

# METRAClip85 and 86 Clamp Multimeters

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- **Current and frequency measurement via clamp meter:**  
600 A AC TRMS and 900 A DC  
(automatic or manual switching)
- **Multimeter functions via connector sockets:**  
V (AC TRMS and DC) up to 1000 V voltage/frequency measurement  
 $\Omega$  Resistance and continuity test (acoustic):  
Indication if a programmable threshold is fallen short of  
→ Diode test
- **Additional measurements:**  
Relative and differential measurements  
**METRAClip85:** Temperature in °C/°F via type K thermocouple  
Adapter function  
**METRAClip86:** Power (W/VA/var), power factor,  
THD measurement  
Phase sequence (2-wire connection)
- **Compact and user-friendly**  
One-hand operation and illuminated digital display
- **Extremely safe** thanks to CAT IV 600 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 (**METRAClip86** 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

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/<br>VDE 0411-1                                    | Safety regulations for electrical equipment for measurement, control and laboratory use   |
| IEC 61010-2-030:2010,<br>DIN EN 61010-2-030:2010,<br>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,<br>DIN EN 61010-2-032:2012,<br>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<br>VDE 0843, part 20  | Electrical equipment for control technology and laboratory use – EMC requirements   |

# METRAClip85 and 86 Clamp Multimeters

## Common Measuring Functions of the METRAClip85 and the METRAClip86

### Measurements via Connector Sockets

#### Voltage, V DC

| Measuring Range  | Resolution | Intrinsic Error under Reference Conditions  |
|------------------|------------|---|
| 0.00 ... 59.99 V | 10 mV      | 0.00 V ... 5.99 V:<br>$\pm(1.0\% \text{ rdg.} + 10 \text{ d})$<br>6.00 V ... 59.99 V<br>$\pm(1.0\% \text{ rdg.} + 3 \text{ d})$ |
| 60.0 ... 599.9 V | 100 mV     | $\pm(1.0\% \text{ rdg.} + 3 \text{ d})$   |
| 600 ... 1000 V   | 1 V        |   |

Input impedance 10 M $\Omega$

#### Voltage, V AC (TRMS)

| Measuring Range  | Resolution | Intrinsic Error under Reference Conditions  |
|--|------------|---|
| 0.15 ... 59.99 V   | 10 mV      | 0.15 V ... 5.99 V:<br>$\pm(1.0\% \text{ rdg.} + 10 \text{ d})$<br>6.00 V ... 59.99 V<br>$\pm(1.0\% \text{ rdg.} + 3 \text{ d})$ |
| 60.0 ... 599.9 V   | 100 mV     | $\pm(1.0\% \text{ rdg.} + 3 \text{ d})$   |
| 600 ... 1000 V <sub>TRMS</sub><br>600 ... 1400 V <sub>peak</sub> | 1 V        |   |

AC frequency range 45 ... 65 Hz (reference range)  
10 Hz ... 3 kHz (bandwidth)

Input impedance 10 M $\Omega$

#### Frequency Measurement for Alternating Voltage

| Measuring Range   | Resolution | Intrinsic Error under Reference Conditions |
|-------------------|------------|--|
| 5.0 ... 599.9 Hz  | 0.1 Hz     | $\pm(0.4\% \text{ rdg.} + 1 \text{ d})$    |
| 600 ... 5999 Hz   | 1 Hz       |  |
| 6.0 ... 19.99 kHz | 10 Hz      |  |

#### Continuity Testing $\Omega$ (acoustic, programmable threshold up to 40 $\Omega$ )

| Measuring Range        | Resolution   | Intrinsic Error under Reference Conditions * |
|------------------------|--------------|--|
| 0.0 ... 599.9 $\Omega$ | 0.1 $\Omega$ | $\pm(1.0\% \text{ rdg.} + 5 \text{ d})$      |

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

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

#### Resistance Measurement $\Omega$

| Measuring Range           | Resolution   | Intrinsic Uncertainty under Reference Conditions <sup>1</sup> |
|---------------------------|--------------|---|
| 0.0 ... 59.9 $\Omega$     | 0.1 $\Omega$ | $\pm(1.0\% \text{ rdg.} + 10 \text{ d})$                      |
| 0.0 ... 599.9 $\Omega$    | 0.1 $\Omega$ | $\pm(1.0\% \text{ rdg.} + 5 \text{ d})$                       |
| 600 ... 5999 $\Omega$     | 1 $\Omega$   |   |
| 6.00 ... 59.99 k $\Omega$ | 10 $\Omega$  |   |

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

Measuring current 600  $\Omega$  range: 550  $\mu\text{A}$

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

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

#### Diode Test

| Measuring Range      | Resolution | Intrinsic Uncertainty under Reference Conditions     |
|----------------------|------------|--|
| 0.000 ... 3.199 V DC | 1 mV       | $\pm(1.0\% \text{ rdg.} + 10 \text{ d})$ METRAClip85 |
| 0.000 ... 3.199 V DC | 1 mV       | $\pm(1.0\% \text{ rdg.} + 3 \text{ d})$ METRAClip86  |

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

### Measurements via Current Clamp

#### Current, A DC

| Measuring Range  | Resolution | Intrinsic Uncertainty under Reference Conditions |
|------------------|------------|--|
| 0.00 ... 59.99 A | 10 mA      | $\pm(1\% \text{ rdg.} + 10 \text{ d})$           |
| 60.0 ... 599.9 A | 100 mA     | $\pm(1\% \text{ rdg.} + 3 \text{ d})$            |
| 600 ... 900 A    | 1 A        |  |

#### Current, A AC (TRMS)

| Measuring Range  | Resolution | Intrinsic Uncertainty under Reference Conditions |
|------------------|------------|--|
| 0.15 ... 59.99 A | 10 mA      | $\pm(1\% \text{ rdg.} + 10 \text{ d})$           |
| 60.0 ... 599.9 A | 100 mA     | $\pm(1\% \text{ rdg.} + 3 \text{ d})$            |
| 600 A            | 1 A        | $\pm(1.5\% \text{ rdg.} + 3 \text{ d})$          |

AC frequency range 45 ... 65 Hz (reference range)  
10 Hz ... 2 kHz (bandwidth)

#### Frequency Measurement for Direct Voltage

| Measuring Range  | Resolution | Intrinsic Uncertainty under Reference Conditions |
|------------------|------------|--|
| 5.0 ... 599.9 Hz | 0.1 Hz     | $\pm(0.4\% \text{ rdg.} + 1 \text{ d})$          |
| 600 ... 2999 Hz  | 1 Hz       | $\pm(0.4\% \text{ rdg.} + 1 \text{ d})$          |

#### True inrush, A AC/DC

| Measuring Range | Resolution | Intrinsic Uncertainty under Reference Conditions |
|-----------------|------------|--|
| 6 ... 600 A AC  | 1 A        | $\pm(5\% \text{ rdg.} + 5 \text{ d})$            |
| 6 ... 900 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

#### Key

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

# METRAClip85 and 86 Clamp Multimeters

## Special Measuring Functions of the METRAClip85

### Measurements via Connector Sockets

#### Temperature Measurement with type K Thermocouple

| Measuring Range     | Resolution | Intrinsic Error <sup>1</sup> under Reference Conditions |
|---------------------|------------|---|
| -60.0 ... 599.9 °C  | 0.1 °C     | 1% rdg. ±3 °C   |
| -76.0 ... 1111.8 °F | 0.1 °F     |   |
| +600 ... +1200 °C   | 1 °C       | 1% rdg. ±5.4 °F   |
| +1112 ... +2192 °F  | 1 °F       |   |

<sup>1</sup> Plus sensor deviation

#### Technical Data of Type K Thermocouple

Measuring Range 0 ... 200 °C  
Length of sense 1000 ±20 mm

#### Adapter Function – Measurement Type: DC

| Measuring Range  | Resolution | Intrinsic Error under Reference Conditions |
|------------------|------------|--|
| 0.0 ... 599.9 mV | 0.1 mV     | ±(1.0% rdg. + 3 d)                         |
| 0.60 ... 5.99 V  | 10 mV      |  |

Input impedance 10 MΩ

#### Adapter Function – Measurement Type: AC

| Measuring Range  | Resolution | Intrinsic Error under Reference Conditions  |
|------------------|------------|---|
| 5.0 ... 599.9 mV | 0.1 mV     | 5.0 ... 59.9 mV:<br>±(1.0% rdg. + 10 d)<br>60.0 ... 599.9 mV:<br>±(1.0% rdg. + 3 d) |
| 0.60 ... 5.99 V  | 10 mV      | ±(1.0% rdg. + 3 d)  |

Input impedance 10 MΩ

#### Apparent Power (AC, DC+AC)

| Measuring Range   | Resolution | Intrinsic Error under Reference Conditions |
|---|------------|--|
| 5 ... 5999 VA   | 1 VA       | ±(2.0% rdg. + 10 d)                        |
| 6.00 ... 59.99 kVA  | 10 VA      | ±(2.0% rdg. + 3 d)                         |
| 60.0 ... 599.9 kVA  | 100 VA     |  |
| AC: 600 kVA <sup>2</sup><br>DC+AC: 600 ... 900 kVA <sup>1</sup> | 1 kVA      |  |

<sup>1</sup> Overload display for measured power values > 900 kVA in single-phase systems (1000 V x 900 A)

<sup>2</sup> Overload display for measured power values > 600 kVA in single-phase systems (1000 V x 600 A)

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

#### Reactive Power (AC, DC+AC)

| Measuring Range   | Resolution | Intrinsic Error under Reference Conditions |
|---|------------|--|
| 5 ... 5999 var  | 1 var      | ±(2.0% rdg. + 10 d)                        |
| 6.00 ... 59.99 kvar   | 10 var     | ±(2.0% rdg. + 3 d)                         |
| 60.0 ... 599.9 kvar   | 100 var    |  |
| AC: 600 kvar <sup>2</sup><br>DC+AC: 600 ... 900 kvar <sup>1</sup> | 1 kvar     |  |

<sup>1</sup> Overload display for measured power values > 900 kvar in single-phase systems (1000 V x 900 A)

<sup>2</sup> Overload display for measured power values > 600 kvar in single-phase systems (1000 V x 600 A)

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

#### Power Factor PF

| Measuring Range | Resolution | Intrinsic Error under Reference Conditions |
|-----------------|------------|--|
| 0.00 ... 0.49   | 0.01       | ±(3% rdg. + 2 d)                           |
| 0.50 ... 1.00   |            | ±(2% rdg. + 3 d)                           |

## Special Measuring Functions of the METRAClip86

### Measurements via Current Clamp and Connector Sockets

#### Active Power (DC/AC, DC+AC)

| Measuring Range  | Resolution | Intrinsic Error under Reference Conditions |
|--|------------|--|
| DC: 0 ... 5999 W<br>AC: 5 ... 5999 W<br>DC+AC: 5 ... 5999 W                                      | 1 W        | ±(2.0% rdg. + 10 d)                        |
| 6.00 ... 59.99 kW  | 10 W       | ±(2.0% rdg. + 3 d)                         |
| 60.0 ... 599.9 kW  | 100 W      |  |
| DC: 600 ... 900 kW <sup>1</sup><br>AC: 600 kW <sup>2</sup><br>DC+AC: 600 ... 900 kW <sup>1</sup> | 1 kW       |  |

<sup>1</sup> Overload display for measured power values > 900 kW in single-phase systems (1000 V x 900 A)

<sup>2</sup> Overload display for measured power values > 600 kW in single-phase systems (1000 V x 600 A)

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

#### 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

#### Phase Sequence

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

# METRAClip85 and 86 Clamp Multimeters

## Common Data for the METRAClip85 and the METRA-Clip86

### LCD with Blue Background Illumination

|                  |                      |
|------------------|----------------------|
| Display          | 7-segment characters |
| Number of places | 4-place, 6000 digits |
| Dimensions       | 222 x 78 mm          |

### Reference Conditions

|  |              |
|--|--------------|
| Ambient temperature                      | +23 °C ±2 °C |
| Relative humidity                        | 45 to 75 %   |
| Battery voltage                          | 9.0 V ±0.5 V |
| Frequency of AC components in the signal | 45 ... 65 Hz |
| Crest factor of measured AC signals      | $\sqrt{2}$   |
| Conductor position                       | Centered     |
| Neighboring conductor                    | None         |
| AC magnetic field                        | None         |
| Electrical field                         | None         |

### Power Supply

|                    |  |
|--------------------|--|
| Battery            | 9 V, IEC 6LF22, 6LR61 or NEDA 1604   |
| Service life       | Average:<br><b>METRAClip85:</b><br>> 130 hours (without display illumination)<br><b>METRAClip86:</b><br>> 120 hours (without display illumination) |
| Automatic shutdown | After 10 minutes   |

### Electrical Safety

|                    |   |
|--------------------|---|
| Protection class   | II (total insulation) per IEC 61010-1/<br>EN 61010-1/VDE 0411-1 |
| Measuring category | CAT III 1000 V or CAT IV 600 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 /<br>interference immunity | EN 61326-1, residential areas |
|--|-------------------------------|

### Mechanical Design

|               |                                   |
|---------------|-----------------------------------|
| Protection    | Housing: IP 54, clamp jaws: IP 40 |
| Clamp opening | Max. 34 mm diameter               |
| Dimensions    | H x W x D: 222 x 78 x 42 mm       |
| Weight        | Approx. 340 g                     |

## Scope of Delivery, METRAClip85

- 1 Clamp multimeter
- 2 Measurement cables (red and black, 1.6 m long), each with contact protected plug, CAT IV 1000 V/15 A
- 1 Type K thermocouple with banana plugs
- 1 9 V battery
- 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



Type K thermocouple with banana plugs

## Scope of Delivery, METRAClip86

- 1 Clamp multimeter
- 2 Measurement cables (red and black, 1.6 m long), each with contact protected plug and plug-on test probe, 1000 V/15 A CAT IV
- 1 Alligator clip, black, CAT IV 1000 V/15 A
- 1 9 V battery
- 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

# METRAClip85 and 86 Clamp Multimeters

## Order Information

| Description   | Type               | Article number |
|---|--------------------|----------------|
| TRMS clamp multimeter, 1000 V AC/DC, 600 A AC, 900 A DC, frequency measurement: 20 kHz/V ... 3 kHz/A, automatic AC/DC detection, relative measurement $\Delta$ dREL, Hold, Min-Max, resistance measurement, diode test, acoustic continuity test, <b>temperature in °C/°F</b> , display illumination, connector sockets, clamp opening: 34 mm, CAT IV 600 V / CAT III 1000 V  | <b>METRAClip85</b> | M312J          |
| TRMS clamp multimeter, 1000 V AC/DC, 1400 Vpeak AC+DC, 600 A AC, 900 A DC, 900 Apeak AC+DC, frequency measurement: 20 kHz/V ... 3 kHz/A, <b>THD measurement, power measurement: 600 kW, display for W/VA/var/PF, phase sequence (2-wire connection)</b> , automatic AC/DC detection, relative measurement $\Delta$ REL, Hold, Min-Max, resistance measurement, diode test, acoustic continuity test, display illumination, connector sockets, clamp opening: 34 mm, CAT IV 600 V / CAT III 1000 V | <b>METRAClip86</b> | M312K          |
| <b>Accessories for METRAClip85</b>  |                    |                |
| Very quick temperature probe for surfaces (T90 = 2 s) Thermoelement K (NiCr-Ni), - 50 ... + 400 °C  | TF400 SURFACE      | Z102E          |
| Flexible AC Current Probe 30/300/3000 A sensor length 61 cm (24"), battery supply, 3 V output on 4 mm safety plugs, Operating Instructions  | METRAFLEX 3000     | Z207E          |

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

# METRA*Clip*85 and 86 Clamp Multimeters

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