GOSSEN METRAWATT

METRA HIT 1A and METRA HIT 2A
Analog Multimeters

3-349-304-03
2/7.04

- **Voltage measurement:**
  0...0.15, 0...0.5 V=, 0 ...1.5, 5, 15, 50, 150, 500 V=/~
- **Input resistance:** 20 kΩ/V=, 4 kΩ/V~
- **Current measurement:** 0 ... 50 µA=, 0 ... 0.5, 5, 50, 500 mA, 5 A=/~
- **Extended current measurement, METRA HIT 2A:** ... 15 A=/~
- **Resistance measurement:** 1 Ω ... 1 MΩ (4 ranges)
- **Capacitance:** 200 mF ... 2 µF (4 ranges)
- **Level:** -15 ... +56 dB (6 ranges)



5 Ampere



15 Ampere / Class 2.5

500 V CAT II
IEC/EN 61010-1, Second Edition

CE

Broad Range of Applications

A large number of measuring ranges allows for universal use of the instruments, for example in electronics, digital technology and a wide variety of general electrical applications.

Safety Features

The connector jacks and plugs included with the measurement cables which are available as accessories are protected against inadvertent contact.

Measuring Range Selector Switch

All measuring ranges are selected with a rotary switch.

Rugged Mechanical Design

The rugged plastic housing and the spring loaded bearing jewels in the moving-coil mechanism protect the instrument from damage due to mechanical stressing. Especially effective protection is provided by the protective rubber cover and the ever-ready case, both of which are available as accessories.

Applicable Regulations and Standards

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

Characteristic Values

Voltage Measuring Ranges

Voltage	Output [1]	Internal Resistance, Approx.	
		—	~
0.15 V —	—	3.15 kΩ	—
0.50 V —	—	10.00 kΩ	—
1.50 V ≂	-15... + 6 dB	31.50 kΩ	6.50 kΩ
5.00 V ≂	- 5 ... + 16 dB	100.00 kΩ	20.00 kΩ
15.00 V ≂	+ 5 ... + 26 dB	315.00 kΩ	65.00 kΩ
50.00 V ≂	+15 ... + 36 dB	1.00 MΩ	200.00 kΩ
150.00 V ≂	+25 ... + 46 dB	3.15 MΩ	650.00 kΩ
500.00 V ≂	+35 ... + 56 dB	10.00 MΩ	2.00 MΩ

[1] 0 dB ≙ 0.775 V in the 1.5 V ~ range, 0 dB ≙ 1 mW to 600 Ω
Voltage related input resistance: for —: 20.0 kΩ/V
for ~: 4.0 kΩ/V

METRA HIT 1A: Current Measuring Ranges

Current	Voltage Drop, Approx.	
	—	~
50.00 µA —	0.158 V	—
0.50 mA ≂	1.15 V	1.00 V
5.00 mA ≂	1.25 V	1.25 V
50.00 mA ≂	1.25 V	1.25 V
500.00 mA ≂	1.85 V	1.85 V
5000.00 mA ≂	1.73 V	1.73 V

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METRA HIT 2A: Current Measuring Ranges

Current	Voltage Drop, Approx.	
	—	~
50 µA —	0.158 V	—
1.5 mA ≂	1.16 V	1.21 V
15 mA ≂	1.25 V	1.25 V
150 mA ≂	1.25 V	1.25 V
1.5 A ≂	1.95 V	1.95 V
15 A ≂	0.43 V	0.49 V

Resistance Measuring Ranges

Resistance	Scale Span	Value at Scale Middle (R_i)	Max. Measuring Current I_{max} [2], Approx.
Ω x 1	1 Ω ... 1 kΩ	18.00 Ω	83 mA
Ω x 10	10 Ω ... 10 kΩ	180.00 Ω	8.3 mA
Ω x 100	100 Ω ... 100 kΩ	1.80 kΩ	0.83 mA
Ω x 1000	1kΩ ... 1 MΩ	18.00 kΩ	0.083 mA

[2] At a battery voltage of 1.5 V

Capacitance Measuring Ranges

Capacitance [3]	Scale Span
µF x 1000	2000 ... 200000 µF
µF x 100	200 ... 20000 µF
µF x 10	20 ... 2000 µF
µF x 1	2 ... 200 µF

[3] Rough measurements in the resistance measuring ranges, determination of measured values with comparative scale

Reference Conditions

Ambient temperature +23°C ±2 K
Normal position of use Horizontal
Frequency 40 ... 60 Hz
Line Voltage For ~: sinusoidal
Relative humidity 40 ... 60%

The instrument is equipped with half-wave rectification and is RMS calibrated. It evaluates the arithmetic mean value of a half-wave and displays different values for pulsating voltage and current depending upon polarity.

Other influencing quantities: per IEC/EN 60 051

Ambient Conditions

Storage temp. range -25 to 65° C (without battery)
Relative humidity Up to 75%, no condensation allowed

METRA HIT 2A: Accuracy (under reference conditions per IEC/EN 60 051)

Class 2.5 for ⎓ and ~, max. additional intrinsic error in the 15 A⎓: range: ±2%; in the 1.5 V~ range: +1/–2,5%,
class 2.5 for Ω (error relative to 52 mm scale length)

METRA HIT 2A: Additional accuracy class influence and Nominal Ranges of Use

Ambient temp. For ⎓: 0 ... +23 ... +40° C
For ~: +13 ... +23 ... +35° C
Frequency 1.5 ... 500 V ranges:
35 ... 40 ... 60 ... 1000 Hz
1.5 mA ... 1.5 A ranges:
35 ... 40 ... 60 ... 1000 Hz
15 A range:
40 ... 45 ... 60 ... 1000 Hz
Other influencing quantities: per IEC/EN 60 051

Power Supply

Battery for resistance measurement: One 1.5 V mignon cell per IEC LR6/R6 (size AA), leak-proof

Electrical Safety

Safety class: II per IEC/EN 61010-1:2001/ VDE 0411-1:2002
Measuring category: II
Nominal voltage: 500 V
Test voltage: 3.5 kV~
Fouling factor: 2
Fuse links:

Replaceable
METRA HIT 1A:
F1: FF630mA/700V AC (50 kA), 6.3 x 32
F2: FF6.3A/500V AC (50 kA), 6.3 x 32
METRA HIT 2A:
F1: FF1.6A/700V AC (50 kA), 6.3 x 32
F2: FF16A/500V AC (50 kA), 6.3 x 32

Soldered permanently into place
750 mA / 600 V AC

METRA HIT 1A: Overload Capacity

Range	To	Range	To
0.15 V –	20 V [1]	—	—
0.5 V –	50 V [2]	—	—
1.5 V –	100 V [2]	1.5 V ~	25 V [2]
5.0 V –	150 V [2]	5.0 V ~	50 V [2]
15.0 V –	250 V [2]	15.0 V ~	150 V [2]
50.0 V –	250 V [2]	50.0 V ~	250 V [2]
150.0 V –	300 V [2]	150.0 V ~	300 V [2]
500.0 V –	500 V [2]	500.0 V ~	500 V [2]
50.0 µA –	1.0 mA	—	—
0.5 mA –	5.0 mA	0.5 mA ~	5.0 mA
5.0 mA –	10.0 mA	5.0 mA ~	10.0 mA
50.0 mA –	70.0 mA	50.0 mA ~	70.0 mA
500.0 mA –	500.0 mA	500.0 mA ~	500.0 mA
5000.0 mA –	3.0 A	5000.0 mA ~	3.0 A
	5.0 A [3]		5.0 A [3]

METRA HIT 2A: Overload Capacity

Range	To	Range	To
0.15 V –	20 V [1]	—	—
0.5 V –	50 V [2]	—	—
1.5 V –	100 V [2]	1.5 V ~	25 V [2]
5.0 V –	150 V [2]	5.0 V ~	50 V [2]
15.0 V –	250 V [2]	15.0 V ~	150 V [2]
50.0 V –	250 V [2]	50.0 V ~	250 V [2]
150.0 V –	300 V [2]	150.0 V ~	300 V [2]
500.0 V –	500 V [2]	500.0 V ~	500 V [2]
50 µA –	1.0 mA	—	—
1.5 mA –	5.0 mA	1.5 mA ~	5.0 mA
15 mA –	20.0 mA	15 mA ~	20.0 mA
150 mA –	150.0 mA	150 mA ~	150.0 mA
1.5 A –	1.2 A	1.5 A ~	1.2 A
	1.5 A [3]		1.5 A [3]
15 A –	12.0 A	15 A ~	12.0 A
	15.0 A [3]		15.0 A [3]

[1] Fuse F1 blows in the event of overloading.
[2] Ranges are protected against overloading with PTC resistor
[3] Max. 1 minute

Electromagnetic Compatibility (EMC)

Interference emission	EN 61326:2002 class B
Interference immunity	EN 61326:2002 IEC 61000-4-2: 8 kV atmospheric discharge IEC 61000-4-3: 3 V/m

Mechanical Design

Scale length	A, V – 0 ... 5.0: approx. 83 mm A, V – 0 ...15.8: approx. 77 mm A, V~ 0 ... 5.0: approx. 67 mm A, V~ 0 ... 15.8: approx. 59 mm Ω ∞ ... 0: approx. 52 mm dB – 15 ... +6: approx. 42 mm
Dimensions	92 x 126 x 45 mm
Weight	Approx. 0.3 kg without battery
Protection	Housing: IP 40, terminals: IP 20 per EN 60529/VDE 0470, part 1

Table Excerpt Regarding Significance of the IP Code

IP XY (1st digit, X)	Protection against penetration of solid particles	IP XY (2nd digit, Y)	Protection against penetration by water
0	Not protected	0	Not protected
1	≥ 50.0 mm dia.	1	Vertical dripping
2	≥ 12.5 mm dia.	2	Dripping (15° inclination)
3	≥ 2.5 mm dia.	3	Spray water
4	≥ 1.0 mm dia.	4	Splashing water
5	Dust protected	5	Jet-water
6	Dust-proof	6	Powerful water jets

Standard Equipment

1 analog multimeter (without battery or cable set)
1 set operating instructions

Order Information

Description	Type	Article Number
Analog multimeter, 5 A / 500 V	METRA HIT 1A	M100A
Analog multimeter, 15 A / 500 V	METRA HIT 2A	M101A
Cable set consisting of 1 pair	KS17-2	GTY 3620 034 P0002
Ever-ready case	F809	GTY 3172 083 P01
Protective rubber cover	GH185	GTY 3171 185 P01
Current measuring adapter for safe, trouble-free measurement of current consumption via the mains plug of connected power consumers	SM16	GTM 9070190E0002
F1 fuse link (shipped in package of ten) for METRAHIT 1A	FF 630 mA / 700 V	Z109J
F2 fuse link (shipped in package of 10) for METRAHIT 1A	FF 6.3 A / 500 V	Z109K
F1 fuse link (shipped in package of 10) for METRAHIT 2A	FF(UR) 1.6 A / 700 V AC	Z109E
F2 fuse link (shipped in package of 10) for METRAHIT 2A	FF(UR) 16 A / 600 V AC	Z109A

For additional information regarding accessories please see:

- *Measuring Instruments and Testers catalog*
- *www.gossenmetrawatt.com*

Accessories

F809 Ever-Ready Case with Cable Compartment – For tabletop operation – The cover can be snapped to the bottom of the case when using the shoulder strap.





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Current Measuring Accessories All current sensors and transformers are equipped with a connector cable (1.2 to 1.5 m long) with 4 mm safety banana plugs									Suitable for METRA HIT	
Type	**Designation**	**Measuring Range**	**Measuring Cat.**	**Max. to Wire Dia.**	**Transformation Ratio**	**Frequency Range**	**Intrinsic Error ±(% rdg. + ...)**	**Article Number**	**1A**	**2A**
AC Current Transformer with Current Output										
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	As of 5 A	As of 5 A
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	As of 50 A	As of 50 A
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	As of 50 A	As of 0 A
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	As of 500 A	As of 500 A

● Without restriction

GH185 Protective Rubber Cover



WZ12 Clip-On Current Transformer



SM16 Current Measuring Adapter



KS17-2 Cable Set

Cable set with permanently mounted test probes and contact-protected angle plugs for safe measuring. Hook clips, alligator clips or push-on lugs can be attached to the test probes for special measuring tasks.



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