

# METRAport<sup>®</sup> 3A Folding Analog Multimeter

3-349-302-03  
1/4.04

- **9 voltage measuring ranges,  $V_{\approx}$ :**  
100 mV, 300 mV, 1 V, 3 V, 10 V, 30 V, 100 V, 300 V and 600 V
- **7 current measuring ranges,  $A_{\approx}$ :**  
10  $\mu$ A, 100  $\mu$ A, 1 mA, 10 mA, 100 mA, 1 A and 10 A
- **5 resistance measuring ranges:** 1  $\Omega$  ... 2 k $\Omega$ / 10  $\Omega$  ... 20 k $\Omega$ /  
100  $\Omega$  ... 200 k $\Omega$ / 1 k $\Omega$  ... 2 M $\Omega$ / 10 k $\Omega$  ... 20 M $\Omega$
- **9 level measuring ranges:** -40 dB ... +62 dB
- High input resistance of 10 M $\Omega$   
for no-load voltage measurement
- Reflective scale in folding lid which can be tilted for easy  
reading and provides transport protection as well,  
accuracy class 1.5 =
- Overload protection: 600 V $\approx$   
in all functions and range settings
- Automatic battery shutdown when instrument is folded closed



**300 V CAT III  
600 V CAT II  
IEC/EN 61010-1, second edition**



## Applications

The multimeter is equipped with an indicator display and an electronic amplifier. It can be used in a wide variety of practical electronics applications, for example in R&D, manufacturing, equipment operation, in the test lab and for service calls, as well as for training and vocational education.

## Description

The multimeter has 46 measuring ranges for direct and alternating voltages of up to 600 V, alternating voltage levels from -40 to +62 dB, direct and alternating current of up to 10 A and resistances of up to 20 M $\Omega$ . It has a constant input resistance of 10 M $\Omega$  in all voltage measuring ranges.

The multimeter is calibrated in RMS values for periodic sinusoidal quantities. It makes use of full-wave rectification for the evaluation of the arithmetic mean value.

All measuring ranges can be selected with the central measuring range selector switch. The ranges are laid out in a clear-cut fashion around the selector switch.

The measuring device and the display unit are enclosed in two separate housing components which are connected to each other by means of a hinge which can be snapped into various positions. In this way, the ideal angle for ease of reading can be selected with the instrument in any position.

Several well coordinated safety devices protect the instrument against damage caused by incorrect operation and overloading within the specified overload limit values:

- Oversized precision resistors
- Fuse link in combination with protective rectifier diodes
- Overvoltage arrester / positive temperature coefficient resistors (PTCs)

The instrument can be operated independent of mains current with a commercially available 9 V flat cell battery. Long battery service life is assured thanks to the minimal current consumption of the instrument's electronic components.

The multimeter's rugged design provides for outstanding protection where harsh mechanical stressing prevails. When folded together, the instrument is provided with extra mechanical protection for the measuring device, as well as for the display unit. The connector jacks are protected against accidental contact. Suitable measurement cables with 4 mm test probes are included as standard equipment.

## Applicable Regulations and Standards

IEC/EN 61010-1:2001 VDE 0411-1:2002	Safety requirements for electrical equipment for measurement, control and laboratory use
DIN EN 61326 VDE 0843, part 20	Electrical equipment for control technology and laboratory use – EMC requirements
DIN EN 60529 DIN VDE 0470, part 1	Test instruments and test procedures – Degrees of protection provided by enclosures (IP code)

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## Folding Analog Multimeter

### Characteristic Values

Voltage <sup>1)</sup>	Level <sup>2)</sup>		Input Resistance R <sub>i</sub>	Overload Protection to <sup>3)</sup>
	Constant	Measuring Span		
100 mV $\approx$	-20 dB	-40 ... ÷ 18 dB	10 M $\Omega$ // 50 pF	600 V $\approx$
300 mV $\approx$	-10 dB	-30 ... ÷ 8 dB		600 V $\approx$
1 V $\approx$	0 dB	-20 ... + 2 dB		600 V $\approx$
3 V $\approx$	+10 dB	-10 ... + 12 dB		600 V $\approx$
10 V $\approx$	+20 dB	0 ... + 22 dB		600 V $\approx$
30 V $\approx$	+30 dB	+10 ... + 32 dB		600 V $\approx$
100 V $\approx$	+40 dB	+20 ... + 42 dB		600 V $\approx$
300 V $\approx$	+50 dB	+30 ... + 52 dB		600 V $\approx$
600 V $\approx$	+60 dB	+40 ... + 62 dB		600 V $\approx$

<sup>1)</sup> The 100 mV to 10 V measuring ranges can also be used for current measurement in accordance with the following table (e.g. reverse current or insulation current). These measuring ranges are rated at accuracy class 5. Frequency range at  $\sim$ : 15 ... 100 Hz.

Same overload protection as for voltage measuring ranges.

<sup>2)</sup> Measured value = displayed value + constant, 0 dB  $\hat{=}$  0.775 V, i.e. 1 mW at 600  $\Omega$

<sup>3)</sup> Protected with PTC resistor

Range	Current at Upper Range Limit	R <sub>i</sub>
100 mV $\approx$	10 nA	10 M $\Omega$
300 mV $\approx$	30 nA $\approx$	
1 V $\approx$	100 nA $\approx$	
3 V $\approx$	300 nA $\approx$	
10 V $\approx$	1 $\mu$ A $\approx$	
30 V $\approx$	3 $\mu$ A $\approx$	

Current	Input Resistance R <sub>i</sub>	Voltage Drop $\Delta U$	Overload Protection to
10 $\mu$ A $\approx$	10.0 k $\Omega$	100 mV	600 V $\approx$ <sup>3)</sup>
100 $\mu$ A $\approx$	1.0 k $\Omega$	100 mV	600 V $\approx$ <sup>3)</sup>
1 mA $\approx$	100.0 $\Omega$	100 mV	600 V $\approx$ <sup>3)</sup>
10 mA $\approx$	10.0 $\Omega$	100 mV	600 V $\approx$ <sup>3)</sup>
100 mA $\approx$	1.4 $\Omega$	140 mV	600 V $\approx$ <sup>3)</sup>
1 A $\approx$	480 m $\Omega$	0.480 V	600 V $\approx$ <sup>3)</sup>
10 A $\approx$	26 m $\Omega$	260 mV	600 V $\approx$ <sup>4)</sup>

Resistance Range	Reading Range	Value at Scale Middle (R <sub>i</sub> )	Open-Circuit Voltage U <sub>0</sub>	Short-Circuit Current I <sub>k</sub>	Overload Protection to
$\Omega$ x 1	1 $\Omega$ ... 2 k $\Omega$	45.6 $\Omega$	100mV	2.2 mA	600 V $\approx$ <sup>3)</sup>
$\Omega$ x 10	10 $\Omega$ ... 20 k $\Omega$	456.0 $\Omega$	100mV	0.22mA	600 V $\approx$ <sup>3)</sup>
$\Omega$ x 100	100 $\Omega$ ... 200 k $\Omega$	4.56 k $\Omega$	100mV	22 $\mu$ A	600 V $\approx$ <sup>3)</sup>
k $\Omega$ x 1	1 k $\Omega$ ... 2 M $\Omega$	45.6 k $\Omega$	1 V	22 $\mu$ A	600 V $\approx$ <sup>3)</sup>
k $\Omega$ x 10	10 k $\Omega$ ... 20 M $\Omega$	456.0k $\Omega$	1 V	2.2 $\mu$ A	600 V $\approx$ <sup>3)</sup>

<sup>3)</sup> Protection by means of FF 1.6A/600V AC fuse link in combination with rectifier diodes.

<sup>4)</sup> FF 16A/600V fuse link, 10 A: max. 10 minutes

### Accuracy under Reference Conditions per IEC 60051/EN 60051

Class 1.5 for zero-frequency quantities, class 2.5 for periodic sinusoidal quantities and class 1.5 for resistance (intrinsic error relative to 69 mm scale length) corresponding to max. 10% intrinsic error of the measured value within the range of the exaggerated scale arc.

### Reference Conditions

Ambient temperature	+23° C $\pm$ 2 K
Relative humidity	40 ... 60%
Normal position of use	Instrument and scale horizontal $\pm$ 1°
Measured quantity frequency	45 ... 65 Hz
Measured quantity waveshape	Sine
Battery voltage	7.5 V $\pm$ 0.1 V
Other influencing quantities	per IEC 60051/EN 60051

### Influencing Quantities and Nominal Ranges of Use

Temperature	+5 ... +23 ... +35° C
Limiting temperatures	For accuracy +5 ... +35° C For operation 0 ... +40° C For storage -25 ... +65° C (without batteries)
Position	Additional influence error of max. $\pm$ 1% of the scale length if the scale is tilted between 0 and $\pm$ 120° relative to horizontal
Frequency	Additional influence error of max. $\pm$ 5% of full scale value in the following ranges: 100 mV, 3 V ... 600 V: 15 Hz ... 1 kHz 10 $\mu$ A ... 10 A: 15 Hz ... 1 kHz 300 mV, 1 V: 15 Hz ... 200 Hz
Auxiliary voltage	No additional influence error. The upper limit must be set with the potentiometer for all measuring ranges in the case of resistance measurement.
Series-mode interference voltage damping	For V $\approx$ : > 60 dB, AC 50 Hz For V $\sim$ : > 120 dB, DC
Common-mode interference voltage damping	> 120 dB, DC and 50 Hz AC
Other influencing quantities	per IEC 60051/EN 60051

### Power Supply

Battery operation	Nominal voltage: 9 V $\approx$ , 9 V flat cell battery per IEC 6LR61 (6F22), alkaline manganese, zinc-carbon or NiCd rechargeable battery.
Battery service life	With zinc-carbon: approx. 500 hours, with alkaline manganese: approx. 1000 hours, with NiCd: approx. 200 hours, in the $\Omega$ x 1 range: $\frac{1}{4}$ of specified service life
Battery test	Pointer must be within the battery test field.

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### Fuses

Ranges to 1 A and $\Omega$	FF 1.6A/600V, 6 mm x 32 mm in combination with rectifier diodes for the 10 $\mu$ A ... 1 A and $\Omega$ x1 ... k $\Omega$ x10 ranges, switching capacity: 50 kA at 600 V~
10 A range	FF 16A/600V AC, 6 mm x 32 mm, switching capacity: 50 kA at 600 V~

### Electrical Safety

Safety class	II per IEC/EN 61010-1:2001/VDE 0411-1:2002	
Measuring category	II	III
Operating voltage	600 V	300 V
Fouling factor	2	
Test voltage	3.5 kV~ per IEC/EN 61010-1:2001/VDE 0411-1:2002	

### Electromagnetic Compatibility (EMC)

Interference emission	EN 61326:2002 class B
Interference immunity	EN 61326:2002 IEC 61000-4-2:1995/A1:1998, Feature B 8 kV atmospheric discharge 4 kV contact discharge IEC 61000-4-3:1995/A1:1998, Feature B 3 V/m

### Mechanical Design

Protection	Housing: IP 40, connector jacks: IP 20
Dimensions	146 x 118 x 44 mm (folded closed)
Weight	approx. 0.45 kg without battery

### Standard Equipment

- 1 multimeter
- 1 9 V battery
- 1 KS17 measurement cable
- 1 set operating instructions

### Order Information

Description	Type	Article Number
Folding analog multimeter for demanding requirements	METRAport®3A	M113A
<b>Consumable Materials</b>		
Fuse link (shipped in package of 10)	FF(UR)1.6A/700V AC	Z109E
Fuse link (shipped in package of 10)	FF(UR)16A/600V AC	Z109A
<b>Accessories</b>		
Carrying pouch	F822	GTY 3172 095 P01
Current measuring adapter for safe, trouble-free measurement of current consumption via the mains plug of connected power consumers	SM16	GTM 9070190E0002
High-voltage probe, 3 kV/3 V <sub>rms</sub> , also suitable as low pass filter for frequency converter signals	HV3	GTZ 3431 001R0011
High-voltage probe, 30 kV / 30 V DC, For safe measurement of direct voltage of up to 30 kV	HV30	GTZ 3431 001R0001
Temperature probes with integrated or plug-on sensors (see Measuring Instruments and Testers catalog)	Z3431...	GTZ 3431...

For additional information regarding accessories please see:

- *Measuring Instruments and Testers catalog*
- [www.gossenmetrawatt.com](http://www.gossenmetrawatt.com)

### Accessories

#### SM16 Current Measuring Adapter



#### HV3 High-Voltage Probe



#### HV30 High-Voltage Probe



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Current Measuring Accessories									Suitable for METRAport	
All current sensors and transformers are equipped with a connector cable (1.2 to 1.5 m long) with 4 mm safety banana plugs									3A	
Type	Designation	Measuring Range	Meas. Category	Max. Wire Dia.	Transformation Ratio	Frequency Range	Intrinsic Error ±(% rdg. + ...)	Article Number		
<b>AC/DC Current Sensors with Voltage Output</b>										
Z201A	Clip-on 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	Clip-on 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	Clip-on 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	Clip-on current sensor with 2 measuring ranges, battery mode (50 h)	0,2 ... 40 A~/60 A~, 0,5 ... 400 A~/600 A~	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	●	
<b>AC Current Sensors with Voltage Output</b>										
WZ12B	Clip-on current sensor	10 mA~ ... 100 A~	300 V / CAT III	15 mm	0.1 mV/mA	45 ... 65 ... 500 Hz	1.5% + 0.1 mA	Z219B	●	
WZ12C	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	45 ... 65 ... 400 Hz	3% + 0.15 mA, 2% + 0.1 A	Z219C	●	
WZ11B	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	30 ... 48 ... 65 ... 500 Hz	1 ... 3%	Z208B	●	
Z3512A	Clip-on current sensor with 4 measuring ranges	1 mA ... 1/10 A~ 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	●	
AF033A	AmpFLEX flexible 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 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 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 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	●	
<b>AC Current Transformer with Current Output</b>										
WZ12A	Clip-on current transformer	15 ... 180 A~	300 V / CAT III	15 mm	1 mA/A	45 ... 65 ... 400 Hz	3%	Z219A	●	
WZ12D	Clip-on 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	Clip-on current transformer	1 ... 200 A~	600 V / CAT III	20 mm	1 mA/A	48 ... 65 ... 400 Hz	1 ... 3%	Z208A	●	
Z3511	Clip-on current transformer	4 ... 500 A~	600 V / CAT III	30 x 63 mm	1 mA/A	48 ... 65 ... 1 kHz	3% + 0.4 A	GTZ 3511 000 R0001	●	
Z3512	Clip-on current transformer	0.5 ... 1000 A~	600 V / CAT III	52 mm	1 mA/A	30 ... 48 ... 65 ... 5 kHz	0.5% ... 0.7%	GTZ 3512 000 R0001	■	
Z3514	Clip-on 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	GTZ 3514 000 R0001	■	

● Without restriction    ■ As of 50 A



WZ11/12 ...



Z201 ... Z203



Z13B

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