METRA*Hit*® FMA1
Field Measurement Adapter for METRA*Hit*® 16S ... 29S

Applications

The FMA1 is an adapter device for digital multimeters of the METRA*Hit* S series for the measurement of low frequency, alternating electrical and magnetic fields. It consists of a control panel with LEDs and a screw-on field measuring probe. The device provides for the recognition of localized peak values and comparison with allowable limit values, as well as the tracing of interference sources. The following range of applications is conceivable:

- *Electrical Power Utilities:*
  Measurement of middle to high-voltage lines, transformer stations and underground cables
- *Public Transportation Operators:*
  Measurements at elevated railway systems
- *Technical Monitoring and Radiation Protection Authorities:*
  Testing in accordance with federal emissions regulations
- *Authorized Personnel for the Monitoring of Work Station Monitor Screens:*
  Testing for observance of MPR or TCO standards
- *Institutes for Biologically Sound Building Practices and Environmental Protection Projects*
- *Clinics and Health Spas*

Measurement Functions

The field measurement adapter delivers an alternating voltage signal at the measurement output (banana plug), which is proportional to the measured alternating field. The measuring range upper limit is equal to 3 V~.

- *Alternating Electrical Field ... 30,000 V/M*
- *Alternating Magnetic Field ... 300 µT*

Applicable Regulations and Standards

DIN EN 50081 Part 1	Generic standard for interference emission; residential, commercial and light industry
DIN EN 50082 Part 1	Generic standard for interference immunity; residential, commercial and light industry
VDI/VDE 3540	Reliability of measuring, control and regulating devices
DIN EN 60529 DIN VDE 0470 Part 1	Testing instruments and procedures – level of protection provided by enclosures (IP code)
ElmSschV	Federal regulations concerning electromagnetic fields (federal emissions protection legislation) – limit values for low frequency systems

Regulations and Standards for the Implementation of the Instrument

DIN VDE 0848-1	Safety in electrical, magnetic and electromagnetic fields, measurement and computation procedures
IRPA	Limit values
MPR / TCO	Irradiation from visual display units *

* Design and frequency range deviate from the standards requirement.

Recommendations for minimum clearances to interference sources are provided by the Federal Authority for Emissions Protection and the Committee for Electrobiology.

Characteristic Values

Meas. Magnitude	Measuring Range	Resolution	Inherent Deviation
Alternating Electrical Field [2]	0.0 ... 300.0 V~/m	0.1 V/m	±10% rdg. ± ...[1] d
	0.0 ... 3000.0 V~/m		
	0.0 ... 30000.0 V~/m		
Alternating Magnetic Field	0.0 ... 3.0 µT~	0.1 µT	±5% rdg. ± ...[1] d
	0.0 ... 30.0 µT~		
	0.0 ... 300.0 µT~		

[1] Deviation dependent upon multimeter
[2] Measurement relative to potential, similar to MPR

Measuring Range Overflow

Frequency Range without Filter: 16 Hz ... 100 kHz (±1 dB)

Frequency Range with Filter: 16 Hz ... 2 kHz (±1 dB)

Display

Red LED: filter setting, battery condition,
Green LED: measurement function and measuring range

Operating Functions

Keys: ON/OFF, measurement function, measuring range and filter

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Reference Conditions

Ambient Temperature	+23 °C ±2 K
Relative Humidity	45 ... 55%
Meas. Magnitude Frequency	sine, 50 Hz
Battery Voltage	3 V ±0.1 V

Ambient Conditions

Operating Temperature Range	0 °C ... + 55 °C
Storage Temperature Range	– 25 °C ... + 70 °C (without batteries)
Relative Humidity	max. 75%
Elevation	to 2000 m

Power Supply

Battery	2 ea. 1.5 V mignon cell alkali manganese cell per IEC LR 6
Service Life	with alkali manganese cell: approx. 130 hours
Battery Test	LED Display
Power Consumption	20 mA typical

Electromagnetic Compatibility, EMC

Interference Emission	EN 50081-1: 1992
Interference Immunity	EN 50082-1: 1992

Mechanical Design

Protection	IP 40	
Dimensions	W x H x D:	
	Controller:	97 mm x 135 mm x 39 mm
	Probe:	43 mm x 130 mm x 28 mm
Weight	Controller:	210 gr. with battery
	Probe:	130 gr.

Included Equipment

1 FMA1 Field Measurement Adapter
1 Field Measurement Probe with Special, Conductive Rubber Grip
2 Batteries
1 Operating Instructions

Suggested Combination with METRA*Hit* 29S and Field Measurement Adapter

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Accessories

METRA*Hit 16S, 18S, 28S and 29S Series Analog-Digital Multimeters*

In addition to high level operating safety with Automatically Blocking Sockets (“ABS”), the METRA*Hit* series includes other exceptional features such as the infrared interface, which allows for linking to a PC, as well as effective value measurements (TRMS) independent of waveform with alternating (AC) and pulsating magnitudes (AC and DC).

Special Features

- *Resolution, 16S: 10 µV, 10 mΩ, 1 µA*
  Resolution, 18S: 10 µV, 10 mΩ, 10 nA
  Resolution, 28S, 29S: 1 µV, 1 mΩ, 1 nA
- *Effective value measurement (TRMS AC, TRMS AC + DC)*
- *Power measurements (W, Var, VA, Wh, PF: METRAHit 29S only)*
- *Measurement value memory: DATA HOLD, MIN/MAX value*
- *Large measurement value memory for real-time data logging (METRAHit 29S only)*

Characteristic Values *

Meas. Functions / Meas. Ranges / Features	METRA*Hit* 16S	18S	28S	29S
30 mV ⎓	■			
300 mV ... 1000 V ⎓	■	■	■	■
300 mV ~		■	■	■
3 V ... 1000 V ~	■	■	■	■
TRMS AC, crest factor max. 5	■	■	■	■
TRMS AC + DC, crest factor max. 5	■	■		
300 µA ⎓	■	■	■	■
3 mA ⎓	■	■	■	■
30 mA ⎓	■	■	■	■
300 mA ⎓	■	■	■	■
3 A ⎓	■	■	■	■
10 A ⎓	■	■	■	■
300 µA ~		■	■	■
3 mA ~	■	■	■	■
30 mA ~		■	■	■
300 mA ~	■	■	■	■
3 A ~		■	■	■
10 A ~	■	■	■	■
30/300 A ~ with curr. transf. 1000:1 TRMS AC + DC, crest factor max. 5	■	■	■	■
Power Measurement				■
Line Fault Analysis				■
– 58 dB ... + 63 dB		■		
30 Ω	■		■	■
300 Ω ... 30 MΩ	■	■	■	■
3 nF		■		
30 nF ... 30 µF	■	■	■	■
300 µF ... 10000 µF		■	■	■
300 Hz ... 100 kHz	■	■	■	■
Duty Cycle 2 % ... 98 %	■			
– 200 °C (– 100 °C) ... + 850 °C Pt100 / Pt1000	■	■	■	■
Types J , K and T			■	■
Event Counting, Event Duration		■	■	■
Continuity / Diode Test	■	■	■	■
Measured DATA memory	■	■	■	■
MIN/MAX memory	■	■	■	■
Memory Mode / Real-Time Data Logging				■
Digital Display ± 3100 digits ± 31,000 digits ± 31 0000 / 310 / 3-fold	■	■	■	■
Analog Display ± 35 Scale Divisions Automatic Scaling	■	■ ■		
Interface with Infrared Transmission	■	■	■	■
Inherent Deviation ± ... % of rdg. at V ⎓ ± ... step(s)	0.1 1	0.05 3	0.02 10	0.02 10

* *For more detailed information please request the following data sheets: METRAHit 12S ... 18S or METRAHit 28S/29S.*

SI232 Memory Adapter *(for METRAHit 16S, 18S and 28S)*

The METRA*Hit* SI232 memory adapter, which can be plugged onto the METRA*Hit* 16S, 18S and 28S hand-held multimeters, provides for on-site measurement data storage without PC, as well as for later uploading to a PC.
Data are synchronized with an internal clock.

Memory:
128 kB
(about 100,000 measurement values, expandable with data compression by a factor of 10 ... 20)

Adjustable Sampling Rate:
50 ms ... 1 min.

For more detailed information please request our data sheet: SI232 Memory Adapter.

BD232 *Interface Adapter (for METRAHit 29S)*

The setting of parameters for the METRA*Hit* 28S and 29S multimeters can be accomplished with the help of the bidirectional BD232 adapter, with which measurement data can also be transmitted to the PC. There is no memory included in the adapter.

METRAwin 10 Software

With METRAwin 10 software (runs under WINDOWS as of 3.11), measurement data can be processed and displayed at the PC. Sampling can be performed manually with an adjustable sampling interval, or signal-dependent (with adjustable signal hysteresis). Storage in ASCII format can be controlled with two trigger thresholds per measuring channel, as well a via system time.

PC with METRAwin10
and digital multimeter with BD232 interface adapter

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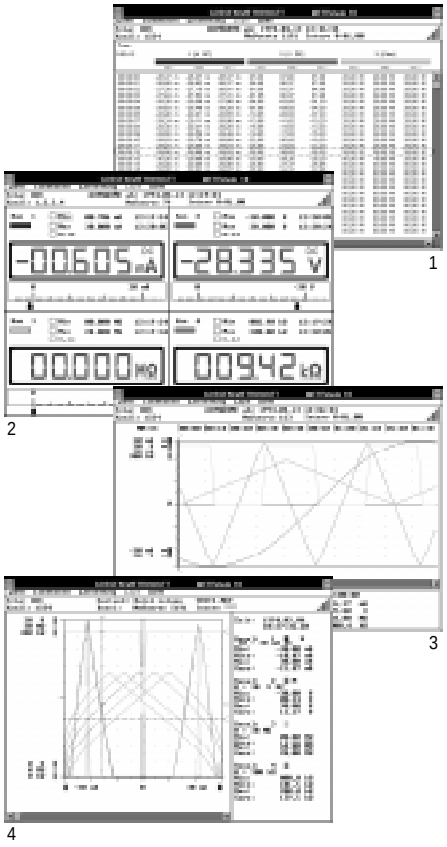

Data Logger (1)

Acquired measurement data from up to 10 channels are numerically displayed at the monitor in clearly defined tabular form.

Multimeter (2)

Transmitted measurement values from a maximum of four freely selectable channels are represented at the monitor in the on-line mode in digital form with supplemental analog scale, or as an analog needle gauge instrument with supplemental digital display.

Y(t) Recorder (3)

Acquired measurement data from up to four freely selectable channels are represented at the monitor as a line graph with horizontal time axis, and are delineated with pointers. Stored signals can be expanded (zoom) or compressed, relative to amplitude as well as the time axis. The time scale can be represented in absolute time, or relative measuring time.

XY-Recorder (4)

Acquired measurement data from two to four freely selectable channels are represented at the monitor as an XY graph, and are delineated with the cursor. As is the case with all display formats, all scales are freely adjustable.

Measurement data can be analyzed, linked and displayed, both on-line and off-line, with powerful, high performance arithmetic functions.

Sampling (on-line)

On-line sampling is accomplished manually (mouse click), automatically with an adjustable interval (50 ms ... 60 min.), or signal-dependent with adjustable signal hysteresis (0 ... 500 digits). Data can be controlled with timing or window triggers, and automatically stored as multiple data files.

Measurement Data Processing

Measurement data can be processed with a high performance computing function, and with the help of linearization functions. For example, mA signals from sensors or transducers can thus be directly represented as pressure values, apparent power etc.

Setting SI232 Memory Adapter Parameters

Memory adapter parameters can be set manually with the keys at the front panel, or via the PC serial interface. If synchronized with the PC clock function, up to ten memory adapters can be used for synchronous data logging. Values for minimum and maximum value triggering, recording time and re-trigger time can be easily adjusted. Start of measurement is also controlled with the quartz movement integrated into the memory adapter, as well as sampling rate and signal hysteresis.

Order Information

Designation	Type	Ident-Number
Field Measurement Adapter	FMA1	Z108A
Reel with 25 m cable for grounding the field measurement adapter for measurements on floor surfaces with exceptional insulating qualities	TR25	GTZ 3303 000 R0001
Multimeter	METRA*Hit* 16S * METRA*Hit* 18S * METRA*Hit* 28S METRA*Hit* 29S	GTM 2016 000 R0003 GTM 2018 000 R0003 M228A M229A
Single channel memory pack including SI232 memory adapter, cable and METRAwin 10 software for METRA*Hit* 16S, 18S and 28S	1-CH. Pack	GTZ 3231 020 R0001
Memory adapter for METRA*Hit* 16S, 18S and 28S	SI232	GTZ 3242 020 R0001
Single channel pack including cable and METRAwin 10 software for METRA*Hit* 29S	Z3231	GTZ 3231 000 R0001
Bidirectional interface adapter for METRA*Hit* 29S	BD232	GTZ 3242 100 R0001
RS232 interface cable, 2 m, (included with Z3231)	Z3241	GTZ 3241 000 R0001
METRAwin 10 software update	Z3240	GTZ 3240 000 R0001
Ever-ready case	F836	GTZ 3302 000 R0001

* Please note that METRA*Hit* series multimeters will, presumably as of Oct. 97, be suitable for plugging on to the field measurement adapter. This is due to the rubber feet, which must be repositioned to assure a secure fit to the multimeter. Retrofitting of older METRA*Hit* series devices available upon request.

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