GOSSEN METRAWATT

METRAClip85 and 86
Clamp Multimeters

3-349-794-03
1/8.14

- **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
  Ω 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

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 (**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 $V_{DC\ or\ TRMS}$.

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	Electrical equipment for control technology and labora-

METRAClip85 and 86
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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: ±(1.0% rdg. + 10 d) 6.00 V ... 59.99 V ±(1.0% rdg. + 3 d)
60.0 … 599.9 V	100 mV	±(1.0% rdg. +3 d)
600 … 1000 V	1 V	

Input impedance 10 MΩ

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: ±(1.0% rdg. + 10 d) 6.00 V ... 59.99 V ±(1.0% rdg. + 3 d)
60.0 … 599.9 V	100 mV	±(1.0% rdg. +3 d)
600 … 1000 V_{TRMS} 600 … 1400 V_{peak}	1 V	

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

Input impedance 10 MΩ

Frequency Measurement for Alternating Voltage

Measuring Range	Resolution	Intrinsic Error under Reference Conditions
5.0 … 599.9 Hz	0.1 Hz	±(0,4% rdg. +1 d)
600 … 5999 Hz	1 Hz	
6.0 … 19.99 kHz	10 Hz	

Continuity Testing Ω (acoustic, programmable threshold up to 40 Ω)

Measuring Range	Resolution	Intrinsic Error under Reference Conditions *
0.0 … 599.9 Ω	0.1 Ω	±(1.0% rdg. +5 d)

Open-circuit voltage ≤ 3.6 V
Measuring current 550 µA

Resistance Measurement Ω

Measuring Range	Resolution	Intrinsic Uncertainty under Reference Conditions [1]
0.0 … 599.9 Ω	0.1 Ω	±(1.0% rdg. +5 d)
600 … 5999 Ω	1 Ω	
6.00 … 59.99 kΩ	10 Ω	

Open-circuit voltage ≤ 3.6 V
Measuring current 600 Ω range: 550 µA
6 kΩ range: 100 µA
60 kΩ range: 10 µA

Diode Test

Measuring Range	Resolution	Intrinsic Uncertainty under Reference Conditions
0.000 … 3.199 V DC	1 mV	±(1.0% rdg. + 10 d) **METRAClip85**
0.000 … 3.199 V DC	1 mV	±(1.0% rdg. + 3 d) **METRAClip86**

Measurements via Current Clamp

Current. A DC

Measuring Range	Resolution	Intrinsic Uncertainty under Reference Conditions
0.00 … 59.99 A	10 mA	±(1% rdg. + 10 d)
60.0 … 599.9 A	100 mA	±(1% rdg. + 3 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	±(1% rdg. + 10 d)
60.0 … 599.9 A	100 mA	±(1% rdg. + 3 d)
600 A	1 A	±(1.5% rdg. + 3 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	±(0.4% rdg. +1 d)
600 … 2999 Hz	1 Hz	±(0.4% rdg. +1 d)

True inrush, A AC/DC

Measuring Range	Resolution	Intrinsic Uncertainty under Reference Conditions
6 … 600 A AC	1 A	±(5% rdg. + 5 d)
6 … 900 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

Key

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

Special Measuring Functions of the METRAClip85

Measurements via Connector Sockets

Temperature Measurement with type K Thermocouple

Measuring Range	Resolution	Intrinsic Error [1] under Reference Conditions
-60.0 … 599.9 °C -76.0 … 1111.8 °F	0.1 °C 0.1 °F	1% rdg. ±3 °C 1% rdg. ±5.4 °F
+600 … +1200 °C +1112 … +2192 °F	1 °C 1 °F	

[1] 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: ±(1.0% rdg. + 10 d) 60.0 … 599.9 mV: ±(1.0% rdg. + 3 d)
0.60 … 5.99 V	10 mV	±(1.0% rdg. + 3 d)

Input impedance 10 MΩ

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 AC: 5 … 5999 W 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[1] AC: 600 kW [2] DC+AC: 600 … 900 kW[1]	1 kW	

[1] Overload display for measured power values > 900 kW in single-phase systems (1000 V x 900 A)
[2] 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

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[2] DC+AC: 600 … 900 kVA[1]	1 kVA	

[1] Overload display for measured power values > 900 kVA in single-phase systems (1000 V x 900 A)
[2] 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[2] DC+AC: 600 … 900 kvar[1]	1 kvar	

[1] Overload display for measured power values > 900 kvar in single-phase systems (1000 V x 900 A)
[2] 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)

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) A: ±(5.0% rdg. ± 5 d)
THDf: 0.0 … 1000%	0.1%	V: ±(5.0% rdg. ± 2 d) 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 METRAClip86

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: **METRAClip85**: > 130 hours (without display illumination) **METRAClip86**: > 120 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 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 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

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

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 ΔdREL, Hold, Min-Max, resistance measurement, diode test, acoustic continuity test, **temperature in °C/°F**, display illumination, connector sockets, clamp opening: 34 mm, CAT IV 600 V / CAT III 1000 V	**METRAClip85**	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, **THD measurement, power measurement: 600 kW, display for W/VA/var/PF, phase sequence (2-wire connection)**, automatic AC/DC detection, relative measurement ΔREL, 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	**METRAClip86**	M312K
Accessories for METRAClip85		
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