GOSSEN METRAWATT

# METRAClip87 and 88
# Clamp Multimeters

3-349-795-03
2/9.16

- **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
  Ω 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


CAT IV

CE

## 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 ½, 1, 2½, 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 $V_{DC\ or\ TRMS}$.

### 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 VDE 0843, part 20** | Electrical equipment for control technology and laboratory use – EMC requirements |

# METRA*Clip 87* and *88*
# Clamp Multimeters

## Common Measuring Functions of the METRA*Clip 87* and the METRA*Clip 88*

### *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: ±(1.0% rdg. + 10 d)<br>10.00 V ... 99.99 V ±(1.0% rdg. + 3 d) |
| 100.0 … 999.9 V | 100 mV | ±(1.0% rdg. +3 d) |
| 1000 V | 1 V | |

Input impedance 10 MΩ

**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: ±(1.0% rdg. + 10 d)<br>10.00 V ... 99.99 V ±(1.0% rdg. + 3 d) |
| 100.0 … 999.9 V | 100 mV | ±(1.0% rdg. +3 d) |
| 1000 V TRMS<br>1400 $V_{peak}$ | 1 V | |

AC frequency range 45 ... 65 Hz (reference range)
Bandwidth 3 kHz
Input impedance 10 MΩ

**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: ±(1.0% rdg. + 10 d)<br>10.00 V ... 99.99 V ±(1.0% rdg. + 3 d) |
| 100.0 … 999.9 V | 100 mV | ±(1.0% rdg. +3 d) |
| 1000 V TRMS<br>1400 $V_{peak}$ | 1 V | |

AC frequency range 45 ... 65 Hz (reference range)
Bandwidth AC 3 kHz
Input impedance 10 MΩ

**Continuity Test Ω**
**(programmable acoustic threshold, default value = 40 Ω)**

| Measuring Range | Resolution | Intrinsic Uncertainty under reference conditions* |
|---|---|---|
| 0.0 … 999.9 Ω | 0.1 Ω | ±(1.0% rdg. +5 d) |

Open-circuit voltage ≤ 3.6 V
Test current 550 µA

**Resistance Measurement Ω**

| Measuring Range | Resolution | Intrinsic Error under Reference Conditions [1] |
|---|---|---|
| 0.0 … 99.9 Ω | 0.1 Ω | ±(1.0% rdg. +10 d) |
| 100.0 … 999.9 Ω | 0.1 Ω | ±(1.0% rdg. +5 d) |
| 1000 … 9999 Ω | 1 Ω | |
| 10.00 … 99.99 kΩ | 10 Ω | |

Open-circuit voltage ≤ 3.6 V
Test current 1 kΩ range: 550 µA
10 kΩ range: 100 µA
100 kΩ range: 10 µA

**Frequency Measurement for Alternating Voltage**

| Measuring Range | Resolution | Intrinsic Error under Reference Conditions |
|---|---|---|
| 5.0 … 999.9 Hz | 0.1 Hz | ±(0.4% rdg. +1 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: ±(5.0% rdg. ±2 d)<br>A: ±(5.0% rdg. ±5 d) |
| THDf: 0.0 … 1000% | 0.1% | V: ±(5.0% rdg. ±2 d)<br>A: ±(5.0% rdg. ±5 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 | ±(3% rdg. + 3 d) |
| 0.50 … 1.00 | | ±(2% rdg. + 3 d) |

**Crest Factor CF**

| Measuring Range | Resolution | Intrinsic Error under Reference Conditions |
|---|---|---|
| 1.00 … 3.50 | 1 d | ±(2% rdg. + 2 d) |
| 3.51 … 5.99 | | ±(5% rdg. + 2 d) |
| 6.00 … 10.00 | | ±(10% rdg. + 2 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 | ±(5% rdg. + 2 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 | ±(5% rdg. + 10 d) |
| 100.0 … 1000% | | |

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

**Key**

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

## Measuring Functions and Measuring Ranges of the METRA*Clip* 87

### *Measurements via Current Clamp*

#### A AC Current Measurement

| Measuring Range | Resolution | Intrinsic Error under Reference Conditions |
|---|---|---|
| 0.15 … 99.99 A | 10 mA | ±(1% rdg. + 10 d) |
| 100.0 … 999.9 A | 100 mA | ±(1% rdg. + 3 d) |
| 1000 A ... 1500 A | 1 A | ±(1.5% rdg. + 3 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 | ±(1% rdg. + 10 d) |
| 100.0 … 999.9 A | 100 mA | ±(1% rdg. + 3 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 | ±(1% rdg. + 10 d) |
| 100.0 … 999.9 A | 100 mA | ±(1% rdg. + 3 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 | ±(5% rdg. + 5 d) |
| 1500 A DC | 1 A | ±(5% rdg. + 5 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 ±(1.5% rdg. + 0.5 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 | ±(0.4 % rdg. +1 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: ±(2.0% rdg. + 10 d) 1 kA ... 1.5 kA: ±(2.5% rdg. + 10 d) |
| 10.00 … 99.99 kW | 10 W | Up to 1000 A: ±(2.0% rdg. + 3 d) 1 kA ... 1.5 kA: ±(2.5% rdg. + 3 d) |
| 100.0 … 999.9 kW | 100 W | |
| 1000 … **1500 kW**[1] | 1 kW | |

[1] 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: ±(2.0% rdg. + 10 d) 1 kA ... 1.5 kA: ±(2.5% rdg. + 10 d) |
| 10.00 … 99.99 kW | 10 W | Up to 1000 A: ±(2.0% rdg. + 3 d) 1 kA ... 1.5 kA: ±(2.5% rdg. + 3 d) |
| 100.0 … 999.9 kW | 100 W | |
| 1000 … 1500 kW[1] | 1 kW | |

[1] 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 | ±(2.0% rdg. + 10 d) |
| 10.00 … 99.99 kW | 10 W | ±(2.0% rdg. + 3 d) |
| 100.0 … 999.9 kW | 100 W | |
| 1000 kW [1] | 1 kW | |

[1] 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: ±(2.0% rdg. + 10 d) 1 kA ... 1.5 kA: ±(2.5% rdg. + 10 d) |
| 10.00 … 99.99 kVA | 10 VA | Up to 1000 A: ±(2.0% rdg. + 3 d) 1 kA ... 1.5 kA: ±(2.5% rdg. + 3 d) |
| 100.0 … 999.9 kVA | 100 VA | |
| 1000 …1500 kVA[1] | 1 kVA | |

[1] 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

### Apparent Power (AC)

| Measuring Range | Resolution | Intrinsic Error under Reference Conditions |
|---|---|---|
| 5 … 9999 VA | 1 VA | ±(2.0% rdg. + 10 d) |
| 10.00 … 99.99 kVA | 10 VA | ±(2.0% rdg. + 3 d) |
| 100.0 … 999.9 kVA | 100 VA | |
| 1000 kVA[1] | 1 kVA | |

[1] 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: ±(2.0% rdg. + 10 d) 1 kA ... 1.5 kA: ±(2.5% rdg. + 10 d) |
| 10.00 … 99.99 kvar | 10 var | Up to 1000 A: ±(2.0% rdg. + 3 d) 1 kA ... 1.5 kA: ±(2.5% rdg. + 3 d) |
| 100.0 … 999.9 kvar | 100 var | |
| 1000 …1500 kvar[1] | 1 kvar | |

[1] 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 | ±(2.0% rdg. + 10 d) |
| 10.00 … 99.99 kvar | 10 var | ±(2.0% rdg. + 3 d) |
| 100.0 … 999.9 kvar | 100 var | |
| 1000 kvar[1] | 1 kvar | |

[1] 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 METRA*Clip 87*

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

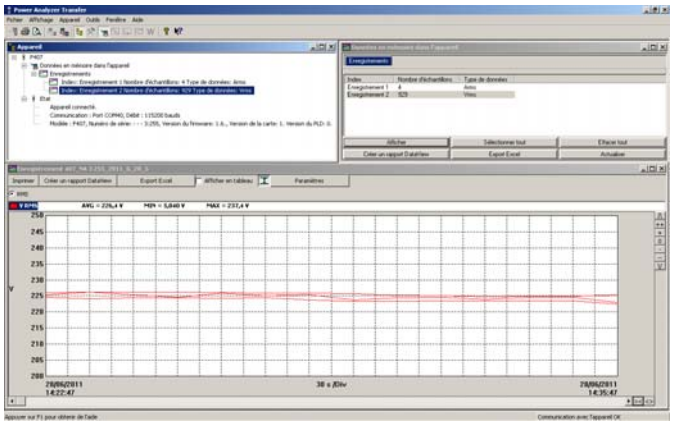
| Data Type | Maximum Number of Recording Intervals | Maximum Recording Duration with 1 Second Interval | Max. Recording Duration with 600 Second Interval |
|---|---|---|---|
| **V, A, Ω** | 3000 | 16 minutes | 160 hours |
| **W** | 3000 | 3.5 minutes | 35 hours |
| **THD** | 3000 | 11 minutes (2 second 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.

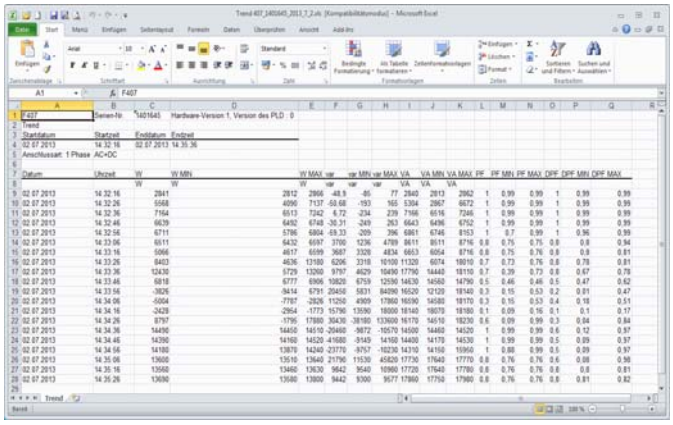
## Evaluation with a PC Program

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



## Special Measuring Functions of the METRA*Clip 88*

### Diode Test

| Measuring Range | Resolution | Intrinsic Error under Reference Conditions |
|---|---|---|
| 0.000 … 3.199 V DC | 1 mV | ±(1.0% rdg. + 3 d) |

Test current 0.55 mA

### Phase Sequence

Frequency range 47 ... 400 Hz
Allowable voltage range 50 to 1000 V
Permissible phase shift ±10°
Permissible amplitude deviation 20%
Permissible harmonic component for voltage: 10%

## Measuring Functions and Measuring Ranges of the METRA*Clip 88*

### *Measurements via Current Clamp*

### A AC Current Measurement

| Measuring Range | Resolution | Intrinsic Error under Reference Conditions |
|---|---|---|
| 0.15 … 99.99 A | 10 mA | ±(1% rdg. + 10 d) |
| 100.0 … 999.9 A | 100 mA | ±(1% rdg. + 3 d) |
| 1000 A ... 2000 A | 1 A | ±(1.5% rdg. + 3 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 | ±(1% rdg. + 10 d) |
| 100.0 … 999.9 A | 100 mA | ±(1% rdg. + 3 d) |
| 1000 ... 3000 A | 1 A | Up to 2 000 A: ± (1.5% rdg. +3 d) 2 kA DC ... 2.5 kA DC: ± (2.5% rdg. + 3 d) 2.5 kA DC ... 3 kADC: ± (3.5% rdg. + 3 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 | ±(1% rdg. + 10 d) |
| 100.0 … 999.9 A | 100 mA | ±(1% rdg. + 3 d) |
| AC: 1000 A ... 2000 A DC or peak: 1000 A ... 3000 A | 1 A | Up to 2000 A: ± (15% display +3 D) 2000 ... 2500 A DC: ± (2.5% display + 3 D) 2500 ... 3000 A DC: ± (3.5% display + 3 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 | ±(5% rdg. + 5 d) |
| 3000 A DC | 1 A | ±(5% rdg. + 5 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 ±(1.5% rdg. + 0.5 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 | ±(0.4% rdg. +1 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: ±(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**[1] | 1 kW | |

[1] 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: ±(2.0% rdg. + 10 d) 1 kA ... 2 kA: ±(2.5% 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) |
| 100.0 … 999.9 kW | 100 W | |
| 1000 kW ... 2000 kW[1] | 1 kW | |

[1] 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

### 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)<br>1 kA ... 2 kA: ±(2.5% rdg. + 10 d)<br>2 kA ... 2.5 kA: ±(35% rdg. + 10 d)<br>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)<br>1 kA ... 2 kA: ±(2.5% rdg. + 3 d)<br>2 kA ... 2.5 kA: ±(35% rdg. + 3 d)<br>2.5 kA ... 3 kA: ±(4.5% rdg. + 3 d) |
| 100.0 … 999.9 kW | 100 W | |
| 1000 ... **3000 kW**[1] | 1 kW | |

[1] 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)<br>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)<br>1 kA ... 2 kA: ±(2.5% rdg. + 3 d) |
| 100.0 … 999.9 kVA | 100 VA | |
| 1000 kVA ... 2000 kVA[1] | 1 kVA | |

[1] 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)<br>1 kA ... 2 kA: ±(2.5% rdg. + 10 d)<br>2 kA ... 2.5 kA: ±(35% rdg. + 10 d)<br>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)<br>1 kA ... 2 kA: ±(2.5% rdg. + 3 d)<br>2 kA ... 2.5 kA: ±(35% rdg. + 3 d)<br>2.5 kA ... 3 kA: ±(4.5% rdg. + 3 d) |
| 100.0 … 999.9 kVA | 100 VA | |
| 1000 ... 3000 kVA[1] | 1 kVA | |

[1] 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)<br>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)<br>1 kA ... 2 kA: ±(2.5% rdg. + 3 d) |
| 100.0 … 999.9 kvar | 100 var | |
| 1000 ... 2000 kvar[1] | 1 kvar | |

[1] 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)<br>1 kA ... 2 kA: ±(2.5% rdg. + 10 d)<br>2 kA ... 2.5 kA: ±(35% rdg. + 10 d)<br>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)<br>1 kA ... 2 kA: ±(2.5% rdg. + 3 d)<br>2 kA ... 2.5 kA: ±(35% rdg. + 3 d)<br>2.5 kA ... 3 kA: ±(4.5% rdg. + 3 d) |
| 100.0 … 999.9 kvar | 100 var | |
| 1000 ... 3000 kvar[1] | 1 kvar | |

[1] 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

## Common Data for the METRA*Clip87* and the METRA-*Clip88*

**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:<br>> 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<br>During storage: ≤ 90% at +70 °C<br>No condensation allowed |
| Elevation | To 2000 m |

**Electromagnetic Compatibility (EMC)**

| | |
|---|---|
| Interference emission / interference immunity | EN 61326-1, residential areas |

**Mechanical Design**

| | |
|---|---|
| Protection class | Housing: IP 54, clamp jaws: IP 40 |
| Clamp opening | **METRA*Clip87***: max. 48 mm diameter<br>**METRA*Clip88***: max. 60 mm diameter |
| Dimensions | **METRA*Clip87***:<br>H x W x D: 272 x 92 x 41 mm<br>**METRA*Clip88***:<br>H x W x D: 296 x 111 x 41 mm |
| Weight | **METRA*Clip87***: approx. 600 g (with batteries)<br>**METRA*Clip88***: approx. 640 g (with batteries) |

## Scope of Delivery, METRA*Clip87*

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, METRA*Clip88*

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

# METRA*Clip 87* 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), **energy meter**, calculation of crest factor (CF), displacement factor (DPF) and residual ripple, automatic AC/DC detection, Hold, Min-Max, **measured value recording**, **data transmission via Bluetooth**, display illumination, connector sockets, 48 mm clamp opening, CAT IV 1000 V | **METRA*Clip 87*** | 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, **diode test**, **phase sequence indicator**, power measurement (W, VA, var, PF), calculation of crest factor (CF), displacement factor (DPF) and residual ripple, automatic AC/DC detection, **relative measurement** **ΔREL**, Hold, Min-Max, display illumination, connector sockets, 60 mm clamp opening, CAT IV 1000 V | **METRA*Clip 88*** | M312M |

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

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