

Handheld Analog Multimeters

METRA HIT 1A, 2A



METRA HIT 1A: Analog Multimeter, Basic Model for Hobby and Work
METRA HIT 2A: Analog Multimeter for Electrical Applications, Class 2.5

MA 1H: Basic analog multimeter for training and hobby applications, compact time-tested design

- Voltage measurement: 0 to 0.15/0 to 0.5 V= \approx ; 0 to 1.5/5/15/50/150/500 V= \approx /~
- Input resistance: 20 k Ω /V= \approx , 4 k Ω /V~
- Current measurement: 0 to 50 μ A= \approx , 0 to 0.5/5/50/500 mA/5 A= \approx /~
- Resistance measurement: 1 Ω to 1 M Ω (4 ranges)
- Level: -15 to +56 dB (6 ranges)
- Dimensions: 92 x 126 x 45 mm, weight: approx. 0.25 kg without battery
- Battery: 1.5 V IEC LR 6 (AA mignon)

MA 2H: Basic analog multimeter for electrical applications, class 2.5, compact time-tested design

- Voltage measurement: 0 to .15/0 to 0.5 V= \approx , 0 to 1.5/5/15/50/150/500 V= \approx /~
- Input resistance: 20 k Ω /V= \approx , 4 k Ω /V~
- Current measurement: 0 to 50 μ A= \approx , 0 to 1.5/15/150 mA/1.5/15 A= \approx /~
- Resistance measurement: 1 Ω to 1 M Ω (4 ranges)
- Level: -15 to +56 dB (6 ranges)
- Accuracy: class 2.5
- Dimensions: 92 x 126 x 45 mm, weight: approx. 0.25 kg without battery
- Battery: 1.5 V IEC LR 6 (AA mignon)

Type	Data Sheet No.	Article Number		
METRA HIT 1A	-	M100A		
METRA HIT 2A	-	M101A		
F809 ever-ready case	-	GTY3172083P01		
GH185 protective rubber cover	-	GTY3171185P01		

METRAmax 2 / ... 3



Analog Multimeter for Training Applications, and for Use in the Electrical Trades

The METRAmax 2 handheld multimeter was developed in cooperation with a renowned German supplier of training systems and fulfills all of the demands placed upon contemporary vocational training. Thanks to exceptional overload capacity, selectable zero point at left or center of the scale and automatic battery shutdown, this instrument is not only well suited for training, but rather for balancing and service work as well.

- Voltage measurement: 0 to 100/300 mV/1 V= \approx ; 0 to 3/10/30/100/300 V= \approx /~
- Current measurement: 0 to 100 μ A/1/10/100 mA/1/3 A= \approx /~
- Zero point: left / center
- Accuracy: 2 =/3 ~
- Dimensions: 100 x 140 x 35 mm, weight: approx. 0.3 kg with battery
- Battery: 9 V flat cell battery, IEC 6 LR 61 (6 F 22)

The METRAmax 3 analog multimeter is an inexpensive, handy multimeter without amplifier stage with an integrated circuit breaker for current measuring circuits. Good overload protection is provided in the voltage ranges as well by means of generous dimensioning and high performance PTC thermistors.

- Voltage measurement: 30/300/600 V= \approx /~
- Current measurement: 0.3/3/15 A= \approx /~
- Resistance measurement: 1 Ω to 500 k Ω
- Protective conductor
- Accuracy: class 2.5
- Dimensions: 100 x 140 x 35 mm, weight: approx. 0.3 kg with battery
- Battery: 1.5 V IEC LR 6 (AA mignon)

Type	Data Sheet No.	Article Number		
METRAmax 2	-	M102A		
METRAmax 3	3-349-117-03	M103A		
F841 carrying pouch	-	Z104A		
GH19 protective rubber cover	-	Z104B		
NW10A shunt resistor	-	GTZ0156000R0001		

MAVOWATT 4

Multiple Electronic Power Meter



The MAVOWATT 4 electronic multiple power meter allows for direct measurement of DC power as well as RMS power measurement for single-phase alternating current and balanced load three-wire, three-phase current.

- Determination of reactive power
- Measurement of phase-to-phase voltage(s)
- Ideal instrument for manufacturing, service and installation
- Phase sequence indicator
- $\cos \varphi$ measurement

Technical Data:

Direct current	12.5 kW
Single-phase alternating current	12.5 kW (active power)
3-wire, 3-phase, balanced load	25 kW (active power) / $25 \text{ kVar} \times \sqrt{3}$ (reactive power)
Nominal Current	0.25 A / 0.01 A / 5 A / 1 A
Nominal voltage	50 / 100 / 250 / 500 V
Frequency range	10 Hz to 400 Hz
AC/DC voltage measurement	50 / 100 / 250 / 500 V
AC/DC current measurement	0.25 A / 0.01 A / 5 A / 1 A
Accuracy class	1.5 (2.5 P-, U, I)
Power supply	2 ea. 9 V flat cell, IEC 6 F 22
Dimensions	110 x 181 x 62 mm
Weight	0.8 kg

Type	Data Sheet No.	Article Number		
MAVOWATT 4	3-348-801-03	GTM3033000R0001		
KS28 cable set	–	GTY3620065P0001		
F786 ever-ready case	–	GTY 3172 068 P01		

METRA HIT 1 ASi

Addressing and Diagnostics Device



The METRA HIT 1 ASi is an easy to use addressing and diagnostics device for active AS-i modules, intelligent sensors and actuators in accordance with AS-i version 2.1 including the extended addressing mode.

- Read-out of slave addresses 0 ... 31, A and B with clear-cut complete display without scrolling
- Read-out of slave IO and ID codes (including extended ID codes 1 and 2)
- Standard and extended addressing mode per AS-i version 2.1
- Programmable ID code 1, slave function test
- Recognition of all system devices, diagnosis functions, memory functions, PC gateway function
- Dimensions: 84 mm x 195 mm x 35 mm, weight: approx. 450 gr. with batteries
- Batteries: 4 ea. 1.5 V IEC LR 6 (AA mignon)

Standard equipment:

- **METRA HIT 1ASi:** AS-i addressing device and tester with GH18, batteries and KS31A
- **Set 1ASi:** AS-i addressing device and tester with batteries, GH18, KS31C, BD232 and ASi-doc documentation software in HC30 hard case

Type	Data Sheet No.	Article Number		
METRA HIT 1ASi	3-349-108-03	M235A		
Set 1ASi	3-349-108-03	M235C		

METRAtest 36 ASi

ASi Bus Tester



Measuring and test instrument, monitoring and addressing device for ASi bus and ASi slaves, for professional initial start-up and troubleshooting

- Simple menu-driven operation with function keys and matrix display
- Measurement of bus characteristics (voltage, current consumption)
- Recognition of data protocol errors (e.g. duplicate addresses)
- Master mode operation for ASi bus
- Programming and parameters configuration for ASi slaves
- PC gateway function
- Monitoring function with address trigger for indication of error frequency
- Tool kit and extensive accessories included
- Complete display of all parameters and addresses, compatible with existing installations and latest ASi standard 2.11
- Integrated 128 kB memory for saving entire systems, also allows for copy functions
- Firmware can be downloaded from a PC via IrDA interface: simplifies later upgrades.
- ASi-doc or ASi-access report and management software (option) streamlines documentation, planning and start-up.
- Dimensions: 275 mm x 140 mm x 65 mm, weight: approx. 1.2 kg with batteries
- Power supply: 6 NiMH mignon cells, 7.2 V nominal voltage, 1300 mAh capacity, charging: 130 mA / 16 h

Standard equipment:

- **METRAtest 36ASi:** AS-i bus tester with neck strap, measurement cable, KS36A, ground cable, NA 0100S, HC30 hard case
- **Set 36 ASi:** AS-i bus tester, same as above but with additional, extensive connector accessories (module base with addressing socket, KS36B, C, D, E), IrDA 0100S interface adapter and ASi-access software

Type	Data Sheet No.	Article Number		
METRAtest 36ASi	3-349-106-03	M236A		
Set 36 ASi	3-349-106-03	M236B		

Accessories, Software

A Variety of Accessories and Software for METRA HIT® 1 ASi and METRAtest 36 ASi

Type	Designation	Article Number		
Akku-Set 36A	NiMh rechargeable battery pack for METRAtest 36A	Z236F		
NA 0100S	Charger for 36A rechargeable battery pack	Z501D		
KS36A	Connector cable set (M12 to jack plug)	Z236A		
KS36B	Connector cable set (M12 female to M12 male)	Z236B		
KS36C	Connector cable set (M12 male to M12 male)	Z236C		
KS36D	1 set (10 ea.) AS-i ribbon cable pick-off	Z236D		
KS36E	1 ea. AS-i ribbon cable pick-off with M12	Z236E		
IrDa 0100S	Interface adapter to RS 232 for METRAtest 36A	Z501C		
ASi.doc-win	Documentation software for AS-i bus	Z710Q		
ASi-access	Documentation and management software for AS-i bus	Z710J		
ASi-Pack 1	Documentation set for AS-i bus with BD232, RS 232 cable and ASi-doc (for METRA HIT 1 ASi)	Z231D		

Multimeter Accessories – Overview

Type	Designation Devices	Suitable for use with ▶ See page▶	METRA HIT ONE	METRA HIT 16I/16T/16U	METRA HIT 27M/27I	METRA HIT 22S	METRA HIT 22M	METRA HIT 23S/24S/25S	METRA HIT 26S/26M/28S	METRA HIT 29S	METRA HIT 30M	METRAmax 2	METRAmax 3	METRAmax 6	METRAmax 12	METRAport 32S/32XS	METRAport 3A	METRA HIT 1A/2A	METRA HIT 28C	
			10	14	15	10	10	11	12	13	13	18	18	15	17	17	17	18	16	
Current Transformers																				
WZ11A	Clip-on current transformer, 1 ... 200 A~, 1 mA/A							●	●	●					④	●	●		●	
WZ11B	Clip-on current sensor, 0.5 ... 20/200 A~ selectable		●		●	●	●	●	●	②	●	○			●	●	●			
WZ12A	Clip-on current transformer, 15 ... 180 A~, 1 mA/A~							●	●	●			●		●	●	●	●	●	
WZ12B	Clip-on current sensor, 10 ... 100 A~, 1 mV/10 mA		●	●	●	●	●	●	●	②	●	④	●		●	●	●	●	●	
WZ12C	Clip-on current sensor, 1 ... 10 A~, 1 mV/mA~ selectable, 1 A ... 120 A~, 1 mV/A		●	●	●	●	●	●	●	②	●	●			●	●	●		●	
WZ12D	Clip-on current transformer, 30 mA ... 150 A~ selectable, 1 mA/A		●					●	●	●	④	●	⑨		⑦	●	●	④	●	
Z3511	Clip-on current transformer, 4 ... 500 A~, 1 mA/A		③					●	●	●			⑨		●	●	●	⑤	⑤	
Z3512	Clip-on current transformer, 0.5 ... 1000 A~, 1 mA/A		●					■	●	●			⑨		⑦	●	●	⑤	⑤	
Z3514	Clip-on current transformer, 1 ... 2000 A~, 1 mA/A							■	●	●			⑥		⑦	●	⑤	⑤	⑤	
Z201A	Clip-on current sensor, 0.01 ... 30 A~, 0.01 ... 20 A~, 100 mV/A, with battery		●	●	●	●	●	●	●	②	●	●			⑤	●	●		●	
Z202A	Clip-on current sensor, 0.1 ... 30/300 A~, 0.1 ... 20/200 A~, 10 mV/A or 1 mV/A, with battery		●	●	●	●	●	●	●	②	●	●			⑦	●	●		●	
Z13B	Clip-on current sensor, 60/600 A~, 40/400 A~, 10 mV/A or 1 mV/A, with battery		●	●	●	●	●	●	●	②	●	●			⑦	●	●		●	
Z203A	Clip-on current sensor, 1 ... 300/1000 A~, 1 ... 200/1000 A~, 1 mV/A, with battery		●	●	●	●	●	●	●	②	●				⑨	●	●		●	
AF033A	Ampliflex current sensor, 0.5 ... 30/300 A~, selectable: 100 mV/A or 10 mV/A, with battery		●	●	●	●	●	●	●	②	●				③	●	●		●	
AF11A	Ampliflex current sensor, 0.5 ... 1000 (2000 A~), 1 mV/A, with battery		●	●	●	●	●	●	●	②	●				⑨	●	●		●	
AF33A	Ampliflex current sensor, 0.5 ... 300/3000 A, selectable: 10 mV/A OR 1 mV/A, with battery		●	●	●	●	●	●	●	②	●	⑨			⑦	●	●		●	
AF101A	Ampliflex current sensor, 0.5 ... 1000/10000 A, selectable: 1 mV/A or 0.1 mV/A, with battery		●	●	●	●	●	●	●	②	●				⑨	●	●		●	
Voltage Probes																				
KS30	Probe for voltage measurement in power installations with up to 1000 V~		●	●	●	●	●	●	●	●	●	●			●	●	●		●	
HV3	High-voltage probe, 3 kV/3 V~		●	●	●	●	●	●	●	●	●	⊕			●	●	●		●	
HV30	High-voltage probe, /30 V~ (for direct voltage only)		●	●	●	●	●	●	●	●	●				●	●	●		●	
High Frequency Probe																				
Z3431-2	High frequency probe, 100 kHz ... 750 MHz, 0.25 ... 50 V~		●	●	●	●	●	●	●	●	●	●			●	●	●		●	
Temperature Sensors and Probes																				
TF220	Pt1000 sensor, class B, for measurements in gases and liquids, -50 ... +220 °C		●	●	●	●	●	●	●	●	●					●			●	
Z3409	Standard Pt100 sensor, class A, for surface and immersion measurements, -40 ... +600 °C		●	●	●	●	●	●	●	●	●					●			●	
TF550	Pt100 oven sensor, class B, for measurements in ovens refrigerators etc., -50 ... +550 °C		●	●	●	●	●	●	●	●	●					●			●	
TS-Chipset	10 miniature Pt100 sensors, class B (2 mm x 2.3 mm), adhesive, -50 ... +550 °C		●	●	●	●	●	●	●	●	●					●			●	
Measuring Adapters																				
R200K	Ri adapter 200 kΩ/230 V		●	●	●	●	●	●	●	●	●	●			●	●	●		●	
Z3450	Leakage current measuring adapter, DIN VDE 0107/DIN VDE 0750			●					●	●	●								●	
SM16	Current measuring adapter, 16 A/230 V, for earth contact plugs		●					●	●	●		●			●	●	●	●	●	
PMA16	Power measuring adapter (single-phase) 16 A/230 V, for earth contact plugs		○					○	○	●			○		○	○				
EMA1	Energy measuring adapter for (3-phase) Ferraris meters									●										
EMC Measuring Adapter																				
FMA1	METRA HIT field measuring adapter for electrical and magnetic fields			●					●	●	●								⑩	
Measuring Accessories																				
KS17S	Cable set with 2 mm diameter steel tips and 120 cm cable, 1000 V / CAT III			●	●	●	●	●	●	●	●								●	
KS17-2	Cable set		●	●	●	●	●	●	●	●	●	●	●	●	○	●	●	●	●	
KY94	Hook clips (1 pair) for KS17-2		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
KY95-1	Alligator clips (1 pair) for KS17-2		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
KY96	Push-on lugs (1 pair) for KS17-2		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Kelvin Clips																				
KC4	Kelvin clips (1 pair) with normal terminals				●						●								●	
KC27	Kelvin probes (1 pair) with stainless steel tips				●						●								●	
Power Packs																				
NA4/500	Power pack, 230 V / 4.5 V, for METRA HITs manufactured through 2003			●		●		●	●										●	
NA5/600	Power pack, 230 V / 5 V, for METRA HITs manufactured as of 2004			●				●	●*										●	
PC Interface																				
BD232	Bidirectional memory adapter for adding channels (without software)				●	●	●	●	●	●	●									
SI232 II	Bidirectional interface adapter for adding channels (without software)		□	●		●	●	●	●	●										
USB-Hit	Bidirectional IR-USB interface adapter for METRA HITs			●		●	●	●	●	●										

● = Accessory is suitable for this device.

○ = Can be used with this device with certain limitations.

■ = Accessory is suitable for this device in the upper current measuring ranges.

□ = Accessory is suitable for METRA HIT ONE plus

⊕ = DC only

* = 28S only

① = to 120 A

② = not for power measurement

③ = to 300 A

④ = as of 5 A

⑤ = as of 50 A

⑥ = as of 500 A

⑦ = as of 2 A

⑧ = as of 0.2 A

⑨ = as of 20 A

⑩ = to 1 kHz

Accessories for Multimeters – Carrying Pouches, Hard Cases, Protective Rubber Covers

Carrying Pouches, Hard Cases,
Protective Rubber Covers

Practical Accessories for Carrying and Protecting METRA HIT Series Instruments



Designation	Type	Data Sheet No.	Article Number		
Protective rubber cover and carrying strap for METRA HIT	GH18	–	GTZ3212000R0001		
Imitation leather carrying pouch for METRA HIT and METRAmax	F829	–	GTZ3301000R0003		
Cordura belt pouch for METRA HIT and METRAport	HitBag	–	Z115A		
Imitation leather ever-ready case with cable compartment	F836	–	GTZ3302000R0001		
Ever-ready case for two METRA HITs, two adapters and accessories	F840	–	GTZ3302001R0001		
Hard case for one METRA HIT and accessories	HC20	–	Z113A		
Hard case for two METRA HITs and accessories	HC30	–	Z113B		

Multimeter Accessories

Clip-On Current Transformers Clip-On Current Sensors



Current within conductors can be conveniently measured with clip-on current transformers, or with clip-on sensors in combination with a multimeter.

The following advantages result:

- The electrical circuit need not be interrupted, no electrical connection to the conductor.
- Measurement of current up to 2000 A, no multimeter overloading as a result of current surges.

Type	Nominal Current	Conductor Cross Section	Transformation Ratio	Intrinsic Error ± (% rdg. + mV/A)
WZ12A	15 ... 180 A ~	15 mm dia.	1 mA/A	3%
WZ12B	10 mA ... 100 A ~	15 mm dia.	0.1 mV/mA	1.5% +0.1 mA
WZ12C	1 mA ... 15 A ~, 1 A ... 150 A ~	15 mm dia.	1 mV/mA, 1 mV/A	3% +0.15 mA, 2% +0.1 A
WZ12D	30 mA ... 150 A ~	15 mm dia.	1 mA/A	2.5% +0.1 mA
WZ11A	1 ... 200 A ~	20 mm dia.	1 mA/A	1 ... 3%
WZ11B	0.5 ... 20, 200 A ~	20 mm dia.	10 mV/A, 100 mV/A	1 ... 3%
Z3511	4 ... 500 A ~	30 x 63 mm	1 mA/A	3% +0.4 A
Z3512	0.5 ... 1000 A ~	52 mm dia.	1 mA/A	0.5% ... 0.7%
Z3512A	0 ... 1/100/1000 A ~	52 mm dia.	1 mV, 1 V/A	0.2% ... 0.7%
Z3514	1 ... 2000 A ~	64 x 150 mm	1 mA/A	0.5% +0.1 A
Z13B	... 60/600 A =, 40/400 A ~	50 mm dia.	10 mV/A, 1 mV/A	1.5%, 2%
Z201A	... 30 A =, 20 A ~	19 mm dia.	100 mV/A	1%
Z202A	... 30/300 A =, 20/200 A ~	19 mm dia.	10 mV/A, 1 mV/A	1% + 0.03 A, 1% + 0.3 A
Z203A	... 300/1000 A =, 200/1000 A ~	31 mm dia.	1 mV/A	1% +0.5 A

Usable with instruments specified in the overview on page 21.

Type	Data Sheet No.	Article Number		
WZ12A	3-349-017-03	Z219A		
WZ12B	3-349-017-03	Z219B		
WZ12C	3-349-017-03	Z219C		
WZ12D	3-349-017-03	Z219D		
WZ11A	3-349-017-03	Z208A		
WZ11B	3-349-017-03	Z208B		
Z3511	–	GTZ3511000R0001		
Z3512	–	GTZ3512000R0001		
Z3512A	–	Z225A		
Z3514	–	GTZ3514000R0001		
Z13B	3-349-085-03	Z213B		
Z201A	–	Z201A		
Z202A	–	Z202A		
Z203A	–	Z203A		

Ampflex Flexible Current Sensors



Current Sensors for the Measurement of Alternating Current at Difficult to Access Locations

These sensors are suited for the measurement of alternating current at difficult to access locations. They are highly insulated and can generally be switched at a ratio of 1:10 with a range selector. They can be operated within a frequency range of up to 20 kHz. Max. phase error is 2.5° at a frequency of up to 1 kHz. Supply power is provided with a 9 V battery with a service life of approx. 150 hours.

Type	Nominal Current	Loop Length	Sensitivity mV/A	Intrinsic Error ± (% of V_A (output voltage) + mV)
AF11A	5 ... 1 kA: 1 V	450 mm	1	1 + 2
AF033A	5 ... 30 A: 3 V	600 mm	100	1 + 50
	5 ... 300 A: 3 V		10	1 + 5
AF33A	5 ... 300 A: 3 V	900 mm	10	1 + 5
	5 ... 3000 A: 3 V		1	1 + 2
AF101A	5 ... 1 kA: 1 V	1200 mm	1	1 + 2
	50 ... 10 kA: 1 V		0.1	1 + 1

Usable with instruments specified in the overview on page 21.

Type	Data Sheet No.	Article Number		
AF11A	3-348-845-03	Z207D		
AF033A	3-348-845-03	Z207A		
AF33A	3-348-845-03	Z207B		
AF101A	3-348-845-03	Z207C		

Voltage Probes



For High-Voltage Measurements with a Multimeter

- KS30: The high impedance KS30 voltage probe offers additional protection against overvoltage and operator error for measurements at high energy voltage sources.
- HV3: The HV3 probe is suitable for measurements of up to 3 kV. It simultaneously serves as a low pass filter for frequency converter signals.
- HV30: The HV30 high-voltage probe (VDE approved) can be used for safe measurement of direct voltages of up to 30 kV.

Usable with instruments specified in the overview on page 21.

Type	Data Sheet No.	Article Number		
KS30	–	GTZ3204000R0001		
HV3	–	GTZ3431011R0001		
HV30	–	GTZ3431001R0001		

Kelvin Clips



Kelvin Clips for Connecting Low-Impedance Resistors to Ohmmeters

Kelvin clips are used for connecting low impedance resistors (e.g. contact resistors, shunts, ...) to an ohmmeter with 4-wire connection, thus allowing for compensation of cable resistance.

- KC4: Kelvin clips (1 set of 2 ea.) for 4-pole connection of low-resistance DUTs, 120 cm cable length, clip for connection to DUTs with diameters of up to 30 mm
- KC27: Kelvin probes (1 set of 2 ea.) with 2 stainless steel tips for 4-pole connection of low-resistance DUTs, 120 cm cable length

Can be used with METRA HIT 30M, 27M and 27I (see overview on page 21)

Type	Data Sheet No.	Article Number		
KC4 Set	–	Z227A		
KC27 Set	–	Z227B		

High Frequency Probe



High Frequency Probe: 100 kHz - 750 MHz, 0.25 ... 50 V_{AC}

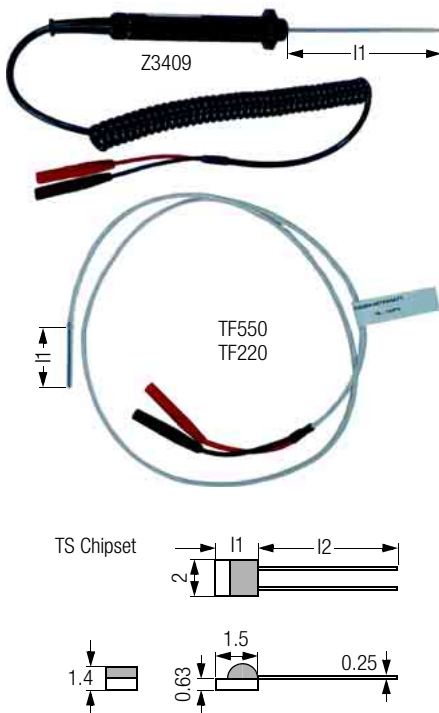
Alternating voltages with an amplitude of 0.25 V to 50 V within a frequency range of 100 kHz to 750 MHz can be measured with the Z3431-2 high frequency probe in combination with a multimeter. The probe rectifies alternating voltages at a ratio of 1:1. The measuring instrument must have an input impedance of 10 MΩ.

Usable with instruments specified in the overview on page 21.

Type	Data Sheet No.	Article Number		
Z3431-2	–	GTZ3431002R0001		

Temperature Sensor

Pt100 / Pt1000 Temperature Sensors



Standard Z3409 sensor for surface and immersion measurements from $-40\text{ }^{\circ}\text{C}$ to $+600\text{ }^{\circ}\text{C}$.
 TF550 oven sensor for temperature measurements in ovens, refrigeration units etc. from $-50\text{ }^{\circ}\text{C}$ to $+550\text{ }^{\circ}\text{C}$.
 TF220 water-proof sensor for temperature measurements in gases and liquids, e.g. water temperature in washing machines, oil temperature in automotive transmissions and air temperature in freezers and air conditioners.
 TF400CAR dipstick oil temperature sensor for motor oil temperature measurement in automotive applications.
 The TS chipset includes 10 miniature adhesive sensors for spot measurements at small measuring points within a range of $-50\text{ }^{\circ}\text{C}$ to $+550\text{ }^{\circ}\text{C}$.

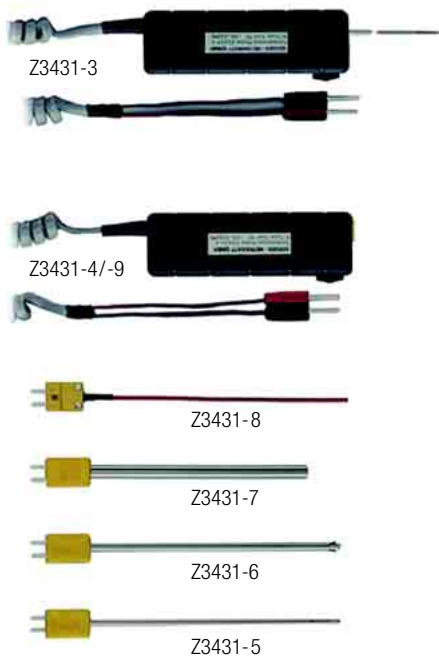
Type	Z3409	TF550	TF220	TF400CAR	TS Chipset
Sensor element	Pt100		Pt1000		Pt100
Sensor element length (l1) mm	130	40	39	810	2.3
Sensor length (l2) mm	1000	1500	1500	2310	10
Temperature range $^{\circ}\text{C}$	$-40\dots+600$	$-50\dots+550$	$-50\dots+220$	$-50\dots+500$	$-50\dots+550$
Accuracy per DIN EN60751/IEC 751	Class A		Class B		
Intrinsic error at $0\text{ }^{\circ}\text{C}$	0.15 K		0.3 K		0.4 K
Intrinsic error for $^{\circ}\text{C}$	600: 1.35K	550: 3.1K	220: 1.4K	–	550: 3.1K
Transient recovery, T_{90} water	5 s		8 s		0.3 s
Transient recovery, T_{90} air	30 s		33 s		15 s
Lead	Strand: 2 ea. 0.35 mm^2			–	0.25 dia./Ni-Pt
Outer jacket	PVC	V4A	Teflon	–	–
Insulation	PVC	Glass	Teflon	–	–

Usable with instruments specified in the overview on page 21.

Type	Data Sheet No.	Article Number
Z3409	–	GTZ3409000R0001
TF550	–	GTZ3408000R0001
TF220	–	Z102A
TF400CAR	–	Z102C
TS Chipset	–	GTZ3406000R0001

Temperature Probes

Temperature Probes (type K / NiCr-Ni)



The Z3431-3 temperature probe is equipped with a permanently mounted, standard immersion sensor. Measuring sensors Z3431-5 through 8 can be plugged into probes Z3431-4 and Z3431-9. They are suitable for temperature measurements within a range of $-25\text{ }^{\circ}\text{C}$ to $+1150\text{ }^{\circ}\text{C}$. The measurement output is connected to the mV/V measurement input at the multimeter.

Type	Z3431-3	Z3431-9	Z3431-4
Measuring range	$-20\text{ }^{\circ}\text{C} \dots +350\text{ }^{\circ}\text{C}$		$-25\text{ }^{\circ}\text{C} \dots +1150\text{ }^{\circ}\text{C}$
Sensor type	NiCr-NiAl, type K thermocouple		
Accuracy (without sensor)	$\pm(0.5\% \text{ rdg.} + 0.5\text{ }^{\circ}\text{C})$		$\pm(1\% \text{ rdg.} + 1\text{ }^{\circ}\text{C})$
Required multimeter input impedance	$> 10\text{ k}\Omega$		
Output voltage	$1\text{ mV} / ^{\circ}\text{C}$		
Operating temperature	$5\text{ }^{\circ}\text{C} \dots 45\text{ }^{\circ}\text{C}$		
Dimensions (without sensor)	$118 \times 37 \times 211\text{ mm}$		
Weight (without sensor)	140 gr.	110 gr.	
Power supply	1.5 V baby cell, 250 hour service life		

- Z3431-5: standard plug-in immersion sensor, to $+1100\text{ }^{\circ}\text{C}$
- Z3431-6: plug-in surface sensor, to $+850\text{ }^{\circ}\text{C}$
- Z3431-7: high-temperature plug-in sensor tape, to $+450\text{ }^{\circ}\text{C}$
- Z3431-8: flexible, insulated plug-in sensor, to $+250\text{ }^{\circ}\text{C}$

Usable with instruments specified in the overview on page 21.

Type	Data Sheet No.	Article Number
Z3431-3	–	GTZ3431003R0001
Z3431-4	–	GTZ3431004R0001
Z3431-5	–	GTZ3431005R0001
Z3431-6	–	GTZ3431006R0001
Z3431-7	–	GTZ3431007R0001
Z3431-8	–	GTZ3431008R0001
Z3431-9	–	GTZ3431009R0001

Leakage Current Adapter



Leakage Current Measuring Adapter, DIN VDE 0107 / DIN VDE 0750

The Z3450 leakage current adapter is used with RMS multimeters for the measurement of contact voltage per DIN VDE 0107, paragraph 10, and for the measurement of continuous leakage and patient auxiliary current per DIN VDE 0750 part 1, IEC 601-1, EN 60 601-1.1990.

Type	Data Sheet No.	Article Number		
Z3450	–	GTZ3450000R0001		

Measuring Adapters



Current Measuring Adapter, Power Measuring Adapter

SM16 current measuring adapter for safe, trouble-free measurement of power consumption at consumers connected to the mains with a plug. The attached cable with contact-protected connectors can be connected directly to the current measurement sockets at the multimeter.

The PMA 1 power measuring adapter includes an additional, second cable for connection to the voltage path of the METRA HIT 29S.

Type	Data Sheet No.	Article Number		
SM16	–	GTM9070190E0002		
PMA16	–	Z228A		

R_i Adapter



Ri Adapter, 200KΩ/230V

The type R200k Ri adapter reduces the input impedance of electronic multimeters to 200 kΩ, which suppresses erroneous measurements caused by capacitive interference.

Type	Data Sheet No.	Article Number		
R200K	–	Z101A		

Cable Set



Measuring Accessories

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

- KS17-2 cable set
- KY94 hook clips (1 pair) for KS17-2
- KY96 push-on lugs (1 pair) for KS17-2
- KY95-1 alligator clips (1 pair) for KS17-2
- KS17S cable set Cable set with 2 mm diameter steel tips and 120 cm cable, 1000 V / CAT III

Type	Data Sheet No.	Article Number		
KS17-2	–	GTY3620034P0002		
KY94	–	GTY3610094P01		
KY95-1	–	GTZ3215000R0002		
KY96	–	GTY3610096P01		
KS17S	–	Z110H		

Multimeter Accessories

Field, Energy, Current and Power Measuring Adapters

METRA HIT FMA1

E and B Field Measuring Adapter for Measurement of Low Frequency Alternating Fields



METRA HIT field measuring adapter for measuring and recording electrical and magnetic fields (recommended for use with following instruments: METRA HIT 26M, 28S and 29S)

- Compact, handy measuring instrument adapted to battery powered multimeters including METRA HIT 26S/26M ... 29S
- Suitable for short and long-term recording of EM fields and measurement data analysis at the PC in combination with METRA HIT 26M and 29S or SI232 II memory interface (accessory)
- Orientation measurements in accordance with federal regulations (BIMSchG)
- Testing for radiation at CRT monitor workstations in accordance with MPRII and TCO
- Easy to use
- High dynamic range assures reliable measurement values, even at 100% over-ranging
- Fluctuating field strengths can be recorded in combination with METRA HIT multimeter and METRAWin software, and peak values can be analyzed
- Dimensions (W x H x D):
Control unit: 97 mm x 135 mm x 39 mm, weight 210 g with battery
Probe: 43 mm x 130 mm x 28 mm, weight 130 g
- Batteries: 2 ea. 1.5 V IEC LR 6 (AA mignon)

Type	Data Sheet No.	Article Number		
FMA1	3-348-854-03	Z108A		

METRA HIT EMA1

Energy Measuring Adapter for Ferraris Meters



The EMA1 is a plug-in adapter for the METRA HIT 29S digital multimeter for energy measurement at Ferraris meters without altering the electrical installation.

The EMA1 is an inexpensive, optimized accessory for acquisition, evaluation and optimization of energy curves in combination with the METRA HIT 29S and METRAWin 10 software.

A METRA HIT 29S can be connected to a Ferraris meter via the EMA1 for the measurement and recording of 3-phase energy curves. The meter pulse is acquired optically and is evaluated and recorded with a programmable factor. Recorded data are displayed as a peak value curve with METRAWin 10 software.

- Dimensions (W x H x D):
Control unit: 97 mm x 135 mm x 39 mm, weight 110 g

Type	Data Sheet No.	Article Number		
EMA1	3-348-994-03	Z112A		

NW3A / NW300mA

Shunt Resistors for Multimeters without Current Measuring Function



The shunt resistors function as adapters for multimeters without their own current measuring function (METRA HIT 22S, 16I, 16T, 16U)

Type	Data Sheet No.	Article Number		
NW3A	–	Z205B		
NW300mA	–	Z205C		

NA4/500 / NA5/600

Power Packs



Mains power packs for METRA HIT instruments allow for battery saving mains operation, in particular for continuous measurements using multimeters with internal memory.

- NA4/500: power pack, 230 V/4.5 V, for METRA HIT 22M, 26M, 27M, 27I, 28C, 28S, 29S and 30M devices **manufactured through 2003**
- NA5/600: power pack, 230 V/5 V/600 mA, for METRA HIT 27M, 27I, 28C, 28S and 29S devices **manufactured as of 2004** (due to modified plug connectors)

Type	Data Sheet No.	Article Number		
NA4/500	–	Z218A		
NA5/600	–	Z218F		

BD232

Interface Adapter for METRA HIT Multimeters



Can be snapped onto all METRA HIT multimeters. The infrared interface allows for electrically isolated data transmission between PC and multimeter. Data transmission is indicated visually by means of two LEDs.

The BD232 interface adapter is especially recommended for measuring instruments with integrated memory (METRA HIT 22M, 26M, 29S, 30M).

The BD-Pack 1 is available as a user-friendly complete package for single-channel operation.

The package includes the BD232 interface adapter, an RS 232 bus cable, METRAwin 10 software and installation instructions. METRAwin 10 is used for data analysis and display (see page 29).

It cannot be used for online recording with type SI232-II adapters.

In order to expand to 2, 3 or 4-channel operation, one BD232 is required for each channel, as well as additionally required multimeters.

Accessories: type Z3241 = RS 232 interface cable, 2 m, (included with 1-Ch. Pack, 4-Ch. Pack and Z3231)

- Dimensions: 135 mm x 97 mm x 39 mm

➤ See page 5 for training seminar: GTT1219B

Type	Data Sheet No.	Article Number		
BD232	3-349-026-03	GTZ3242100R0001		
BD-Pack 1	3-349-026-03	Z215A		
Z3241	–	GTZ3241000R0001A1		

USB-Hit

USB Interface Adapter for METRA HIT Multimeters



Bidirectional IR-USB interface adapter for METRA HITs

Can be snapped onto all METRA HIT multimeters.

Data are transmitted from the multimeter to the adapter in an electrically isolated, bidirectional fashion, and to the USB interface for PCs and laptops.

➤ See page 5 for training seminar: GTT1219B

Type	Data Sheet No.	Article Number		
USB-Hit	–	Z216A		

SI232 II

Memory Adapter, Single-Channel / 4-Channel Memory Pack for METRA HIT Multimeters



Can be snapped onto all METRA HIT multimeters and convert IR measurement data received from the instrument, as well as control signals received from the PC. Measurement data are recorded to the integrated memory with reference to real-time, and are transmitted to the PC after measurement has been completed. The 128 kB memory can be broken down into blocks as desired. The sampling interval can be set within a range of 50 ms to 10 min., or sampling can be triggered in a signal dependent fashion for optimum memory usage.

The SI 232-II memory adapter is especially recommended for measuring instruments **without** integrated memory (METRA HIT 22S through 28S).

The 1-Ch. pack is available as a user-friendly complete package for single-channel operation.

The pack includes the SI232 II memory adapter, an RS 232 bus cable, METRAwin 10 software and installation instructions. METRAwin 10 is used for data analysis and display (see page 29).

In order to expand to 2, 3 or 4-channel operation, one SI 232-II is required for each channel, as well as additionally required multimeters. The 4-Ch. Pack is recommended for simultaneous recording with 4 multimeters.

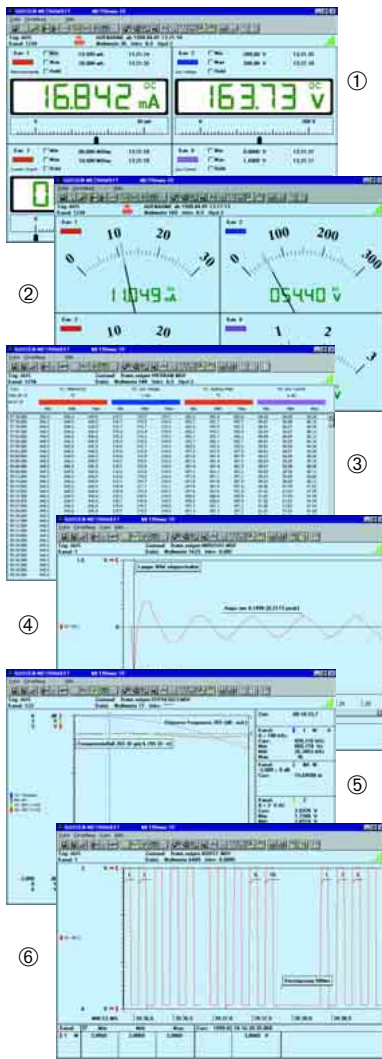
Accessories: type Z3241 = RS 232 interface cable, 2 m, (included with 1-Ch. Pack, 4-Ch. Pack and Z3231)

- Dimensions: 135 mm x 97 mm x 39 mm, weight approx. 0.25 kg with battery
- Batteries: 2 ea. 1.5 V IEC LR 6 (AA mignon)

➤ See page 5 for training seminar: GTT1219B

Type	Data Sheet No.	Article Number		
SI232 II	3-349-026-03	GTZ3242020R0001		
1-Ch. Pack II	3-349-026-03	GTZ3231020R0001		
4-Ch. Pack II	3-349-026-03	GTZ3234020R0001		
Z3241	–	GTZ3241000R0001A1		

METRAwin® 10/Hit



Measurement Data Recording and Parameters Configuring Software for METRA HIT Multimeters

Together with a BD232 interface adapter or an SI232 memory adapter, METRAwin 10/METRA HIT turns any METRA HIT multimeter into a professional, PC-based universal recording system. Measured values are read in from the multimeters, managed at the PC and displayed as Yt or XY diagrams (up to 4 channels), or in tabular form (up to 10 channels) with METRAwin 10/METRA HIT. In the online mode, measurement data are displayed live in diverse formats, e.g. at up to 4 virtual indicator instruments or digital displays (with adjustable limit values). High performance, online arithmetic functions allow for data analysis and evaluation. The sampling interval can be set within a broad range depending upon device type and measuring function: 50 ms – 100 ms – 200 ms – 500 ms – 1 sec. to 60 min., online or off-line to device memory at max. 0.5 ms (with the METRA HIT 29S). Measurement data can be easily imported to other Windows PC applications such as Word and Excel via the clipboard. METRAwin 10 / METRA HIT software is included with the memory and interface adapter packs, and is not offered separately. The article number shown below includes updates.

Multimeter and Indicator Instruments (1 and 2)

Uploaded measured values are displayed at the screen both digitally and at an analog scale.

Data Logger (3)

Acquired measurement data are displayed chronologically at the screen in easy to read tabular form.

Arithmetic Functions

Measurement data from different channels can be linked and processed with high performance arithmetic functions.

Yt Diagram (4 and 6)

Acquired measurement data are displayed at the screen as a time graph with a horizontal time axis, and are measured off with two cursors. Stored signals can be expanded or compressed along amplitude or time axes (zoom function). The time axis can be scaled in absolute time, or in relative measuring time.

Continuous Line Recorder

Up to 10 channels can be printed out continuously as a Yt line graph at a color printer.

Yt Diagram (5)

Acquired data are displayed as an XY graph and are measured off with the cursors. As is the case with all display formats, all scales can be freely adjusted.

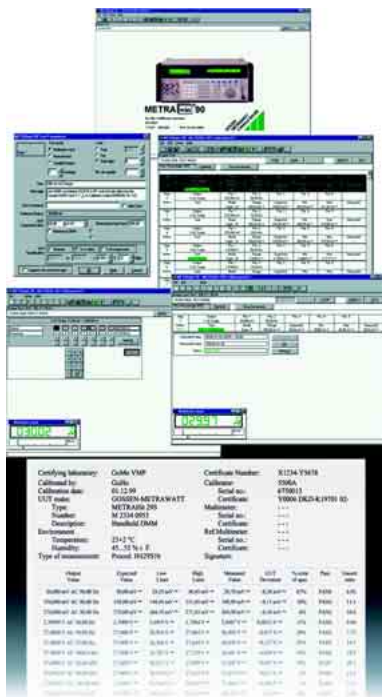
Sampling

Sampling can be started either manually (mouse click), automatically with an adjustable interval (50 ms to 1 hour) or as a function of the signal with adjustable signal hysteresis (0 to 500 digits). The minimum sampling interval for devices with integrated memory is 0.5 ms (see figure 6).

Data can be controlled with time and window triggers, and can be saved automatically as multiple data files.

Type	Data Sheet No.	Article Number		
METRAwin 10 Software Update	3-349-026-03	GTZ3240000R0001		

METRAwin 90F / FJ



METRAwin 90-F: Calibration Software for Fluke 55xx Benchtop Calibrators METRAwin 90-FJ: Calibration and Adjusting Software

With METRAwin 90F, an IEEE-488 interface at the PC and a Fluke 5500A, 5520A or 5700A calibrator, a universal, professional, automated closed-loop calibration system can be set up for METRA HIT series multimeters.

However, it is also suitable for universal use for calibrating analog and digital multimeters, recording instruments, power meters, power measuring transducers, amplifier modules, transducers etc. Calibration procedures are generated with METRAwin90-F. Specified analog values are transmitted from the PC via the IEEE 488 interface to the calibrator and are fed to the device to be calibrated from the analog output at the calibrator. A BD232 adapter is coupled to the computer via an RS 232 cable for automatic transmission of measurement results from the METRA HIT multimeter to the computer. In the case of measuring transducers, the analog output value from the device to be calibrated is measured by a METRA HIT multimeter, and is returned to the PC for evaluation via the interface. If the measurement results remain within the specified tolerances, each consecutive calibration step is initialized automatically until the entire procedure has been run step by step.

- Automated calibration of METRA HIT ..S / ..M / ..A series handheld multimeters with infrared interface
- **New:** Adjustment of METRA HIT 22-29S / M handheld multimeters via RS 232 interface
- Simple and quick generation, testing and documentation of calibration procedures
- Uncomplicated operation: even semiskilled workers can execute qualified calibration tasks
- Outstanding applications flexibility with calibration signal fed by means of key entry or via the interface
- Documentation can be printed out as standard calibration report, or as a user-specific certificate
- Dynamic data exchange with Microsoft Excel and Word
- Documentation includes all entries required for certificates in accordance with EN ISO 9000
- "Determination of measuring uncertainty" in accordance with DKD-3 after a specified number of measurements
- Specification of calculated measuring uncertainty in accordance with DKD-3 or TUR (test uncertainty ratio) included in the report

Type	Data Sheet No.	Article Number		
METRAwin 90-F	–	Z211C		
METRAwin 90-FJ	–	Z211F		

CP1 Calibrator Pack

Calibrator Pack with METRAWin 90-2 and Accessories



The CP1 calibrator pack includes all hardware and software components required for connecting the METRA HIT 18C or the METRA HIT 28C to a PC.

The CP1 is ideal for stationary calibration of indicators, recorders etc., in the test department or in the lab, and for expanding a METRA HIT 28C into an automated process calibration system. Easy creation of calibration procedures and storage to the calibrator also significantly simplify on-site use.

The CP1 consists of:

- METRAWin 90-2 calibration software
- BD232 interface adapter
- RS 232 interface cable

Type	Data Sheet No.	Article Number		
CP1	3-348-828-03	GTZ 3231 100 R0001		

CP28 Calibrator Pack

Calibrator Pack with METRA HIT[®] 28C and Accessories



The CP28 calibrator pack includes all hardware and software components required for the creation of a PC aided, automatic process calibration system.

The CP28 is ideal for on-site calibration of system components and measuring transducers, as well as for recorders etc. in testing and in the laboratory. Easy creation of calibration procedures and storage to the METRA HIT 28C also significantly simplify on-site calibration work.

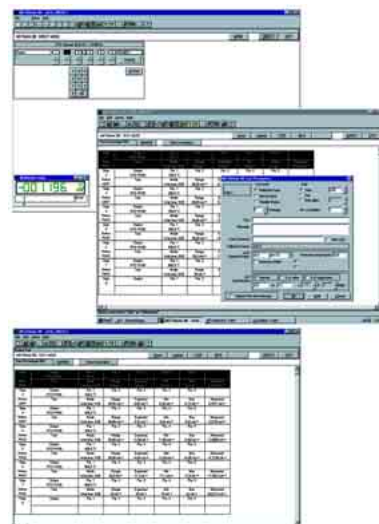
The CP28 consists of:

- METRA HIT 28C calibrator
- BD232 interface adapter
- RS 232 interface cable
- KC2 Kelvin Clips
- 1ASi rechargeable battery set
- KY95-1 alligator clips (1 pair)
- METRAWin 10/METRA HIT recording software, METRAWin 90-2 calibration software

Type	Data Sheet No.	Article Number		
CP28	3-349-098-03	M231B		

Calibration Software METRAWin[®] 90-2

Calibration Software for METRA HIT 18C and METRA HIT 28C



The handheld METRA HIT 18C or 28C calibrator with multimeter is transformed into a professional, PC-based calibration system for measuring transducers, indicators and recording instruments with the help of METRAWin 90-2 and a BD232 interface adapter.

Calibration procedures are created with METRAWin software. Specified analog values are transmitted from the PC via the BD232 adapter to the calibrator, and are fed to the device to be calibrated from the analog output at the calibrator. The analog output value from the device to be calibrated is then measured by the multimeter, and is returned to the PC for evaluation via the interface. If the measurement results remain within the specified tolerances, each consecutive calibration step is initialized automatically until the entire procedure has been run.

Calibration data can be easily imported into other Windows applications (e.g. Word or Excel).

- METRAWin 90-2 is included with the above described calibrator packs.

Type	Data Sheet No.	Article Number		
METRAWin 90-2	3-349-098-03	Z211A		