GOSSEN METRAWATT

METRA HIT 28S and 29S
Precision Digital Multimeters, Power Meters

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METRA HIT 28S and 29S

- 300,000 digits and triple display
- Precision multimeter (V, dB, A, Ω, F, Hz, F, °C/°F, V-▶|-)
- Direct current measurement (to 10 A) or via (clip-on) current transformer: A transformation ration of 1000:1 or 10,000:1 is accounted for by the display
- Quartz movement for Min-Max recording relative to real-time
- AUTO SELECT
  Automatic recognition of measured quantities (V, Ω and F)
- Connector jack for external power pack

METRA HIT 29S

- Power and energy measurement (W, VAr, VA, Wh, VArh, PF) with analog signals or pulse-type energy measurement, display of momentary measured values, mean values and peak power values
- Power disturbance recording
- Large measurement data memory for up to 60,000 measured values

CAT IV

Quality Management System

DQS Certified per
DIN EN ISO 9001 reg. no. 1262

Deutscher Kalibrierdienst DKD-K-19701 DKD Calibration Certificate

Applications

METRA HIT 28S and 29S multimeters are high performance precision instruments for laboratory use, as well as for service and training. With a display range of 300,000 digits, as well as outstanding accuracy and long-term stability, they fulfill all requirements for use in calibration and R&D laboratories. The instruments can be utilized on-site for precision maintenance and calibration tasks thanks to battery operation.

Features

Convenient Triple Display

The momentary measured value and up to two additional values are displayed simultaneously, for example:

– Momentary, minimum and maximum measured values
– Frequency and RMS value of AC measuring voltage

Or for power measurement with METRA HIT 29S:

– Momentary measured values as well as active power, voltage and current
– Maximum value for periodic power with date and time

High Resolution and Precision

5¾ places (≙ 309,999 digits) for DC measured quantities and 4¾ places (≙ 30,999 digits) for AC measured quantities allow for precision reference measurements and use as a calibration standard for testing devices and assemblies.

RMS Value with Distorted Waveshape

The utilized measuring method allows for waveshape independent RMS measurement (TRMS AC and AC+DC) up to 100 kHz, and up to crest factor 5.

Additional Functions

Continuity testing with acoustic signal, events counting (number and duration), counting of zero-crossings, stopwatch, data-compare and extended-range capacitance measurement.
Type J and K thermocouples and platinum sensors can be connected thanks to the integrated temperature measuring function.

Overload Protection

The instrument is safeguarded for up to 600 V in all measuring functions by overload protection. An acoustic signal is generated if the upper voltage or current range limit is exceeded.

FUSE appears at the display if the fuse for the current measuring ranges blows.

Calibration Certificate

The multimeters are furnished with an internationally valid DKD calibration certificate. After the specified calibration interval has elapsed (recommended interval: 1 year), the multimeters can be recalibrated in our own, or any other accredited DKD calibration laboratory.

Although required very rarely, readjustment of the multimeter is possible via the integrated infrared data interface, which necessitates special adjusting software (upon request).

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Infrared Data Interface

The device can be remote configured, and momentary and saved measurement data (METRA HIT 29S) can be read out via the bidirectional infrared interface supplied as standard equipment. The BD232 or USB-Hit interface adapter, or the SI232-II memory adapter, as well as METRAwin®10/METRA*Hit*® software, are required to this end (see accessories). Device driver software for LabView is available upon request.

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 in many cases eliminates it entirely.

Automatic Measured Value Storage with Comparison*

The DATA function automatically saves the digitally displayed measured value after settling in. Acoustic signaling is also used to indicate whether the new measured value deviates from the initial reference value less or more than 33% of the measuring range.

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.

Connector Jack for External Power Supply

Our NA5/600 can be connected for long term measurement, especially in memory mode operation, and for power disturbance recording. As opposed to common plug-in power packs, the NA5/600 includes a regulated output with minimal residual ripple and coupling capacitance to the mains input, as well as a highly insulated power cable. Measurement accuracy influences are thus minimized, and there is no impairment of electrical safety.

* Patented

Additional Functions for METRA HIT 29S

Power Measurement

The METRA HIT 29S is a compact power meter for direct and alternating current in single-phase systems. The electrical circuit can be connected either directly, or via a current transformer. If a current transformer is connected to the multimeter (mA or A input), all current and power displays are represented with the correct value based upon the selected transformation ratio of 1000:1 or 10,000:1.
Universal power measurement includes the following measuring functions: active, reactive and apparent power, power factor and energy.
Beyond this, the mean power value can be generated over a specified time period (e.g. 15 min.), and the corresponding maximum value can be recorded along with time of occurrence. The following clip-on ammeters are recommended: WZ12D, Z3511, Z3512 and Z3514.

Power Disturbance Recording

The METRA HIT 29S is equipped with a function for acquiring and recording power disturbances which is unique amongst the handheld multimeters. This allows for simultaneous, continuous recording of voltage characteristics and event-triggered recording of voltage dips (> 10 ms) and voltage transients (> 0.5 µs).

One of two different recording and analysis modes can be selected:

1. If a power disturbance occurs, its type, time of occurrence, duration and maximum value are entered to an events list (capacity: 250 events, volatile memory), whose contents can be viewed at the multimeter display.
2. Same as above plus additional recording of measured values to internal measured value memory when events occur (capacity: approx. 60,000 measured values). Memory contents can be read out with METRAwin®10/METRA*Hit*® software and analyzed in detail.

Memory Mode Operation

The METRA HIT 29S is equipped with a quartz-movement synchronized measurement data memory (128 kB), which has enough capacity for 13,000 to 120,000 measured values depending upon configuration. This allows for utilization of the instrument as an autonomous real-time data logger.

Measurement data recording is executed either:

- In a time controlled fashion with an adjustable sampling interval within a range of 0.5 ms (for V DC only) to 10 minutes (see sampling rate in the table on page 3)
- Dependent upon measured value in the event of exceeded limit/delta value
- As an individual measured value by pressing a key

Memory contents can be read out by a PC with the help of the BD232, the SI232-II or the USB-Hit adapter, and can be analyzed and documented with METRAwin®10/METRA*Hit*® analysis software.

Applicable Regulations and Standards

DIN EN 61010, part 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)

Standard equipment

1 multimeter
1 protective rubber cover
1 cable set:
KS17 for 28S (2 safety measurement cables with test probes)
KS29 for 29S (3 safety measurement cables with test probes)
2 batteries
1 set operating instructions
1 DKD calibration certificate

Guarantee

3 years material and workmanship
1 to 3 years for calibration (depending upon application)

Characteristic Values

Meas. Function	Measuring Range	Resolution at Upper Range Limit			Input Impedance		Intrinsic Error at Max. Resolution under Reference Conditions		Overload Capacity [4]		Measuring Rate		
							±(% rdg. + ... % of range + ... d)	±(% rdg. . + ... d)					
		300,000 [1]	30,000 [1]	3000 [1]	—	≂	—	≂ [5]	Overload Value	Overload Duration	—	≂	~
V	300 mV	1 µV	10 µV		> 20 MΩ	5 MΩ // < 50 pF	0.02 + 0.010 + 5 [7]	0.5 + 30	600 V DC AC RMS sine	Cont.	50 ms (29S 0.5 ms)	0.5 s	1 s
	3 V	10 µV	100 µV		11 MΩ	5 MΩ // < 50 pF	0.02 + 0.005 + 5	0.2 + 30					
	30 V	100 µV	1 mV		10 MΩ	5 MΩ // < 50 pF	0.02 + 0.005 + 5	0.2 + 30					
	300 V	1 mV	10 mV		10 MΩ	5 MΩ // < 50 pF	0.02 + 0.005 + 5	0.2 + 30					
	600 V	10 mV	100 mV		10 MΩ	5 MΩ // < 50 pF	0.02 + 0.005 + 5	0.2 + 30					
dB	See table on following page				—	Same as V ≂	—	± 0.1 dB [11]			1 s		
					Approx. voltage drop at URL								
					—	≂	—	≂ [5]			—	≂	
A	300 µA	1 nA	10 nA		160 mV	160 mV	0.05 + 0.02 + 5	0.5 + 30	0.36 A	Cont.	50 ms	0.5 s	
	3 mA	10 nA	100 nA		160 mV	160 mV	0.05 + 0,01 + 5	0.5 + 30					
	20 mA	100 nA	1 µA		170 mV	170 mV	0.02 + 0,01 + 5	0.5 + 30					
	30 mA						0.05 + 0,01 + 5						
	300 mA	1 µA	10 µA		300 mV	300 mV	0.1 + 0,01 + 5	0.5 + 30					
	3 A		100 µA		110 mV	110 mV	0.2 + 0,05 + 5	0.7 + 30 [12]	10 A [6]	Cont.			
	10 A		1 mA		350 mV	350 mV	0.2 + 0,05 + 5	0.5 + 30					
					Open-circuit voltage	Meas. current at URL	±(% rdg. + ... % of range + ... d)						
Ω	300 Ω	1 mΩ			0.6 V	Max. 250 µA	0.05 + 0,01 + 5 [7]		600 V DC AC RMS Sine	10 min.	0.5 s		
	3 kΩ	10 mΩ			0.6 V	Max. 45 µA	0.05 + 0,01 + 5 [7]						
	30 kΩ	100 mΩ			0.6 V	Max. 4.5 µA	0.05 + 0,01 + 5						
	300 kΩ	1 Ω			0.6 V	Max. 1,5 µA	0.05 + 0,02 + 5						
	3 MΩ	10 Ω			0.6 V	Max. 150 nA	0.1 + 0,02 + 5						
	30 MΩ	100 Ω			0.6 V	Max. 15 nA	1 + 0,2 + 5						
Ω 🔊	300 Ω			0.1 Ω	Max. 3 V	Max. 1 mA	1 + 0 + 3						
⇥ 🔊	300 mV			100 µV	Max. 3 V	Max. 1 mA	0.2 + 0 + 3				50 ms		
⇥	3 V		100 µV		Max. 3 V	Max. 1 mA	0.2 + 0 + 3				50 ms		
					Discharge res.	$U_{0\ max}$	±(% rdg. + ... % of range)						
F	3 nF			1 pF	10 MΩ	3 V	1.0 + 0.2 [7]		600 V DC AC RMS Sine	10 min.	2 s		
	30 nF			10 pF	10 MΩ	3 V	1.0 + 0.2 [7]						
	300 nF			100 pF	1 MΩ	3 V	1.0 + 0.2						
	3 µF			1 nF	100 kΩ	3 V	1.0 + 0.2						
	30 µF			10 nF	11 kΩ	3 V	1.0 +0.2						
	300 µF			100 nF	2 kΩ	3 V	5.0 + 1						
	3,000 µF			1 µF	2 kΩ	3 V	5.0 + 1				2 ... 7 s		
	30000 µF			1 µF	2 kΩ	3 V	5.0 + 1				2 ... 14 s		
					f_{min} [3]		±(% rdg. + ... d)						
Hz	300.000 Hz	0.001 Hz			1 Hz		0.05 + 1 [8]		600 V	Cont.	1 s		
	3.00000 kHz	0.01 Hz			1 Hz		0.05 + 1 [8]		600 V				
	300.000 kHz	1 Hz			1 Hz		0.05 + 1 [8]		300 V 30 V				
⏱	100 min. [2]		100 ms (1/10 s)				±15 d		600 V				
							±(% rdg. + ... d)						
°C/°F	Pt 100/ Pt 1000	– 200.0 ... +100.0 °C	0.1 °C				0.5 K + 3 [9]		600 V DC RMS sine	10 min.	0.5 s		
		+ 100.0 ... +850.0 °C					0.2% + 3 [9]						
	K NiCr-Ni	– 270.0 ... +1372.0 °C	0.1 °C				0.7 + 3 [9, 10]		600 V DC RMS sine				
	J Fe-CuNi	– 210.0 ... +1200.0 °C	0.1 °C				0.8 + 3 [9, 10]						

[1] Display: 5¾-place for DC and 4¾-place for AC
[2] Stopwatch format: **mm:ss:hh** where m = minutes, s = seconds and h = hundredths of a second, max. 99:59:59, key operation only
[3] Lowest measurable frequency for sinusoidal measuring signals symmetrical to zero point
[4] At 0° ... + 40°C
[5] Values of less than 100 digits are suppressed, 16 ... 45 ... 65 Hz ... 100 kHz sinusoidal. See influence error on page 4.
[6] 12 A – 5 min., 16 A – 30 s
[7] ZERO is displayed for "zero balancing" function.
[8] Range 300mV ≂: U_E = 50 mV_{RMS} . . . 300 mV_{RMS}
3 V ≂: U_E = 0.3 V_{RMS} . . . 3 V_{RMS}
30 V ≂: U_E = 3 V_{RMS} . . . 30 V_{RMS}
300 V ≂: U_E = 30 V_{RMS} . . . 300 V_{RMS}
600 V ≂: U_E = 300 V_{RMS} . . . 600 V_{RMS}
For voltages > 100 V: power limiting of $3 \cdot 10^6$ V · Hz
[9] Plus sensor deviation
[10] Without integrated reference junction, additional error with internal reference junction: ±2 K
[11] For U > 10% of the measuring range
[12] Applicable as from 500 digits

Key: rdg. = measured value (reading), d = digit, URL = upper range limit

Real-Time Clock

Accuracy	±1 min./month
Temperature Influence	50 ppm/K

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dB Ranges

Measuring Ranges	Display Range at Reference Voltage U_{REF} = 0.775 V	Resolution
300mV ∼	– 48 dB ... – 8 dB	0.01 dB
3 V ∼	– 38 dB ...+ 12 dB	0.01 dB
30 V ∼	– 18 dB ...+ 32 dB	0.01 dB
300 V ∼	+ 2 dB ...+ 52 dB	0.01 dB
600 V ∼	+ 22 dB ...+ 63 dB	0.01 dB
	Display (dB) = 20 lg U_x (V) /U_{REF}	

AUTO SELECT: Automatic Measured Quantity Recognition

Measured Quantity	Measuring Range Recognition	Condition	Recog. Time
Voltage V ⎓	V_{RMS} > 0.81 V . . . 600 V	—	1 s
Voltage V ∼	V_{RMS} > 1 V . . . 600 V	Frequency > 20 Hz	1 s
Resistance	0 Ω . . . 15 MΩ	—	1 s
Capacitance	> 1.5 nF . . . 300 µF	Electrolytic capacitor must be correctly connected	1 s
Diode	Voltage in conducting direction: max. 1 V	Diode must be correctly connected: anode to ⊳|	1 s

Power Measurement with METRA HIT 29S

Measuring Function	Measuring Range	Switch Setting mA	Switch Setting A	Resolution at Upper Range Limit 10,000	Overload Capacity at 0 ... + 40° C: Overload Value	Overload Capacity at 0 ... + 40° C: Overload Duration
W, VAr, VA	1 mW	●		0.1 µW	V: 600 V mA: 0.36 A A: 10 A DC AC RMS Sine	V / mA: cont. 10 A: cont. 12 A: 5 min. 16 A: 30 s
	10 mW	●		1 mΩ		
	100 mW	●		10 mΩ		
	1 W	●		0.1 mW		
	10 W	●	●	1 mW		
	100 W	●	●	10 mW		
	1 kW	●	●	0.1 W		
	10 kW		●	1 W		

Intrinsic Error and Frequency Influence for Power and Energy Measurement with METRA HIT 29S

Measured Quantity	Measuring Range	Intrinsic Error (... % rdg. + ... d) 15 Hz ... 45 Hz	45 Hz ... 65 Hz	65 Hz ... 1 kHz
Active power	300 mA ... 10 A	1.3+20	1+20	3+20
Reactive power		2.5+20	1.5+20	3+20
Apparent power		1.2+20	1+20	1.2+20
Power factor	±(0.02 ... 1)	2+2	1+2	2+2
¼ hour power		1.2+20	1+20	1.3+20
Energy		1.2+2	1+2	1.3+2
Voltage		0.4+30	0.3+30	0.4+30
Current		0.7+30	0.6+30	0.9+30

Mains Monitoring with METRA HIT 29S

Type of Disturbance	Measuring Range	Resolution	Intrinsic Error under Reference Conditions	Disturbance Acquirable as of
Dropout*	300 V_{RMS}	4 V	5% rdg. + 5% of range	10 ms
	600 V_{RMS}	40 V	10% rdg. + 10% of range	
±Pulse *	200 ... 1000 V_S	10 V	50 V	0.5 ... 5 µs

* Adjustable trigger threshold

Influencing Quantities and Influence Error

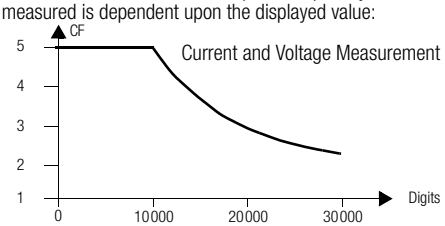
Influencing Qty.	Sphere of Influence	Measured Qty/Meas. Range [1]	Influence Error ppm/K
Temperature	0° C ... +21° C and +25° C ... +40° C	V ⎓	30
		V ∼	50
		300 µA ... 30 mA ⎓ + ≂	180
		300 mA ⎓ + ≂	290
		3 A / 10 A ⎓ + ≂	200
		300 Ω ... 300 kΩ	100
		3 MΩ	200
		30 MΩ	1000
		3 nF ... 30 µF	500
		Hz	50
		°C	100

Influencing Qty.	Sphere of Influence	Measured Qty/Meas. Range	Influence Error
Relative Humidity	75%, 3 days, instrument off	V, A, Ω, F, Hz, °C	1 x intrinsic error

Influencing Quantity	Frequency	Measured Qty. / Measuring Range	Influence Error [2] ±(% rdg. +... d)
Frequency V_{AC}	> 15 Hz ... 45 Hz	300.000 mV	2 + 10 d
	> 65 Hz ... 1 kHz		0.5
	> 1 kHz ... 10 kHz		1
	> 10 kHz ... 50 kHz		3
	> 50 kHz ... 100 kHz		10
	> 15 Hz ... 45 Hz	3.00000 V 30.0000 V 300.000 V	2 + 10 d
	> 65 Hz ... 1 kHz		0.5
	> 1 kHz ... 20 kHz		1.5
	> 20 kHz ... 100 kHz		5
	> 15 Hz ... 45 Hz	600.00 V	2 + 10 d
	> 65 Hz ... 1 kHz		1
	> 1 kHz ... 10 kHz		10
Frequency I_{AC}	> 15 Hz ... 45 Hz	300 µA ... 300 mA	2 + 10
	> 65 Hz ... 5 kHz		0.75 + 5
	> 5 kHz ... 10 kHz		5 + 5
	> 15 Hz ... 45 Hz	3 A	2 + 10
	> 65 Hz ... 1 kHz		29S: 0.75 + 5 / 28S: 2 + 5
	> 1 kHz ... 10 kHz		5 + 5
	> 15 Hz ... 45 Hz	10 A	2 + 10
	> 65 Hz ... 2 kHz		0.75 + 5
	> 2 kHz ... 10 kHz		5 + 5

Influencing Qty.	Sphere of Influence	Measured Qty./Meas. Range	Influence Error [3]
Measured Quantity Waveshape	Crest Factor CF 1 ... 3	V ∼, A ∼	±1% rdg.
	Crest Factor CF > 3 ... 5		±3% rdg.

Allowable crest factor CF of the periodic quantity to be measured is dependent upon the displayed value:



Influencing Qty.	Sphere of Influence	Measuring Range	Attenuation ± dB
Common Mode Interference Voltage	Interference quantity max. 600 V ∼	V ⎓	> 90 dB
	Interference quantity max. 600 V ∼ 50 Hz, 60 Hz sine	300 mV ... 30 V ∼	> 80 dB
		300 V ∼	> 70 dB
		600 V ∼	> 60 dB
Series Mode Interference Voltage	Interference quantity: V ∼, resp. nominal value of the measuring range, max. 600 V ∼, 50 Hz, 60 Hz sine	V ⎓	> 60 dB
	Interference quantity max. 600 V —	V ∼	> 60 dB

[1] With zero balancing
[2] Specified error valid as of display values of 10% of the measuring range
[3] Except for sinusoidal waveshape

Reference Conditions

Ambient Temperature	+23 °C ±2 K
Relative humidity	40 ... 60%
Measured qty. frequency	45 ... 65 Hz
Measured quantity waveshape	Sine
Battery voltage	3 V ±0.1 V
Adapter voltage	5 V ±0.2 V

Response Time (after manual range selection)

Measured Quantity / Measuring Range	Digital Display Response Time	Measured Quantity Jump Function
V ⎓ , V ∼, A ⎓ , A ∼	1.5 s	from 0 to 80% of upper range limit
300 Ω ... 3 MΩ	2 s	from ∞ to 50% of upper range limit
30 MΩ	5 s	
Continuity	< 50 ms	
⇻	1.5 s	
3 nF ... 300 µF	Max. 2 s	from 0 to 50% of upper range limit
3 000 µF	Max. 7 s	
30 000 µF	Max. 14 s	
>10 Hz	Max. 1.5 s	
°C	Max. 3 s	

Display

LCD panel (65 x 30 mm) with display of up to 3 measured values, unit of measure, type of current and various special functions.

Display / Char. Height	7-segment characters Main display: 12 mm Auxiliary displays: 7 mm
Number of places	5¾-place ≙ 309,999 steps
Overflow display	"OL" appears
Polarity display	"–" sign is displayed if plus pole is connected to "⊥"
Refresh rate	Same as sampling rate (see table), but not more than twice per second

Power Supply

Battery	2 ea. 1.5 V mignon cell (2 ea. size AA) Alkaline manganese per IEC LR6 Zinc-carbon battery per IEC R6
Service life	Alkaline manganese: approx. 100 hours Zinc-carbon: approx. 50 hours
Battery test	⊣ is displayed automatically if battery voltage drops to below approx. 2,3 V.
External supply	3.5 ... 5 V–, max. 35 mA, see accessories for suitable power pack

Electrical Safety

Safety class	II per EN 61010-1:2001/VDE 0411-1:2002	
Measuring category	III	IV
Operating voltage	600 V	300 V
Fouling factor	2	2
Test voltage	5.2 kV~ per IEC/EN 61010-1:2001/ VDE 0411-1:2002	

Fuses

Fuse links for ranges

Up to 300 mA	FF (UR) 1,6 A / 1000 V AC/DC, 6.3 x 32 mm, switching capacity: 10 kA at 1000 V, protects all current measuring ranges up to 300 mA in combination with power diodes
Up to 10 A	FF (UR) 10 A / 1000 V AC/DC, 10 x 38 mm, switching capacity: 30 kA at 1000 V, protects the 3 and 10 A ranges

Electromagnetic Compatibility (EMC)

Interference emission	EN 61326-1:2002 class B
Interference immunity	EN 61326:2002 IEC 61000-4-2:1995 + A1:1998 8 kV atmospheric discharge 4 kV contact discharge IEC 61000-4-3:1995 + A1:1998 3 V/m IEC 61000-4-4:1995 0.5 kV

Ambient Conditions

Operating temp.	–20° C ... +50° C
Storage temp.	–25° C ... +70° C (without batteries)
Relative humidity	Max. 75%, no condensation allowed
Elevation	to 2000 m

Mechanical Design

Housing	Impact resistant plastic (ABS)
Dimensions	84 x 195 x 35 mm
Weight	METRA HIT 28S: approx. 350 g with batteries METRA HIT 29S: approx. 405 g with batteries
Protection	Housing: IP 50 Extract from table on the meaning of IP codes

IP XY (1st digit X)	Protection against foreign object entry	IP XY (2nd digit Y)	Protection against the penetration of water
5	dust protected	0	not protected

Data Interface

Type	Optical via infrared light through the housing
Data transmission	Serial, bidirectional (not IrDa compatible)
Protocol	Device specific
Baud Rate	8192/9600 baud (selectable)
Functions	– Select / query measuring functions and parameters – Query / transmit current measurement data – Read out stored measurement data (29S only)

BD232, SI232-II and USB-Hit plug-in interface adapters allow for adaptation to common computer interfaces, namely RS 232 C and USB (see accessories).

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Accessories for operation at a PC

BD232 Interface Adapter

METRA HIT series 20 multimeters can be configured from a PC, and measured data can be transferred live to the PC with the help of the BD232 bidirectional adapter. The adapter has no memory of its own. It can be used to read out data from integrated memory in the METRA HIT 29S (22M and 26M). Up to 6 adapters can be cascaded for the creation of a multi-channel measuring system.

SI232-II Memory adapter

The SI232-II memory adapter, which can be plugged on to the handheld multimeters, includes all of the functions of the above mentioned BD232 adapter, and also allows for storage of measurement data without a PC, as well as subsequent transfer to a PC. Data are synchronized by means of the integrated clock and can be recalled at the adapter's display as well.

Measurement data recording is executed either:

- Time-controlled with an adjustable storage interval ranging from 50 ms (for V DC only) to 1 minute
- Dependent upon measured value in the event of exceeded limit/delta value
- As an individual measured value by pressing a key

Adapters can be cascaded (combination with the BD232 as well) in order to create a multi-channel system.

These adapters are also compatible with the older METRAHit 12S ... 18S multimeter range.

Memory Capacity:
128 kB *(corresponds to roughly 60,000...120,000 measured values, depending upon measuring function and measured value dynamics)*

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

USB-Hit Interface Adapter

This adapter is functionally identical to the BD232 interface adapter, although bidirectional transmission takes place between the IR and the USB interface in this case.

It is not possible to set up a multi-channel system with this adpater.

SoftwareMETRAwin®10/METRA*Hit*®

METRAwin®10/METRA*Hit*® PC software is a multilingual data logging program for recording, visualizing, evaluating and documenting measured values acquired with METRA HIT multimeters.

Communications between the PC and the measuring instrument(s) is established via available interfaces and memory adapters. Telephone modems can be interconnected as well.

Depending upon device type, one or several of the following operating modes are possible:

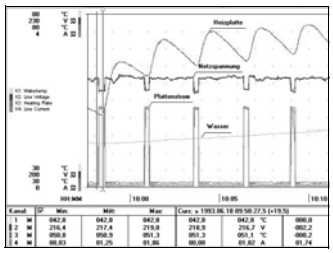
- **Device Configuration**
  Remote configuration and querying of device-specific functions and parameters, for example measuring function, measuring range and memory parameters. Frequently used device settings can be saved to configuration files for easy recall.
- **Online Recording of Measurement Data**
  Read-in, display and recording of current measurement data from the interconnected device
  – Measuring channels Up to 10
  – Start recording Manual, triggered by measured value, time triggered
  – Recording mode > Time controlled with sampling interval of 0.05 s* ... 1 s ... 60 min.
  > Manually controlled
  > Measured-value controlled in the event of exceeded limit/delta value
  – Recording duration Max. 10 million intervals

* Depending upon device type, measuring function, number of measuring channels and communication mode (e.g. via modem), sampling intervals of less than 1 second cannot be used.

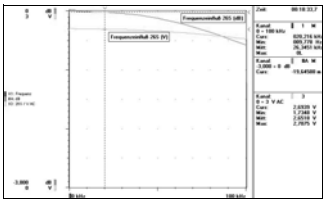
- **Reading Out and Visualizing Stored Data**
  If supported by the device: read-in and display of offline data recorded to device memory

For purposes of analysis, data recorded online or read in from the device's memory can be displayed in various formats:

Y(t) Recorder Display for Up to 6 Channels

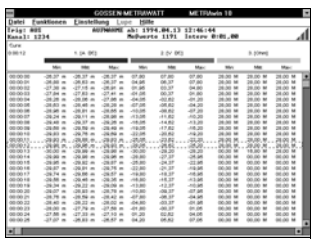


XY Recorder Display for Up to 4 Channels



Multimeter Display for Up to 4 Channels

Tabular Display for Up to 10 Channels



System Requirements

METRAwin 10 (version 5.x) can be run on IBM compatible PCs with Microsoft Windows® 95, 98, ME, NT 4.0, 2000 or XP.

METRA HIT 28S and 29S
Precision Digital Multimeters, Power Meters

Accessories

METRA HIT EMA1 – Energy Measuring Adapter for Ferraris Meters

A METRA HIT 29S can be connected to a Ferraris meter via the EMA1 for 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 can be analyzed as a characteristic load profile with METRAwin®10/ METRA*Hit*® software.

HitBag Cordura Belt Pouch

For METRA HIT series multimeters (with/without protective rubber cover) and METRAport

HC20 Hard Case

For multimeters (with/without GH18 protective rubber cover) and accessories

NA5/600 Mains Power Pack

Output:

5 V–, max. 600 mA, linear controlled with minimal residual ripple and coupling capacitance to the mains input, highly insulated (CAT III/600 V)

Input:

230 V~ ±10%, 50/60 Hz

We recommend our power pack in combination with a commercially available mains adapter for Euro plugs for countries with line voltage ranging from 220 to 240 V, but with other mains plugs.

PMA16 Power Measuring Adapter

The adapter is used for safe, trouble-free measurement of current consumption (up to 16 A) at earthing contact plugs, as well as for connecting the voltage path to the METRA HIT 29S for power measurement.

Order Information

Designation	Type	Article Number
Precision digital multimeter including KS17 cable set, battery, GH18 and DKD calibration certificate	METRA HIT 28S	M228A
Precision digital multimeter and power meter including KS29 cable set, battery, GH18 and DKD calibration certificate	METRA HIT 29S	M229A
Power pack, 230 V~/5 V–, 600 mA	NA5/600	Z218F
Accessories for Operation at a PC		
Single-channel pack consisting of BD232 bidirectional interface adapter, cable and METRAwin®10/METRA*Hit*® software	BD-Pack 1 [2]	Z215A
Single-channel memory pack consisting of SI232-II memory adapter, cable and METRAwin®10/METRA*Hit*® software	1-CH. Pack II [1]	GTZ 3231 020 R0001
4-channel memory pack consisting of 4 SI232-II memory adapters, cable and METRAwin®10/METRA*Hit*® software	4-CH. Pack II [1]	GTZ 3234 020 R0001
Memory adapter for METRA HIT	SI232-II	GTZ 3242 020 R0001
Bidirectional interface adapter	BD232 [2]	GTZ 3242 100 R0001
RS 232 interface cable, 2 m	Z3241	GTZ 3241 000 R0001
METRAwin®10 software update	Z3240	GTZ 3240 000 R0001
IR-USB bidirectional interface adapter for METRA HITs	USB-Hit	Z216A
Accessories for Voltage, Energy and Temperature Measurement		
Probe for voltage measurement in power installations to 1000 V	KS30	GTZ 3204 000 R0001
High-voltage probe, 3 kV/3 V	HV3	GTZ 3431 011 R0001
High-voltage probe, 30 kV/30 V (for direct voltage only)	HV30	GTZ 3431 001 R0001
Power measuring adapter	PMA16 [D]	Z228A
Energy meas. adapter for Ferraris meters	EMA1 [D]	Z112A
Pt100 temperature sensor for surface and immersion measurement, –40 ... +600° C	Z3409	GTZ 3409 000 R0001
Pt1000 temperature sensor for measurement in gases and liquids, –50 ... +220° C	TF220	Z102A
Pt100 oven sensor, –50 ... +550° C	TF550	GTZ 3408 000 R0001
Ten adhesive Pt100 temperature sensors, –50 ... +550° C.	TS Chipset	GTZ 3406 000 R0001
Replacement Parts		
Fuses (pack of 10)	FF (UR) 1.6 A / 1000 V AC/DC	GTY 3578 136 P0001
Fuses (pack of 10)	FF (UR) 10 A / 1000 V AC/DC	Z109L
Replacement safety cable set for 28S	KS17-2	GTY 3620 034 P0002
Replacement cable set for power meters	KS29	Z229A
Transport Accessories		
Imitation leather carrying pouch for METRA HIT	F829	GTZ 3301 000 R0003
Cordura belt pouch for METRA HIT series multimeters and METRAport	HitBag	Z115A
Imitation leather ever-ready case with cable compartment	F836	GTZ 3302 000 R0001
Ever-ready case for 2 METRA HITs, 2 adapters and accessories	F840	GTZ 3302 001 R0001
Hard case for one METRA HIT and accessories	HC20	Z113A
Hard case for two METRA HITS and accessories	HC30	Z113A

[1] For METRA HIT 28S (with limited functionality)
[2] For METRA HIT 29S, highly recommended
[D] Data sheet available

METRA HIT 28S and 29S
Precision Digital Multimeters, Power Meters

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**	**Meas. Category**	**Max. Wire Dia.**	**Transformation Ratio**	**Frequency Range**	**Intrinsic Error ±(% rdg. + ...)**	**Article Number**	**22S/M 27M/I**	**23..26S/M 28S/29S**
AC/DC Current Sensors with Voltage Output										
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	●	●
AC Current Sensors with Voltage Output										
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	Amp*FLEX* 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	Amp*FLEX* 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	Amp*FLEX* 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	Amp*FLEX* 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	▲	■
AC Current Transformers 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	—	●
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	—	●
Shunt Resistors for Multimeters without Current Measuring Function										
NW300mA	Plug-in shunt resistor, encapsulated	0 ... 300 mA	300 V / CAT III	—	1 mV/mA	DC ...10 kHz	0.5%	Z205C	▲	—
NW3A	Plug-in shunt resistor, encapsulated	0 ... 3 A	300 V / CAT III	—	100 mV/A	DC ...10 kHz	0.5%	Z205B	▲	—

● Without restriction ■ Not for power measurement with METRA HIT 29S ▲ Not for METRA HIT 27M/I

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