

METRAHit[®] 28S and 29S

Precision Digital Multimeter, Power Meter

Features

- Precision multimeter (V, dB, A, Ω , F, Hz, °C)
- Power meter (W, Var, VA, Wh, PF: METRAHit 29S only)
- Triple display for simultaneous indication of 3 measurement values
- Large, 128 kB measurement value memory (METRAHit 29S only)
- DKD calibration certificate provided
- Accessory Windows software for measurement value processing and calibration via RS232 interface

Applications

METRAHit 28S and 29S multimeters are high performance precision instruments for the lab, service and training. With a display range of 300,000 digits as well high level accuracy and long-term stability, they fulfill all calibration and R&D laboratory demands. Battery operation allows for on-site precision servicing and calibration.

Description

Convenient Triple Display

The current measurement value, as well as two other values, are updated and displayed, e.g. minimum and maximum value. The usual switching back and forth between display values is no longer necessary. *Display resolution* for the main display value can be varied from 4 $\frac{3}{4}$ places for AC to 5 $\frac{3}{4}$ places for DC (29S: from 2 $\frac{3}{4}$ to 5 $\frac{3}{4}$ places). The *measurement rate*, adjustable from 1 ms to 0.5 s, allows for high-speed recorder, precision data logger and mean value recorder functions with the help of METRAWin (optional PC software).

High Resolution and Precision

5 $\frac{3}{4}$ places, or 309,999 digits, allow for cost effective calibration and precise reference measurements.

Effective Value for Distorted Waveforms

The implemented measurement process provides for effective value measurement (TRMS) independent of the waveform up to 100 kHz.

AUTO-SELECT

Provides for automatic selection of the measurement function (V, Ω and F), as well as automatic setting of the measuring range.

Additional Functions

Continuity testing with acoustic signal, event counting, event duration measurement, overall time, stopwatch, data compare and wide-range capacitance measurement. The integrated temperature measurement function allows for the connection of thermocouples and platinum resistance thermometers.

Overload Protection

The instrument is protected from overload in the voltage range. Acoustic signalling occurs if measuring range limits are exceeded. The FUSE display indicates a defective fuse in the current range.

Calibration

METRAHit 28S and 29S multimeters are shipped with a DKD calibration certificate. They can be automatically calibrated with the CS91 calibration system via the RS232 data interface.

Power Pack and Sensor Connection

The connector terminal for power supply via mains power pack can be used alternately for multimeter power supply or for the output of pressure sensor auxiliary power (accessory for METRAHit 29S).



Automatically Blocking System (ABS) *

Automatic blocking of connector sockets prevents incorrect connection of measurement cables, and selection of incorrect measurement magnitudes. Thus hazards for the operator, the instrument and the system are substantially reduced, and in many cases entirely eliminated.

Automatic Measurement Value Storage *

The DATA HOLD function allows for storage of the digitally displayed measurement value. A patented process assures that the actual measurement value, and not random values, are stored when rapid measurement magnitude changes occur. The stored measurement value appears at the digital display.

Infrared Measurement Data Transmission *

These devices include a serial, duplex data interface for remote control and measurement value transmission via infrared light.

Additional Functions, METRAHit 29S

Power Measurement

The METRAHit 29S is a compact high performance measurement instrument for direct and alternating current for single and three-phase current measurements. The current path can be connected directly, or with a clip-on current transformer. The transfer ratio can also be adjusted for transformers with a voltage output. Universal power measurement is possible for the following measuring functions: active, reactive, and apparent power, power factor and energy.

Memory Mode

The instrument includes a quartz-movement synchronized measurement value memory (128 kB), which has room for 13,000 to 60,000 measurement values, depending upon settings. Data can be stored to intermediate memory, or transmitted directly to the PC. Data are acquired by the system relative to real-time. This also allows for use as a real-time data logger.

Line Fault Analysis

Power meter continuously monitors mains voltage and line faults.

* Protected by patent

METRAHit 28S and 29S

Precision Digital Multimeter, Power Meter

METRAHit 28S and 29S Characteristic Values

Meas. Function	Measuring Range	Resolution at Measuring Range Upper Limit				Input Impedance		Inherent Deviation at highest resolution under reference conditions		Overload Capacity ⁷⁾		Meas. Function
		±(...% of rdg. + ...% of r. + ... d)	±(...% of r. + ... d)	Overload Value	Overload Duration							
		300 000 ¹⁾	30 000 ¹⁾			3 000 ¹⁾	300 ¹⁾	—	∞ ⁸⁾			
V ²⁾	300 mV ³⁾	1 μV	10 μV	100 μV	1 mV	> 20 MΩ	5 MΩ // < 50 pF	0.02 + 0.005 + 5	0.5 + 30	1050 V DC AC eff. sine	continuous	V
	3 V ³⁾	10 μV	100 μV	1 mV	10 mV	11 MΩ	5 MΩ // < 50 pF	0.02 + 0.005 + 5	0.2 + 30			
	30 V	100 μV	1 mV	10 mV	100 mV	10 MΩ	5 MΩ // < 50 pF	0.02 + 0.005 + 5	0.2 + 30			
	300 V	1 mV	10 mV	100 mV	1 V	10 MΩ	5 MΩ // < 50 pF	0.02 + 0.005 + 5	0.2 + 30			
	1000 V	10 mV	100 mV	1 V	10 V	10 MΩ	5 MΩ // < 50 pF	0.02 + 0.005 + 5	0.2 + 30			
dB	see table below				—	same as V ∞ ⁸⁾	—	± 0.1 dB ¹⁴⁾			dB	
						Voltage Drop, approx. for upper range limit B						
A ²⁾	300 μA	1 nA	10 nA	100 nA	1 μA	160 mV	160 mV	0.05 + 0.02 + 5	0.5 + 30	0.36 A	continuous	A
	3 mA	10 nA	100 nA	1 μA	10 μA	160 mV	160 mV	0.05 + 0.01 + 5	0.5 + 30			
	20 mA 30 mA	100 nA	1 μA	10 μA	100 μA	200 mV	200 mV	0.02 + 0.01 + 5	0.5 + 30			
	300 mA	1 μA	10 μA	100 μA	1 mA	350 mV	300 mV	0.05 + 0.01 + 5	0.5 + 30			
	3 A		100 μA	1 mA	10 mA	150 mV	110 mV	0.1 + 0.01 + 5	0.5 + 30			
	10 A		1 mA	10 mA	100 mA	400 mV	350 mV	0.2 + 0.05 + 5	0.5 + 30			
Ω	300 Ω	1 mΩ	10 mΩ			Open-Circuit Voltage	Short-Circuit Current	±(...% of rdg. + ...% of r. + ... d)		500 V DC AC eff. sine	10 min	Ω
	3 kΩ	10 mΩ	100 mΩ			0.6 V	max. 250 μA	0.05 + 0.01 + 5 ¹⁰⁾				
	30 kΩ	100 mΩ	1 Ω			0.6 V	max. 45 μA	0.05 + 0.01 + 5 ¹⁰⁾				
	300 kΩ	1 Ω	10 Ω			0.6 V	max. 4.5 μA	0.05 + 0.01 + 5				
	3 MΩ	10 Ω	100 Ω			0.6 V	max. 1.5 μA	0.05 + 0.02 + 5				
	30 MΩ	100 Ω	1 kΩ			0.6 V	max. 150 nA	0.1 + 0.02 + 5				
Ω ⁴⁾	300 Ω			0.1 Ω	max. 3 V	max. 1.4 mA	0.2 + 0 + 3		500 V DC AC eff. sine	10 min	Ω ⁴⁾	
→ ⁴⁾	300 mV			100 μV	max. 3 V	max. 1.4 mA	0.2 + 0 + 3					
→	3 V-			100 μV	max. 3 V	max. 1.4 mA	0.2 + 0 + 3					
F	3 nF			1 pF	Discharge Resistance		U _{0max}	±(...% of rdg. + ...% of r)		500 V DC AC eff. sine	10 min	F
	30 nF			10 pF	10 MΩ	3 V	1.0 + 0.2 ¹⁰⁾					
	300 nF			100 pF	10 MΩ	3 V	1.0 + 0.2					
	3 μF			1 nF	1 MΩ	3 V	1.0 + 0.2					
	30 μF			10 nF	100 kΩ	3 V	1.0 + 0.2					
	300 μF			100 nF	11 kΩ	3 V	1.0 + 0.2					
	3000 mF			1 μF	2 kΩ	3 V	5.0 + 1					
	30000 mF			1 μF	2 kΩ	3 V	5.0 + 1					
					2 kΩ	3 V	5.0 + 1					
					2 kΩ	3 V	5.0 + 1					
Hz	300.000 Hz		0.001 Hz		f _{min} ⁶⁾		±(...% of rdg. + ... Hz)		1000 V	continuous	Hz	
	3.00000kHz		0.01 Hz		1 Hz		0.05 + 0.001 ¹¹⁾					
	300.000kHz		1 Hz		1 Hz		0.05 + 0.01 ¹¹⁾					
⌚	100 min ⁴⁾		10 ms				± 15 D		1000 V		⌚	
°C/°F	Pt 100	-200.0 ... +100.0 °C		0.1 °C			±(...% of rdg. + ... d)		500 V DC eff. sine	10 min	°C/°F	
	Pt 1000 ⁵⁾	+100.0 ... +850.0 °C		0.1 °C			0.5 K + 3 ¹²⁾					
	K	-270.0 ... +1372.0 °C		0.1 °C			0.2% + 3 ¹²⁾					
	NiCr-Ni	-270.0 ... +1372.0 °C		0.1 °C			0.7 + 3 ^{12, 13)}					
	J	-210.0 ... +1200.0 °C		0.1 °C			0.8 + 3 ^{12, 13)}					

dB Ranges

Measuring Range	Display Range at Reference Voltage U _{REF} = 0.775 V	Resolution
300 mV ~	-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
1000 V ~	+22 dB ... +63 dB	0.01 dB
	Display (dB) = 20 lg U _x (V) / U _{REF}	

Key

rdg. = measurement value
r. = measuring range
d. = digit

- METRAHit 28S: 5% places for DC, and 4% places for AC, METRAHit 29S: 2% to 5% places
- Sampling rate depends upon resolution: 0.5 s/50 ms/5 ms/1 ms (without filter); filter ON: -3 dB @ 3 Hz
- Also applies to mA input, if METRAHit 29S parameters have been set for use with current/voltage transformer
- Stopwatch: format: mm:ss:hh where m=minute, s=second and h=hundredth second, max.: 99:59:59
- METRAHit 29S only
- lowest measurable frequency with sinusoidal measurement signal symmetric to zero point
- at 0 ° ... + 40 °C
- Values < 300 digits are suppressed, 16 ... 45 ... 65 Hz ... 100 kHz sine. See page 3 for influences.
- 12 A - 5 min, 16 A - 30 s
- With "Zero Balancing" function active (cable compensation)
- Range
 - 3 V ∞: U_E = 0.3 V_{eff/rms} ... 3 V_{eff/rms}
 - 30 V ∞: U_E = 3 V_{eff/rms} ... 30 V_{eff/rms}
 - 300 V ∞: U_E = 30 V_{eff/rms} ... 300 V_{eff/rms}
- Plus sensor deviation
- Without integrated reference junction; inherent deviation: +10 d for T < 0 °C or +5 d for T > 0 °C
- 14 for U > 10% of the measuring range

METRAHit® 28S and 29S Precision Digital Multimeter, Power Meter

Power Measurements with METRAHit 29S

Meas. Function	Measuring Range	Selector Switch Position		Resolution at Measuring Range Upper Limit	Overload Capacity at 0 ... +40 °C	
		mA	A	10 000	Overload Value	Overload Duration
W, Var, VA	1 mW	●		0.1 μW	V: 1050 V mA: 0.36 A A: 10 A DC AC eff sine	V / mA: continuous A: 5 min
	10 mW	●		1 μW		
	100 mW	●		10 μW		
	1 W	●		0.1 mW		
	10 W	●	●	1 mW		
	100 W	●	●	10 mW		
	1 kW	●	●	0.1 W		
	10 kW	●	●	1 W		

System Monitoring with METRAHit 29S

Interference Type	Meas. Function/Measuring Range	Resolution	Inherent Deviation at Max. Resolution under Reference Conditions	Pulse Duration
High speed peaks	300 V	4 V	5% rdg. + 5% range	> 2 ms
	1000 V	40 V	10% rdg. + 10% range	
Pulse	200 ... 1000 V	10 V	50 V	0.5 ... 5 μs

Real-Time Clock

Accuracy ±1 min/month
Temperature Effect 50 ppm/K

Inherent Deviation and Frequency Influence for Power and Energy Measurements with METRAHit 29S

Measurement Magnitude	Inherent Deviation (... % of rdg. + ... d)		
	15 Hz ... 45 Hz	45 Hz ... 65 Hz	65 Hz ... 1 kHz
Frequency range	15 Hz ... 45 Hz	45 Hz ... 65 Hz	65 Hz ... 1 kHz
Active power	0.4 + 20	0.2 + 20	0.5 + 20
Reactive power	2 + 20	1 + 20	2 + 20
Apparent power	0.4 + 20	0.2 + 20	0.4 + 20
Power factor	2 + 2	1 + 2	2 + 2
¼ hr. power	0.4 + 20	0.2 + 20	0.5 + 20
Energy	0.4 + 2	0.2 + 2	0.5 + 2

AUTO SELECT

Automatic Measurement Magnitude Recognition

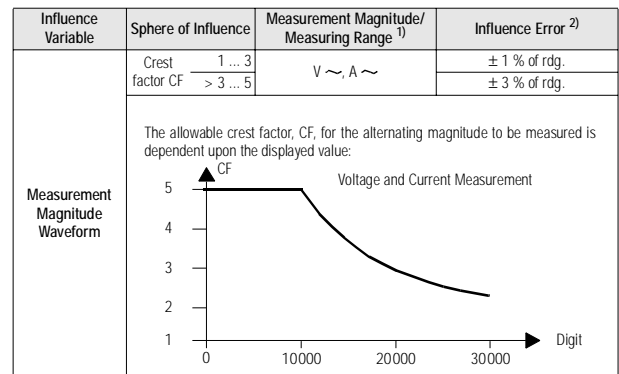
Meas. Magnitude	Measuring Range for Recognition	Condition	Recognition Time
Voltage V \equiv	$V_{eff} > 0.81 V \dots 1000 V$	—	1 s
Voltage V \sim	$V_{eff} > 1 V \dots 1000 V$	frequency > 20 Hz	1 s
Resistance	$0 \Omega \dots 15 M\Omega$	—	1 s
Capacitance	$> 1.5 nF \dots 300 \mu F$	Electrolytic capacitor must be correctly connected.	1 s
Diode	voltage in forward direction: max. 1 V	Diode must be correctly connected: anode to \rightarrow	1 s

Influence Variables and Errors

Influence Variable	Sphere of Influence	Measurement Magnitude/Measuring Range ¹⁾	Influence Error ppm/K
Temperature	0 °C ... +21 °C and +25 °C ... +40 °C	V \equiv	30
		V \sim	50
		300 μA ... 30 mA \equiv + \sim	180
		300 mA \equiv + \sim	290
		3 A / 10 A \equiv + \sim	200
		300 Ω ... 300 kΩ	100
		3 MΩ	200
		30 MΩ	1000
		3 nF ... 30 μF	500
		Hz	50
°C	100		

Influence Variable	Sphere of Influence (max. resolution)	Frequency	Inherent Deviation ³⁾ ± ... % of rdg.
Frequency V_{AC}	300.000 mV	> 15 Hz ... 45 Hz	2 + 10 d
		> 65 Hz ... 1 kHz	0.5
		> 1 kHz ... 20 kHz	1.5
		> 20 kHz ... 50 kHz	2
		> 50 kHz ... 100kHz	5
	3.00000 V 30.0000 V 300.000 V	> 15 Hz ... 45 Hz	2 + 10 d
		> 65 Hz ... 1 kHz	0.5
		> 1 kHz ... 20 kHz	1.5
		> 20 kHz ... 50 kHz	2
		> 50 kHz ... 100kHz	2
1000.00 V	> 15 Hz ... 45 Hz	2 + 10 d	
	> 65 Hz ... 1 kHz	1	
	> 1 kHz ... 10 kHz	10	

Influence Variable	Sphere of Influence (max. resolution)	Frequency	Inherent Deviation ± (... % of rdg. + ... d)
Frequency I_{AC}	300.00 μA 3.0000 mA 30.000 mA 300.00 mA 3.0000 A 10.000 A	> 15 Hz ... 45 Hz	2 + 10
		> 65 Hz ... 200 Hz	0.75 + 5
		> 200 Hz ... 5 kHz	0.75 + 5
		> 5 kHz ... 20 kHz	5 + 5



Influence Variable	Sphere of Influence	Measurement Magnitude/Measuring Range ¹⁾	Influence Error
Relative Humidity	75 %	V, A, Ω F, Hz °C	1 x inherent deviation
	3 days		
	instrument OFF		

Influence Variable	Sphere of Influence	Meas. Range	Damping ±dB
Common Mode Interference Voltage	Interference magnitude max. 1000 V \sim 50 Hz, 60 Hz sine	V \equiv	> 90 dB
		300 mV ... 30 V \sim	> 80 dB
		300 V \sim	> 70 dB
		1000 V \sim	> 60 dB
Series Mode Interference Voltage	Interference magnitude V \sim , per nominal measuring range value, max. 1000 V \sim , 50 Hz, 60 Hz sine	V \equiv	> 60 dB
		V \sim	> 60 dB

1) With zero balancing
2) Except for sinusoidal waveforms
3) Indicated error applies as of display of 10% of measurement value

METRAHit[®] 28S and 29S

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Reference Conditions

Ambient Temperature	+ 23 °C ± 2 K
Relative Humidity	45 ... 55 %
Meas. Magnitude	
Frequency	45 ... 65 Hz
Meas. Magnitude	
Waveform	sine
Battery Voltage	3 V ± 0.1 V
Power Pack Voltage	4.2 V ± 0.2 V

Applicable Regulations and Standards

IEC 1010-1 DIN EN 61010 Part 1 VDE 0411-1	Safety regulations for electrical measurement, control, regulating and laboratory devices
DIN 43751	Digital measuring instruments
DIN EN 50081 Part 1	Generic standard for interference emission; residential, business and light industry
DIN EN 50082 Part 1	Generic standard for interference immunity; residential, business and light industry
VDI/VDE 3540	Reliability of measurement, control and regulating devices
DIN EN 60529 DIN VDE 0470 Part 1	Test instruments and procedures – level of protection provided by enclosures (IP code)

Response Time

Response Time (after manual range selection)

Meas. Magnitude/ Measuring Range	Digital Display Response Time	Meas. Magnitude Step Function
V $\overline{\sim}$, V \sim A $\overline{\sim}$, A \sim	1.5 s	from 0 to 80 % of measuring range upper limit
300 Ω ... 3 M Ω	2 s	from ∞ to 50 % of measuring range upper limit
30 M Ω	5 s	
Continuity	< 50 ms	
\rightarrow	1.5 s	from 0 to 50 % of measuring range upper limit
3 nF ... 300 μ F	max. 2 s	
3 000 μ F	max. 7 s	
30 000 μ F	max. 14 s	
>10 Hz	max. 1.5 s	
°C	max. 3 s	

Power Supply

Battery	2 ea. 1.5 V mignon cell zinc carbon battery per IEC R6 alkali manganese cell per IEC LR6
Service Life	with zinc carbon battery: approx. 50 hr. with alkali manganese cell: prox. 100 hr.
Battery Test	automatic display of " \rightarrow ", symbol when battery voltage drops below approx. 2.3 V

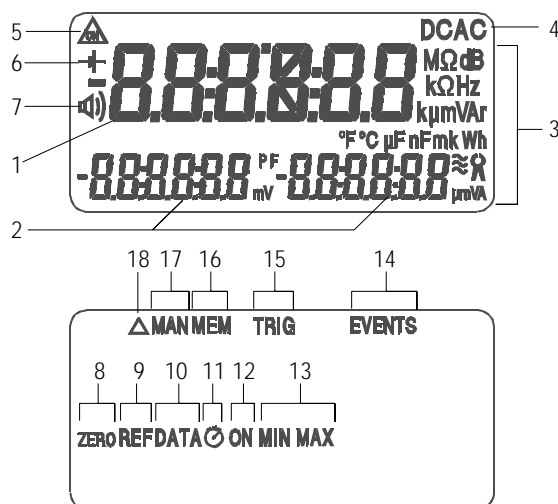
Economy Circuit

The instrument is switched off automatically, if the measurement value remains unchanged for about 10 minutes, and no activation of operating elements occurs during this time. This function can be deactivated.

Display

LCD display field (65 mm x 30 mm) with display of max. 3 measurement values, unit of measure, current type and various special functions.

Display /	
Character Height	7 segment characters main display: 12 mm auxiliary displays: 7 mm
Number of Places	5 $\frac{3}{4}$ places \cong 309999 steps
Overflow Display	"OL" appears in display
Polarity Display	"-" sign is displayed when plus pole is connected to "⊥" jack
Defective Fuse	"FUSE" appears in display
Refresh Display	0.5/s ... 2/s depending upon measure- ment type (except for capacitance)



METRAHit 28S and 29S Display

Digital Display Symbols

- Main display with decimal point and polarity display
- Auxiliary displays with decimal point and polarity display
- Unit of measure
- Selected current type
- Continuous operation, symbol blinks for data transmission
- Low battery
- Acoustic signal on, buzzer sounds for corresponding function
- Zero balancing
- Reference value
- Display memory, "save measurement value"
- Stopwatch on, or elapsed time since start of measurement
- Together with symbol 11:
Elapsed time since activation of corresponding function, counter,
number of events if trigger threshold is exceeded
- MIN/MAX storage
- Event duration
- Synchronized storage, METRAHit 29S only
- Memory mode, METRAHit 29S only
- Manual measuring range selection
- Relative value

METRAHit® 28S and 29S

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Fusing

Fuse for ranges <i>up to 300 mA</i>	FF 1.6 / 500 G; 6.3 mm x 32 mm; 20 kA switching capacity at 500 V ~ with resistive load; protects all current measuring ranges up to 300 mA in combination with power diodes
<i>up to 10 A</i>	16 A / 600 V; 10 mm x 38 mm; 100 kA switching capacity at 600 V ~ with resistive load; protects 3 A and 10 A ranges at up to 600 V

Electrical Safety

Protection Class	II per IEC 61010-1/EN 61010-1/ VDE 0411-1	
Overvoltage Category	II	III
Operating Voltage	1000 V	600 V
Contamination Level	2	2
Test Voltage	5.55 kV~ per IEC 61010-1/EN 61010-1/ VDE 0411-1	

Electromagnetic Compatibility, EMC

Interference Emission	EN 50081-1:1992 / EN 55022:1987 Class B
Interference Immunity	EN 50082-1:1992 / / IEC 801-2:1991 8 kV atmospheric discharge / / IEC 801-3:1984 3 V/m / / IEC 801-4:1988 0.5 kV

Data Interface

Data Transmission	Optical transmission through housing with infrared light
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With accessory interface adapter

Type	RS232C, serial, per DIN 19241
Baud Rate	Z3242: 9600 baud, SI232: 8192 baud, BD232: 9600 baud

Ambient Conditions

Operating Temperature Range	-20 °C ... +50 °C
Storage Temperature Range	-25 °C ... +70 °C (without batteries)
Relative Humidity	max. 75%, without condensation
Climatic Category	2z/-20/50/70/75% in compliance with VDI/VDE 3540
Elevation	to 2000 m

Mechanical Design

Protection	Devices: IP 50 Connector jacks: IP 20
Dimensions	84 mm x 195 mm x 35 mm
Weight	METRAHit 28S: approximately 350 gr. with batteries METRAHit 29S: approximately 405 gr. with batteries

Included Equipment

- Multimeter
- Protective case for operation under adverse conditions.
A cover made of pliable rubber including support bar protects the device from damage due to impacts and falls. The rubber material assures a secure stance for the instrument even on vibrating surfaces.
- KS17 cable set
- Batteries
- Operating Instructions
- DKD calibration certificate

Guarantee

- 3 years material and workmanship
- 1 year for calibration

Accessories

Ever-ready Case F836

for multimeters (without protective rubber cover) and accessories



Carrying Case F829
for multimeters
(with or without protective
rubber cover GH18)
or accessories



Interface Adapter, METRAHit[®]S as Multiple Measuring System

Adapter for the connection of the multimeter to a PC

Whereas the METRAHit 28S can be expanded with the SI232 memory adapter for memory mode operation and connection to the PC, the METRAHit 29S includes an integrated memory and only requires an interface adapter for PC connection. Both devices can be connected to the PC with either SI232, RS232 or BD232 adapters.

SI232 Memory Adapter

The METRAHit SI232 memory adapter, which can be plugged on to hand-held METRAHit S multimeters, provides for direct transmission of measurement data from a METRAHit S to the PC, as well as on-site measurement data storage without PC, and subsequent uploading to the PC. Data are synchronized with an integrated clock.

Memory: 128 kB (equal to about 100,000 measurement values)

Sampling

With a selected sampling rate of max. 0.5 s, an arithmetic mean value is ascertained for measurement values which are transmitted at a clock pulse of 50 ms. Within a range of 1 s to 60 s, the signal sampling duration remains at a constant 0.5 s (10 measurement values). Thanks to the integrated stand-by circuit, the memory module enters the "dormant mode" for the remaining duration of the sampling cycle after acquisition has occurred, and thus spares the battery. Signal acquisition is thus interrupted during the rest cycle. The functional principle is the same as for a dot matrix printer.

Sampling is based on the selected signal hysteresis, and is signal-dependent. This sampling method results in a virtual memory expansion, which is independent of measurement signal dynamics and selected signal hysteresis. This allows for a manifold expansion of memory capacity (10- ... 100-fold).

Adjustable Sampling Rate 50 ms ... 1 min

Sampling Period	Operating Life (battery service life)
0.05 ... 0.5 s	> 30 days
10 s	9 months
20 s	12 months
60 s	18 months

Trigger (on-line)

The on-line trigger functions are quite varied and enable effective data reduction. They are triggered when lower or upper limit threshold values are exceeded. The following functions are available for data reduction:

- Trigger when lower/upper threshold limits are exceeded
- Trigger within lower/upper threshold limits
- Store when lower/upper threshold limits are exceeded
- Store within lower/upper threshold limits

The trigger function can also be triggered by date and time.

An "automatic restart" function allows for the storage of up to 1000 trigger data files to the PC hard disc.

Multiple Measurement System Set-Up (on-line and off-line)

Up to 6 METRAHit SI232 adapters can be interconnected for the set-up of an on-line, high performance multiple measuring system, which are connected to a PC with a standard interface cable (RS232C), or up to ten adapters for off-line operation.

Each adapter can be manually equipped with a specific destination address.

BD232 Interface Adapter (for METRAHit 29S)

With the help of the BD232 bidirectional adapter, METRAHit 28S and 29S multimeters can be adjusted and their parameters can be set, and measurement data can be transmitted to the PC. This adapter includes no memory.

RS232 Interface Adapter

This interface adapter, which can be plugged on to hand-held METRAHit S multimeters, allows for the transmission of measurement data to the PC (single channel pack). The adapter includes no memory and does not provide for the interconnection of two or more multimeters with one another.

Interface Packs

An interface pack is capable of connecting one or more METRAHit S multimeters to a PC. It includes all hardware and software required for the set-up of a PC measuring system.

Single Channel Memory Pack

- 1 METRAHit SI232 Memory Adapter
- 1 RS232 bus cable, 2 m long
- 1 METRAwin10 program floppy disc, 3½", 1.44 Mbyte
- 1 METRAwin 10/METRAHit installation instructions

Four Channel Memory Pack

- 4 METRAHit SI232 Memory Adapter
- 1 RS232 bus cable, 2 m long
- 1 METRAwin10 program floppy disc, 3½", 1.44 Mbyte
- 1 METRAwin 10/METRAHit installation instructions

Type Z3231 Single Channel Pack

- 1 RS232 Interface Adapter
- 1 RS232 bus cable, 2 m long
- 1 METRAwin10 program floppy disc, 3½", 1.44 Mbyte
- 1 METRAwin 10/METRAHit installation instructions



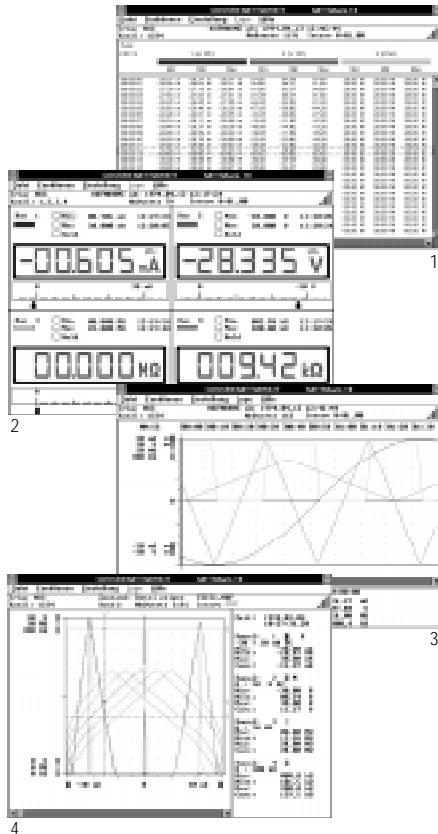
4 METRAHit S digital multimeters, connected to one another via SI 232 memory adapters, result in a multiple measuring system in combination with a PC and METRAwin 10/METRAHit software.

The measurement values are electrically isolated with the fully enclosed METRAHit Housing, and are transmitted via infrared light to the RS232 interface adapter or SI 232 memory adapter. Connection to the PC is made with a serial interface cable.

METRAWin 10/METRAHit Software

METRAWin 10/METRAHit Software

METRAWin 10/METRAHit software (runs under WINDOWS 3.11 or higher) provides for the processing and representation of measurement data at the PC. Sampling in the on-line mode can be accomplished manually with the adjustable sampling interval, or signal dependent (with adjustable signal hysteresis). Storage in ASCII format is controlled with two trigger thresholds per channel, as well as via system time.



Data Logger (1)

Acquired measurement data from as many as 10 channels are numerically represented at the monitor in concise tabular form.

Multimeter (2)

Transmitted measurement data from a maximum of 4 freely selectable channels are represented at the monitor in the on-line mode in digital form.

Y(t) Recorder (3)

Acquired measurement data from up to 4 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 time axis. The time scale can be represented in absolute time, or relative to measuring time.

XY Recorder (4)

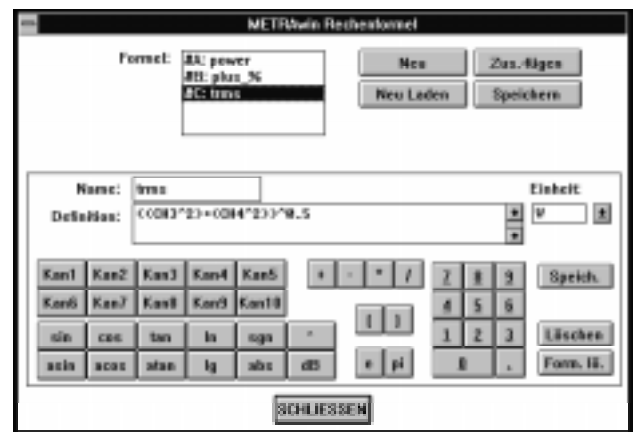
Acquired measurement data from two to four freely selectable channels are represented at the monitor as an XY graph, and are delineated with the cursor. As is the case in all display formats, all scales are freely adjustable.

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 trigger windows, and automatically stored as multiple data files.

Measurement Data Processing

Measurement data can be analyzed, linked and represented, on or off-line, by means of high performance computing functions.



Further processing of measurement data is also possible with linearization functions. mA signals from sensors can thus, for example, 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.

METRAHit[®] 28S and 29S

Precision Digital Multimeter, Power Meter

Order Information

Designation	Type	Ident-Number	Designation	Type	Ident-Number
Precision digital multimeter including KS17-2 cable set, battery, GH18 and DKD calibration certificate	METRAHit 28S	M228A	Clip-on current/voltage transformer, active, with battery (service life 50 hr.) Measuring range AC 20 A/200 A Measuring range DC 30 A/300 A Frequency range DC ... 10 kHz Output 10 mV/A or 1 mV/A Clip jaw opening – cable diameter max. 19 mm	Z202A ¹⁾	Z202A
Precision digital multimeter and power meter including KS17-2 cable set, battery, GH18 and DKD calibration certificate	METRAHit 29S	M229A	Clip-on current/voltage transformer, active, with battery (service life 50 hr.) Measuring range AC 200 A/1000 A Measuring range DC 300 A/1000 A Frequency range DC ... 10 kHz Output 1 mV/A Clip jaw opening – cable diameter max. 32 mm	Z203A ¹⁾	Z203A
Accessories			Amp FLEX current transformer ^{D)} 30/300 A; 3 V 300/3000 A; 3 V 1000 A; 1 V 1/10 kA; 1 V	AF033A AF33A AF11A AF101A	Z207A Z207B Z207D Z207C
Power pack	NA4/500	Z218A	Pt100 temperature sensor for surface and immersion measurements, –40 ... +600 °C	Z3409	GTZ 3409 000 R0001
Cable set for multimeter	KS17	GTY 3620 034 P0002	Pt1000 temperature sensor for measurements in gases and liquids, –50 ... +220 °C	TF220	Z102A
Safety cable set for power meters	KS29	Z229A	Pt100 oven sensor, –50 ... +550 °C	TF550	GTZ 3408 000 R0001
Single channel memory pack including SI232 memory adapter, cable and METRAwin 10/METRAHit software	1-CH. Pack ¹⁾	GTZ 3231 020 R0001	10 adhesive Pt100 temperature sensors, from –50 ... +550 °C	TS-Chipset	GTZ 3406 000 R0001
Four channel memory pack including 4 SI232 memory adapters, cable and METRAwin 10/METRAHit software	4-CH. Pack ¹⁾	GTZ 3234 020 R0001	Leakage current measurement adptr.	Z3450	GTZ 3450 000 R0001
Memory adapter for METRAHit 28S	SI232 ^{D)}	GTZ 3242 020 R0001	Ri adapter 200 k Ω /230 V Load resistance which reduces the high input resistance of concurrent measuring instruments from about 10 M Ω to approximately 200 k Ω	R200K	Z101A
Bidirectional interface adapter for METRAHit 29S	BD232	GTZ 3242 100 R0001	Carrying case	F829	GTZ 3301 000 R0003
Single channel pack including cable and X METRAwin 10 software	Z3231	GTZ 3231 000 R0001	Ever-ready case	F836	GTZ 3302 000 R0001
RS232 interface adapter (included with Z3231)	Z3242	GTZ 3242 000 R0001	Ever-ready case for 2 METRAHit S with SI232 and accessories	F840	GTZ 3302 001 R0001
RS232 interface cable, 2 m, (included with Z3231)	Z3241	GTZ 3241 000 R0001	Protective rubber cover with support bar and carrying strap	GH18	GTZ 3212 000 R0001
METRAwin 10 software update	Z3240	GTZ 3240 000 R0001	Fuse link (10 ea.)	FF1.6/500G	GTY 3578 136 P0001
Electric set including: F829 carrying case, WZ11 clip-on current transformer (15 ... 180 A~, 1 mA/1 A~) and meas. cables	Electric-Set	GTZ 3236 000 R0001	Fuse link (10 ea.)	16 A/600 V	GTY 3578 176 P0001
Clip-on current transformer, 15 ... 180 A~, 1 mA/A~	WZ11	GTM 0000 044 E2			
Clip-on current transformer, 1 mA ... 10 A, 1 mV/mA, U=1:1, 1 A ... 120 A, 1 mV/A, U=1000:1	Z 3510	GTZ 3510 000 R0001			
Clip-on current/voltage transformer, active, with battery (service life 30 hr.) Measuring range AC 20 A Measuring range DC 30 A Frequency range DC ... 20 kHz Output 10 mV/A Clip jaw opening – cable diameter max. 19 mm	Z201A ¹⁾	Z201A			

¹⁾ for METRAHit 28S

^{D)} Data sheet available

For further information see catalog measuring and testing.