GOSSEN METRAWATT

METRAHIT IM XTRA BT & METRAHIT IM E-DRIVE BT & METRAHIT IM TECH BT

Isolation Tester, Milliohmmeter, TRMS Multimeter, Short-Circuited Coil Tester

3-447-034-03
6/7.21

- **Insulation resistance measurement up to 3.1 GΩ** with interference voltage detection, test voltages: 50, 100, 250, 500 and 1000 V per EN 61557-2 (**METRAHIT IM XTRA BT** / **METRAHIT IM E-DRIVE BT** only)
- **DAR:** dielectric absorption rate, **PI:** polarization index (**METRAHIT IM XTRA BT** / **METRAHIT IM XTRA BT** only)
- **4-wire milliohm measurement** (Kelvin connection) with 200 mA or 1 A measuring current for the precise measurement of extremely small resistances with a resolution of 1 µΩ
- **2-wire Rlo measurement** with 200 mA test current per EN 61557-4 (**METRAHIT IM XTRA BT** / **METRAHIT IM E-DRIVE BT** only)
- **Short-circuited coil test** with 1000 V and optional COIL adapter (**METRAHIT IM XTRA BT** / **METRAHIT IM E-DRIVE BT** only)
- **Multifunctional measuring instrument** (V, A, Ω, F, Hz,°C/°F, %) (**METRAHIT IM XTRA BT** / **METRAHIT IM E-DRIVE BT** only), RPM (**METRAHIT IM XTRA BT** / **METRAHIT IM E-DRIVE BT** only)
- **TRMS** $_{AC\ /\ AC+DC}$ **measurement** for current/voltage value up to 10/100 kHz
- **Current measurement direct or with clamp sensors** – with adjustable CLIP factor
- **Capacitance measurement**
- **Precision temperature measurement** °C, and °F for RTD and TC-K sensors
- **Diode measurement** (I_K = 1 mA, U_{Flow} up to 4.5 V) and continuity testing
- **Data logger** thanks to integrated memory module and real-time clock, individual measurements as well
- **Programmable sequences** for test routines (**METRAHIT IM XTRA BT** / **METRAHIT IM E-DRIVE BT** only)
- **Color graphic display**
- **Modular power supply:** standard quick-change rechargeable lithium battery, change without interrupting the measuring circuit thanks to touch protected module socket
- **Automatic blocking sockets** for the current input
- Test probe with START (ISO) and STORE keys
- **Housing** with **IP52 protection**, dust protected and drip-proof, replaceable rubber holster
- **Interfaces:** Bluetooth
- **IZYTRONIQ** windows software for documentation, preparation of test reports

CE

600 V CAT IV
1000 V CAT III

MADE IN GERMANY

3 YEARS WARRANTY

reddot award 2018
winner industrial design

ilac-MRA DAkkS Deutsche Akkreditierungsstelle D-K-15080-01-01

Applications

The **METRAHIT IM XTRA BT**, **METRAHIT IM E-DRIVE BT** and **METRAHIT IM TECH BT** are portable, extremely rugged multimeters designed for use in the field. They're suitable for maintenance, service and diagnosis at electric machines, drive units and systems, for example in automotive, energy and automation applications.

METRAHIT IM XTRA BT and **METRAHIT IM E-DRIVE BT** multimeters are all-in-one instruments: insulation tester, milliohmmeter, short-circuited coil tester and universal multimeter. They're ideal for safety testing and diagnosis at electric and hybrid vehicles, as well as all types of electric machines.

The **METRAHIT IM XTRA BT** and the **METRAHIT IM E-DRIVE BT** make it possible to test coils for short-circuits within an inductance range of 10 µH to 50 mH (at 100 Hz) in combination with the optional **COIL Adapter 50mH**. This range corresponds to motors in accordance with DIN standards with power ratings of roughly 15 kVA to 80 MVA. A universal adapter for motors with medium power ratings is in preparation.

METRAHIT IM TECH BT is a handy ALL-In-ONE universal multimeter and milliohmmeter.

Features

Insulation Resistance Measurement with Interference Voltage Detection (METRAHIT IM XTRA BT / METRAHIT IM E-DRIVE BT only)

Insulation resistance measurement with test voltages of 50 to 1000 V. If interference voltage of greater than 15 V AC or 25 V DC is detected during insulation measurement, the device issues an optical and acoustic warning whereupon measurements cannot be launched. Afterwards, automatic switching to $TRMS_{AC+DC}$ voltage measurement at 1 MΩ takes place and the currently measured voltage is displayed as U_{ext}.

Polarization Index (PI) (METRAHIT IM XTRA BT / METRAHIT IM E-DRIVE BT only)

When test voltage is applied, insulation resistance is measured after one minute and after ten minutes. The polarization index is the ratio which results from the two measured values. In the case of electric drive units, a value of at least 2 indicates intact insulation and a value of greater than 4 indicates very good insulation.

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Absorption Index (DAR) (METRAHIT IM XTRA BT / METRAHIT IM E-DRIVE BT only)

Practically speaking, the absorption index test is a quick polarization index measurement. The ISO values measured after 30 and 60 seconds are used to generate a ratio.

Kelvin Connection for 4-Wire Measurement (4-L) (milliohm measurement)

The 4-wire measurement compensates for influences resulting from cable and contact resistances which must not be neglected when measuring very small resistances. Measuring current can be set to 200 mA or 1 A. In this way, even extremely small contact resistances can be measured, for example at welded and riveted joints and on aircraft outer skins (lightning protection and wick test), or equipotential bonding is measured in accordance with UN ECE R100 in hybrid and electric vehicles.

2-Wire Rlo Measurement with 200 mA Test Current per EN 61557 (METRAHIT IM XTRA BT / METRAHIT IM E-DRIVE BT only)

Low-resistance measurement per EN 61557-4 for earth, protective and equipotential bonding conductors. If excessive interference current is detected during insulation measurement, the device issues an optical and acoustic warning whereupon measurements cannot be launched.

RMS Value with Distorted Waveform

The utilized measuring method allows for waveform-independent TRMS measurement of alternating quantities (AC) and pulsating quantities (AC and DC) for voltage and current at up to 100 kHz.

Activatable Filter for V AC Measurement

A 1 kHz low-pass filter can be activated if required, for example when measuring 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, and these are indicated at the display if applicable.

Diode Testing with Constant Current I_k = 1 mA

Testing of the polarity of diodes and checking for short-circuits and interruptions in electrical circuits. The test voltage source makes it possible to measure LEDs and reference diodes up to 4.5 V, e.g. also white LEDs.

Fast Acoustic Continuity Test I_k = 1 mA

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

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 for quick, repetitive measurements.

Color Graphic Display

A high-resolution transmissive 3½" TFT color graphic display with 320 x 480 dots is used for measured values and menu navigation. The display is easily readable from all directions, as well as under difficult lighting conditions (controllable with light sensor). Graphic representation permits user-friendly menu navigation including help texts.

Analog Bar Graph for Quick Trend Displays

The bar graph (with additional negative axis range for zero-frequency quantities) permits faster detection of measured value changes as compared with digital value displays.

Display Resolution

High resolution with 30,000 digits and a basic accuracy of 0.15%.

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 is displayed as a digital value. The bar graph continuously indicates the momentary measured value.

Overload Protection

Overload protection safeguards the instrument in all measuring functions for up to 1000 V. Voltages of greater than 1000 V and currents of greater than 1 A are indicated acoustically. FUSE appears at the display if the fuse for the current or mΩ measurement input blows.

Battery Charge Level – Power Saving Circuit

The battery charge level is accurately indicated in the graphic display.

The device is switched off automatically if the measured value remains unchanged for a period of between 10 and 59 minutes (adjustable), if none of the controls are activated during this time and continuous operation is not activated.

Automatic Blocking Sockets (ABS) [1]

All current ranges are implemented via a single connector jack which prevents any possibility of operator error.

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. EP 1801 598 and US 7,439,725)

Housing and Protective Cover for Harsh Conditions

- New housing design
- Separate fuse compartment
- Quick-change rechargeable battery

The instrument is protected against damage in the event of impacts or dropping by means of a soft rubber cover with tilt stand. The rubber material also assures that the instrument doesn't wander if it's set up on a vibrating surface.

Data Interfaces

The instrument can be remote configured and momentary and saved measurement data can be read out via Bluetooth. For PC, the complete software **IZYTRONIQ** or **METRAHIT IM Data Reader** is required to this end. For smartphones and tablets with Android™, the **METRALOG** app is available.

Interface protocol and device driver software for **LabVIEW** (National Instruments™) are available upon request.

Voluntary Manufacturer's Guarantee

36 months for materials and workmanship. [2]

1 year for calibration.

DAkkS calibration certificate

The multimeter is furnished with a DAkkS calibration certificate, which is also recognized internationally (EA, ILAC).

After the user-specified calibration interval has elapsed (recommended interval: 1 to 3 years), the multimeter can be inexpensively recalibrated in our proprietary DAkkS calibration laboratory.

METRAHIT IM XTRA BT & METRAHIT IM E-DRIVE BT & METRAHIT IM TECH BT

Isolation Tester, Milliohmmeter, TRMS Multimeter, Short-Circuited Coil Tester

Overview of Included Features

Function	METRAHIT IM XTRA BT IM E-DRIVE BT	METRAHIT IM TECH BT
V_{DC} (Ri = 9 MΩ)	•	•
V_{AC} / Hz TRMS (Ri = 9 MΩ)	1kHz filter	1kHz filter
V_{AC+DC} TRMS (Ri = 9 MΩ) [1]	1kHz filter	1kHz filter
V_{AC+DC} TRMS (Ri = 1 MΩ) R_{ISO} range (interference voltage)	•	
Hz (V_{AC})	... 300 kHz	... 300 kHz
$V_{AC, AC+DC}$ bandwidth	100 kHz	100 kHz
$A_{DC, AC, AC+DC}$ / Hz TRMS	10 nA ... 1 A	10 nA ... 1 A
Fuse F1 current measurement function	1 A/1000 V - 30 kA [4]	1 A/1000 V - 30 kA [4]
Current sensor transformation ratio	1 mV : 1 • 10 • 100 • 1000 mA	1 mV : 1 • 10 • 100 • 1000 mA
Hz (A AC)	... 30 kHz	... 30 kHz
Insulation resistance RISO: test voltages	50 • 100 • 250 • 500 • 1000 V	
Short-circuited coil test (1 kV) with COIL adapter	option	
Duty cycle measurement as %	•	
Speed measurement in RPM	•	
Resistance Rlo with 200 mA per EN 61557	•	
Milliohm with 4-wire method, mΩ with 200 mA	•	•
Milliohm with 4-wire method, mΩ with 1 A pulse	•	•
Fuse F2 Rlo measurement function	315 mA/1000 V – 30 kA [4]	
Resistance Ω	•	•
Continuity	•	•
Diode ... 4.5 V	•	•
Temperature °C/°F TC type K and Pt100/1000 [2]	•	•
Capacitance	•	•
MIN/MAX/data hold	•	•
Test sequence	1 (with 10 steps)	
Sequence functions Expert	option	option
64 MBit memory [3]	•	•
Bluetooth interface	•	•
3.5“ TFT color graphic display	•	•
Push-button probe Start/Stop and Send/Store	•	
Quick-change battery with USB charging	•	•
Protection	IP52	IP52
Measuring category	1000 V CAT III, 600 V CAT IV	1000 V CAT III, 600 V CAT IV

[1] Due to the system, the DC component indicated in the smallest measuring range (300 mV) has an offset. For a precise measurement of the DC component, please select measuring function VDC.
[2] with optional temperature sensors
[3] For 300,000 measured values, sampling rate adjustable from 0.1 seconds to 9 hours
[4] 30 kA = breaking capacity

Standard Equipment (depending on Device Variant)

1 Multimeter with rubber holster
1 HC40 hard case (for multimeter and accessories) (Z270K: black or Z270H: orange)
1 Quick-change, rechargeable lithium polymer battery with USB power pack (5 V DC, 2 A) (Z270A or Z270G)
1 Probe (with start/stop and store/send function) (Z270S) (**METRAHIT IM XTRA BT** and **METRAHIT IM E-DRIVE** only)
1 Cable set KS17-2 (1 pair of safety measurement cables, red/black, with 4 mm test tips) (GTY362003P0002)
1 Pair of KC4 Kelvin clips (Z227A) (**METRAHIT IM XTRA BT** and **METRAHIT IM TECH BT** only)
1 KC&S Kelvin clip and Kelvin probe (Z227C) (**METRAHIT IM E-DRIVE BT** only)
1 DAkkS calibration certificate
1 Condensed operating instructions
* Comprehensive operating instructions available on the Internet for download

1 IZYTRONIQ Business Starter license (card with registration key for software)

IZYTRON .IQ STARTER BUSINESS

Overview of Scope of Delivery

Accessories	Type	Article No.	M273S	M274S	M272S
METRAHIT IM XTRA BT		**M273D**	**X**		
METRAHIT IM E-DRIVE BT		**M274B**		**X**	
METRAHIT IM TECH BT		**M272B**			**X**
Quick-change lithium polymer rechargeable battery & USB mains power pack	M27x	Z270A/ Z270G	X	X	X
USB mains power pack with 4 replaceable primary terminals (for Z270A/ Z270G)	M27x	Z270L	0	0	0
Push-button probe	Z270S	Z270S	X	X	—
Cable set	KS17-2	GTY3620 03P0002	X	X	X
1 pair of Kelvin clips	KC4	Z227A	X	0	X
1 pair of Kelvin probes	KC27	Z227B	0	0	0
1 Kelvin clip & 1 Kelvin probe	KC&S	Z227C	0	X	0
Concentric Kelvin probes for 4-wire measurements	KCC	Z227O	0	0	0
Cable reel for 4-wire measurements, 100 meters	KCV100	Z227E	0	0	0
Hard case black orange	HC40	Z270K Z270H	X	X	X
Magnetic holder and Velcro fastener	HIT-Clip	Z117A	0	0	0
COIL adapter 10 µH ... 50 mH	COIL Adapter 50mH	Z270F	0	0	—
COIL adapter 10 µH ... 500 mH	COIL Adapter XTRA	Z270M	0	0	—
Set of test probes with alligator clips for COIL adapter XTRA	KSC-3L	Z110C	0	0	—
Adapter cable 4 mm male to 6 mm female	AK-4M/6F	Z110L	0	0	0
Functions expansion to 16 test sequences with up to 63 test steps each	Sequence Expert	Z270P	0	0	0
IZYTRONIQ Business Starter License	S101S & Z956A	S101S & Z956A	X	X	X

Key
X = standard 0 = option — = not possible, not provided for

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Isolation Tester, Milliohmmeter, TRMS Multimeter, Short-Circuited Coil Tester

Characteristic Values

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

Meas. Func. (input)	Measuring Range	Resolution at Upper Range Limit 30,000	Resolution at Upper Range Limit 3000	Input Impedance ⎓	Input Impedance ~ / ≂	Intrinsic Uncertainty ±(... % rdg. + ... d) 30,000 ⎓	Intrinsic Uncertainty ±(... % rdg. + ... d) 3000 ⎓	Intrinsic Uncertainty ±(... % rdg. + ... d) 30,000 ~ [1, 11]	Intrinsic Uncertainty ±(... % rdg. + ... d) 30,000 ≂ [1, 11]	Overload Capacity [2] Value	Overload Capacity [2] Time
V	300 mV	10 µV		9 MΩ	9 MΩ // < 50 pF	0.15 + 10 [10]		0.5 + 30	1.0 + 30	1000 V DC AC RMS sine [6]	Cont.
	3 V	100 µV		9 MΩ	9 MΩ // < 50 pF	0.15 + 10					
	30 V	1 mV		9 MΩ	9 MΩ // < 50 pF	0.15 + 10					
	300 V	10 mV		9 MΩ	9 MΩ // < 50 pF	0.2 + 20					
	1000 V	100 mV		9 MΩ	9 MΩ // < 50 pF	0.2 + 20					
				Voltage drop at approx. range limit			⎓	~ [1, 11]	≂ [1, 11]		
A	300 µA	10 nA		70 mV		0.25 + 10		1+ 30 [10]	1.0 + 30 d	0.3 A	Cont.
	3 mA	100 nA		165 mV		0.15 + 10		0,5 + 30 [10]			
	30 mA	1 µA		190 mV							
	300 mA	10 µA		450 mV							
	1 A	100 µA		1.2 V						1 A	5 min.
	Factor: 1:1/10/100/1000	Measurement input		Input impedance			⎓	~ [1, 11]	≂ [1, 11]		
A ⊁ @ V_{AC} / V_{AC}	0.3, 3, 30, 300 A		300 mV	Voltage measurement input approx. 9 MΩ (⊁ V socket)		0.15 + 10 [10]	plus current transformer clamp error	0.5 + 30 d	1.0 + 30 d	Measurement input [6]	
	3, 30, 300, 3 k A		3 V							1000 V	Max. 10 s
				Open-circuit voltage	Meas. current at range limit	±(... % rdg. + ... d)	3000				
mΩ @ 1 A pulse (4-wire)	3 mΩ		0.001 mΩ	2.8 … 3.8 V	1 A		1.0 + 20			± 0.6 V [14]	Cont.
	30 mΩ		0.01 mΩ	2.8 … 3.8 V	1 A		0.5 + 7				
	300 mΩ		0.1 mΩ	2.8 … 3.8 V	1 A						
mΩ@ 200mA (4-wire)	30 mΩ		0.01 mΩ	> 4 V	200 mA		0.5 + 7 [16]			± 0.6 V [14]	Cont.
	300 mΩ		0.1 mΩ	> 4 V	200 mA						
	3 Ω		1 mΩ	> 4 V	200 mA						
mΩ@ 20 mA (4-wire)	30 Ω		10 mΩ	> 4 V	20 mA		0.5 + 7			± 0.6 V [14]	Cont.
R_{Lo} (2-wire) [18] EN61557 [17]	@ 200mA: 3 Ω		1 mΩ	> 4 V	200 mA		2.5 +10 [10]			± 0.6 V [15]	Cont.
	@ 20mA: 30 Ω		10 mΩ	> 4 V	20 mA		2.5 +10 [10]				
Ω (2-wire)	300 Ω	10 mΩ		< 1.4 V	approx. 300 µA	0.2 + 30 [10]				1000 V DC AC RMS sine	Max. 10 s
	3 kΩ	100 mΩ		< 1.4 V	approx. 100 µA	0.15 + 10 [10]					
	30 kΩ	1 Ω		< 1.4 V	approx. 10 µA	0.15 + 10					
	300 kΩ	10 Ω		< 1.4 V	approx. 1 µA	0.15 + 10					
	3 MΩ	100 Ω		< 1.4 V	approx. 0.2 µA	0.5 + 10					
	30 MΩ	1 kΩ		< 1.4 V	approx. 0.03 µA	2.0 + 10					
🔊	300 Ω		100 mΩ	approx. 3 V	approx. 1 mA constant		1 + 5 [10]				
⊳|	4,5 V [3]		1 mV	approx. 8 V			0.5 + 2				
				Discharge resistance	$U_{0\ max}$	±(... % rdg. + ... d)					
F	30 nF		10 pF	10 MΩ	0.7 V	1.5 + 10 [4] [10]				1000 V DC AC RMS sine	Max. 10 s
	300 nF		100 pF	1 MΩ	0.7 V	1 + 6 [4]					
	3 µF		1 nF	100 kΩ	0.7 V	1 + 6 [4]					
	30 µF		10 nF	12 kΩ	0.7 V	1 + 6 [4]					
	300 µF		100 nF	3 kΩ	0.7 V	5 + 6 [4]					
					f_{min} [5]	±(... % rdg. + ... d)					
Hz (V)/ Hz (A) Hz (A 🗜)	300 Hz	0.01 Hz			1 Hz	0.05 + 5 [8]				Hz (V) [6]; Hz (A ⊁) [6]: 1000 V	Max. 10 s
	3 kHz	0.1 Hz									
	30 kHz	1 Hz									
	300 kHz	10 Hz			20 Hz					Hz (A): [7]	
			Resolution	Voltage MR [13]	Frequency MR	±(... % v. MR + ... d)					
% [18]	10.0 ... 90.0		0.1%	3 V AC	15 Hz ... 1 kHz	0.2% rdg. + 8 d				1000 V DC AC RMS sine [6]	Cont.
	10.0 … 90.0				> 1 kHz ... 4 kHz	0.2% MR/kHz + 8 d					
	5.0 ... 95.0			30 V AC	15 Hz ... 1 kHz	0.2% rdg. + 8 d					
	15.0 … 85.0				> 1 kHz ... 4 kHz	0.2% MR/kHz + 8 d					
RPM [18]	30 … 30,000		1 RPM								
						±(... % rdg. + ... K) [9]					
°C / °F	Pt100	– 200 ... +850 °C	0.1 °C			0.5% + 1.5				1000 V DC/AC RMS sine	Max. 10 s
	Pt1000	– 200 ... +850 °C				0.5% + 1.5					
	K (NiCr-Ni)	– 250 ... +1372 °C				1% + 5					

1 15 ... 45 ... 65 Hz ... 100 kHz sinusoidal. For influence see page 5.
2 At 0 ° ... + 40 °C
3 Display of up to max. 4.5 V, "OL" in excess of 5.1 V.
4 Applies to measurements at film capacitors during battery operation
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. 6 x 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 the voltage or current measuring range, restriction in mV measuring range: 30% rdg. The voltage measuring ranges with max. 10 kHz apply in the A measuring range.
9 Plus sensor deviation
10 With ZERO function active
11 Accuracy applies as from 1 % of MR; due to the TRMS converter, values < 50 digits are suppressed in the zero point.
12 10 minute cool-down period
13 Required signal range: 30% to 100% of the voltage measuring range
14 The integrated FF1A/1000 V fuse blows in the event of overloading
15 The integrated FF0.315A/1000 V fuse blows in the event of overloading
16 For measuring range 30 mΩ and 300 mΩ with function TComp active
17 A test current of 200 mA must be set for the measuring range 0.2–2 Ω for the standards-compliant testing of protective measures.
18 METRAHIT IM XTRA BT and METRAHIT IM E-DRIVE BT only

Isolation Tester, Milliohmmeter, TRMS Multimeter, Short-Circuited Coil Tester

Insulation Measurement
(METRAHIT IM XTRA BT and METRAHIT IM E-DRIVE BT only)

Measuring Range	Resolution	Nominal Voltage U_{ISO}	Intrinsic Uncertainty at Reference Conditions ±(% rdg. + d)
3 ... 1000 V ≃ [1]		Ri = 1MΩ	3 + 3
300 kΩ [2]	0.1 kΩ	50/100/250/500/1000 V	2 + 10
3 MΩ	1 kΩ	50/100/250/500/1000 V	2 + 10
30 MΩ	10 kΩ	50/100/250/500/1000 V	2 + 10
300 MΩ	100 kΩ	50/100/250/500/1000 V	5 + 10
3000 MΩ	1 MΩ	250/500/1000 V	5 + 10

1 TRMS interference voltage measurement (V_{AC+DC}) with 1 MΩ input resistance, frequency response width: > 65 ... 500 Hz, accuracy: 3% + 30 digits

2 Current for the MΩ measurement with U_{ISO} is limited to 1 mA. And thus when measuring small insulation resistances, U_{Actual} deviates from U_{Set}, i.e. U_{Actual} is correspondingly smaller. Example: at R_{ISO} 200 kΩ max. 200 V.

Measuring Function	Nom. Voltage U_N	Open-Circuit Voltage U_0 Max.	Nom. Current I_N	Short-Circuit Current I_K	Acoustic Signal for	Overload Capacity Value	Overload Capacity Time
$U_{int.}$/ $M\Omega_{@}U_{ISO}$	—	—	—	—	U > 1000 V	1000 V≂	Cont.
$M\Omega_{@}U_{ISO}$	50 100	1.2x U_{ISO}	1.0 mA	< 1.4 mA	U > 1000 V	1000 V≂	10 s
	250 500 V 1000 V	1.12x U_{ISO}					

Short-Circuited Coil Test (only METRAHIT IM XTRA BT or METRAHIT IM E-DRIVE BT and with optional COIL Adapter)

Measuring Range	Resolution	Nominal Voltage U_{SET}	Intrinsic Uncertainty at Reference Conditions ±(% rdg. + d)
0.3 ... 1000 V ≂ [1]		Ri = 1MΩ	3 + 30 > 100 digits
10.0 ... 30.9 µs	0.1 [µs]	1000 V	10 + 5 digits
31 ... 250 µs	1 [µs]		

1 TRMS interference voltage measurement (V_{AC+DC}) with 1 MΩ input resistance, frequency response width: > 65 ... 500 Hz, accuracy: 3% + 30 digits

2 The time value may vary for different COIL adapters by up to 10 %. This has no influence whatsoever if you perform the measurements with the same COIL adapter and compare them with each other.

Inductance measuring ranges of optional COIL adapters:

- COIL adapter XTRA (Z270M): 10 µH up to 5 H
- COIL adapter 50mH (Z270F): 10 µH up to 50 mH

Internal Clock

Time format	DD.MM.YYYY hh:mm:ss
Resolution	0.1 s (measured values time stamp)
Accuracy	±1 minute per month
Temperature influence	50 ppm/K

Reference Conditions

Ambient temperature	+23 °C ±2 K
Relative humidity	40% … 75%
Measured quantity frequency	45 Hz … 65 Hz
Measured quantity waveform	Sinusoidal
Supply voltage	4.0 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	2 + 5
		Hz	0.2 + 5
		°C/°F (Pt100/Pt1000)	0.5 + 5

1 With zero balancing

Frequency Influence for V_{AC} V_{AC+DC} Voltage Ranges

Frequency Range	Deviation [1] 300 mV range ± (... % rdg. + ... d)	3 V, 30 V, 300 V range [2] ± (... % rdg. + ... d)	1000 V range [2] ± (... % rdg.)
15 Hz ... 45 Hz	2 + 30	2 + 30	2 + 30
> 65 Hz ... 1 kHz	0.5 + 30	0.5 + 30	1 + 30
> 1 kHz ... 10 kHz	2 + 30	1.5 + 30	10 + 30
> 10 kHz ... 20 kHz	3 + 30	1.5 + 30	—
> 20 kHz ... 50 kHz	3 + 30	5 + 30	—
> 50 kHz ... 100 kHz	10 + 30	10 + 30	—

1 For sinusoidal input signals > 10% to 100% of the range (mV range: as of 30% of range, at 1% to 10% of the range: f < 50 kHz, intrinsic error increased by 0.2% of the upper range limit.

2 Overload capacity of the voltage measurement input: power limiting: frequency x voltage max. 6 x 10^6 V x Hz at > 100 V

Frequency Influence for I_{AC} / I_{AC+DC} Current Measuring Ranges

Frequency Range	Influence Error [1] 300 µA to 300 mA ± (... % rdg. + ... digits)	1 A range ± (... % rdg. + ... digits)
15 Hz ... 45 Hz	2 + 30	2 + 30
> 65 Hz ... 1 kHz	1 + 30	1 + 30
> 1 kHz ... 2 kHz	1 + 30	1 + 30
> 2 kHz ... 5kHz	1 + 30	3 + 30
> 5 kHz ... 10 kHz	5 + 30	5 + 30

1 For sinusoidal input signals > 10% to 100% of the range.

Influencing Quantity	Sphere of Influence	Measured Quantity / Measuring Range	Influence Error [1]
Crest Factor CF	1 … 3	V ∼, A ∼	± 1% rdg.
	> 3 ... 5		± 3% rdg.

1 Except for sinusoidal waveform

Influencing Quantity	Sphere of Influence	Measured Quantity	Influence Error
Relative Atmospheric Humidity	75% 3 days instrument off	V, A, Ω, F, Hz, °C	1 x intrinsic uncertainty
Battery Voltage		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 ⎓	> 90 dB
	Interference quantity max. 1000 V ∼ 50 Hz ... 60 Hz, sinusoidal	3 V ∼	> 90 dB
		30, 300 V ∼	> 150 dB
		1000 V ∼	> 150 dB
Series Mode Interference Voltage	Interference quantity: V ∼ , respective nominal value of the measuring range, max. 1000 V ∼ , 50 Hz ... 60 Hz sinusoidal	V ⎓	> 50 dB
	Interference quantity max. 1000 V —	V ∼	> 50 dB

METRAHIT IM XTRA BT & METRAHIT IM E-DRIVE BT & METRAHIT IM TECH BT

Isolation Tester, Milliohmmeter, TRMS Multimeter, Short-Circuited Coil Tester

Response Time (after manual range selection)

Measured Quantity / Measuring Range	Digital Display Response Time	Measured Quantity Jump Function
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, $M\Omega_{@U_{ISO}}$	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	

Display

TFT color graphic display (55 x 36 mm) with analog and digital display including unit of measure, type of current and various special functions

Background Illumination

Activated background illumination can be regulated by means of a light sensor.

Analog Bar Graph

Scaling	linear
Polarity display	with automatic switching
Measuring rate	40 measurements per second and display refresh

Digital Measured Value Display

Resolution / char. height	320 x 480 dots, 12 mm
Number of places	31,000 / 3100 4¾-place in the V, A, Hz and Ω measuring functions, depending on parameter setting
Overflow display	"OL" is displayed for ≥ 31,000 digits or ≥ 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 and duty cycle measuring functions
Refresh Rate	2 times per second, every 500 ms

Electrical Safety

Protection category	II per EN 61010-1	
Measuring category	CAT III	CAT IV
Nominal Voltage	1000 V	600 V
Pollution degree	2	
Test voltage	7.4 kV~ per EN 61010-1	

Fuse

Current measuring ranges & 4-wire mΩ measuring ranges	**F1:** FF 1 A/1000 V AC/DC, 6.3 x 32 mm Fuse with breaking capacity of 30 kA at 1000 V AC/DC, protects the current measurement input in the 300 µA to 1 A ranges
2-wire mΩ measuring ranges (**METRAHIT IM XTRA BT** and **METRAHIT IM E-DRIVE BT** only)	**F2:** FF 0,315 A/1000 V 6.3 x 32 mm Fuse with breaking capacity of 30 kA at 1000 V AC/DC

Power Supply

Battery module	3.7 V, 4000 mAh, LiPo (approx. 25% self-discharge per year)
Service life	approx. 20 hours (without $M\Omega_{ISO}$ measurement / R_{LO} / R 4-wire measurement)
Battery indicator	Battery charge level display via battery symbol:  , querying of momentary exact charge level in % via menu function
Power OFF function	The multimeter is switched off automatically: – when battery voltage drops to below approx. 3.6 V – 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

Rechargeable battery modules 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 EN 61557
V ⎓			20 [1]	
V ∼			15 [1]	
RINS	100 V	1 MΩ	5	
	100 V	100 kΩ		300
	500 V	500 kΩ		60
	1000 V	2 MΩ		20

[1] Times 0.7 for interface operation

Electromagnetic Compatibility (EMC)

Interference emission	EN 61326-1 class B
Interference immunity	EN 61326-1

Short-term measured value deviation of up to 10% may occur during electromagnetic interference thus reducing the specified operating quality.

Ambient Conditions

Accuracy range	0 °C to +40 °C
Operating temperatures (Storage temperature with batteries)	–10 °C ... +50 °C –20 °C ... +50 °C with rubber holster
Storage temperatures	–25 °C ... +70 °C (without battery)
Relative humidity	40 to 75 %, no condensation allowed
Elevation	to 2000 m
Deployment	Indoors, except within specified ambient conditions

Data Interface

Type	Bluetooth 4.2
Frequency band	2.402 ... 2.480 GHz
Transmitting power	max. 91 mW
Functions	– Query measuring functions and parameters – Query momentary measurement data

Internal Measured Value Storage

Memory capacity	64 MBit for approx. 300,000 measured values with indication of date and time

Mechanical Design

Housing	Impact resistant plastic (ABS)
Dimensions	235 × 105 × 56 mm (without rubber holster)
Weight	approx. 0.7 kg with battery module
Protection	Housing: IP 52 (pressure equalization by means of the housing)

Excerpt from table on the meaning of IP Codes

IP XY (1st digit X)	Protection against foreign object entry	IP XY (2nd digit Y)	Protection against the penetration of water
0	not protected	0	not protected
1	≥ 50.0 mm dia.	1	vertically falling drops
2	≥ 12.5 mm dia.	2	vertically falling drops with enclosure tilted 15°
3	≥ 2.5 mm dia.	3	spraying water
4	≥ 1.0 mm dia.	4	splashing water
5	dust protected	5	water jets

Applicable Regulations and Standards

EN 61010-1	Safety requirements for electrical equipment for measurement, control and laboratory use – Part 1: General requirements
EN 61010-2-033	Safety requirements for electrical equipment for measurement, control and laboratory use - Part 2-033: Particular requirements for hand-held multimeters and other meters, for domestic and professional use, capable of measuring mains voltage
EN 61326-1	Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements
EN 60529	Test instruments and test procedures – degrees of protection provided by enclosures (IP code)
EN 61557-1 (METRAHIT IM XTRA BT and METRAHIT IM E-DRIVE BT only)	Electrical safety in low voltage distribution systems up to 1000 V a.c. and 1500 V d.c. – Equipment for testing, measuring or monitoring of protective measures Part 1: General requirements
EN 61557-2 (METRAHIT IM XTRA BT and METRAHIT IM E-DRIVE BT only)	Part 2: Insulation resistance
EN 61557-4 (METRAHIT IM XTRA BT and METRAHIT IM E-DRIVE BT only)	Part 4: Resistance of earth connection and equipotential bonding

METRAHIT IM XTRA BT with Accessory COIL Adapter 50mH (Z270F)

METRAHIT IM XTRA BT with Accessory COIL Adapter XTRA (Z270M)

METRAHIT IM XTRA BT & METRAHIT IM E-DRIVE BT & METRAHIT IM TECH BT

Isolation Tester, Milliohmmeter, TRMS Multimeter, Short-Circuited Coil Tester

Order Information

Designation	Type	Article Number
Multimeter, milliohmmeter and isolation resistance tester (COIL Ready) with graphic display, Bluetooth, and software **IZYTRONIQ** Business Starter. R-ISO up to 1kV & mΩ @ 200 mA 2-wire & mΩ @ 200 mA 4-wire & mΩ @ 1 A 4-wire. Standard equipment comprises multimeter (M273D), push-button probe, cable set, kelvin-clips, hard case, rechargeable lithium battery, USB mains power pack, calibration certificate, and software license.	**METRAHIT IM XTRA BT**	M273S
Multimeter, milliohmmeter and isolation resistance tester (COIL Ready) with graphic display, Bluetooth, and software **IZYTRONIQ** Business Starter. R-ISO up to 1kV & mΩ @ 200 mA 2-wire & mΩ @ 200 mA 4-wire & mΩ @ 1 A 4-wire. Standard equipment comprises multimeter (M274B), push-button probe, cable set, each one Kelvin clip and Kelvin probe, hard case, rechargeable lithium battery, USB mains power pack, calibration certificate, and software license.	**METRAHIT IM E-DRIVE BT**	M274S
Multimeter and milliohmmeter with graphic display, Bluetooth and **IZYTRONIQ** Business Starter software. 4-wire mΩ @ 200 mA and 1 A. The scope of delivery includes the DMM (M272B), 1 pair of Kelvin clips, cable set, hard case, rechargeable LiPo battery, USB mains power pack, calibration certificate and software license.	**METRAHIT IM TECH BT**	M272S
Expansion of scope of functions		
METRAHIT IM Expert sequence functions: functions expansion to 16 test sequences with up to 63 test steps each	Expert sequence functions	Z270P
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 diameter steel tips and 120 cm cable, 1000 V / CAT III	KS17-S	Z110H
Adapter cable 4 mm male to 6 mm female for the charging plug of hybrid and electric vehicles	AK-4M/6F	Z110L
Cable set including test probes, clamps and US test probes (1000 V CAT II / III 20 A)	KS-NTS	Z110W
Alligator clips (1 pair) for KS17-2 1000 V CAT III 16 A	KY95-3	Z110J
Current clamp sensor, 10 mA … 100 A, 1 mV/10 mA, clamp opening: 15 mm dia.	WZ12B	Z219B
Kelvin clips (1 set of 2 ea.) for 4-pole connection of low-resistance DUTs, cable length: 150 cm	KC4	Z227A
Kelvin probes (1 set of 2 ea.) with double steel tips for 4-pole connection of low-resistance DUTs	KC27	Z227B
Set including 1 Kelvin clip and 1 Kelvin probe, as well as 2 stainless steel tips for 4-wire measurement, 120 cm cable length with 4 mm angle plugs	KC&S	Z227C
Concentric Kelvin probes for the 4-wire measurement at measuring points which are difficult to access or close to each other; Cable length 100 cm, 300 V CAT II, 10 A, 4 mm safety plug (90° angle)	KCC	Z227O
Cable reel for 4-wire measurements at large objects (2-pole extension cable), cable length 100 meters	KCV100	Z227E
Rechargeable lithium polymer battery,14.8 Wh	M27x	Z270A
Rechargeable lithium polymer battery, 14.8 Wh	M27x	Z270G
Charger	M27x	Z270L
Coil adapter for interturn short circuit detection at inductivities from 10 µH to 50 mH	COIL Adapter 50mH	Z270F
Coil adapter for interturn short circuit detection at inductivities from 10 µH to 5 H	COIL Adapter XTRA	Z270M
Test probe set with alligator clips for COIL Adapter XTRA for the connection of the COIL Adapter XTRA to 3-phase machines; 1000 V CAT II / 16 A, 1000 V CAT III / 1 A, 600 V CAT IV / 1 A, cable length 1.3 m (without test probes and angle plug)	KSC-3L	Z110C
Push-button probe	Z270S	Z270S
AC/DC current clamp sensor, 5 mA ... 30 A, 100 mV/A	CP30	Z201B
AC/DC current clamp sensor, 0.5 ... 30 A, 5 ... 300 A, 10 mV/A, 1 mV/A	CP330	Z202B
AC/DC current clamp sensor, 0.5 ... 100 A, 5 ... 1000 A, 10 mV/A, 1 mV/A	CP1100	Z203B
AC/DC current clamp sensor, 0.5 ... 125 A, 5 ... 1250 A, 10 mV/A, 1 mV/A	CP1800	Z204A
Accessories for temperature measurement with resistance thermometer		
Pt100 temperature sensor for surface and immersion 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
Protection and transport accessories		
Hard case with foam insert and compartments for 1 multimeter and 2 batteries, as well as 2 universal compartments for accessories.	HC40	Z270K (black) Z270H (orange)
Magnetic holder and Velcro fastener (is attached to the rubber holster)	HIT-Clip	Z117A
Replacement fuses		
Fuse F1 for current measuring ranges FF1 A/1000 V AC/DC (10 pcs.)	FF1 A/1000 V AC/DC	Z109O
Fuse F2 for milliohm measuring ranges FF0,315 A/1000 V AC/DC (10 pcs.)	FF0,315 A/1000 V AC/DC	Z109P

1 with plugged on safety caps
2 without plugged on safety caps

GOSSEN METRAWATT

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