GOSSEN METRAWATT

METRAHIT 2+
Universal TRMS Multimeter

3-349-476-03
7/5.12

- Resolution: 100 µV, 100 mΩ, 10 µA
- TRMS measurement
- Precision temperature measurement
- Automatic and manual measuring range selection
- Backlit digital display with additional analog scale
- Measured value memory, HOLD, MIN / MAX value
- Overload and blown fuse indicators
- IP 40 protection
- Protective rubber cover
- 3 year guarantee
- DKD calibration certificate included as a standard feature

CE

Quality Management System

DQS certified per DIN EN ISO 9000

Deutscher Kalibrierdienst DKD - K - 19701

DKD Calibration Certificate DIN EN ISO/IEC 17025

Features

Automatic Blocking Sockets (ABS) *

Automatic blocking sockets prevent incorrect connection of measurement cables and inadvertent selection of the wrong measured quantity. This significantly reduces danger to the user, the instrument and the system under test, and eliminates it entirely in many cases.

Automatic / Manual Measuring Range Selection

Measured quantities are selected with the rotary switch. The measuring range is automatically matched to measured values. The measuring range can be selected manually as well with the help of the AUTO/MAN key.

Display of Negative Values at the Analog Scale

Negative values are also displayed at the analog scale for zero-frequency quantities, allowing for observation of measured quantity fluctuation around the zero-point.

Storage of Measured Values

By pressing the **HOLD**/MIN/MAX key, the currently displayed measurement value can be „frozen“ in the display.
The minimum and maximum values which were present at the input of the measuring instrument after activation of the MIN/MAX mode can be selectively "retained" with the MIN/ MAX function. The most important application is the determination of the minimum or maximum value during long-term observation of measurement quantities. MIN/MAX has no effect on the analog display; it continues to display the current measurement value.

Continuity Test

Allows for the detection of short-circuits and interrupted conductors. In addition to displaying test results, an acoustic signal can also be generated if desired.

Power Saving Circuit

The device is switched off automatically if the measured value remains unchanged for a period of approximately 10 minutes, and if none of the controls are activated during this time. Automatic shutdown can be deactivated.

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. The rubber material also assures that the instrument does not wander if it is set up on a vibrating surface.

RMS Measurement with Distorted Waveshapes

The measuring method applied allows for RMS measurement for alternating signals (AC) in voltage and current measurement, independent of the waveshape up to 1 kHz (for non-sinusoidal signals as well).

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

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Applicable Regulations and Standards

IEC 61010-1/EN 61010-1/ VDE 0411-1	Safety requirements for electrical equipment for measurement, control and laboratory use
EN 60529 VDE 0470, Part 1	Test instruments and test procedures Protection provided by enclosures (IP code)
IEC 61326/EN 61326	Electromagnetic compatibility (EMC)

Voluntary Manufacturer's Guarantee

36 months for material and workmanship
1 ... 3 years for calibration (depending on application)

Characteristic Values

Meas. Function	Measuring Range		Resolution	Input Impedance		Intrinsic Error at Max. Resolution under Reference Conditions		Overload Capacity [1]		Meas. Function
						±(... % rdg. + ... d)	±(... % rdg. + ... d)			
			6000	⎓	∼	⎓	∼ [5]	Value	Time	
V	600	mV	100 µV	10 MΩ // < 40 pF	8.1 MΩ // 50 pF	0.5 + 5	1 + 5	600 V DC AC eff Sinus	Cont.	**V**
	6	V	1 mV	5.2 MΩ // < 40 pF	4.6 MΩ // 50 pF	0.5 + 5				
	60	V	10 mV	5 MΩ // < 40 pF	4.4 MΩ // 50 pF	0.5 + 5				
	600	V	100 mV	5 MΩ // < 40 pF	4.4 MΩ // 50 pF	0.5 + 5				
				Voltage drop at approx. range limit						
				⎓	∼	⎓	∼ [5]			
A	60	mA	10 µA	100 mV	100 mV	1.0 + 5 (> 10 D)	1.5 + 5 (> 10 D)	1.0 A	Cont.	**A**
	600	mA	100 µA	700 mV	700 mV	1.0 + 5	1.5 + 5 (> 10 D)			
	6	A	1 mA	200 mV	200 mV	1.0 + 5 (> 10 D)	1.5 + 5 (> 10 D)	10 A [4]	Cont.	
	10	A	10 mA	300 mV	300 mV	1.0 + 5	1.5 + 5 (> 10 D)			
				Open-circuit voltage	**Meas. current at range limit**	±(... % rdg. + ... d)				
Ω	600	Ω	100 mΩ	max. 1 V	max. 250 µA	1 + 5 [2]		600 V DC AC eff Sinus	max. 10 s	Ω
	6	kΩ	1 Ω	max. 1 V	max. 100 µA	0.7 + 3				
	60	kΩ	10 Ω	max. 1 V	max. 12 µA	0.7 + 3				
	600	kΩ	100 Ω	max. 1 V	max. 1.2 µA	0.7 + 3				
	6	MΩ	1 kΩ	max. 1 V	max. 120 nA	0.7 + 3				
	40	MΩ	10 kΩ	max. 1 V	max. 50 nA	2.0 + 3				
⇥⇤	2	V	1 mV	max. 3 V		1 + 5				⇥⇤
						±(... % rdg. + ... d)				
🔊	600	Ω	0.1 Ω	max. 1 V		1 + 5		600 V DC AC	max. 10 s	🔊
						±(... % rdg. + ... K)				
°C	TYP K	−50.0 ... +400.0 °C	0.1 °C			1.0 + 5 K [3]		600 V DC/AC eff Sinus	max. 10 s	°C
						±(... % rdg. + ... d)				
Hz	100 Hz		0.1 Hz			0.1 + 2		600 V [6]		Hz
	1000 Hz		1 Hz			0.1 + 2				

1) At 0 to + 40 °C
2) With zero balancing, or + 35 digits without zero balancing
3) Without sensor
4) 12 A for 5 min, 16 A for 30 s
5) 1 ... 35 d from the zero point due to TRMS converter when probe tips are short-circuited
6) power limiting: frequency x voltage max. 3 x 10^6 V x Hz for U > 100 V

Key

rdg. = reading (measured value)
d = digit

Reference Conditions

Ambient temperature	+ 23 °C ± 2 K
Relative humidity	40 ... 60%
Measured quantity frequency	45 ... 65 Hz
Measured quantity waveshape	Sinusoidal
Battery voltage	3 V ± 0.1 V

Influencing Quantities and Influence Error

Influencing Quantity	Sphere of Influence	Measured Quantity / Measuring Range	Influence Error [1] ±(... % rdg. + ... digits)
Temperature	0 °C ... +21 °C and +25 °C ... +40 °C	600 mV ⎓	1.0 + 3
		6 ... 600 V ⎓	0.15 + 1
		V ∼	0.4 + 2
		60 mA ... 600 mA ⎓	0.5 + 1
		6 A/10 A ⎓	0.5 + 1
		A ∼	0.75 + 1
		0 Ω [2]	0.15 + 2
		600 Ω	0.25 + 2
		6 kΩ ... 6 MΩ	0.15 + 1
		40 MΩ	1.0 + 1
		– 50 ... + 200 °C	1 K + 2
		+ 200 ... + 400 °C	1 + 2
Measured Quantity Frequency	> 30 Hz ... 45 Hz	A ∼	2.0 + 10
	> 65 Hz ... 1 kHz	60 / 600 mA / 6 A	1.5 + 10
		10 A	2 + 10
	> 30 Hz ... 45 Hz	600 mV	3 + 10
		6 / 60 /600 V	2.5 + 10
	> 65 Hz . ... 500 Hz	600 mV	35 + 20
	> 65 Hz ... 800 Hz	6 / 60 V	2.5 + 10

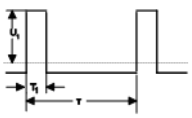
Influencing Quantity	Sphere of Influence	Measured Quantity / Measuring Range	Influence Error
Battery Voltage	⊣ [3] ... < 2.9 V > 3.1 V ... 3.6 V	V ⎓	± 2 Digits
		V ∼	± 4 Digits
		A ⎓	± 4 Digits
		A ∼	± 6 Digits
		60 Ω / 600 Ω / °C	± 4 Digits
		6 kΩ ... 40 MΩ	± 3 Digits
Relative Humidity	75% 3 days Instrument off	V ≃ A ≃ Ω °C	1 x intrinsic error
HOLD	—		± 1 Digits
MIN / MAX	—	V ≃, A ≃	± 2 Digits

[1] For temperature: specified error valid starting with temperature changes as of 10 K. For frequency: specified error valid starting with display values as of 300 digits.
[2] With zero balancing
[3] After the ⊣ symbol appears at the display

Influencing Quantity	Sphere of Influence	Measuring Ranges	Damping
Common Mode Interference Voltage	Interference quantity max. 600 V ∼	V ⎓	> 120 dB
	Interference quantity max. 600 V ∼ 50 Hz, 60 Hz sine	6 V ∼, 60 V ∼	> 80 dB
		600 V ∼	> 70 dB
Series Mode Interference Voltage	Interference quantity: V ∼, respective nominal value of the measuring range, max. 600 V ∼ , 50 Hz, 60 Hz sine	V ⎓	> 50 dB
	Interference quantity max. 600 V —	V ∼	> 110 dB

Crestfaktor CF

Test signal: Rectangle 55 Hz, no DC component



Influencing Quantity	Sphere of Influence	Measured Quantity / Measuring Range	Influence Error
Crest factor CF	1.5 < CF ≤ 2	6 V, 60 V, 600 V ∼	±1 % rdg.
	2 < CF ≤ 4		±5 % rdg.

The admissible crest factor CF of the alternating quantity to be measured depends on the display value.

Crest factor 4 at the end of range, it is increased accordingly when the range is reduced. However, due to input protection, voltage is limited to 1000 V, therefore the admissible crest factor in the 600 V ranges is half as high.

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

Response Time (after manual range selection)

Measured Quantity / Measuring Range	Response Time		Measured Quantity Step Function
	Analog Display	Digital Display	
V ⎓, V ∼, A ⎓, A ∼	0.7 s	1.5 s	from 0 to 80% of the upper range limit
600 Ω ... 6 MΩ	1.5 s	2 s	from ∞ to 50% of the upper range limit
40 MΩ	4 s	5 s	
⊣	—	1.5 s	
°C	—	max. 1 ... 3 s	from 0 to 50% of the upper range limit

Display

LCD panel (65 mm x 30 mm) with analog and digital display including unit of measure, type of current and various special functions. Background illumination the **ON** / **OFF** key, and is switched off automatically after approximately 1.

minute.

Analog:

Display	LCD scale with pointer
Scale length	55 mm in all ranges
Scaling	0 ... ± 60 with 61 scale divisions in all ranges
Polarity display	With automatic switching
Overflow display	Triangle
Measuring rate	20 measurements per second

Digital:

Display / char. height	7-segment characters / 15 mm
Number of places	$3^6/_7$ -place ≙, 6000 steps
Overflow display	„0.L“ appears
Polarity display	“–” sign is displayed if plus pole is connected to ⊥
Measuring rate	2 measurements per second

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Power Supply

Battery	2 x 1.5 V AA size batteries, alkaline manganese per IEC LR6 or equivalent rechargeable NiCd battery
Service life	With alkaline manganese: approx. 750 hours for V ⎓ , A ⎓ approx. 200 hours for V ~ , A ~
Battery test	⊣ is displayed automatically if battery voltage drops to below approximately 2.1 V.

Electrical Safety

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

Electromagnetic Compatibility (EMC)

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

Fuses

Fuse links for all ranges up to 600 mA	FF 1.6 A/1000 V, 6.3 mm x 32 mm, switching capacity: 10 kA at 1000 V~ with ohmic load, protects all current measuring ranges up to 600 mA in combination with power diodes
Fuse links for all ranges up to 10 A	FF 10 A/1000 V, 10 mm x 38 mm, switching capacity: 30 kA at 1000 V with ohmic load, protects 6 A and 10 A ranges to 1000 V

Ambient Conditions

Accuracy range	0 °C ... + 40 °C
Operating temp.	–10 °C ... + 50 °C
Storage temperature	– 25 °C ... + 70 °C without batteries
Relative humidity	45 ... 75%, no condensation allowed
Elevation	to 2000 m

Mechanical Design

Protection	IP 40, IP 20 at the connector jacks per DIN VDE 0470, part 1 / EN 60529
Dimensions	84 mm x 195 mm x 35 mm
Weight	Approx. 350 gr. with battery

Standard Equipment

1 TRMS-Digital-Multimeter
1 protective rubber holster
2 2 x 1.5 V AA size batteries
1 set of measurement cables KS17-ONE
1 DKD calibration certificate
1 Short-form operating instructions

Detailed operating instructions are available on our website www.gossenmetrawatt.com.

Order Information

Description	Type	Article Number
Analog-digital multimeter standard equipment see above	METRAHIT 2+	M205A
Accessories		
Fast reacting surface temperature sensor, type K (NiCr-Ni) –50 ... +400 °C	TF400SURFACE	Z102E
Clip-on current transformer, 30 mA ... 150 A~, 1000:1, ±2.5 %, 1 mA/A	WZ12D	Z219D
Clip-on current sensor 60 / 600 A ⎓ , 40 / 400 A ~ , 10 mV / A or 1 mV / A ≂	Z13B	Z213B
Carrying pouch	F829	GTZ3301000R0003
Imitation leather carrying pouch for one METRAHit® and accessories	F836	GTZ3302000R0001
Imitation leather carrying pouch for two METRAHit®, adapter and accessories	F840	GTZ3302001R0001
Hard case for 1 METRAHit® and accessories	HC20	Z113A
Hard case for two METRAHit®, adapter and accessories	HC30	Z113A
Fuses (pack of 10)	FF 1.6 A / 1000 V	Z109C
Fuses (pack of 10)	FF 10 A / 1000 V	Z109L

For additional information on accessories, please refer to

- our „Measuring Instruments and Testers“ catalogue
- our website www.gossenmetrawatt.com

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