | 300 V CAT III | 15 mm | 1 mA/A | 45 ... 65 ... 400 Hz | 3% | Z219A | — | ● |
| WZ12D | AC clamp current transformer | 30 mA ... 150 A~ | 300 V CAT III | 15 mm | 1 mA/A | 45 ... 65 ... 500 Hz | 2.5% + 0.1 mA | Z219D | — | ● |
| WZ11A | AC clamp current transformer | 1 ... 200 A~ | 600 V CAT III | 20 mm | 1 mA/A | 48 ... 65 ... 400 Hz | 1 ... 3% | Z208A | — | ● |
| Z3511 | AC clamp current transformer | 4 ... 500 A~ | 600 V CAT III | 30 x 63 mm | 1 mA/A | 48 ... 65 ... 1 kHz | 3% + 0.4 A | GTZ35110 00R0001 | — | ● |
| Z3512 | AC clamp current transformer | 0.5 ... 1000 A~ | 600 V CAT III | 52 mm | 1 mA/A | 30...48...65 ... 5 kHz | 0.5% ... 0.7% | GTZ35120 00R0001 | — | ● |
| Z3514 | AC clamp current transformer | 1 ... 2000 A ~ | 600 V CAT III | 64 x 150 mm | 1 mA/A | 30...48...65 ... 5 kHz | 0.5% + 0.1 A | GTZ35140 00R0001 | — | ● |
| Shunt Resistors for Multimeters without Current Measuring Function | | | | | | | | | | |
| NW300 mA | Plug-in shunt resistor, encapsulated | 0 ... 300 mA | 300 V CAT III | — | 1 mV/mA | DC ... 10 kHz | 0.5% | Z205C | ● | ● |
| NW3A | Plug-in shunt resistor, encapsulated | 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

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