

# METRAClip87 and 88 Clamp Multimeters

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1/7.14

- **Current and frequency measurement via clamp meter:**  
**METRAClip87:** 1500 A AC TRMS and 1500 A DC  
**METRAClip88:** 2000 A AC TRMS and 3000 A DC
- **Multimeter functions via connector sockets:**  
V (AC TRMS and DC) up to 1000 V voltage/frequency measurement  
 $\Omega$  Resistance and continuity test (acoustic)
- **Additional measurements:** THD measurement  
Active, apparent and reactive power (W/VA/var)  
Starter current measurement, true inrush
- **Calculations:** Power factor, crest factor (CF)  
Displacement factor (DPF)  
Residual ripple
- **METRAClip87:** Measured value recording  
Data transmission to a PC via Bluetooth  
and evaluation with a PC program
- **METRAClip88:** Relative and differential measurements  
Phase sequence (2-wire connection)  
→ Diode test, energy meter
- **Compact and user-friendly**  
One-hand operation and illuminated digital display
- **Extremely safe** thanks to CAT IV 1000 V



## Applications

- Measurement of starting current for electric motors
- Measurement of motor temperature rise with temperature sensors
- Measurement of direct current, e.g. automotive batteries

## Features

### Display Memory (data hold)

The momentary measured value can be "frozen" at the display.

### Data Logging (max., min., peak)

Measured values can be stored for long-term observation of measured quantities. At the same time, maximum, minimum and peak values (**METRAClip88** only) are acquired for the duration of the selected recording time.

### True Inrush

Measurement of motor starting current characteristics based upon the relationship between amplitude and time.

This function makes it possible to track rapid current changes of the damped sinusoidal oscillation type by measuring successive TRMS values which are calculated over 1/2, 1, 2 1/2, 5 and 10 periods based upon the largest calculated TRMS value, and are refreshed via a half-wave.

## Relative and Differential Measurements (**METRAClip88** only)

A momentary measured value can be saved as a reference value. A differential value based on the momentary measured value and the reference value can be generated and displayed for each following measurement. Alternatively, the differential value can be related to the reference value and displayed as a relative value as a percentage for each following measurement.

## Safety Devices

- Visual indication is provided in the event that the measuring range is exceeded.
- An intermittent acoustic signal warns the user of voltages which are equal to or larger than the safety voltage of 1000 V<sub>DC</sub> or TRMS.

## Automatic Shutdown

The device is shut down automatically in the event that none of the keys or the rotary switch are activated for a duration of 10 minutes. Automatic shutdown can be deactivated.

## Applicable Regulations and Standards

IEC 61010-1/EN 61010-1/ VDE 0411-1	Safety regulations for electrical equipment for measurement, control and laboratory use
IEC 61010-2-030:2010, DIN EN 61010-2-030:2010, VDE 0411-2-030:2011	Safety requirements for electrical equipment for measurement, control and laboratory use – Part 2-030: Particular requirements for testing and measuring circuits
IEC 61010-2-032:2012, DIN EN 61010-2-032:2012, VDE 0411-2-032:2013	Part 2-032: Particular requirements for hand-held and hand-manipulated current sensors for electrical test and measurement
DIN EN 61326	Electrical equipment for control technology and labora-

# METRAClip87 and 88 Clamp Multimeters

## Common Measuring Functions of the METRAClip87 and the METRAClip88

### Measurements via Connector Sockets

#### V DC Voltage Measurement

Measuring Range	Resolution	Intrinsic Error under Reference Conditions
0.00 ... 99.99 V	10 mV	0.00 V ... 9.99 V: $\pm(1.0\% \text{ rdg.} + 10 \text{ d})$ 10.00 V ... 99.99 V $\pm(1.0\% \text{ rdg.} + 3 \text{ d})$
100.0 ... 999.9 V	100 mV	$\pm(1.0\% \text{ rdg.} + 3 \text{ d})$
1000 V	1 V	

Input impedance 10 M $\Omega$

#### V AC Voltage Measurement

Measuring Range	Resolution	Intrinsic Error under Reference Conditions
0.15 ... 99.99 V	10 mV	0.15 V ... 9.99 V: $\pm(1.0\% \text{ rdg.} + 10 \text{ d})$ 10.00 V ... 99.99 V $\pm(1.0\% \text{ rdg.} + 3 \text{ d})$
100.0 ... 999.9 V	100 mV	$\pm(1.0\% \text{ rdg.} + 3 \text{ d})$
1000 V TRMS 1400 V <sub>peak</sub>	1 V	

AC frequency range 45 ... 65 Hz (reference range)

Bandwidth 3 kHz

Input impedance 10 M $\Omega$

#### V AC+DC Voltage Measurement

Measuring Range	Resolution	Intrinsic Error under Reference Conditions
0.15 ... 99.99 V	10 mV	0.15 V ... 9.99 V: $\pm(1.0\% \text{ rdg.} + 10 \text{ d})$ 10.00 V ... 99.99 V $\pm(1.0\% \text{ rdg.} + 3 \text{ d})$
100.0 ... 999.9 V	100 mV	$\pm(1.0\% \text{ rdg.} + 3 \text{ d})$
1000 V TRMS 1400 V <sub>peak</sub>	1 V	

AC frequency range 45 ... 65 Hz (reference range)

Bandwidth AC 3 kHz

Input impedance 10 M $\Omega$

#### Continuity Test $\Omega$

(programmable acoustic threshold, default value = 40  $\Omega$ )

Measuring Range	Resolution	Intrinsic Uncertainty under reference conditions*
0.0 ... 999.9 $\Omega$	0.1 $\Omega$	$\pm(1.0\% \text{ rdg.} + 5 \text{ d})$

Open-circuit voltage  $\leq 3.6 \text{ V}$

Test current 550  $\mu\text{A}$

#### Resistance Measurement $\Omega$

Measuring Range	Resolution	Intrinsic Error under Reference Conditions <sup>1</sup>
0.0 ... 999.9 $\Omega$	0.1 $\Omega$	$\pm(1.0\% \text{ rdg.} + 5 \text{ d})$
1000 ... 9999 $\Omega$	1 $\Omega$	
10.00 ... 99.99 k $\Omega$	10 $\Omega$	

Open-circuit voltage  $\leq 3.6 \text{ V}$

Test current 1 k $\Omega$  range: 550  $\mu\text{A}$

10 k $\Omega$  range: 100  $\mu\text{A}$

### Frequency Measurement for Alternating Voltage

Measuring Range	Resolution	Intrinsic Error under Reference Conditions
5.0 ... 999.9 Hz	0.1 Hz	$\pm(0.4\% \text{ rdg.} + 1 \text{ d})$
1000 ... 9999 Hz	1 Hz	
10.00 ... 19.99 kHz	10 Hz	

### Harmonics, THD

Measurement with Voltage via Connector Sockets,  
Measurement with Current via Current Clamp

Measuring Range	Resolution	Intrinsic Error under Reference Conditions
THDr: 0.0 ... 100%	0.1%	V: $\pm(5.0\% \text{ rdg.} + 2 \text{ d})$ A: $\pm(5.0\% \text{ rdg.} + 5 \text{ d})$
THDf: 0.0 ... 1000%	0.1%	V: $\pm(5.0\% \text{ rdg.} + 2 \text{ d})$ A: $\pm(5.0\% \text{ rdg.} + 5 \text{ d})$

THDr: harmonic component relative to the TRMS value of the fundamental harmonic

THDf: harmonic component relative to the fundamental harmonic

### Calculation Functions

#### Power Factor PF

Measuring Range	Resolution	Intrinsic Error under Reference Conditions
0.00 ... 0.49	0.01	$\pm(3\% \text{ rdg.} + 3 \text{ d})$
0.50 ... 1.00		$\pm(2\% \text{ rdg.} + 3 \text{ d})$

#### Crest Factor CF

Measuring Range	Resolution	Intrinsic Error under Reference Conditions
1.00 ... 3.50	1 d	$\pm(2\% \text{ rdg.} + 2 \text{ d})$
3.51 ... 5.99		$\pm(5\% \text{ rdg.} + 2 \text{ d})$
6.00 ... 10.00		$\pm(10\% \text{ rdg.} + 2 \text{ d})$

Specified measuring range as of 5 V or 5 A

The peak values are limited to 1500 V or 1500 A.

Intrinsic uncertainty up to 400 Hz

#### Displacement Factor (DPF),

Measuring Range	Resolution	Intrinsic Error under Reference Conditions
0.00 ... 1.00	0.01	$\pm(5\% \text{ rdg.} + 2 \text{ d})$

Measuring range as of 1 A AC: 0 ... 100% of MR

#### Residual Ripple in DC Mode

Measuring Range	Resolution	Intrinsic Error under Reference Conditions
0.1 ... 99.9%	0.1	$\pm(5\% \text{ rdg.} + 10 \text{ d})$
100.0 ... 1000%		

Specified measuring range as of 3 A DC or 2 V DC

#### Key

rdg. = measured value (reading); d = digits

# METRAClip87 and 88 Clamp Multimeters

## Measuring Functions and Measuring Ranges of the METRAClip87

### Measurements via Current Clamp

#### A AC Current Measurement

Measuring Range	Resolution	Intrinsic Error under Reference Conditions
0.15 ... 99.99 A	10 mA	$\pm(1\% \text{ rdg.} + 10 \text{ d})$
100.0 ... 999.9 A	100 mA	$\pm(1\% \text{ rdg.} + 3 \text{ d})$
1000 A ... 1500 A	1 A	$\pm(1.5\% \text{ rdg.} + 3 \text{ d})$

AC frequency range 45 to 65 Hz (reference range)

Bandwidth 2 kHz

#### A DC Current Measurement

Measuring Range	Resolution	Intrinsic Error * under Reference Conditions
0.00 ... 99.99 A	10 mA	$\pm(1\% \text{ rdg.} + 10 \text{ d})$
100.0 ... 999.9 A	100 mA	$\pm(1\% \text{ rdg.} + 3 \text{ d})$
1000 ... 1500 A	1 A	

\* After zero-point compensation

#### A AC+DC Current Measurement

Measuring Range	Resolution	Intrinsic Error * under Reference Conditions
0.15 ... 99.99 A	10 mA	$\pm(1\% \text{ rdg.} + 10 \text{ d})$
100.0 ... 999.9 A	100 mA	$\pm(1\% \text{ rdg.} + 3 \text{ d})$
AC: 1000 A ... 1500 A DC or peak: 1500 A	1 A	

\* After zero-point compensation

AC frequency range 45 to 65 Hz (reference range)

Bandwidth 2 kHz

#### A AC/DC Starter Current Measurement, True Inrush

Measuring Range	Resolution	Intrinsic Error under Reference Conditions
10 ... 1000 A AC	1 A	$\pm(5\% \text{ rdg.} + 5 \text{ d})$
1500 A DC	1 A	$\pm(5\% \text{ rdg.} + 5 \text{ d})$

Specific data in the **peak function** for true inrush current measurements (from 10 to 400 Hz AC):

- Intrinsic uncertainty: the values in the table have to be increased by  $\pm(1.5\% \text{ rdg.} + 0.5 \text{ A})$ .
- Acquisition time for peak values: min. 1 ms to max. 1.5 ms

Applications include:

- Measurement of starting current for electric motors
- Precise specification of fuses and protective circuit breakers (relationship between amplitude and signal time)
- Loading components with a current overload

#### Frequency Measurement for Direct Voltage

Measuring Range	Resolution	Intrinsic Error under Reference Conditions
5.0 ... 1999 Hz	0.1 Hz	$\pm(0.4\% \text{ rdg.} + 1 \text{ d})$

### Measurements via Current Clamp and Connector Sockets

#### Active Power (DC+AC)

Measuring Range	Resolution	Intrinsic Error under Reference Conditions
5 ... 9999 W	1 W	Up to 1000 A: $\pm(2.0\% \text{ rdg.} + 10 \text{ d})$ 1 kA ... 1.5 kA: $\pm(2.5\% \text{ rdg.} + 10 \text{ d})$
10.00 ... 99.99 kW	10 W	Up to 1000 A: $\pm(2.0\% \text{ rdg.} + 3 \text{ d})$ 1 kA ... 1.5 kA: $\pm(2.5\% \text{ rdg.} + 3 \text{ d})$
100.0 ... 999.9 kW	100 W	
1000 ... 1500 kW <sup>1</sup>	1 kW	

<sup>1</sup> Overload display for measured power values > 1.5 kW in single-phase systems (1000 V x 1500 A)

Bandwidth AC voltage measurement: 3 kHz  
AC current measurement: 2 kHz

#### Active Power (DC)

Measuring Range	Resolution	Intrinsic Error under Reference Conditions
0 ... 9999 W	1 W	Up to 1000 A: $\pm(2.0\% \text{ rdg.} + 10 \text{ d})$ 1 kA ... 1.5 kA: $\pm(2.5\% \text{ rdg.} + 10 \text{ d})$
10.00 ... 99.99 kW	10 W	Up to 1000 A: $\pm(2.0\% \text{ rdg.} + 3 \text{ d})$ 1 kA ... 1.5 kA: $\pm(2.5\% \text{ rdg.} + 3 \text{ d})$
100.0 ... 999.9 kW	100 W	
1000 ... 1500 kW <sup>1</sup>	1 kW	

<sup>1</sup> Overload display for measured power values > 1.5 kW in single-phase systems (1000 V x 1500 A)

#### Active Power (AC)

Measuring Range	Resolution	Intrinsic Error under Reference Conditions
5 ... 9999 W	1 W	$\pm(2.0\% \text{ rdg.} + 10 \text{ d})$
10.00 ... 99.99 kW	10 W	$\pm(2.0\% \text{ rdg.} + 3 \text{ d})$
100.0 ... 999.9 kW	100 W	
1000 kW <sup>1</sup>	1 kW	

<sup>1</sup> Overload display for measured power values > 1 kW in single-phase systems (1000 V x 1000 A)

Bandwidth AC voltage measurement: 3 kHz  
AC current measurement: 1 kHz

#### Apparent Power (DC+AC)

Measuring Range	Resolution	Intrinsic Error under Reference Conditions
5 ... 9999 VA	1 VA	Up to 1000 A: $\pm(2.0\% \text{ rdg.} + 10 \text{ d})$ 1 kA ... 1.5 kA: $\pm(2.5\% \text{ rdg.} + 10 \text{ d})$
10.00 ... 99.99 kVA	10 VA	Up to 1000 A: $\pm(2.0\% \text{ rdg.} + 3 \text{ d})$ 1 kA ... 1.5 kA: $\pm(2.5\% \text{ rdg.} + 3 \text{ d})$
100.0 ... 999.9 kVA	100 VA	
1000 ... 1500 kVA <sup>1</sup>	1 kVA	

<sup>1</sup> Overload display for measured power values > 1.5 kVA in single-phase systems (1000 V x 1500 A)

Bandwidth AC voltage measurement: 3 kHz  
AC current measurement: 2 kHz

# METRAClip87 and 88 Clamp Multimeters

## Apparent Power (AC)

Measuring Range	Resolution	Intrinsic Error under Reference Conditions
5 ... 9999 VA	1 VA	$\pm(2.0\% \text{ rdg.} + 10 \text{ d})$
10.00 ... 99.99 kVA	10 VA	$\pm(2.0\% \text{ rdg.} + 3 \text{ d})$
100.0 ... 999.9 kVA	100 VA	
1000 kVA <sup>1</sup>	1 kVA	

<sup>1</sup> Overload display for measured power values > 1 kVA in single-phase systems (1000 V x 1000 A)

Bandwidth AC voltage measurement: 3 kHz  
AC current measurement: 2 kHz

## Reactive Power (DC+AC)

Measuring Range	Resolution	Intrinsic Error under Reference Conditions
5 ... 9999 var	1 var	Up to 1000 A: $\pm(2.0\% \text{ rdg.} + 10 \text{ d})$ 1 kA ... 1.5 kA: $\pm(2.5\% \text{ rdg.} + 10 \text{ d})$
10.00 ... 99.99 kvar	10 var	Up to 1000 A: $\pm(2.0\% \text{ rdg.} + 3 \text{ d})$ 1 kA ... 1.5 kA: $\pm(2.5\% \text{ rdg.} + 3 \text{ d})$
100.0 ... 999.9 kvar	100 var	
1000 ... 1500 kvar <sup>1</sup>	1 kvar	

<sup>1</sup> Overload display for measured power values > 1.5 kvar in single-phase systems (1000 V x 1500 A)

Bandwidth AC voltage measurement: 3 kHz  
AC current measurement: 2 kHz

## Reactive Power (AC)

Measuring Range	Resolution	Intrinsic Error under Reference Conditions
5 ... 9999 var	1 var	$\pm(2.0\% \text{ rdg.} + 10 \text{ d})$
10.00 ... 99.99 kvar	10 var	$\pm(2.0\% \text{ rdg.} + 3 \text{ d})$
100.0 ... 999.9 kvar	100 var	
1000 kvar <sup>1</sup>	1 kvar	

<sup>1</sup> Overload display for measured power values > 1 kvar in single-phase systems (1000 V x 1000 A)

Bandwidth AC voltage measurement: 3 kHz  
AC current measurement: 2 kHz

## Measured Value Recording and Data Transmission via Bluetooth to the PC with the METRAClip87

The recording function can be used to continuously save measurement results to the device at a specified interval. As a standard feature, a recording interval of 60 seconds is preset at the device. This value can be set to anywhere between 1 and 600 seconds (10 minutes) in the configuration mode.

### Overview of Possible Recording Intervals

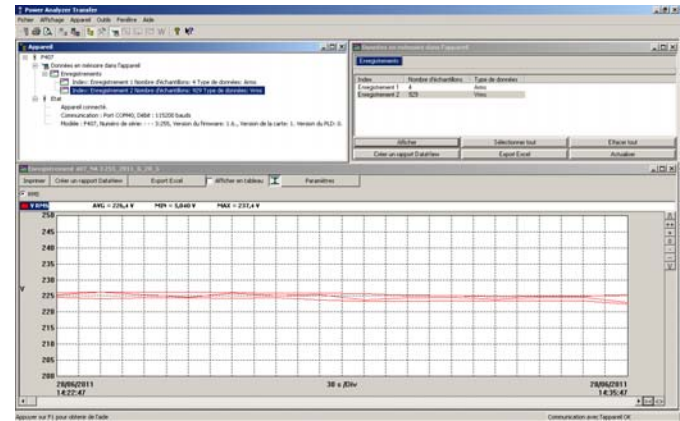
Data Type	Maximum Number of Recording Intervals	Maximum Recording Duration with 1 Second Interval	Max. Recording Duration with 600 Second Interval
V, A, $\Omega$	3000	16 minutes	160 hours
W	3000	3.5 minutes	35 hours
THD	3000	11 minutes (2 second interval)	55 hours
Harmonics	3000	8 minutes	80 hours

Data stored to the device can be transmitted wirelessly to a PC with the Bluetooth function.

## Evaluation with a PC Program

With a connection between the clamp and the PC, the measurement data to be transmitted to the evaluation program at the PC can be selected by the user. The measurement data can then be displayed as a graphic or exported to an Excel table.

### Example, Graphic Mode with Zoom



### Example, Data Export to Excel

Date	U <sub>eff</sub>	I <sub>eff</sub>	W	W (MVA)	W MAX	U <sub>eff</sub>	I <sub>eff</sub>	W	W (MVA)	U <sub>eff</sub>	I <sub>eff</sub>	W	W (MVA)	U <sub>eff</sub>	I <sub>eff</sub>	W	W (MVA)	
02.07.2013	14.32.16	2841	2812	2966	48.9	49	77	2840	2813	2962	1	0.99	0.99	1	0.99	0.99	1	0.99
02.07.2013	14.32.26	5568	4090	7137	58.68	193	765	5394	2967	6672	1	0.99	0.99	1	0.99	0.99	1	0.99
02.07.2013	14.32.36	7164	6513	7422	4.12	234	279	7165	6516	7246	1	0.99	0.99	1	0.99	0.99	1	0.99
02.07.2013	14.32.46	6639	6432	6742	20.31	249	263	6643	6436	6752	1	0.99	0.99	1	0.99	0.99	1	0.99
02.07.2013	14.32.56	6711	6786	6924	49.33	209	294	6781	6746	6953	1	0.97	0.99	1	0.97	0.99	1	0.99
02.07.2013	14.33.06	6811	6432	6997	3700	1236	4789	6811	6811	6716	0.8	0.75	0.75	0.8	0.8	0.8	0.8	0.8
02.07.2013	14.33.16	5066	4817	6099	2687	3326	4834	6053	6054	6716	0.8	0.75	0.75	0.8	0.8	0.8	0.8	0.8
02.07.2013	14.33.26	6403	4836	5199	6206	3719	9100	11329	6054	18910	0.7	0.73	0.76	0.8	0.76	0.8	0.76	0.8
02.07.2013	14.33.36	12430	5729	13200	9797	4829	10490	17790	14448	18110	0.7	0.39	0.73	0.8	0.67	0.78	0.78	0.78
02.07.2013	14.33.46	6818	6777	6906	10020	6759	12290	14620	14620	14790	0.5	0.46	0.46	0.5	0.47	0.62	0.62	0.62
02.07.2013	14.33.56	3826	6414	6791	25458	5821	8490	16520	12120	18140	0.3	0.15	0.53	0.2	0.21	0.47	0.47	0.47
02.07.2013	14.34.06	-5004	-7787	-2826	11220	4909	17800	16290	14080	18170	0.3	0.15	0.53	0.4	0.18	0.18	0.18	0.18
02.07.2013	14.34.16	2428	2864	1773	15790	15106	18000	16146	16070	18190	1.1	0.29	0.16	0.1	0.1	0.17	0.17	0.17
02.07.2013	14.34.26	8797	1795	1780	36430	38180	13600	16170	14510	18230	0.6	0.09	0.99	0.3	0.04	0.04	0.04	0.04
02.07.2013	14.34.36	14490	6445	1410	29400	3872	16170	14090	14480	14820	1	0.99	0.99	0.6	0.12	0.67	0.67	0.67
02.07.2013	14.34.46	14290	14160	14200	41600	41600	14160	14400	14170	14530	1	0.99	0.99	0.5	0.29	0.37	0.37	0.37
02.07.2013	14.34.56	14180	13870	14240	23770	3757	16230	14310	14190	14950	1	0.88	0.99	0.5	0.29	0.37	0.37	0.37
02.07.2013	14.35.06	13660	13510	13640	21790	11530	45620	17730	17640	17770	0.8	0.76	0.76	0.8	0.86	0.86	0.86	0.86
02.07.2013	14.35.16	13560	13460	13620	21790	11530	45620	17730	17640	17790	0.8	0.76	0.76	0.8	0.81	0.81	0.81	0.81
02.07.2013	14.35.26	13630	13580	13640	21790	11530	45620	17730	17640	17790	0.8	0.76	0.76	0.8	0.81	0.81	0.81	0.81

# METRAClip87 and 88 Clamp Multimeters

## Special Measuring Functions of the METRAClip88

### Diode Test

Measuring Range	Resolution	Intrinsic Error under Reference Conditions
0.000 ... 3.199 V DC	1 mV	$\pm(1.0\% \text{ rdg.} + 3 \text{ d})$

Test current 0.55 mA

### Phase Sequence

Frequency range 47 ... 400 Hz  
 Allowable voltage range 50 to 1000 V  
 Permissible phase shift  $\pm 10^\circ$   
 Permissible amplitude deviation 20%  
 Permissible harmonic component for voltage: 10%

## Measuring Functions and Measuring Ranges of the METRAClip88

### Measurements via Current Clamp

#### A AC Current Measurement

Measuring Range	Resolution	Intrinsic Error under Reference Conditions
0.15 ... 99.99 A	10 mA	$\pm(1\% \text{ rdg.} + 10 \text{ d})$
100.0 ... 999.9 A	100 mA	$\pm(1\% \text{ rdg.} + 3 \text{ d})$
1000 A ... 2000 A	1 A	$\pm(1.5\% \text{ rdg.} + 3 \text{ d})$

AC frequency range 45 to 65 Hz (reference range)  
 Bandwidth 1 kHz

#### A DC Current Measurement

Measuring Range	Resolution	Intrinsic Error * under Reference Conditions
0.00 ... 99.99 A	10 mA	$\pm(1\% \text{ rdg.} + 10 \text{ d})$
100.0 ... 999.9 A	100 mA	$\pm(1\% \text{ rdg.} + 3 \text{ d})$
1000 ... 3000 A	1 A	Up to 2 000 A: $\pm(1.5\% \text{ rdg.} + 3 \text{ d})$ 2 kA DC ... 2.5 kA DC: $\pm(2.5\% \text{ rdg.} + 3 \text{ d})$ 2.5 kA DC ... 3 kADC: $\pm(3.5\% \text{ rdg.} + 3 \text{ d})$

\* After zero-point compensation

#### A AC+DC Current Measurement

Measuring Range	Resolution	Intrinsic Error * under Reference Conditions
0.15 ... 99.99 A	10 mA	$\pm(1\% \text{ rdg.} + 10 \text{ d})$
100.0 ... 999.9 A	100 mA	$\pm(1\% \text{ rdg.} + 3 \text{ d})$
AC: 1000 A ... 2000 A DC or peak: 1000 A ... 3000 A	1 A	Up to 2000 A: $\pm(15\% \text{ display} + 3 \text{ D})$ 2000 ... 2500 A DC: $\pm(2.5\% \text{ display} + 3 \text{ D})$ 2500 ... 3000 A DC: $\pm(3.5\% \text{ display} + 3 \text{ D})$

\* After zero-point compensation

AC frequency range 45 to 65 Hz (reference range)  
 Bandwidth 1 kHz

#### A AC/DC Starter Current Measurement, True Inrush

Measuring Range	Resolution	Intrinsic Error under Reference Conditions
20 ... 2000 A AC	1 A	$\pm(5\% \text{ rdg.} + 5 \text{ d})$
3000 A DC	1 A	$\pm(5\% \text{ rdg.} + 5 \text{ d})$

Specific data in the **peak function** for true inrush current measurements (from 10 to 400 Hz AC):

- Intrinsic uncertainty: the values in the table have to be increased by  $\pm(1.5\% \text{ rdg.} + 0.5 \text{ A})$ .
- Acquisition time for peak values: min. 1 ms to max. 1.5 ms.

Applications include:

- Measurement of starting current for electric motors
- Precise specification of fuses and protective circuit breakers (relationship between amplitude and signal time)
- Loading components with a current overload

#### Frequency Measurement for Alternating Current

Measuring Range	Resolution	Intrinsic Error under Reference Conditions
5.0 ... 999.9 Hz	0.1 Hz	$\pm(0.4\% \text{ rdg.} + 1 \text{ d})$

### Measurements via Current Clamp and Connector Sockets

#### Active Power (DC)

Measuring Range	Resolution	Intrinsic Error under Reference Conditions
0 ... 9999 W	1 W	Up to 1000 A: $\pm(2.0\% \text{ rdg.} + 10 \text{ d})$ 1 kA ... 2 kA: $\pm(2.5\% \text{ rdg.} + 10 \text{ d})$ 2 kA ... 2.5 kA: $\pm(35\% \text{ rdg.} + 10 \text{ d})$ 2.5 kA ... 3 kA: $\pm(4.5\% \text{ rdg.} + 10 \text{ d})$
10.00 ... 99.99 kW	10 W	Up to 1000 A: $\pm(2.0\% \text{ rdg.} + 3 \text{ d})$ 1 kA ... 2 kA: $\pm(2.5\% \text{ rdg.} + 3 \text{ d})$ 2 kA ... 2.5 kA: $\pm(35\% \text{ rdg.} + 3 \text{ d})$ 2.5 kA ... 3 kA: $\pm(4.5\% \text{ rdg.} + 3 \text{ d})$
100.0 ... 999.9 kW	100 W	
1000 ... 3000 kW <sup>1</sup>	1 kW	

<sup>1</sup> Overload display for measured power values > 3 kW in single-phase systems (1000 V x 3000 A)

#### Active Power (AC)

Measuring Range	Resolution	Intrinsic Error under Reference Conditions
5 ... 9999 W	1 W	Up to 1000 A: $\pm(2.0\% \text{ rdg.} + 10 \text{ d})$ 1 kA ... 2 kA: $\pm(2.5\% \text{ rdg.} + 10 \text{ d})$
10.00 ... 99.99 kW	10 W	Up to 1000 A: $\pm(2.0\% \text{ rdg.} + 3 \text{ d})$ 1 kA ... 2 kA: $\pm(2.5\% \text{ rdg.} + 3 \text{ d})$
100.0 ... 999.9 kW	100 W	
1000 kW ... 2000 kW <sup>1</sup>	1 kW	

<sup>1</sup> Overload display for measured power values > 2 kW in single-phase systems (1000 V x 2000 A)

Bandwidth AC voltage measurement: 3 kHz  
 AC current measurement: 1 kHz



# METRAClip87 and 88 Clamp Multimeters

## Active Power (DC+AC)

Measuring Range	Resolution	Intrinsic Error under Reference Conditions
5 ... 9999 W	1 W	Up to 1000 A: ±(2.0% rdg. + 10 d) 1 kA ... 2 kA: ±(2.5% rdg. + 10 d) 2 kA ... 2.5 kA: ±(35% rdg. + 10 d) 2.5 kA ... 3 kA: ±(4.5% rdg. + 10 d)
10.00 ... 99.99 kW	10 W	Up to 1000 A: ±(2.0% rdg. + 3 d) 1 kA ... 2 kA: ±(2.5% rdg. + 3 d) 2 kA ... 2.5 kA: ±(35% rdg. + 3 d) 2.5 kA ... 3 kA: ±(4.5% rdg. + 3 d)
100.0 ... 999.9 kW	100 W	
1000 ... 3000 kW <sup>1</sup>	1 kW	

<sup>1</sup> Overload display for measured power values > 3 kW in single-phase systems (1000 V x 3000 A)

Bandwidth AC voltage measurement: 3 kHz  
AC current measurement: 1 kHz

## Apparent Power (AC)

Measuring Range	Resolution	Intrinsic Error under Reference Conditions
5 ... 9999 VA	1 VA	Up to 1000 A: ±(2.0% rdg. + 10 d) 1 kA ... 2 kA: ±(2.5% rdg. + 10 d)
10.00 ... 99.99 kVA	10 VA	Up to 1000 A: ±(2.0% rdg. + 3 d) 1 kA ... 2 kA: ±(2.5% rdg. + 3 d)
100.0 ... 999.9 kVA	100 VA	
1000 kVA ... 2000 kVA <sup>1</sup>	1 kVA	±(2.5% rdg. + 3 d)

<sup>1</sup> Overload display for measured power values > 2 kVA in single-phase systems (1000 V x 2000 A)

Bandwidth AC voltage measurement: 3 kHz  
AC current measurement: 1 kHz

## Apparent Power (DC+AC)

Measuring Range	Resolution	Intrinsic Error under Reference Conditions
5 ... 9999 VA	1 VA	Up to 1000 A: ±(2.0% rdg. + 10 d) 1 kA ... 2 kA: ±(2.5% rdg. + 10 d) 2 kA ... 2.5 kA: ±(35% rdg. + 10 d) 2.5 kA ... 3 kA: ±(4.5% rdg. + 10 d)
10.00 ... 99.99 kVA	10 VA	Up to 1000 A: ±(2.0% rdg. + 3 d) 1 kA ... 2 kA: ±(2.5% rdg. + 3 d) 2 kA ... 2.5 kA: ±(35% rdg. + 3 d) 2.5 kA ... 3 kA: ±(4.5% rdg. + 3 d)
100.0 ... 999.9 kVA	100 VA	
1000 ... 3000 kVA <sup>1</sup>	1 kVA	

<sup>1</sup> Overload display for measured power values > 3 kVA in single-phase systems (1000 V x 3000 A)

Bandwidth AC voltage measurement: 3 kHz  
AC current measurement: 1 kHz

## Reactive Power (AC)

Measuring Range	Resolution	Intrinsic Error under Reference Conditions
5 ... 9999 var	1 var	Up to 1000 A: ±(2.0% rdg. + 10 d) 1 kA ... 2 kA: ±(2.5% rdg. + 10 d)
10.00 ... 99.99 kvar	10 var	Up to 1000 A: ±(2.0% rdg. + 3 d) 1 kA ... 2 kA: ±(2.5% rdg. + 3 d)
100.0 ... 999.9 kvar	100 var	
1000 ... 2000 kvar <sup>1</sup>	1 kvar	

<sup>1</sup> Overload display for measured reactive power values > 2 kvar in single-phase systems (1000 V x 2000 A)

Bandwidth AC voltage measurement: 3 kHz  
AC current measurement: 1 kHz

## Reactive Power (DC+AC)

Measuring Range	Resolution	Intrinsic Error under Reference Conditions
5 ... 9999 var	1 var	Up to 1000 A: ±(2.0% rdg. + 10 d) 1 kA ... 2 kA: ±(2.5% rdg. + 10 d) 2 kA ... 2.5 kA: ±(35% rdg. + 10 d) 2.5 kA ... 3 kA: ±(4.5% rdg. + 10 d)
10.00 ... 99.99 kvar	10 var	Up to 1000 A: ±(2.0% rdg. + 3 d) 1 kA ... 2 kA: ±(2.5% rdg. + 3 d) 2 kA ... 2.5 kA: ±(35% rdg. + 3 d) 2.5 kA ... 3 kA: ±(4.5% rdg. + 3 d)
100.0 ... 999.9 kvar	100 var	
1000 ... 3000 kvar <sup>1</sup>	1 kvar	

<sup>1</sup> Overload display for measured reactive power values > 3 kvar in single-phase systems (1000 V x 3000 A)

Bandwidth AC voltage measurement: 3 kHz  
AC current measurement: 1 kHz

# METRAClip87 and 88 Clamp Multimeters

## Common Data for the METRAClip87 and the METRAClip88

### LCD with Blue Background Illumination

Display	7-segment characters
Number of places	4-place, 6000 digits
Dimensions	41 x 48 mm

### Reference Conditions

Ambient temperature	+23 °C ±2 °C
Relative humidity	45 to 75%
Battery voltage	6.0 V ±0.5 V
Frequency of AC components in the signal	45 ... 65 Hz
Waveform	Sinusoidal
Crest factor of measured AC signals	$\sqrt{2}$
Conductor position	Centered
Neighboring conductor	None
AC magnetic field	None
Electrical field	None

### Power Supply

Battery	4 ea. 1.5 V LR6
Service life	Average: > 350 hours (without display illumination)
Automatic shutdown	After 10 minutes

### Electrical Safety

Protection class	II (total insulation) per IEC 61010-1/ EN 61010-1/VDE 0411-1
Measuring category	CAT IV 1000 V

### Ambient Conditions

Operating temperature	-20 °C ... +55 °C
Storage temp. range	-40 °C ... +70 °C (without batteries)
Relative humidity	During operation: ≤ 90% at +55 °C During storage: ≤ 90% at +70 °C No condensation allowed
Elevation	To 2000 m

### Electromagnetic Compatibility (EMC)

Interference emission / interference immunity	EN 61326-1, residential areas
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### Mechanical Design

Protection class	Housing: IP 54, clamp jaws: IP 40
Clamp opening	<b>METRAClip87:</b> max. 48 mm diameter <b>METRAClip88:</b> max. 60 mm diameter
Dimensions	<b>METRAClip87:</b> H x W x D: 272 x 92 x 41 mm <b>METRAClip88:</b> H x W x D: 296 x 111 x 41 mm
Weight	<b>METRAClip87:</b> approx. 600 g (with batteries) <b>METRAClip88:</b> approx. 640 g (with batteries)

## Scope of Delivery, METRAClip87

- 1 Clamp multimeter
- 2 Measurement cables (red and black, 1.6 m long), each with contact protected plug and plug-on test probe, CAT IV 1000 V/15 A
- 2 Alligator clips, red and black, CAT IV 1000 V/15 A
- 4 1.5 V batteries
- 1 Carrying pouch with holding strap
- 1 Test report
- 1 Safety data sheet
- 1 Condensed operating instructions in D/GB/F/E/I, printed
- 1 Operating instructions in D/GB/F/E/I, on mini CD ROM
- 1 PC program for measured value evaluation on mini CD ROM

## Scope of Delivery, METRAClip88

- 1 Clamp multimeter
- 2 Measurement cables (red and black, 1.6 m long), each with contact protected plug and plug-on test probe, CAT IV 1000 V/15 A
- 4 1.5 V batteries
- 1 Carrying pouch with holding strap
- 1 Test report
- 1 Safety data sheet
- 1 Condensed operating instructions in D/GB/F/E/I, printed
- 1 Operating instructions in D/GB/F/E/I, on mini CD ROM

# METRAClip87 and 88 Clamp Multimeters

## Order Information

Description	Type	Article number
Clamp multimeter, TRMS current measurement 1500 V AC/DC, frequency measurement 20 kHz/V – 2 kHz/A, starting and overcurrent measurement (true inrush), TRMS voltage measurement, frequency measurement, THD measurement, acoustic continuity test, resistance measurement, power measurement (W, VA, var, PF), <b>energy meter</b> , calculation of crest factor (CF), displacement factor (DPF) and residual ripple, automatic AC/DC detection, Hold, Min-Max, <b>measured value recording, data transmission via Bluetooth</b> , display illumination, connector sockets, 48 mm clamp opening, CAT IV 1000 V	<b>METRAClip87</b>	M312L
Clamp multimeter, TRMS current measurement, 2000 V AC, 3000 A DC, frequency measurement 20 kHz/V – 1 kHz/A, starting and overcurrent measurement (true inrush), TRMS voltage measurement, frequency measurement, THD measurement, acoustic continuity test, resistance measurement, <b>diode test, phase sequence indicator</b> , power measurement (W, VA, var, PF), calculation of crest factor (CF), displacement factor (DPF) and residual ripple, automatic AC/DC detection, <b>relative measurement</b> $\Delta$ REL, Hold, Min-Max, display illumination, connector sockets, 60 mm clamp opening, CAT IV 1000 V	<b>METRAClip88</b>	M312M

*For additional information regarding accessories please refer to our Measuring Instruments and Testers catalog*

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