CHAUVIN® ARNOUX
CHAUVIN ARNOUX GROUP

# Current Clamps Catalogue

Measure up

# About the CHAUVIN ARNOUX GROUP

Founded in 1893 by Raphaël Chauvin and René Arnoux, **CHAUVIN ARNOUX** is an expert in the measurement of electrical and physical quantities in the industrial and tertiary sectors.

Total control of product design and manufacturing in-house enables the Group to innovate constantly and to propose a very broad product and service offering meeting all its customers' needs.

The Group's quality policy enables it to deliver products which comply with the specifications, as well as the international and national standards, in the metrological, environmental and user-safety sectors.

**"CHAUVIN ARNOUX is a major force on the measurement market in France and internationally"**

### Your partner:

- energy performance
- regulatory testing
- environmental measurements
- installation supervision and sizing.

### A few figures

- 100 million euros of sales revenues
- 10 subsidiaries spread across the world
- 900 employees
- 7 production sites
- 6 R&D departments worldwide
- 11 % of revenues invested in R&D

CONCEPTION FABRICATION FRANÇAISE

# The Current CLamps Catalogue

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## Clamps and flexible probes "accessories"



See last page for details of "made to order" model.



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# Current clamps

## A modern method for measuring electrical currents

### INTRODUCTION

Clamp are designed to extend the current measuring capabilities of DMMs, power instruments, oscilloscopes, hand-held scopes, recorders or loggers, and other diverse instruments.
The clamp is placed around the current-carrying conductor to perform non-contact current measurements without interrupting the circuit under test. The clamp outputs current or voltage signals directly proportional to the measured current, thereby providing current measuring and displaying capabilities to instruments with low current or voltage inputs.

When making a measurement, the current-carrying conductor circuit is not broken and remains electrically isolated from the instrument's input terminals. As a result, the instrument's low input terminal may be either floated or earthed. It is not necessary to interrupt the power supply when using a current clamp for taking measurements, so costly downtime can be eliminated.
True RMS measurements within the clamp's frequency response are possible by using most Chauvin Arnoux current clamps with a true RMS multimeter.

In most cases, RMS measurements are not limited by the clamps, but by the instrument to which they are connected. Best results are provided by clamps offering inherent high accuracy, good frequency response, and minimal phase shift.

Several Chauvin Arnoux® clamps are patented for their unique circuitry and design.

### AC CURRENT CLAMPS

- **Theory of Operation:**

An AC current clamp may be viewed as a variant of a simple current transformer.

A transformer (figure 1) is essentially two coils wound on a common iron core. A current I1 is applied through the coil B1, inducing through the common core a current I2 in the coil B2.
The number of turns of each coil and the current are related by:

$$N1 \times I1 = N2 \times I2$$

where N1 and N2 are the number of turns in each coil.

From this relationship:

$$I2 = N1 \times I1/N2 \text{ or } I1 = N2 \times I2/N1.$$

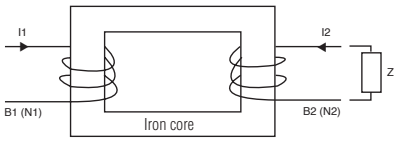



*Figure 1*

This same principle is applied to a current clamp (figure 2). The articulated magnetic core holds the coil B2 and clamps onto a conductor where the current I1 is flowing.
B1 is simply the conductor where the user is measuring the current with the number of turns N1 equal to one. The current sensor clamped around the conductor provides an output proportional to the number of turns in its coil B2, such that:

$$I2 \text{ (clamp output)} = N1/N2 \times I1$$

where N1 = 1 or clamp output = I1/N2 (number of turns in the clamp's coil).

It is often difficult to measure I1 directly because of currents which are too high to be fed directly into a meter or simply because breaking into the circuit is not possible. To provide a manageable output level, a known number of turns is made on the clamp's coil.

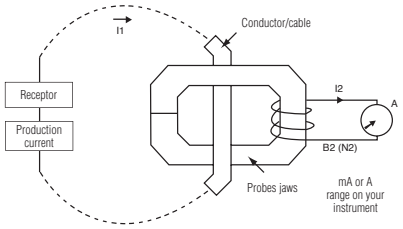



*Figure 2*

The number of turns in the winding of the clamp is usually a whole number (e.g. 100, 500 or 1,000). If N2 equals 1000, then the clamp has a ratio of N1/N2 or 1/1000, which is expressed as 1000:1.

Another way to express this ratio is to say that the clamp output is 1 mA/A - the clamp output is 1 mA (I2) for 1 A (or 1 A @ 1,000 A) flowing in the jaw window.
There are numerous other ratios possible: 500:5, 2000:2, 3000:1, 3000:5, etc. for different applications.

The most common application is the use of a current clamp with a digital multimeter. Take as an example a current clamp with a ratio of 1000:1 (model C100) with an output of 1 mA/A. This ratio means that any current flowing through the probe jaws will result in a current flowing at the output:

| Conductor input | Clamp output |
|---|---|
| 1,000 A | 1 A |
| 750 A | 750 mA |
| 250 A | 250 mA |
| 10 A | 10 mA |

The clamp output is connected to a DMM set on the AC current range to handle the clamp output. Then, to determine the current in the conductor, multiply the reading of the DMM by the ratio (e.g., 150 mA read on the 200 mA DMM range represents 150 mA x 1000 = 150 A in the conductor measured).

Current clamps may be used with other instruments with current ranges, provided that these instruments have the required input impedance (see figure 3).

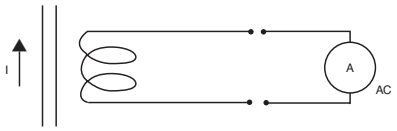



*Figure 3*

Current clamps may also have AC or DC voltage outputs to accommodate current measurements with instruments (loggers, scopes, etc.) with voltage ranges only (figures 4 and 5).

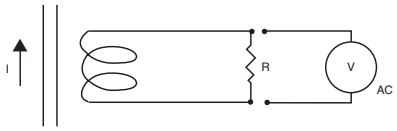



*Figure 4*

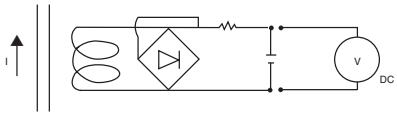



*Figure 5*

This is simply done by conditioning the current clamp output inside the clamp to provide voltage (e.g., model Y4N or MINI09). In these cases, the probe mV output is proportional to the measured current.

# Current clamps

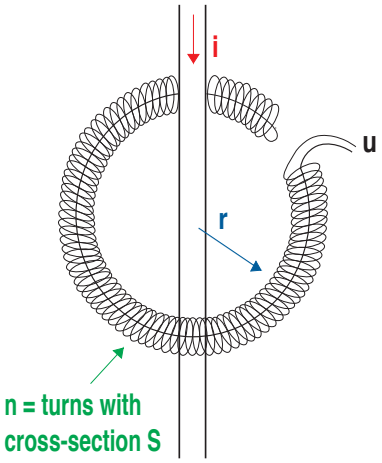
## A modern method for measuring electrical currents

### • Operating principle

The AmpFlex® and MiniFlex® sensors are based on the principle of the Rogowski coil.
The primary circuit is constituted by the conductor carrying the alternating current to be measured, while the secondary is formed by a special coil wound on a flexible support.
At its terminals, this coil develops a voltage proportional to the derivative of the primary current to be measured:

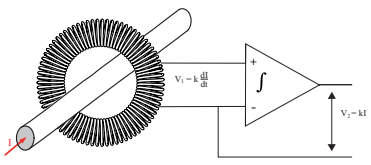
$$u = \frac{\mu_0 . n}{2\pi . r} \times S . \frac{di}{dt}$$

where $\mu_0$ = vacuum permeability
S = surface area of a turn
n = number of turns
r = core radius




*Rogowski coil*

This AC voltage u is then passed via a screened cable to the casing containing all the processing electronics and the battery power supply. Because there are not magnetic circuits on these sensors, they are very lightweight and flexible. Without magnetic circuits, there is no saturation effect or overheating. This feature offers ensures excellent linearity and low phase shift.



## AC/DC CLAMP-ON CURRENT PROBES

### • Theory of Operation (Hall effect)

Unlike on traditional AC transformers, AC/DC current measurement is often achieved by measuring the strength of a magnetic field created by a current-carrying conductor in a semiconductor chip using the Hall-effect principle.
When a thin semiconductor (figure 6) is placed at right angles to a magnetic field (B), and a current (Id) is applied to it, a voltage (Vh) is developed across the semiconductor. This voltage is known as the Hall voltage, named after the US scientist Edwin Hall who first reported the phenomenon.

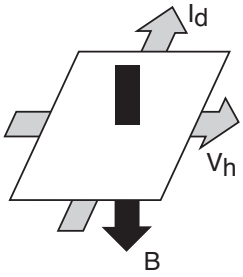



*Figure 6*

When the Hall device drive current (Id) is held constant, the magnetic field (B) is directly proportional to the current in a conductor. Thus, the Hall output voltage (Vh) is representative of that current.
Such an arrangement has two important benefits for universal current measurement.

First, since the Hall voltage is not dependent on a reversing magnetic field, but only on its strength, the device can be used for DC measurement.
Second, when the magnetic field strength varies due to varying current flow in the conductor, response to change is instantaneous.
Thus, complex AC wave forms may be detected and measured with high accuracy and low phase shift.

The basic construction of a clamp jaw assembly is shown in figure 7, (note: one or two Hall generators are used depending on the type of current clamp).

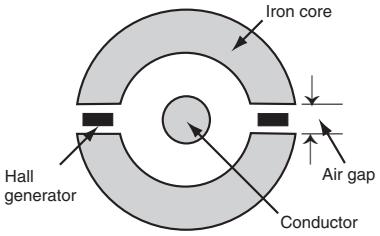



*Figure 7*

The Chauvin Arnoux AC/DC current clamps were developed using the above principle, together with patented electronic circuitry incorporating signal conditioning for linear output and a temperature compensation network. These have a wide dynamic range and frequency response with highly accurate linear output, for application in all areas of current measurement up to 1,500 A. Direct currents can be measured without the need of expensive, power-consuming shunts, and alternating currents up to several kHz can be measured accurately to respond to the requirements of complex signals and RMS measurements.

The clamp outputs are in mV (mV DC when measuring DC, and mV AC when measuring AC) and may be connected to most instruments with a voltage input, such as DMMs, loggers, oscilloscopes, handheld scopes, recorders, etc.

Chauvin Arnoux also offers various technologies for DC measurements, as in the K1 and K2, designed to measure very low DC currents and using saturated magnetic circuit technology.
The AC/DC clamps also offer the opportunity to display or measure True RMS in AC or AC+DC.

# Current clamps

## A modern method for measuring electrical currents

### AC OR DC CURRENT MEASUREMENT

- Connect the clamp to the instrument
- Select the function and range
- Clamp the clamp around a single conductor
- Read the conductor's current value

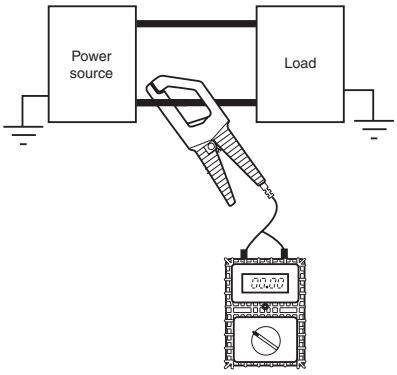
**Examples** (figure 8):

**AC: clamp model: Y2N**
Ratio: 1000:1
Output: 1 mA AC/A AC
DMM: set to 200 mA AC range
DMM reading: 125 mA AC
Current in conductor:
125 mA x 1000 = 125 A AC

**DC: clamp model: PAC 21**
1 mV DC/A DC (Hall sensor)
DMM: set to 200 mV DC range
DMM reading: 160 mV DC
Current in conductor: 160 A DC

**AC: clamp model: PAC 11**
Output: 1 mV AC/A AC
(Hall sensor)
DMM: set to 200 mV AC range
DMM reading: 120 mV AC
Current in conductor: 120 A AC

**DC: micro clamp K1**
Output: 1 mV/mA
DMM: set to 200 mV DC range
DMM reading: 7.4 mV DC
Current in conductor: 7.4 mA




• *Figure 8*

### MEASUREMENTS OF LOW CURRENTS, PROCESS LOOPS AND LEAKAGE CURRENTS

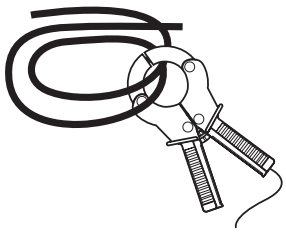
Numerous clamps are offered for low current measurements. For example, models K1 and K2 have a 50 mA DC sensitivity and the model K2 may be used on 4-20 mA process loops.

**Example: 4-20 mA loop**
**Clamp model: K2**
Output: 10 mV/mA
DMM: set to 200 mV DC range
DMM reading: 135 mV DC
Loop current: 13.5 mA DC

When the current to be measured is too low for the clamp or better accuracy is required, it is possible to insert the conductor multiple times through the probe jaws. The value of the current is the ratio of the reading to the number of turns.

**Example:** figure 9

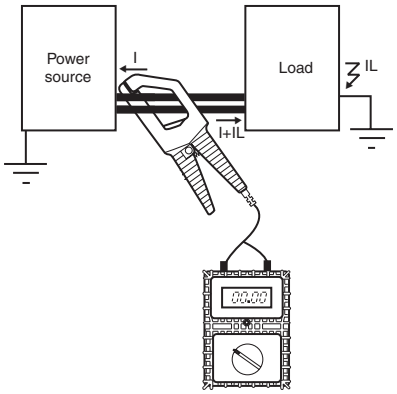
**Clamp model: C100**
Ratio: 1000:1
DMM: set to 200 mA AC range
Turns in clamp jaw: 10
DMM reading: 60 mA AC
Current in conductor:
60 mA x 1,000 / 10 = 6,000 mA = 6 A



• *Figure 9*

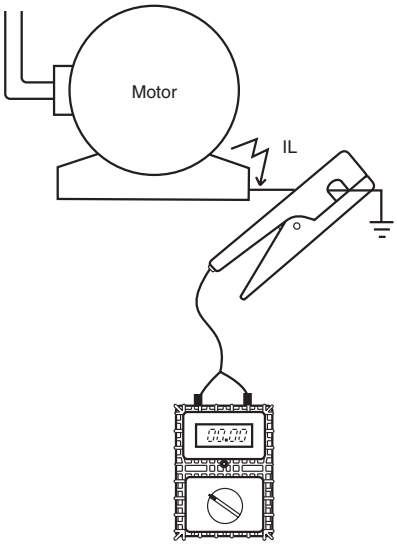
When the clamp is placed around two conductors with different polarities, the resulting reading will be the difference between the two currents. If the currents are the same, the reading will be zero (figure 10).

When a reading other than zero is obtained, the reading is the amount of leakage current on the load.




• *Figure 10*

To measure low currents or leakage, you need a clamp which will measure low values, such as the model B102 or C173. However, earth leakage currents may also be measured directly with the simple model (figure 11).




• *Figure 11*

**Example:** figure 11

**MINI 05**
Ratio: 1 mV AC/mA AC
DMM: set to 200 mA AC range
DMM reading: 10 mV AC
Leakage current: 10 mA AC

# Current clamps

## A modern method for measuring electrical currents

### SELECTING A CURRENT PROBE

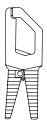
Answering the following questions will help you to select the appropriate clamp for your applications:

1. Determine if you are measuring AC or DC (DC current clamps are categorized as AC/DC because they measure both).
2. What is the the maximum current you will measure, and what is the minimum current you will measure? Check that the accuracy at low levels is appropriate, or select a low-current measurement clamp. Most clamps perform with greater accuracy at the upper end of their range. Several clamps are designed to measure very low DC or AC.
3. What size conductor will you clamp onto? This parameter determines the clamp jaw size needed.
4. What type of clamp output do you need or can you work with (mA, mV, AC, DC, etc.)? Check the maximum receiver impedance to ensure that the clamp will perform to specifications.

Other factors you may want to consider:

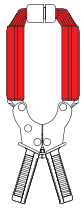
- What is the working voltage of the conductor to be measured ?
- Chauvin Arnoux clamps must not be used above 600 volts (see specifications).
- What type of termination do you need: sockets, banana leads or BNC leads ?
- Will the probe be used for harmonics or power clamp ?
  Look at the frequency specifications and phase shift specifications.

# Measurement of AC current

| Series | Model | Input: Measuring range [1] – Very weak current | Input: Measuring range [1] – Weak current | Input: Measuring range [1] – Medium current | Input: Measuring range [1] – Strong current | Input – AC | Input – DC | Output - Connections – Current | Output - Connections – Voltage | Output - Connections – Lead + Ø 4 mm safety connectors [3] | Output - Connections – Ø 4 mm female sockets | Output - Connections – BNC connector (coaxial) | Specific features – Transformation ratio (input/output) | Specific features – Output protected against voltage surges | Specific features – Automatic DC voltage | Specific features – Measurement of power (slight phase shift) | Specific features – Bandwidth (frequency in Hz) | Specific features – Typical accuracy | To order |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  Chap. 1 | **MINI 01** | | 2 A .. 150 A | | | ● | | 0.15 A AC | | ● | | | 1000/1 | ● | | | 48 Hz .. 500 Hz | ≤ 2.5 % | P01105101Z |
| | **MINI 02** | 50 mA .. 100 A | | | | ● | | 0.1 A AC | | ● | | | 1000/1 | ● | | ● | 48 Hz .. 10 kHz | ≤ 1 % | P01105102Z |
| | **MINI 03** | | 1 A .. 100 A | | | ● | | | 0.1 V AC | ● | | | 1 A / 1 mV | | | | 48 Hz .. 500 Hz | ≤ 2 % | P01105103Z |
| | **MINI 05** | 5 mA .. 10 A<br>1 A .. 100 A | | | | ● | | | 10 V AC<br>0.1 V AC | ● | | | 1 mA / 1 mV<br>1 A / 1 mV | | | | | ≤ 3 %<br>≤ 2 % | P01105105Z |
| | **MINI 09** | | 1 A .. 150 A | | | ● | | | 15 V DC | ● | | | 1 A / 100 mV | | | | | ≤ 4 % | P01105109Z |
| | **MINI 102** | 0.05 A - 200 A | | | | ● | | 0.2 A AC | | ● | | | 1000/1 | ● | | | 48 Hz .. 10 kHz | ≤ 1 % | P01106102 |
| | **MINI 103** | 0.1 A - 200 A | | | | ● | | | 0.2 V AC | ● | | | 1 A / 1 mV | ● | | | | ≤ 1.5 % | P01106103 |
|  Chap. 2 | **MN 08** | | 0.5 A .. 240 A | | | ● | | 0.2 A AC | | | ● | | 1000/1 | | | | 40 Hz .. 10 kHz | ≤ 1 % | P01120401 |
| | **MN 09** | | 0.5 A .. 240 A | | | ● | | 0.2 A AC | | ● | | | 1000/1 | | | | | ≤ 1 % | P01120402 |
| | **MN 10** | | 0.5 A .. 240 A | | | ● | | 0.2 A AC | | | ● | | 1000/1 | ● | | | | ≤ 2 % | P01120403 |
| | **MN 11** | | 0.5 A .. 240 A | | | ● | | 0.2 A AC | | ● | | | 1000/1 | ● | | | | ≤ 2 % | P01120404 |
| | **MN 12** | | 0.5 A .. 240 A | | | ● | | | 2 V AC | | ● | | 1 A / 10 mV | | | | | ≤ 1 % | P01120405 |
| | **MN 13** | | 0.5 A .. 240 A | | | ● | | | 2 V AC | ● | | | 1 A / 10 mV | | | | | ≤ 1 % | P01120406 |
| | **MN 14** | | 0.5 A .. 240 A | | | ● | | | 0.2 V AC | | ● | | 1 A / 1 mV | | | | | ≤ 1 % | P01120416 |
| | **MN 15** | | 0.5 A .. 240 A | | | ● | | | 0.2 V AC | ● | | | 1 A / 1 mV | | | | | ≤ 1 % | P01120417 |
| | **MN 21** | | 0.1 A .. 240 A | | | ● | | 0.2 A AC | | ● | | | 1000/1 | ● | | | | ≤ 2 % | P01120418 |
| | **MN 23** | | 0.1 A .. 240 A | | | ● | | | 2 V AC | ● | | | 1 A / 10 mV | | | | | ≤ 1.5 % | P01120419 |
| | **MN 38** | | 0.1 A .. 24 A<br>0.5 A .. 240 A | | | ● | | | 2 V AC<br>2 V AC | | ● | | 1 A / 100 mV<br>1 A / 10 mV | | | | | ≤ 1 % | P01120407 |
| | **MN 39** | | 0.1 A .. 24 A<br>0.5 A .. 240 A | | | ● | | | 2 V AC<br>2 V AC | ● | | | 1 A / 100 mV<br>1 A / 10 mV | | | | | ≤ 1 % | P01120408 |
| | **MN 60** | | 0.1 A .. 60 A peak<br>0.5 A .. 600 A peak | | | ● | | | 6 V peak<br>6 V peak | | | ● | 1 A / 100 mV<br>1 A / 10 mV | | | | 40 Hz .. 40 kHz | ≤ 2 %<br>≤ 1.5 % | P01120409 |
| | **MN 71** | 10 mA .. 12 A | | | | ● | | | 1 V AC | ● | | | 1 A / 100 mV | | | | 40 Hz .. 10 kHz | ≤ 1 % | P01120420 |
| | **MN 73** | 10 mA .. 2,4 A<br>100 mA .. 240 A | | | | ● | | | 2 V AC<br>2 V AC | ● | | | 1 mA / 1 mV<br>1 A / 10 mV | | | | | ≤ 1 %<br>≤ 2 % | P01120421 |
| | **MN 88** | | 0.5 A .. 240 A | | | ● | | | 20 V DC [2] | | ● | | 1 A / 100 mV | | | | | ≤ 2 % | P01120410 |
| | **MN 89** | | 0.5 A .. 240 A | | | ● | | | 20 V DC [2] | ● | | | 1 A / 100 mV | | | | | ≤ 2 % | P01120415 |
|  Chap. 3 | **Y1N** | | 4 A .. 500 A | | | ● | | 0.5 A AC | | ● | | | 1000/1 | ● | | | 48 Hz .. 1 kHz | ≤ 3 % | P01120001A |
| | **Y2N** | | 4 A .. 500 A | | | ● | | 0.5 A AC | | ● | | | 1000/1 | ● | | | | ≤ 1 % | P01120028A |
| | **Y3N** | | 4 A .. 500 A | | | ● | | 5 A AC | | ● | | | 100/1 | | | | | ≤ 3 % | P01120029A |
| | **Y4N** | | 4 A .. 500 A | | | ● | | | 0.5 V DC [2] | ● | | | 500 A / 0.5 V | | | | | ≤ 1 % | P01120005A |
| | **Y7N** | | 1 A .. 1,200 A peak | | | ● | | | 1.2 V peak | | | ● | 1 A / 1 mV | | | | 5 Hz .. 10 kHz | ≤ 2 % | P01120075 |

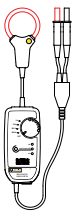
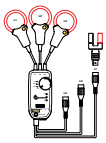
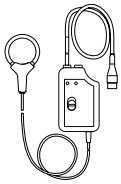
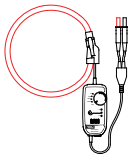
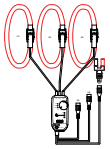
(1) The upper value corresponds to 120 % of the maximum rated value (2) Remise en forme du signal alternatif par diodes
(3) Lead + electronic unit with Ø 4 mm safety connectors, centre distance 19 mm, for K and AmpFlex®

# Measurement of AC current

| Series | Model | Input: Measuring range [1] – Very weak current | Weak current | Medium current | Strong current | AC | DC | Output - Connections: Current | Voltage | Lead + Ø 4 mm safety connectors [3] | Ø 4 mm female sockets | BNC connector (coaxial) | Specific features: Transformation ratio (input/output) | Output protected against voltage surges | Automatic DC voltage | Measurement of power (slight phase shift) | Bandwidth (frequency in Hz) | Typical accuracy | To order |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  Chap. 4 | **C100** | 0.1 A .. 1,200 A | | | | ● | | 1 A AC | | | ● | | 1000/1 | | | | 30 Hz ..10 kHz | ≤ 0.5 % | P01120301 |
| | **C102** | 0.1 A .. 1,200 A | | | | ● | | 1 A AC | | | ● | | 1000/1 | ● | | | | ≤ 0.5 % | P01120302 |
| | **C103** | 0.1 A .. 1,200 A | | | | ● | | 1 A AC | | ● | | | 1000/1 | ● | | | | ≤ 0.5 % | P01120303 |
| | **C106** | 0.1 A .. 1,200 A | | | | ● | | | 1 V AC | | ● | | 1 A / 1 mV | | | | | ≤ 0.5 % | P01120304 |
| | **C107** | 0.1 A .. 1,200 A | | | | ● | | | 1 V AC | ● | | | 1 A / 1 mV | | | | | ≤ 0.5 % | P01120305 |
| | **C112** | 1 mA .. 1,200 A | | | | ● | | 1 A AC | | | ● | | 1000/1 | ● | | ● | | ≤ 0.3 % | P01120314 |
| | **C113** | 1 mA .. 1,200 A | | | | ● | | 1 A AC | | ● | | | 1000/1 | ● | | ● | | ≤ 0.3 % | P01120315 |
| | **C116** | 1 mA .. 1,200 A | | | | ● | | | 1 V AC | | ● | | 1 A / 1 mV | | | ● | | ≤ 0.3 % | P01120316 |
| | **C117** | 1 mA .. 1,200 A | | | | ● | | | 1 V AC | ● | | | 1 A / 1 mV | | | ● | | ≤ 0.3 % | P01120317 |
| | **C122** | 1 A .. 1,200 A | | | | ● | | 5 A AC | | | ● | | 1000/5 | ● | | | | ≤ 1 % | P01120306 |
| | **C148** | | 1 A .. 300 A<br>1 A .. 600 A<br>1 A .. 1,200 A | | | ● | | 5 A AC | | | ● | | 250/5<br>500/5<br>1000/5 | ● | | | 48 Hz .. 1 kHz | ≤ 2 %<br>≤ 1 %<br>≤ 1 % | P01120307 |
| | **C160** | | 0.1 A .. 30 A peak<br>0.1 A .. 300 A peak<br>1 A .. 2,000 A peak | | | ● | | | 3 V peak<br>3 V peak<br>2 V peak | | | ● | 10 A / 1 V<br>100 A / 1 V<br>1,000 A / 1 V | | | | 10 Hz ..100 kHz | ≤ 3 %<br>≤ 2 %<br>≤ 1 % | P01120308 |
| | **C173** | 1 mA .. 1.2 A<br>0.01 A .. 12 A<br>0.1 A .. 120 A<br>1 A .. 1,200 A | | | | ● | | | 1 V AC | ● | | | 1 A / 1 V<br>10 A / 1 V<br>100 A / 1 V<br>1,000 A / 1 V | | | | 10 Hz .. 3 kHz | ≤ 0.7 %<br>≤ 0.5 %<br>≤ 0.3 %<br>≤ 0.2 % | P01120309 |
|  Chap. 5 | **D30N** | | 1 A .. 3,600 A | | | ● | | 1 A AC | | | ● | | 3000/1 | ● | | ● | 30 Hz .. 5 kHz | ≤ 0.5 % | P01120049A |
| | **D30CN** | | 1 A .. 3,600 A | | | ● | | 1 A AC | | ● | | | 3000/1 | ● | | ● | | ≤ 0.5 % | P01120064 |
| | **D31N** | | 1 A .. 600 A<br>1 A .. 1,200 A<br>1 A .. 1,800 A | | | ● | | 1 A AC | | | ● | | 500/1<br>1000/1<br>1500/1 | ● | | | 30 Hz .. 1.5 kHz | ≤ 3 %<br>≤ 1 %<br>≤ 0.5 % | P01120050A |
| | **D32N** | | 1 A .. 1,200 A<br>1 A .. 2,400 A<br>1 A .. 3,600 A | | | ● | | 1 A AC | | | ● | | 1000/1<br>2000/1<br>3000/1 | ● | | ● | 30 Hz .. 1 kHz | ≤ 1 %<br>≤ 0.5 %<br>≤ 0.5 % | P01120051A |
| | **D33N** | | 1 A .. 3,600 A | | | ● | | 5 A AC | | | ● | | 3000/5 | | | | 30 Hz .. 5 kHz | ≤ 1 % | P01120052A |
| | **D34N** | | 1 A .. 600 A<br>1 A .. 1,200 A<br>1 A .. 1,800 A | | | ● | | 5 A AC | | | ● | | 500/5<br>1000/5<br>1500/5 | | | | 30 Hz .. 1.5 kHz | ≤ 3 %<br>≤ 1 %<br>≤ 0.5 % | P01120053A |
| | **D35N** | | 1 A .. 1,200 A<br>1 A .. 2,400 A<br>1 A .. 3,600 A | | | ● | | 5 A AC | | | ● | | 1000/5<br>2000/5<br>3000/5 | | | ● | | ≤ 1 %<br>≤ 0.5 %<br>≤ 0.5 % | P01120054A |
| | **D36N** | | 1 A .. 3,600 A | | | ● | | 3 A AC | | | ● | | 3000/3 | ● | | ● | 30 Hz .. 5 kHz | ≤ 0.5 % | P01120055A |
| | **D37N** | 0.1 A .. 36 A<br>1 A .. 360 A<br>1 A .. 3,600 A | | | | ● | | | 3 V AC | | ● | | 30 A/3 V<br>300 A/3 V<br>3,000 A/3 V | | | | | ≤ 2 % | P01120056A |
| | **D38N** | | 1 A .. 90 A peak<br>1 A .. 900 A peak<br>1 A .. 9,000 A peak | | | ● | | | 0.9 V peak | | | ● | 1 A / 10 mV<br>1 A / 1 mV<br>1 A / 0.1 mV | | | | 30 Hz .. 50 kHz | ≤ 2 % | P01120057A |

(1) The upper value corresponds to 120 % of the maximum rated value
(3) Lead + electronic unit with Ø 4 mm safety connectors, centre distance 19 mm, for K and AmpFlex®

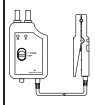
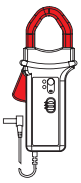
# Measurement of AC current

| Series | Model | Input: Measuring range (1) – Very weak current | Weak current | Medium current | Strong current | AC | DC | Output - Connections: Current | Voltage | Lead + Ø 4 mm safety connectors (3) | Ø 4 mm female sockets | BNC connector (coaxial) | Specific features: Transformation ratio (input/output) | Output protected against voltage surges | Automatic DC voltage | Measurement of power (slight phase shift) | Bandwidth (frequency in Hz) | Typical accuracy | To order |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  Chap. 6 | **B102** | 500 µA .. 4 A<br>0.5 A .. 400 A | | | | ● | | | 4 V AC<br>0.4 V AC | ● | | | 1 mA / 1 mV<br>1 A / 1 mV | | | | 10 Hz .. 1 kHz | ≤ 0.5 %<br>≤ 0.35 % | P01120083 |
|  Chap. 7 | **MA110<br>3-30-300-3000/3<br>(17 cm / Ø 4.5 cm)** | 0.08 A - 3 A<br>0.5 A .. 30 A<br>0.5 A .. 300 A<br>0.5 A .. 3,000 A | | | | ● | | | 3 V AC | ● | | | 1 V/A<br>100 mV/A<br>10 mV/A<br>1 mV/A | | | ● | 10 Hz .. 10 kHz<br>10 Hz .. 20 kHz<br>10 Hz .. 20 kHz<br>10 Hz .. 20 kHz | ≤ 1 % | P01120660 |
| | **MA110<br>3-30-300-3000/3<br>(25 cm / Ø 7 cm)** | | | | | ● | | | | ● | | | | | | | | | P01120661 |
| | **MA110<br>3-30-300-3000/3<br>(35 cm / Ø 10 cm)** | | | | | ● | | | | | | | | | | | | | P01120662 |
|  Chap. 7 | **MA130<br>30-300-3000/3<br>(27 cm / Ø 7 cm)** | 0.5 A .. 30 A<br>0.5 A .. 300 A<br>0.5 A .. 3,000 A | | | | ● | | | 3 V AC | | | ● | 100 mV/A<br>10 mV/A<br>1 mV/A | | | ● | 10 Hz .. 20 kHz | ≤ 1 % | P01120663 |
|  Chap. 7 | **MA200<br>30-300/3 (17 cm)** | 0.5 A .. 45 A peak<br>0.5 A .. 450 A peak | | | | ● | | | 4.5 V peak | | | ● | 100 mV/A<br>10 mV/A | | | | 5 Hz .. 1 MHz | ≤ 1 %<br>+ 0.3 A | P01120570 |
| | **MA200<br>30-300/3 (25 cm)** | 0.5 A .. 45 A peak<br>0.5 A .. 450 A peak | | | | ● | | | 4.5 V peak | | | ● | 100 mV/A<br>10 mV/A | | | | | ≤ 1 %<br>+ 0.3 A | P01120571 |
| | **MA200<br>3000/3 (35 cm)** | | 5 A .. 4,500 A peak | | | ● | | | 4.5 V peak | | | ● | 1 mV/A | | | | | ≤ 1 %<br>+ 0.3 A | P01120572 |
|  Chap. 8 | **A110<br>3-30-300-3000/3<br>(45 cm / Ø 14 cm)** | 0.08 A - 3 A<br>0.5 A .. 30 A<br>0.5 A .. 300 A<br>0.5 A .. 3,000 A | | | | ● | | | 3 V AC | ● | | | 1 V/A<br>100 mV/A<br>10 mV/A<br>1 mV/A | | | ● | 10 Hz .. 10 kHz<br>10 Hz .. 20 kHz<br>10 Hz .. 20 kHz<br>10 Hz .. 20 kHz | ≤ 1 % | P01120630 |
| | **A110<br>3-30-300-3000/3<br>(80 cm / Ø 25 cm)** | | | | | ● | | | 3 V AC | ● | | | | | | ● | | ≤ 1 % | P01120631 |
| | **A110<br>30-300-3000-30000/3<br>(120 cm / Ø 38 cm)** | 0.5 A - 30 A<br>0.5 A .. 300 A<br>0.5 A .. 3,000 A<br>0.5 A .. 30,000 A | | | | ● | | | 3 V AC | ● | | | 100 mV/A<br>10 mV/A<br>1 mV/A<br>0.1 mV/A | | | ● | 10 Hz .. 5 kHz<br>10 Hz .. 20 kHz<br>10 Hz .. 20 kHz<br>10 Hz .. 20 kHz | ≤ 1 % | P01120632 |
|  Chap. 8 | **A130<br>30-300-3000/3<br>(80 cm / Ø 25 cm)** | 0.5 A .. 30 A<br>0.5 A .. 300 A<br>0.5 A .. 3,000 A | | | | ● | | | 3 V AC | | | ● | 100 mV/A<br>10 mV/A<br>1 mV/A | | | ● | 10 Hz .. 20 kHz | ≤ 1 % | P01120633 |

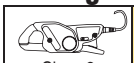
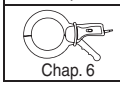
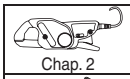
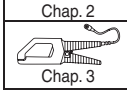
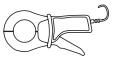
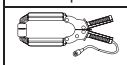
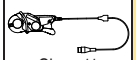
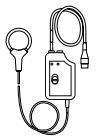
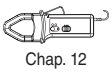
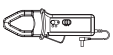
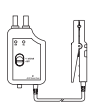
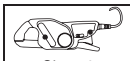
(1) The upper value corresponds to 120 % of the maximum rated value

(3) Lead + electronic unit with Ø 4 mm safety connectors, centre distance 19 mm, for K and AmpFlex®

# Measurement of AC/DC current

| Series | Model | Input: Measuring range[1] – Very weak current | Weak current | Medium current | Strong current | AC | DC | Output - Connections: Current | Voltage | Lead + Ø 4 mm safety connectors[3] | Ø 4 mm female sockets | BNC connector (coaxial) | Specific features: Transformation ratio (input/output) | Output protected against voltage surges | Automatic DC voltage | Measurement of power (slight phase shift) | Bandwidth (frequency in Hz) | Typical accuracy | To order |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  Chap. 9 | **K1** | 1 mA .. 4.5 A DC<br>1 mA .. 3 ARMS<br>1 mA .. 4.5 A peak | | | | ● | ● | | 4.5 V AC<br>3 VRMS<br>4.5 V peak | ● | | | 1 mA / 1 mV | | | | DC .. 2 kHz | ≤ 1 % | P01120067A |
| | **K2** | 100 µA .. 450 mA DC<br>100 µA .. 300 mARMS<br>100 µA .. 450 mA peak | | | | ● | ● | | 4.5 V AC<br>3 VRMS<br>4.5 V peak | ● | | | 1 mA / 10 mV | | | | DC .. 1.5 kHz | ≤ 1 % | P01120074A |
|  Chap. 10 | **E1N** | | 0.05 A .. 2 A DC<br>0.05 A .. 1.5 A AC<br>0.5 A .. 150 A AC/DC | | | ● | ● | | 2 V DC<br>1.5 V AC<br>150 mV AC/DC | ● | | | 1 A / 1 V<br>1 A / 1 mV | | | | DC .. 2 kHz<br>DC .. 8 kHz | ≤ 2 %<br>≤ 1.5 % | P01120030A |
| | **E3N** | 0.05 A .. 10 A peak<br>1 A .. 100 A peak | | | | ● | ● | | 1 V peak | | | ● | 1 A / 100 mV<br>1 A / 10 mV | | | | DC .. 100 kHz | ≤ 3 %<br>≤ 4 % | P01120043A |
| | **E6N** | 5 mA .. 2 A DC<br>5 mA .. 1.5 A AC<br>20 mA .. 80 A AC/DC | | | | ● | ● | | 2 V DC<br>1.5 V AC<br>0.8 V AC/ DC | ● | | | 1 A / 1 V<br>1 A / 10 mV | | | | DC .. 2 kHz<br>DC .. 8 kHz | ≤ 2 %<br>≤ 4 % | P01120040A |
|  Chap. 11 | **MH60** | 0.01 A .. 140 A peak | | | | ● | ● | | 1.4 V peak | | | ● | 10 mV/A | | ● | | DC .. 1 MHz | ≤ 1.5 % | P01120612 |
|  Chap. 12 | **PAC10** | | 0.5 A .. 400 A AC<br>0.5 A .. 600 A DC | | | ● | ● | | 600 mV AC/DC | ● | | | 1 A / 1 mV | | | | DC .. 5 kHz | ≤ 2 % | P01120070 |
| | **PAC11** | | 0.2 A .. 40 A AC<br>0.4 A .. 60 A DC<br>0.5 A .. 400 A AC<br>0.5 A .. 600 A DC | | | ● | ● | | 600 mV AC/DC | ● | | | 1 A / 10 mV<br>1 A / 1 mV | | ● | | DC .. 10 kHz | ≤ 1.5 %<br>≤ 2 % | P01120068 |
| | **PAC12** | | 0.2 A .. 60 A peak<br>0.4 A .. 60 A DC<br>0.5 A .. 600 A peak<br>0.5 A .. 600 A DC | | | ● | ● | | 600 mV peak | | | ● | 1 A / 10 mV<br>1 A / 1 mV | | ● | | DC .. 10 kHz | ≤ 1.5 %<br>≤ 2 % | P01120072 |
|  Chap. 12 | **PAC20** | | 0.5 A .. 1,000 A AC<br>0.5 A .. 1,400 A DC | | | ● | ● | | 1.4 V AC/DC | ● | | | 1 A / 1 mV | | | | DC .. 5 kHz | ≤ 2 % | P01120071 |
| | **PAC21** | | 0.2 A .. 100 A AC<br>0.4 A .. 150 A DC<br>0.5 A .. 1,000 A AC<br>0.5 A .. 1,400 A DC | | | ● | ● | | 1.5 V AC/DC<br>1.4 V AC/DC | ● | | | 1 A / 10 mV<br>1 A / 1 mV | | ● | | DC .. 10 kHz | ≤ 1.5 %<br>≤ 2.5 % | P01120069 |
| | **PAC22** | | 0.2 A .. 150 A peak<br>0.4 A .. 150 A DC<br>0.5 A .. 1,400 A peak<br>0.5 A .. 1,400 A DC | | | ● | ● | | 1.5 V peak<br>1.4 V peak | | | ● | 1 A / 10 mV<br>1 A / 1 mV | | ● | | DC .. 10 kHz | ≤ 1.5 %<br>≤ 2.5 % | P01120073 |

(1) The upper value corresponds to 120 % of the maximum rated value
(3) Lead + electronic unit with Ø 4 mm safety connectors, centre distance 19 mm, for K and AmpFlex®

| Series | Model | Input: Measuring range (1): Very weak current | Weak current | Medium current | Strong current | AC | DC | Output - Connections: Current | Voltage | Lead + Ø 4 mm safety connectors (3) | Ø 4 mm female sockets | BNC connector (coaxial) | Specific features: Transformation ratio (input/output) | Output protected against voltage surges | Automatic DC voltage | Measurement of power (slight phase shift) | Bandwidth (frequency in Hz) | Typical accuracy | To order |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Leakage current measurement** | | | | | | | | | | | | | | | | | | | |
|  Chap. 2 | **MN73** | 10 mA .. 2,4 A<br>100 mA .. 240 A | | | | ● | | | 2 V AC<br>2 V AC | ● | | | 1 A / 1,000 mV<br>1 A / 10 mV | | | | 40 Hz .. 10 kHz | ≤ 1 %<br>≤ 2 % | P01120421 |
|  Chap. 4 | **C173** | 1 mA .. 1.2 A<br>0.01 A .. 12 A<br>0.1 A .. 120 A<br>1 A .. 1,200 A | | | | ● | | | 1 V AC | ● | | | 1 A / 1 V<br>10 A / 1 V<br>100 A / 1 V<br>1,000 A / 1 V | | | | 10 Hz .. 3 kHz | ≤ 0.7 %<br>≤ 0.3 %<br>≤ 0.5 %<br>≤ 0.2 % | P01120309 |
|  Chap. 6 | **B102** | 500 µA .. 4 A<br>0.5 A .. 400 A | | | | ● | | | 4 V AC<br>0.4 V AC | ● | | | 1 mA / 1 mV<br>1 A / 1 mV | ● | | | 10 Hz .. 1 kHz | ≤ 0.5 %<br>≤ 0.35 % | P01120083 |
| **Measurement on oscilloscope** | | | | | | | | | | | | | | | | | | | |
|  Chap. 2 | **MN60** | 0.1 A .. 60 Apeak<br>0.5 A .. 600 Apeak | | | | ● | | | 6 Vpeak<br>6 Vpeak | | | ● | 1 A / 100 mV<br>1 A / 10 mV | | | | 40 Hz .. 40 kHz | ≤ 2 %<br>≤ 1.5 % | P01120409 |
|  Chap. 3 | **Y7N** | 1 A .. 1,200 Apeak | | | | ● | | | 1.2 Vpeak | | | ● | 1 mA / 1 mV | | | | 5 Hz .. 10 kHz | ≤ 2 % | P01120075 |
|  Chap. 4 | **C160** | 0.1 A .. 30 Apeak<br>1 A .. 300 Apeak<br>1 A .. 2,000 Apeak | | | | ● | | | 3 Vpeak<br>3 Vpeak<br>2 Vpeak | | | ● | 10 A / 1 V<br>100 A / 1 V<br>1,000 A / 1 V | | | | 10 Hz .. 100 kHz | ≤ 3 %<br>≤ 2 %<br>≤ 1 % | P01120308 |
|  Chap. 5 | **D38N** | 1 A .. 90 Apeak<br>1 A .. 900 Apeak<br>1 A .. 9,000 Apeak | | | | ● | | | 0.9 Vpeak | | | ● | 1 A / 10 mV<br>1 A / 1 mV<br>1 A / 0.1 mV | | | | 30 Hz .. 50 kHz | ≤ 2 % | P01120057A |
|  Chap. 10 | **E3N** | 0.05 A .. 10 Apeak<br>1 A .. 100 Apeak | | | | ● | ● | | 1 Vpeak | | | ● | 1 A / 10 mV<br>1 A / 1 mV | | | | DC .. 100 kHz | ≤ 3 %<br>≤ 4 % | P01120043A |
|  Chap. 11 | **MH60** | 0.01 A .. 140 Apeak | | | | ● | ● | | 1.4 Vpeak | | | ● | 10 mV/A | | ● | | DC .. 1 MHz | ≤ 1.5 % | P01120612 |
|  Chap. 7 | **MA200 30-300/3** (17 cm / Ø 4.5 cm) | 0.5 A .. 45 Apeak<br>0.5 A .. 450 Apeak | | | | ● | | | 4.5 Vpeak | | | ● | 100 mV/A<br>10 mV/A | | | | 5 Hz .. 1 MHz | ≤ 1 %<br>+ 0.3 A | P01120570 |
| | **MA200 30-300/3** (25 cm / 7 cm) | 0.5 A .. 45 Apeak<br>0.5 A .. 450 Apeak | | | | ● | | | 4.5 Vpeak | | | ● | 100 mV/A<br>10 mV/A | | | | 5 Hz .. 1 MHz | ≤ 1 %<br>+ 0.3 A | P01120571 |
| | **MA200 3000/3** (35 cm / Ø 10 cm) | 5 A .. 4,500 Apeak | | | | ● | | | 4.5 Vpeak | | | ● | 1 mV/A | | | | 5 Hz .. 1 MHz | ≤ 1 %<br>+ 0.3 A | P01120572 |
|  Chap. 12 | **PAC12** | 0.2 A .. 60 Apeak<br>0.4 A .. 60 A DC<br>0.5 A .. 600 Apeak<br>0.5 A .. 600 A DC | | | | ● | ● | | 600 mVpeak | | | ● | 1 A / 10 mV<br>1 A / 1 mV | | ● | | DC .. 10 kHz | ≤ 1.5 %<br>≤ 2 % | P01120072 |
|  Chap. 12 | **PAC22** | 0.2 A .. 150 Apeak<br>0.4 A .. 150 A DC<br>0.5 A .. 1,400 Apeak<br>0.5 A .. 1,400 A DC | | | | ● | ● | | 1.5 Vpeak<br>1.4 Vpeak | | | ● | 1 A / 10 mV<br>1 A / 1 mV | | ● | | DC .. 10 kHz | ≤ 1.5 %<br>≤ 2.5 % | P01120073 |
| **Measurement of process current** | | | | | | | | | | | | | | | | | | | |
|  Chap. 9 | **K1** | 1 mA .. 4.5 A DC<br>1 mA .. 3 Arms<br>1 mA .. 4.5 Apeak | | | | ● | ● | | 4.5 V DC<br>3 Vrms<br>4.5 Vpeak | ● | | | 1 mA / 1 mV | | | | DC .. 2 kHz | ≤ 1 % | P01120067A |
| | **K2** | 100 µA .. 450 mA DC<br>100 µA .. 300 mArms<br>100 µA .. 450 mApeak | | | | ● | ● | | 4.5 V DC<br>3 Vrms<br>4.5 Vpeak | ● | | | 1 mA / 10 mV | | | | DC .. 1.5 kHz | ≤ 1 % | P01120074A |
| **Measurement on secondary winding of current transformers** | | | | | | | | | | | | | | | | | | | |
|  Chap. 2 | **MN71** | 10 mA .. 12 A | | | | ● | | | 1 V AC | ● | | | 1 A / 100 mV | | | | 40 Hz .. 10 kHz | ≤ 1 % | P01120420 |

(1) The upper value corresponds to 120 % of the maximum rated value
(3) Lead + electronic unit with Ø 4 mm safety connectors, centre distance 19 mm, for K and AmpFlex®

# Current clamps for AC current

## MINI SERIES

Small, compact and particularly resistant, this range of miniature clamps is designed for measurements from a few milli-amperes to 150 A AC. Their shape makes them very practical in confined spaces, such as circuit-breaker boards, control panels or control boxes. They are ideal for use with multimeters.

There are two types of MINI clamps.

The first type operates like a traditional current transformer and provides a current output (mA) which can be used with multimeters, loggers or instruments with current calibres.

The second provides a voltage output proportional to the current measured. This voltage output enables instruments with AC voltage calibres to display or store current values.

There is also a model with a DC voltage output.

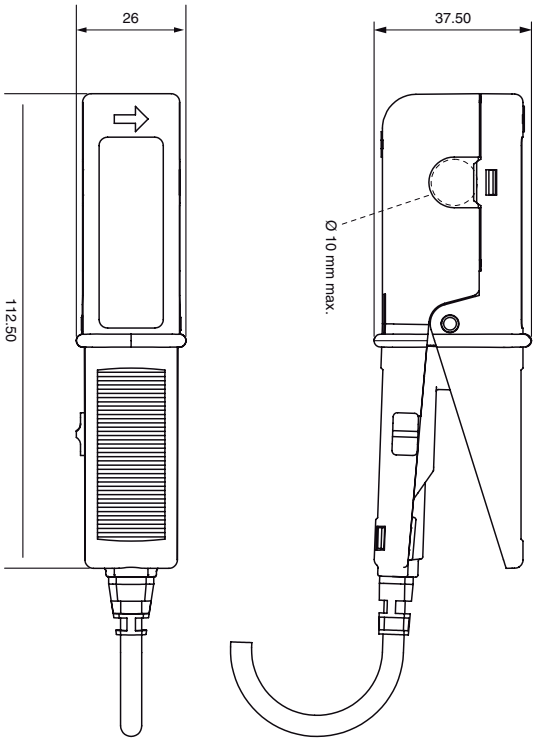
The MINI clamps give True RMS results when used with a True RMS instrument.

## MINI 100 SERIES

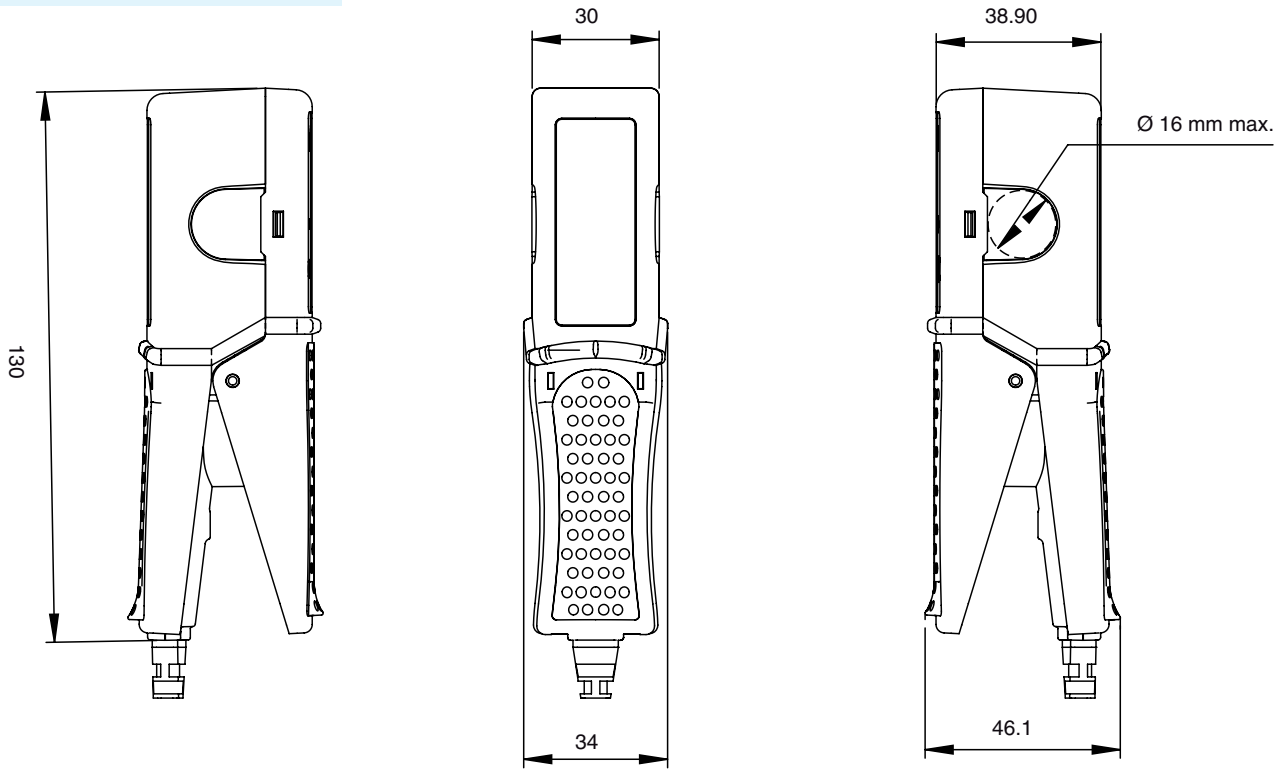
Incorporating all the essentials which made the Miniclamps and the MINI 10 Series so successful, the MINI 100 Series completes the range with a clamping diameter of 16 mm.

The models in the MINI 100 Series are equipped with a so-called “direct reading” input/output ratio and can measure currents up to 350 A.

## MINI SERIES




## MINI 100 SERIES



# Current clamp for AC current
# Model MINI 01

| | |
|---|---|
| **Calibre** | 150 A AC |
| **Sensitivity** | 1 mA/A (1000/1) |

## DESCRIPTION

Small and compact, the MINI 01 current clamp is the ideal complement for any multimeter to measure AC currents in low-power tertiary or industrial applications.
If there is a current in the conductor clamped, the MINI 01 clamp is protected against overvoltages during disconnection from the measurement instrument.

## MAIN SPECIFICATIONS (1)

| **Calibre** | **150 A** |
|---|---|
| Measurement range | 2 A .. 150 A |
| Accuracy of primary current in % | ≤ 2.5 % + 0.15 A (load 1 Ω)<br>≤ 3 % + 0.15 A (load 10 Ω) |
| Phase shift | not specified |
| Output signal | 1 mA AC/A AC (1000/1)<br>(150 mA for 150 A) |

- **Output:**
  Double-insulated cable 1.5 m long, terminated by 2 insulated elbowed male banana connectors Ø 4 mm
- **Bandwidth:**
  48 Hz .. 500 Hz
- **Clamping capacity:**
  Cable Ø max 10 mm

## ELECTRICAL SPECIFICATIONS

- **Load impedance:**
  ≤ 10 Ω
- **Maximum currents:**
  I < 150 A permanent from 48 Hz .. 500 Hz
- **Influence of temperature:**
  ≤ 0.2 % per 10 °K
- **Influence of adjacent conductor:**
  ≤ 2 mA/A at 50 Hz
- **Influence of conductor position in jaws:**
  ≤ 0.1 % at 50/60 Hz
- **Influence of frequency:**
  ≤ 2 % from 65 Hz to 500 Hz
- **Maximum output voltage (secondary open):**
  30 V

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  -10 °C to +50 °C
- **Storage temperature:**
  -40 °C to +80 °C
- **Relative humidity for operation:**
  From 0 to 85 % RH with a linear decrease above 35 °C
- **Operating altitude:**
  0 to 2,000 m
- **Casing protection rating (leakproofing):**
  IP40 (2) (EN 60529 Ed. 1992)
- **Drop test:**
  1.5 m (IEC 68-2-32)
- **Shock resistance:**
  100 g / 6 ms / half-period (IEC 68-2-27)
- **Vibration resistance (3):**
  5-15 Hz (1.5 mm), 15-25 Hz (1 mm), 25-55 Hz (0.25 mm) (IEC 68-2-6)
- **Self-extinguishing capability:**
  casing UL94 V2
- **Dimensions:**
  130 x 37 x 25 mm
- **Weight:**
  approx. 180 g
- **Colour:**
  Black casing

## SAFETY SPECIFICATIONS

- **Electrical safety:**
  Instrument with double insulation or reinforced insulation between the primary, the secondary and the grippable part located under the guard as per EN 61010-1 Ed. 2:2001, EN 61010-2-031 Ed. 2002 & EN 61010-2-032 Ed. 2003
  - 600 V category III, pollution degree 2
  - 300 V category IV, pollution degree 2
- **Electromagnetic compatibility:**
  CE-certified equipment compliant with standard EN 61326-1 (Ed. 97) + A1 (Ed. 98) + A2 (Ed. 01)
  - Emission: stipulations for class B equipment (domestic use).
  - Immunity: stipulations for equipment used intermittently on industrial sites.

(1) Conditions of reference: 23 °C ± 3 °K, 20 °C to 75 % RH, sinusoidal signal with frequency of 48 Hz to 65 Hz, distortion factor < 1 % with no DC component, external DC magnetic field < 40 A/m, no external AC magnetic field, no external conductor with circulating current, conductor centred for measurement, measurement instrument load impedance ≤ 10 Ω.

(2) With clamp closed.

(3) Vibrations expressed in mm peak, scanning of 1 octave/minute for 10 minutes on 3 axes.

| **To order** | **Reference** |
|---|---|
| AC current clamp model **MINI 01** with operating manual | P01105101Z |

# Current clamp for AC current
# Model MINI 02

| | |
|---|---|
| **Calibre** | 100 A AC |
| **Sensitivity** | 1 mA / A (1000 / 1) |

## DESCRIPTION

The MINI 02 current clamp, whose jaws are equipped with a high-performance magnetic material and a double coil, offers excellent linearity and improved performance.
Small and compact, it is ideal for measuring AC currents in low-power tertiary or industrial applications.
If a current is present in the conductor being clamped, the MINI 02 clamp is protected against voltage surges when it is disconnected from the measurement instrument.

## MAIN SPECIFICATIONS (1)

| Calibre | 100 A |
|---|---|
| Measurement range | 50 mA .. 100 A (load 1 Ω)<br>50 mA .. 90 A (load 10 Ω) |
| Accuracy of primary current in % (48 Hz to 10 kHz) | ≤ 1 % + 0.02 A (load 1 Ω)<br>≤ 1.5 % + 0.01 A (load 10 Ω) |
| Phase shift (50 Hz to 60 Hz) | ≤ 3° (load 1 Ω)<br>≤ 6° (load 10 Ω) |
| Output signal | 1 mA AC / A AC (1000 / 1)<br>(100 mA for 100 A) |

- **Output:**
  Double-insulated cable 1.5 m long, terminated by 2 insulated elbowed male banana connectors Ø 4 mm
- **Bandwidth:**
  48 Hz .. 10 000 Hz
- **Clamping capacity:**
  Cable Ø max 10 mm

## ELECTRICAL SPECIFICATIONS

- **Load impedance:**
  ≤ 100 Ω
- **Influence of load impedance:**
  See curves
- **Maximum currents:**
  I < 100 A permanent from 48 Hz .. 10,000 Hz
- **Influence of temperature:**
  ≤ 0.2 % per 10 °K
- **Influence of adjacent conductor:**
  ≤ 2 mA / A at 50 Hz
- **Influence of conductor position in jaws:**
  ≤ 0.1 % at 50/60 Hz
- **Influence of frequency:**
  ≤ 2 % from 65 Hz to 10 kHz
- **Maximum output voltage (secondary open):**
  ≤ 30 V

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  -10 °C to +50 °C
- **Storage temperature:**
  -40 °C to +80 °C
- **Relative humidity for operation:**
  From 0 to 85 % RH with a linear decrease above 35 °C
- **Operating altitude:**
  0 to 2,000 m
- **Casing protection rating (leakproofing):**
  IP40 (2) (EN 60529 Ed. 1992)
- **Drop test:**
  1.5 m (IEC 68-2-32)
- **Shock resistance:**
  100 g / 6 ms / half-period (IEC 68-2-27)
- **Vibration resistance (3):**
  5-15 Hz (1.5 mm), 15-25 Hz (1 mm), 25-55 Hz (0.25 mm) (IEC 68-2-6)
- **Self-extinguishing capability:**
  Casing UL94 V2
- **Dimensions:**
  130 x 37 x 25 mm
- **Weight:**
  Approx. 180 g
- **Colour:**
  Black casing

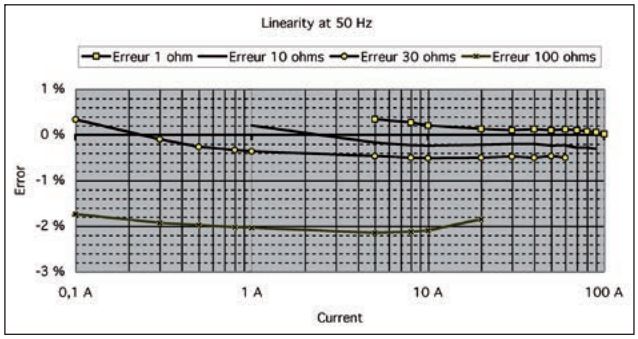
## SAFETY SPECIFICATIONS

- **Electrical safety:**
  Instrument with double insulation or reinforced insulation between the primary, the secondary and the grippable part located under the guard as per EN 61010-1 Ed. 2:2001, EN 61010-2-031 Ed. 2002 & EN 61010-2-032 Ed. 2003
  - 600 V category III, pollution degree 2
  - 300 V category IV, pollution degree 2
- **Electromagnetic compatibility:**
  CE-certified equipment compliant with standard EN 61326-1 (Ed. 97) + A1 (Ed. 98) + A2 (Ed. 01)
  - Emission: stipulations for class B equipment (domestic use).
  - Immunity: stipulations for equipment used intermittently on industrial sites.

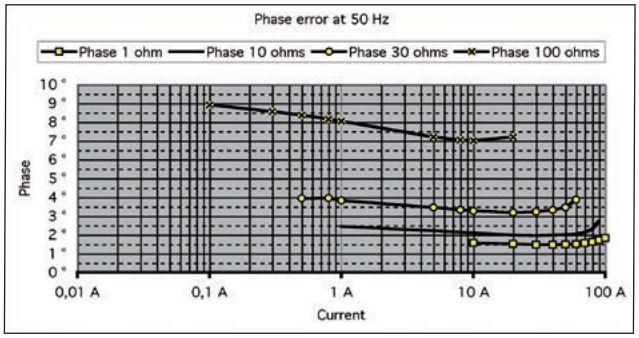
# Current clamp for AC current
# Model MINI 02

## CURVES AT 50 HZ

Typical linearity error for loads of 1, 10, 30 and 100 Ω

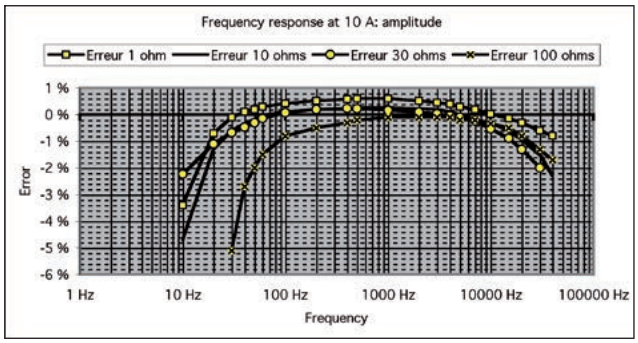



Typical phase shift for loads of 1, 10, 30 and 100 Ω

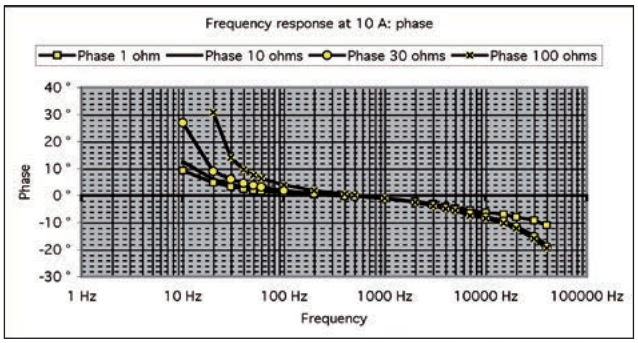



## FREQUENCY RESPONSE AT 10 A

Typical linearity error for loads of 1, 10, 30 and 100 Ω




Typical phase shift for loads of 1, 10, 30 and 100 Ω




(1) Conditions of reference: 23 °C ± 3 °K, 20 °C to 75 % RH, sinusoidal signal with frequency of 48 Hz at 10 kHz, distortion factor < 1 % with no DC component, external DC magnetic field < 40 A/m, no external AC magnetic field, no external conductor with circulating current, conductor centred for measurement, measurement instrument load impedance ≤ 10 Ω.

(2) With clamp closed.

(3 Vibrations expressed in mm peak, scanning of 1 octave/minute for 10 minutes on 3 axes.

| To order | Reference |
|---|---|
| AC current clamp model **MINI 02** with operating manual | P01105102Z |

# Current clamp for AC current
# Model MINI 03

| | |
|---|---|
| **Calibre** | 100 A AC |
| **Sensitivity** | 1 mV / A |

## DESCRIPTION

Small and compact, the MINI 03 current clamp is the ideal complement for any multimeter to measure AC currents in low-power tertiary or industrial applications.

When used with an AC voltmeter, it allows you to directly read the current measured on the voltmeter.

## MAIN SPECIFICATIONS (1)

| **Calibre** | **100 A** |
|---|---|
| Measurement range | 1 A .. 100 A |
| Accuracy of primary current in % | ≤ 2 % + 50 mA |
| Phase shift | not specified |
| Output signal | 1 mV AC / A AC<br>(100 mV for 100 A) |

- **Output:**
  Double-insulated cable 1.5 m long, terminated by 2 insulated elbowed male banana connectors Ø 4 mm
- **Bandwidth:**
  48 Hz .. 500 Hz
- **Clamping capacity:**
  Cable Ø max 10 mm

## ELECTRICAL SPECIFICATIONS

- **Maximum currents:**
  I < 150 A permanent from 48 Hz .. 500 Hz
- **Influence of temperature:**
  ≤ 0.2 % per 10 °K
- **Influence of adjacent conductor:**
  ≤ 2 mA / A at 50 Hz
- **Influence of conductor position in jaws:**
  ≤ 0.1 % at 50/60 Hz
- **Influence of frequency:**
  ≤ 1 % from 65 Hz to 500 Hz

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  -10 °C to +50 °C
- **Storage temperature:**
  -40 °C to +80 °C
- **Relative humidity for operation:**
  From 0 to 85 % RH with a linear decrease above 35 °C
- **Operating altitude:**
  0 to 2,000 m
- **Casing protection rating (leakproofing):**
  IP40 (2) (EN 60529 Ed. 1992)
- **Drop test:**
  1.5 m (IEC 68-2-32)
- **Shock resistance:**
  100 g / 6 ms / half-period (IEC 68-2-27)
- **Vibration resistance (3):**
  5-15 Hz (1.5 mm), 15-25 Hz (1 mm), 25-55 Hz (0.25 mm) (IEC 68-2-6)
- **Self-extinguishing capability:**
  Casing UL94 V2
- **Dimensions:**
  130 x 37 x 25 mm
- **Weight:**
  Approx. 180 g
- **Colour:**
  Black casing

## SAFETY SPECIFICATIONS

- **Electrical safety:**
  Instrument with double insulation or reinforced insulation between the primary, the secondary and the grippable part located under the guard as per EN 61010-1 Ed. 2:2001,
  EN 61010-2-031 Ed. 2002 &
  EN 61010-2-032 Ed. 2003
  - 600 V category III, pollution degree 2
  - 300 V category IV, pollution degree 2
- **Electromagnetic compatibility:**
  CE-certified equipment compliant with standard EN 61326-1 (Ed. 97) + A1 (Ed. 98) + A2 (Ed. 01)
  - Emission: stipulations for class B equipment (domestic use).
  - Immunity: stipulations for equipment used intermittently on industrial sites.

(1) Conditions of reference: 23 °C ± 3 °K, 20 °C to 75 % RH, sinusoidal signal with frequency of 48 Hz to 65 Hz, distortion factor < 1 % with no DC component, external DC magnetic field < 40 A/m, no external AC magnetic field, no external conductor with circulating current, conductor centred for measurement, measurement instrument load impedance ≥ 10 kΩ.

(2) With clamp closed.

(3) Vibrations expressed in mm peak, scanning of 1 octave/minute for 10 minutes on 3 axes.

| **To order** | **Reference** |
|---|---|
| AC current clamp model **MINI 03** with operating manual | P01105103Z |

# Current clamp for AC current
# Model MINI 05

| Calibre | 10 A AC | 100 A AC |
|---|---|---|
| Sensitivity | 1 mV/mA | 1 mV/A |

## DESCRIPTION

Small and compact, the MINI 05 current clamp is the ideal complement for any multimeter to measure AC currents in low-power tertiary or industrial applications.
With its 2 calibres, it offers excellent resolution for measuring AC currents from 5 mA to 100 A.

## MAIN SPECIFICATIONS (1)

| Calibre | 10 A | 100 A |
|---|---|---|
| Measurement range | 5 mA .. 10 A | 1 A .. 100 A |
| Accuracy of primary current in % | ≤ 3 % + 0.15 mA | ≤ 2 % + 50 mA |
| Phase shift | not specified | |
| Output signal | 1 mV AC/mA AC (10 V for 10 A) | 1 mV AC/A AC (100 mV for 100 A) |

- **Output:**
  Double-insulated cable 1.5 m long, terminated by 2 insulated elbowed male banana connectors Ø 4 mm
- **Bandwidth:**
  48 Hz .. 500 Hz
- **Clamping capacity:**
  Cable Ø max 10 mm

## ELECTRICAL SPECIFICATIONS

- **Maximum currents:**
  - 100 A calibre
    I < 150 A permanent from 48 Hz .. 500 Hz
  - 10 A calibre
    I < 15 A permanent from 48 Hz .. 500 Hz
- **Influence of temperature:**
  ≤ 0.2 % per 10 °K
- **Influence of adjacent conductor:**
  ≤ 2 mA/A at 50 Hz
- **Influence of conductor position in jaws:**
  ≤ 0.1 % at 50/60 Hz
- **Influence of frequency:**
  - 100 A calibre:
    ≤ 1 % from 65 Hz to 500 Hz
  - 10 A calibre:
    ≤ 3 % from 65 Hz to 500 Hz

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  -10 °C to +50 °C
- **Storage temperature:**
  -40 °C to +80 °C
- **Relative humidity for operation:**
  From 0 to 85 % RH with a linear decrease above 35 °C
- **Operating altitude:**
  0 to 2,000 m
- **Casing protection rating (leakproofing):**
  IP40 (2) (EN 60529 Ed. 1992)
- **Drop test:**
  1.5 m (IEC 68-2-32)
- **Shock resistance:**
  100 g / 6 ms / half-period (IEC 68-2-27)
- **Vibration resistance (3):**
  5-15 Hz (1.5 mm), 15-25 Hz (1 mm), 25-55 Hz (0.25 mm) (IEC 68-2-6)
- **Self-extinguishing capability:**
  casing UL94 V2
- **Dimensions:**
  130 x 37 x 25 mm
- **Weight:**
  Approx. 180 g
- **Colour:**
  Black casing

## SAFETY SPECIFICATIONS

- **Electrical safety:**
  Instrument with double insulation or reinforced insulation between the primary, the secondary and the grippable part located under the guard as per EN 61010-1 Ed. 2:2001,
  EN 61010-2-031 Ed. 2002 &
  EN 61010-2-032 Ed. 2003
  - 600 V category III, pollution degree 2
  - 300 V category IV, pollution degree 2
- **Electromagnetic compatibility:**
  CE-certified equipment compliant with standard EN 61326-1 (Ed. 97) + A1 (Ed. 98) + A2 (Ed. 01)
  - Emission: stipulations for class B equipment (domestic use).
  - Immunity: stipulations for equipment used intermittently on industrial sites.

(1) Conditions of reference: 23 °C ± 3 °K, 20 °C to 75 % RH, sinusoidal signal with frequency of 48 Hz to 65 Hz, distortion factor < 1 % with no DC component, external DC magnetic field < 40 A/m, no external AC magnetic field, no external conductor with circulating current, conductor centred for measurement, measurement instrument load impedance ≥ 1 MΩ (10 A calibre) & ≥ 10 kΩ (100 A calibre).

(2) With clamp closed.

(3) Vibrations expressed in mm peak, scanning of 1 octave/minute for 10 minutes on 3 axes.

| To order | Reference |
|---|---|
| AC current clamp model **MINI 05** with operating manual | P01105105Z |

# Current clamp for AC current
# Model MINI 09

| | |
|---|---|
| **Calibre** | 150 A AC |
| **Sensitivity** | 100 mV DC / A AC |

## DESCRIPTION

Small and compact, the MINI 09 current clamp is the ideal complement for any multimeter to measure AC currents in low-power tertiary or industrial applications.
Its DC voltage output helps to overcome the low sensitivity of certain AC measurement instruments.

## MAIN SPECIFICATIONS (1)

| **Calibre** | **150 A** | | | |
|---|---|---|---|---|
| Measurement range | 1 A .. 5 A | 5 A .. 15 A | 15 A .. 40 A | 40 A .. 150 A |
| Accuracy of primary current in % | ≤ 10 % + 0.2 A | ≤ 6 % + 0.2 A | ≤ 3 % + 0.2 A | ≤ 4 % |
| Phase shift | not specified | | | |
| Output signal | 100 mV DC / A AC (15 V DC for 150 A) | | | |

- **Output:**
  Double-insulated cable 1.5 m long, terminated by 2 insulated elbowed male banana connectors Ø 4 mm
- **Bandwidth:**
  48 Hz .. 500 Hz
- **Clamping capacity:**
  Cable Ø max 10 mm

## ELECTRICAL SPECIFICATIONS

- **Maximum currents:**
  I < 150 A permanent from 65 Hz .. 500 Hz
- **Influence of temperature:**
  ≤ 0.2 % per 10 °K
- **Influence of adjacent conductor:**
  ≤ 2 mA / A at 50 Hz
- **Influence of conductor position in jaws:**
  ≤ 0.1 % at 50/60 Hz
- **Influence of frequency:**
  ≤ 3 % from 65 Hz to 500 Hz

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  -10 °C to +50 °C
- **Storage temperature:**
  -40 °C to +80 °C
- **Relative humidity for operation:**
  0 to 85 % RH decreasing linearly above 35 °C
- **Operating altitude:**
  0 to 2,000 m
- **Casing protection rating (leakproofing):**
  IP40 (2) (EN 60529 Ed. 1992)
- **Drop test:**
  1.5 m (IEC 68-2-32)
- **Shock resistance:**
  100 g / 6 ms / half-period (IEC 68-2-27)
- **Vibration resistance (3):**
  5-15 Hz (1.5 mm), 15-25 Hz (1 mm), 25-55 Hz (0.25 mm) (IEC 68-2-6)
- **Self-extinguishing capability:**
  Casing UL94 V2
- **Dimensions:**
  130 x 37 x 25 mm
- **Weight:**
  Approx. 180 g
- **Colour:**
  Black casing

## SAFETY SPECIFICATIONS

- **Electrical safety:**
  Instrument with double insulation or reinforced insulation between the primary, the secondary and the grippable part located under the guard as per EN 61010-1 Ed. 2:2001, EN 61010-2-031 Ed. 2002 & EN 61010-2-032 Ed. 2003
  - 600 V category III, pollution degree 2
  - 300 V category IV, pollution degree 2
- **Electromagnetic compatibility:**
  CE-certified equipment compliant with standard EN 61326-1 (Ed. 97) + A1 (Ed. 98) + A2 (Ed. 01)
  - Emission: stipulations for class B equipment (domestic use).
  - Immunity: stipulations for equipment used intermittently on industrial sites.

(1) Conditions of reference: 23 °C ± 3 °K, 20 % to 75 % RH, sinusoidal signal with frequency of 48 Hz to 65 Hz, distortion factor < 1 % with no DC component, external DC magnetic field < 40 A/m, no external AC magnetic field, no external conductor with circulating current, conductor centred for measurement, measurement instrument load impedance ≥ 50 kΩ.

(2) With clamp closed.

(3) Vibrations expressed in mm peak, scanning of 1 octave/minute for 10 minutes on 3 axes.

| **To order** | **Reference** |
|---|---|
| AC current clamp model **MINI 09** with operating manual | P01105109Z |

# Current clamp for AC current
# Model MINI 102

| | |
|---|---|
| **Calibre** | 200 A AC |
| **Sensitivity** | 1 mA/A (1000/1) |


## DESCRIPTION

The MINI 102 current clamp, whose jaws are equipped with a high-performance magnetic material and a double coil, offer excellent linearity and improved performance.
If a current is present in the clamped conductor, the MINI 102 clamp is protected against voltage surges when it is connected to the measuring instrument.

## MAIN SPECIFICATIONS (1)

| Calibre | 200 A |
|---|---|
| Measurement range | 50 mA .. 200 A (load 1 Ω)<br>50 mA .. 200 A (load 10 Ω)<br>50 mA .. 20 A (load 100 Ω) |
| Accuracy in % | ≤ 1 % + 0.02 A (load 1 Ω)<br>≤ 1.5 % + 0.01 A (load 10 Ω)<br>≤ 4 % + 0.01 A (load 100 Ω) |
| Phase shift | ≤ 3° (load 1 Ω)<br>≤ 6° (load 10 Ω)<br>≤ 12° (load 10 0Ω) |
| Output signal | 1 mA AC/A AC (1000/1)<br>(200 mA for 200 A) |

- **Output:**
  Double-insulated cable 1.5 m long, terminated by 2 insulated elbowed male banana connectors Ø 4 mm
- **Bandwidth:**
  48 Hz .. 10 000 Hz
- **Clamping capacity:**
  Cable Ø max 16 mm

## ELECTRICAL SPECIFICATIONS

- **Load impedance:**
  ≤ 100 Ω
- **Influence of load impedance:**
  See curves
- **Maximum currents:**
  350 A permanent at a frequency ≤ 1 kHz.
  200 A permanent at a frequency ≤ 8 kHz
  (limitation proportional to the reciprocal of the frequency beyond that)
- **Influence of temperature:**
  ≤ 0.2 % per 10 °K
- **Influence of adjacent conductor:**
  ≤ 2 mA/A at 50 Hz
- **Influence of conductor position in jaws:**
  ≤ 0.08 % at 50/60 Hz
- **Influence of frequency:**
  ≤ 1 % typique
- **Maximum output voltage (secondary open):**
  ≤ 30 V

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  -10 °C to +50 °C
- **Storage temperature:**
  -40 °C to +80 °C
- **Relative humidity for operation:**
  From 0 to 85 % RH with a linear decrease above 35 °C
- **Operating altitude:**
  0 to 2,000 m
- **Casing protection rating (leakproofing):**
  IP20 (2) (EN 60529 Ed. 2001)
- **Drop test:**
  1 m (IEC 68-2-32)
- **Dimensions:**
  130.4 x 46 x 34 mm
- **Weight:**
  approx. 250 g
- **Colour:**
  Black casing

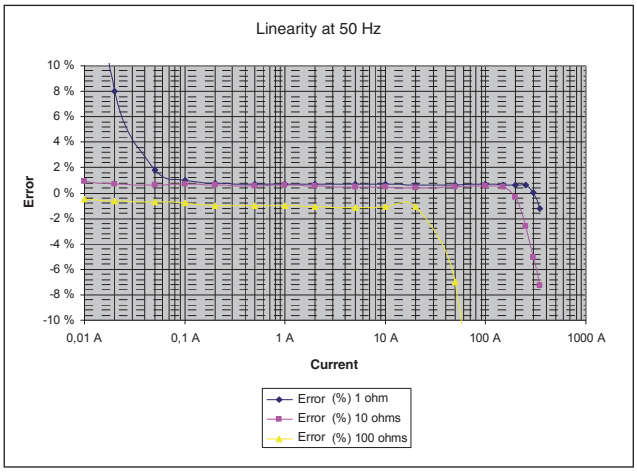
## SAFETY SPECIFICATIONS

- **Electrical safety:**
  Instrument with double insulation or reinforced insulation between the primary, the secondary and the grippable part located under the guard as per EN 61010-1 Ed. 2:2001, EN 61010-2-031 Ed. 2002 & EN 61010-2-032 Ed. 2003
  - 600 V category III, pollution degree 2
  - 300 V category IV, pollution degree 2
- **Electromagnetic compatibility:**
  CE-certified equipment compliant with standard EN 61326-1: 2006
  - Emission: stipulations for class B equipment (domestic use).
  - Immunity: stipulations for equipment used intermittently on industrial sites.

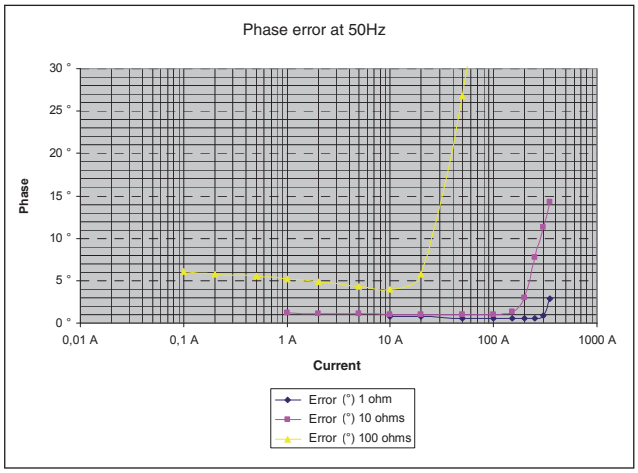
# Current clamp for AC current
# Model MINI 102

## CURVES AT 50 Hz

Typical linearity error for loads of 1, 10 and 100 Ω

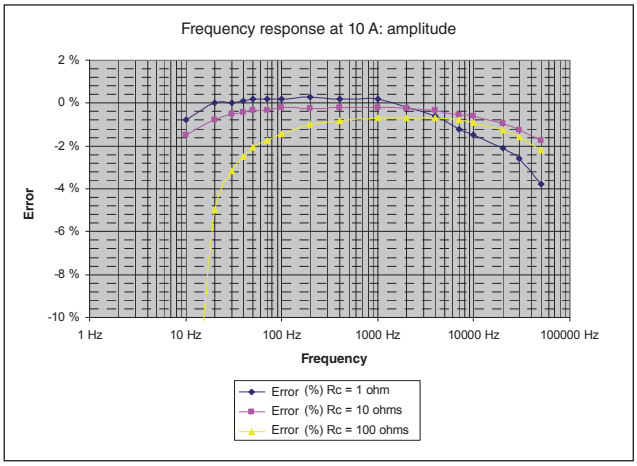



Typical phase shift for loads of de 1, 10, 30 and 100 Ω

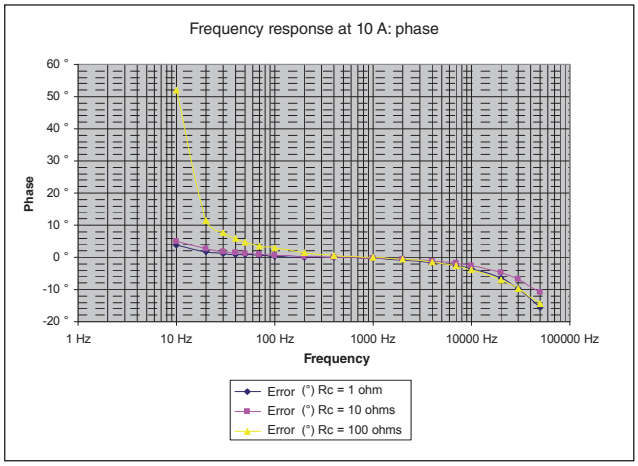



## FREQUENCY RESPONSE AT 10 A

Typical linearity error for loads of 1, 10 and 100 Ω




Typical phase shift for loads of 1, 10 and 100 Ω




(1) Conditions of reference: 23 °C ± 3 °K, 20 °C to 75 % RH, sinusoidal signal with frequency of 48 Hz at 10 kHz, distortion factor < 1 % with no DC component, external DC magnetic field < 40 A/m, no external AC magnetic field, no external conductor with circulating current, conductor centred for measurement, measurement instrument load impedance ≤ 10 Ω.

(2) With clamp closed.

| To order | Reference |
|---|---|
| AC current clamp model **MINI 102** with operating manual | P01106102 |

# Current clamp for AC current
# Model MINI 103

| | |
|---|---|
| **Calibre** | 200 A AC |
| **Sensitivity** | 1 mV / A |

## DESCRIPTION

The MINI 103 current clamp is the ideal companion for any multimeter to measure AC currents in tertiary or industrial applications.
When used with an AC voltmeter, it enables you to read the current measured directly on the voltmeter.

## MAIN SPECIFICATIONS (1)

| **Calibre** | **200 A** |
|---|---|
| Measurement range | 0.1 A .. 200 A AC |
| Accuracy in % | ≤ 1.5 % + 0.02 A |
| Phase shift | ≤ 3° |
| Output signal | 1 mV AC / A AC<br>(200 mV for 200 A) |

- **Output:**
  Double-insulated cable 1.5 m long, terminated by 2 insulated elbowed male banana connectors Ø 4 mm
- **Bandwidth:**
  48 Hz .. 10 000 Hz
- **Clamping capacity:**
  Cable Ø max 16 mm

## ELECTRICAL SPECIFICATIONS

- **Load impedance:**
  ≥ 10 kΩ
- **Influence of load impedance:**
  See curves
- **Maximum currents:**
  350 A permanent at a frequency ≤ 1 kHz.
  200 A permanent at a frequency ≤ 8 kHz
  (limitation proportional to the reciprocal of the frequency beyond that)
- **Influence of temperature:**
  ≤ 0.2 % per 10 °K
- **Influence of adjacent conductor:**
  ≤ 2 mA / A at 50 Hz
- **Influence of conductor position in jaws:**
  ≤ 0.08 % at 50/60 Hz
- **Influence of frequency:**
  ≤ 1 % typique

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  -10 °C to +50 °C
- **Storage temperature:**
  -40 °C to +80 °C
- **Relative humidity for operation:**
  From 0 to 85 % RH with a linear decrease above 35 °C
- **Operating altitude:**
  0 to 2,000 m
- **Casing protection rating (leakproofing):**
  IP20 (2) (EN 60529 Ed. 2001)
- **Drop test:**
  1 m (IEC 68-2-32)
- **Dimensions:**
  130.4 x 46 x 34 mm
- **Weight:**
  approx. 250 g
- **Colour:**
  Black casing

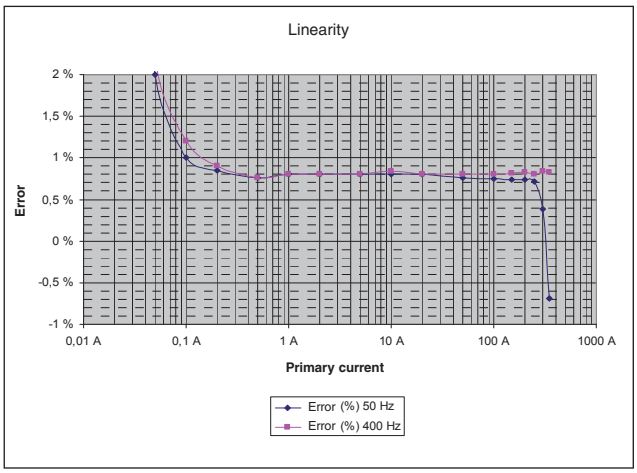
## SAFETY SPECIFICATIONS

- **Electrical safety:**
  Instrument with double insulation or reinforced insulation between the primary, the secondary and the grippable part located under the guard as per EN 61010-1 Ed. 2:2001, EN 61010-2-031 Ed. 2002 & EN 61010-2-032 Ed. 2003
  - 600 V category III, pollution degree 2
  - 300 V category IV, pollution degree 2
- **Electromagnetic compatibility:**
  CE-certified equipment compliant with standard EN 61326-1: 2006
  - Emission: stipulations for class B equipment (domestic use).
  - Immunity: stipulations for equipment used intermittently on industrial sites.

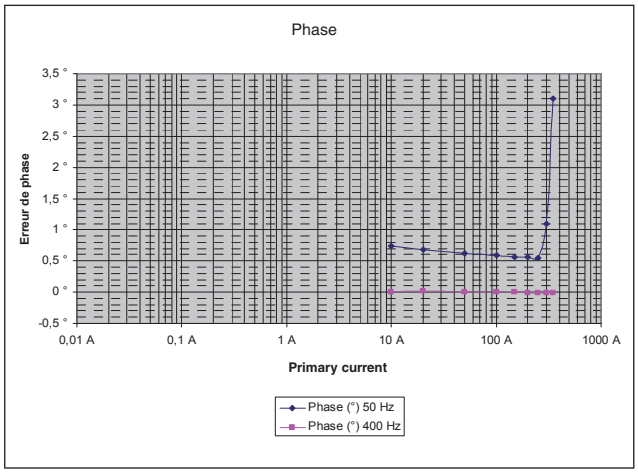
# Current clamp for AC current
# Model MINI 103

## CURVES AT 50 Hz

Typical linearity error

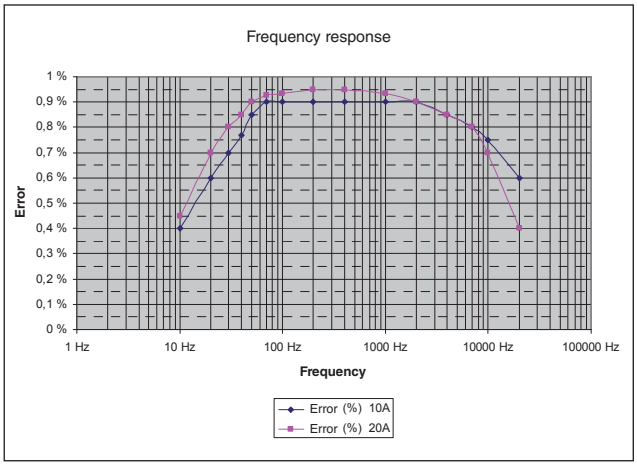



Typical phase shift

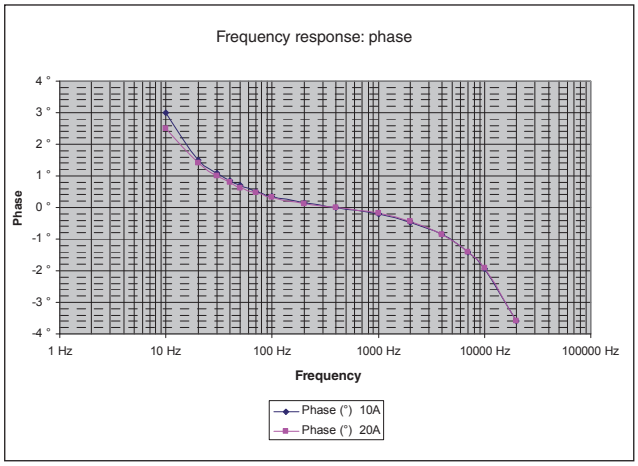



## FREQUENCY RESPONSE

Typical linearity error




Typical phase shift




(1) Conditions of reference: 23 °C ± 3 °K, 20 °C to 75 % RH, sinusoidal signal with frequency of 48 Hz at 65 Hz, distortion factor < 1 % with no DC component, external DC magnetic field < 40 A/m, no external AC magnetic field, no external conductor with circulating current, conductor centred for measurement, measurement instrument load impedance ≥ 10 kΩ.

(2) With clamp closed.

| To order | Reference |
|---|---|
| AC current clamp model **MINI 103** with operating manual | P01106103 |


## MN SERIES

These ergonomic mini-clamps are designed to make light work of measuring low and medium currents from 0.01 A to 240 A AC.

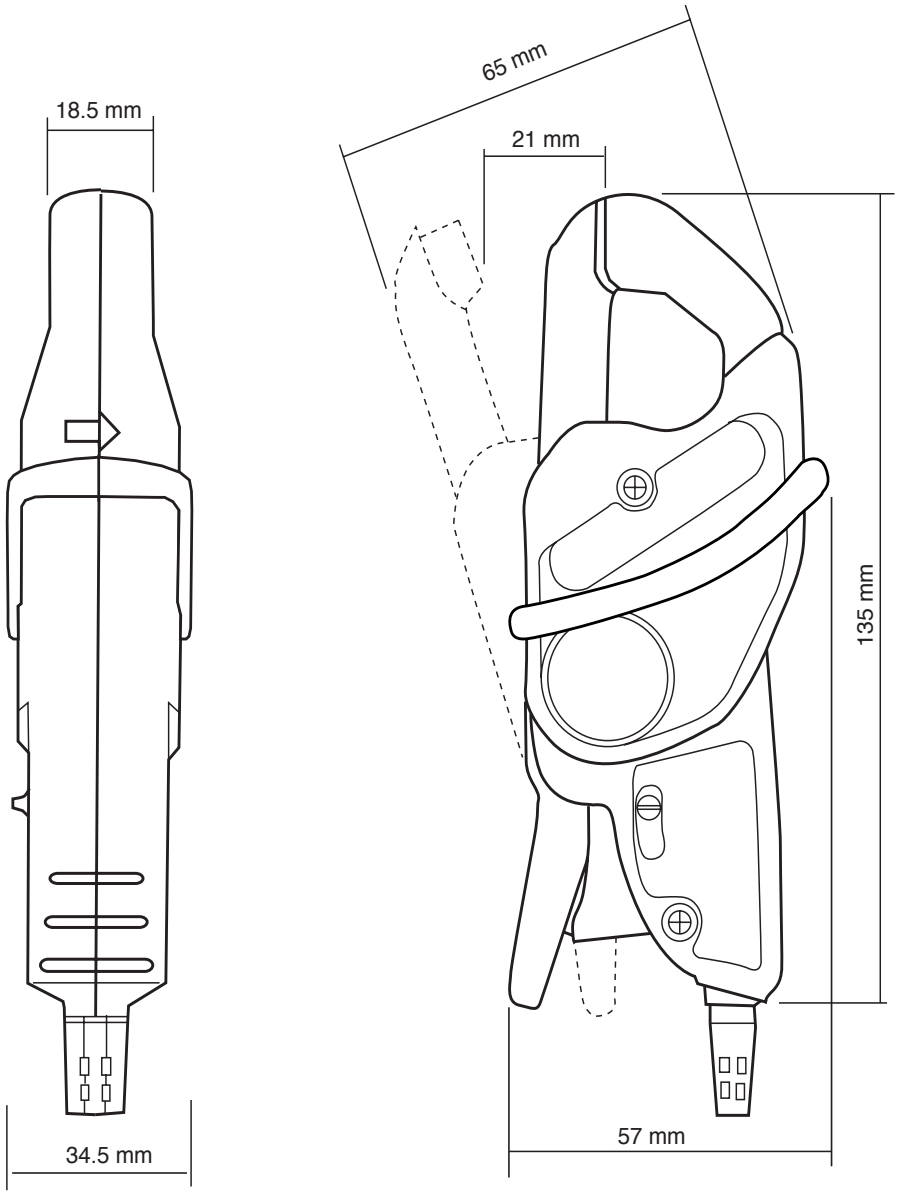
The shape of the jaws makes 'hooking' onto cables easy, even in areas of restrictive access. The jaws can grip conductors up to 20 mm in diameter.

Depending on the particular model, they have one or two calibres. The output is via either jack sockets or a lead with 4 mm Ø plugs, hence these clamps are compatible with all multimeters and testers on the market.

There are two types of MN series clamps available. The first kind operates as a current transformer (ratio 1,000/1) and gives a current output (mA) for use with any tester with current calibres.

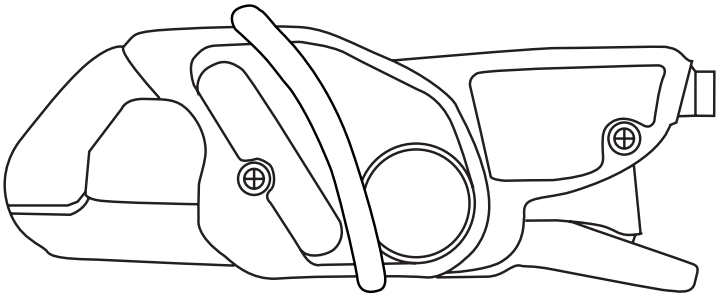
The second type gives a voltage output (DC or AC depending on the model) proportional to the measured current (1, 10, 100 or 1,000 mV/A). This voltage output means that, even with testers without any current calibres, it is possible to measure currents by means of the DC or AC voltage calibres.

There are specific models in the MN series that have been designed with particular applications in mind such as measurement on current transformer outputs, on oscilloscopes and even of leakage currents.


18.5 mm
34.5 mm
65 mm
21 mm
135 mm
57 mm

# Current clamps for AC current
# Models MN08 and MN09

| | |
|---|---|
| **Current** | 200 A AC |
| **Ratio** | 1000/1 |
| **Output** | 1 mA/A |



## ELECTRICAL SPECIFICATIONS

- **Current range:**
  0.5 A AC .. 240 A AC
- **Current transformation ratio:**
  1000/1
- **Output signal:**
  1 mA AC/A AC (240 mA for 240 A)
- **Accuracy and phase shift** (1)**:**

| Primary current | 0.5 A .. 10 A | 10 A .. 40 A | 40 A .. 100 A | 100 A .. 240 A |
|---|---|---|---|---|
| % Accuracy of output signal | ≤ 3 % + 0.5 mA | ≤ 2.5 % + 0.5 mA | ≤ 2 % + 0.5 mA | ≤ 1 % + 0.5 mA |
| Phase shift | not specified | ≤ 5° | ≤ 3° | ≤ 2.5° |

- **Bandwidth:**
  40 Hz .. 10 kHz
- **Crest factor:**
  3 for a current of 200 A RMS
- **Maximum currents:**
  200 A continuous for a frequency ≤ 3 kHz (limitation proportional to the inverse of one third of frequency beyond)
- **Load impedance:**
  ≤ 10 Ω
- **Operating voltage:**
  600 VRMS
- **Common mode voltage:**
  600 V category III and pollution degree 2
- **Influence of adjacent conductor:**
  ≤ 15 mA/A at 50 Hz
- **Influence of conductor position in jaws:**
  ≤ 0.5 % of output signal at 50/60 Hz
- **Load influence:** 0.2 .. 10 Ω
  < 0.5 % on measurement
  < 0.5° on phase
- **Influence of frequency** (2)**:**
  < 3 % of output signal from 40 Hz .. 1 kHz
  < 12 % of output signal from 1 kHz .. 10 kHz
- **Influence of crest factor:**
  < 4 % of output signal for a crest factor of 3 and current 200 of A RMS

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  -10 °C to +55 °C
- **Storage temperature:**
  -40 °C to +70 °C
- **Influence of temperature:**
  ≤ 0.15 % of output signal per 10 °K
- **Relative humidity for operation:**
  0 to 85 % RH decreasing linearly above 35 °C
- **Influence of relative humidity:**
  < 0.2 % of output signal from 10 % to 85 % RH
- **Operating altitude:**
  0 to 2,000 m
- **Max. jaw opening:**
  20 mm
- **Clamping capacity:**
  Cable: Ø max 20 mm
  Busbar: 1 busbar of 20 x 5 mm
- **Casing protection rating:**
  IP40 (IEC 529)
- **Drop test:**
  1 m (IEC 68-2-32)
- **Shock resistance:**
  100 g (IEC 68-2-27)
- **Vibration resistance:**
  10/55/10 Hz, 0.15 mm (IEC 68-2-6)
- **Self-extinguishing capability:**
  Casing: UL94 V2
  Jaws: UL94 V0
- **Dimensions:**
  135 x 51 x 30 mm
- **Weight:**
  180 g
- **Colours:**
  Dark grey case with red jaws
- **Output:**
  MN08:
  Safety sockets (4 mm)
  MN09:
  1.5 m two-wire lead with double or reinforced insulation terminated by 2 elbowed male safety plugs (4 mm)

## SAFETY SPECIFICATIONS

- **Electrical safety:**
  Instrument with double insulation or reinforced insulation between the primary, the secondary and the grippable part located under the guard as per IEC 1010-1 & IEC 1010-2-032.
  - 600 V category III, pollution degree 2
  - 300 V category IV, pollution degree 2
- **Electromagnetic compatibility (EMC):**
  EN 50081-1: class B
  EN 50082-2:
  - Electrostatic discharge: IEC 1000-4-2
  - Radiated field: IEC 1000-4-3
  - Fast transients: IEC 1000-4-4
  - Magnetic field at 50/60 Hz: IEC 1000-4-8

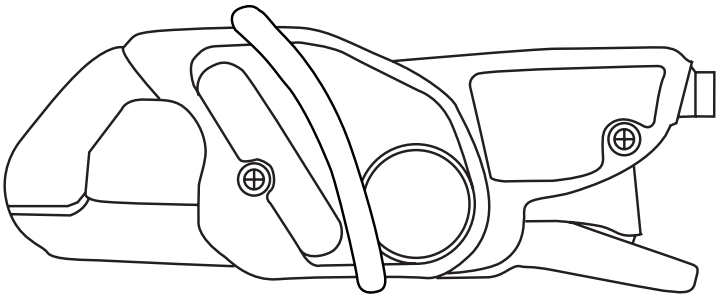
(1) Conditions of reference: 23 °C ± 3 °K, 20 to 70 % RH, sinusoidal signal with frequency of 48 Hz to 65 Hz, external magnetic field < 40 A/m, no DC components, no external conductor with circulating current, conductor centred for measurement, 1 Ω load.

(2) Out of reference domain.

| To order | Reference |
|---|---|
| AC current clamp model **MN08** with operating manual | P01120401 |
| AC current clamp model **MN09** with operating manual | P01120402 |

# Current clamps for AC current
# Models MN10 and MN11

| | |
|---|---|
| **Current** | 200 A AC |
| **Ratio** | 1000/1 |
| **Output** | 1 mA/A |



## DESCRIPTION

An electronic voltage-limiting system protects output of clamp when operating, if the secondary circuit is opened.

## ELECTRICAL SPECIFICATIONS

- **Current range:**
  0.5 A AC .. 240 A AC
- **Current transformation ratio:**
  1000/1
- **Output signal:**
  1 mA AC / A AC (240 mA for 240 A)
- **Accuracy and phase shift** (1)**:**

| Primary current | 0.5 A .. 10 A | 10 A .. 40 A | 40 A .. 100 A | 100 A .. 150 A | 150 A .. 200 A | 200 A .. 240 A |
|---|---|---|---|---|---|---|
| Accuracy in % of output signal | ≤ 3 % + 0.5 mA | ≤ 2.5 % + 0.5 mA | ≤ 2 % + 0.5 mA | ≤ 1 % + 0.5 mA | ≤ 2 % + 0.5 mA | ≤ 3 % + 0.5 mA |
| Phase shift | not specified | ≤ 5° | ≤ 3° | ≤ 2.5° | ≤ 2.5° | ≤ 2.5° |

- **Bandwidth:**
  40 Hz .. 10 kHz
- **Crest factor:**
  3 for a current of 200 ARMS
- **Maximum currents:**
  200 A continuous for a frequency ≤ 3 kHz (limitation proportional to the inverse of one third of frequency beyond)
- **Load impedance:**
  ≤ 10 Ω
- **Maximum output voltage (secondary open):**
  Limited to 8 V peak max.
- **Operating voltage:**
  600 VRMS
- **Common mode voltage:**
  600 V category III and pollution degree 2
- **Influence of adjacent conductor:**
  ≤ 15 mA/A at 50 Hz
- **Influence of conductor position in jaws:**
  ≤ 0.5 % of output signal at 50/60 Hz
- **Load influence:** 0.2 .. 10 Ω
  < 0.5 % on measurement
  < 0.5 ° on phase
- **Influence of frequency** (2)**:**
  < 3 % of output signal from 40 Hz .. 1 kHz
  < 12 % of output signal from 1 kHz .. 10 kHz
- **Influence of crest factor:**
  < 4 % of output signal for a crest factor of 3 and current of 200 A RMS

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  -10 °C to +55 °C
- **Storage temperature:**
  -40 °C to +70 °C
- **Influence of temperature:**
  ≤ 0.15 % of output signal per 10 °K
- **Relative humidity for operation:**
  0 to 85 % RH decreasing linearly above 35 °C
- **Influence of relative humidity:**
  < 0.2 % of output signal from 10 % to 85 % RH
- **Operating altitude:**
  0 to 2,000 m
- **Max. jaw opening:**
  20 mm
- **Clamping capacity:**
  Cable: Ø max 20 mm
  Busbar: 1 busbar of 20 x 5 mm
- **Casing protection rating:**
  IP40 (IEC 529)
- **Drop test:**
  1 m (IEC 68-2-32)
- **Shock resistance:**
  100 g (IEC 68-2-27)
- **Vibration resistance:**
  10/55/10 Hz, 0.15 mm (IEC 68-2-6)
- **Self-extinguishing capability:**
  Casing: UL94 V2
  Jaws: UL94 V0
- **Dimensions:**
  135 x 51 x 30 mm
- **Weight:**
  180 g
- **Colours:**
  Dark grey case with red jaws
- **Output:**
  MN10:
  Safety sockets (4 mm)
  MN11:
  1.5 m two-wire lead with double or reinforced insulation terminated by 2 elbowed male safety plugs (4 mm)

## SAFETY SPECIFICATIONS

- **Electrical safety:**
  Instrument with double insulation or reinforced insulation between the primary, the secondary and the grippable part located under the guard as per IEC 1010-1 & IEC 1010-2-032
  - 600 V category III, pollution degree 2
  - 300 V category IV, pollution degree 2
- **Electromagnetic compatibility (EMC):**
  EN 50081-1: class B
  EN 50082-2:
  - Electrostatic discharge: IEC 1000-4-2
  - Radiated field: IEC 1000-4-3
  - Fast transients: IEC 1000-4-4
  - Magnetic field at 50/60 Hz: IEC 1000-4-8

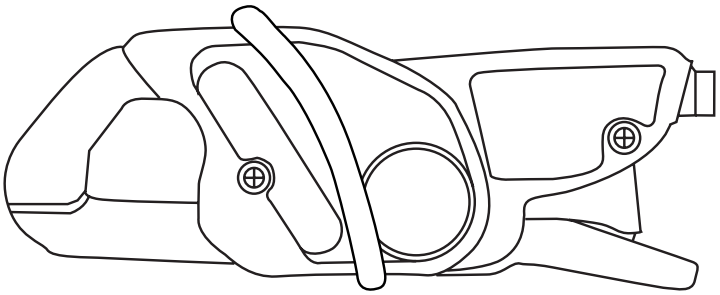
(1) Conditions of reference: 23 °C ± 3 °K, 20 to 70 % RH, sinusoidal signal with frequency of 48 Hz to 65 Hz, external magnetic field < 40 A/m, no DC components, no external conductor with circulating current, conductor centred for measurement, 1 Ω load.

(2) Out of reference domain.

| To order | Reference |
|---|---|
| AC current clamp model **MN10** with operating manual | P01120403 |
| AC current clamp model **MN11** with operating manual | P01120404 |

# Current clamps for AC current
# Models MN12 and MN13

| | |
|---|---|
| **Current** | 200 A AC |
| **Output** | 10 mV / A |



## ELECTRICAL SPECIFICATIONS

- **Current range:**
  0.5 A AC .. 240 A AC
- **Output signal:**
  10 mV AC / A AC (2.4 V for 240 A)
- **Accuracy and phase shift** (1)**:**

| Primary current | 0.5 A .. 10 A | 10 A .. 40 A | 40 A .. 100 A | 100 A .. 240 A |
|---|---|---|---|---|
| % Accuracy of output signal | ≤ 3.5 % + 5 mV | ≤ 2.5 % + 5 mV | ≤ 2 % + 5 mV | ≤ 1 % + 5 mV |
| Phase shift | not specified | ≤ 5 ° | ≤ 3° | ≤ 2.5 ° |

- **Bandwidth:**
  40 Hz .. 10 kHz
- **Crest factor:**
  3 for a current of 200 $A_{RMS}$
- **Maximum currents:**
  200 A continuous for a frequency ≤ 1 kHz (derating proportional to the inverse of frequency beyond)
- **Load impedance:**
  > 1 MΩ
- **Operating voltage:**
  600 $V_{RMS}$
- **Common mode voltage:**
  600 V category III and pollution degree 2
- **Influence of adjacent conductor:**
  ≤ 15 mA / A at 50 Hz
- **Influence of conductor position in jaws:**
  ≤ 0.5 % of output signal at 50/60 Hz
- **Influence of frequency** (2)**:**
  < 3 % of output signal from 40 Hz .. 1 kHz
  < 12 % of output signal from 1 kHz .. 10 kHz
- **Influence of crest factor:**
  < 3 % of output signal for a crest factor of 3 and current of 200 $A_{RMS}$

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  -10 °C to +55 °C
- **Storage temperature:**
  -40 °C to +70 °C
- **Influence of temperature:**
  ≤ 0.15 % of output signal per 10 °K
- **Relative humidity for operation:**
  0 to 85 % RH decreasing linearly above 35 °C
- **Influence of relative humidity:**
  < 0.2 % of output signal from 10 % to 85 % RH
- **Operating altitude:**
  0 to 2,000 m
- **Max. jaw opening:**
  20 mm
- **Clamping capacity:**
  Cable: Ø max 20 mm
  Busbar: 1 busbar of 20 x 5 mm
- **Casing protection rating:**
  IP40 (IEC 529)
- **Drop test:**
  1 m (IEC 68-2-32)
- **Shock resistance:**
  100 g (IEC 68-2-27)
- **Vibration resistance:**
  10 / 55 / 10 Hz, 0.15 mm (IEC 68-2-6)
- **Self-extinguishing capability:**
  Casing: UL94 V2
  Jaws: UL94 V0
- **Dimensions:**
  135 x 51 x 30 mm
- **Weight:**
  180 g
- **Colours:**
  Dark grey case with red jaws
- **Output:**
  MN12:
  Safety sockets (4 mm)
  MN13:
  1.5 m two-wire lead with double or reinforced insulation terminated by 2 elbowed male safety plugs (4 mm)

## SAFETY SPECIFICATIONS

- **Electrical safety:**
  Instrument with double insulation or reinforced insulation between the primary, the secondary and the grippable part located under the guard as per IEC 1010-1 & IEC 1010-2-032
  - 600 V category III, pollution degree 2
  - 300 V category IV, pollution degree 2
- **Electromagnetic compatibility (EMC):**
  EN 50081-1: class B
  EN 50082-2:
  - Electrostatic discharge: IEC 1000-4-2
  - Radiated field: IEC 1000-4-3
  - Fast transients: IEC 1000-4-4
  - Magnetic field at 50/60 Hz: IEC 1000-4-8

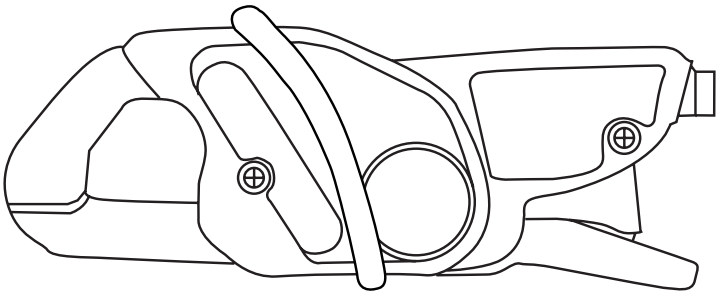
(1) Conditions of reference: 23 °C ± 3 °K, 20 to 70 % RH, sinusoidal signal with frequency of 48 Hz to 65 Hz, external magnetic field < 40 A/m, no DC components, no external conductor with circulating current, conductor centred for measurement, load impedance > 1 MΩ.

(2) Out of reference domain

| To order | Reference |
|---|---|
| AC current clamp model **MN12** with operating manual | P01120405 |
| AC current clamp model **MN13** with operating manual | P01120406 |

# Current clamps for AC current
# Models MN14 and MN15

| | |
|---|---|
| **Current** | 200 A AC |
| **Output** | 1 mV / A |



## ELECTRICAL SPECIFICATIONS

- **Current range:**
  0.5 A AC .. 240 A AC
- **Output signal:**
  1 mV AC / A AC (240 mV for 240 A)
- **Accuracy and phase shift** (1):

| Primary current | 0.5 A .. 10 A | 10 A .. 40 A | 40 A .. 100 A | 100 A .. 240 A |
|---|---|---|---|---|
| % Accuracy of output signal | ≤ 3 % + 5 mV | ≤ 2.5 % + 5 mV | ≤ 2 % + 5 mV | ≤ 1 % + 5 mV |
| Phase shift | not specified | ≤ 5 ° | ≤ 3° | ≤ 2.5 ° |

- **Bandwidth:**
  40 Hz .. 10 kHz
- **Crest factor:**
  3 for a current of 200 $A_{RMS}$
- **Maximum currents:**
  200 A continuous for a frequency ≤ 1 kHz (limitation proportional to the inverse of frequency beyond)
- **Load impedance:**
  > 1 MΩ
- **Operating voltage:**
  600 $V_{RMS}$
- **Common mode voltage:**
  600 V category III and pollution degree 2
- **Influence of adjacent conductor:**
  ≤ 15 mA / A at 50/60 Hz
- **Influence of conductor position in jaws:**
  ≤ 0.5 % of output signal at 50/60 Hz
- **Influence of frequency** (2)**:**
  < 3 % of output signal from 40 Hz .. 1 kHz
  < 12 % of output signal from 1 kHz .. 10 kHz
- **Influence of crest factor:**
  < 3 % of output signal for a crest factor of 3 and current of 200 $A_{RMS}$

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  -10 °C to +55 °C
- **Storage temperature:**
  -40 °C to +70 °C
- **Influence of temperature:**
  ≤ 0.15 % of output signal per 10 °K
- **Relative humidity for operation:**
  0 to 85 % RH decreasing linearly above 35 °C
- **Influence of relative humidity:**
  < 0.2 % of output signal of 10 % at 90 % RH
- **Operating altitude:**
  0 to 2,000 m
- **Max. jaw opening:**
  20 mm
- **Clamping capacity:**
  Cable: Ø max 20 mm
  Busbar: 1 busbar of 20 x 5 mm
- **Casing protection rating:**
  IP40 (IEC 529)
- **Drop test:**
  1 m (IEC 68-2-32)
- **Shock resistance:**
  100 g (IEC 68-2-27)
- **Vibration resistance:**
  10 / 55 / 10 Hz, 0.15 mm (IEC 68-2-6)
- **Self-extinguishing capability:**
  Casing: UL94 V2
  Jaws: UL94 V0
- **Dimensions:**
  135 x 51 x 30 mm
- **Weight:**
  180 g
- **Colours:**
  Dark grey case with red jaws
- **Output:**
  MN14:
  Safety sockets (4 mm)
  MN15:
  1.5 m two-wire lead with double or reinforced insulation terminated by 2 elbowed male safety plugs (4 mm)

## SAFETY SPECIFICATIONS

- **Electrical safety:**
  Instrument with double insulation or reinforced insulation between the primary, the secondary and the grippable part located under the guard as per IEC 1010-1 & IEC 1010-2-032
  - 600 V category III, pollution degree 2
  - 300 V category IV, pollution degree 2
- **Electromagnetic compatibility (EMC):**
  EN 50081-1: class B
  EN 50082-2:
  - Electrostatic discharge: IEC 1000-4-2
  - Radiated field: IEC 1000-4-3
  - Fast transients: IEC 1000-4-4
  - Magnetic field at 50 Hz: IEC 1000-4-8

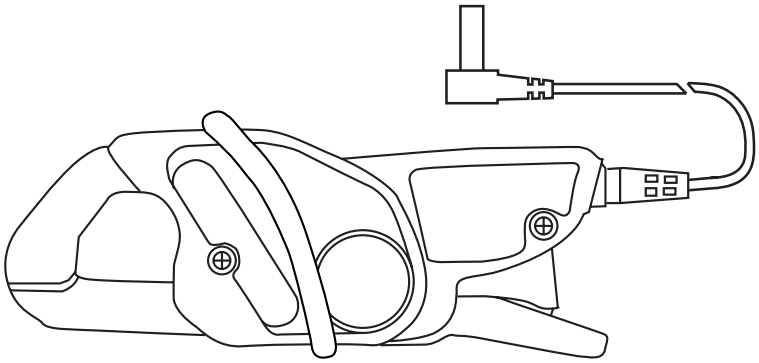
(1) Conditions of reference: 23 °C ± 3 °K, 20 to 70 % RH, sinusoidal signal with frequency of 48 Hz to 65 Hz, external magnetic field < 40 A/m, no DC components, no external conductor with circulating current, conductor centred for measurement, load impedance > 1 MΩ.

(2) Out of reference domain

| To order | Reference |
|---|---|
| AC current clamp model **MN14** with operating manual | P01120416 |
| AC current clamp model **MN15** with operating manual | P01120417 |

# Current clamp for AC current
# Model MN21

| | |
|---|---|
| **Current** | 200 A AC |
| **Ratio** | 1000/1 |
| **Output** | 1 mA/A |



## DESCRIPTION

An electronic voltage-limiting system protects output of clamp when operating, if the secondary circuit is opened.

## ELECTRICAL SPECIFICATIONS

- **Current range:**
  0.1 A AC .. 240 A AC
- **Current transformation ratio:**
  1000/1
- **Output signal:**
  1 mA AC/A AC (240 mA for 240 A)
- **Accuracy and phase shift** (1)**:**

| Primary current | 0.1 A .. 10 A | 1 A .. 20 A | 20 A .. 80 A | 80 A .. 150 A | 150 A .. 200 A |
|---|---|---|---|---|---|
| % Accuracy of output signal | ≤ 2 % + 20 µA | ≤ 1 % + 20 µA | ≤ 1 % | ≤ 2 % | ≤ 4 % |
| Phase shift | not specified | ≤ 2° | ≤ 1.5° | ≤ 1.5° | ≤ 2° |

- **Bandwidth:**
  40 Hz .. 10 kHz
- **Crest factor:**
  5 for a current of 280 A peak
- **Maximum currents:**
  200 A continuous for a frequency ≤ 3 kHz (limitation proportional to the inverse of one third of frequency beyond)
- **Load impedance:**
  ≤ 10 Ω
- **Maximum output voltage (secondary open):**
  Limited to 8 V peak max.
- **Operating voltage:**
  600 VRMS
- **Common mode voltage:**
  600 V category III and pollution degree 2
- **Influence of adjacent conductor:**
  ≤ 15 mA/A at 50 Hz
- **Influence of conductor position in jaws:**
  ≤ 0.5 % of output signal at 50/60 Hz
- **Load influence:** 0.1 .. 5 Ω
  < 0.5 % on measurement
  < 0.5° on phase
- **Influence of frequency Ip < 150 A** (2)**:**
  < 5 % of output signal from 40 Hz .. 1 kHz
  < 15 % of output signal from 1 kHz .. 10 kHz
  add 5 % error if 150 A < Ip < 200 A
- **Influence of crest factor:**
  < 3 % of output signal for crest factor < 5 with current < 280 A peak (50 ARMS)

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  -10 °C to +55 °C
- **Storage temperature:**
  -40 °C to +70 °C
- **Influence of temperature:**
  ≤ 0.20 % of output signal per 10 °K
- **Relative humidity for operation:**
  0 to 85 % RH decreasing linearly above 35 °C
- **Influence of relative humidity:**
  < 0.2 % of output signal from 10 % to 85 % RH
- **Operating altitude:**
  0 to 2,000 m
- **Max. jaw opening:**
  20 mm
- **Clamping capacity:**
  Cable: Ø max 20 mm
  Busbar: 1 busbar of 20 x 5 mm
- **Casing protection rating:**
  IP40 (IEC 529)
- **Drop test:**
  1 m (IEC 68-2-32)
- **Shock resistance:**
  100 g (IEC 68-2-27)
- **Vibration resistance:**
  10/55/10 Hz, 0.15 mm (IEC 68-2-6)
- **Self-extinguishing capability:**
  Casing: UL94 V2
  Jaws: UL94 V0
- **Dimensions:**
  135 x 51 x 30 mm
- **Weight:**
  180 g
- **Colours:**
  Dark grey case with red jaws
- **Output:**
  1.5 m two-wire lead with double or reinforced insulation terminated by 2 elbowed male safety plugs (4 mm)

## SAFETY SPECIFICATIONS

- **Electrical safety:**
  Instrument with double insulation or reinforced insulation between the primary, the secondary and the grippable part located under the guard as per IEC 1010-1 & IEC 1010-2-032
  - 600 V category III, pollution degree 2
  - 300 V category IV, pollution degree 2
- **Electromagnetic compatibility (EMC):**
  EN 50081-1: class B
  EN 50082-2:
  - Electrostatic discharge: IEC 1000-4-2
  - Radiated field: IEC 1000-4-3
  - Fast transients: IEC 1000-4-4
  - Magnetic field at 50 Hz: IEC 1000-4-8

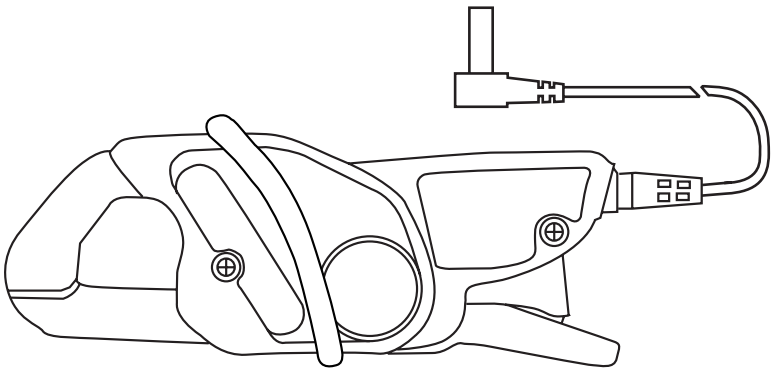
(1) Conditions of reference: 23 °C ± 3 °K, 20 to 70 % RH, sinusoidal signal with frequency of 48 Hz to 65 Hz, external magnetic field < 40 A/m, no DC components, no external conductor with circulating current, conductor centred for measurement, 1 Ω load.

(2) Out of reference domain

| To order | Reference |
|---|---|
| AC current clamp model **MN21** with operating manual | P01120418 |

# Current clamp for AC current
# Model MN23

| | |
|---|---|
| **Current** | 200 A AC |
| **Output** | 10 mV / A |



## ELECTRICAL SPECIFICATIONS

- **Current range:**
  0.1 A AC .. 240 A AC
- **Output signal:**
  10 mV AC / A AC (2.4 V for 240 A)
- **Accuracy and phase shift** (1)**:**

| Primary current | 0.1 A .. 1 A | 1 A .. 20 A | 20 A .. 80 A | 80 A .. 150 A | 150 A .. 200 A |
|---|---|---|---|---|---|
| % Accuracy of output signal | ≤ 3 % + 200 µA | ≤ 2 % + 200 µA | ≤ 1 % | ≤ 4 % | ≤ 10 % |
| Phase shift | not specified | ≤ 3° | ≤ 2° | ≤ 2.5 ° | ≤ 3.5 ° |

- **Bandwidth:**
  40 Hz .. 10 kHz
- **Crest factor:**
  5 for a current of 280 A peak
- **Maximum currents:**
  200 A continuous for a frequency ≤ 1 kHz (limitation proportional to the inverse of frequency beyond)
- **Load impedance:**
  > 1 MΩ
- **Operating voltage:**
  600 $V_{RMS}$
- **Common mode voltage:**
  600 V category III and pollution degree 2
- **Influence of adjacent conductor:**
  ≤ 15 mA / A at 50 Hz
- **Influence of conductor position in jaws:**
  ≤ 0.5 % of output signal at 50/60 Hz
- **Influence of frequency at IP < 100 A** (2)**:**
  < 5 % of output signal from 40 Hz .. 1 kHz**
  < 15 % of output signal from 1 kHz .. 10 kHz
  **Add 10 % error if 100 < IP < 200 A
- **Influence of crest factor:**
  < 3 % of output signal for a crest factor < 5 to a current < 280 A peak (50 $A_{RMS}$)

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  -10 °C to +55 °C
- **Storage temperature:**
  -40 °C to +70 °C
- **Influence of temperature:**
  ≤ 0.20 % of output signal per 10 °K
- **Relative humidity for operation:**
  0 to 85 % RH decreasing linearly above 35 °C
- **Influence of relative humidity:**
  < 0.2 % of output signal from 10 % to 85 % RH
- **Operating altitude:**
  0 to 2,000 m
- **Max. jaw opening:**
  20 mm
- **Clamping capacity:**
  Cable: Ø max 20 mm
  Busbar: 1 busbar of 20 x 5 mm
- **Casing protection rating:**
  IP40 (IEC 529)
- **Drop test:**
  1 m (IEC 68-2-32)
- **Shock resistance:**
  100 g (IEC 68-2-27)
- **Vibration resistance:**
  10 / 55 / 10 Hz, 0.15 mm (IEC 68-2-6)
- **Self-extinguishing capability:**
  Casing: UL94 V2
  Jaws: UL94 V0
- **Dimensions:**
  135 x 51 x 30 mm
- **Weight:**
  180 g
- **Colours:**
  Dark grey case with red jaws
- **Output:**
  1.5 m two-wire lead with double or reinforced insulation terminated by 2 elbowed male safety plugs (4 mm)

## SAFETY SPECIFICATIONS

- **Electrical safety:**
  Instrument with double insulation or reinforced insulation between the primary, the secondary and the grippable part located under the guard as per IEC 1010-1 & IEC 1010-2-032
  - 606.5 V category III, pollution degree 2
  - 306.5 V category IV, pollution degree 2
- **Electromagnetic compatibility (EMC):**
  EN 50081-1: class B
  EN 50082-2:
  - Electrostatic discharge: IEC 1000-4-2
  - Radiated field: IEC 1000-4-3
  - Fast transients: IEC 1000-4-4
  - Magnetic field at 50 Hz: IEC 1000-4-8

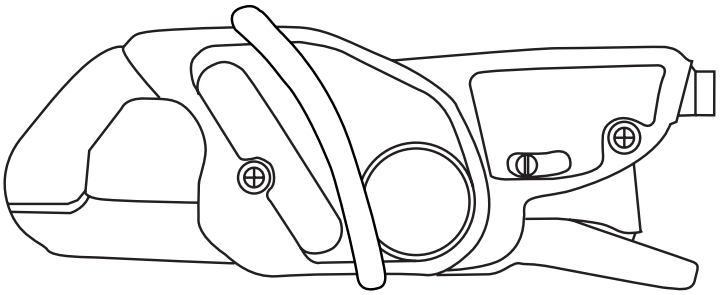
(1) Conditions of reference: 23 °C ± 3 °K, 20 to 70 % RH, sinusoidal signal with frequency of 48 Hz to 65 Hz, external magnetic field < 40 A/m, no DC components, no external conductor with circulating current, conductor centred for measurement, load impedance > 1 MΩ.

(2) Out of reference domain.

| To order | Reference |
|---|---|
| AC current clamp model **MN23** with operating manual | P01120419 |

# Current clamps for AC current
# Models MN38 and MN39

| Current | 20 A AC | 200 A AC |
|---|---|---|
| Output | 100 mV / A | 10 mV / A |



## ELECTRICAL SPECIFICATIONS

- **Current range:**
  0.1 A AC .. 24 A AC
  0.5 A AC .. 240 A AC
- **Output signal:**
  100 mV AC / A AC (2.4 V for 24 A)
  10 mV AC / A AC (2.4 V for 240 A)
- **Accuracy and phase shift (1):**

| Calibre | 20 A | 200 A | | | |
|---|---|---|---|---|---|
| Primary current | 0.1 A .. 20 A | 0.5 A .. 10 A | 10 A .. 40 A | 40 A .. 100 A | 100 A .. 240 A |
| % Accuracy of output signal | ≤ 1 % + 50 mV | ≤ 3 % + 5 mV | ≤ 2.5 % + 5 mV | ≤ 2 % + 5 mV | ≤ 1 % + 5 mV |
| Phase shift | not specified | not specified | ≤ 5 ° | ≤ 3° | ≤ 2.5 ° |

- **Bandwidth:**
  40 Hz .. 10 kHz
- **Crest factor:**
  3 for a current of 200 ARMS
- **Maximum currents:**
  200 A continuous for a frequency ≤ 1 kHz (limitation proportional to the inverse of frequency beyond)
- **Load impedance:**
  > 1 MΩ
- **Operating voltage:**
  600 VRMS
- **Common mode voltage:**
  600 V category III and pollution degree 2
- **Influence of adjacent conductor:**
  ≤ 15 mA / A at 50 Hz
- **Influence of conductor position in jaws:**
  ≤ 0.5 % of output signal at 50/60 Hz
- **Influence of frequency (2):**
  - 20 A calibre:
    < 5 % of output signal from 40 Hz .. 1 kHz
    < 15 % of output signal from 1 kHz .. 10 kHz
  - 200 A calibre:
    < 3 % of output signal from 40 Hz .. 1 kHz
    < 12 % of output signal from 1 kHz .. 10 kHz
- **Influence of crest factor:**
  < 3 % of output signal for a crest factor of 3 and current of 200 ARMS

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  -10 °C to +55 °C
- **Storage temperature:**
  -40 °C to +70 °C
- **Influence of temperature:**
  ≤ 0.15 % of output signal per 10 °K
- **Relative humidity for operation:**
  0 to 85 % RH decreasing linearly above 35 °C
- **Influence of relative humidity:**
  < 0.2 % of output signal from 10 % to 85 % RH
- **Operating altitude:**
  0 to 2,000 m
- **Max. jaw opening:**
  20 mm
- **Clamping capacity:**
  Cable: Ø max 20 mm
  Busbar: 1 busbar of 20 mm x 5 mm
- **Casing protection rating:**
  IP40 (IEC 529)
- **Drop test:**
  1 m (IEC 68-2-32)
- **Shock resistance:**
  100 g (IEC 68-2-27)
- **Vibration resistance:**
  10 / 55 / 10 Hz, 0.15 mm (IEC 68-2-6)
- **Self-extinguishing capability:**
  Casing: UL94 V2
  Jaws: UL94 V0
- **Dimensions:**
  135 x 51 x 30 mm
- **Weight:**
  180 g
- **Colours:**
  Dark grey case with red jaws
- **Output:**
  MN38:
  Safety jacks (4 mm)
  MN39:
  1.5 m two-wire lead with double or reinforced insulation terminated by 2 elbowed male safety plugs (4 mm)

## SAFETY SPECIFICATIONS

- **Electrical safety:**
  Instrument with double insulation or reinforced insulation between the primary the secondary and the grippable part located under the guard as per IEC 1010-1 & IEC 1010-2-032
  - 600 V category III, pollution degree 2
  - 300 V category IV, pollution degree 2
- **Electromagnetic compatibility (EMC):**
  EN 50081-1: class B
  EN 50082-2:
  - Electrostatic discharge: IEC 1000-4-2
  - Radiated field: IEC 1000-4-3
  - Fast transients: IEC 1000-4-4
  - Magnetic field at 50/60 Hz: IEC 1000-4-8

(1) Conditions of reference: 23 °C ± 3 °K, 20 to 70 % RH, sinusoidal signal with frequency of 48 Hz to 65 Hz, external magnetic field < 40 A/m, no DC components, no external conductor with circulating current, conductor centred for measurement, load impedance > 1 MΩ.

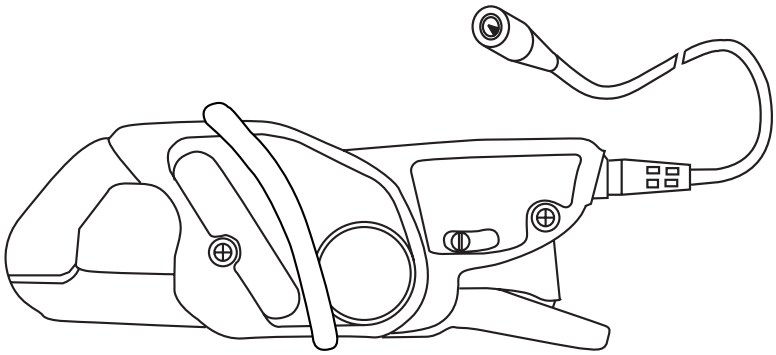
(2) Out of reference domain

| To order | Reference |
|---|---|
| AC current clamp model **MN38** with operating manual | P01120407 |
| AC current clamp model **MN39** with operating manual | P01120408 |

# Oscilloscope clamp for AC current

## Model MN60 (insulated AC current probe)

| | | |
|---|---|---|
| **Current** | 60 A peak | 600 A peak |
| **Output** | 100 mV / A | 10 mV / A |



## DESCRIPTION

This 200 A AC clamp enables easy display and measurement of "current" curves. It fits any oscilloscope since it has a coaxial lead with BNC plug. It produces a mV signal directly proportional to current. It offers 2 different sensitivities.

## ELECTRICAL SPECIFICATIONS

- **Current range:**
  0.1 A AC .. 20 A AC (60 A peak)
  0.5 A AC .. 200 A AC (600 A peak)
- **Output signal:**
  100 mV AC / A AC (2 V for 20 A)
  10 mV AC / A AC (2 V for 200 A)
- **Accuracy and phase shift (1):**

| Calibre | 20 A | 200 A | | | |
|---|---|---|---|---|---|
| Primary current | 0.1 A .. 20 A | 0.5 A .. 10 A | 10 A .. 40 A | 40 A .. 100 A | 100 A .. 240 A |
| % Accuracy of output signal | ≤ 2 % + 50 mV | ≤ 3.5 % + 5 mV | ≤ 3 % + 5 mV | ≤ 2.5 % + 5 mV | ≤ 1.5 % + 5 mV |
| Phase shift | not specified | not specified | ≤ 6° | ≤ 4° | ≤ 3° |

- **Bandwidth:**
  40 Hz .. 40 kHz (-3 dB) (depending on current value)
- **Rise/fall time from 10 % to 90 %:**
  - 20 A calibre: 7.4 µs
  - 200 A calibre: 8.7 µs
- **10 % delay time:**
  0.1 µs
- **Ampere second product:**
  - 20 A calibre: 25 A.s
  - 200 A calibre: 2 A.s
- **Insertion impedance (at 400 Hz / 10 kHz)**
  - 20 A calibre: < 0.3 mΩ / < 7.2 mΩ
  - 200 A calibre: < 1 mΩ / < 26 mΩ
- **Maximum currents:**
  200 A continuous for a frequency ≤ 3 kHz (limitation proportional to inverse of one third of frequency beyond)
- **Influence of temperature:**
  ≤ 150 ppm /k or 0.15 % of output signal per 10 °K
- **Influence of relative humidity:**
  < 0.2 % of output signal
- **Influence of adjacent conductor:**
  ≤ 15 mA / A at 50 Hz
- **Influence of DC current < 10 % of rated calibre superimposed on the rated current:**
  - 20 A calibre:
    For I DC < 2 A: influence < 0.5 %
  - 200 A calibre:
    For I DC < 20 A: influence < 5 %
- **Influence of conductor position in jaws:**
  ≤ 0.5 % of output signal at 50/60 Hz
- **Influence of frequency (2):**
  - 20 A calibre:
    < 10 % of output signal from 40 Hz .. 1 kHz
    < 15 % of output signal from 1 kHz .. 10 kHz
  - 200 A calibre:
    < 3 % of output signal from 40 Hz .. 1 kHz
    < 12 % of output signal from 1 kHz .. 10 kHz
- **Influence of crest factor:**
  < 3 % of output signal for a crest factor of 3 and current of 200 ARMS

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  -10 °C to +55 °C
- **Storage temperature:**
  -40 °C to +70 °C
- **Relative humidity for operation:**
  0 to 85 % RH decreasing linearly above 35 °C
- **Operating altitude:**
  0 to 2,000 m
- **Max. jaw opening:**
  20 mm
- **Clamping capacity:**
  Cable: Ø max 20 mm
  Busbar: 1 busbar of 20 x 5 mm
- **Casing protection rating:**
  IP40 (IEC 529)
- **Drop test:**
  1 m (IEC 68-2-32)
- **Shock resistance:**
  100 g / 6 ms / half-periode (IEC 68-2-27)
- **Protection against impacts:**
  IK04 0.5 J (EN 50102)
- **Vibration resistance:**
  10 / 55/10 Hz, 0.15 mm (IEC 68-2-6)
- **Self-extinguishing capability:**
  Casing: UL94 V2
  Jaws: UL94 V0
- **Dimensions:**
  128 x 49 x 28 mm
- **Weight:**
  180 g
- **Colours:**
  Dark grey case with red jaws
- **Output:**
  Coaxial cable 2 m long, terminated by an insulated BNC connector

## SAFETY SPECIFICATIONS

- **Electrical safety:**
  Instrument with double insulation or reinforced insulation between the primary, the secondary and the grippable part located under the guard as per IEC 1010-1 & IEC 1010-2-032
  - 600 V category III, pollution degree 2
  - 300 V category IV, pollution degree 2
- **Electromagnetic compatibility (EMC):**
  EN 50081-1: class B
  EN 50082-2:
  - Electrostatic discharge: IEC 1000-4-2
    4 kV level 2 performance criterion B
    8 kV in the air level 3 performance criterion B
  - Radiated field: IEC 1000-4-3
    10 V/m performance criterion A
  - Fast transients: IEC 1000-4-4
    1 kV level 2 performance criterion B
    2 kV level 3 performance criterion B
  - Magnetic field at 50/60 Hz: IEC 1000-4-8
    field of 400 A/m at 50 Hz: < 1 A

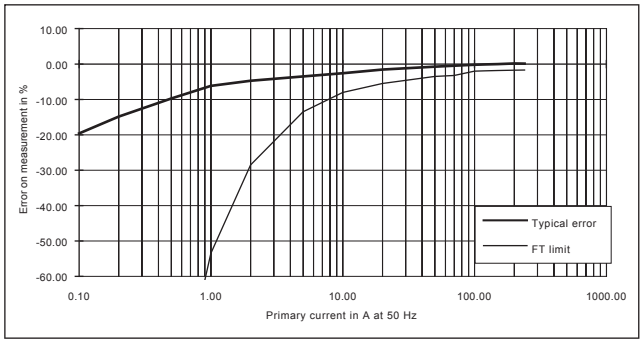
# Oscilloscope clamp for AC current
# Model MN60 (insulated AC current probe)

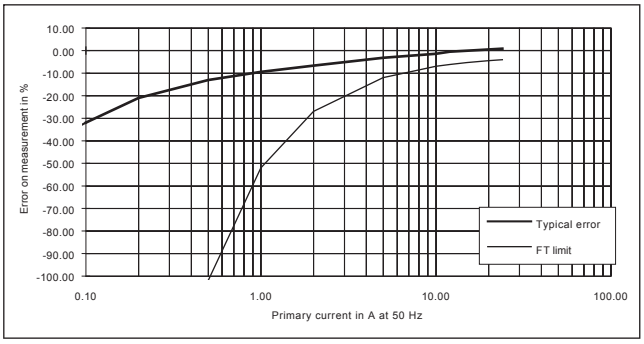
## CURVES AT 50 Hz

200 A calibre

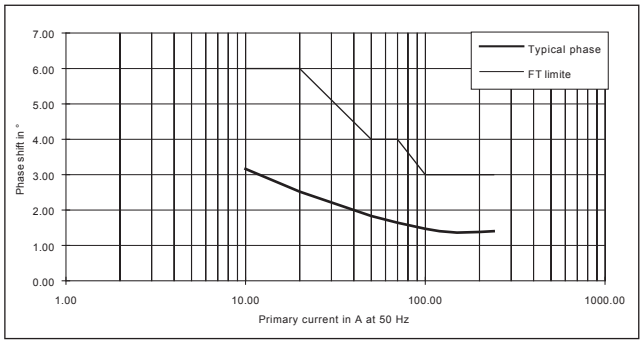
20 A calibre

Error on measurement



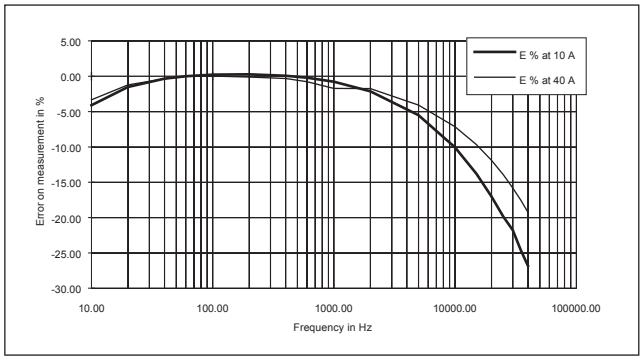

Phase shift

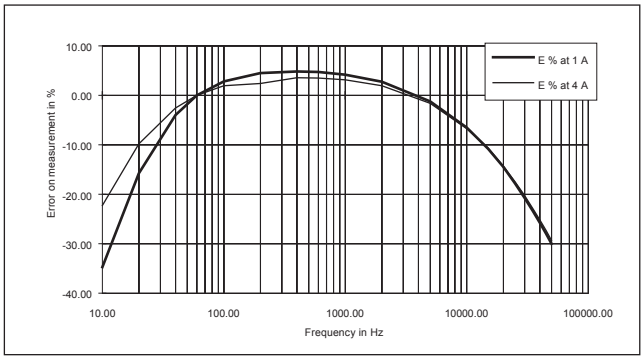


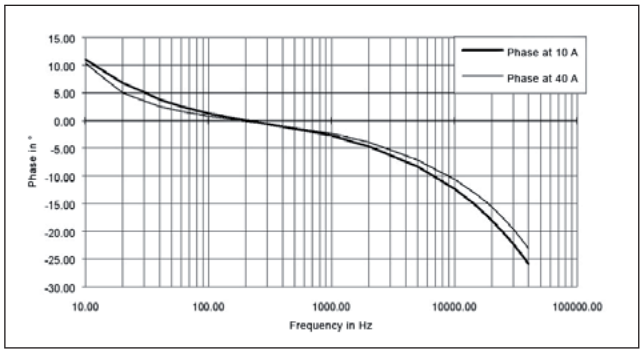

## FREQUENCY RESPONSE

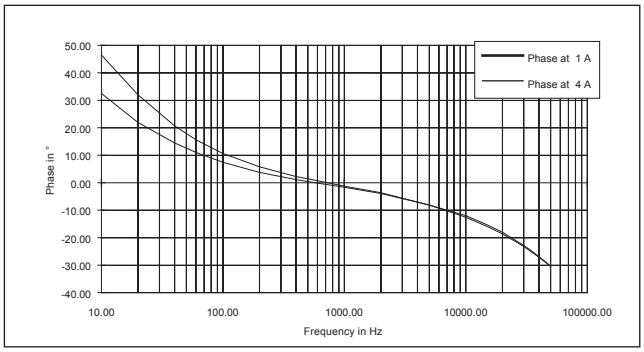
200 A calibre

20 A calibre



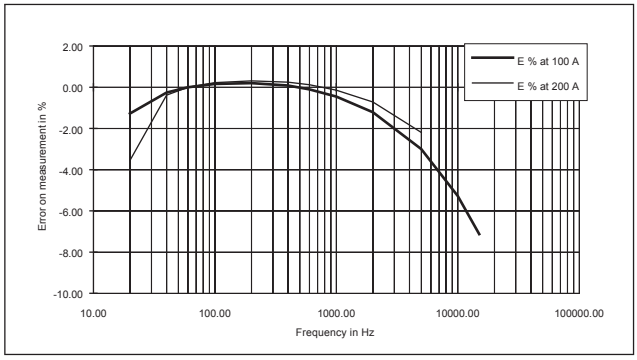



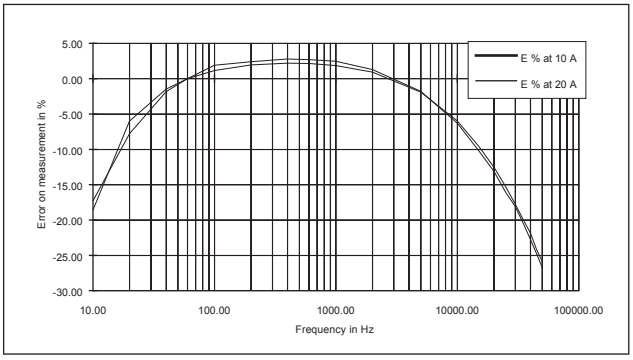
# Oscilloscope clamp for AC current
# Model MN60 (insulated AC current probe)

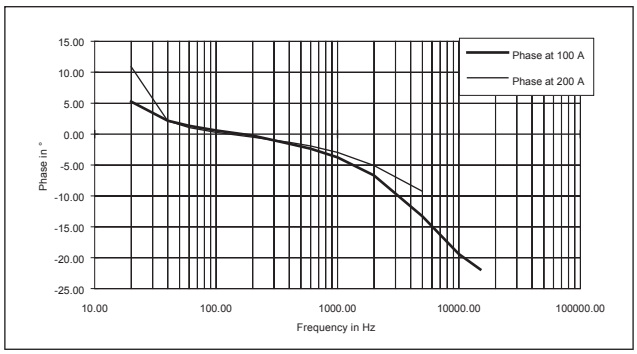
## FREQUENCY RESPONSE (CONT.)

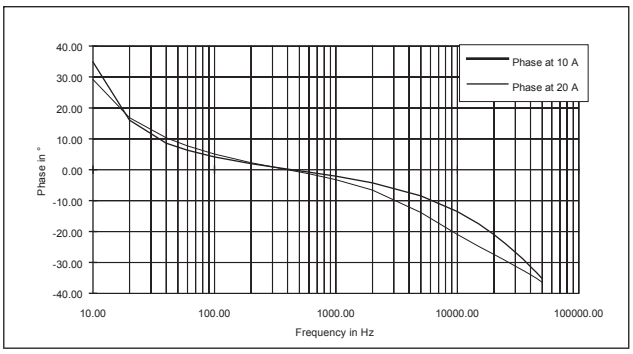
200 A calibre




20 A calibre



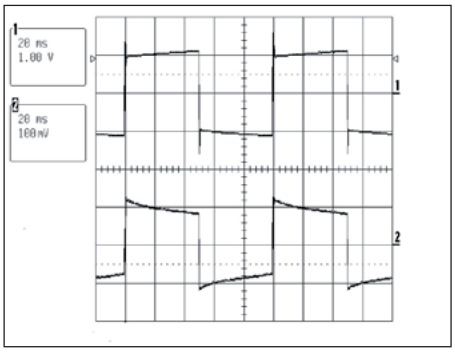



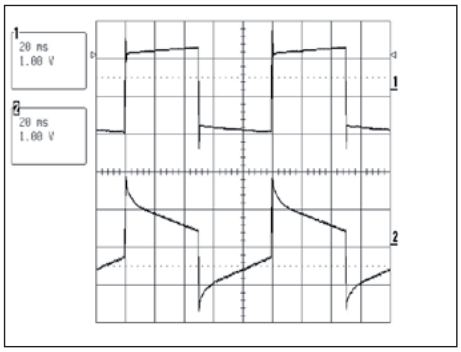

## RESPONSE TO A SQUARE SIGNAL

200 A calibre

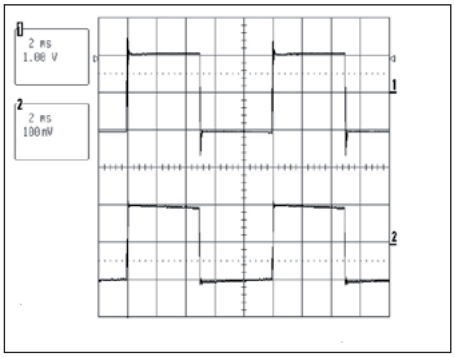
20 A calibre

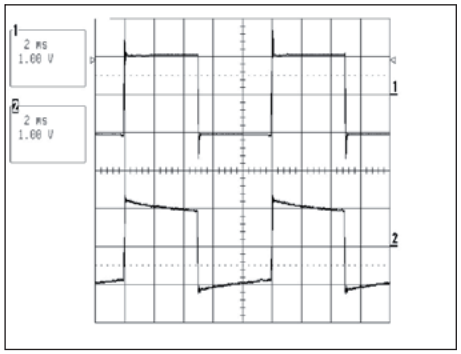
10 A at 10 Hz




10 A at 100 Hz



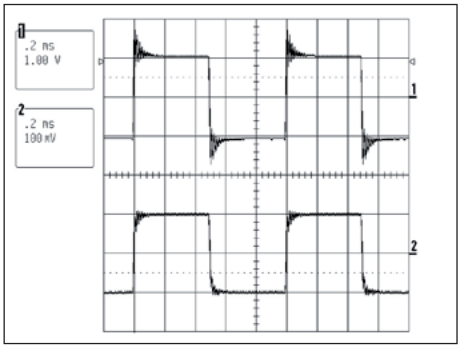
# Oscilloscope clamp for AC current
# Model MN60 (insulated AC current probe)

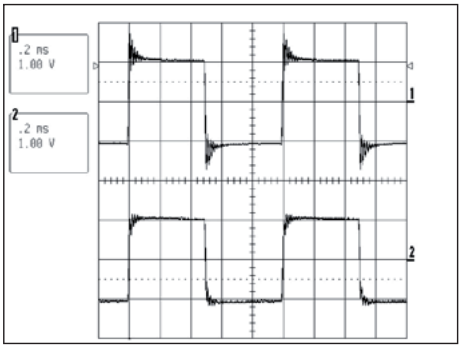
## RESPONSE TO A SQUARE SIGNAL (CONT.)

200 A calibre

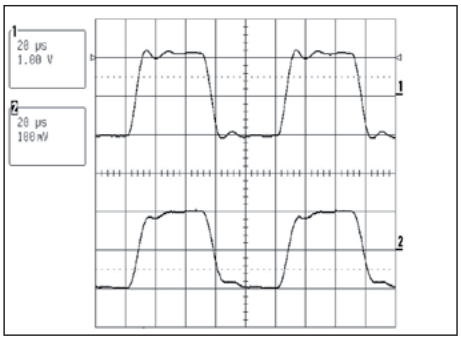
20 A calibre

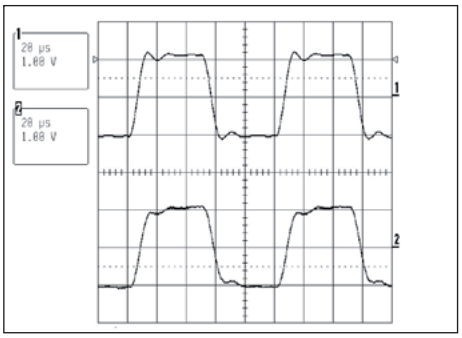
10 A at 1 kHz




10 A at 10 kHz



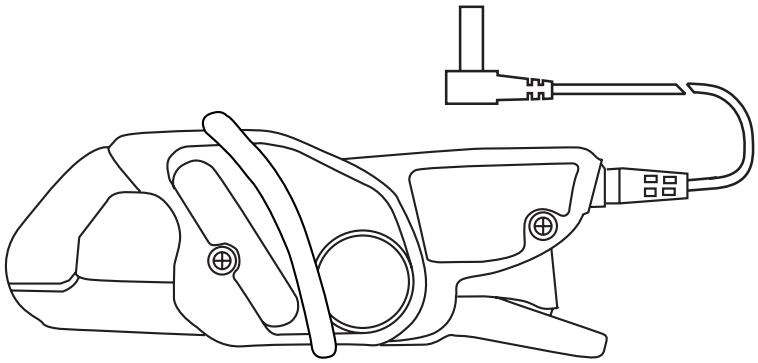

(1) Conditions of reference: 23 °C ± 3 °K, 20 % to 75 % RH, sinusoidal signal with frequency of 48 Hz at 1 kHz, external magnetic field < 40 A/m, no DC components, no external conductor with circulating current, conductor centred for measurement, load impedance > 1 MΩ and < 100 pF.

(2) Out of reference domain

| To order | Reference |
|---|---|
| AC current clamp model **MN60** for oscilloscope with operating manual | P01120409 |

# Current clamp for AC current
# Model MN71

| | |
|---|---|
| **Current** | 10 A AC |
| **Output** | 100 mV / A |



## DESCRIPTION

This clamp was specially designed to measure current on current transformer secondary circuits.

## ELECTRICAL SPECIFICATIONS

- **Current range:**
  0.01 A AC .. 12 A AC
- **Output signal:**
  100 mV AC / A AC (1.2 V for 12 A)
- **Accuracy and phase shift** (1)**:**

| Primary current | 0.01 A .. 0.1 A | 0.1 A .. 1 A | 1 A .. 5 A | 5 A .. 12 A |
|---|---|---|---|---|
| Accuracy in % of output signal | ≤ 3 % + 0.1 mV | ≤ 2.5 % | ≤ 1 % | |
| Phase shift | not specified | ≤ 5° | ≤ 3° | ≤ 3° |

- **Bandwidth:**
  40 Hz .. 10 kHz
- **Crest factor:**
  5 for a current of 40 A peak (8 ARMS)
- **Maximum currents:**
  20 A continuous for a frequency ≤ 10 kHz (limitation proportional to the inverse of one tenth of frequency beyond)
- **Load impedance:**
  > 1 MΩ
- **Operating voltage:**
  600 VRMS
- **Common mode voltage:**
  600 V category III and pollution degree 2
- **Influence of adjacent conductor:**
  < 15 mA / A at 50 Hz
- **Influence of conductor position in jaws:**
  < 0.5 % of output signal at 50/60 Hz
- **Influence of frequency** (2)**:**
  < 5 % of output signal from 20 Hz .. 1 kHz
  < 10 % of output signal from 1 kHz .. 10 kHz
- **Influence of crest factor:**
  < 3 % of output signal for crest factor < 5 with current < 40 ARMS

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  -10 °C to +55 °C
- **Storage temperature:**
  -40 °C to +70 °C
- **Influence of temperature:**
  ≤ 0.2 % of output signal per 10 °K
- **Relative humidity for operation:**
  0 to 85 % RH decreasing linearly above 35 °C
- **Influence of relative humidity:**
  < 0.2 % of output signal from 10 % to 85 % RH
- **Operating altitude:**
  0 to 2,000 m
- **Max. jaw opening:**
  20 mm
- **Clamping capacity:**
  Cable: Ø max 20 mm
  Busbar: 1 busbar of 20 x 5 mm
- **Casing protection rating:**
  IP40 (IEC 529)
- **Drop test:**
  1 m (IEC 68-2-32)
- **Shock resistance:**
  100 g (IEC 68-2-27)
- **Vibration resistance:**
  10 / 55 / 10 Hz, 0.15 mm (IEC 68-2-6)
- **Self-extinguishing capability:**
  Casing: UL94 V2
  Jaws: UL94 V0
- **Dimensions:**
  135 x 51 x 30 mm
- **Weight:**
  180 g
- **Colours:**
  Dark grey case with red jaws
- **Output:**
  1.5 m two-wire lead with double or reinforced insulation terminated by 2 elbowed male safety plugs (4 mm)

## SAFETY SPECIFICATIONS:

- **Electrical safety:**
  Instrument with double insulation or reinforced insulation between the primary the secondary and the grippable part located under the guard as per IEC 1010-1 & IEC 1010-2-032
  - 600 V category III, pollution degree 2
  - 300 V category IV, pollution degree 2
- **Electromagnetic compatibility (EMC):**
  EN 50081-1: class B
  EN 50082-2:
  - Electrostatic discharge: IEC 1000-4-2
  - Radiated field: IEC 1000-4-3
  - Fast transients: IEC 1000-4-4
  - Magnetic field at 50 Hz: IEC 1000-4-8

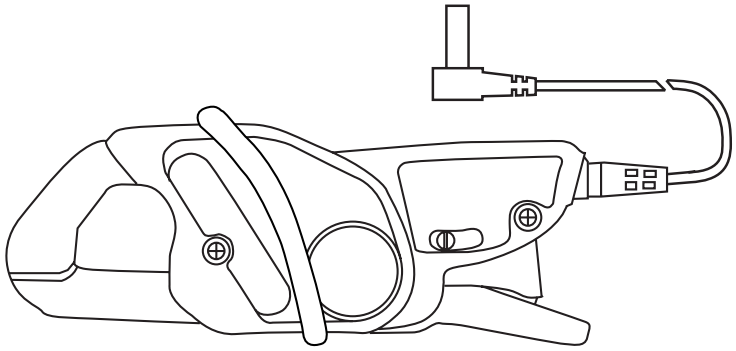
(1) Conditions of reference: 23 °C ± 3 °K, 20 % to 75 % RH, sinusoidal signal with frequency of 48 Hz to 65 Hz, external magnetic field < 40 A/m, no DC components, no external conductor with circulating current, conductor centred for measurement, load impedance > 1 MΩ.

(2) Out of reference domain

| To order | Reference |
|---|---|
| AC current clamp model **MN71** with operating manual | P01120420 |

# Current clamp for AC current
# Model MN73

| Current | 2 A AC | 200 A AC |
|---|---|---|
| Output | 1,000 mV / A | 10 mV / A |



## DESCRIPTION

This clamp has a wide measurement range (up to 200 A), and it can also measure very low currents. We call it the "universal" probe.

## ELECTRICAL SPECIFICATIONS

- **Current calibres:**
  0.01 A AC .. 2.4 A AC
  0.1 A AC .. 240 A AC
- **Output signal:**
  1,000 mV AC / A AC (2 V for 2 A)
  10 mV AC / A AC (2.4 V for 240 A)
- **Accuracy and phase shift (1):**

| Calibre | 2 A | | | | 200 A | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Primary current | 0.01 A .. 0.1 A | 0.1 A .. 1 A | 1 A .. 2 A | 2 A .. 2.4 A | 0.1 A .. 1 A | 1 A .. 20 A | 20 A .. 80 A | 80 A .. 150 A | 150 A .. 200 A |
| % Accuracy of output signal | ≤ 5 % + 2 mV | ≤ 3 % + 1 mV | ≤ 1 % | ≤ 1 % | ≤ 3 % + 200 µV | ≤ 2 % + 200 µV | ≤ 1 % | ≤ 4 % | ≤ 10 % |
| Phase shift | not specified | | | | not specified | ≤ 3° | ≤ 2° | ≤ 3° | ≤ 4° |

- **Bandwidth:**
  40 Hz .. 10 kHz
- **Crest factor:**
  5 for a current of 280 A peak (200 Arms)
- **Maximum currents:**
  200 A continuous for a frequency ≤ 1 kHz (limitation proportional to the inverse frequency beyond)
- **Load impedance:**
  > 1 MΩ
- **Operating voltage:**
  600 Vrms
- **Common mode voltage:**
  600 V category III and pollution degree 2
- **Influence of adjacent conductor:**
  ≤ 15 mA / A at 50 Hz
- **Influence of conductor position in jaws:**
  ≤ 0.5 % of output signal at 50/60 Hz
- **Influence of frequency (2):**
  - Calibre 2 A:
    < 10 % of output signal from 40 Hz .. 10 kHz
  - 200 A calibre:
    < 5 % of output signal from 40 Hz .. 1 kHz**
    < 15 % of output signal from 1 kHz .. 10 kHz
    ** add 10 % error if 100 A < $I_{Primary}$ < 200 A
- **Influence of crest factor:**
  < 5 % of output signal for crest factor < 5 with current < 280 Arms

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  -10 °C to +55 °C
- **Storage temperature:**
  -40 °C to +70 °C
- **Influence of temperature:**
  ≤ 0.20 % of output signal per 10 °K
- **Relative humidity for operation:**
  0 to 85 % RH decreasing linearly above 35 °C
- **Influence of relative humidity:**
  < 0.2 % of output signal from 10 % to 85 % RH
- **Operating altitude:**
  0 to 2,000 m
- **Max. jaw opening:**
  20 mm
- **Clamping capacity:**
  Cable: Ø max 20 mm
  Busbar: 1 busbar of 20 x 5 mm
- **Casing protection rating:**
  IP40 (IEC 529)
- **Drop test:**
  1 m (IEC 68-2-32)
- **Shock resistance:**
  100 g (IEC 68-2-27)
- **Vibration resistance:**
  10 / 55 / 10 Hz, 0.15 mm (IEC 68-2-6)
- **Self-extinguishing capability:**
  Casing: UL94 V2
  Jaws: UL94 V0
- **Dimensions:**
  135 x 51 x 30 mm
- **Weight:**
  180 g
- **Colours:**
  Dark grey case with red jaws
- **Output:**
  1.5 m two-wire lead with double or reinforced insulation terminated by 2 elbowed male safety plugs (4 mm)

## SAFETY SPECIFICATIONS

- **Electrical safety:**
  Instrument with double insulation or reinforced insulation between the primary the secondary and the grippable part located under the guard as per IEC 1010-1 & IEC 1010-2-032
  - 600 V category III, pollution degree 2
  - 300 V category IV, pollution degree 2
- **Electromagnetic compatibility (EMC):**
  EN 50081-1: class B
  EN 50082-2:
  - Electrostatic discharge: IEC 1000-4-2
  - Radiated field: IEC 1000-4-3
  - Fast transients: IEC 1000-4-4
  - Magnetic field at 50 Hz: IEC 1000-4-8

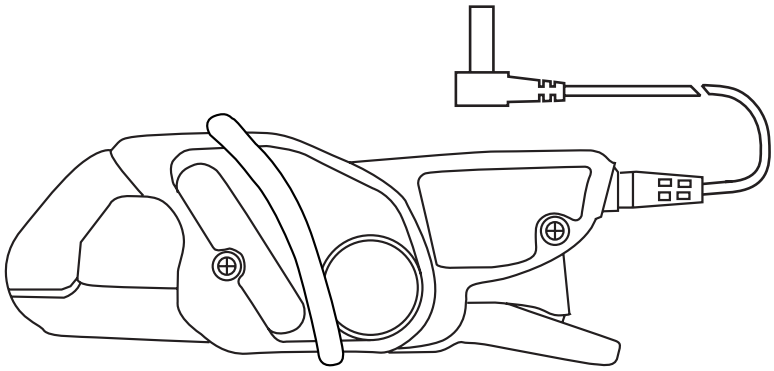
(1) Conditions of reference: 23 °C ± 3 °K, 20 % to 75 % RH, sinusoidal signal with frequency of 48 Hz to 65 Hz, external magnetic field < 40 A/m, no DC components, no external conductor with circulating current, conductor centred for measurement, load impedance > 1 MΩ.

(2) Out of reference domain

| To order | Reference |
|---|---|
| AC current clamp model **MN73** with operating manual | P01120421 |
| Accessory: **AN1** artificial neutral box *(see capter 12)* | P01197201 |

# Current clamps for AC current
# Models MN88 and MN89

| | |
|---|---|
| **Current** | 200 A AC |
| **Output** | 100 mV DC / A |



## DESCRIPTION

These clamps produce a DC voltage output which is very useful for multimeters whose sensitivity in V or A is too weak.

## ELECTRICAL SPECIFICATIONS

- **Current range:**
  0.5 A AC .. 240 A AC
- **Output signal:**
  100 mV DC / A (24 V for 240 A AC)
- **Accuracy** (1)**:**

| Primary current | 0.5 A .. 10 A | 10 A .. 40 A | 40 A .. 100 A | 100 A .. 240 A |
|---|---|---|---|---|
| % Accuracy of output signal | ≤ 5 % + 50 mV | ≤ 3 % + 50 mV | ≤ 2 % + 50 mV | ≤ 2 % |

- **Bandwidth:**
  40 Hz .. 10 kHz
- **Crest factor:**
  3 for a current of 200 ARMS
- **Maximum currents:**
  200 A continuous for a frequency ≤ 1 kHz (derating proportional to the inverse of frequency beyond)
- **Load impedance:**
  > (1 MΩ + filter RC 2s)
- **Operating voltage:**
  600 VRMS
- **Common mode voltage:**
  600 V category III and pollution degree 2
- **Influence of adjacent conductor:**
  ≤ 15 mA / A at 50 Hz
- **Influence of conductor position in jaws:**
  ≤ 0.5 % of output signal at 50 Hz
- **Influence of frequency** (2)**:**
  < 5 % of output signal from 40 Hz .. 1 kHz < 12 % of output signal from 1 kHz .. 10 kHz
- **Influence of crest factor**
  < 3 % of output signal for a crest factor of 3 and current of 200 ARMS

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  -10 °C to +55 °C
- **Storage temperature:**
  -40 °C to +70 °C
- **Influence of temperature:**
  ≤ 0.15 % of output signal per 10 °K
- **Relative humidity for operation:**
  0 to 85 % RH decreasing linearly above 35 °C
- **Influence of relative humidity:**
  < 0.2 % of output signal from 10 % to 85 % RH
- **Operating altitude:**
  0 to 2,000 m
- **Max. jaw opening:**
  20 mm
- **Clamping capacity:**
  Cable: Ø max 20 mm
  Busbar: 1 busbar of 20 x 5 mm
- **Casing protection rating:**
  IP40 (IEC 529)
- **Drop test:**
  1 m (IEC 68-2-32)
- **Shock resistance:**
  100 g (IEC 68-2-27)
- **Vibration resistance:**
  10/55/10 Hz, 0.15 mm (IEC 68-2-6)
- **Self-extinguishing capability:**
  Casing: UL94 V2
  Jaws: UL94 V0
- **Dimensions:**
  135 x 51 x 30 mm
- **Weight:**
  180 g
- **Colours:**
  Dark grey case with red jaws
- **Output:**
  MN88:
  Safety jacks (4 mm)
  MN89:
  1.5 m two-wire lead with double or reinforced insulation terminated by 2 elbowed male safety plugs (4 mm)

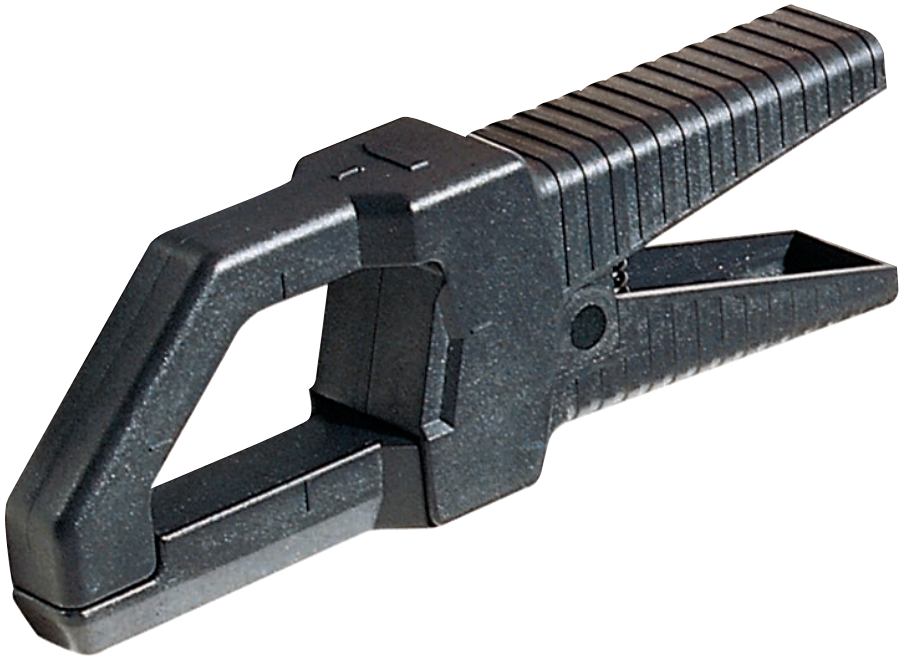
## SAFETY SPECIFICATIONS

- **Electrical safety:**
  Instrument with double insulation or reinforced insulation between the primary the secondary and the grippable part located under the guard as per IEC 1010-1 & IEC 1010-2-032
  - 600 V category III, pollution degree 2
  - 300 V category IV, pollution degree 2
- **Electromagnetic compatibility (EMC):**
  EN 50081-1: class B
  EN 50082-2:
  - Electrostatic discharge: IEC 1000-4-2
  - Radiated field: IEC 1000-4-3
  - Fast transients: IEC 1000-4-4
  - Magnetic field at 50/60 Hz: IEC 1000-4-8

(1) Conditions of reference: 23 °C ± 3 °K, 20 to 70 % RH, sinusoidal signal with frequency of 48 Hz to 65 Hz, external magnetic field < 40 A/m, no DC components, no external conductor with circulating current, conductor centred for measurement, load impedance > 1 MΩ + filter RC 2s.

(2) Out of reference domain

| To order | Reference |
|---|---|
| AC current clamp model **MN88** with operating manual | P01120410 |
| AC current clamp model **MN89** with operating manual | P01120415 |



## $Y_N$ SERIES

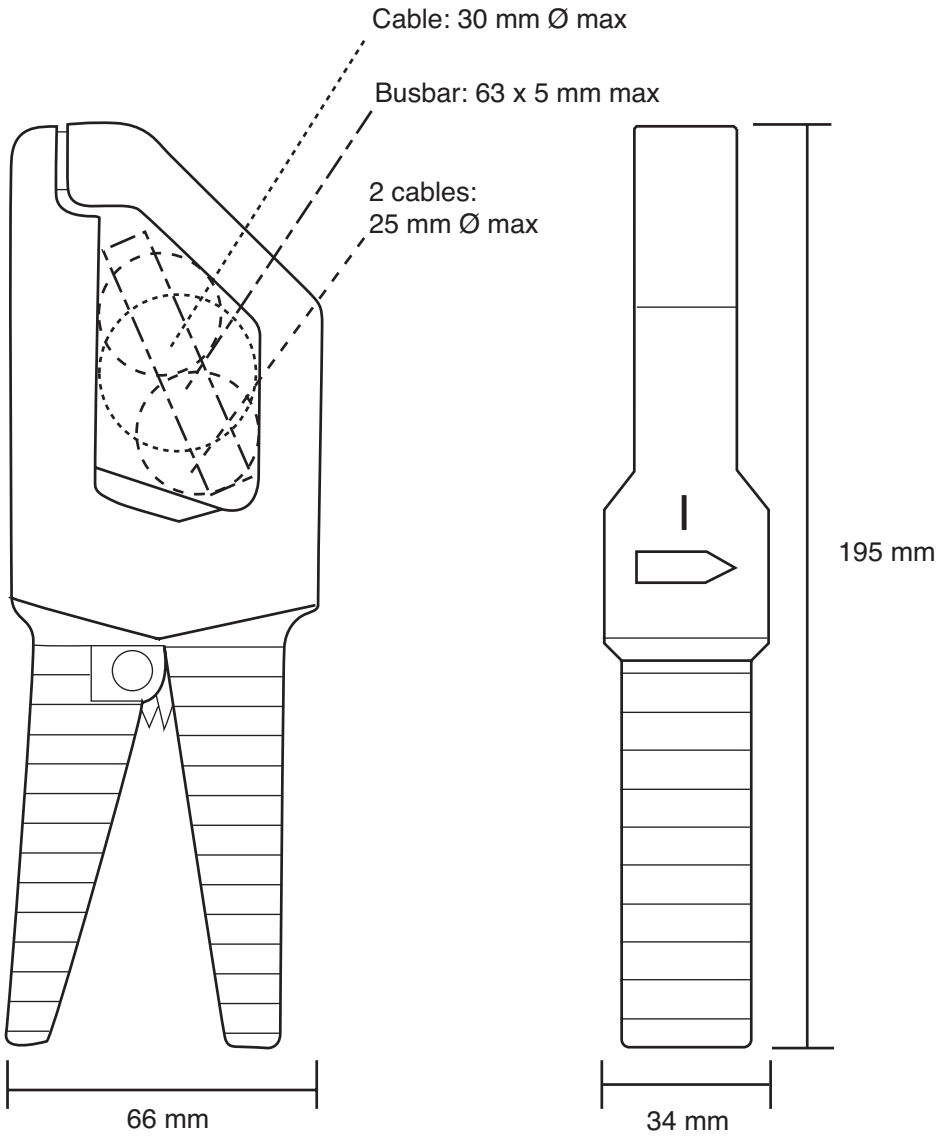
The Y series clamps are designed to be both rugged and versatile whilst remaining easy to use. The jaws are designed so that the clamps can be hooked onto cables or clamped onto busbars for current measurement up to 600 A AC.

There are two types of Y series clamps available:

The first acts as a current transformer (ratios of 100:1 or 1000:1), giving an output current that may be read by a multimeter, logger or other suitable devices with appropriate current calibres.

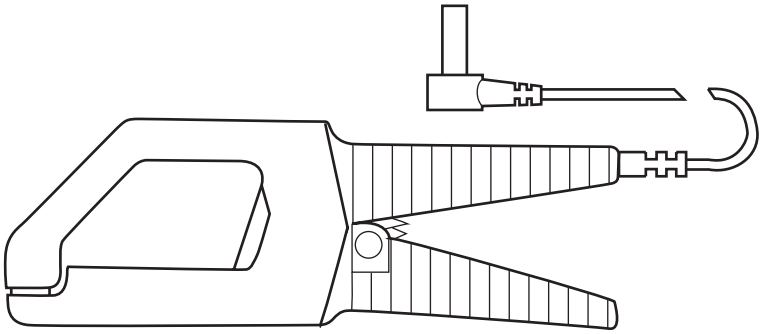
The other kind of Y series clamp has a DC voltage output proportional to the AC current measured, allowing instruments without current calibres to measure, display and record currents on a DC voltage calibre.

There is also a model available specifically for direct use with oscilloscopes.


Cable: 30 mm Ø max
Busbar: 63 x 5 mm max
2 cables:
25 mm Ø max
195 mm
66 mm
34 mm

# Current clamp for AC current
# Model Y1N

| | |
|---|---|
| **Current** | 500 A AC |
| **Ratio** | 1000/1 |
| **Output** | 1 mA/A |



## ELECTRICAL SPECIFICATIONS

- **Current range:**
  4 A AC .. 600 A AC
- **Current transformation ratio:**
  1000:1
- **Output signal:**
  1 mA AC/A AC
- **Accuracy** (1)**:**

| Primary current | 4 A | 25 A | 100 A | 250 A | 500 A | 600 A (2) |
|---|---|---|---|---|---|---|
| Accuracy in % of output signal | 4.5 % + 0.5 mA | 4.5 % | 3.5 % | 3 % | 3 % | 3 % |
| Phase shift | not specified | 4° | 2° | 2° | 2° | 2° |

class 3 at 1.25 VA

- **Bandwidth:**
  48 Hz .. 1,000 Hz
- **Load impedance:**
  5 Ω max
- **Overload:**
  700 A for 10 minutes
- **Maximum output voltage (secondary open):**
  Electronic protection circuit limiting voltage to 10 V peak max
- **Operating voltage:**
  600 VRMS
- **Common mode voltage:**
  600 VRMS
- **Influence of adjacent and parallel conductors:**
  < 30 mA/A at 50 Hz
- **Influence of conductor position in jaws:**
  ±1.5 %

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  -15 °C .. +50 °C
- **Storage temperature:**
  -40 °C .. +85 °C
- **Influence of temperature:**
  < 0.1 % per 10 °K
- **Operating altitude:**
  0 to 2,000 m
- **Max. jaw opening:**
  33 mm
- **Clamping capacity:**
  Cable: Ø max 30 mm
  Busbar: 63 x 5 mm
- **Casing protection rating:**
  IP20 in accordance with IEC 529
- **Drop test:**
  1.5 m (IEC 68-2-32)
- **Shock resistance:**
  100 g, in accordance with IEC 68-2-27
- **Vibration resistance:**
  10/55/10 Hz, 0.15 mm test in accordance with IEC 68-2-6
- **Self-extinguishing capability:**
  UL94 V0
- **Dimensions:**
  66 x 195 x 34 mm
- **Weight:**
  420 g
- **Colour:**
  Dark grey
- **Output:**
  1.5 m two-wire lead with double or reinforced insulation terminated by 2 elbowed male safety plugs (4 mm)

## SAFETY SPECIFICATIONS

- **Electrical safety:**
  Double or reinforced insulation between the primary and secondary circuits and the outer casing in accordance with IEC 1010-2-032.
  - 600 V category III, pollution degree 2
  - 300 V category IV, pollution degree 2
- **Electromagnetic compatibility (EMC):**
  EN 50081-1: class B
  EN 50082-2:
  - Electrical discharge: IEC 1000-4-2
  - Radiated field: IEC 1000-4-3
  - Fast transients: IEC 1000-4-4
  - Magnetic field at 50/60 Hz: IEC 1000-4-8

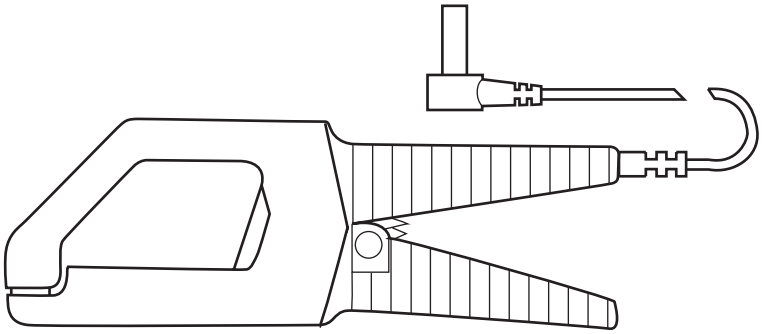
(1) Conditions of reference: 23 °C ± 5 °K, 20 % to 75 % RH, 48 Hz to 65 Hz, external magnetic field < 40 A/m, no current-carrying conductor nearby, centred test sample, load impedance 5 Ω.

(2) 700 A for 10 minutes max.

| To order | Reference |
|---|---|
| AC current clamp model **Y1N** with operating manual | P01120001A |

# Current clamp for AC current
# Model Y2N

| | |
|---|---|
| **Current** | 500 A AC |
| **Ratio** | 1000/1 |
| **Output** | 1 mA/A |



## ELECTRICAL SPECIFICATIONS

- **Current range:**
  4 A AC .. 600 A AC
- **Current transformation ratio:**
  1000:1
- **Output signal:**
  1 mA AC/A AC
- **Accuracy** (1):

| Primary current | 4 A | 25 A | 100 A | 250 A | 500 A | 600 A (2) |
|---|---|---|---|---|---|---|
| Accuracy in % of output signal | 3 % + 0.5 mA | 3 % | 1.5 % | 1 % | 1 % | 1 % |
| Phase shift | not specified | 3° | 1.5° | 1° | 1° | 1° |

class 1 at 1.25 VA

- **Bandwidth:**
  48 Hz .. 1,000 Hz
- **Load impedance:**
  5 Ω max
- **Overload:**
  700 A for 10 minutes
- **Maximum output voltage (secondary open):**
  Electronic protection circuit limiting voltage to 10 V peak max
- **Operating voltage:**
  600 Vrms
- **Common mode voltage:**
  600 Vrms
- **Influence of adjacent and parallel conductors:**
  < 30 mA/A at 50 Hz
- **Influence of conductor position in jaws:**
  < 1 %

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  -15 °C .. +50 °C
- **Storage temperature:**
  -40 °C .. +85 °C
- **Influence of temperature:**
  < 0.1 % per 10 °K
- **Operating altitude:**
  0 to 2,000 m
- **Max. jaw opening:**
  33 mm
- **Clamping capacity:**
  Cable: Ø max 30 mm
  Busbar: 63 x 5 mm
- **Casing protection rating:**
  IP20 in accordance with IEC 529
- **Drop test:**
  1.5 m (IEC 68-2-32)
- **Shock resistance:**
  100 g, in accordance with IEC 68-2-27
- **Vibration resistance:**
  10/55/10 Hz, 0.15 mm test in accordance with IEC 68-2-6
- **Self-extinguishing capability:**
  UL94 V0
- **Dimensions:**
  66 x 195 x 34 mm
- **Weight:**
  420 g
- **Colour:**
  Dark grey
- **Output:**
  1.5 m two-wire lead with double or reinforced insulation terminated by 2 elbowed male safety plugs (4 mm)

## SAFETY SPECIFICATIONS

- **Electrical safety:**
  Double or reinforced insulation between the primary and secondary circuits and the outer casing in accordance with IEC 1010-2-032.
  - 600 V category III, pollution degree 2
  - 300 V category IV, pollution degree 2
- **Electromagnetic compatibility (EMC):**
  EN 50081-1: class B
  EN 50082-2:
  - Electrical discharge: IEC 1000-4-2
  - Radiated field: IEC 1000-4-3
  - Fast transients: IEC 1000-4-4
  - Magnetic field at 50/60 Hz: IEC 1000-4-8

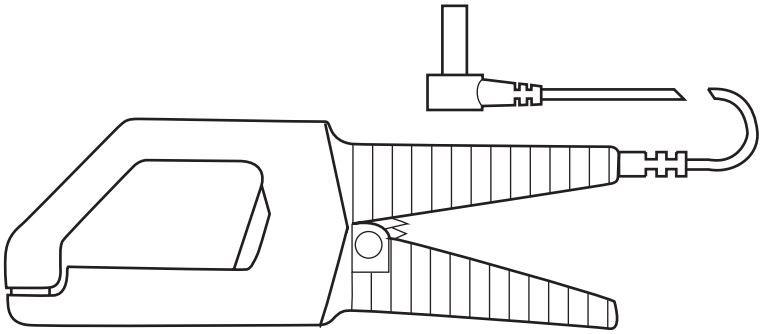
(1) Conditions of reference: 23 °C ± 5 °K, 20 % to 75 % RH, 48 Hz to 65 Hz, external magnetic field < 40 A/m, no current-carrying conductor nearby, centred test sample, load impedance 5 Ω.

(2) 700 A for 10 minutes max

| To order | Reference |
|---|---|
| AC current clamp model **Y2N** with operating manual | P01120028A |

# Current clamp for AC current
# Model Y3N

| | |
|---|---|
| **Current** | 500 A AC |
| **Ratio** | 100/1 |
| **Output** | 10 mA/A |



## ELECTRICAL SPECIFICATIONS

- **Current range:**
  4 A AC .. 600 A AC
- **Current transformation ratio:**
  100:1
- **Output signal:**
  10 mA AC / A AC
- **Accuracy** (1)**:**

| Primary current | 4 A | 25 A | 100 A | 250 A | 500 A | 600 A (2) |
|---|---|---|---|---|---|---|
| Accuracy in % of output signal | 5 % + 5 mA | 5 % | 3 % | 3 % | 3 % | 3 % |
| Phase shift | not specified | 6° | 5 ° | 3° | 3° | 3° |

class 3 at 2.5 VA

- **Bandwidth:**
  48 Hz .. 1,000 Hz
- **Load impedance:**
  0.1 Ω max
- **Overload:**
  700 A for 10 minutes
- **Maximum output voltage (secondary open):**
  Electronic protection circuit limiting voltage to 10 V peak max
- **Operating voltage:**
  600 VRMS
- **Common mode voltage:**
  30 VRMS
- **Influence of adjacent and parallel conductors:**
  < 30 mA / A at 50 Hz
- **Influence of conductor position in jaws:**
  ±1 %

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  15 °C .. +50 °C
- **Storage temperature:**
  -40 °C .. +85 °C
- **Influence of temperature:**
  < 0.1 % per 10 °K
- **Operating altitude:**
  0 to 2,000 m
- **Max. jaw opening:**
  33 mm
- **Clamping capacity:**
  Cable: Ø max 30 mm
  Busbar: 63 x 5 mm
- **Casing protection rating:**
  IP20 in accordance with IEC 529
- **Drop test:**
  1.5 m (IEC 68-2-32)
- **Shock resistance:**
  100 g, in accordance with IEC 68-2-27
- **Vibration resistance:**
  10/55/10 Hz, 0.15 mm test in accordance with IEC 68-2-6
- **Self-extinguishing capability:**
  UL94 V0
- **Dimensions:**
  66 x 195 x 34 mm
- **Weight:**
  420 g
- **Colour:**
  Dark grey
- **Output:**
  1.5 m two-wire lead with double or reinforced insulation terminated by 2 elbowed male safety plugs (4 mm)

## SAFETY SPECIFICATIONS

- **Electrical safety:**
  Double or reinforced insulation between the primary and secondary circuits and the outer casing in accordance with IEC 1010-2-032.
  - 600 V category III, pollution degree 2
  - 300 V category IV, pollution degree 2
- **Electromagnetic compatibility (EMC):**
  EN 50081-1: class B
  EN 50082-2:
  - Electrical discharge: IEC 1000-4-2
  - Radiated field: IEC 1000-4-3
  - Fast transients: IEC 1000-4-4
  - Magnetic field at 50/60 Hz: IEC 1000-4-8

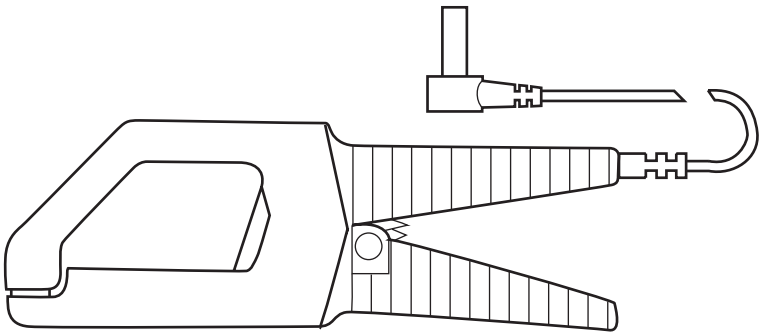
(1) Conditions of reference: 23 °C ± 5 °K, 20 % to 75 % RH, 48 Hz to 65 Hz, external magnetic field < 40 A/m, no current-carrying conductor nearby, centred test sample, load impedance 0.1 Ω.

(2) 700 A for 10 minutes max.

| To order | Reference |
|---|---|
| AC current clamp model **Y3N** with operating manual | P01120029A |

# Current clamp for AC current
# Model Y4N

| | |
|---|---|
| **Current** | 500 A AC |
| **Output** | 1 mV DC / A AC |



## ELECTRICAL SPECIFICATIONS

- **Current range:**
  4 A AC .. 600 A AC
- **Output signal:**
  1 mV DC / A AC
- **Accuracy** (1)**:**

| Primary current | 2 A | 25 A | 100 A | 250 A | 500 A | 600 A (2) |
|---|---|---|---|---|---|---|
| Accuracy in % of output signal | 5 % + 0.5 mV DC | 5 % | 2 % | 1 % | 1 % | 2 % |

- **Bandwidth:**
  48 Hz .. 1,000 Hz
  (error: add 2 % to reference)
- **Load impedance:**
  > 100 kΩ max
- **Overload:**
  700 A for 10 minutes
- **Operating voltage:**
  600 VRMS
- **Common mode voltage:**
  600 VRMS
- **Influence of adjacent and parallel conductors:**
  < 30 mA / A at 50 Hz
- **Influence of conductor position in jaws:**
  ±1 %

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  15 °C .. +50 °C
- **Storage temperature:**
  -40 °C .. +85 °C
- **Influence of temperature:**
  < 0.1 % per 10 °K
- **Operating altitude:**
  0 to 2,000 m
- **Max. jaw opening:**
  33 mm
- **Clamping capacity:**
  Cable: Ø max 30 mm
  Busbar: 63 x 5 mm
- **Casing protection rating:**
  IP20 in accordance with IEC 529
- **Drop test:**
  1.5 m (IEC 68-2-32)
- **Shock resistance:**
  100 g, in accordance with IEC 68-2-27
- **Vibration resistance:**
  10/55/10 Hz, 0.15 mm test in accordance with IEC 68-2-6
- **Self-extinguishing capability:**
  UL94 V0
- **Dimensions:**
  66 x 195 x 34 mm
- **Weight:**
  420 g
- **Colour:**
  Dark grey
- **Output:**
  1.5 m two-wire lead with double or reinforced insulation terminated by 2 elbowed male safety plugs (4 mm)

## SAFETY SPECIFICATIONS

- **Electrical safety:**
  Double or reinforced insulation between the primary and secondary circuits and the outer casing in accordance with IEC 1010-2-032.
  - 600 V category III, pollution degree 2
  - 300 V category IV, pollution degree 2
- **Electromagnetic compatibility (EMC):**
  EN 50081-1: class B
  EN 50082-2:
  - Electrical discharge: IEC 1000-4-2
  - Radiated field: IEC 1000-4-3
  - Fast transients: IEC 1000-4-4
  - Magnetic field at 50/60 Hz: IEC 1000-4-8

(1) Conditions of reference: 23 °C ± 5 °K, 20 % to 75 % RH, 48 Hz to 65 Hz, external magnetic field < 40 A/m, no current-carrying conductor nearby, centred test sample, load impedance 10 MΩ.

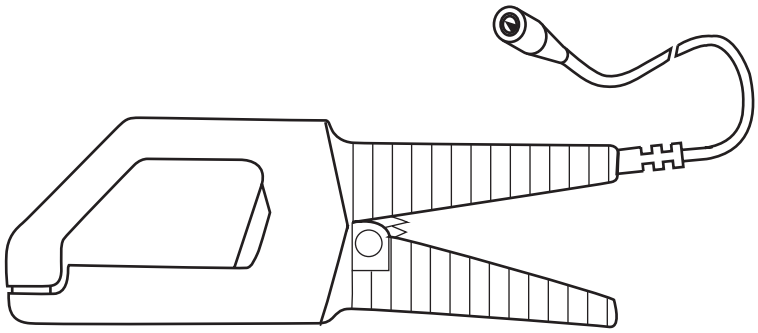
(2) 600 A for 10 minutes max

| To order | Reference |
|---|---|
| AC current clamp model **Y4N** with operating manual | P01120005A |

# Oscilloscope clamp for AC current

## Model Y7N (insulated AC current probe)

| | |
|---|---|
| **Current** | 1,200 A peak |
| **Output** | 1 mV / A |



## DESCRIPTION

This 500 A AC clamp can be used for the display and measurement of 'current' curves. It comes with a coaxial cable terminated by a BNC plug, thus making it the ideal tool for use with oscilloscopes. It supplies a mV output signal that is directly proportional to the measured current.

## ELECTRICAL SPECIFICATIONS

- **Current range:**
  1 A AC .. 500 A AC (1,200 A peak)
- **Output signal:**
  1 mV AC / A AC (0.5 V for 500 A)
- **Accuracy and phase shift (1):**

| Primary current | 1 A .. 20 A | 20 A .. 100 A | 100 A .. 500 A |
|---|---|---|---|
| % Accuracy of output signal | ≤ 5 % + 0.3 mV | ≤ 5 % | ≤ 2 % |
| Phase shift | not specified | ≤ 3° | ≤ 1° |

- **Bandwidth:**
  5 Hz .. 10 kHz (at -3 dB) (depending on current)
- **Rise/fall time from 10 % to 90 %:**
  37 µs
- **10 % delay time:**
  1 µs
- **Ampere second product:**
  10 A.s
- **Insertion impedance (at 400 Hz / 10 kHz):**
  < 0.1 mΩ / < 3.1 mΩ
- **dV / dt:**
  0.24 mV / µs (typical)
- **Maximum currents:**
  500 A constant
  700 A: 10 minutes operation / 30 minutes shutdown for frequency ≤ 2 kHz (limitation proportional to the inverse of one third of the frequency above that)
- **Internal load impedance:**
  ≤ 100 Ω / 4.7 nF
- **Influence of temperature:**
  ≤ 0.15 % of output signal per 10 °K
- **Influence of adjacent conductor:**
  ≤ 5 µV / A at 50 Hz
- **Influence of conductor position in jaws:**
  ≤ 1.5 % + 0.1 A AC

## MECHANICAL SPECIFICATIONS

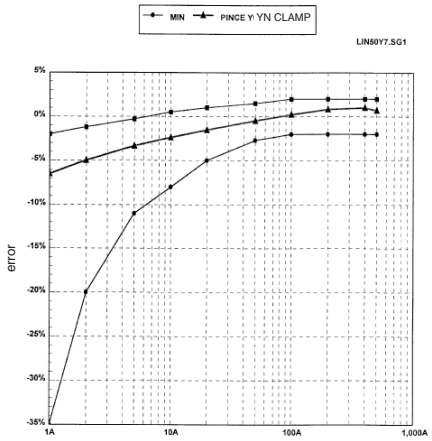
- **Operating temperature:**
  -25 °C to +50 °C
- **Storage temperature:**
  -40 °C to +80 °C
- **Relative humidity for operation:**
  0 to 85 % RH decreasing linearly above 35 °C
- **Operating altitude:**
  0 to 2,000 m
- **Max. jaw opening:**
  33 mm
- **Clamping capacity:**
  Cable: Ø max 30 mm
  Busbar: 1 busbar of 63 x 5 mm
- **Casing protection rating:**
  IP20 (IEC 529)
- **Drop test:**
  1.5 m (IEC 68-2-32)
- **Shock resistance:**
  100 g / 6 ms / half-periode (IEC 68-2-27)
- **Protection against impacts:**
  IK04 0.5 J (EN 50102)
- **Vibration resistance:**
  10 / 55 / 10 Hz 0.15 mm (IEC 68-2-6)
- **Self-extinguishing capability:**
  UL94 V0
- **Dimensions:**
  195 x 66 x 34 mm
- **Weight:**
  420 g
- **Colour:**
  Dark grey
- **Output:**
  Via 2 m coaxial cable terminated by insulated BNC plug

## SAFETY SPECIFICATIONS

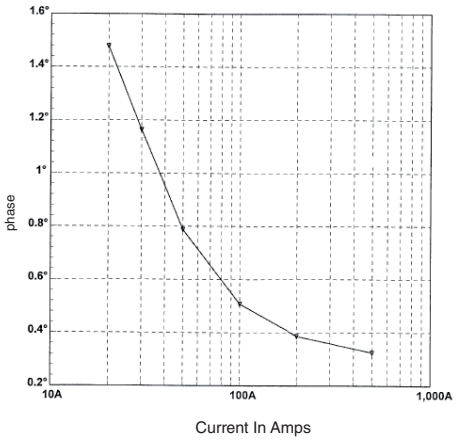
- **Electrical safety:**
  Instrument with double insulation or reinforced insulation between the primary the secondary and the grippable part located under the guard as per IEC 1010-1 & IEC 1010-2-032
  - 600 V category III, pollution degree 2
  - 300 V category IV, pollution degree 2
- **Electromagnetic compatibility (EMC):**
  EN 50081-1: class B
  EN 50082-2:
  - Electrostatic discharge: IEC 1000-4-2
    4 kV level 2 performance criterion B
    8 kV in the air level 3 performance criterion B
  - Radiated field: IEC 1000-4-3
    10 V/m performance criterion A
  - Fast transients: IEC 1000-4-4
    1 kV level 2 performance criterion B
    2 kV level 3 performance criterion B
  - Magnetic field at 50/60 Hz: IEC 1000-4-8
    field of 400 A/m at 50 Hz: < 1 A

## CURVES

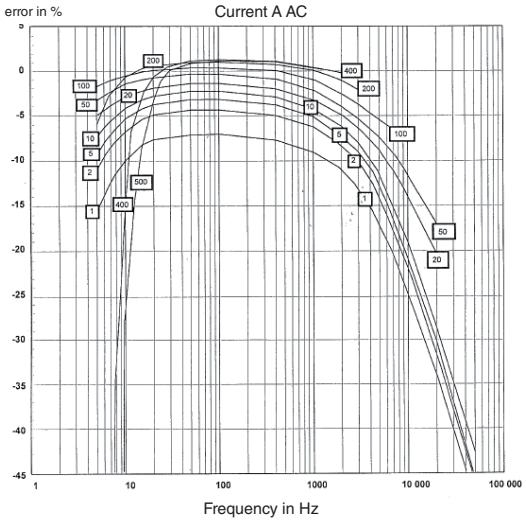
Error on measurement at 50 Hz



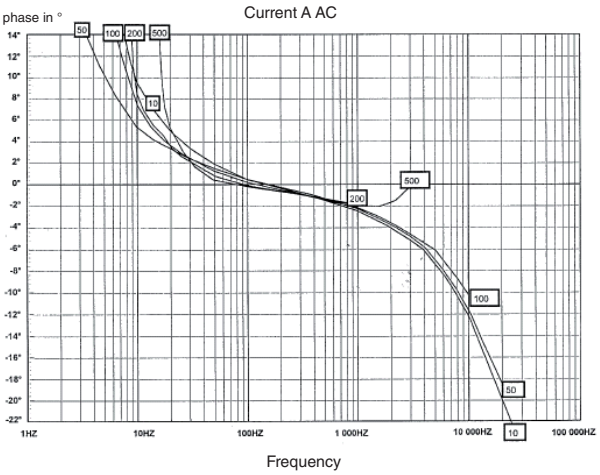

Phase shift at 50 Hz




Frequency response




Phase shift according to frequency

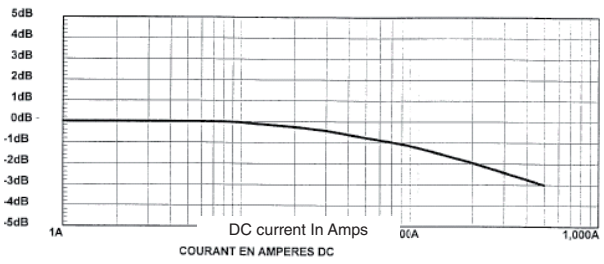



Influence of frequency and derating

| Frequency Hz | 5 Hz to 10 Hz | 10 Hz to 20 Hz | 20 Hz to 45 Hz | 65 Hz to 3 kHz | 3 kHz to 6 kHz | 6 kHz to 10 kHz |
|---|---|---|---|---|---|---|
| 1 A to 200 A | 15 % | | | | | |
| > 200 A | not spec. | | | | | |
| 1 A to 300 A | | 5 % | | | | |
| 300 A to 400 A | | 15 % | | | | |
| 400 A to 500 A | | 25 % | | | | |
| 1 A to 500 A | | | 5 % | | | |
| 1 A to 50 A | | | | 5 % + 0.4 A | | |
| 50 A to 500 A | | | | 5 % | | |
| > 500 A | | | | not spec. | | |
| 1 A to 100 A | | | | | 15 % + 0.4 A | |
| > 100 A | | | | | not spec. | |
| 1 A to 50 A | | | | | | -3 dB |
| > 50 A | | | | | | not spec. |

- Error in % of reading; not spec. means not specified
- Do not exceed 500 A for measurement with constant operation, and for the derating, use the formula 500 (A) * 2 / F (kHz) to calculate the maximum current in A AC, in constant use, depending on the frequency in kHz.

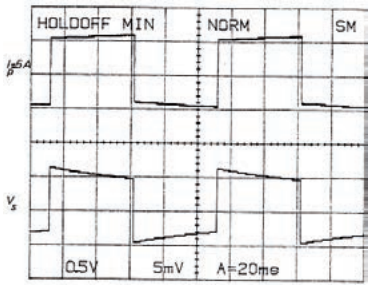
Influence of DC current



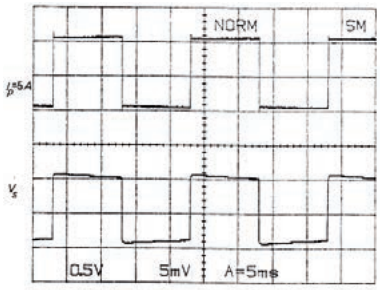
# Oscilloscope clamp for AC current
# Model Y7N (insulated AC current probe)

## RESPONSE TO A SQUARE SIGNAL

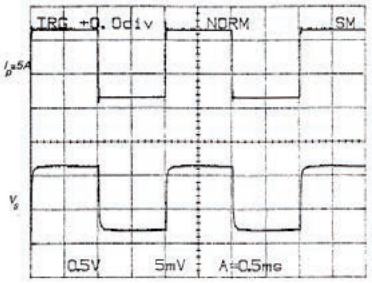
5 A at 10 Hz



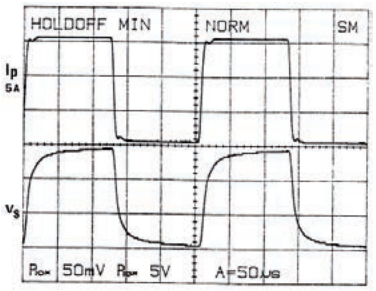

5 A at 50 Hz



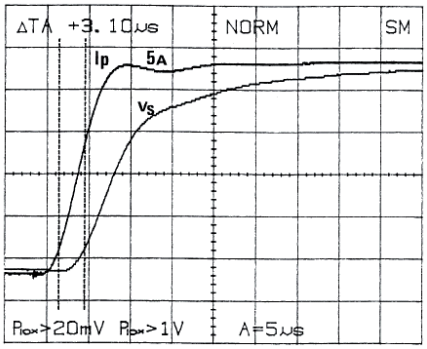

5 A at 500 Hz




5 A at 4 kHz




## RESPONSE TO A STEP




(1) Conditions of reference: 23 °C ± 3 °K, 20 % to 75 % RH, sinusoidal signal with frequency of 48 Hz at 1 kHz, external magnetic field < 40 A/m, no DC components, no external conductor with circulating current, conductor centred for measurement, load impedance > 1 MΩ / < 100 pF.

| To order | Reference |
|---|---|
| AC current clamp model **Y7N** for oscilloscope with operating manual | P01120075 |

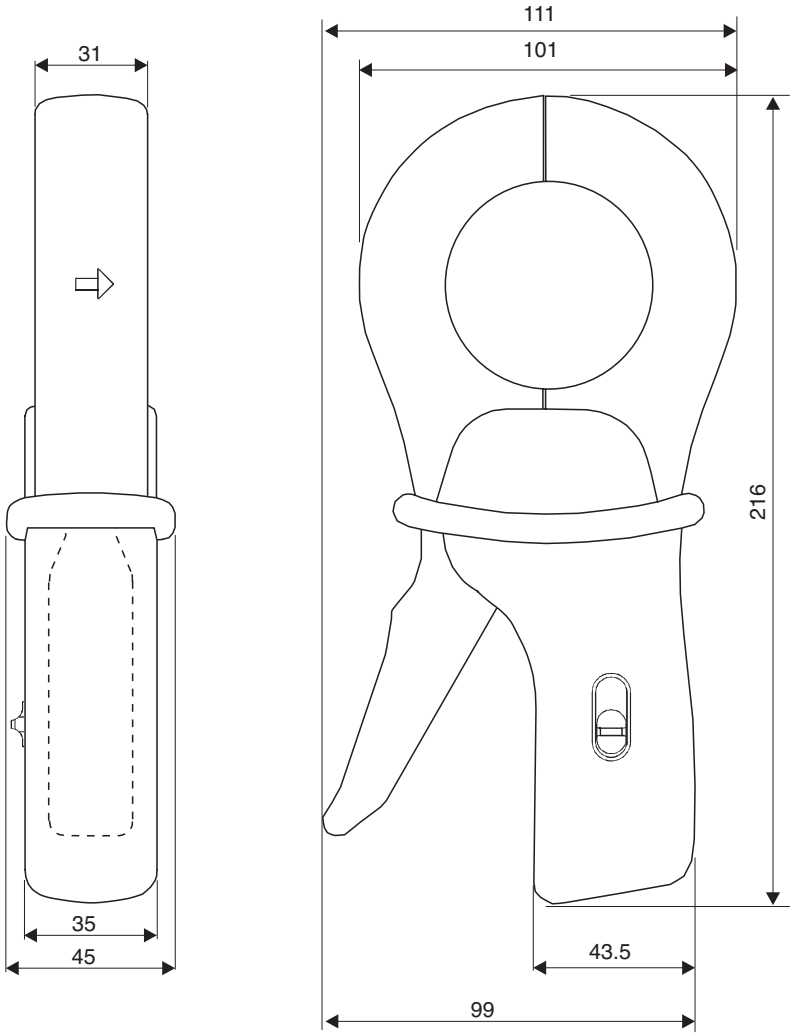

## "C 100" SERIES

The "C100" series is a range of thirteen transformer clamps with all the advantages of our old "C30" series clamps whilst incorporating considerable improvements, particularly in the field of safety, ergonomics and performance:

- 1,000 A measurement, excellent metrology, high accuracy, high level of linearity, symmetrical coil windings for minimum phase shift, pendular adjusting system for magnetic elements, maximum conductor diameter Ø 52 mm and also some models with µ metal core specially made for wattmeter use.
- Innovative design: excellent ergonomics, handle with finger grips, assisted opening system for jaws (patented system), IEC 1010 600 V cat. III safety (industry and services), antislip protection, conductor anti-pinching system,...

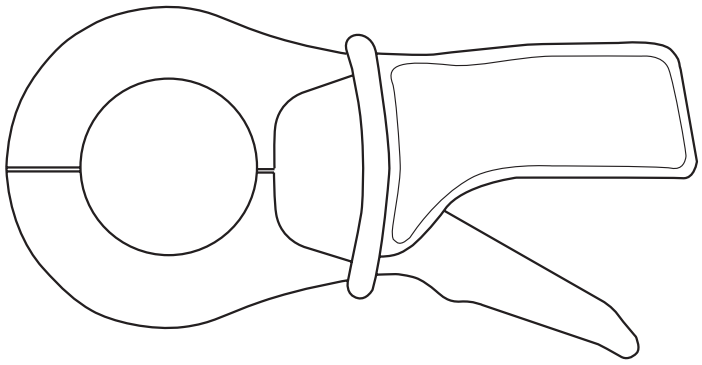
All this technology and manufacturing quality has been combined to provide the best measurement possible without any complications.

A "C100" series clamp is compatible with any instrument (multimeter, wattmeter, recorder, oscilloscope...) for safe measurement of AC currents without shutting down the installation.


31
35
45
111
101
216
43.5
99

# Current clamp for AC current
# Model C100

| | |
|---|---|
| **Current** | 1,000 A |
| **Ratio** | 1000/1 |
| **Output** | 1 mA/A |



## ELECTRICAL SPECIFICATIONS

- **Current range:**
  0.1 A AC .. 1,200 A AC
- **Current transformation ratio:**
  1000:1
- **Output signal:**
  1 mA AC/A AC (1 A to 1,000 A)
- **Accuracy and phase shift (1):**

| Primary current | 0.1 A .. 10 A | 10 A | 50 A (2) | 200 A (2) | 1,000 A (2) | 1,200 A (2) |
|---|---|---|---|---|---|---|
| % Accuracy of output signal | ≤ 3 % + 0.1 mA | ≤ 3 % | ≤ 1.5 % | ≤ 0.75 % | ≤ 0.5 % | ≤ 0.5 % |
| Phase shift | not specified | ≤ 3° | ≤ 1.5° | ≤ 0.75 ° | ≤ 0.5 ° | ≤ 0.5 ° |

- **Bandwidth:**
  30 Hz .. 10 kHz (-3 dB)
- **Crest factor:**
  ≤ 6 for a current ≤ 3,000 A peak (500 Arms)
- **Maximum currents:**
  1,000 A continuous for a frequency ≤ 1 kHz (limitation proportional to the inverse of frequency beyond)
  1,200 A for 40 minutes max (interval between measurements > 20 minutes)
- **Load impedance:**
  ≤ 15 Ω
- **Operating voltage:**
  600 Vrms
- **Common mode voltage:**
  600 V category III and pollution degree 2
- **Influence of adjacent conductor:**
  ≤ 1 mA/A at 50 Hz
- **Influence of conductor position in jaws:**
  ≤ 0.1 % of output signal for frequencies ≤ 400 Hz
- **Load influence:**
  From 5 Ω to 15 Ω
  < 0.5 % on measurement
  < 0.5 ° on phase
- **Influence of frequency (3):**
  < 1 % of output signal from 30 Hz .. 48 Hz
  < 0.5 % of output signal from 65 Hz .. 1 kHz
  < 1 % of output signal from 1 kHz .. 5 kHz
- **Influence of crest factor:**
  < 1 % of output signal for crest factor ≤ 6 with current ≤ 3,000 A peak (500 Arms)
- **Influence of DC current superimposed on rated current:**
  < 1 % of output signal for a current ≤ 30 A DC

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  -10 °C to +50 °C
- **Storage temperature:**
  -40 °C to +70 °C
- **Influence of temperature:**
  ≤ 0.1 % of output signal per 10 °K
- **Relative humidity for operation:**
  0 to 85 % RH decreasing linearly above 35 °C
- **Influence of relative humidity:**
  < 0.1 % of output signal from 10 % to 85 % RH
- **Operating altitude:**
  0 to 2,000 m
- **Max. jaw opening:**
  53 mm
  Patented progressive opening system
- **Clamping capacity:**
  Cable: Ø max 52 mm
  Busbar: 1 busbar of 50 x 5 mm / 4 busbars of 30 x 5 mm
- **Casing protection rating:**
  IP40 (IEC 529)
- **Drop test:**
  1 m (IEC 68-2-32)
- **Shock resistance:**
  100 g (IEC 68-2-27)
- **Vibration resistance:**
  5/15 Hz 1.5 mm
  15/25 Hz 1 mm
  25/55 Hz 0.25 mm
  (IEC 68-2-6)
- **Self-extinguishing capability:**
  Casing and jaws: UL94 V0
- **Dimensions:**
  216 x 111 x 45 mm
- **Weight:**
  550 g
- **Colours:**
  Dark grey case with red jaws
- **Output:**
  Safety sockets (4 mm)

## SAFETY SPECIFICATIONS

- **Electrical safety:**
  Instrument with double insulation or reinforced insulation between the primary the secondary and the grippable part located under the guard as per IEC 1010-1 & IEC 1010-2-032
  - 600 V category III, pollution degree 2
  - 300 V category IV, pollution degree 2
- **Electromagnetic compatibility (EMC):**
  EN 50081-1: class B
  EN 50082-2:
  - Electrostatic discharge: IEC 1000-4-2
  - Radiated field: IEC 1000-4-3
  - Fast transients: IEC 1000-4-4
  - Magnetic field at 50/60 Hz: IEC 1000-4-8

(1) Conditions of reference: 23 °C ± 3 °K, 20 % to 75 % RH, signal sinus, frequency of 48 Hz to 65 Hz, distortion factor < 1 %, no DC components, external magnetic field < 40 A/m, no AC magnetic field, conductor centred for measurement, load impedance 5 Ω (5 VA)

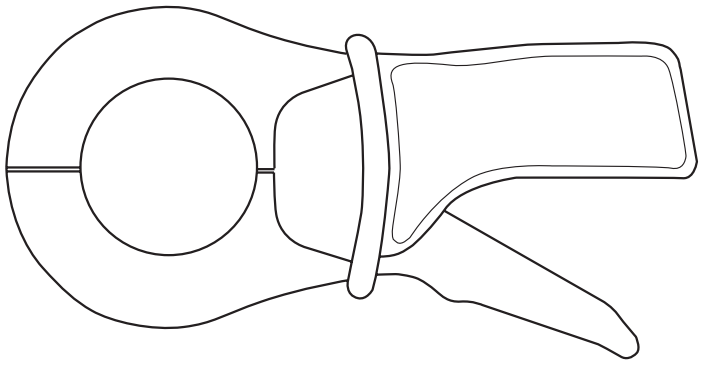
(2) Accuracy class in accordance with IEC 185: 5 VA - class 0.5 - 48 Hz .. 65 Hz

(3) Out of frequency domain

| To order | Reference |
|---|---|
| AC current clamp model **C100** with operating manual | P01120301 |

# Current clamps for AC current
# Models C102 and C103

| | |
|---|---|
| **Current** | 1,000 A |
| **Ratio** | 1000/1 |
| **Output** | 1 mA/A |



## DESCRIPTION

An electronic voltage limiter protects the output of the clamp, if the secondary circuit is opened accidentally.

## ELECTRICAL SPECIFICATIONS

- **Current range:**
  0.1 A AC .. 1,200 A AC
- **Current transformation ratio:**
  1000:1
- **Output signal:**
  1 mA AC / A AC (1 A to 1,000 A)
- **Accuracy and phase shift (1):**

| Primary current | 0.1 A .. 10 A | 10 A | 50 A (2) | 200 A (2) | 1,000 A (2) | 1,200 A (2) |
|---|---|---|---|---|---|---|
| % Accuracy of output signal | ≤ 3 % + 0.1 mA | ≤ 3 % | ≤ 1.5 % | ≤ 0.75 % | ≤ 0.5 % | ≤ 0.5 % |
| Phase shift | not specified | ≤ 3° | ≤ 1.5° | ≤ 0.75 ° | ≤ 0.5 ° | ≤ 0.5 ° |

- **Bandwidth:**
  30 Hz .. 10 kHz (-3 dB)
- **Crest factor:**
  ≤ 6 for a current ≤ 3,000 A peak (500 Arms)
- **Maximum currents:**
  1,000 A continuous for a frequency ≤ 1 kHz (limitation proportional to the inverse of frequency beyond)
  1,200 A for 40 minutes max (interval between measurements > 20 minutes)
- **Load impedance:**
  ≤ 15 Ω
- **Max. voltage output:**
  Electronic protection circuit limiting voltage to 30 V peak max
- **Operating voltage:**
  600 Vrms
- **Common mode voltage:**
  600 V category III and pollution degree 2
- **Influence of adjacent conductor:**
  ≤ 1 mA / A at 50 Hz
- **Influence of conductor position in jaws:**
  ≤ 0.1 % of output signal for frequencies ≤ 400 Hz
- **Load influence:** from 5 Ω to 15 Ω
  < 0.5 % on measurement
  < 0.5 ° on phase
- **Influence of frequency (3):**
  < 1 % of output signal from 30 Hz .. 48 Hz
  < 0.5 % of output signal from 65 Hz .. 1 kHz
  < 1 % of output signal from 1 kHz .. 5 kHz
- **Influence of crest factor:**
  < 1 % of output signal for crest factor ≤ 6 with current ≤ 3,000 A peak (500 Arms)
- **Influence of DC current superimposed on rated current:**
  < 1 % of output signal for a current ≤ 30 A DC

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  -10 °C to +50 °C
- **Storage temperature:**
  -40 °C to +70 °C
- **Influence of temperature:**
  ≤ 0.1 % of output signal per 10 °K
- **Relative humidity for operation:**
  0 to 85 % RH with a linear decrease above 35 °C
- **Influence of relative humidity:**
  < 0.1 % of output signal from 10 % to 85 % RH
- **Operating altitude:**
  0 to 2,000 m
- **Max. jaw opening:**
  53 mm, patented progressive opening system
- **Clamping capacity:**
  Cable: Ø max 52 mm
  Busbar: 1 busbar of 50 x 5 mm /
  4 busbars of 30 x 5 mm
- **Casing protection rating:**
  IP40 (IEC 529)
- **Drop test:**
  1 m (IEC 68-2-32)
- **Shock resistance:**
  100 g (IEC 68-2-27)
- **Vibration resistance:**
  5/15 Hz 1.5 mm -15/25 Hz 1 mm - 25/55 Hz 0.25 mm (IEC 68-2-6)
- **Self-extinguishing capability:**
  Casing and jaws: UL94 V0
- **Dimensions:**
  216 x 111 x 45 mm
- **Weight:**
  550 g
- **Colours:**
  Dark grey case with red jaws
- **Output:**
  C102: Safety sockets (4 mm)
  C103: two-wire cable with reinforced insulation or double insulation, length 1.5 m, terminated by 2 insulated elbowed male banana plugs (4 mm)

## SAFETY SPECIFICATIONS

- **Electrical safety:**
  Instrument with double insulation or reinforced insulation between the primary the secondary and the grippable part located under the guard as per IEC 1010-1 & IEC 1010-2-032
  - 600 V category III, pollution degree 2
  - 300 V category IV, pollution degree 2
- **Electromagnetic compatibility (EMC):**
  EN 50081-1: class B
  EN 50082-2:
  - Electrostatic discharge: IEC 1000-4-2
  - Radiated field: IEC 1000-4-3
  - Fast transients: IEC 1000-4-4
  - Magnetic field at 50/60 Hz: IEC 1000-4-8

(1) Conditions of reference: 23 °C ± 3 °K, 20 % to 75 % RH, signal sinus, frequency of 48 Hz to 65 Hz, distortion factor < 1 %, no DC components, external magnetic field < 40 A/m, no AC magnetic field, conductor centred for measurement, load impedance 5 Ω (5 VA).

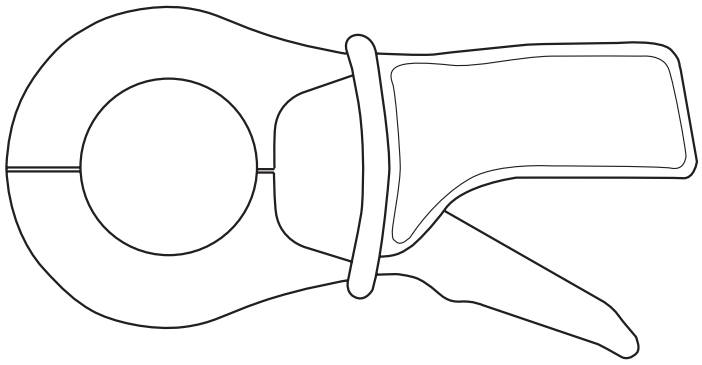
(2) Accuracy class in accordance with IEC 185: 5 VA - class 0.5 - 48 .. 65 Hz.

(3) Out of reference domain.

| To order | Reference |
|---|---|
| AC current clamp model **C102** with operating manual | P01120302 |
| AC current clamp model **C103** with operating manual | P01120303 |

# Current clamps for AC current
# Models C106 and C107

| | |
|---|---|
| **Current** | 1,000 A |
| **Output** | 1 mV / A |



## ELECTRICAL SPECIFICATIONS

- **Current range:**
  0.1 A AC .. 1,200 A AC
- **Output signal:**
  1 mV AC / A AC (1 V for 1,000 A)
- **Accuracy and phase shift (1):**

| Primary current | 0.1 A .. 10 A | 10 A | 50 A | 200 A | 1,000 A | 1,200 A |
|---|---|---|---|---|---|---|
| % Accuracy of output signal | ≤ 3 % + 0.1 mV | ≤ 3 % | ≤ 1.5 % | ≤ 0.75 % | ≤ 0.5 % | ≤ 0.5 % |
| Phase shift | not specified | ≤ 3° | ≤ 1.5° | ≤ 0.75 ° | ≤ 0.5 ° | ≤ 0.5 ° |

- **Bandwidth:**
  30 Hz .. 10 kHz
- **Crest factor:**
  ≤ 6 for a current ≤ 3,000 A peak (500 Arms)
- **Maximum currents:**
  1,000 A continuous for a frequency ≤ 1 kHz (limitation proportional to the inverse frequency beyond)
  1,200 A for 40 minutes max (interval between measurements > 20 minutes)
- **Output impedance:**
  1 Ω ± 1 %
- **Load impedance:**
  ≥ 1 MΩ and ≤ 100 pF
- **Operating voltage:**
  600 Vrms
- **Common mode voltage:**
  600 V category III and pollution degree 2
- **Influence of adjacent conductor:**
  ≤ 1 µV / A at 50 Hz
- **Influence of conductor position in jaws:**
  ≤ 0.1 % of output signal for frequencies ≤ 400 Hz
- **Load influence:**
  On receiver, for an input impedance of 100 Ω: ≤ 1 % on measurement, no measurement on phase
  On receiver, for an input impedance of 1 kΩ: ≤ 0.1 % on measurement, no measurement on phase
- **Influence of frequency (2):**
  < 1 % of output signal from 30 Hz .. 48 Hz
  < 0.5 % of output signal from 65 Hz .. 1 kHz
  < 1 % of output signal from 1 kHz .. 5 kHz
- **Influence of crest factor:**
  < 1 % of output signal for crest factor ≤ 6 with current ≤ 3,000 A peak (500 Arms)
- **Influence of DC current superimposed on rated current:**
  < 1 % of output signal for a current ≤ 30 A DC

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  -10 °C to +50 °C
- **Storage temperature:**
  -40 °C to +70 °C
- **Influence of temperature:**
  ≤ 0.1 % of output signal per 10 °K
- **Relative humidity for operation:**
  0 to 85 % RH decreasing linearly above 35 °C
- **Influence of relative humidity:**
  < 0.1 % of output signal from 10 % to 85 % RH
- **Operating altitude:**
  0 to 2,000 m
- **Max. jaw opening:**
  53 mm
  Patented progressive opening system
- **Clamping capacity:**
  Cable: Ø max 52 mm
  Busbar: 1 busbar of 50 x 5 mm / 4 busbars of 30 x 5 mm
- **Casing protection rating:**
  IP40 (IEC 529)
- **Drop test:**
  1 m (IEC 68-2-32)
- **Shock resistance:**
  100 g (IEC 68-2-27)
- **Vibration resistance:**
  5/15 Hz 1.5 mm
  15/25 Hz 1 mm
  25/55 Hz 0.25 mm
  (IEC 68-2-6)
- **Self-extinguishing capability:**
  Casing and jaws: UL94 V0
- **Dimensions:**
  216 x 111 x 45 mm
- **Weight:**
  550 g
- **Colours:**
  Dark grey case with red jaws
- **Output:**
  C106: Safety sockets (4 mm)
  C107: two-wire cable with reinforced insulation or double insulation, length 1.5 m, terminated by 2 insulated elbowed male banana plugs (4 mm)

## SAFETY SPECIFICATIONS

- **Electrical safety:**
  Instrument with double insulation or reinforced insulation between the primary the secondary and the grippable part located under the guard as per IEC 1010-1 & IEC 1010-2-032
  - 600 V category III, pollution degree 2
  - 300 V category IV, pollution degree 2
- **Electromagnetic compatibility (EMC):**
  EN 50081-1: class B
  EN 50082-2:
  - Electrostatic discharge: IEC 1000-4-2
  - Radiated field: IEC 1000-4-3
  - Fast transients: IEC 1000-4-4
  - Magnetic field at 50/60 Hz: IEC 1000-4-8

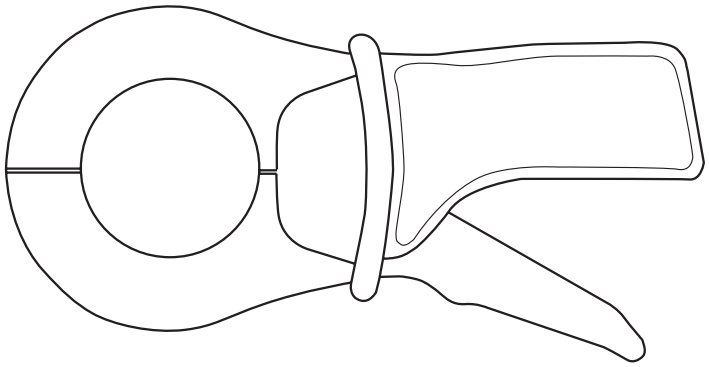
(1) Conditions of reference: 23 °C ± 3 °K, 20 % to 75 % RH, signal sinus, frequency of 48 Hz to 65 Hz, distortion factor < 1 %, no DC components, external magnetic field < 40 A/m, no AC magnetic field, conductor centred for measurement.

(2) Out of reference domain.

| To order | Reference |
|---|---|
| AC current clamp model **C106** with operating manual | P01120304 |
| AC current clamp model **C107** with operating manual | P01120305 |

# Current clamps for AC current
# Models C112 and C113

| | |
|---|---|
| **Current** | 1,000 A |
| **Ratio** | 1000/1 |
| **Output** | 1 mA/A |



## DESCRIPTION

Thanks to their excellent technical performance (phase shift and linearity), these µ-metal core clamps are highly recommended for wattmeter use. These clamps are protected at output against overvoltages.

## ELECTRICAL SPECIFICATIONS

- **Current range:**
  0.001 A AC .. 1,200 A AC
- **Current transformation ratio:**
  1000:1
- **Output signal:**
  1 mA AC/A AC (1 A for 1,000 A)
- **Accuracy and phase shift (1):**

| Primary current | 0.1 A .. 100 mA | 0.1 A .. 1 A | 1 A .. 10 A | 10 A .. 100 A | 100 A .. 1,200 A |
|---|---|---|---|---|---|
| % Accuracy of output signal | ≤ 3 % + 5 µA | ≤ 2 % + 3 µA | ≤ 1 % | ≤ 0.5 % | ≤ 0.3 % |
| Phase shift | not specified | not specified | ≤ 2° | ≤ 1° | ≤ 0.7° |

- **Bandwidth:**
  30 Hz .. 10 kHz
- **Crest factor:**
  ≤ 6 for a current ≤ 2,000 A peak (300 ARMS)
- **Maximum currents:**
  1,000 A continuous for a frequency ≤ 1 kHz (limitation proportional to the inverse of frequency beyond)
  1,200 A for 40 minutes max (interval between measurements > 20 minutes)
- **Load impedance:**
  ≤ 1 Ω
- **Max. voltage output:**
  Electronic protection circuit limiting voltage to 30 V peak max
- **Operating voltage:**
  600 VRMS
- **Common mode voltage:**
  600 V category III and pollution degree 2
- **Influence of adjacent conductor:**
  ≤ 0.5 mA/A at 50 Hz
- **Influence of conductor position in jaws:**
  ≤ 0.1 % of output signal for frequencies ≤ 400 Hz
- **Load influence:**
  From 1 Ω to 5 Ω
  < 0.1 % on measurement
  < 0.2° on phase
- **Influence of frequency (2):**
  < 0.5 % of output signal from 30 Hz .. 48 Hz
  < 1 % of output signal from 65 Hz .. 1 kHz
  < 2 % of output signal from 1 kHz .. 5 kHz
- **Influence of crest factor:**
  < 1 % of output signal for crest factor ≤ 6 with current ≤ 2,000 A peak (300 A RMS)
- **Influence of DC current superimposed on rated current:**
  < 1 % of output signal for a current ≤ 15 A DC

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  -10 °C to +50 °C
- **Storage temperature:**
  -40 °C to +70 °C
- **Influence of temperature:**
  ≤ 0.2 % of output signal per 10 °K
- **Relative humidity for operation:**
  0 to 85 % RH with a linear decrease above 35 °C
- **Influence of relative humidity:**
  < 0.1 % of output signal from 10 % to 85 % RH
- **Operating altitude:**
  0 to 2,000 m
- **Max. jaw opening:**
  53 mm, patented progressive opening system
- **Clamping capacity:**
  Cable: Ø max 52 mm
  Busbar: 1 busbar of 50 x 5 mm / 4 busbars of 30 x 5 mm
- **Casing protection rating:**
  IP40 (IEC 529)
- **Drop test:**
  1 m (IEC 68-2-32)
- **Shock resistance:**
  100 g (IEC 68-2-27)
- **Vibration resistance:**
  5/15 Hz 1.5 mm, 15/25 Hz 1 mm, 25/55 Hz 0.25 mm (IEC 68-2-6)
- **Self-extinguishing capability:**
  Casing and jaws: UL94 V0
- **Dimensions:**
  216 x 111 x 45 mm
- **Weight:**
  550 g
- **Colours:**
  Dark grey case with red jaws
- **Output:**
  C112: Safety sockets (4 mm)
  C113: two-wire cable with reinforced insulation or double insulation, length 1.5 m, terminated by 2 insulated elbowed male banana plugs (4 mm)

## SAFETY SPECIFICATIONS

- **Electrical safety:**
  Instrument with double insulation or reinforced insulation between the primary the secondary and the grippable part located under the guard as per IEC 1010-1 & IEC 1010-2-032
  - 600 V category III, pollution degree 2
  - 300 V category IV, pollution degree 2
- **Electromagnetic compatibility (EMC):**
  EN 50081-1: class B
  EN 50082-2:
  - Electrostatic discharge: IEC 1000-4-2
  - Radiated field: IEC 1000-4-3
  - Fast transients: IEC 1000-4-4
  - Magnetic field at 50/60 Hz: IEC 1000-4-8

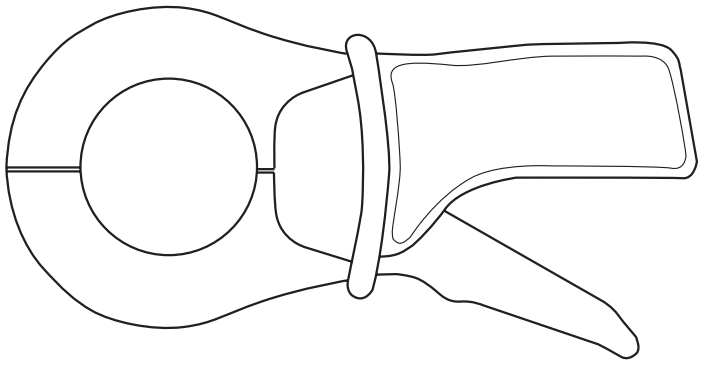
(1) Conditions of reference: 23 °C ± 3 °K, 20 % to 75 % RH, signal sinus, frequency of 48 Hz to 65 Hz, distortion factor < 1 %, no DC components, external magnetic field < 40 A/m, no AC magnetic field, conductor centred for measurement, load impedance 1 Ω (1 VA)

(2) Out of reference domain.

| To order | Reference |
|---|---|
| AC current clamp model **C112** with operating manual | P01120314 |
| AC current clamp model **C113** with operating manual | P01120315 |

# Current clamps for AC current
# Models C116 and C117

| | |
|---|---|
| **Current** | 1,000 A |
| **Output** | 1 mV / A |



## DESCRIPTION

Thanks to their excellent technical performance (phase shift and linearity), these µ-metal core clamps are highly recommended for wattmeter use.

## ELECTRICAL SPECIFICATIONS

- **Current range:**
  0.001 A AC .. 1,200 A AC
- **Output signal:**
  1 mV AC / A AC (1 V for 1,000 A)
- **Accuracy and phase shift** (1):

| Primary current | 1 mA .. 100 mA | 0.1 A .. 1 A | 1 A .. 10 A | 10 A .. 100 A | 100 A .. 1,200 A |
|---|---|---|---|---|---|
| % Accuracy of output signal | ≤ 3 % + 5 µA | ≤ 2 % + 3 µA | ≤ 1 % | ≤ 0.5 % | ≤ 0.3 % |
| Phase shift | not specified | not specified | ≤ 2° | ≤ 1° | ≤ 0.7° |

- **Bandwidth:**
  30 Hz .. 10 kHz
- **Crest factor:**
  ≤ 6 for a current ≤ 2,000 A peak (300 Arms)
- **Maximum currents:**
  1,000 A continuous for a frequency ≤ 1 kHz (limitation proportional to the inverse of frequency beyond)
  1,200 A for 40 minutes max (interval between measurements > 20 minutes)
- **Output impedance:**
  1 Ω ± 1 %
- **Load impedance:**
  ≥ 1 MΩ and ≤ 100 pF
- **Operating voltage:**
  600 Vrms
- **Common mode voltage:**
  600 V category III and pollution degree 2
- **Influence of adjacent conductor:**
  ≤ 0.5 mA / A at 50 Hz
- **Influence of conductor position in jaws:**
  ≤ 0.1 % of output signal for frequencies ≤ 400 Hz
- **Load influence:**
  On receiver, for an input impedance of 100 Ω: ≤ 1 % on measurement, no measurement on phase.
  On receiver, for an input impedance of 1 kΩ: ≤ 0.1 % on measurement, no measurement on phase.
- **Influence of frequency** (2):
  < 0.5 % of output signal from 30 Hz .. 48 Hz
  < 1 % of output signal from 65 Hz .. 1 kHz
  < 2 % of output signal from 1 kHz .. 5 kHz
- **Influence of crest factor:**
  < 1 % of output signal for crest factor ≤ 6 with current ≤ 2,000 A peak
- **Influence of DC current superimposed on rated current:**
  < 1 % of output signal for a current ≤ 15 A DC

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  -10 °C to +50 °C
- **Storage temperature:**
  40 °C to +70 °C
- **Influence of temperature:**
  ≤ 0.2 % of output signal per 10 °K
- **Relative humidity for operation:**
  0 to 85 % RH decreasing linearly above 35 °C
- **Influence of relative humidity:**
  < 0.1 % of output signal from 10 % to 85 % RH
- **Operating altitude:**
  0 to 2,000 m
- **Max. jaw opening:**
  53 mm
  Patented progressive opening system
- **Clamping capacity:**
  Cable: Ø max 52 mm
  Busbar: 1 busbar of 50 x 5 mm / 4 busbars of 30 x 5 mm
- **Casing protection rating:**
  IP40 (IEC 529)
- **Drop test:** 1 m (IEC 68-2-32)
- **Shock resistance:**
  100 g (IEC 68-2-27)
- **Vibration resistance:**
  5/15 Hz 1.5 mm
  15/25 Hz 1 mm
  25/55 Hz 0.25 mm
  (IEC 68-2-6)
- **Self-extinguishing capability:**
  Casing and jaws: UL94 V0
- **Dimensions:**
  216 x 111 x 45 mm
- **Weight:**
  550 g
- **Colours:**
  Dark grey case with red jaws
- **Output:**
  C116: Safety sockets (4 mm)
  C117: two-wire cable with reinforced insulation or double insulation, length 1.5 m, terminated by 2 insulated elbowed male banana plugs, Ø 4 mm

## SAFETY SPECIFICATIONS

- **Electrical safety:**
  Instrument with double insulation or reinforced insulation between the primary the secondary and the grippable part located under the guard as per IEC 1010-1 & IEC 1010-2-032
  - 600 V category III, pollution degree 2
  - 300 V category IV, pollution degree 2
- **Electromagnetic compatibility (EMC):**
  EN 50081-1: class B
  EN 50082-2:
  - Electrostatic discharge: IEC 1000-4-2
  - Radiated field: IEC 1000-4-3
  - Fast transients: IEC 1000-4-4
  - Magnetic field at 50/60 Hz: IEC 1000-4-8

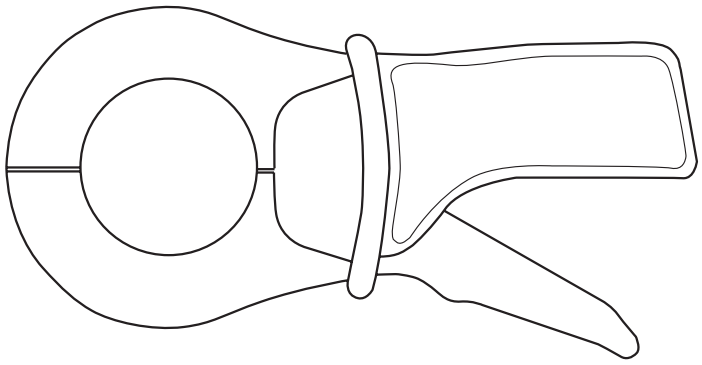
(1) Conditions of reference: 23 °C ± 3 °K, 20 % to 75 % RH, signal sinus, frequency of 48 Hz to 65 Hz, distortion factor < 1 %, no DC components, external magnetic field < 40 A/m, no AC magnetic field, conductor centred for measurement, load impedance ≥ 1 MΩ and ≤ 100 pF

(2) Out of reference domain

| To order | Reference |
|---|---|
| AC current clamp model **C116** with operating manual | P01120316 |
| AC current clamp model **C117** with operating manual | P01120317 |

# Current clamp for AC current
# Model C122

| | |
|---|---|
| **Current** | 1,000 A |
| **Ratio** | 1000/5 |
| **Output** | 5 mA/A |



## DESCRIPTION

An electronic voltage-limiting system protects output of clamp when operating, if the secondary circuit is opened accidentally.

## ELECTRICAL SPECIFICATIONS

- **Current range:**
  1 A AC .. 1,200 A AC
- **Current transformation ratio:**
  1000:5
- **Output signal:**
  5 mA AC/A AC (5 A for 1,000 A)
- **Accuracy and phase shift (1):**

| Primary current | 1 A .. 20 A | 20 A | 50 A (2) | 200 A (2) | 1,000 A (2) | 1,200 A (2) |
|---|---|---|---|---|---|---|
| Accuracy en % | ≤ 6 % + 0.5 mA | ≤ 5 % | ≤ 3 % | ≤ 1.5 % | ≤ 1 % | ≤ 1 % |
| Phase shift | not specified | ≤ 3° | ≤ 3° | ≤ 1.5° | ≤ 1° | ≤ 1° |

- **Bandwidth:**
  30 Hz .. 10 kHz
- **Crest factor:**
  ≤ 6 for a current ≤ 3,000 A peak (500 Arms)
- **Maximum currents:**
  1,000 A continuous for a frequency ≤ 1 kHz (limitation proportional to the inverse of frequency beyond)
  1,200 A for 30 minutes max (interval between measurements > 15 minutes)
- **Load impedance:**
  ≤ 0.6 Ω
- **Impedance of connection leads:**
  ≤ 40 mΩ
- **Maximum output voltage (secondary open):**
  Electronic protection circuit limiting voltage to 30 V peak max
- **Operating voltage:**
  600 Vrms
- **Common mode voltage:**
  600 V category III and pollution degree 2
- **Influence of adjacent conductor:**
  ≤ 1 mA/A at 50 Hz
- **Influence of conductor position in jaws:**
  ≤ 0.2 % of output signal for frequencies ≤ 400 Hz
- **Load influence:**
  From 0.2 Ω to 0.6 Ω
  < 0.5 % on measurement
  < 0.5 ° on phase
- **Influence of frequency (3):**
  < 1 % of output signal from 30 Hz .. 48 Hz
  < 0.5 % of output signal from 65 Hz .. 1 kHz
  < 1 % of output signal from 1 kHz .. 5 kHz
- **Influence of crest factor:**
  < 1 % of output signal for crest factor ≤ 6 with current ≤ 3,000 A peak (500 Arms)
- **Influence of DC current superimposed on rated current:**
  < 1 % of output signal for a current ≤ 30 A DC

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  -10 °C to +50 °C
- **Storage temperature:**
  -40 °C to +70 °C
- **Influence of temperature:**
  ≤ 0.1 % of output signal per 10 °K
- **Relative humidity for operation:**
  0 to 85 % RH with a linear decrease above 35 °C
- **Influence of relative humidity:**
  < 0.2 % of output signal from 10 % to 85 % RH
- **Operating altitude:**
  0 to 2,000 m
- **Max. jaw opening:**
  53 mm
  Patented progressive opening system
- **Clamping capacity:**
  - Cable: Ø max 52 mm
  - Busbar: 1 busbar of 50 x 5 mm / 4 busbars of 30 x 5 mm
- **Casing protection rating:**
  IP40 (IEC 529)
- **Drop test:**
  1 m (IEC 68-2-32)
- **Shock resistance:**
  100 g (IEC 68-2-27)
- **Vibration resistance:**
  5/15 Hz 1.5 mm
  15/25 Hz 1 mm
  25/55 Hz 0.25 mm
  (IEC 68-2-6)
- **Self-extinguishing capability:**
  Casing and jaws: UL94 V0
- **Dimensions:**
  216 x 111 x 45 mm
- **Weight:**
  550 g
- **Colours:**
  Dark grey case with red jaws
- **Output:**
  Safety sockets (4 mm)

## SAFETY SPECIFICATIONS

- **Electrical safety:**
  Instrument with double insulation or reinforced insulation between the primary the secondary and the grippable part located under the guard as per IEC 1010-1 & IEC 1010-2-032
  - 600 V category III, pollution degree 2
  - 300 V category IV, pollution degree 2
- **Electromagnetic compatibility (EMC):**
  EN 50081-1: class B
  EN 50082-2:
  - Electrostatic discharge: IEC 1000-4-2
  - Radiated field: IEC 1000-4-3
  - Fast transients: IEC 1000-4-4
  - Magnetic field at 50/60 Hz: IEC 1000-4-8

(1) Conditions of reference: 23 °C ± 3 °K, 20 % to 75 % RH, signal sinus, frequency of 48 Hz to 65 Hz, distortion factor < 1 %, no DC components, external magnetic field < 40 A/m, no AC magnetic field, conductor centred for measurement, load impedance 0.2 Ω (5 VA)

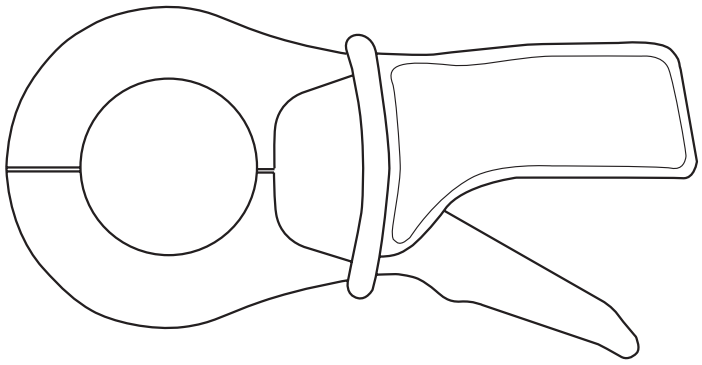
(2) Accuracy class in accordance with IEC 185: 5 VA - class 1 - 48 .. 65 Hz

(3) Out of reference domain

| To order | Reference |
|---|---|
| AC current clamp model **C122** with operating manual | P01120306 |

# Current clamp for AC current
# Model C148

| Current | 250 A AC | 500 A AC | 1,000 A AC |
|---|---|---|---|
| Ratio | 250:5 | 500:5 | 1000:5 |
| Output | 20 mA/A | 10 mA/A | 5 mA/A |



## DESCRIPTION

An electronic voltage-limiting system protects output of clamp when operating if the secondary circuit is opened accidentally.

## ELECTRICAL SPECIFICATIONS

- **Current range:**
  1 A AC .. 300 A AC
  1 A AC .. 600 A AC
  1 A AC .. 1,200 A AC
- **Current transformation ratio**
  250:5
  500:5
  1000:5
- **Output signal:**
  20 mA AC/A AC (5 A for 250 A)
  10 mA AC/A AC (5 A for 500 A)
  5 mA AC/A AC (5 A for 1,000 A)
- **Accuracy and phase shift [1]:**

▪ 250 A calibre

| Primary current | 1 A .. 5 A | 5 A | 12,5 A [2] | 50 A [2] | 250 A [2] | 300 A [2] |
|---|---|---|---|---|---|---|
| Accuracy en % | ≤ 10 % + 2 mA | ≤ 10 % | ≤ 5 % | ≤ 2.5 % | ≤ 2 % | ≤ 2 % |
| Phase shift | not specified | not specified | ≤ 10° | ≤ 10° | ≤ 10° | ≤ 10° |

▪ 500 A calibre

| Primary current | 1 A .. 10 A | 10 A | 25 A [3] | 100 A [3] | 500 A [3] | 600 A [3] |
|---|---|---|---|---|---|---|
| Accuracy en % | ≤ 6 % + 1 mA | ≤ 6 % | ≤ 3 % | ≤ 2 % | ≤ 1 % | ≤ 1 % |
| Phase shift | not specified | ≤ 6° | ≤ 4° | ≤ 3° | ≤ 2.5 ° | ≤ 2.5 ° |

▪ 1,000 A calibre

| Primary current | 1 A .. 20 A | 20 A | 50 A [4] | 200 A [4] | 1,000 A [4] | 1,200 A [4] |
|---|---|---|---|---|---|---|
| Accuracy en % | ≤ 6 % + 0.5 mA | ≤ 5 % | ≤ 3 % | ≤ 1.5 % | ≤ 1 % | ≤ 1 % |
| Phase shift | not specified | ≤ 5 ° | ≤ 3° | ≤ 1.5° | ≤ 1° | ≤ 1° |

- **Bandwidth:**
  48 Hz .. 1 kHz
- **Crest factor:**
  ▪ 250 A calibre:
  ≤ 6 with current ≤ 750 A peak
  ▪ 500 A calibre:
  ≤ 6 with current ≤ 1,500 A peak
  ▪ 1,000 A calibre:
  ≤ 6 with current ≤ 3,000 A peak
- **Maximum currents:**
  1,200 A for frequencies ≤ 1 kHz for 30 minutes max (interval between measurements > 15 minutes)
- **Load impedance:**
  ▪ 250 A calibre: ≤ 0.2 Ω
  ▪ 500 A calibre: ≤ 0.4 Ω
  ▪ 1,000 A calibre: ≤ 0.4 Ω
- **Impedance of connection leads:**
  ≤ 40 mΩ
- **Maximum output voltage (secondary open):**
  Electronic protection circuit limiting voltage to 30 V peak max
- **Operating voltage:**
  600 $V_{RMS}$
- **Common mode voltage:**
  600 V category III and pollution degree 2
- **Influence of adjacent conductor:**
  ▪ 250 A calibre: ≤ 15 mA/A at 50 Hz
  ▪ 500 A calibre: ≤ 10 mA/A at 50 Hz
  ▪ 1,000 A calibre: ≤ 1 mA/A at 50 Hz
- **Influence of conductor position in jaws:**
  For frequencies ≤ 400 Hz
  ▪ 250 A calibre: ≤ 0.6 % of output signal
  ▪ 500 A calibre: ≤ 0.4 % of output signal
  ▪ 1,000 A calibre: ≤ 0.2 % of output signal
- **Load influence:**
  ▪ 250 A calibre: from 25 mΩ to 0.2 Ω
  < 2 % on measurement
  < 4° on phase
  ▪ 500 A calibre: from 50 mΩ to 0.4 Ω
  < 1 % on measurement
  < 2° on phase
  ▪ 1,000 A calibre: from 50 mΩ to 0.4 Ω
  < 0.5 % on measurement
  < 0.5 ° on phase
- **Influence of frequency [5]:**
  ▪ 250 A calibre:
  < 1 % of output signal from 65 Hz .. 100 Hz
  < 5 % of output signal from 100 Hz .. 1 kHz
  ▪ 500 A calibre:
  < 1 % of output signal from 65 Hz .. 1 kHz
  ▪ 1,000 A calibre:
  < 0.5 % of output signal from 65 Hz .. 100 Hz
  < 1 % of output signal from 100 Hz .. 1 kHz
- **Influence of crest factor:**
  < 1 % of output signal for crest factor ≤ 6 with current:
  ≤ 750 A peak (calibre 250 A)
  ≤ 1,500 A peak (calibre 500 A)
  ≤ 3,000 A peak (1,000 A calibre)
- **Influence of DC current superimposed on rated current:**
  < 1 % of output signal for a current ≤ 30 A DC

# Current clamp for AC current
# Model C148

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  -10 °C to +50 °C
- **Storage temperature:**
  -40 °C to +70 °C
- **Influence of temperature:**
  ≤ 0.15 % of output signal per 10 °K
- **Relative humidity for operation:**
  0 to 85 % RH decreasing linearly above 35 °C
- **Influence of relative humidity:**
  From 10 % to 85 % RH
  - 250 A calibre:
    < 0.6 % of output signal and < 2° on phase
  - 500 A calibre:
    < 0.4 % of output signal and < 0.6° on phase
  - 1,000 A calibre:
    < 0.2 % of output signal and < 0.2° on phase
- **Operating altitude:**
  0 to 2,000 m
- **Max. jaw opening:**
  53 mm
  Patented progressive opening system
- **Clamping capacity:**
  Cable: Ø max 52 mm
  Busbar: 1 busbar of 50 x 5 mm /
  4 busbars of 30 x 5 mm
- **Casing protection rating:**
  IP40 (IEC 529)
- **Drop test:**
  1 m (IEC 68-2-32)
- **Shock resistance:**
  100 g (IEC 68-2-27)
- **Vibration resistance:**
  5/15 Hz 1.5 mm
  15/25 Hz 1 mm
  25/55 Hz 0.25 mm
  (IEC 68-2-6)
- **Self-extinguishing capability:**
  UL94 V0
- **Dimensions:**
  216 x 111 x 45 mm
- **Weight:**
  550 g
- **Colours:**
  Dark grey case with red jaws
- **Output:**
  Safety jacks (4 mm)

## SAFETY SPECIFICATIONS

- **Electrical safety:**
  Instrument with double insulation or reinforced insulation between the primary the secondary and the grippable part located under the guard as per IEC 1010-1 & IEC 1010-2-032
  - 600 V category III, pollution degree 2
  - 300 V category IV, pollution degree 2
- **Electromagnetic compatibility (EMC):**
  EN 50081-1: class B
  EN 50082-2:
  - Electrostatic discharge: IEC 1000-4-2
  - Radiated field: IEC 1000-4-3
  - Fast transients: IEC 1000-4-4
  - Magnetic field at 50/60 Hz: IEC 1000-4-8

(1) Conditions of reference: 23 °C ± 3 °K, 20 % to 75 % RH, signal sinus, frequency of 48 Hz to 65 Hz, distortion factor < 1 %, external magnetic field < 40 A/m, no AC magnetic field, conductor centred for measurement, load impedance:
- 250 A calibre: 0.1 Ω (2.5 VA)
- 500 A calibre: 0.2 Ω (5 VA)
- 1,000 A calibre: 0.2 Ω (5 VA)

(2) Accuracy class in accordance with IEC 185: 2.5 VA - class 3 - 48-65 Hz

(3) Accuracy class in accordance with IEC 185: 5 VA - class 3 - 48-65 Hz

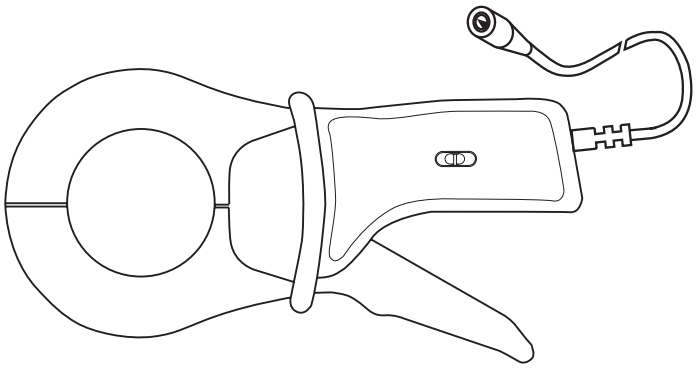
(4) Accuracy class in accordance with IEC 185: 5 VA - class 1 - 48-65 Hz

(5) Out of reference domain

| To order | Reference |
|---|---|
| AC current clamp model **C148** with operating manual | P01120307 |

# Oscilloscope clamp for AC current
# Model C160 (insulated AC current probe)

| Current | 30 A peak | 300 A peak | 2,000 A peak |
|---|---|---|---|
| Output | 100 mV/A | 10 mV/A | 1 mV/A |



## DESCRIPTION

This 1,000 A AC clamp can be used for easy display and measurement of current curves. Equipped with a coaxial cable terminated by a BNC connector, it is ideal for use with any oscilloscope. It outputs a signal in mV directly proportional to the current. It offers 3 different sensitivities.

## ELECTRICAL SPECIFICATIONS

- **Current range:**
  0.1 A AC .. 10 A AC (30 A peak)
  1 A AC .. 100 A AC (300 A peak)
  1 A AC .. 1,000 A AC (2,000 A peak)
- **Output signal:**
  100 mV AC/A AC (1 V for 10 A)
  10 mV AC/A AC (1 V for 100 A)
  1 mA AC/A AC (1 V for 1,000 A)
- **Accuracy and phase shift** [1]**:**
  - 10 A calibre

| Primary current | 0.1 A .. 0.5 A | 0.5 A .. 2 A | 2 A .. 10 A | 10 A .. 12 A |
|---|---|---|---|---|
| % Accuracy of output signal | ≤ 3 % + 10 mV | ≤ 3 % + 10 mV | ≤ 3 % + 10 mV | ≤ 3 % + 10 mV |
| Phase shift | not specified | not specified | ≤ 15 ° | ≤ 15 ° |

  - 100 A calibre

| Primary current | 0.1 A .. 5 A | 5 A .. 20 A | 20 A .. 100 A | 100 A .. 120 A |
|---|---|---|---|---|
| % Accuracy of output signal | ≤ 2 % + 5 mV | ≤ 2 % + 5 mV | ≤ 2 % + 5 mV | ≤ 2 % + 5 mV |
| Phase shift | not specified | ≤ 15 ° | ≤ 10° | ≤ 5 ° |

  - 1,000 A calibre

| Primary current | 1 A .. 50 A | 50 A .. 200 A | 200 A .. 1,000 A | 1,000 A .. 1,200 A |
|---|---|---|---|---|
| % Accuracy of output signal | ≤ 1 % + 1 mV | ≤ 1 % + 1 mV | ≤ 1 % + 1 mV | ≤ 1 % + 1 mV |
| Phase shift | not specified | ≤ 3° | ≤ 2° | ≤ 1° |

- **Bandwidth:**
  10 Hz .. 100 kHz (-3 dB)
  (depending on current value)
- **Rise/fall time from 10 % to 90 %:**
  3.5 µs
- **10 % delay time:**
  0.5 µs
- **Ampere second product:**
  - 10 A calibre: 3,2 A.s
  - 100 A calibre: 26 A.s
  - 1,000 A calibre: 64 A.s
- **Maximum currents:**
  1,000 A permanent
  1,200 A for 40 minutes max. / > 20 minutes shutdown for a frequency ≤ 1 kHz (limitation proportional to the inverse of one third of the frequency beyond that)
- **Insertion impedance (at 400 Hz / 10 kHz)**
  - 10 A calibre: < 0.3 mΩ / < 6,6 mΩ
  - 100 A calibre: < 0.3 mΩ / < 2 mΩ
  - 1,000 A calibre: < 0.3 mΩ / < 1.6 mΩ
- **Output impedance at 1 kHz:**
  - 10 A calibre: ≤ 515 Ω ± 10 %
  - 100 A calibre: ≤ 515 Ω ± 10 %
  - 1,000 A calibre: ≤ 515 Ω ± 10 %
- **Influence of temperature:**
  ≤ 150 ppm /k or 0.15 % of output signal per 10 °K
- **Influence of relative humidity:**
  < 0.1 % of output signal
- **Influence of adjacent conductor:**
  ≤ 1 mA/A at 50 Hz
- **Influence of DC current ≤ 30 A superimposed on rated current:**
  < 1 %
- **Influence of conductor position in jaws:**
  ≤ 0.1 % of output signal for frequencies ≤ 400 Hz
- **Influence of frequency** [2]**:**
  - 10 A calibre:
    < 10 % of output signal from 10 Hz .. 1 kHz
    < 5 % of output signal from 1 kHz .. 10 kHz
    < 20 % of output signal from 10 kHz .. 50 kHz
    3 dB of output signal from 50 kHz .. 100 kHz
  - 100 A calibre:
    < 5 % of output signal from 10 Hz .. 1 kHz
    < 3 % of output signal from 1 kHz .. 10 kHz
    < 20 % of output signal from 10 kHz .. 50 kHz
    3 dB of output signal from 50 kHz .. 100 kHz
  - 1,000 A calibre:
    < 1 % of output signal from 10 Hz .. 1 kHz
    < 2 % of output signal from 1 kHz .. 10 kHz
    < 10 % of output signal from 10 kHz .. 50 kHz
    3 dB of output signal from 50 kHz .. 100 kHz
- **Influence of crest factor:**
  < 1 % of output signal for crest factor ≤ 6 with current
  - 10 A calibre: ≤ 30 A peak
  - 100 A calibre: ≤ 300 A peak
  - 1,000 A calibre: ≤ 3,000 A peak

# Oscilloscope clamp for AC current
# Model C160 (insulated AC current probe)

## MECHANICAL SPECIFICATIONS

- **Max. jaw opening:**
  53 mm
- **Clamping capacity:**
  Cable: Ø max 52 mm
  Busbar: 1 busbar of 50 x 5 mm/
  4 busbars of 30 x 5 mm
- **Operating temperature:**
  -10 °C to +55 °C
- **Storage temperature:**
  -40 °C to +70 °C
- **Relative humidity for operation:**
  0 to 85 % RH decreasing linearly above 35 °C
- **Operating altitude:**
  0 to 2,000 m
- **Casing protection rating:**
  IP30 with clamp open (IEC 529)
  IP40 with clamp closed (IEC 529)
- **Drop test:**
  1 m (IEC 68-2-32)
- **Shock resistance:**
  100 g / 6 ms / half-periode (IEC 68-2-27)
- **Protection against impacts:**
  IK04 0.5 J (EN 50102)
- **Vibration resistance:**
  5/15 Hz 1.5 mm peak
  15/25 Hz 1 mm peak
  25/55 Hz 0.25 mm peak
  (IEC 68-2-6)
- **Self-extinguishing capability:**
  Casing and jaws: UL94 V0
- **Dimensions:**
  216 x 111 x 45 mm
- **Weight:**
  550 g
- **Colours:**
  Dark grey case with red jaws
- **Output:**
  Via 2 m coaxial cable terminated by insulated BNC plug

## SAFETY SPECIFICATIONS

- **Electrical safety:**
  Instrument with double insulation or reinforced insulation between the primary the secondary and the grippable part located under the guard as per IEC 1010-1 & IEC 1010-2-032
  - 600 V category III, pollution degree 2
  - 300 V category IV, pollution degree 2
- **Electromagnetic compatibility (EMC):**
  EN 50081-1: class B
  EN 50082-2:
  - Electrostatic discharge: IEC 1000-4-2
    without disturbance: 4 kV class 2
    non-destructive: 15 kV class 4
  - Radiated field: IEC 1000-4-3
    without disturbance: 10 V/m performance criterion A
  - Fast transients: IEC 1000-4-4
    without disturbance: 1 kV class 2
    non-destructive: 2 kV class 3
  - Magnetic field at 50/60 Hz: IEC 1000-4-8
    field of 400 A/m at 50 Hz: < 1 A

(1) Conditions of reference: 23 °C ± 3 °K, 20 % to 75 % RH, signal sinus, frequency of 48 Hz à 1,000 Hz, distortion factor < 1 % with no DC component, external magnetic field < 40 A/m, no DC components, no external conductor with circulating current, conductor centred for measurement, load impedance: ≥ 1 MΩ and < 100 pF

(2) Out of reference domain

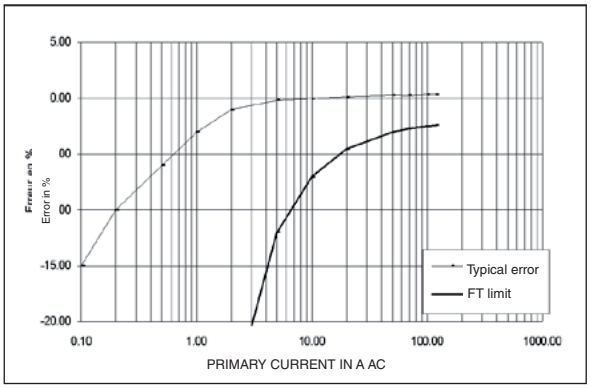
| To order | Reference |
|---|---|
| AC current clamp model **C160** with operating manual | P01120308 |

# Oscilloscope clamp for AC current
# Model C160 (insulated AC current probe)

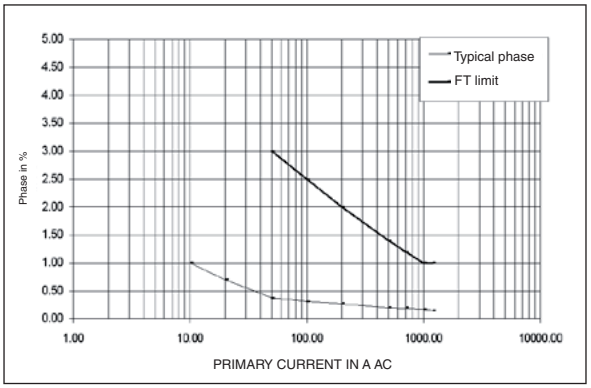
## CURVES AT 50 Hz

1,000 A calibre

Error on measurement

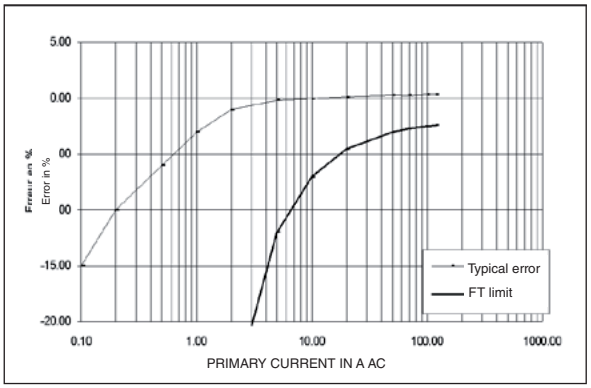



Phase shift

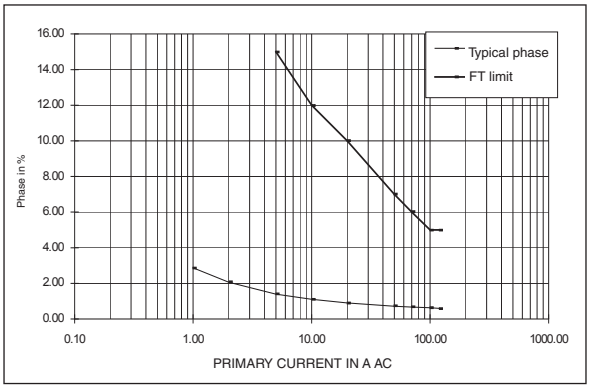



100 A calibre

Error on measurement

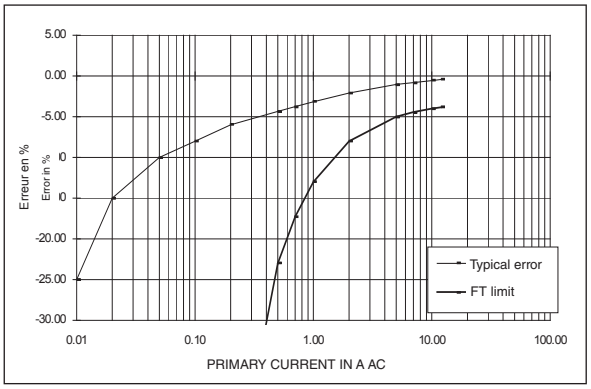



Phase shift

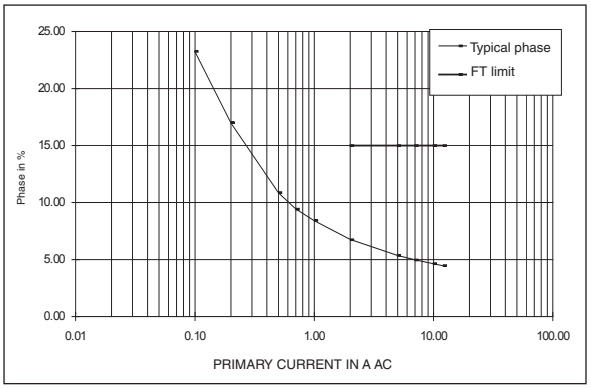



10 A calibre

Error on measurement



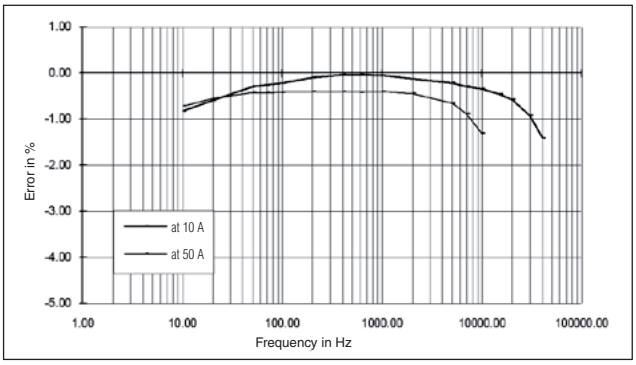

Phase shift

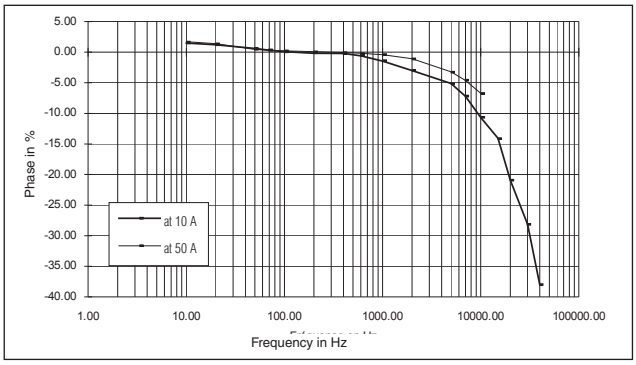


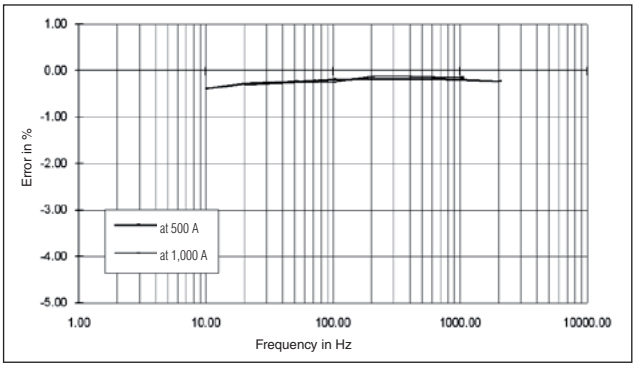
# Oscilloscope clamp for AC current
# Model C160 (insulated AC current probe)

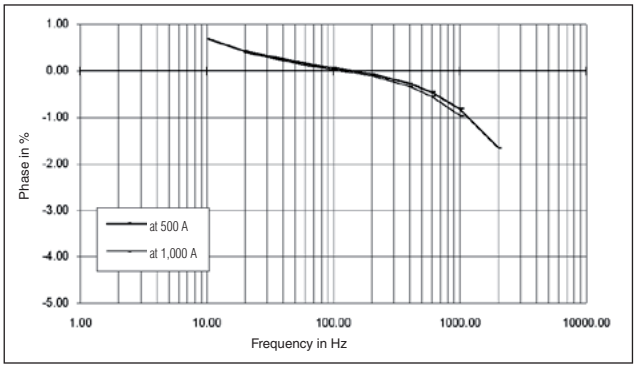
## FREQUENCY RESPONSE (CONT.)

1,000 A calibre

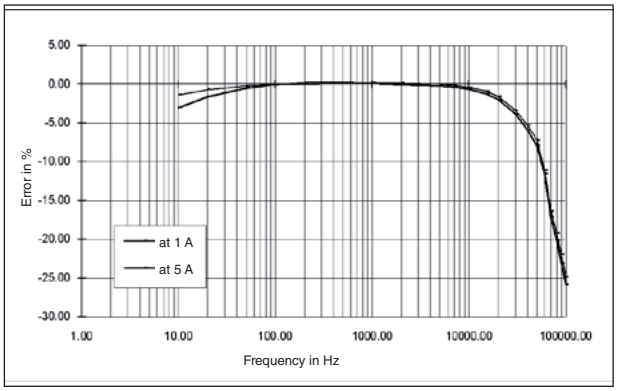


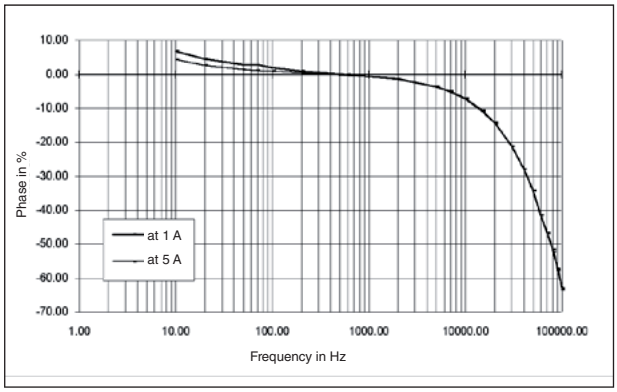



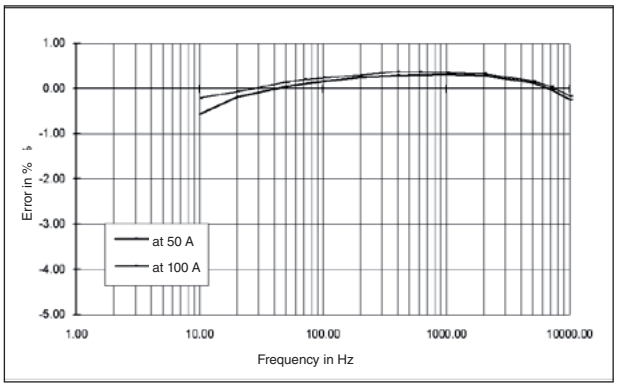



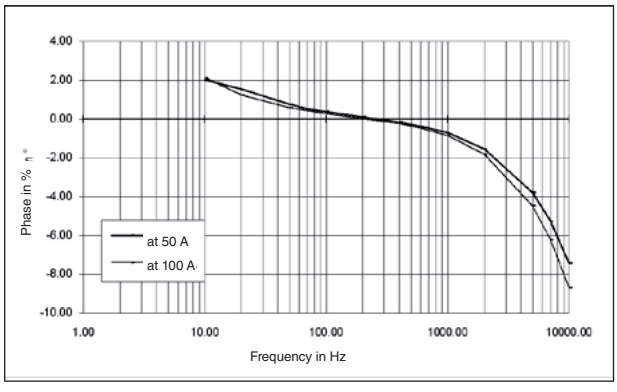




100 A calibre



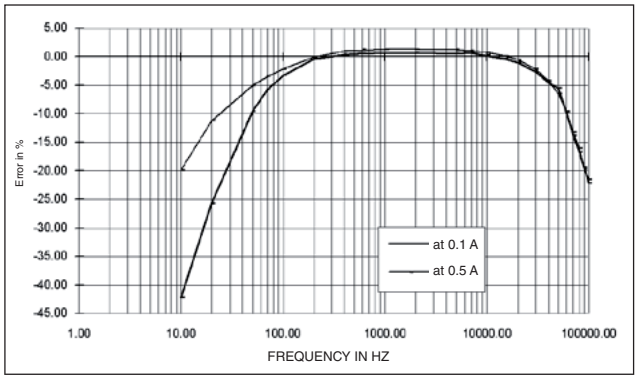



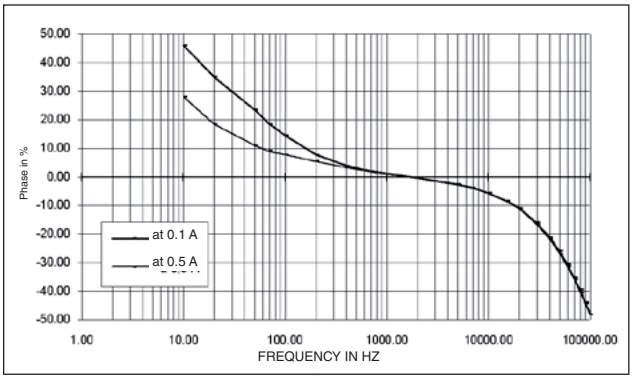



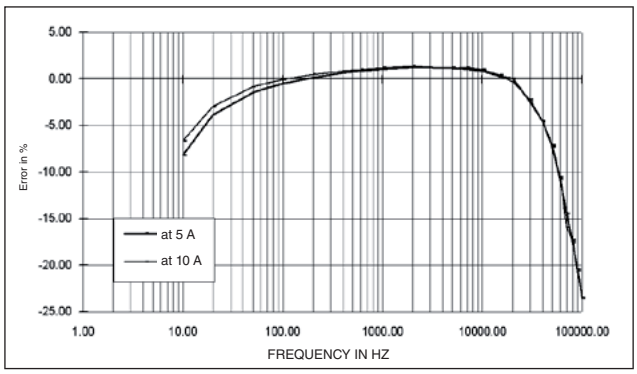
# Oscilloscope clamp for AC current
# Model C160 (insulated AC current probe)

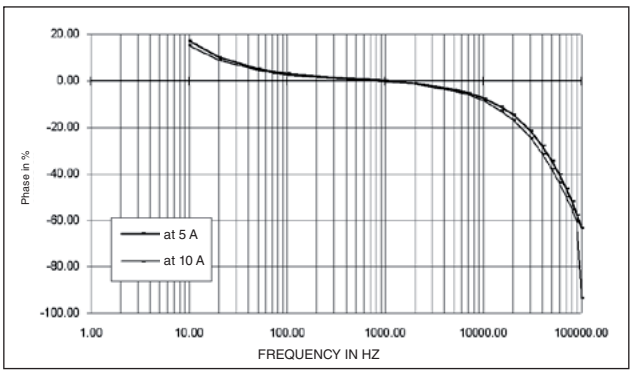
## FREQUENCY RESPONSE (CONT.)

10 A calibre



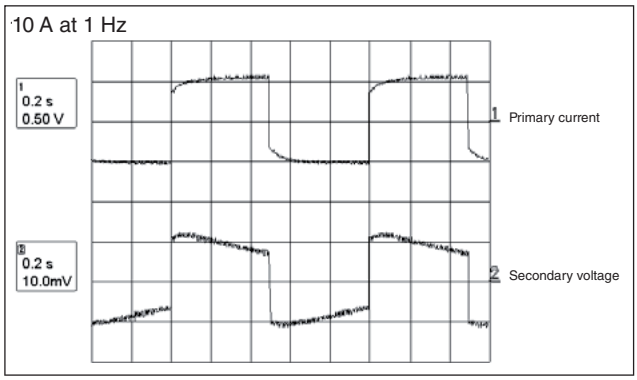



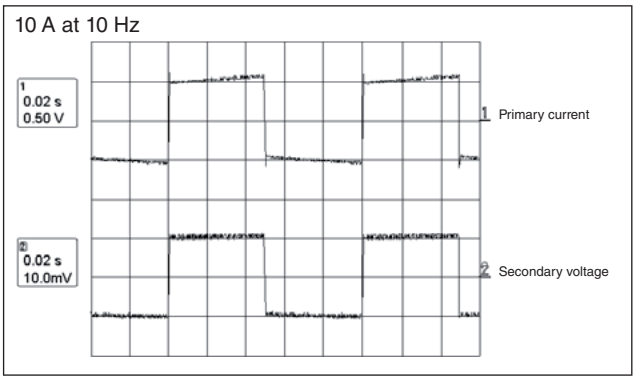



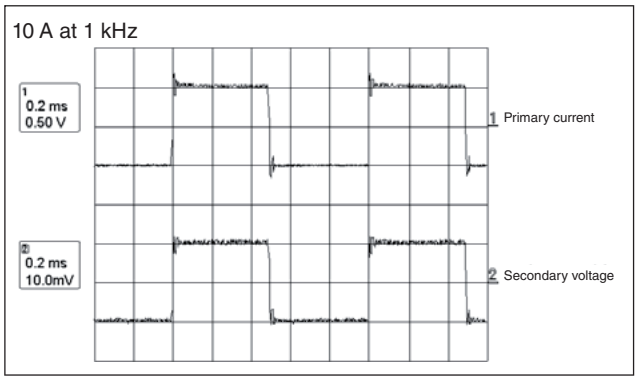



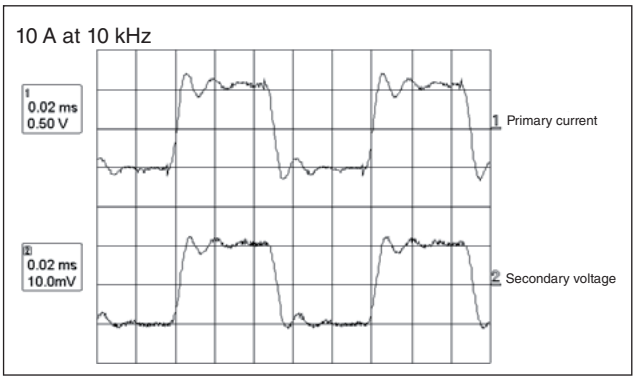

## RESPONSE TO A SQUARE SIGNAL

1,000 A calibre



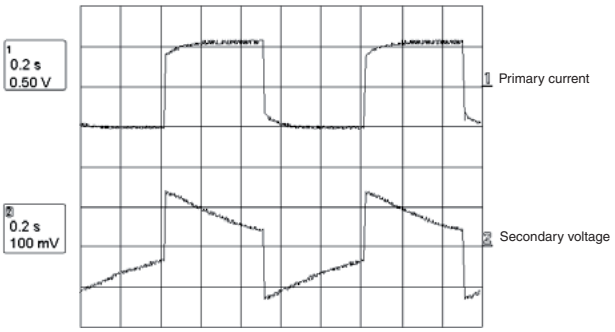



# Oscilloscope clamp for AC current
# Model C160 (insulated AC current probe)

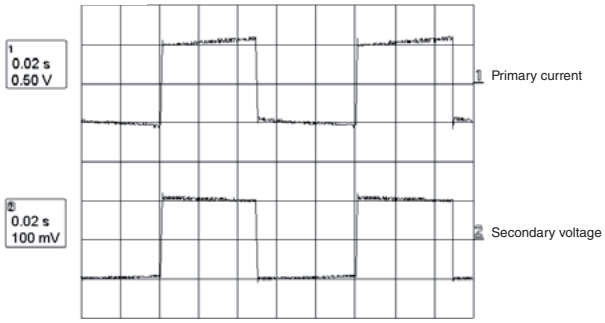
## RESPONSE TO A SQUARE SIGNAL (CONT.)

100 A calibre

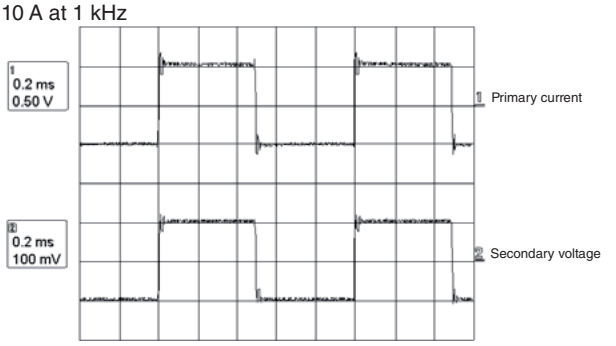
10 A at 10 Hz



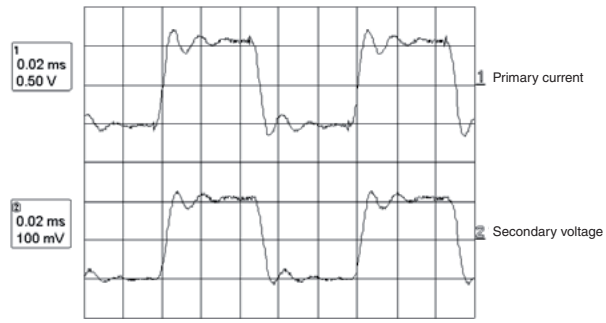

10 A at 100 Hz




10 A at 1 kHz

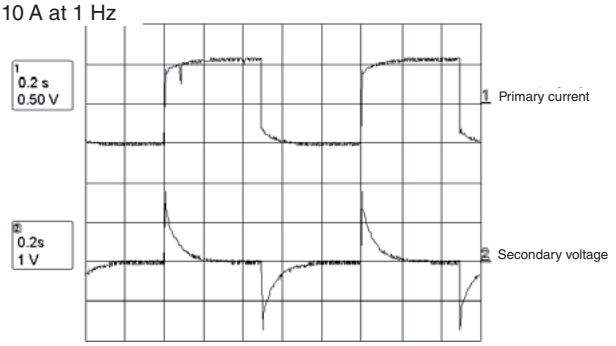



10 A at 10 kHz

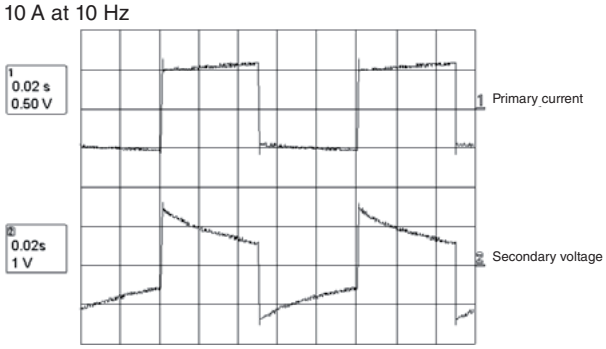



10 A calibre

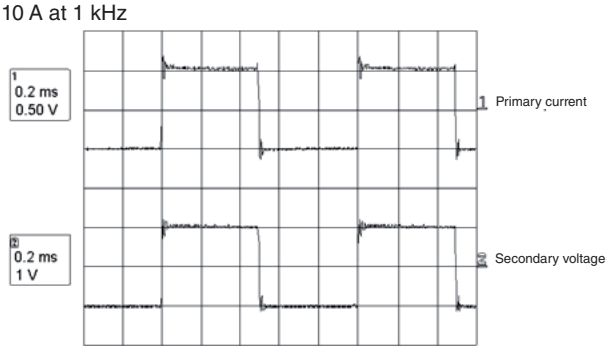
10 A at 1 Hz



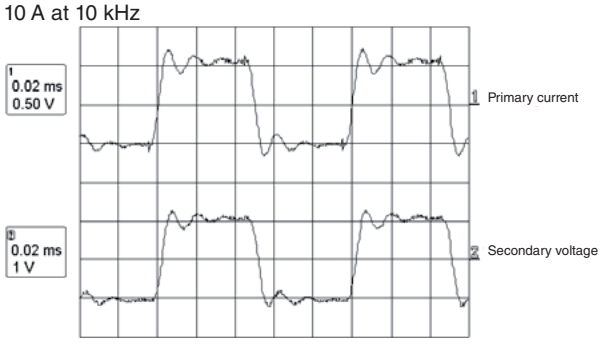

10 A at 10 Hz




10 A at 1 kHz

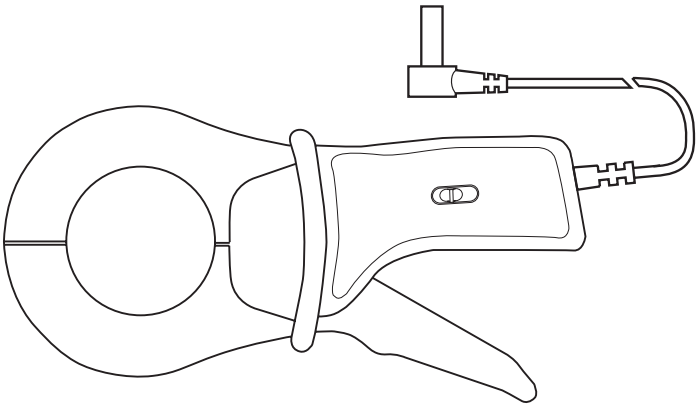



10 A at 10 kHz



# Current clamp for AC current
# Model C173 (probe for leakage currents)

| Current | 1 A | 10 A | 100 A | 1,000 A |
|---|---|---|---|---|
| Output | 1 V/A | 100 mV/A | 10 mV/A | 1 mV/A |



## DESCRIPTION

The C173 clamp measures leakage or differential currents from 1 mA upwards and can also be used with multimeters equipped with a range in mV AC.
The C173 clamp measures earth-loop currents and leakage currents. It also locates faults in circuits of single and three-phase networks.
For unearthed three-phase systems, use the optional Artificial Neutral.

## ELECTRICAL SPECIFICATIONS

- **Current range:**
  0.001 A AC .. 1.2 A AC
  0.01 A AC .. 12 A AC
  0.1 A AC .. 120 A AC
  1 A AC .. 1,200 A AC
- **Output signal:**
  1 V AC / A AC (1 V for 1 A)
  100 mV AC / A AC (1 V for 10 A)
  10 mV AC / A AC (1 V for 100 A)
  1 mV AC / A AC (1 V for 1,000 A)
- **Accuracy and phase shift** (1):

▪ 1 A calibre

| Primary current | 0.001 A .. 0.01 A | 0.01 A .. 0.1 A | 0.1 A .. 1 A | 1 A .. 1.2 A |
|---|---|---|---|---|
| % Accuracy of output signal | ≤ 3 % + 1 mV | ≤ 3 % + 1 mV | ≤ 0.7 % + 1 mV | ≤ 0.7 % + 1 mV |
| Phase shift | not specified | not specified | ≤ 10° | ≤ 10° |

▪ 10 A calibre

| Primary current | 0.01 A .. 0.1 A | 0.1 A .. 1 A | 1 A .. 10 A | 10 A .. 12 A |
|---|---|---|---|---|
| % Accuracy of output signal | ≤ 1 % + 0.2 mV | ≤ 0.5 % + 0.2 mV | ≤ 0.5 % | ≤ 0.5 % |
| Phase shift | not specified | ≤ 5 ° | ≤ 2° | ≤ 2° |

▪ 100 A calibre

| Primary current | 0.1 A .. 1 A | 1 A .. 10 A | 10 A .. 100 A | 100 A .. 120 A |
|---|---|---|---|---|
| % Accuracy of output signal | ≤ 1 % + 0.2 mV | ≤ 0.5 % + 0.2 mV | ≤ 0.3 % | ≤ 0.2 % |
| Phase shift | not specified | ≤ 2° | ≤ 1° | ≤ 1° |

▪ 1,000 A calibre

| Primary current | 1 A .. 10 A | 10 A .. 100 A | 100 A .. 1,000 A | 1,000 A .. 1,200 A |
|---|---|---|---|---|
| % Accuracy of output signal | ≤ 1 % + 0.2 mV | ≤ 0.5 % + 0.2 mV | ≤ 0.2 % | ≤ 0.2 % |
| Phase shift | not specified | ≤ 2° | ≤ 1° | ≤ 1° |

- **Bandwidth:**
  10 Hz .. 3 kHz
- **Crest factor:**
  ▪ 1 A calibre:
  ≤ 3 for I ≤ 3 A peak (1 Arms)
  ▪ 10 A calibre:
  ≤ 3 for I ≤ 30 A peak (10 Arms)
  ▪ 100 A calibre:
  ≤ 3 for I ≤ 300 A peak (100 Arms)
  ▪ 1,000 A calibre:
  ≤ 3 for I ≤ 1700 A peak (500 Arms)
- **Maximum currents:**
  1,000 A continuous for a frequency ≤ 500 Hz (limitation proportional to the inverse of 1/2 of frequency beyond)
- **Load impedance:**
  ≥ 10 MΩ and ≤ 47 pF
- **Output impedance:**
  ▪ 1 A calibre: 10 kΩ ± 10 %
  ▪ 10 A calibre: 1 kΩ ± 10 %
  ▪ 100 A calibre: 100 Ω ± 10 %
  ▪ 1,000 A calibre: 100 Ω ± 10 %
- **Operating voltage:**
  600 Vrms
- **Common mode voltage:**
  600 V category III and pollution degree 2
- **Influence of adjacent conductor:**
  ≤ 1 mA / A at 50 Hz
- **Influence of conductor position in jaws:**
  ≤ 0.3 % of output signal for frequencies ≤ 400 Hz
- **Influence of frequency** (2):
  ▪ 1 A calibre:
  < 2 % of output signal 30 Hz .. 48 Hz and 65 Hz .. 1 kHz
  < 10 % of output signal 1 kHz .. 3 kHz
  ▪ 10 A calibre:
  < 2 % of output signal 10 Hz .. 48 Hz and 65 Hz .. 3 kHz
  ▪ 100 A calibre:
  < 1.5 % of output signal 10 Hz .. 48 Hz and 65 Hz .. 3 kHz
  ▪ 1,000 A calibre:
  < 1 % of output signal 10 Hz .. 48 Hz and 65 Hz .. 1 kHz
- **Influence of crest factor:**
  ≤ 0.5 % for crest factor limited to 3
- **Influence of DC current superimposed on rated current:**
  ≤ 10 % at 1,000 A for a current DC from 10 A

# Current clamp for AC current
# Model C173 (probe for leakage currents)

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  -10 °C .. +50 °C
- **Storage temperature:**
  -40 °C .. +70 °C
- **Influence of temperature:**
  ≤ 0.15 % of output signal per 10 °K from -10 °C .. +40 °C
  ≤ 0.2 % of output signal per 10 °K from +40 °C .. +50 °C
- **Relative humidity for operation:**
  From 0 .. 85 % from RH decreasing linearly above 35 °C
- **Influence of relative humidity:**
  < 0.1 % of output signal from 10 .. 85 % from RH
- **Operating altitude:**
  0 to 2,000 m
- **Max. jaw opening:**
  53 mm
  Patented progressive opening system
- **Clamping capacity:**
  Cable: Ø max 52 mm
  Busbar: 1 busbar of 50 x 5 mm or 4 busbars of 30 x 5 mm
- **Casing protection rating:**
  IP40 (IEC 529)
- **Drop test:**
  1 m (IEC 68-2-32)
- **Shock resistance:**
  100 g (IEC 68-2-27)
- **Vibration resistance:**
  5/15 Hz 1.5 mm
  15/25 Hz 1 mm
  25/55 Hz 0.25 mm
  (IEC 68-2-6)
- **Self-extinguishing capability:**
  UL94 V0
- **Dimensions:**
  216 x 111 x 45 mm
- **Weight:**
  550 g
- **Colours:**
  Dark grey case with red jaws
- **Output:**
  1.5 m two-wire lead with double or reinforced insulation terminated by 2 elbowed male safety plugs (4 mm)

## SAFETY SPECIFICATIONS

- **Electrical safety:**
  Instrument with double insulation or reinforced insulation between the primary the secondary and the grippable part located under the guard as per IEC 1010-1 & IEC 1010-2-032
  - 600 V category III, pollution degree 2
  - 300 V category IV, pollution degree 2
- **Electromagnetic compatibility (EMC):**
  EN 50081-1: class B
  EN 50082-2:
  - Electrostatic discharge: IEC 1000-4-2
  - Radiated field: IEC 1000-4-3
  - Fast transients: IEC 1000-4-4
  - Magnetic field at 50/60 Hz: IEC 1000-4-8

(1) Conditions of reference: 23 °C ± 3 °K, 20 % to 75 % RH, signal sinus, frequency of 48 Hz to 65 Hz, distortion factor < 1 %, no DC components, external magnetic field < 40 A/m, no AC magnetic field, conductor centred for measurement, load impedance: ≥ 10 MΩ and ≤ 47 pF

(2) Out of reference domain

| To order | | Reference |
|---|---|---|
| AC current clamp model **C173** with operating manual | | P01120309 |
| Accessory: | **AN1** artificial neutral box (see capter 12)<br>Bag **n°11** | P01197201<br>P01100120 |

## DN SERIES

The DN series comprises a range of high-performance clamp-on AC current probes designed for high current measurements. Their excellent current transformation ratios and low phase shift, combined with a broad frequency response, allows highly accurate current and power measurements. High-quality magnetic cores and windings mean high precision current measurement up to 3,000 A (AC). The rectangular jaws can be used to clamp large-diameter cables or busbars.

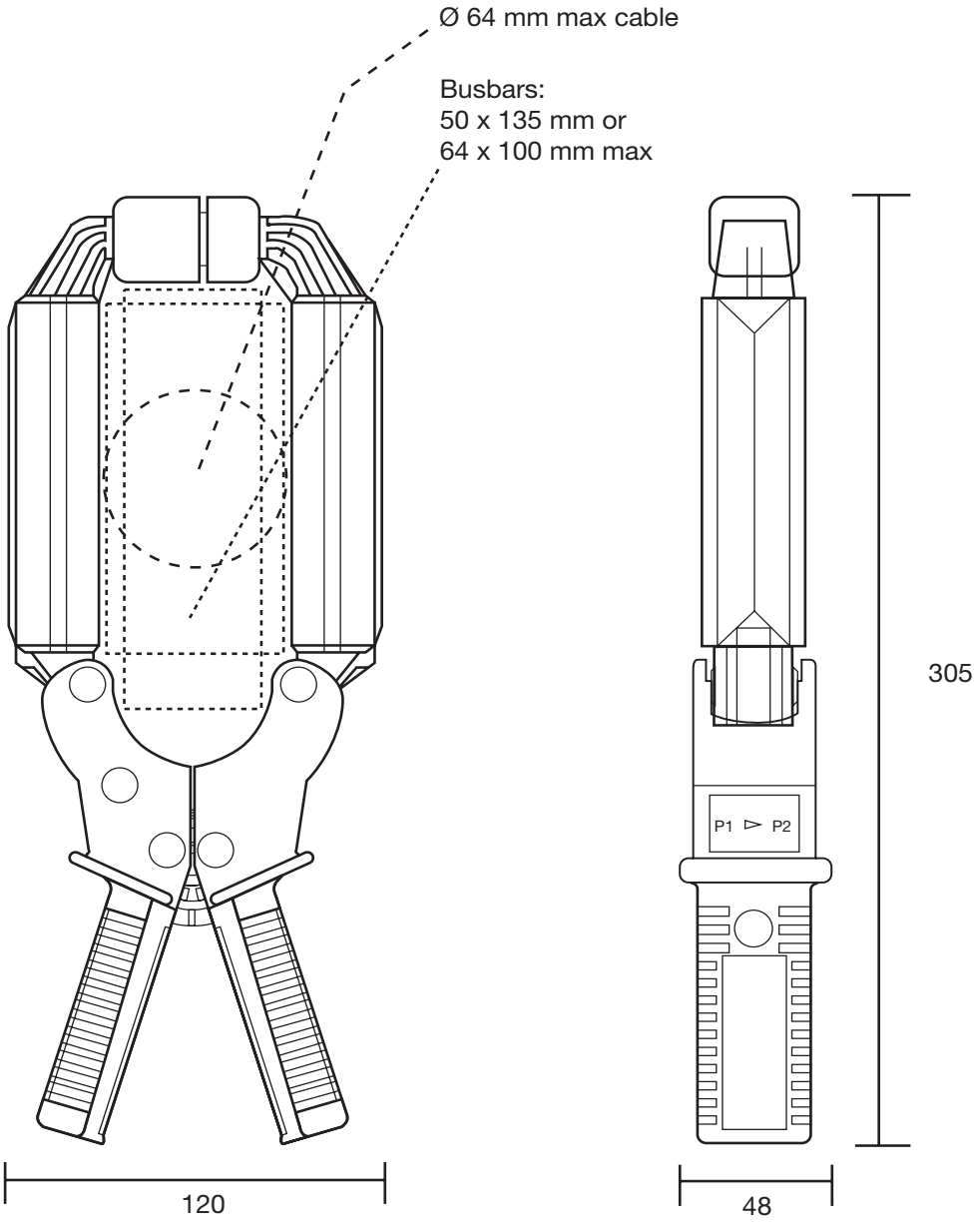
The DN series clamps provide true RMS measurement values and faithful signal reproduction.

There are two different kinds of model available in the DN series: the first acts as a traditional current transformer with a current output (mA) and has a wide range of voltage ratios.

These clamps may also be used with multimeters, harmonic and power measurement equipment, logging apparatus or other instruments allowing AC current input.

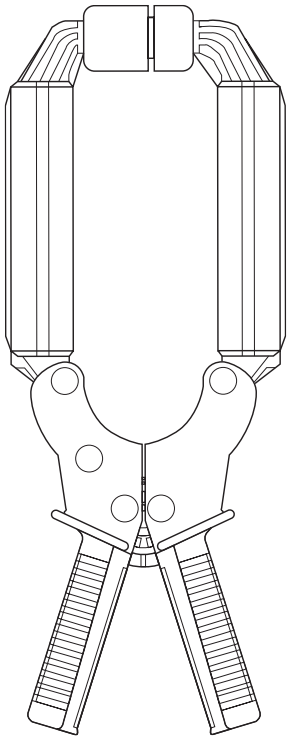
The second type of model gives a voltage output in precise proportion to the measured current (1 mV/A, 10 mV/A or 100 mV/A) so you can display and log currents on instruments without current inputs.

Model D38N has been specifically designed for use with oscilloscopes, or other instruments with a BNC input.


Ø 64 mm max cable
Busbars:
50 x 135 mm or
64 x 100 mm max
P1
P2
305
120
48

# Current clamps for AC current
# Models D30N and D30CN

| | |
|---|---|
| **Current** | 2,400 A AC |
| **Ratio** | 3000:1 |
| **Output** | 0.333 mA / A |



## ELECTRICAL SPECIFICATIONS

- **Current range:**
  1 A AC .. 2,400 A AC
  (3,000 A for temperature < 35 °C)
- **Current transformation ratio:**
  3000:1
- **Output signal:**
  0.333 mA / A AC (1 A to 3,000 A)
- **Accuracy and phase shift (1):**

| Primary current | 150 A | 600 A | 3,000 A |
|---|---|---|---|
| % Accuracy of output signal | 1.5 % | 0.75 % | 0.5 % |
| Phase shift | 1.5° | 0.75 ° | 0.5 ° |

- **Overload:**
  3600 A for 5 minutes
- **Maximum output voltage (secondary open):**
  Electronic protection circuit limiting voltage to 42 V peak max.
- **Accuracy:**
  In accordance with IEC 185-26-27, 5 VA, class 0.5 from 48 Hz to 1,000 Hz
- **Bandwidth:**
  30 Hz to 5 kHz (in continuous use above 1 kHz, the max. measurement current is limited)
- **Ampere second product:**
  90 A.s
- **Load impedance:**
  < 5 Ω
- **Operating voltage:**
  600 V AC
- **Common mode voltage:**
  600 V AC
- **Influence of adjacent conductor:**
  0.005 A / A AC
- **Influence of conductor position in jaws:**
  1 % ± 0.1 A

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  -10 °C to +50 °C
- **Storage temperature:**
  -25 °C to +80 °C
- **Influence of temperature:**
  < 0.1 % per 10 °K
- **Max. jaw opening:**
  90 mm
- **Max. jaw insertion capacity:**
  Cable: 64 mm
  Group of wires: 50 x 135 mm - 64 x 100 mm
- **Casing protection rating:**
  IP20 in accordance with IEC 529
- **Drop test:**
  500 mm (IEC 68-2-32)
- **Shock resistance:**
  100 g, in accordance with IEC 68-2-27
- **Vibration resistance:**
  10 / 55 / 10 Hz, 0.15 mm test in accordance with IEC 68-2-6
- **Self-extinguishing capability:**
  Casing: UL94 V0
  Jaws: UL94 V2
- **Dimensions:**
  120 x 315 x 48 mm
- **Weight:**
  1,200 g
- **Colour:**
  Dark grey casing with red jaws
- **Output:**
  - $D30_N$: two safety sockets (4 mm)
  - $D30C_N$: two-wire 1.5 m cable with reinforced insulation or double insulation ending with 2 elbowed 4 mm male safety plugs

## SAFETY SPECIFICATIONS

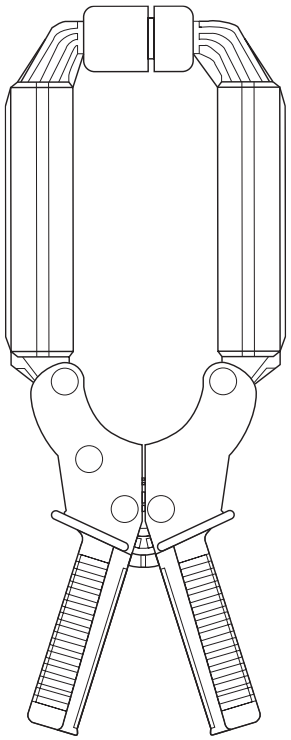
- **Electrical safety:**
  Double insulation or reinforced insulation between the primary and the secondary circuits and the outside casing in accordance with IEC 1010-2-032.
  - 600 V category III, pollution degree 2
  - 300 V category IV, pollution degree 2
- **Electromagnetic compatibility (EMC):**
  EN 50081-1: class B
  EN 50082-2:
  - Electrical discharge: IEC 1000-4-2
  - Radiated field: IEC 1000-4-3
  - Fast transients: IEC 1000-4-4
  - Magnetic field at 50/60 Hz: IEC 1000-4-8

(1) Conditions of reference: 23 °C ± 5 °K, 20 % to 75 % RH, 48 Hz to 65 Hz, external magnetic field < 40 A/m, no DC component, no current-carrying conductor nearby, centred test sample, load impedance 5 Ω.

| To order | Reference |
|---|---|
| AC current clamp model **D30N** with operating manual | P01120049A |
| AC current clamp model **D30CN** with operating manual | P01120064 |

# Current clamp for AC current
# Model D31N

| Current | 500 A AC | 1,000 A AC | 1,500 A AC |
|---|---|---|---|
| Ratio | 500:1 | 1000:1 | 1500:1 |
| Output | 2 mA/A | 1 mA/A | 0.66 mA/A |



## ELECTRICAL SPECIFICATIONS

- **Current range:**
  1 A AC .. 500 A AC
  1 A AC .. 1,000 A AC
  1 A AC .. 1,500 A AC
- **Current transformation ratio:**
  500:1, 1000:1, 1500:1
- **Output signal:**
  2 mA/A AC (1 A to 500 A)
  1 mA/A AC (1 A to 1,000 A)
  0.66 mA/A AC (1 A to 1,500 A)
- **Accuracy and phase shift (1):**

▪ 500 A calibre

| Primary current | 25 A | 100 A | 500 A |
|---|---|---|---|
| % Accuracy of output signal | 4 % | 3 % | 3 % |
| Phase shift | 4° | 3.5 ° | 2° |

- Load impedance: 5 Ω
- Overload: 700 A for 10 minutes
- Ampere second product: 6 A.s
- Accuracy: in accordance with IEC 185-26-27, 5 VA, class 3 from 48 Hz to 1,000 Hz

▪ 1,000 A calibre

| Primary current | 50 A | 200 A | 1,000 A |
|---|---|---|---|
| % Accuracy of output signal | 3 % | 1.5 % | 1 % |
| Phase shift | 3° | 1.5° | 1° |

- Load impedance: 5 Ω
- Overload: 1,400 A for 10 minutes
- Ampere second product: 30 A.s
- Accuracy: in accordance with IEC 185-26-27, 5 VA, class 1 from 48 Hz to 1,000 Hz

▪ 1,500 A calibre

| Primary current | 75 A | 300 A | 1,500 A |
|---|---|---|---|
| % Accuracy of output signal | 1.5 % | 0.75 % | 0.5 % |
| Phase shift | 1.5° | 0.75 ° | 0.5 ° |

- Load impedance: 5 Ω
- Overload: 1800 A for 10 minutes
- Ampere second product: 65 A.s
- Accuracy: in accordance with IEC 185-26-27, 5 VA class 0.5 from 48 Hz to 1,000 Hz

- **Bandwidth:**
  30 Hz to 1,500 Hz (in continuous use above 1 kHz the max. measurement current is limited)
- **Load impedance:**
  < 5 Ω
- **Operating voltage:**
  600 V AC
- **Common mode voltage:**
  600 V AC
- **Maximum output voltage (secondary open):**
  Electronic protection circuit limiting voltage to 42 V peak max
- **Influence of adjacent conductor:**
  0.005 A/A AC
- **Influence of conductor position in jaws:**
  1.5 % ± 0.2 A on the 500:1 ratio
  1 % ± 0.2 A on the 1000:1 ratio
  1 % ± 0.2 A on the 1500:1 ratio

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  -10 °C to +50 °C
- **Storage temperature:**
  -25 °C to +80 °C
- **Influence of temperature:**
  < 0.1 % per 10 °K
- **Max. jaw opening:**
  90 mm
- **Max. jaw insertion capacity:**
  Cable: 64 mm
  Group of wires: 50 x 135 mm - 64 x 100 mm
- **Casing protection rating:**
  IP20 in accordance with IEC 529
- **Drop test:**
  500 mm (IEC 68-2-32)
- **Shock resistance:**
  100 g, in accordance with IEC 68-2-27
- **Vibration resistance:**
  10/55/10 Hz, 0.15 mm
  test in accordance with IEC 68-2-6
- **Self-extinguishing capability:**
  Casing: UL94 V0
  Jaws: UL94 V2
- **Dimensions:**
  120 x 315 x 48 mm
- **Weight:**
  1,200 g
- **Colour:**
  Dark grey casing with red jaws
- **Output:**
  2 Safety sockets (4 mm)

## SAFETY SPECIFICATIONS

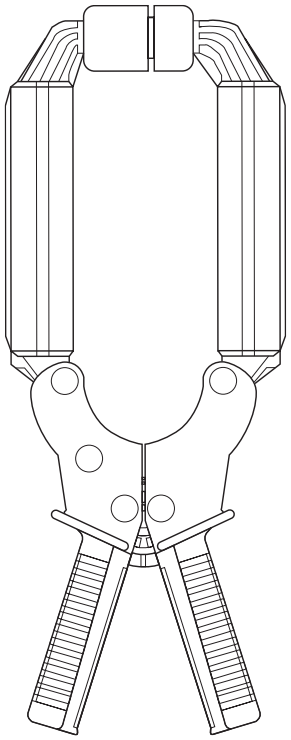
- **Electrical safety:**
  Double insulation or reinforced insulation between the primary and the secondary circuits and the outside casing in accordance with IEC 1010-2-032.
  - 600 V category III, pollution degree 2
  - 300 V category IV, pollution degree 2
- **Electromagnetic compatibility (EMC):**
  EN 50081-1: class B
  EN 50082-2:
  - Electrical discharge: IEC 1000-4-2
  - Radiated field: IEC 1000-4-3
  - Fast transients: IEC 1000-4-4
  - Magnetic field at 50/60 Hz: IEC 1000-4-8

(1) Conditions of reference: 23 °C ± 5 °K, 20 % to 75 % RH, 48 Hz to 65 Hz, external magnetic field < 40 A/m, no DC component, no current-carrying conductor nearby, centred test sample.

| To order | Reference |
|---|---|
| AC current clamp model **D31N** with operating manual | P01120050A |

# Current clamp for AC current
# Model D32N

| Current | 1,000 A AC | 2,000 A AC | 2,400 A AC |
|---|---|---|---|
| Ratio | 1000:1 | 2000:1 | 3000:1 |
| Output | 1 mA/A | 0.5 mA/A | 0.333 mA/A |



## ELECTRICAL SPECIFICATIONS

- **Current range:**
  1 A AC .. 1,000 A AC
  1 A AC .. 2,000 A AC
  1 A AC .. 2,400 A AC
- **Current transformation ratio:**
  1000:1, 2000:1, 3000:1
- **Output signal:**
  1 mA/A AC (1 A to 1,000 A)
  0.5 mA/A AC (1 A to 2,000 A)
  0.333 mA/A AC (1 A to 3,000 A)
- **Accuracy and phase shift** (1)**:**

▪ 1,000 A calibre

| Primary current | 50 A | 200 A | 1,000 A |
|---|---|---|---|
| % Accuracy of output signal | 3 % | 1.5 % | 1 % |
| Phase shift | 3° | 1.5° | 1° |

- Load impedance: 2.5 Ω
- Overload: 1,400 A for 10 minutes
- Ampere second product: 25 A.s
- Accuracy: in accordance with IEC 185-26-27, 2.5 VA, class 1 from 48 Hz to 1,000 Hz

▪ 2,000 A calibre

| Primary current | 100 A | 400 A | 2,000 A |
|---|---|---|---|
| % Accuracy of output signal | 1.5 % | 0.75 % | 0.5 % |
| Phase shift | 1.5° | 0.75 ° | 0.5 ° |

- Load impedance: 5 Ω
- Overload: 2,400 A for 10 minutes
- Ampere second product: 60 A.s
- Accuracy: in accordance with IEC 185-26-27, 5 VA, class 0.5 from 48 Hz to 1,000 Hz

▪ 3,000 A calibre

| Primary current | 150 A | 600 A | 3,000 A |
|---|---|---|---|
| % Accuracy of output signal | 1.5 % | 0.75 % | 0.5 % |
| Phase shift | 1.5° | 0.75 ° | 0.5 ° |

- Load impedance: 10 Ω
- Overload: 3,400 A for 10 minutes
- Ampere second product: 90 A.s
- Accuracy: in accordance with IEC 185-26-27, 10 VA class 0.5 from 48 Hz to 1,000 Hz

- **Bandwidth:**
  30 Hz to 1,000 Hz (in continuous use above 600 Hz the max. measurement current is limited)
- **Load impedance:**
  < 10 Ω max
- **Operating voltage:**
  600 V AC
- **Common mode voltage:**
  600 V AC
- **Maximum output voltage (secondary open):**
  Electronic protection circuit limiting voltage to 42 V peak max
- **Influence of adjacent conductor:**
  0.005 A/A AC
- **Influence of conductor position in jaws:**
  1.5 % ± 0.2 A on the 1000:1 ratio
  1 % ± 0.2 A on the 2000:1 ratio
  1 % ± 0.2 A on the 3000:1 ratio

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  -10 °C to +50 °C
- **Storage temperature:**
  -25 °C to +80 °C
- **Influence of temperature:**
  < 0.1 % per 10 °K
- **Max. jaw opening:**
  90 mm
- **Max. jaw insertion capacity:**
  Cable: 64 mm
  Group of wires: 50 x 135 mm - 64 x 100 mm
- **Casing protection rating:**
  IP20 in accordance with IEC 529
- **Drop test:**
  500 mm (IEC 68-2-32)
- **Shock resistance:**
  100 g, in accordance with IEC 68-2-27
- **Vibration resistance:**
  10/55/10 Hz, 0.15 mm
  test in accordance with IEC 68-2-6
- **Self-extinguishing capability:**
  Casing: UL94 V0
  Jaws: UL94 V2
- **Dimensions:**
  120 x 315 x 48 mm
- **Weight:**
  1,200 g
- **Colour:**
  Dark grey casing with red jaws
- **Output:**
  2 Safety sockets (4 mm)

## SAFETY SPECIFICATIONS

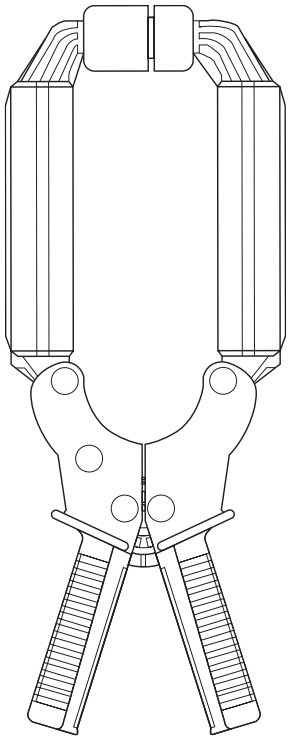
- **Electrical safety:**
  Double insulation or reinforced insulation between the primary and the secondary circuits and the outside casing in accordance with IEC 1010-2-032.
  - 600 V category III, pollution degree 2
  - 300 V category IV, pollution degree 2
- **Electromagnetic compatibility (EMC):**
  EN 50081-1: class B
  EN 50082-2:
  - Electrical discharge: IEC 1000-4-2
  - Radiated field: IEC 1000-4-3
  - Fast transients: IEC 1000-4-4
  - Magnetic field at 50/60 Hz: IEC 1000-4-8

(1) Conditions of reference: 23 °C ± 5 °K, 20 % to 75 % RH, 48 Hz to 65 Hz, external magnetic field < 40 A/m, no DC component, no current-carrying conductor nearby, centred test sample.

| To order | Reference |
|---|---|
| AC current clamp model **D32N** with operating manual | P01120051A |

# Current clamp for AC current
# Model D33N

| | |
|---|---|
| **Current** | 2,400 A AC |
| **Ratio** | 3000:5 |
| **Output** | 1.666 mA / A |



## ELECTRICAL SPECIFICATIONS

- **Current range:**
  1 A AC .. 2,400 A AC
  (3,000 A for temperature < 35 °C)
- **Current transformation ratio:**
  3000:5
- **Output signal:**
  1.666 mA / A AC (5 A for 3,000 A)
- **Accuracy and phase shift** (1):

| Primary current | 150 A | 600 A | 3,000 A |
|---|---|---|---|
| Accuracy in % of output signal | 3 % | 1.5 % | 1 % |
| Phase shift | 3° | 1.5° | 1° |

- **Overload:**
  3600 A for 10 minutes
- **Accuracy:**
  In accordance with IEC 185-26-27, 5 VA class 1 from 48 Hz to 1,000 Hz
- **Bandwidth:**
  30 Hz to 5 kHz (in continuous use above 1 kHz, the max. measurement current is limited)
- **Ampere second product:**
  90 A.s
- **Load impedance:**
  < 1 Ω
- **Operating voltage:**
  600 V AC
- **Common mode voltage:**
  600 V AC
- **Influence of adjacent conductor:**
  0.005 A / A AC
- **Influence of conductor position in jaws:**
  1 % ± 0.1 A

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  -10 °C to +50 °C
- **Storage temperature:**
  -25 °C to +80 °C
- **Influence of temperature:**
  < 0.1 % per 10 °K
- **Max. jaw opening:**
  90 mm
- **Max. jaw insertion capacity:**
  Cable: 64 mm
  Group of wires: 50 x 135 mm - 64 x 100 mm
- **Casing protection rating:**
  IP20 in accordance with IEC 529
- **Drop test:**
  500 mm (IEC 68-2-32)
- **Shock resistance:**
  100 g, in accordance with IEC 68-2-27
- **Vibration resistance:**
  10 / 55 / 10 Hz, 0.15 mm
  test in accordance with IEC 68-2-6
- **Self-extinguishing capability:**
  Casing: UL94 V0
  Jaws: UL94 V2
- **Dimensions:**
  120 x 315 x 48 mm
- **Weight:** 1,200 g
- **Colour:**
  Dark grey casing with red jaws
- **Output:**
  2 Safety sockets (4 mm)

## SAFETY SPECIFICATIONS

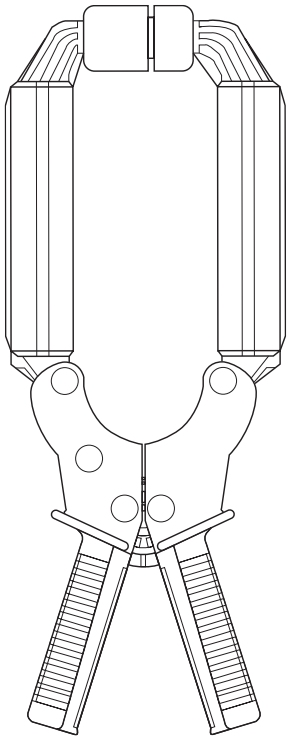
- **Electrical safety:**
  Double insulation or reinforced insulation between the primary and the secondary circuits and the outside casing in accordance with IEC 1010-2-032.
  - 600 V category III, pollution degree 2
  - 300 V category IV, pollution degree 2
- **Electromagnetic compatibility (EMC):**
  EN 50081-1: class B
  EN 50082-2:
  - Electrical discharge: IEC 1000-4-2
  - Radiated field: IEC 1000-4-3
  - Fast transients: IEC 1000-4-4
  - Magnetic field at 50/60 Hz: IEC 1000-4-8

(1) Conditions of reference: 23 °C ± 5 °K, 20 % to 75 % RH, 48 Hz to 65 Hz, external magnetic field < 40 A/m, no DC component, no current-carrying conductor nearby, centred test sample, load impedance 0.2 Ω.

| To order | Reference |
|---|---|
| AC current clamp model **D33N** with operating manual | P01120052A |

# Current clamp for AC current
# Model D34N

| | | | |
|---|---|---|---|
| **Current** | 500 A AC | 1,000 A AC | 1,500 A AC |
| **Ratio** | 500:5 | 1000:5 | 1500:5 |
| **Output** | 10 mA/A | 5 mA/A | 3.33 mA/A |



## ELECTRICAL SPECIFICATIONS

- **Current range:**
  1 A AC .. 500 A AC
  1 A AC .. 1,000 A AC
  1 A AC .. 1,500 A AC
- **Current transformation ratio:**
  500:5, 1000:5, 1500:5
- **Output signal:**
  10 mA/A AC (5 A for 500 A)
  5 mA/A AC (5 A for 1,000 A)
  3.33 mA/A AC (5 A for 1,500 A)
- **Accuracy and phase shift** (1):

▪ 500 A calibre

| Primary current | 25 A | 100 A | 500 A |
|---|---|---|---|
| Accuracy in % of output signal | 5 % | 3 % | 3 % |
| Phase shift | 6° | 4° | 4° |

- Load impedance: 0.2 Ω
- Overload: 700 A for 10 minutes
- Ampere second product: 3.5 A.s
- Accuracy: in accordance with IEC 185-26-27, 5 VA class 3 from 48 Hz to 1,000 Hz

▪ 1,000 A calibre

| Primary current | 50 A | 200 A | 1,000 A |
|---|---|---|---|
| Accuracy in % of output signal | 3 % | 1.5 % | 1 % |
| Phase shift | 3° | 1.5° | 1° |

- Load impedance: 0.1 Ω
- Overload: 1,400 A for 10 minutes
- Ampere second product: 18 A.s
- Accuracy: in accordance with IEC 185-26-27, 2.5 VA class 1 from 48 Hz to 1,000 Hz

▪ 1,500 A calibre

| Primary current | 75 A | 300 A | 1,500 A |
|---|---|---|---|
| Accuracy in % of output signal | 1.5 % | 0.75 % | 0.5 % |
| Phase shift | 1.5° | 0.75 ° | 0.5 ° |

- Load impedance: 0.1 Ω
- Overload: 1800 A for 10 minutes
- Ampere second product: 40 A.s
- Accuracy: in accordance with IEC 185-26-27, 2.5 VA class 0.5 from 48 Hz to 1,000 Hz

- **Bandwidth:**
  30 Hz to 1,500 Hz (in continuous use above 1.5 kHz the max. measurement current is limited)
- **Load impedance:**
  < 1 Ω max
- **Operating voltage:**
  600 V AC
- **Common mode voltage:**
  600 V AC
- **Maximum output voltage (secondary open):**
  Electronic protection limiting the voltage to 42 V peak max.
- **Influence of adjacent conductor:**
  0.005 A/A AC
- **Influence of conductor position in jaws:**
  1.5 % ± 0.2 A on the 500:5 ratio
  1 % ± 0.2 A on the 1000:5 ratio
  1 % ± 0.2 A on the 1500:5 ratio

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  -10 °C to +50 °C
- **Storage temperature:**
  -25 °C to +80 °C
- **Influence of temperature:**
  < 0.1 % per 10 °K
- **Max. jaw opening:**
  90 mm
- **Max. jaw insertion capacity:**
  Cable: 64 mm
  Group of wires: 50 x 135 mm - 64 x 100 mm
- **Casing protection rating:**
  IP20 in accordance with IEC 529
- **Drop test:**
  500 mm (IEC 68-2-32)
- **Shock resistance:**
  100 g, in accordance with IEC 68-2-27
- **Vibration resistance:**
  10/55/10 Hz, 0.15 mm
  test in accordance with IEC 68-2-6
- **Self-extinguishing capability:**
  Casing: UL94 V0
  Jaws: UL94 V2

- **Dimensions:**
  120 x 315 x 48 mm
- **Weight:**
  1,200 g
- **Colour:**
  Dark grey casing with red jaws
- **Output:**
  2 Safety sockets (4 mm)

## SAFETY SPECIFICATIONS

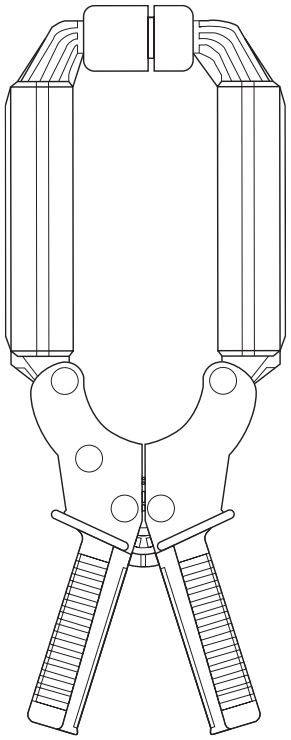
- **Electrical safety:**
  Double insulation or reinforced insulation between the primary and the secondary circuits and the outside casing in accordance with IEC 1010-2-032.
  - 600 V category III, pollution degree 2
  - 300 V category IV, pollution degree 2
- **Electromagnetic compatibility (EMC):**
  EN 50081-1: class B
  EN 50082-2:
  - Electrical discharge: IEC 1000-4-2
  - Radiated field: IEC 1000-4-3
  - Fast transients: IEC 1000-4-4
  - Magnetic field at 50/60 Hz: IEC 1000-4-8

(1) Conditions of reference: 23 °C ± 5 °K, 20 % to 75 % RH, 48 Hz to 65 Hz, external magnetic field < 40 A/m, no DC component, no current-carrying conductor nearby, centred test sample.

| To order | Reference |
|---|---|
| AC current clamp model **D34N** with operating manual | P01120053A |

# Current clamp for AC current
# Model D35N

| Current | 1,000 A AC | 2,000 A AC | 2,400 A AC |
|---|---|---|---|
| Ratio | 1000:5 | 2000:5 | 3000:5 |
| Output | 5 mA/A | 2.5 mA/A | 1.666 mA/A |



## ELECTRICAL SPECIFICATIONS

- **Current range:**
  1 A AC .. 1,000 A AC
  1 A AC .. 2,000 A AC
  1 A AC .. 2,400 A AC
  (3,000 A for temperature < 35 °C)
- **Current transformation ratio:**
  1000:5, 2000:5, 3000:5
- **Output signal:**
  5 mA/A AC (5 A for 1,000 A)
  2.5 mA/A AC (5 A for 2,000 A)
  1.666 mA/A AC (5 A for 3,000 A)
- **Accuracy and phase shift** (1):

▪ 1,000 A calibre

| Primary current | 50 A | 200 A | 1,000 A |
|---|---|---|---|
| % Accuracy of output signal | 3 % | 1.5 % | 1 % |
| Phase shift | 3° | 1.5° | 1° |

- Load impedance: 0.1 Ω
- Overload: 1,200 A for 10 minutes
- Ampere second product: 15 A.s
- Accuracy: in accordance with IEC 185-26-27, 2.5 VA, class 1 from 48 Hz to 1,000 Hz

▪ 2,000 A calibre

| Primary current | 100 A | 400 A | 2,000 A |
|---|---|---|---|
| % Accuracy of output signal | 1.5 % | 0.75 % | 0.5 % |
| Phase shift | 1.5° | 0.75 ° | 0.5 ° |

- Load impedance: 0.2 Ω
- Overload: 2,400 A for 10 minutes
- Ampere second product: 50 A.s
- Accuracy: in accordance with IEC 185-26-27, 5 VA, class 0.5 from 48 Hz to 1,000 Hz

▪ 3,000 A calibre

| Primary current | 150 A | 600 A | 3,000 A |
|---|---|---|---|
| % Accuracy of output signal | 1.5 % | 0.75 % | 0.5 % |
| Phase shift | 1.5° | 0.75 ° | 0.5 ° |

- Load impedance: 0.4 Ω
- Overload: 2,400 A for 10 minutes
- Ampere second product: 80 A.s
- Accuracy: in accordance with IEC 185-26-27, 10 VA class 0.5 from 48 Hz to 1,000 Hz

- **Bandwidth:**
  30 Hz to 1,500 Hz (in continuous use above 1.5 kHz, the max. measurement current is limited)
- **Load impedance:**
  < 2 Ω max
- **Operating voltage:**
  600 V AC
- **Common mode voltage:**
  600 V AC
- **Influence of adjacent conductor:**
  0.005 A/A AC
- **Influence of conductor position in jaws:**
  1.5 % ± 0.2 A on the 1000:5 ratio
  1 % ± 0.2 A on the 2000:5 ratio
  1 % ± 0.2 A on the 3000:5 ratio

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  -10 °C to +50 °C
- **Storage temperature:**
  -25 °C to +80 °C
- **Influence of temperature:**
  < 0.1 % per 10 °K
- **Max. jaw opening:**
  90 mm
- **Max. jaw insertion capacity:**
  Cable: 64 mm
  Group of wires: 50 x 135 mm - 64 x 100 mm
- **Casing protection rating:**
  IP20 in accordance with IEC 529
- **Drop test:**
  500 mm (IEC 68-2-32)
- **Shock resistance:**
  100 g, in accordance with IEC 68-2-27
- **Vibration resistance:**
  10/55/10 Hz, 0.15 mm
  test in accordance with IEC 68-2-6
- **Self-extinguishing capability:**
  Casing: UL94 V0
  Jaws: UL94 V2
- **Dimensions:**
  120 x 315 x 48 mm
- **Weight:**
  1,200 g

- **Colour:**
  Dark grey casing with red jaws
- **Output:**
  Safety sockets (4 mm)

## SAFETY SPECIFICATIONS

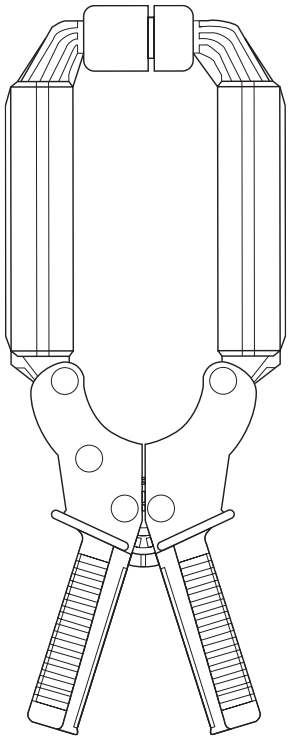
- **Electrical safety:**
  Double insulation or reinforced insulation between the primary and the secondary circuits and the outside casing in accordance with IEC 1010-2-032.
  - 600 V category III, pollution degree 2
  - 300 V category IV, pollution degree 2
- **Electromagnetic compatibility (EMC):**
  EN 50081-1: class B
  EN 50082-2:
  - Electrical discharge: IEC 1000-4-2
  - Radiated field: IEC 1000-4-3
  - Fast transients: IEC 1000-4-4
  - Magnetic field at 50/60 Hz: IEC 1000-4-8

(1) Conditions of reference: 23 °C ± 5 °K, 20 % to 75 % RH, 48 Hz to 65 Hz, external magnetic field < 40 A/m, no DC component, no current-carrying conductor nearby, centred test sample.

| To order | Reference |
|---|---|
| AC current clamp model **D35N** with operating manual | P01120054A |

# Current clamp for AC current
# Model D36N

| | |
|---|---|
| **Current** | 3,000 A AC |
| **Ratio** | 3000:3 |
| **Output** | 1 mA/A |



## ELECTRICAL SPECIFICATIONS

- **Current range:**
  1 A AC .. 2,400 A AC
- **Current transformation ratio:**
  3000:3
- **Output signal:**
  1 mA/A AC (3 A for 3,000 A)
- **Accuracy and phase shift (1):**

| Primary current | 150 A | 600 A | 3,000 A |
|---|---|---|---|
| % Accuracy of output signal | 0.5 % | 0.75 % | 0.5 % |
| Phase shift | 1.5° | 0.75 ° | 0.5 ° |

- **Accuracy:**
  In accordance with IEC 185-26-27, 5 VA, class 0.5 from 48 Hz to 1,000 Hz
- **Bandwidth:**
  30 Hz to 5 kHz
  (beyond 400 Hz the output is limited in inverse proportion to the frequency)
- **Overload:**
  3600 A for 5 minutes
- **Maximum output voltage (secondary open):**
  Electronic protection circuit limiting voltage to 42 V peak max
- **Load impedance:**
  < 0.6 Ω
- **Operating voltage:**
  600 V AC
- **Common mode voltage:**
  600 V AC
- **Influence of adjacent conductor:**
  0.005 A/A AC
- **Influence of conductor position in jaws:**
  1 % ± 0.1 A

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  -10 °C to +50 °C
- **Storage temperature:**
  -25 °C to +80 °C
- **Influence of temperature:**
  < 0.1 % per 10 °K
- **Max. jaw opening:**
  90 mm
- **Max. jaw insertion capacity:**
  Cable: 64 mm
  Group of wires: 50 x 135 mm - 64 x 100 mm
- **Casing protection rating:**
  IP20 in accordance with IEC 529
- **Drop test:**
  500 mm (IEC 68-2-32)
- **Shock resistance:**
  100 g, in accordance with IEC 68-2-27
- **Vibration resistance:**
  10/55/10 Hz, 0.15 mm
  test in accordance with IEC 68-2-6
- **Self-extinguishing capability:**
  Casing: UL94 V0
  Jaws: UL94 V2
- **Dimensions:**
  120 x 315 x 48 mm
- **Weight:**
  1,200 g
- **Colour:**
  Dark grey casing with red jaws
- **Output:**
  Safety jacks (4 mm)

## SAFETY SPECIFICATIONS

- **Electrical safety:**
  Double insulation or reinforced insulation between the primary and the secondary circuits and the outside casing in accordance with IEC 1010-2-032.
  - 600 V category III, pollution degree 2
  - 300 V category IV, pollution degree 2
- **Electromagnetic compatibility (EMC):**
  EN 50081-1: class B
  EN 50082-2:
  - Electrical discharge: IEC 1000-4-2
  - Radiated field: IEC 1000-4-3
  - Fast transients: IEC 1000-4-4
  - Magnetic field at 50/60 Hz: IEC 1000-4-8

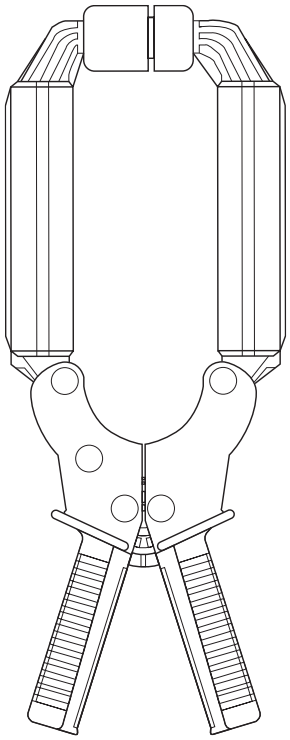
(1) Conditions of reference: 23 °C ± 5 °K, 20 % to 75 % RH, 48 Hz to 65 Hz, external magnetic field < 40 A/m, no DC component, no current-carrying conductor nearby, centred test sample, load impedance 0.55 Ω.

| To order | Reference |
|---|---|
| AC current clamp model **D36N** with operating manual | P01120055A |

# Current clamp for AC current
# Model D37N



| Current | 30 A AC | 300 A AC | 3,000 A AC |
|---|---|---|---|
| Output | 100 mV / A | 10 mV / A | 1 mV / A |



## ELECTRICAL SPECIFICATIONS

- **Current range:**
  10 mA .. 30 A AC
  1 A AC .. 300 A AC
  1 A AC .. 2,000 A AC
  (2,800 A for temperature < 35 °C)
- **Output signal:**
  100 mV / A AC (3 V for 30 A) 90 A peak
  10 mV / A AC (3 V for 300 A) 900 A peak
  1.666 mV / A AC (3 V for 3,000 A) 9,000 A peak
- **Accuracy and phase shift** (1):
  - 30 A calibre

| Primary current | 1.5 A | 6 A | 30 A |
|---|---|---|---|
| % Accuracy of output signal | 2 % ± 10 mV | | |
| Phase shift | 15 ° | 7° | 5 ° |

  - 300 A calibre

| Primary current | 15 A | 60 A | 300 A |
|---|---|---|---|
| % Accuracy of output signal | 2 % ± 2 mV | | |
| Phase shift | 3° | 1.5° | 1° |

  - 3,000 A calibre

| Primary current | 150 A | 600 A | 3,000 A |
|---|---|---|---|
| % Accuracy of output signal | 2 % ± 0.5 mV | | |
| Phase shift | 1.5° | 1° | 0.5 ° |

- **Overload:**
  3,200 A for 5 minutes
- **Ampere second product:**
  100 A.s
- **dV / dt:**
  100 mV AC / A AC: dV / dt = 400 mV / µs
  10 mV AC / A AC: dV / dt = 50 mV / µs
  1 mV AC / A AC: dV / dt = 5 mV / µs
- **Bandwidth:**
  30 Hz to 5 kHz (on the 3,000 A range the max. measurement current is limited above 200 Hz)
- **Load impedance:**
  ≥ 1 MΩ
- **Operating voltage:**
  600 V AC
- **Common mode voltage:**
  600 V AC
- **Influence of adjacent conductor:**
  0.005 A / A AC
- **Influence of conductor position in jaws:**
  1.5 % of the reading
- **Influence of frequency:**
  of 30 Hz to 5 kHz: ± 6 % on all calibres
- **Influence of DC current:**
  0.04 % per A DC

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  -10 °C to +50 °C
- **Storage temperature:**
  -25 °C to +80 °C
- **Influence of temperature:**
  < 0.1 % per 10 °K
- **Max. jaw opening:**
  90 mm
- **Max. jaw insertion capacity:**
  Cable: 64 mm
  Group of wires: 50 x 135 mm - 64 x 100 mm
- **Casing protection rating:**
  IP20 in accordance with IEC 529
- **Drop test:**
  500 mm (IEC 68-2-32)
- **Shock resistance:**
  100 g, in accordance with IEC 68-2-27
- **Vibration resistance:**
  10 / 55 / 10 Hz, 0.15 mm
  test in accordance with IEC 68-2-6
- **Self-extinguishing capability:**
  Casing: UL94 V0
  Jaws: UL94 V2
- **Dimensions:**
  120 x 315 x 48 mm
- **Weight:**
  1,200 g
- **Colour:**
  Dark grey casing with red jaws
- **Output:**
  Safety jacks (4 mm)

## SAFETY SPECIFICATIONS

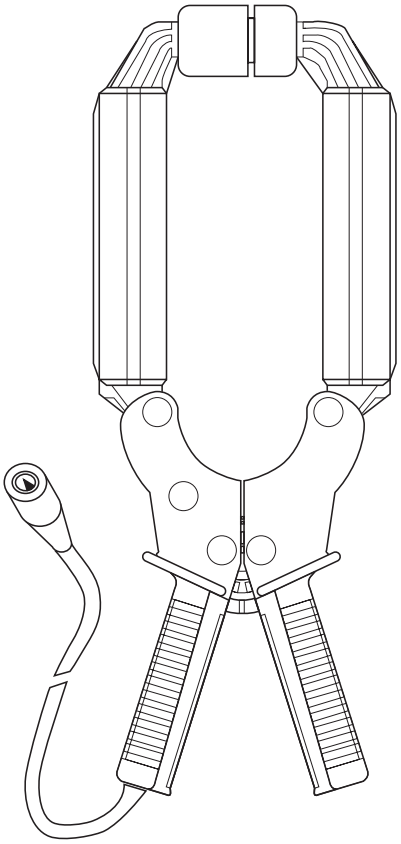
- **Electrical safety:**
  Double insulation or reinforced insulation between the primary and the secondary circuits and the outside casing in accordance with IEC 1010-2-032.
  - 600 V category III, pollution degree 2
  - 300 V category IV, pollution degree 2
- **Electromagnetic compatibility (EMC):**
  EN 50081-1: class B
  EN 50082-2:
  - Electrical discharge: IEC 1000-4-2
  - Radiated field: IEC 1000-4-3
  - Fast transients: IEC 1000-4-4
  - Magnetic field at 50/60 Hz: IEC 1000-4-8

(1) Conditions of reference: 23 °C ± 5 °K, 20 % to 75 % RH, 48 Hz to 65 Hz, external magnetic field < 40 A/m, no DC component, no current-carrying conductor nearby, centred test sample.

| To order | Reference |
|---|---|
| AC current clamp model **D37N** with operating manual | P01120056A |

# Oscilloscope clamp for AC current
## Model D38N (insulated AC current probe)

| Current | 90 A peak | 900 A peak | 9,000 A peak |
|---|---|---|---|
| Output | 10 mV/A | 1 mV/A | 0.1 mV/A |



## DESCRIPTION

The D38N offers accurate AC current measurement and a voltage output in mV allowing direct readings on oscilloscopes. A switch with 3 positions on the handle can be used to select the ranges. The wide opening of the jaws means they can be used on cables and small busbars.

## ELECTRICAL SPECIFICATIONS

- **Current calibres:**
  1 A AC .. 30 A AC (90 A peak)
  1 A AC .. 300 A AC (900 A peak)
  1 A AC .. 2,400 A AC (9,000 A peak)
  (3,000 A for temperature < 35 °C)
- **Output signal:**
  10 mV/A AC (3 V for 30 A)
  1 mV/A AC (3 V for 300 A)
  0.1 mV/A AC (3 V for 3,000 A)
- **Accuracy and phase shift (1):**
  - 30 A calibre

| Primary current | 1.5 A | 6 A | 30 A | 36 A |
|---|---|---|---|---|
| % Accuracy of output signal | 2 % ± 1 mV | | | |
| Phase shift | ≤ 20° | ≤ 10° | ≤ 5° | ≤ 5° |

  - 300 A calibre

| Primary current | 15 A | 60 A | 300 A | 360 A |
|---|---|---|---|---|
| % Accuracy of output signal | 2 % ± 0.5 mV | | | |
| Phase shift | ≤ 3° | ≤ 1.5° | ≤ 1° | ≤ 1° |

  - 3,000 A calibre

| Primary current | 150 A | 600 A | 3,000 A | 3600 A |
|---|---|---|---|---|
| % Accuracy of output signal | 2 % ± 0.2 mV | | | |
| Phase shift | ≤ 3° | ≤ 1.5° | ≤ 1° | ≤ 1° |

- **Bandwidth:**
  10 Hz to 50 kHz (depending on current)
- **Rise/fall time from 10 % to 90 %:**
  4 µs
- **10 % delay time:**
  0.3 µs
- **Ampere second product:**
  30 A calibre: 30 A.s
  300 A calibre: 125 A.s
  3,000 A calibre: 180 A.s
- **Insertion impedance (at 400 Hz / 10 kHz):**
  30 A calibre: < 0.1 mΩ / < 1 mΩ
  300 A calibre: < 0.1 mΩ / < 0.5 mΩ
  3,000 A calibre: < 0.1 mΩ / < 0.4 mΩ
- **Maximum currents:**
  I < 2,400 A permanent
  2,400 A .. 2,800 A for 10 minutes and then 30 minutes shutdown
  2,800 A .. 4,000 A for 5 minutes and then 30 minutes shutdown
- **Output impedance:**
  30 A calibre: ≤ 130 Ω ± 15 %
  300 A calibre: ≤ 140 Ω ± 15 %
  3,000 A calibre: ≤ 140 Ω ± 15 %
- **Influence of temperature:**
  ≤ 0.2 % of output signal par 10 K
- **Influence of adjacent conductor:**
  ≤ 5 mA/A at 50 Hz
- **Influence of DC current < 10 % of rated calibre superimposed on the rated current:**
  0.05 % / A DC
- **Influence of conductor position in jaws:**
  ≤ 1 % + 0.1 A at 50/60 Hz
- **Influence of frequency (2):**
  30 A calibre: < 1 dB from 10 Hz .. 10 kHz
  300 A calibre: < 1 dB from 10 Hz .. 10 kHz
  3,000 A calibre: < 1 dB from 10 Hz .. 10 kHz

## MECHANICAL SPECIFICATIONS

- **Max. jaw opening:**
  90 mm
- **Clamping capacity:**
  Cable: Ø max 64 mm
  Busbars:
  5 busbars from 125 x 5 mm
  3 busbars from 100 x 10 mm
  (busbars spaced by their thickness)
- **Output:**
  Via 2 m coaxial cable terminated by insulated BNC plug
- **Dimensions:**
  310 x 120 x 48 mm
- **Weight:**
  1,200 g
- **Operating temperature:**
  -10 °C to +50 °C
- **Storage temperature:**
  -25 °C to +80 °C
- **Relative humidity for operation:**
  0 to 85 % RH with a linear decrease above 35 °C
- **Operating altitude:**
  0 to 2,000 m
- **Casing protection rating:**
  IP 20 (IEC 529)
- **Drop test:**
  0.5 m (IEC 68-2-32)
- **Shock resistance:**
  100 g / 6 ms / half-periode (IEC 68-2-27)
- **Protection against impacts:**
  IK04 0.5 J (EN 50102)
- **Vibration resistance:**
  10/55/10 Hz, 0.15 mm (IEC 68-2-6)
- **Self-extinguishing capability:**
  Handles: UL94 V0
  Jaws: UL94 V2
- **Colours:**
  Dark grey handles with red jaws

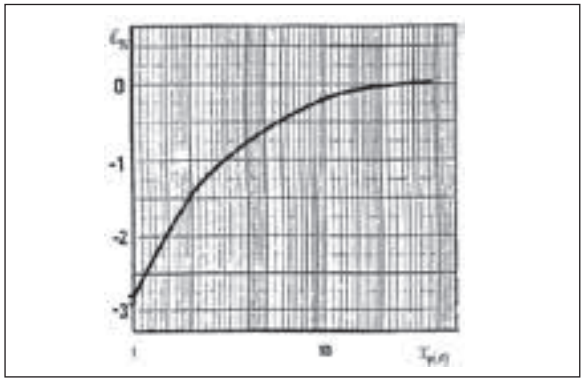
## SAFETY SPECIFICATIONS

- **Electrical safety:**
  Instrument with double insulation or reinforced insulation between the primary the secondary and the grippable part located under the guard as per IEC 1010-1 & IEC 1010-2-032
  - 600 V category III, pollution degree 2
  - 300 V category IV, pollution degree 2

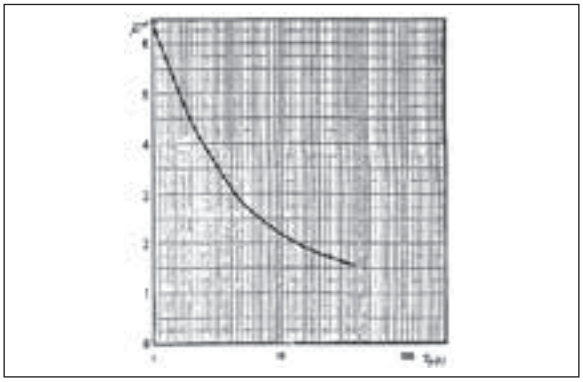
## CURVES AT 50 Hz

30 A calibre

Error on measurement

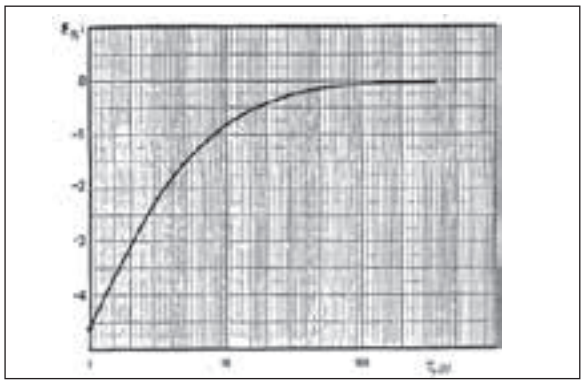


Phase shift

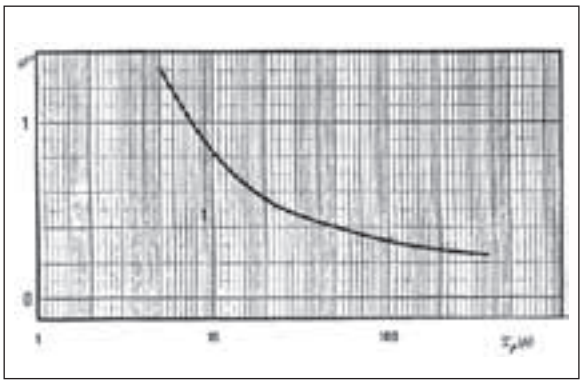


300 A calibre

Error on measurement

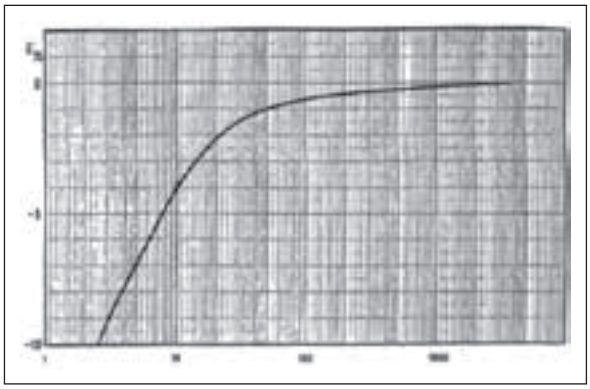


Phase shift

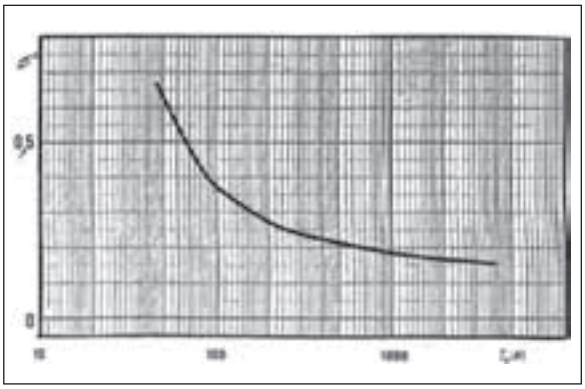


3,000 A calibre

Error on measurement



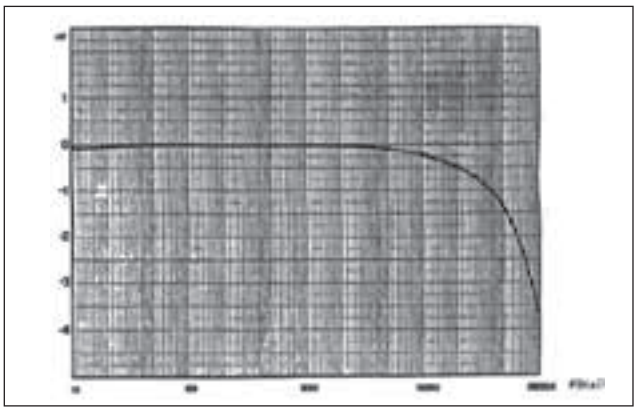
Phase shift

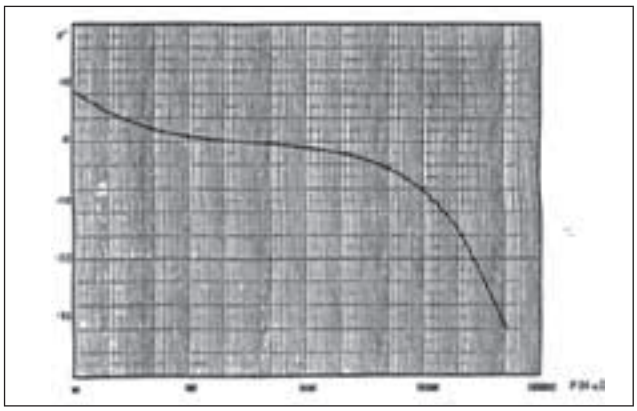


## FREQUENCY RESPONSE

30 A calibre

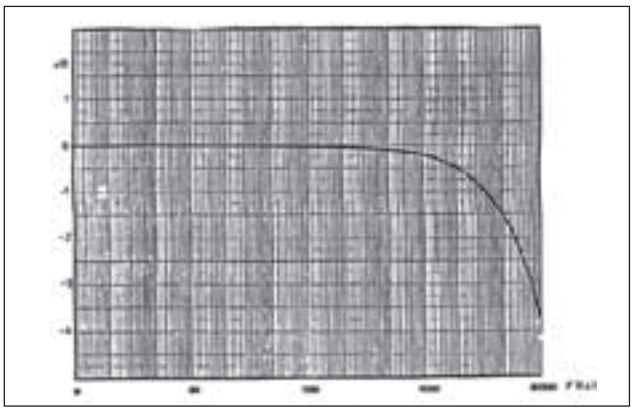
I = 10 A

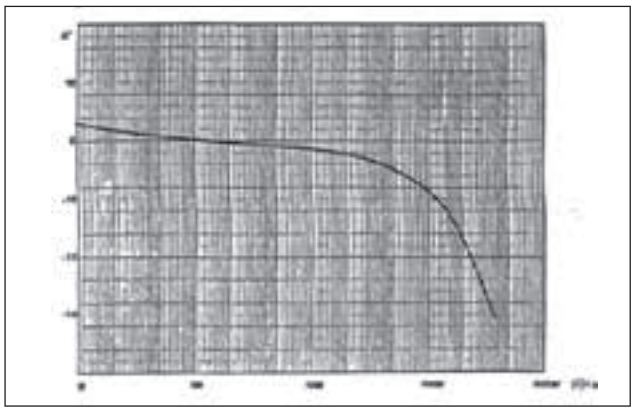




300 A calibre

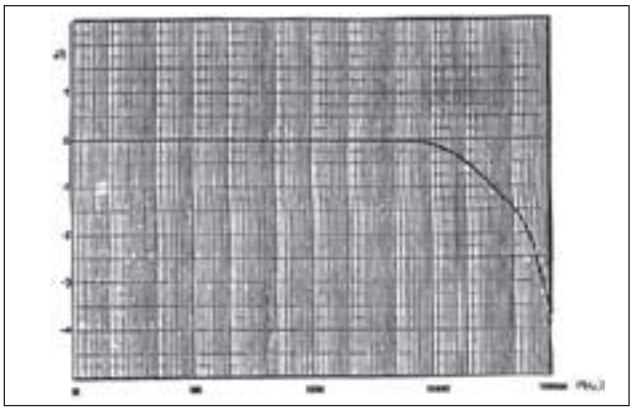
I = 10 A

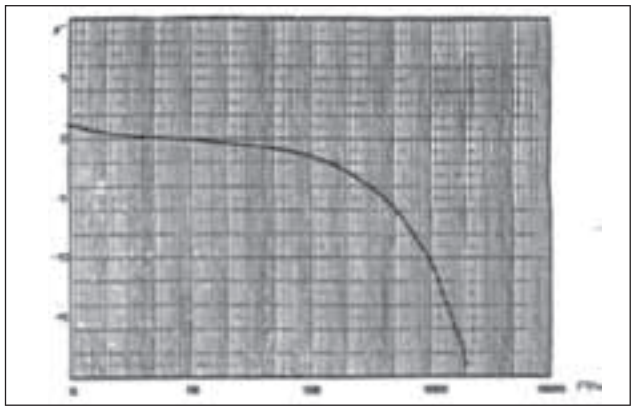




3,000 A calibre

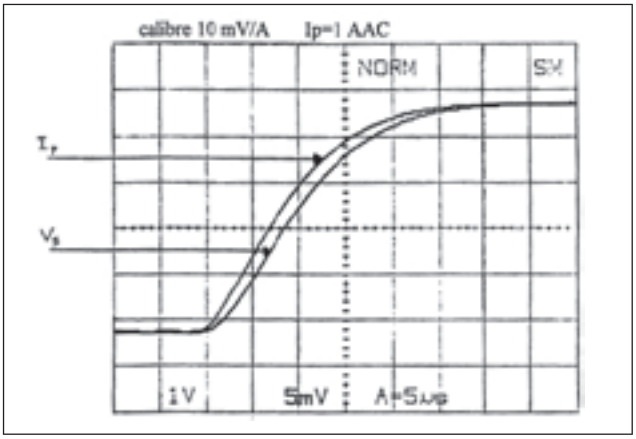
I = 100 A

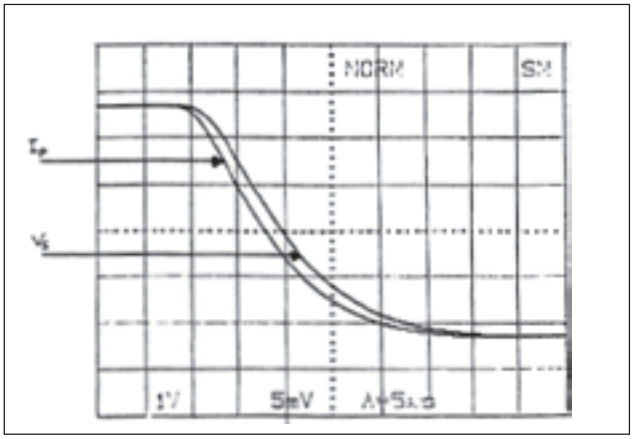




## RESPONSE TO A SQUARE SIGNAL (Ip = 1 A)

30 A calibre

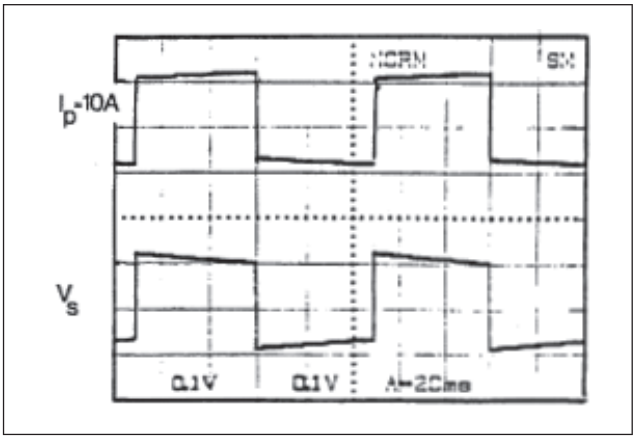


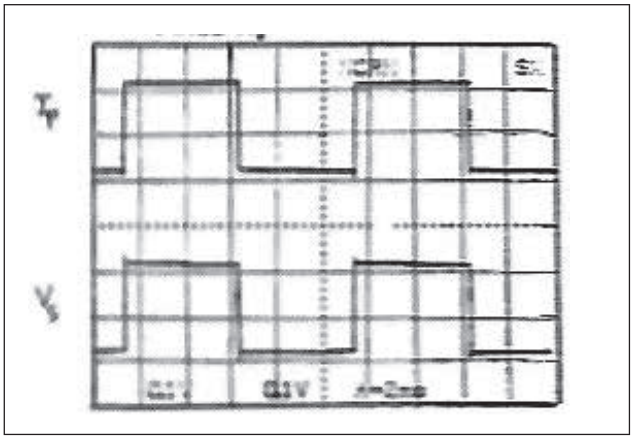

## RESPONSE TO A SQUARE SIGNAL (Ip = 10 A)

30 A calibre

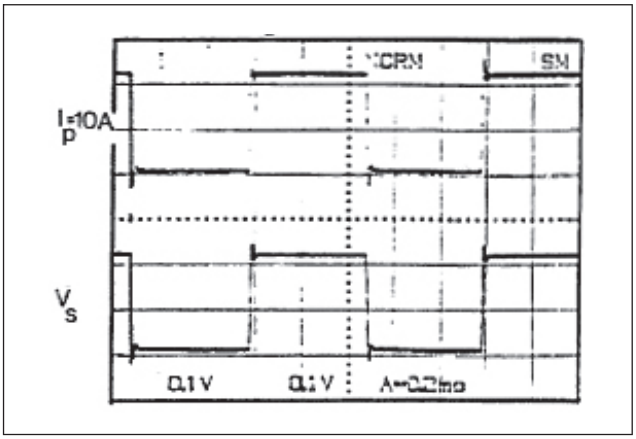
10 Hz



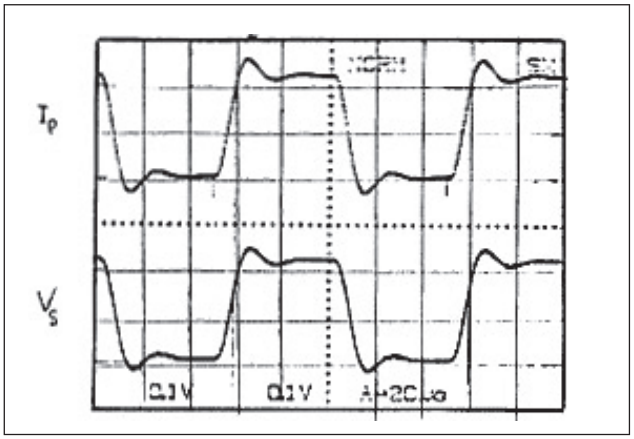

100 Hz



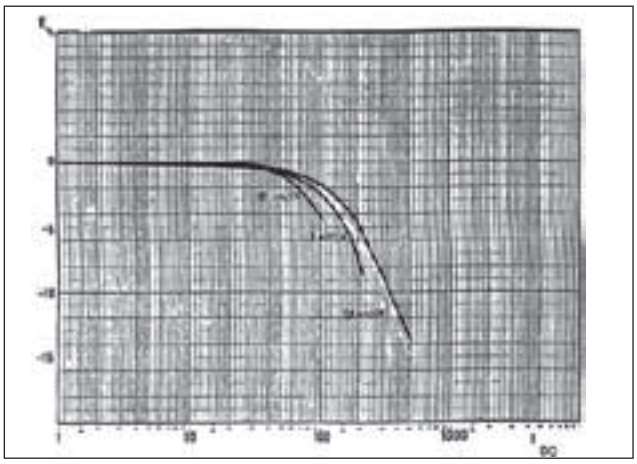

1 KHz



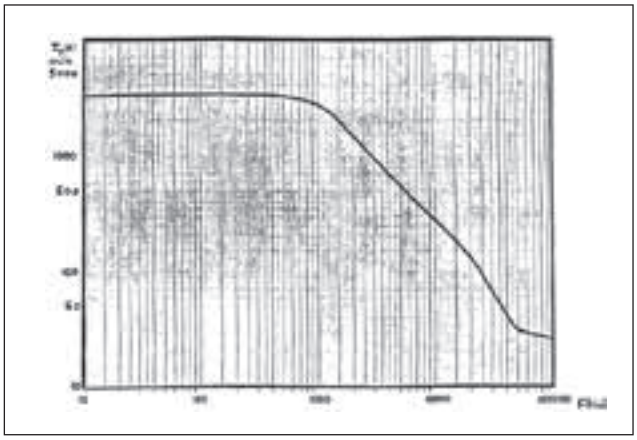

10 kHz



## INFLUENCE OF DC CURRENT SUPERIMPOSED ON THE SIGNAL



## MAXIMUM CURRENT ACCORDING TO FREQUENCY



(1) Conditions of reference: 23 °C ± 3 °K, 20 % to 75 % RH, sinusoidal signal from frequency of 48 Hz to 65 Hz, external magnetic field < 40 A/m, no DC component, no external conductor with circulating current, conductor centred for measurement, load impedance > 1 MΩ / < 47 pF.

(2) Out of reference domain.

| To order | Reference |
|---|---|
| AC current clamp model **D38N** with operating manual | P01120057A |


## B SERIES

The only model in the B series, the B102 is designed to measure earth leakage currents caused by insulation faults.

It enables the fault to be located and diagnosed before failure occurs thus avoiding installation shutdown.

It is designed specifically for locating low-current faults on high-current circuits.

The B102 measures differential or leakage current from 500 µA upwards and may be used to measure currents up to 400 A in continuous use (400 A max.).

The B102 has two measurement ranges, 1 mV/mA or 1 mV/A.

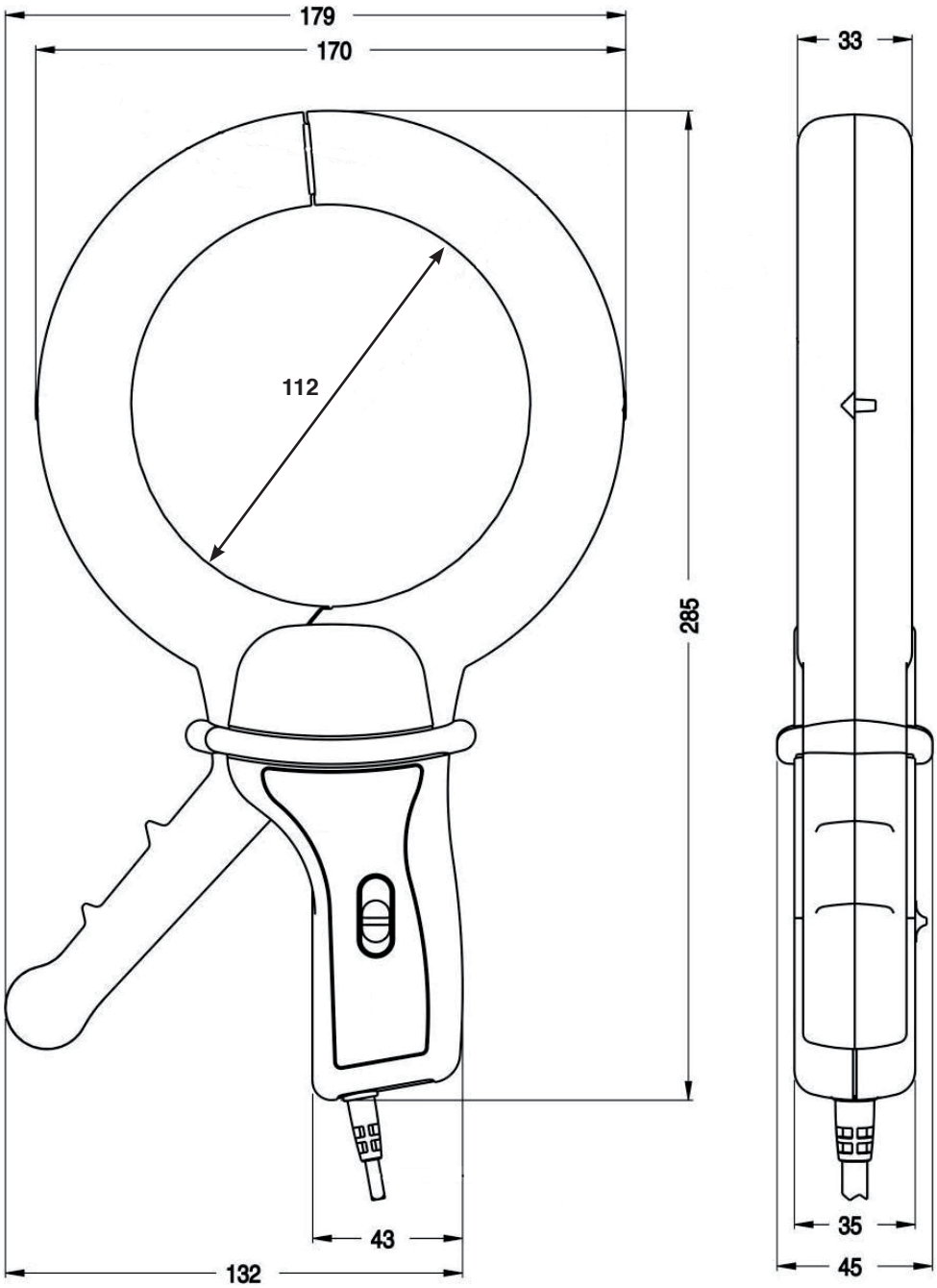
As a leakage current detector, the B102 can be used on single or multiphase systems whether the currents are in or out of phase, balanced or unbalanced.

The B02 may be used simply as a high-precision clamp-on current probe.

With its 115 mm jaw opening and dynamic measurement range from 500 µA to 400 A, the B102 is a versatile instrument, highly useful in the analysis of unbalanced circuits, leakage currents and earth loop currents.

When operated in conjunction with an artificial neutral, the B102 can also be used to measure fault currents on 3-phase circuits with no neutral.

(1) AN1 artificial neutral box (see capter 13)

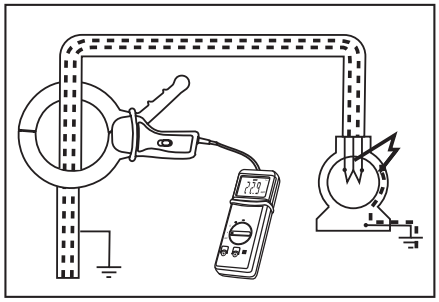

179
170
112
285
43
132
33
35
45

# Current clamp for AC current
# Model B102 (clamp for leakage currents)

| | | |
|---|---|---|
| **Current** | 4 A AC | 400 A AC |
| **Output** | 1 mV/mA | 1 mV/A |

## DESCRIPTION

The B102 clamp measures leakage currents or residual currents as low as 500 µA and can be used with multimeters equipped with a calibre in mV AC. The B102 clamp measures the currents flowing in earth loops as well as leakage currents. It can be used on live installations to detect insulation faults on the earth circuits of single and three-phase networks. For three-wire three-phase systems, use the artificial neutral box.




## ELECTRICAL SPECIFICATIONS

- **Current range:**
  0.5 mA AC .. 4 A AC
  0.5 A AC .. 400 A AC
- **Output signal:**
  1 mV AC / mA AC (4 V for 4 A)
  1 mV AC / A AC (0.4 V for 400 A)
- **Accuracy and phase shift** [1]**:**

| **Calibre** | **4 A** | | |
|---|---|---|---|
| Primary current | 0.5 mA .. 10 mA | 10 mA .. 100 mA | 100 mA .. 4 A |
| Accuracy in % of output signal | ≤ 3 % + 1 mV | ≤ 0.5 % + 0.5 mV | ≤ 0.5 % + 0.5 mV |
| Phase shift | not specified | ≤ 15° | ≤ 10° |

| **Calibre** | **400 A** | | |
|---|---|---|---|
| Primary current | 0.5 mA .. 10 mA | 10 A .. 200 A | 200 A .. 400 A |
| Accuracy in % of output signal | ≤ 0.5 % + 0.5 mV | ≤ 0.35 % + 0.5 mV | ≤ 0.35 % + 0.5 mV |
| Phase shift | not specified | ≤ 1° | ≤ 0.7° |

- **Bandwidth:**
  30 kHz ..1 kHz (depending on current value)
- **Maximum currents:**
  400 A AC continuous for a frequency ≤ 1 kHz
  Peak current < 1,000 A
- **Load impedance:**
  ≥ 10 MΩ / 100 pF
- **Max. voltage output:**
  Electronic protection circuit limiting the voltage to 6 V peak max.
- **Influence of temperature:**
  Measurement: ≤ 100 ppm/K or 0.1 % of output signal per 10 °K
- **Influence of adjacent conductor:**
  0.4 mA/A typical at 50 Hz
- **Influence of an external field:**
  for 400 A calibre/m at 50 Hz
  - 4 A calibre: ≤ 60 mA
  - 400 A calibre: ≤ 0.1 A
- **Influence of conductor position in jaws:**
  ≤ 0.1 % of the reading at 50/60 Hz (non-residual current)
  ≤ 0.2 % of the reading at 50/60 Hz (residual current)
- **Influence of DC current superimposed on rated current AC:**
  for a current DC from 1 A
  - 4 A calibre: ≤ 1 mA
  - 400 A calibre: ≤ 0.1 A
- **Influence of frequency:**
  - 4 A calibre: ≤ 2 %
  - 400 A calibre: ≤ 0.5 % from 30 Hz to 1 kHz (limited to 100 A for 1 kHz)
- **Influence of the measurement instrument's input impedance (Ze):**
  - 4 A calibre: E% = [Ze/(Ze + 4.8)-1]*100
  - 400 A calibre: E% = [Ze/(Ze + 0.0048)-1]*100

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  -10 °C to +55 °C
- **Storage temperature:**
  -40 °C to +70 °C
- **Max. jaw insertion capacity:**
  Cables: Ø 112 mm
  Busbars: 1 busbar 20 x 50 mm
- **Casing protection rating:**
  IP40 with clamp closed (NF EN 60529 Ed. 95)
  IP30 with jaws open
- **Relative humidity for operation:**
  0 to 85 % RH with a linear decrease above 35°C
- **Operating altitude:**
  0 to 2,000 m
- **Drop test:**
  1 m (NF EN 61010-2-032)
- **Self-extinguishing capability:**
  Casing: V0 according to UL94
  Jaws: V2 according to UL94
- **Dimensions:**
  285 x 175 x 43 mm
- **Weight:**
  1.3 kg approx.
- **Colours:**
  Casing: dark grey
  Jaws: red
- **Output:**
  Cable with double insulation, length 1.5 m, terminated by 2 insulated elbowed male Ø 4 mm banana plugs

## SAFETY SPECIFICATIONS

- **Electrical safety:**
  Instrument with double insulation or reinforced insulation between the primary, the secondary and the grippable part located under the guard as per EN 61010-1 Ed. 2: 2001, EN 61010-2-031 Ed. 2002 & EN 61010-2-032 Ed. 2003
  - 600 V category III, pollution degree 2
  - 300 V category IV, pollution degree 2
- **Electromagnetic compatibility:**
  CE-certified equipment compliant with standard EN 61326-1 (Ed. 97) + A1 (Ed. 98) + A2 (Ed. 01)
  - Emission: regulations for class B equipment (domestic use)
  - Immunity: regulations for equipment operated intermittently on industrial sites.

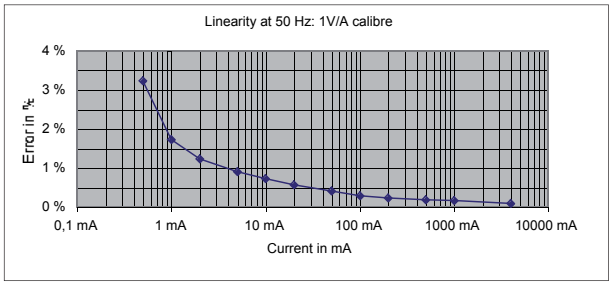
# Current clamp for AC current
# Model B102 (clamp for leakage currents)

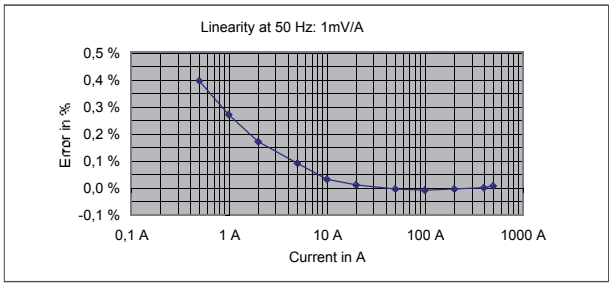
## CURVES AT 50 HZ

4 A calibre

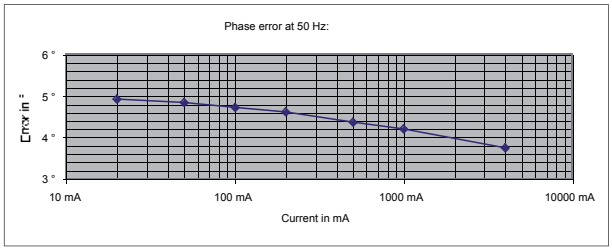
400 A calibre

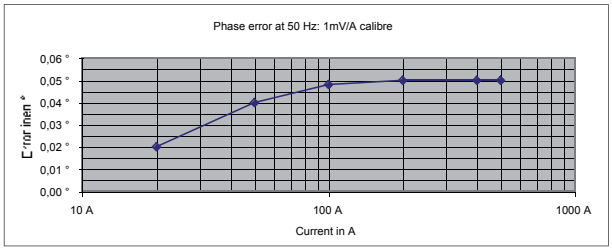
Linearity for AC




Phase shift



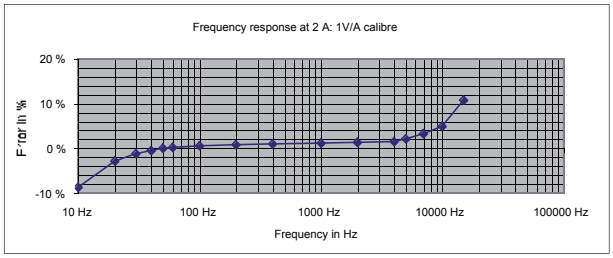



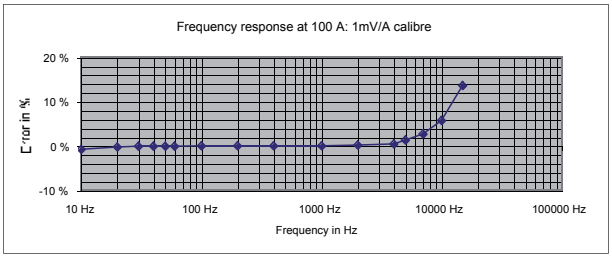

## FREQUENCY RESPONSE

4 A calibre

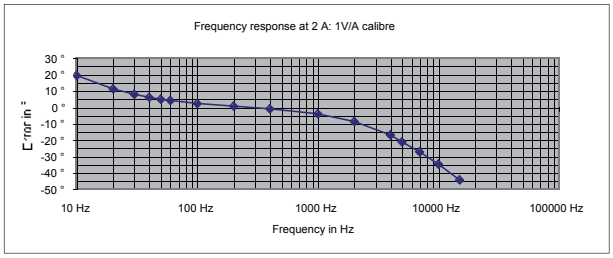
400 A calibre

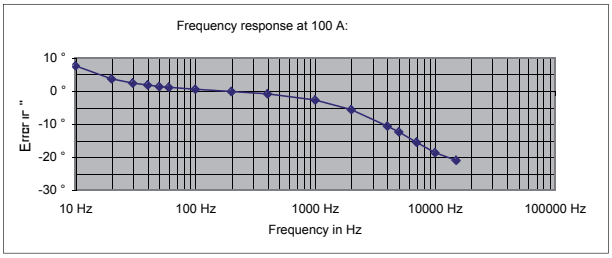
Typical error on measurement




Typical phase shift




(1) Conditions of reference: 23 °C ± 3 °K, 20 % to 75 % RH, sinusoidal signal from frequency of 48 to 65 Hz, distortion factor < 1 %, no DC components, external magnetic field < 40 A/m, no AC magnetic field, no external conductor with circulating current, conductor centred for measurement, load impedance ≥ 10 MΩ / ≤ 100 pF.

| To order | | Reference |
|---|---|---|
| AC current clamp model **B102** with operating manual | | P01120083 |
| Accessories: | **AN1** artificial neutral box (see capter 13) | P01197201 |
| | Hard case 320 x 255 x 75 mm | P01298004 |



## MiniFlex® SERIES

Making use of the principle of Rogowski coils, the MiniFlex® models are flexible sensors offering a wide dynamic range for measuring AC currents and viewing high-speed current pulses.

The sensor's output voltage is proportional to the derivative of the current measured in the conductor and requires an electronic system for formatting.

The absence of a magnetic core at the centre of the coil brings several advantages:

- flexibility and light weight

- excellent response to rapid current changes, as it is not possible for induced Fourier currents to occur, so they do not increase the sensor's response time.

- excellent linearity due to the absence of core saturation even when there are very high current, as in the case of electric power transmission, electrical welding or applications involving high-power pulses.

The great care taken when manufacturing our sensors means they benefit from particularly homogeneous winding, with equidistant turns along the whole length of the sensor, thus ensuring good immunity against electromagnetic interference.

The MiniFlex® models are made up of a flexible sensor connected to a casing containing processing electronics which outputs a voltage with the same amplitude and form as the current measured.

- **MiniFlex® MA110 series:**

With their small diameter and size, the sensors in the MA110 series are ideal for measuring currents in the electrical cabinets of residential or tertiary buildings or in low-power cabinets in industry. The rugged click-together system benefits from IP67 ingress protection.
Available with "banana" or "BNC" connection technology, the MA110 series can be connected directly to a multimeter, a wattmeter or a logger for RMS measurements at the standard industrial frequencies. The casing offers 4 measurement calibres.

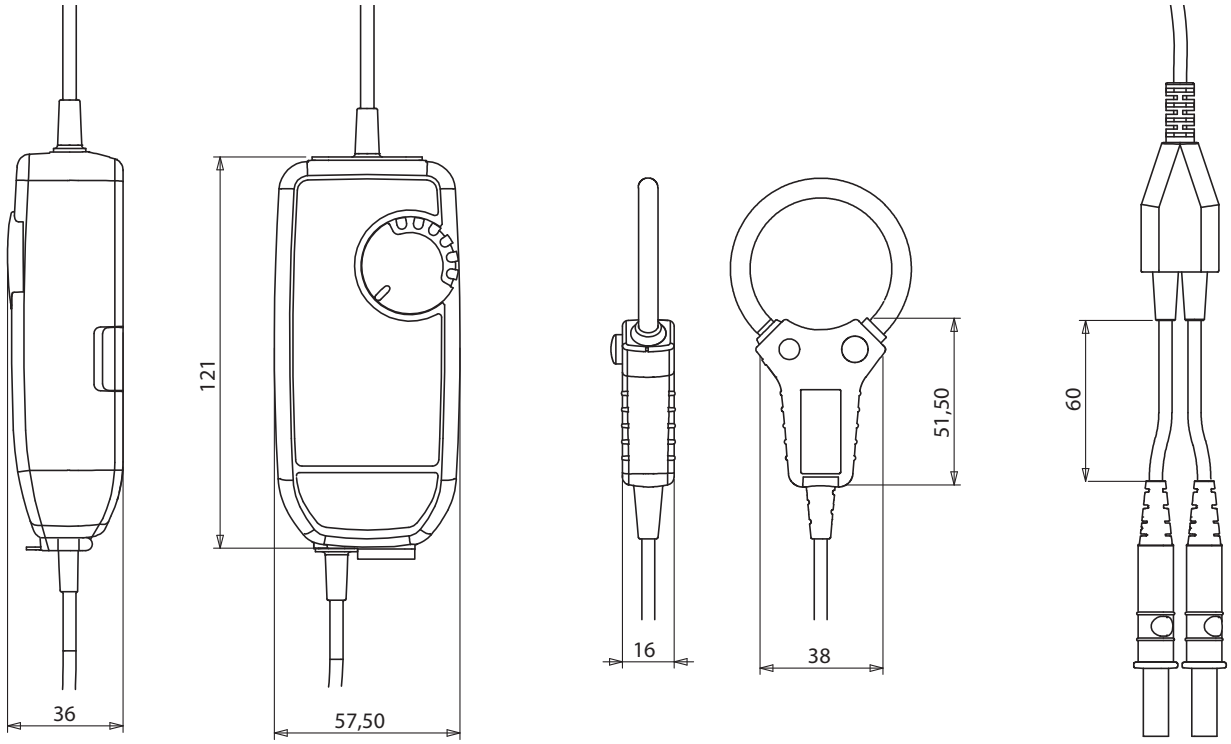
- **MiniFlex® MA130:**

The MA130 sensor, part of the same series as the MA110, can be used to measure currents on three-phase installations. It is equipped with BNC connections with adapters for banana plugs. The processing unit offers 3 measurement calibres. The rugged click-together system has IP67 ingress protection. It can be connected to the AC voltage inputs (mV AC, AC) of any power analyser, logger or other measuring instrument.

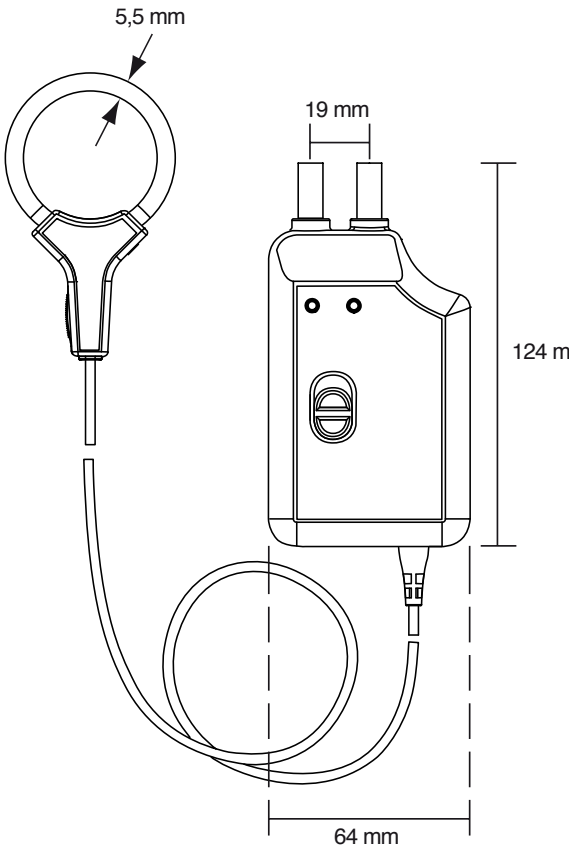
- **MiniFlex® MA200 series:**

The MA200 series is a family of "high-frequency" sensors specially designed for viewing and measuring electrical or electrotechnical signals with wide variations and high amplitude. These "insulated current probes for oscilloscopes" offer a bandwidth of 1 MHz and can be used to analyse currents with complex forms, transients present in electronic power supplies, welding units, etc.

## MA110 - MA130 SERIES




## MA200 SERIES



# Flexible probe for AC current
# Model MA110 3-30-3000-3000/3

| Current | 3 A AC | 30 A AC | 300 A AC | 3,000 A AC |
|---|---|---|---|---|
| Output | 1 mV/mA | 100 mV/A | 10 mV/A | 1 mV/A |

## DESCRIPTION

The model MA110 MiniFlex® sensor is a flexible sensor comprising an active part (Rogowski coil) linked to a casing containing electronics.
Unlike a current clamp with magnetic circuits, the MiniFlex® models are flexible and are not subject to magnetic saturation constraints, so they offer excellent linearity, low phase shift and a large dynamic range for measurement (up to several kA) while remaining easy to use. The sensors' flexibility makes it simple to clamp and measure any conductor, whatever its type (cable, busbar, strand, etc. and accessibility). The click-lock system for opening and closing the coil is specially designed for use with safety gloves.
The MA110 MiniFlex® sensor can be connected to the AC voltage input of any multimeter with Ø 4 mm female plugs.
The MiniFlex® MA110 model can be powered by batteries or by a standard external power supply. If the power supply fails, the instrument's batteries take over.
To maximize the battery life, the MiniFlex® MA110 model has an automatic standby system which can be deactivated at start-up to perform long-term measurement campaigns.
The MiniFlex® MA110 model has 3 green, yellow and red LEDs indicating, respectively, the power supply status, the status of the automatic standby function and any overruns of the measurement capacity.

## SPECIFICATIONS FOR CURRENT MEASUREMENT (1)

| Calibre ($I_N$) | 3 A | 30 A | 300 A | 3000 A |
|---|---|---|---|---|
| Measurement range in use | 0.08 .. 3 A AC | 0.5 .. 30 A AC | 0.5 .. 300 A AC | 0.5 .. 3000 A AC |
| Specified measurement range | 0.5 .. 3 A AC | 5 .. 30 A AC | 5 .. 300 A AC | 50 .. 3000 A AC |
| Output/input ratio | 1 V/A (1 mV / mA) | 100 mV / A | 10 mV / A | 1 mV / A |
| Bandwidth at -3 dB | 10 Hz .. 10 kHz | 10 Hz .. 20 kHz | 10 Hz .. 20 kHz | 10 Hz .. 20 kHz |
| Frequency limitation | Null | Null | Null | See curve |
| Intrinsic uncertainty | ≤ 1 % + 40 mV | ≤ 1 % + 4 mV | ≤ 1.5 % + 0.4 mV (I < 10 % $I_N$)<br>≤ 1 % + 0.4 mV (I ≥ 10 % $I_N$) | ≤ 1.5 % + 0.04 mV (I < 10 % $I_N$)<br>≤ 1 % + 0.04 mV (I ≥ 10 % $I_N$) |
| Phase shift at 50 Hz | ≤ 1° (0.5° typical) | ≤ 1° (0.5° typical) | ≤ 1° (0.5° typical) | ≤ 1° (0.5° typical) |

## ELECTRICAL SPECIFICATIONS (1)

- **Operating voltage:**
  600 VRMS (Cat. IV)
  1,000 VRMS (Cat. III)
- **Battery:**
  Two 1.5 V batteries (NEDA 15A, IEC LR6, AA)
  +5 VDC with a type B micro-USB connector
- **Battery life (2):**
  300 hours typical
  1,800 10-minute approx. measurements
- **Consumption:**
  10 µA (OFF position)
  90 µA (sleep mode)
- **Battery level indication:**
  Flashing green LED (batteries voltage > 2 V)
- **Influence of battery voltage:**
  ≤ 0.1 % (0.02 % typical) from 3.1 V to 2 V
- **Influence of temperature:**
  ≤ 0.5 % (0.15 % typical) of output signal per 10 °K
- **Influence of relative humidity:**
  ≤ 0.5 % (0.2 % typical) of output signal
- **Influence of conductor position in the sensor (3):**
  ≤ 2.5 % (1 % typical)
- **Influence of sensor deformation (4):**
  ≤ 1 % (0.2 % typical)
- **Influence of adjacent conductor (5):**
  ≤ $I_{ADJ}$ x 1 % (2 % near click-lock system)
  (0.2 % typical)
- **Input impedance of the measuring instrument:**
  ≥ 1 MΩ
- **Common mode rejection (6):**
  ≤ 80 dB (100 dB typical)
- **Influence of the measurement instrument's impedance Z:**
  ≤ 0.1 % at 10 kΩ

# Flexible probe for AC current
# Model MA110 3-30-3000-3000/3

## MECHANICAL SPECIFICATIONS (1)

- **Clamping capacity:**
  Model 170 mm: Ø max 45 mm
  Model 250 mm: Ø max 70 mm
  Model 350 mm: Ø max 100 mm
- **Bending radius:**
  ≥ 20 mm
- **Operating temperature:**
  -10 °C to +55 °C
- **Storage temperature:**
  -40 °C to +70 °C
- **Max. temperature of clamped conductor (measured):**
  90 °C for 10 minutes max.
- **Relative humidity for operation:**
  0 to 85 % RH with a linear decrease above 35 °C
- **Operating altitude:**
  0 to 2,000 m
- **Casing protection rating (leakproofing):**
  Casing: IP54
  Sensor: IP 67
  According to IEC 60529 Ed. 2.2-2013
- **Drop test:**
  1 m
- **Self-extinguishing capability:**
  Casing: UL94-V2
  Sensor: UL94 V0
- **Dimensions:**
  Casing: 120 x 55 x 39 (overall)
  Length of intermediate cable linking the sensor/processing unit: 2 m
  Length of output cable: 0.5 m
  Ø of sensor: 6 mm
  Connection cable Ø: 4 mm
- **Weight:**
  Model 170 mm: 300 g
  Sensor: 5 g / 10 cm
- **Colours:**
  Sensor: red
  Sensor closing system: dark grey
  Casing: dark grey
- **Output:**
  Two-wire cable with reinforced or double insulation terminated by 2 red and black isolated male banana plugs Ø 4 mm

## SAFETY SPECIFICATIONS

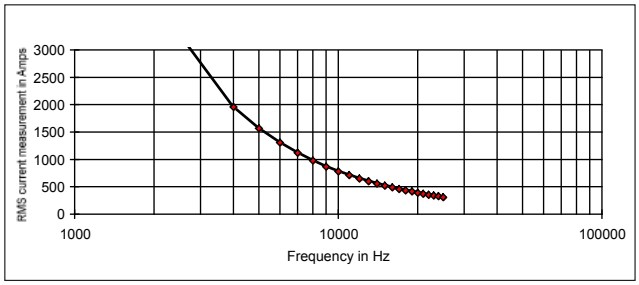
- **Electrical safety:**
  Class II equipment with double or reinforced insulation between the primary and the secondary (winding connected to the connection cable) as per EN 61010-1 and 61010-2-032:

  Sensor:
  - Type B
  - 600 V Cat. IV / 1,000 V Cat. III, pollution degree 2

  Casing:
  - 600 V Cat. IV between the terminals and the external enclosure of the casing
- **Electromagnetic compatibility (EMC):**
  Complies with the industrial environments according to EN 61326-1 Ed. 02-2012:
  - Immunity to radiated fields: at 3 V/m, error ≤ 5% of measuring range (criterion A)

3,000 A calibre

Frequency limitation according to amplitude




(1) Conditions of reference: 23 °C ± 5 °K, 20 % to 75 % RH
Battery voltage 3.2 V ± 0.1 VDC
Frequency and form of signal measured: 30 to 440 Hz sinusoidal
Continuous magnetic field < 40 A/m
Absence of external AC magnetic field
Absence of external electrical field
Measured conductor centred in the circular sensor (coil) after operation for 1 minute
Measurement instrument input impedance ≥ 1 MΩ

(2) With 3,000 mA/h batteries, for a supplied voltage between 3.2 V and 1.8 V (1.6 V to 0.9 V per battery), giving an average voltage of 2.8 V

(3) Whatever the conductor's position within the loop, as long as the sensor is not distorted (circular sensor)

(4) Oblong shape

(5) Adjacent conductor carrying an AC current $I_{ADJ}$, in contact with the sensor

(6) For a 600 V voltage applied between the enclosure and the secondary

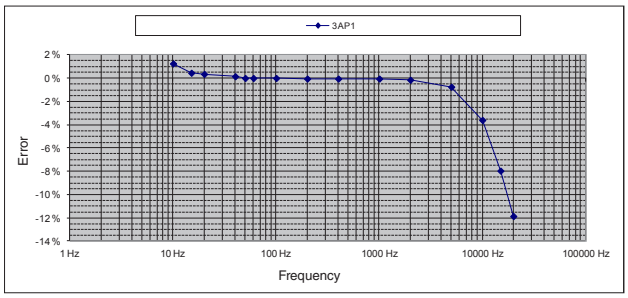
| To order | | Reference |
|---|---|---|
| MiniFlex® **MA110** | **3-30-300-3,000 A / 3 V**, length **170 mm**,<br>Output via cable terminated by 2 x Ø 4 mm isolated male banana plugs | P01120660 |
| MiniFlex® **MA110** | **3-30-300-3,000 A / 3 V**, length **250 mm**,<br>Output via cable terminated by 2 x Ø 4 mm isolated male banana plugs | P01120661 |
| MiniFlex® **MA110** | **3-30-300-3,000 A / 3 V**, length **350 mm**,<br>Output via cable terminated by 2 x Ø 4 mm isolated male banana plugs | P01120662 |

# Flexible probe for AC current
# Model MA110 3-30-3000-3000/3

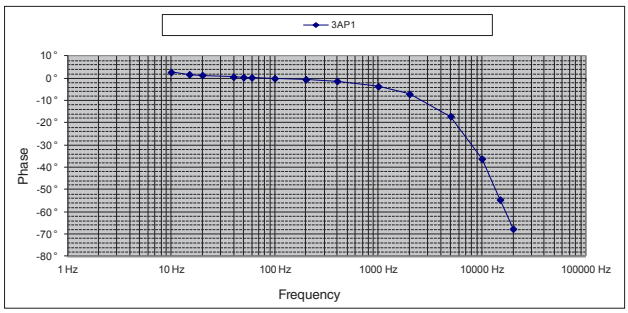
## FREQUENCY RESPONSE

### Calibre 3 A

Typical error on measurement according to frequency for a current of 2 A

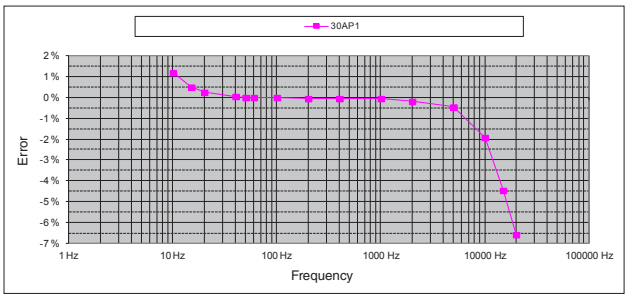



Typical phase shift according to frequency for a current of 2 A

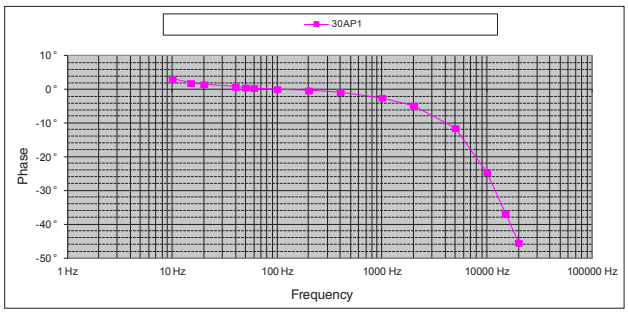



### 30 A calibre

Typical error on measurement according to frequency for a current of 20 A

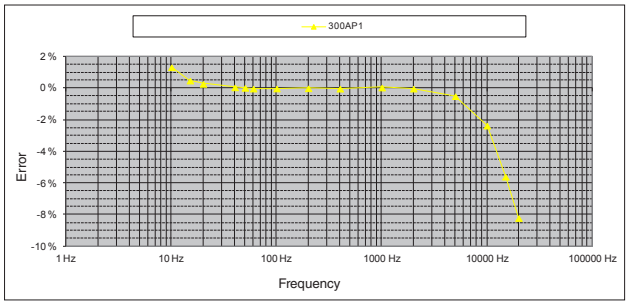



Typical phase shift according to frequency for a current of 20 A

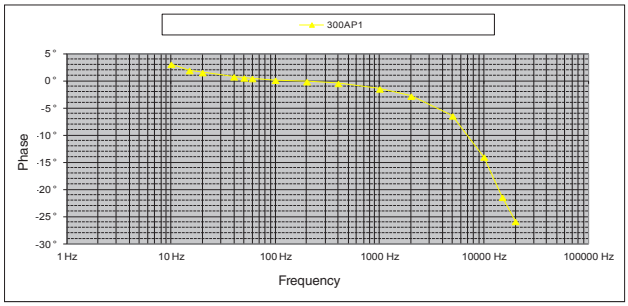



### 300 A calibre

Typical error on measurement according to frequency for a current of 20 A

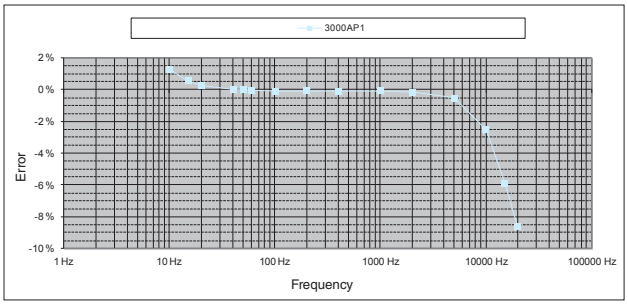



Typical phase shift according to frequency for a current of 20 A

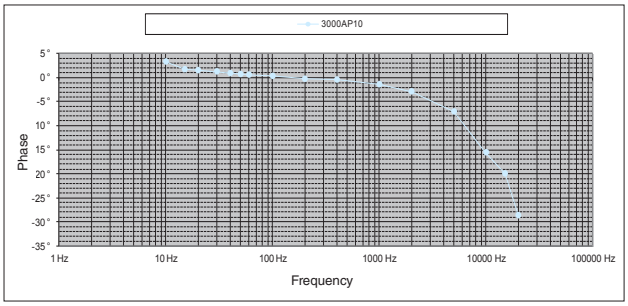



### 3,000 A calibre

Typical error on measurement according to frequency for a current of 20 A




Typical phase shift according to frequency for a current of 20 A



# Flexible probe for AC current
# Model MA110 on request

## CONFIGURATIONS

Level 1 | M | A | 1 | 1 | 0 | | | | | | | | | | | |

| | | |
|---|---|---|
| ❶ **Category** | M A 1 1 0 | |
| ❷ **Lead length in centimeters**<br>Min value : **015** (15 cm)<br>Max value : **100** (100 cm = 1 m)<br>Increment per 5 cm section | .. .. .. | On request - Modulo 5 cm<br>Coding over 3 characters<br>E.g. 50 cm = 050; 1 m = 100 |
| ❸ **Length of connection lead in centimeters**<br>Min value : **050** (50 cm)<br>Max value : **995** (9.95 m)<br>Increment per 5 cm section | .. .. .. | On request - Modulo 5 cm<br>Coding over 3 characters<br>E.g. 50 cm = 050; 9 m = 900 |
| ❹ **Output via**<br>**A:** coaxial cable of the length to be defined in ❺ terminated by a 600 V CAT III isolated male BNC socket<br>**B:** cable 50 cm long terminated by 2 red/black Ø 4 mm isolated male banana plugs rated 600 V CAT IV<br>**C:** shielded cable with 2 bared, tin-plated conductors of the length to be defined in ❺, rated 600 V CAT IV | .. | |
| ❺ **Output cable length in cm**<br>If ❹ = "A"<br>Min value : **050** (50 cm)<br>Max value : **110** (1.10 m)<br>Increment per 5 cm section<br>If ❹ = "C"<br>Min value : **050** (50 cm)<br>Max value : **995** (9.95 m)<br>Increment per 5 cm section | .. .. .. | On request - Modulo 5 cm<br>Coding over 3 characters<br>E.g. 50 cm = 050; 1.10 m = 110 |

| References: (products available in stock) | Codes |
|---|---|
| M A 1 1 0 0 2 5 2 0 0 B 0 5 0 | P01120661 |
| M A 1 1 0 0 3 5 2 0 0 B 0 5 0 | P01120662 |

# Flexible probe for AC current
# Model MA130 30-300-3000/3 Three-phase

| | | | |
|---|---|---|---|
| **Current** | 30 A AC | 300 A AC | 3,000 A AC |
| **Output** | 100 mV/A | 10 mV/A | 1 mV/A |

## DESCRIPTION

The MiniFlex® MA130 is a flexible sensor comprising an active part (Rogowski coil) linked to a casing containing electronics.
Unlike a current clamp with magnetic circuits, the MiniFlex® models are flexible and are not subject to magnetic saturation constraints, so they offer excellent linearity, low phase shift and a large dynamic range for measurement (up to several kA) while remaining easy to use.
The sensors' flexibility makes it simple to clamp and measure any conductor, whatever its type (cable, busbar, strand, etc. and accessibility.
The click-lock system for opening and closing the coil is specially designed for use with safety gloves.
The MiniFlex® MA130 can be connected to the AC voltage inputs (mV AC, V AC) of any power analyser, logger or measuring instrument equipped with BNC plugs.
The MiniFlex® MA130 can be powered by batteries or a standard external power supply. If the power supply fails, the instrument's batteries take over.
To maximize the battery life, the MiniFlex® MA130 model has an automatic standby system which can be deactivated at start-up to perform long-term measurement campaigns. The MiniFlex® MA130 model has 3 green, yellow and red LEDs indicating, respectively, the power supply status, the status of the automatic standby function and any overruns of the measurement capacity.

## SPECIFICATIONS FOR CURRENT MEASUREMENT (1)

| Calibre ($I_N$) | 30 A | 300 A | 3000 A |
|---|---|---|---|
| Measurement range in use | 0.5 .. 30 A AC | 0.5 .. 300 A AC | 0.5 .. 3000 A AC |
| Specified measurement range | 5 .. 30 A AC | 5 .. 300 A AC | 50 .. 3000 A AC |
| Output/input ratio | 100 mV / A | 10 mV / A | 1 mV / A |
| Bandwidth at -3 dB | 10 Hz .. 20 kHz | 10 Hz .. 20 kHz | 10 Hz .. 20 kHz |
| Frequency limitation | Null | Null | See curve |
| Intrinsic uncertainty | ≤ 1 % + 4 mV | ≤ 1.5 % + 0.4 mV (I < 10 % $I_N$)<br>≤ 1 % + 0.4 mV (I ≥ 10 % $I_N$) | ≤ 1.5 % + 0.04 mV (I < 10% $I_N$)<br>≤ 1 % + 0.04 mV (I ≥ 10% $I_N$) |
| Phase shift at 50 Hz | ≤ 1° (0.5° typical) | ≤ 1° (0.5° typical) | ≤ 1° (0.5° typical) |

## ELECTRICAL SPECIFICATIONS (1)

- **Operating voltage:**
  600 VRMS (Cat. IV)
  1,000 VRMS (Cat. III)
- **Battery:**
  Two 1.5 V batteries (NEDA 15A, IEC LR6, AA)
  +5 VDC with a type B micro-USB connector
- **Battery life (2):**
  500 hours typical
  3,000 10-minute approx. measurements
- **Consumption:**
  10 µA (OFF position)
  90 µA (sleep mode)
- **Battery level indication:**
  Flashing green LED (batteries voltage > 2 V)
- **Influence of battery voltage:**
  ≤ 0.1 % (0.02 % typical) from 3.1 V to 2 V
- **Influence of temperature:**
  ≤ 0.5 % (0.15 % typical) of output signal per 10 °K
- **Influence of relative humidity:**
  ≤ 0.5 % (0.2 % typical) of output signal
- **Influence of conductor position in the sensor (3):**
  ≤ 2.5 % (1 % typical)
- **Influence of sensor deformation (4):**
  ≤ 1 % (0.2 % typical)
- **Influence of adjacent conductor (5):**
  ≤ $I_{ADJ}$ x 1 % (2 % near click-lock system)
  (0.2 % typical)
- **Input impedance of the measuring instrument:**
  ≥ 1 MΩ
- **Common mode rejection (6):**
  ≤ 80 dB (100 dB typical)
- **Influence of the measurement instrument's impedance Z:**
  ≤ 0.1 % at 10 kΩ

# Flexible probe for AC current
# Model MA130 30-300-3000/3 Three-phase

## MECHANICAL SPECIFICATIONS

- **Clamping capacity:**
  Model 250 mm: Ø max 70 mm
- **Bending radius:**
  ≥ 20 mm
- **Operating temperature:**
  -10 °C to +55 °C
- **Storage temperature:**
  -40 °C to +70 °C
- **Max. temperature of clamped conductor (measured):**
  90 °C for 10 minutes max.
- **Relative humidity for operation:**
  0 to 85 % RH with a linear decrease above 35 °C
- **Operating altitude:**
  0 to 2,000 m
- **Casing protection rating (leakproofing):**
  Casing: IP54
  Sensor: IP 67
  According to IEC 60529 Ed. 2.2-2013
- **Drop test:**
  1 m (IEC 68-2-32)
- **Self-extinguishing capability:**
  Casing: UL94-V2
  Sensor: UL94 V0
- **Dimensions:**
  Casing: 120 x 55 x 39 (overall)
  Length of intermediate cable linking the cable/ processing unit: 3 m
  Length of output cable: 0.5 m
  Ø of sensor: 6 mm
  Connection cable Ø: 4 mm
- **Weight:**
  500 g
- **Colours:**
  Sensor: red
  Sensor closing system: dark grey
  Casing: dark grey
- **Output:**
  3 coaxial cables with reinforced or double isolation terminated by 1 black isolated male BNC plug

## SAFETY SPECIFICATIONS

- **Electrical safety:**
  Class II equipment with double or reinforced insulation between the primary and the secondary (winding connected to the connection cable) as per EN 61010-1 and 61010-2-032:

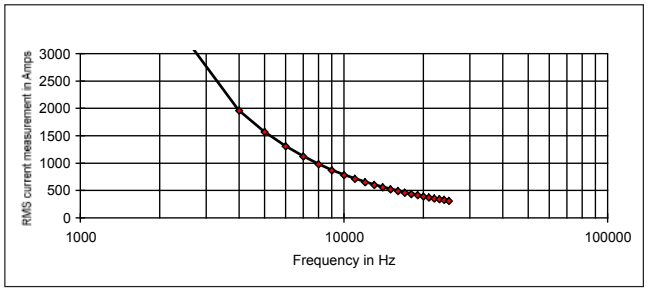
  Sensor:
  - Type B
  - 600 V Cat. IV / 1,000 V Cat. III, pollution degree 2

  Casing:
  - 600 V Cat. III between the BNC output and the external enclosure of the casing

- **Electromagnetic compatibility (EMC):**
  Compliance for industrial environments as per EN 61326-1 Ed. 02-2012:
  - Immunity to radiated fields: at 3 V/m, error ≤ 5 % of measurement range (criterion A)

3,000 A calibre

Frequency limitation according to amplitude




(1) Conditions of reference: 23 °C ± 5 °K, 20 % to 75 % RH
Battery voltage 3.2 V ± 0.1 V DC
Frequency and form of signal measured: 30 to 440 Hz sinusoidal
Continuous magnetic field < 40 A/m
Absence of external AC magnetic field
Absence of external electrical field
Measured conductor centred in the circular sensor (coil) after operation for 1 minute
Measurement instrument input impedance ≥ 1 MΩ

(2) With 3,000 mA/h batteries, for a supplied voltage between 3.2 V and 1.8 V (1.6 V to 0.9 V per battery), giving an average voltage of 2.8 V

(3) Whatever the conductor's position within the loop, as long as the sensor is not distorted (circular sensor)

(4) Oblong shape

(5) Adjacent conductor carrying an AC current $I_{ADJ}$, in contact with the sensor

(6) For a 600 V voltage applied between the enclosure and the secondary

7) Delivered with a set of 3 female BNC/ Ø 4 mm isolated male banana adapters with 19 mm spacing and a set of identifiers (12 colours)

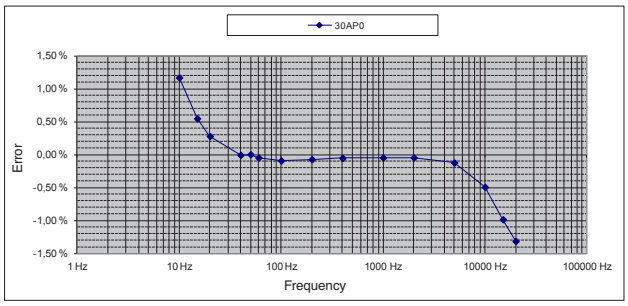
| To order | | Reference |
|---|---|---|
| MiniFlex® **MA130** | **30-300-3,000 A / 3 V**, length **250 mm**,<br>Output via 3 coaxial cables terminated by 1 isolated male BNC plug | P01120663 |

# Flexible probe for AC current
# Model MA130 30-300-3000/3 triphase

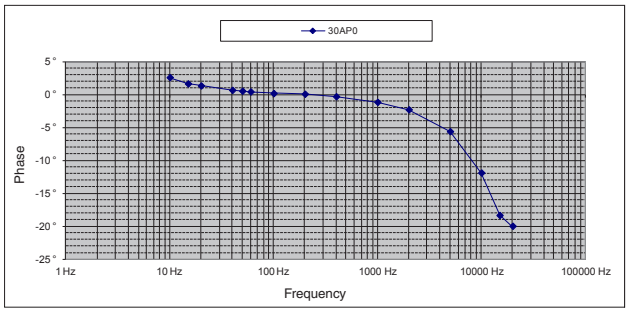
## FREQUENCY RESPONSE

### 30 A calibre

Typical error on measurement according to frequency for a current of 20 A

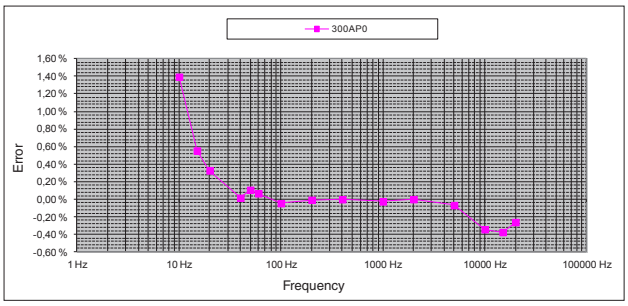



Typical phase shift according to frequency for a current of 20 A

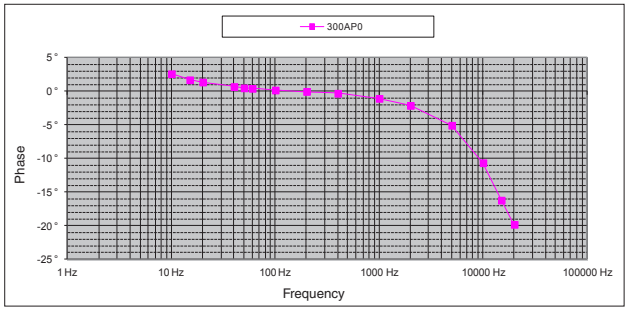



### 300 A calibre

Typical error on measurement according to frequency for a current of 20 A

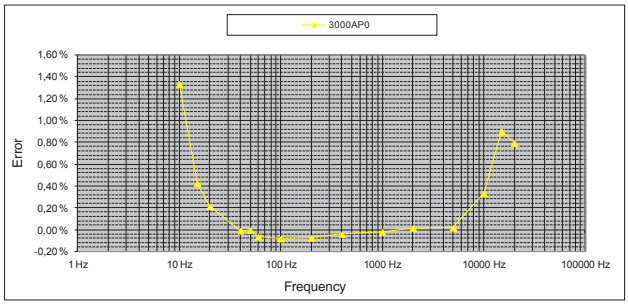



Typical phase shift according to frequency for a current of 20 A

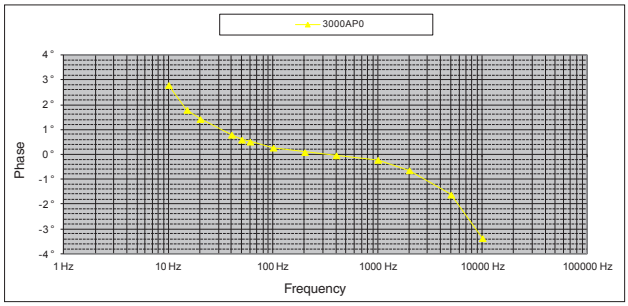



### 3,000 A calibre

Typical error on measurement according to frequency for a current of 20 A




Typical phase shift according to frequency for a current of 20 A



# Flexible probe for AC current
# Model MA130 on request

## CONFIGURATIONS

Level 1 | M | A | 1 | 3 | 0 | | | | | | | | | | | |

**1 Category**

| M | A | 1 | 3 | 0 |
|---|---|---|---|---|

**2 Lead length in centimeters**

Min value : **015** (15 cm)
Max value : **100** (100 cm = 1 m)

Increment per 5 cm section

| .. | .. | .. |
|---|---|---|

On request - Modulo 5 cm
Coding over 3 characters
E.g. 50 cm = 050; 1 m = 100

**3 Length of connection lead in centimeters**

Min value : **050** (50 cm)
Max value : **995** (9.95 m)

Increment per 5 cm section

| .. | .. | .. |
|---|---|---|

On request - Modulo 5 cm
Coding over 3 characters
E.g. 50 cm = 050; 9 m = 900

**4 Output via**

**A:** coaxial cable of the length to be defined in 5 terminated by a 600 V CAT III isolated male BNC socket
**B:** cable 50 cm long terminated by 2 red/black Ø 4 mm isolated male banana plugs rated 600 V CAT IV
**C:** shielded cable with 2 bared, tin-plated conductors of the length to be defined in 5, rated 600 V CAT III

| .. |
|---|

**5 Output cable length in cm**

If 4 = "A"

Min value : **050** (50 cm)
Max value : **110** (1.10 m)

Increment per 5 cm section

| .. | .. | .. |
|---|---|---|

On request - Modulo 5 cm
Coding over 3 characters
E.g. 50 cm = 050; 1.10 m = 110

If 4 = "C"

Min value : **050** (50 cm)
Max value : **995** (9.95 m)

Increment per 5 cm section

| Reference: (products available in stock) | Codes |
|---|---|
| M A 1 3 0 0 2 5 3 0 0 A 0 5 0 | P01120663 |

# Flexible probe for AC current
# Model MA200 30-300/3 (insulated AC current probe)

| | | |
|---|---|---|
| **Current** | 45 A peak | 450 A peak |
| **Output** | 100 mV / A | 10 mV / A |


## DESCRIPTION

The MiniFlex® MA200 is a flexible sensor comprising an active part (Rogowski coil) linked to a casing containing electronics.
Unlike a current clamp with magnetic circuits, the MiniFlex® models are flexible and are not subject to magnetic saturation constraints, so they offer excellent linearity, low phase shift and a large dynamic range for measurement (up to several kA) while remaining easy to use.
The oscilloscope probes in the MA200 series a specially designed for viewing alternating currents in order to assess the transition and propagation times on electrotechnical equipment.
The sensors' flexibility makes it simple to clamp and measure any conductor, whatever its type (cable, busbar, strand, etc. and accessibility.
The click-lock system for opening and closing the coil is specially designed for use with safety gloves.
The casing can be connected to any oscilloscope equipped with an AC voltage input.

## SPECIFICATIONS FOR CURRENT MEASUREMENT (1)

| Calibre | 30 A | 300 A |
|---|---|---|
| Measurement range in use | 0.5 .. 30 A AC (45 A peak) | 0.5 .. 300 A AC (450 A peak) |
| Specified measurement range (2) | 5 .. 30 A AC (45 A peak) | 5 .. 300 A AC (450 A peak) |
| Output/input ratio | 100 mV/A | 10 mV/A |
| % Accuracy of output signal | ≤ 1 % + 0.3 A | |
| Phase shift at 1 kHz | ≤ 1.5° | |
| Residual current (noise) at I = 0 | ≤ 0.5 Arms | |
| Output impedance | 1 kΩ | |

## FREQUENCY MEASUREMENT SPECIFICATIONS (1)

| Calibre | 30 A | 300 A |
|---|---|---|
| Bandwidth at -3 dB | 2 Hz .. 1 MHz | 2 Hz .. 1 MHz |
| Rise time (3) (10 to 90 %)<br>Fall time (4) (10 to 90 %) | 0.3 µs (typical) | 0.24 µs (typical) |
| Propagation time (5) (to 10 %) | 0.4 µs (typical) | 0.3 µs (typical) |
| Insertion impedance at 10 kHz | < 0.05 mΩ | |

# Flexible probe for AC current
# Model MA200 30-300/3 (insulated AC current probe)

## ELECTRICAL SPECIFICATIONS (1)

- **Operating voltage:**
  600 VRMS (Cat. IV)
  1,000 VRMS (Cat. III)
- **Battery:**
  9 V alkaline battery (NEDA 1604A, IEC 6LR61)
- **Battery life:**
  100 hours typical
- **Typical consumption:**
  3.6 mA typical
- **Battery level indication:**
  Green LED when > 7.0 V approx.
- **Influence of battery voltage:**
  ≤ 0.1 % from 9 V to 7 V
- **Influence of temperature:**
  ≤ 0.2 % / 10 °K
- **Influence of humidity:**
  ≤ 0.5 % from 10 % to 90 % RH without condensation
- **Influence of conductor position in the sensor (8):**
  ≤ 2.5 %
- **Influence of sensor deformation (6):**
  ≤ 1 %
- **Influence of an adjacent conductor with circulating AC current (7):**
  ≤ 1.5 % or 36.5 dB
- **Common mode rejection:**
  - between enclosure and secondary: ≤ 75 dB
  - between sensor and secondary: ≤ 80 dB
- **Influence of the measurement instrument's impedance Z:**
  0.1 % / Z (in MΩ)

## MECHANICAL SPECIFICATIONS

- **Clamping capacity:**
  Model 170 mm: Ø max 45 mm
  Model 250 mm: Ø max 70 mm
- **Operating temperature:**
  -10 °C to +55 °C
- **Storage temperature:**
  -40 °C to +70 °C
- **Max. temperature of clamped conductor (measured):**
  ≤ 90 °C
- **Relative humidity for operation:**
  0 to 85 % RH with a linear decrease above 35 °C
- **Operating altitude:**
  0 to 2,000 m
- **Storage altitude:**
  ≤ 12,000 m
- **Casing protection rating (leakproofing):**
  Casing: IP50
  Sensor: IP50
  According to EN 60529/A1 Ed. 06/2000
- **Shock resistance:**
  IK04 according to NF EN 50102 Ed. 1995
- **Self-extinguishing capability:**
  Casing: UL94-V2
  Sensor: UL94 V0
- **Dimensions:**
  Casing: 140 x 64 x 28 mm
  Connector lead: 2 m (connects sensor to casing)
  Ø of sensor: 5.5 mm approx.
  Connection cable Ø: 3 mm approx.
- **Colours:**
  Sensor: red
  Sensor closing system: dark grey
  Sensor locking tab: yellow
  Casing: Dark grey
- **Output:**
  According to model:
  Coaxial cable 40 cm long, terminated by an insulated BNC plug

## SAFETY SPECIFICATIONS

- **Electrical safety:**
  Class II equipment with double or reinforced insulation between the primary and the secondary (winding connected to the connection cable) as per EN 61010-1 and 61010-2-032:
  - 1,000 V Cat. III, pollution degree 2
  - 600 V Cat. IV, pollution degree 2
  - Type-B sensor
  - 600 V Cat. III between the BNC output and the external enclosure of the casing
- **Electromagnetic compatibility (EMC):**
  Complies with the IEC 61326 (Ed. 1997) + A1 (Ed. 1998)
  - Adequate immunity to disturbances for industrial environments
  - Adequate immunity to disturbances for residential environments

(1) Conditions of reference: 23 °C ± 5 °K, 20 % to 75 % RH
Battery voltage: 9 V ± 0.5 V
Continuous external DC magnetic field (earth field) < 40 A/m
Absence of external AC magnetic field
External electrical field < 1 V/m
Position of conductor measured: centred in the measurement coil
Shape of measurement coil: quasi-circular
Measurement instrument input impedance (oscilloscope) ≥ 1 MΩ
Frequency and form of signal measured: 40 to 400 Hz sinusoidal.

(2) Measurement range for the specifications indicated in this document.

(3) Rise Time ($t_r$)

(4) Fall Time ($t_f$)

(5) Delay Time ($d_t$)

(6) Oblong shape

(7) Adjacent conductor 1 cm from sensor; ≤ 3 % or 30.5 dB near click-lock system

(8) ≤ 6 % near click-lock system

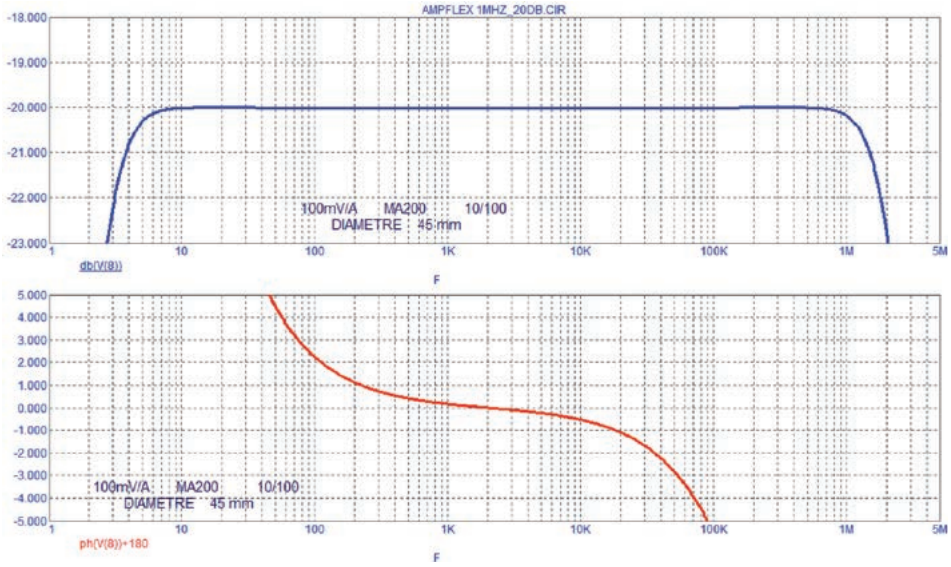
(9) Typical curve obtained by mathematical modelling

| To order | | Reference |
|---|---|---|
| MiniFlex® **MA200** | **30-300 A / 3 V,** length 170 mm with operating manual and Battery | P01120570 |
| MiniFlex® **MA200** | **30-300 A / 3 V,** length 250 mm with operating manual and Battery | P01120571 |

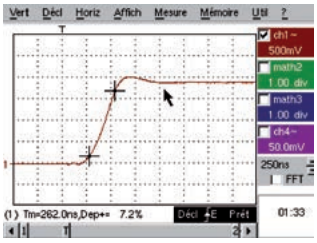
# Flexible probe for AC current
# Model MA200 30-300/3 (insulated AC current probe)

## 170 mm LOOP - 30 A CALIBRE

Frequency and phase responses [9]

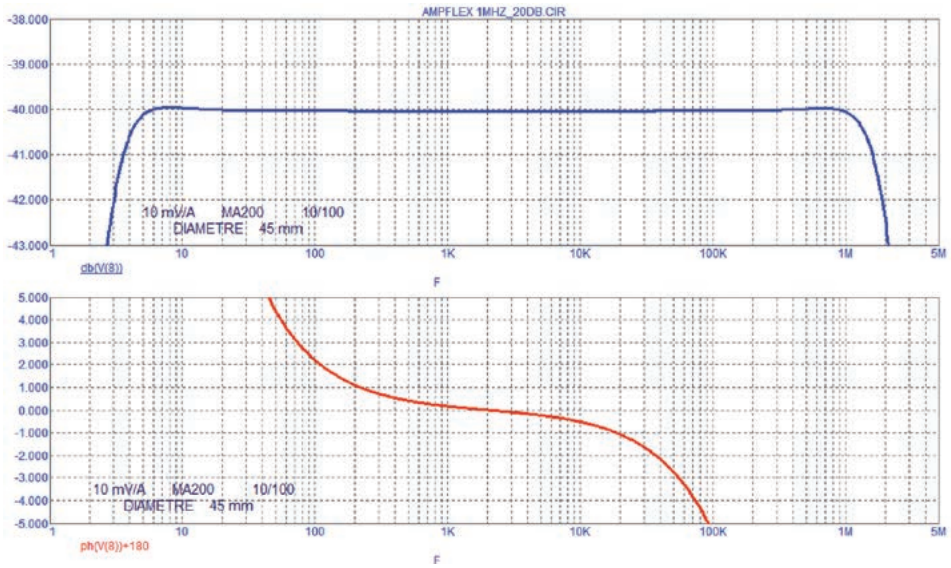



Pulse response

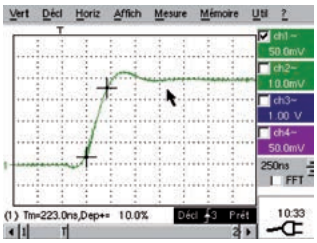



## 170 mm LOOP- 300 A CALIBRE

Frequency and phase responses [9]



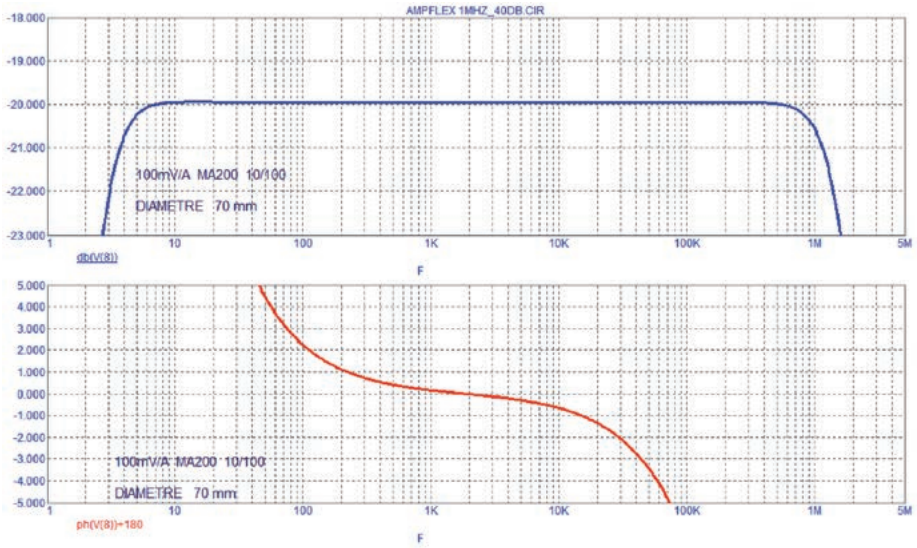

Pulse response



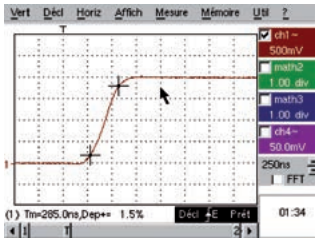
# Flexible probe for AC current
# Model MA200 30-300/3 (insulated AC current probe)

## 250 mm LOOP - 30 A CALIBRE

Frequency and phase responses (9)

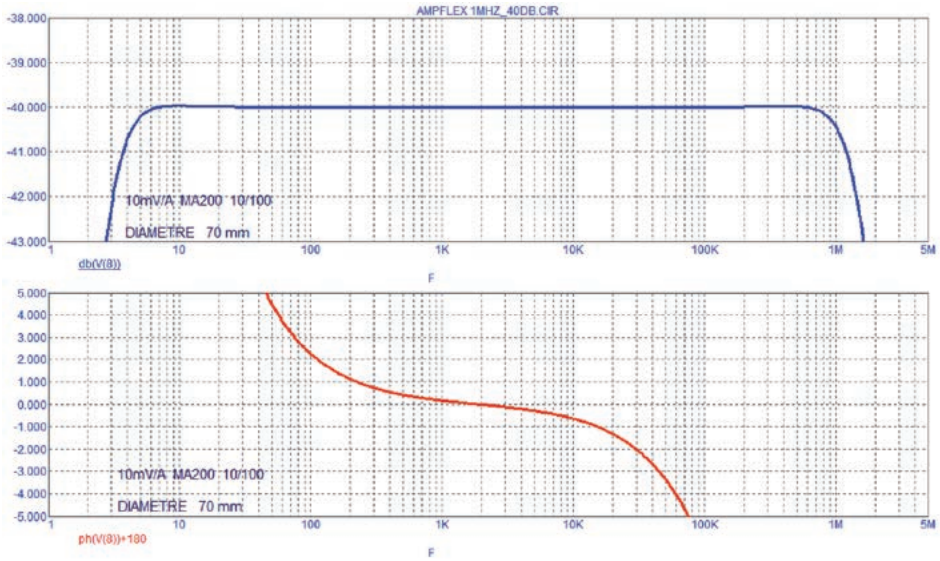



Pulse response

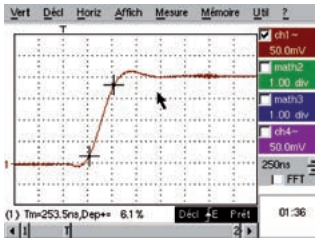



## 250 mm LOOP - 300 A CALIBRE

Frequency and phase responses (9)




Pulse response



# Flexible probe for AC current
# Model MA200 3000/3 (insulated AC current probe)

| | |
|---|---|
| **Current** | 4500 A peak |
| **Output** | 1 mV / A |


## DESCRIPTION

The MiniFlex® MA200 is a flexible sensor comprising an active part (Rogowski coil) linked to a casing containing electronics.
Unlike a current clamp with magnetic circuits, the MiniFlex® models are flexible and are not subject to magnetic saturation constraints, so they offer excellent linearity, low phase shift and a large dynamic range for measurement (up to several kA) while remaining easy to use.
The oscilloscope probes in the MA200 series a specially designed for viewing alternating currents in order to assess the transition and propagation times on electrotechnical equipment.
The sensors' flexibility makes it simple to clamp and measure any conductor, whatever its type (cable, busbar, strand, etc. and accessibility.
The click-lock system for opening and closing the coil is specially designed for use with safety gloves.
The casing can be connected to any oscilloscope equipped with an AC voltage input.

## SPECIFICATIONS FOR CURRENT MEASUREMENT (1)

| **Calibre** | **3,000 A** |
|---|---|
| Measurement range in use | 0.5 .. 3,000 A AC (4,500 A peak) |
| Specified measurement range (2) | 5 .. 3,000 A AC (4,500 A peak) |
| Output/input ratio | 1 mV/A |
| Accuracy in % of output signal | ≤ 1 % + 0.3 A |
| Phase shift at 1 kHz | ≤ 1.5° |
| Residual current (noise) at I = 0 | ≤ 0.5 ARMS |
| Output impedance | 1 kΩ |

## FREQUENCY MEASUREMENT SPECIFICATIONS (1)

| **Calibre** | **3,000 A** |
|---|---|
| Bandwidth at -3 dB (6) | 2 Hz .. 1 MHz |
| Rise time (3) (10 to 90 %)<br>Fall time (4) (10 to 90 %) | 0.3 µs (typical) |
| Temps from propagation (5) (to 10 %) | 0.4 µs (typical) |
| Insertion impedance at 10 kHz | < 0.05 mΩ |

# Flexible probe for AC current
# Model MA200 3000/3 (insulated AC current probe)

## ELECTRICAL SPECIFICATIONS (1)

- **Operating voltage:**
  600 Vrms (Cat. IV)
  1,000 Vrms (Cat. III)
- **Battery:**
  9 V alkaline battery (NEDA 1604A, IEC 6LR61)
- **Battery life:**
  100 hours typical
- **Typical consumption:**
  3.6 mA typical
- **Battery level indication:**
  Green LED when > 7.0 V approx.
- **Influence of battery voltage:**
  ≤ 0.1 % from 9 V to 7 V
- **Influence of temperature:**
  ≤ 0.6 % / 10 °K
- **Influence of humidity:**
  ≤ 0.5 % from 10 % to 90 % RH without condensation
- **Influence of conductor position in the sensor (9):**
  ≤ 2.5 %
- **Influence of sensor deformation (7):**
  ≤ 1 %
- **Influence of an adjacent conductor with circulating AC current (8):**
  ≤ 1.5 % or 36.5 dB
- **Common mode rejection:**
  - between enclosure and secondary: ≤ 75 dB
  - between sensor and secondary: ≤ 80 dB
- **Influence of the measurement instrument's impedance Z:**
  0.1 % / Z (in MΩ)

## MECHANICAL SPECIFICATIONS

- **Clamping capacity:**
  Model 350 mm: Ø max 100 mm
- **Operating temperature:**
  -10 °C to +55 °C
- **Storage temperature:**
  -40 °C to +70 °C
- **Max. temperature of clamped conductor (measured):**
  ≤ 90 °C
- **Relative humidity for operation:**
  0 to 85 % RH with a linear decrease above 35 °C
- **Operating altitude:**
  0 to 2,000 m
- **Storage altitude:**
  ≤ 12,000 m
- **Casing protection rating (leakproofing):**
  Casing: IP50
  Sensor: IP50
  According to EN 60529/A1 Ed. 06/2000
- **Shock resistance:**
  IK04 according to NF EN 50102 Ed. 1995
- **Self-extinguishing capability:**
  Casing: UL94 V2
  Sensor: UL94 V0
- **Dimensions:**
  Casing: 140 x 64 x 28 mm
  Connector lead: 2 m (connects sensor to casing)
  Ø of sensor: 5.5 mm approx.
  Connection cable Ø: 3 mm approx.
- **Colours:**
  Sensor: red
  Sensor closing system: dark grey
  Sensor locking tab: yellow
  Casing: dark grey
- **Output:**
  Coaxial cable 40 cm long, terminated by an insulated BNC plug

## SAFETY SPECIFICATIONS

- **Electrical safety:**
  Class II equipment with double or reinforced insulation between the primary and the secondary (winding connected to the connection cable) as per EN 61010-1 and 61010-2-032:
  - 1,000 V Cat. III, pollution degree 2
  - 600 V Cat. IV, pollution degree 2
  - Type-B sensor
  - 600 V Cat. III between the BNC output and the external enclosure of the casing
- **Electromagnetic compatibility (EMC):**
  Complies with the IEC 61326 (Ed. 1997) + A1 (Ed. 1998)
  - Adequate immunity to disturbances for industrial environments
  - Adequate immunity to disturbances for residential environments

(1) Conditions of reference: 23 °C ± 5 °K, 20 % to 75 % RH
Battery voltage: 9 V ± 0.5 V
Continuous external DC magnetic field (earth field) < 40 A/m
Absence of external AC magnetic field
External electrical field < 1 V/m
Position of conductor measured: centred in the measurement coil
Shape of measurement coil: quasi-circular
Measurement instrument input impedance (oscilloscope) ≥ 1 MΩ
Frequency and form of signal measured: 40 to 400 Hz sinusoidal.

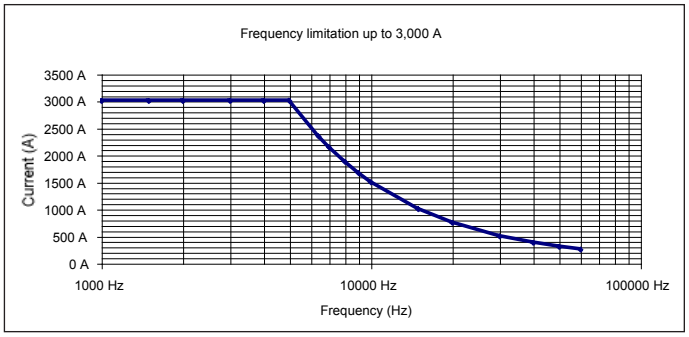
(2) Measurement range for the specifications indicated in this document.

(3) Rise Time ($r_t$)

(4) Fall Time ($f_t$)

(5) Delay Time ($d_t$)

(6) Frequency limitation according to amplitude




(7) Oblong shape

(8) Adjacent conductor 1 cm from sensor; ≤ 3 % or 30.5 dB near click-lock system

(9) ≤ 6 % near click-lock system

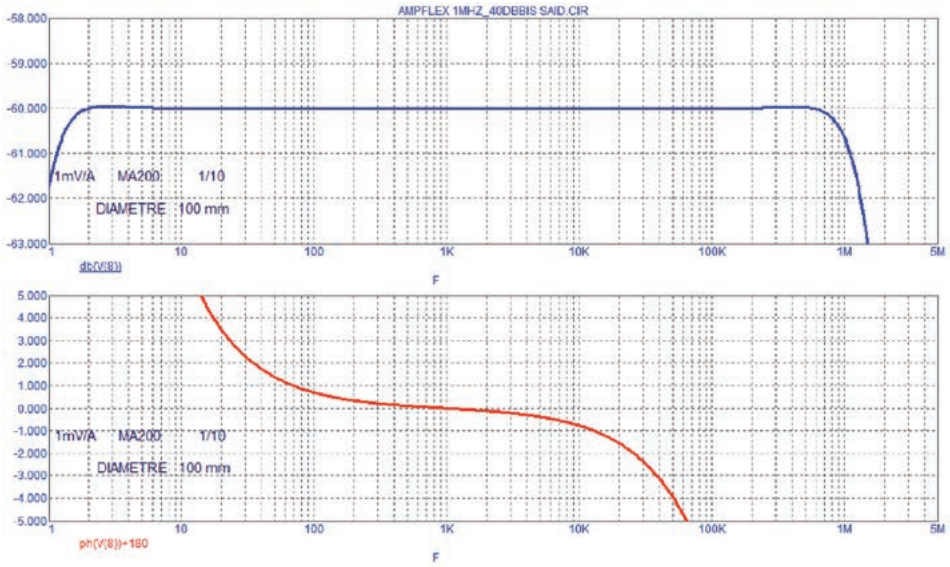
(10) Typical curve obtained by mathematical modelling

| To order | | Reference |
|---|---|---|
| MiniFlex® **MA200** | **3,000 A / 3 V,** length 350 mm with operating manual and battery | P01120572 |

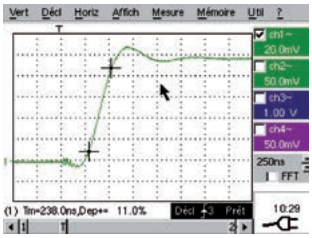
# Flexible probe for AC current
# Model MA200 3000/3 (insulated AC current probe)

## 3,000 A CALIBRE

Frequency and phase responses (10)




Pulse response



# Flexible probes for AC current

## SERIE AmpFlex®

These flexible current probes are as at home measuring low AC currents of a few tens mA as they are measuring high currents of several tens of kA.

Their main point of interest is their flexibility and the ease with which electrical conductors of all shapes and sizes (cables, busbars) and degrees of accessibility can be gripped.

They have a number of other advantages; they are lightweight (no magnetic circuit), they do not suffer from the saturation effect and their high level of accuracy combined with minimal phase shift make them perfect for power measurement applications.

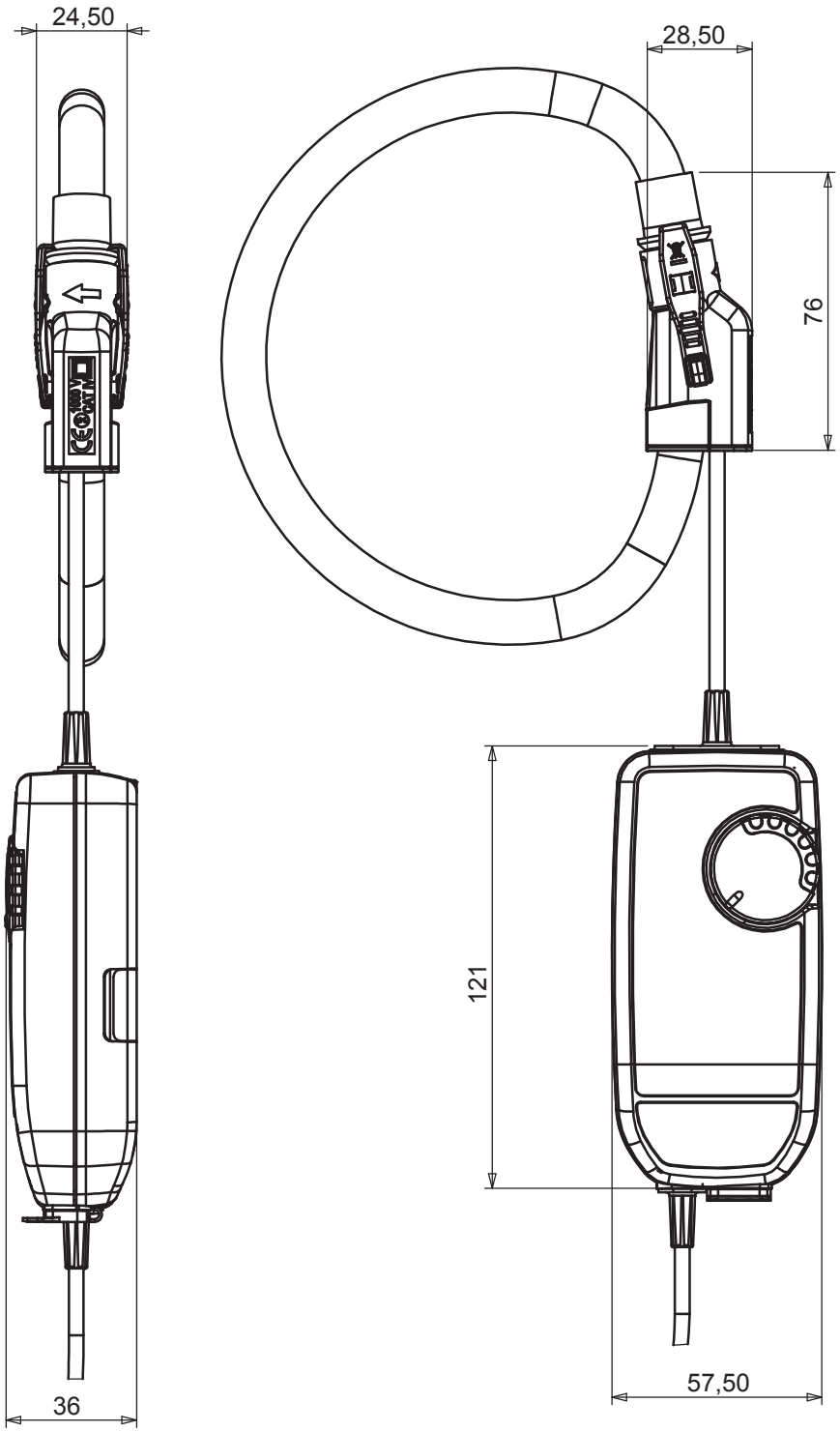
- **AmpFlex® A110 series:**

The sensors in the A110 Series have a flexible core connected by a shielded cable to a small unit containing processing electronics. This IP54 unit offers 4 measurement calibres and can be connected directly to any multimeter, wattmeter or logger. The length of the sensors in this Series (up to 120 cm as standard) enables you to clamp cables with a large cross-section or several conductors simultaneously. The A110 can be used for measurements up to 30 kA AC.

The AmpFlex® A110 offers IP67 ingress protection and can be connected to the AC voltage input (mV AC, V AC) of any multimeter or measuring instrument equipped with Ø 4 mm female banana plugs.

- **AmpFlex® A130:**

The A130 model is a version of the A110 Series adapted for measurements on three-phase installations. It is equipped with BNC connections. The processing unit offers 3 measurement calibres. The A130 sensor can be connected to the AC voltage inputs (mV AC, V AC) of any power analyser, logger or measuring instrument equipped with BNC plugs.


24,50
28,50
76
121
36
57,50

# Flexible probe for AC current
# Model A110 3-30-300-3000/3

| | | | | |
|---|---|---|---|---|
| **Current** | 3 A AC | 30 A AC | 300 A AC | 3,000 A AC |
| **Output** | 1 mV/mA | 100 mV/A | 10 mV/A | 1 mV/A |

## DESCRIPTION

The AmpFlex® A110 is a flexible sensor which comprises an active part (Rogowski coil) and a casing containing an electronic processing unit. Unlike current clamps using magnetic circuits, the AmpFlex® models are flexible sensors without magnetic saturation constraints. As a result, they offer excellent linearity, low phase shift, a large dynamic range for measurement (up to several kA) while remaining easy to use. The sensors' flexibility makes it easy to clamp the conductor, whatever its type (cable, busbar, strand, etc.) and access conditions.
The design of the click-together opening and closing system means it can be handled with protective gloves.
The AmpFlex® A110 can be connected to the AC voltage input (mV AC, V AC) of any multimeter or measuring instrument equipped with Ø 4 mm female banana plugs.
The AmpFlex® A110 can be powered by batteries or a standard external power supply. If the power supply fails, the instrument's batteries take over.
To maximize the battery life, the MiniFlex® A110 has an automatic standby system which can be deactivated at start-up to perform long-term measurement campaigns.
The MiniFlex® A110 has 3 green, yellow and red LEDs indicating, respectively, the power supply status, the status of the automatic standby function and any overruns of the measurement capacity.

## SPECIFICATIONS FOR CURRENT MEASUREMENT (1)

| Calibre ($I_N$) | 3 A | 30 A | 300 A | 3,000 A |
|---|---|---|---|---|
| Measurement range in use | 0,08 .. 3 A AC | 0.5 .. 30 A AC | 0.5 .. 300 A AC | 0.5 .. 3,000 A AC |
| Specified measurement range | 0.5 .. 3 A AC | 2 .. 30 A AC | 5 .. 300 A AC | 50 .. 3,000 A AC |
| Output/input ratio | 1 V / A | 100 mV / A | 10 mV / A | 1 mV / A |
| Bandwidth at -3 dB | 10 Hz .. 10 kHz | 10 Hz .. 20 kHz | 10 Hz .. 20 kHz | 10 Hz .. 20 kHz |
| Frequency limitation | Null | Null | Null | See curve XX |
| Intrinsic uncertainty | ≤ 1 % | ≤ 1 % | ≤ 1.5 % (I < 10 % $I_N$)<br>≤ 1 % (I ≥ 10 % $I_N$) | ≤ 1.5 % (I < 10 % $I_N$)<br>≤ 1 % (I ≥ 10 % $I_N$) |
| Phase shift at 50 Hz | ≤ 1° (0.5° typical) | ≤ 1° (0.5° typical) | ≤ 1° (0.5° typical) | ≤ 1° (0.5° typical) |

## ELECTRICAL SPECIFICATIONS (1)

- **Operating voltage:**
  1,000 VRMS (Cat. IV)
- **Battery:**
  2 x 1.5 V batteries (NEDA 15A, IEC LR6, AA)
  +5 VDC with a type B micro-USB connector
- **Battery life (2):**
  300 hours typical
  1,800 10-minute approx. measurements
- **Consumption:**
  10 µA (position OFF)
  90 µA (sleep mode)
- **Battery level indication:**
  Flashing green LED (batteries voltage > 2 V)
- **Influence of battery voltage:**
  ≤ 0.1 % (0.02 % typical) from 3.1 V to 2 V
- **Influence of temperature:**
  ≤ 0.5 % (0.15 % typical) of output signal per 10 °K
- **Influence of relative humidity:**
  ≤ 0.5 % (0.2 % typical) of output signal
- **Influence of conductor position in the sensor (3):**
  ≤ 2.5 % (1 % typical)
- **Influence of sensor deformation (4):**
  ≤ 1 % (0.2 % typical)
- **Influence of adjacent conductor (5):**
  ≤ $I_{ADJ}$ x 1 % (2 % near click-lock system)
  (0.2 % typical)
- **Input impedance of the measuring instrument:**
  ≥ 1 MΩ
- **Common mode rejection (6):**
  ≤ 80 dB (100 dB typical)
- **Influence of the measurement instrument's impedance Z:**
  ≤ 0.1 % at 10 kΩ

# Flexible probe for AC current
# Model A110 3-30-300-3000/3

## MECHANICAL SPECIFICATIONS

- **Clamping capacity:**
  Model 45 cm: Ø max 7 cm
  Model 80 cm: Ø max 12.5 cm
- **Bending radius:**
  ≥ 40 mm
- **Operating temperature:**
  -10 °C to +55 °C
- **Storage temperature:**
  -40 °C to +70 °C
- **Max temperature of measured cable:**
  90 °C for 10 minutes max.
- **Relative humidity for operation:**
  0 to 85 % RH decreasing linearly above 35 °C
- **Operating altitude:**
  0 to 2,000 m
- **Casing protection rating (leakproofing):**
  Casing: IP54
  Flexible sensor: IP 67
  According to IEC 60529 Ed. 2.2-2013
- **Drop test:**
  1 m
- **Self-extinguishing capability:**
  Casing: UL94-V2
  Sensor: UL94 V0
- **Dimensions:**
  Casing: 120 x 55 x 39 (overall)
  Connector lead: 2 m (connects sensor to casing)
  Length of output cable: 0.5 m
  Ø of sensor: 12 mm
  Connection cable Ø: 4 mm
- **Weight:**
  Model 45 mm: 450 g
  Sensor: 30 g / 10 cm
- **Colours:**
  Sensor: red
  Click-lock system: dark grey
  Casing: dark grey
- **Output:**
  Two-wire cable with reinforced or double isolation terminated by 2 red and black Ø 4 mm isolated male banana plugs

## SAFETY SPECIFICATIONS

- **Electrical safety:**
  Class II equipment with double or reinforced insulation between the primary and the secondary (winding connected to the connection cable) as per EN 61010-1 and 61010-2-032 Ed. 03-2012:

  Sensor:
  - Type B
  - 1,000 V Cat. IV pollution degree 2

  Casing:
  - 600 V Cat. III between the terminals and the external enclosure of the casing
- **Electromagnetic compatibility (EMC):**
  Complies with the industrial environments according to EN 61326-1 Ed. 02-2012:
  - Immunity to radiated fields: at 3 V/m, error ≤ 5 % of measurement range (criterion A)

(1) Conditions of reference: 23 °C ± 5 °K, 20 % to 75 % RH
Battery voltage 3.2 V ± 0.1 VDC
Frequency and form of signal measured: 30 to 440 Hz sinusoidal
Continuous magnetic field < 40 A/m
Absence of external AC magnetic field
Absence of external electrical field
Measured conductor centred in the circular sensor (coil) after operation for 1 minute
Measurement instrument input impedance ≥ 1 MΩ

(2) With 3,000 mA/h batteries, for a supplied voltage between 3.2 V and 1.8 V (1.6 V to 0.9 V per battery), giving an average voltage of 2.8 V

(3) Whatever the conductor's position within the loop, as long as the sensor is not distorted (circular sensor)

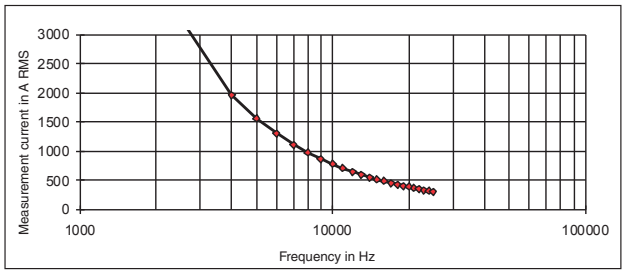
(4) Oblong shape

(5) Adjacent conductor carrying an AC current $I_{ADJ}$, in contact with the sensor

(6) For a 600 V voltage applied between the enclosure and the secondary

3,000 A calibre

Limitation of current measured according to frequency



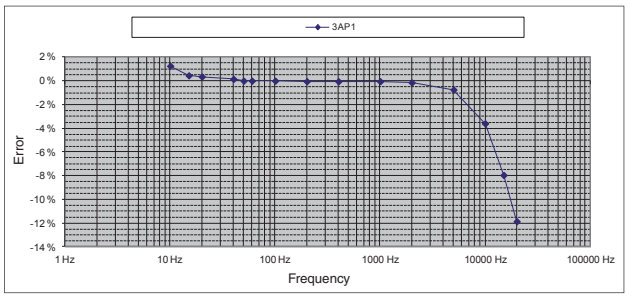

| To order | | Reference |
|---|---|---|
| AmpFlex® **A110** | **3-30-300-3,000 A / 3 V,** length **45 cm**<br>Output via cable terminated by 2 x Ø 4 mm isolated male banana plugs | P01120630 |
| AmpFlex® **A110** | **3-30-300-3,000 A / 3 V,** length **80 cm**<br>Output via cable terminated by 2 x Ø 4 mm isolated male banana plugs | P01120631 |

# Flexible probe for AC current
# Model A110 3-30-300-3000/3

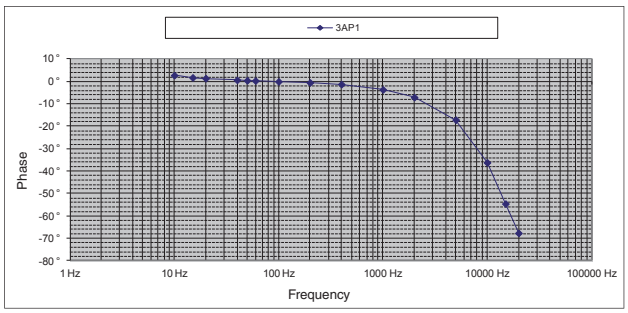
## FREQUENCY RESPONSE

### Calibre 3 A

Typical error on measurement according to frequency for a current of 2 A

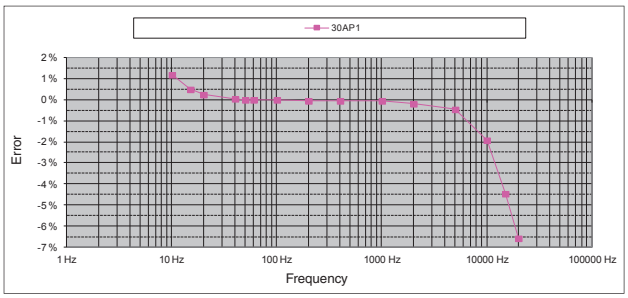



Typical phase shift according to frequency for a current of 2 A

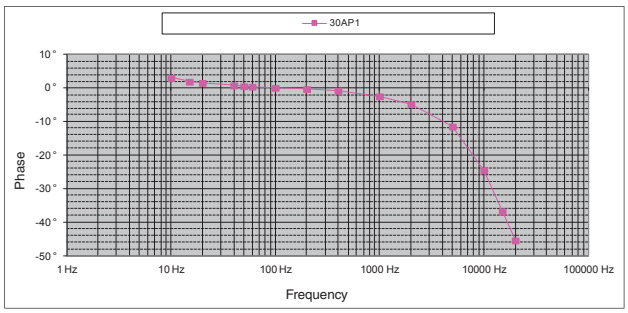



### 30 A calibre

Typical error on measurement according to frequency for a current of 20 A

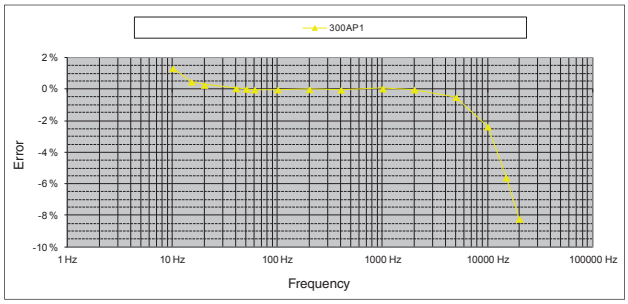



Typical phase shift according to frequency for a current of 20 A

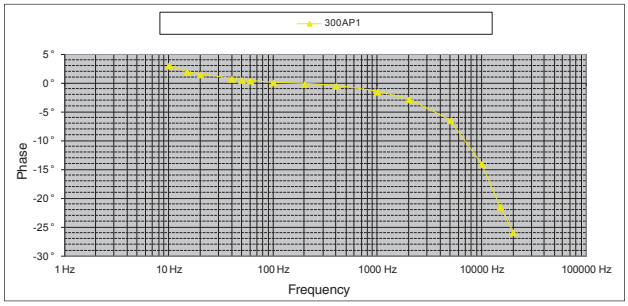



### 300 A calibre

Typical error on measurement according to frequency for a current of 20 A

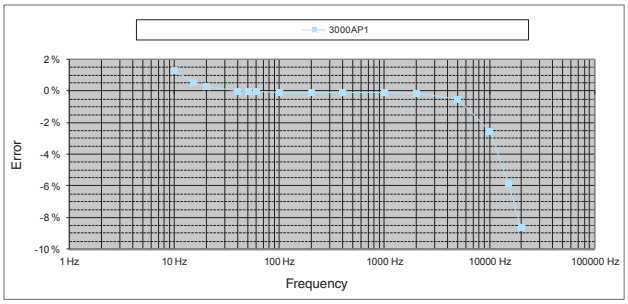



Typical phase shift according to frequency for a current of 20 A

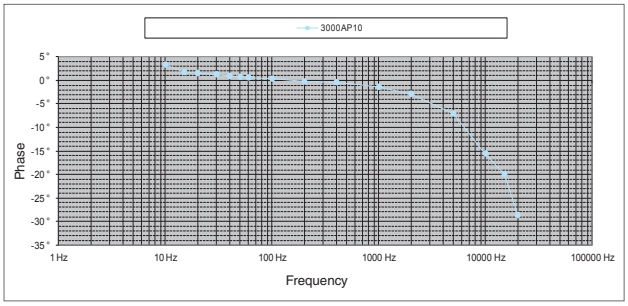



### 3,000 A calibre

Typical error on measurement according to frequency for a current of 20 A




Typical phase shift according to frequency for a current of 20 A



# Flexible probe for AC current
# Model A110 30-300-3000-30000/3

| Current | 30 A AC | 300 A AC | 3,000 A AC | 30,000 A AC |
|---|---|---|---|---|
| Output | 100 mV/A | 10 mV/A | 1 mV/A | 0.1 mV/A |

## DESCRIPTION

The AmpFlex® A110 is a flexible sensor which comprises an active part (Rogowski coil) and a casing containing an electronic processing unit. Unlike current clamps using magnetic circuits, the AmpFlex® models are flexible sensors without magnetic saturation constraints. As a result, they offer excellent linearity, low phase shift, a large dynamic range for measurement (up to several kA) while remaining easy to use. The sensors' flexibility makes it easy to clamp the conductor, whatever its type (cable, busbar, strand, etc.) and access conditions.
The design of the click-together opening and closing system means it can be handled with protective gloves.
The AmpFlex® A110 can be connected to the AC voltage input (mV AC, V AC) of any multimeter or measuring instrument equipped with Ø 4 mm female banana plugs.
The AmpFlex® A110 can be powered by batteries or a standard external power supply. If the power supply fails, the instrument's batteries take over.
To maximize the battery life, the MiniFlex® A110 has an automatic standby system which can be deactivated at start-up to perform long-term measurement campaigns.
The MiniFlex® A110 has 3 green, yellow and red LEDs indicating, respectively, the power supply status, the status of the automatic standby function and any overruns of the measurement capacity.

## SPECIFICATIONS FOR CURRENT MEASUREMENT (1)

| Calibre ($I_N$) | 30 A | 300 A | 3,000 A | 30,000 A |
|---|---|---|---|---|
| Measurement range in use | 0.5 .. 30 A AC | 0.5 .. 300 A AC | 0.5 .. 3,000 A AC | 0.5 .. 30,000 A AC |
| Specified measurement range | 0.5 .. 30 A AC | 10 .. 300 A AC | 10 .. 3,000 A AC | 50 .. 30,000 A AC |
| Output/input ratio | 100 mV / A | 10 mV / A | 1 mV / A | 0.1 mV / A |
| Bandwidth at -3 dB | 10 Hz .. 10 kHz | 10 Hz .. 10 kHz | 10 Hz .. 20 kHz | 10 Hz .. 20 kHz |
| Frequency limitation | Null | Null | Null | See curve |
| Intrinsic uncertainty | ≤ 1 % | ≤ 1 % | ≤ 1.5 % (I < 10 % $I_N$)<br>≤ 1 % (I ≥ 10% $I_N$) | ≤ 1.5 % (I < 10 % $I_N$)<br>≤ 1 % (I ≥ 10 % $I_N$) |
| Phase shift at 50 Hz | ≤ 1° (0.5° typical) | ≤ 1° (0.5° typical) | ≤ 1° (0.5° typical) | ≤ 1° (0.5° typical) |

## ELECTRICAL SPECIFICATIONS (1)

- **Operating voltage:**
  1,000 VRMS (Cat. IV)
- **Battery:**
  Two 1.5 V batteries (NEDA 15A, IEC LR6, AA)
  +5 VDC with a type B micro-USB connector
- **Battery life (2):**
  300 hours typical
  1,800 10-minute approx. measurements
- **Consumption:**
  10 µA (position OFF)
  90 µA (sleep mode)
- **Battery level indication:**
  Flashing green LED (batteries voltage > 2 V)
- **Influence of battery voltage:**
  ≤ 0.1 % (0.02 % typical) from 3.1 V to 2 V
- **Influence of temperature:**
  ≤ 0.5 % (0.15 % typical) of output signal per 10 °K
- **Influence of relative humidity:**
  ≤ 0.5 % (0.2 % typical) of output signal
- **Influence of conductor position in the sensor (3)**
  ≤ 2.5 % (1 % typical)
- **Influence of sensor deformation (4):**
  ≤ 1 % (0.2 % typical)
- **Influence of adjacent conductor (5):**
  ≤ $I_{ADJ}$ x 1 % (2 % near click-lock system)
  (0.2 % typical)
- **Input impedance of the measuring instrument:**
  ≥ 1 MΩ
- **Common mode rejection (6):**
  ≤ 80 dB (100 dB typical)
- **Influence of the measurement instrument's impedance Z:**
  ≤ 0.1 % at 10 kΩ

# Flexible probe for AC current
# Model A110 30-300-3000-30000/3

## MECHANICAL SPECIFICATIONS

- **Clamping capacity:**
  Model 120 mm: Ø max 19 cm
- **Bending radius:**
  ≥ 40 mm
- **Operating temperature:**
  -10 °C to +55 °C
- **Storage temperature:**
  -40 °C to +70 °C
- **Max temperature of measured cable:**
  90 °C for 10 minutes max.
- **Relative humidity for operation:**
  0 to 85 % RH decreasing linearly above 35 °C
- **Operating altitude:**
  0 to 2,000 m
- **Casing protection rating (leakproofing):**
  Casing: IP54
  Flexible sensor: IP 67
  According to IEC 60529 Ed. 2.2-2013
- **Drop test:**
  1 m
- **Self-extinguishing capability:**
  Casing: UL94-V2
  Sensor: UL94 V0
- **Dimensions:**
  Casing: 120 x 55 x 39 (overall)
  Connector lead: 2 m (connects sensor to casing)
  Length of output cable: 0.5 m
  Ø of sensor: 12 mm
  Connection cable Ø: 4 mm
- **Weight:**
  Model 45 mm: 450 g
  Sensor: 30 g / 10 cm
- **Colours:**
  Sensor: red
  Click-lock system: dark grey
  Casing: dark grey
- **Output:**
  Two-wire cable with reinforced or double isolation terminated by 2 red and black Ø 4 mm isolated male banana plugs

## SAFETY SPECIFICATIONS

- **Electrical safety:**
  Class II equipment with double or reinforced insulation between the primary and the secondary (winding connected to the connection cable) as per EN 61010-1 and 61010-2-032 Ed. 03-2012:

  Sensor:
  - Type B
  - 1,000 V Cat. IV pollution degree 2

  Casing:
  - 600 V Cat. III between the terminals and the external enclosure of the casing
- **Electromagnetic compatibility (EMC):**
  Complies with the industrial environments according to EN 61326-1 Ed. 02-2012:
  - Immunity to radiated fields: at 3 V/m, error ≤ 5 % of measurement range (criterion A)

(1) Conditions of reference: 23 °C ± 5 °K, 20 % to 75 % RH
Battery voltage 3.2 V ± 0.1 VDC
Frequency and form of signal measured: 30 to 440 Hz sinusoidal
Continuous magnetic field < 40 A/m
Absence of external AC magnetic field
Absence of external electrical field
Measured conductor centred in the circular sensor (coil) after operation for 1 minute
Measurement instrument input impedance ≥ 1 MΩ

(2) With 3,000 mA/h batteries, for a supplied voltage between 3.2 V and 1.8 V (1.6 V to 0.9 V per battery), giving an average voltage of 2.8 V

(3) Whatever the conductor's position within the loop, as long as the sensor is not distorted (circular sensor)

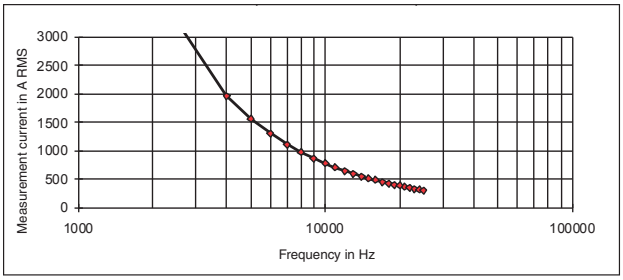
(4) Oblong shape

(5) Adjacent conductor carrying an AC current $I_{ADJ}$, in contact with the sensor

(6) For a 600 V voltage applied between the enclosure and the secondary

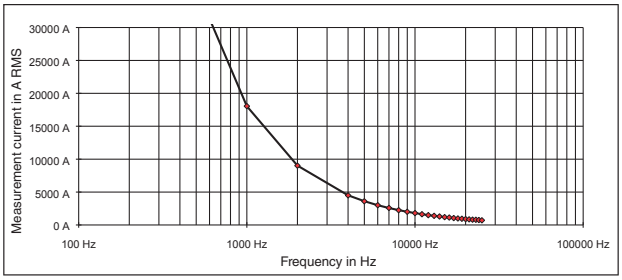
3,000 A calibre

Limitation of current measured according to frequency




30,000 A calibre

Limitation of current measured according to frequency



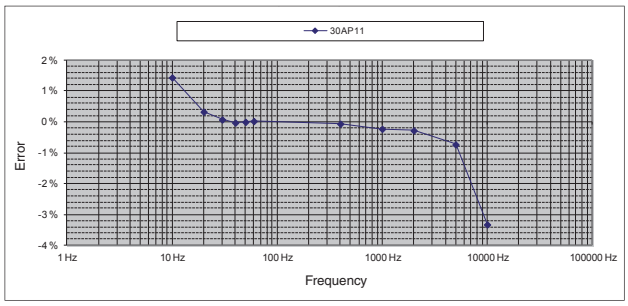

| To order | | Reference |
|---|---|---|
| AmpFlex® **A110** | **30-300-3k-30k A / 3 V,** length **120 cm**<br>Output via cable terminated by 2 x Ø 4 mm isolated male banana plugs | P01120632 |

# Flexible probe for AC current
# Model A110 30-300-3000-30000/3

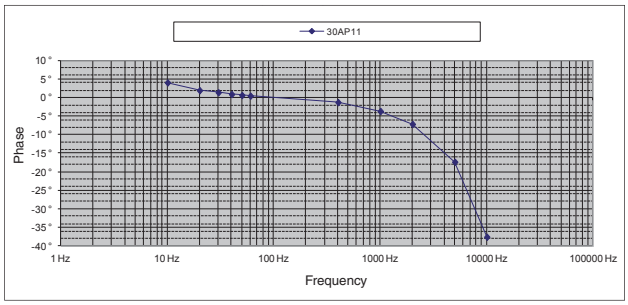
## FREQUENCY RESPONSE

### 30 A calibre

Typical error on measurement according to frequency for a current of 2 A

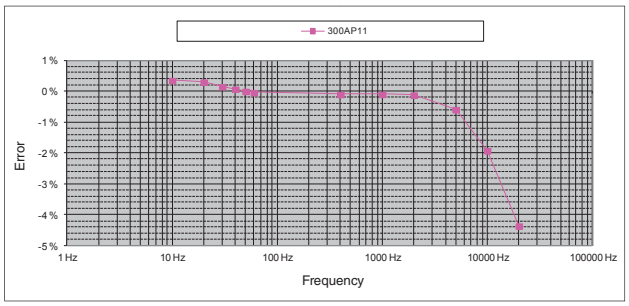



Typical phase shift according to frequency for a current of 20 A

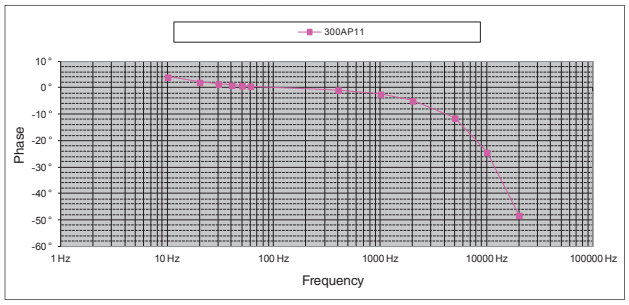



### 300 A calibre

Typical error on measurement according to frequency for a current of 20 A

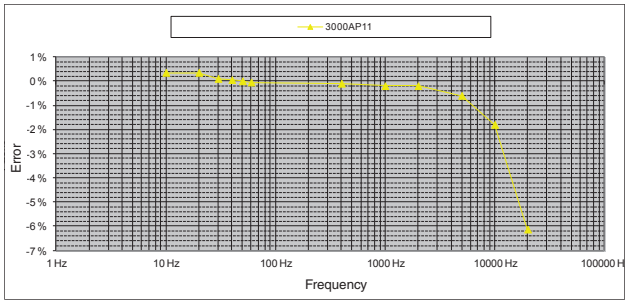



Typical phase shift according to frequency for a current of 20 A

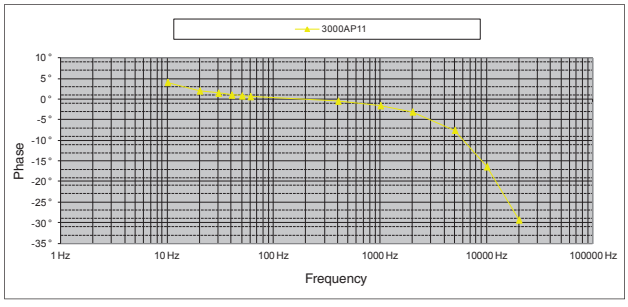



### 3,000 A calibre

Typical error on measurement according to frequency for a current of 20 A

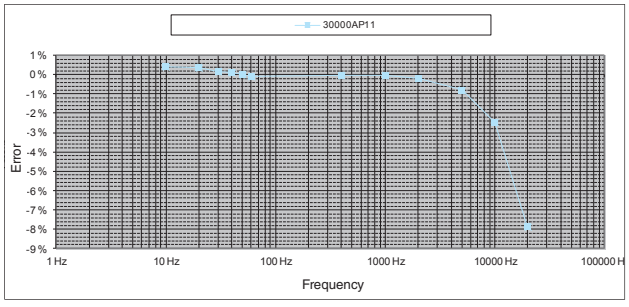



Typical phase shift according to frequency for a current of 20 A

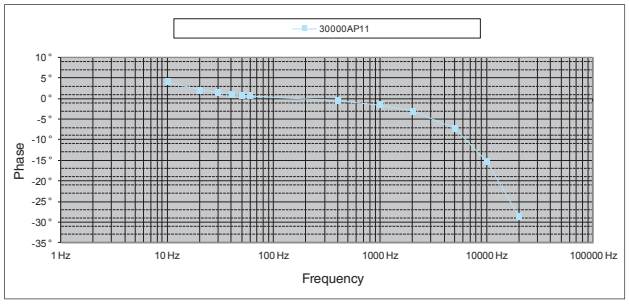



### 30,000 A calibre

Typical error on measurement according to frequency for a current of 20 A




Typical phase shift according to frequency for a current of 20 A



# Flexible probe for AC current
# Model A110 on request

## CONFIGURATIONS

Level 1 | A | 1 | 1 | 0 | | | | | | | | | | | |

**1 Category**

| A | 1 | 1 | 0 |
|---|---|---|---|

**2 Lead length in centimeters**

Min value : **050** (50 cm)
Max value : **995** (9.95 m)

Increment per 5 cm section

| .. | .. | .. |
|---|---|---|

On request - Modulo 5 cm
Coding over 3 characters
E.g. 50 cm = 050; 9 m = 900

**3 Length of connection lead in centimeters**

Min value : **050** (50 cm)
Max value : **995** (9.95 m)

Increment per 5 cm section

| .. | .. | .. |
|---|---|---|

On request - Modulo 5 cm
Coding over 3 characters
E.g. 50 cm = 050; 9 m = 900

**4 Output via**

**A:** coaxial cable of the length to be defined in 5 terminated by a 600 V CAT III isolated male BNC socket
**B:** cable 50 cm long terminated by 2 red/black Ø 4 mm isolated male banana plugs rated 600 V CAT IV
**C:** shielded cable with 2 bared, tin-plated conductors of the length to be defined in 5, rated 600 V CAT IV

| .. |
|---|

**5 Output cable length in cm**

If 4 = "A"

Min value : **050** (50 cm)
Max value : **110** (1.10 m)

Increment per 5 cm section

If 4 = "C"

Min value : **050** (50 cm)
Max value : **995** (9.95 m)

Increment per 5 cm section

| .. | .. | .. |
|---|---|---|

On request - Modulo 5 cm
Coding over 3 characters
E.g. 50 cm = 050; 1 m = 100

**6 Measurement calibres (sensitivities)**

**A:** 3 A-30 A-300 A -3000 A/3 V (1 V-100 mV-10 mV-1 mV/A)
**B:** 30 A-300 A -3,000 A-30,000 A / 3 V (100 mV-10 mV-1 mV-0.1 mV / A)

| .. |
|---|

| Reference: (products available in stock) | Codes |
|---|---|
| A 1 1 0 0 8 0 2 0 0 B 0 5 0 A | P01120631 |
| A 1 1 0 1 2 0 2 0 0 B 0 5 0 B | P01120632 |

# Flexible probe for AC current
# Model A130 30-300-3000/3 Three-phase

| Current | 30 A AC | 300 A AC | 3,000 A AC |
|---|---|---|---|
| Output | 100 mV/A | 10 mV/A | 1 mV/A |

## DESCRIPTION

The AmpFlex® A130 is a flexible sensor which comprises an active part (Rogowski coil) and a casing containing an electronic processing unit. Unlike current clamps using magnetic circuits, the AmpFlex® models are flexible sensors without magnetic saturation constraints. As a result, they offer excellent linearity, low phase shift, a large dynamic range for measurement (up to several kA) while remaining easy to use. The sensors' flexibility makes it easy to clamp the conductor, whatever its type (cable, busbar, strand, etc.) and access conditions.
The design of the click-together opening and closing system means it can be handled with protective gloves.
The AmpFlex® A130 can be connected to the AC voltage input (mV AC, V AC) of any multimeter or measuring instrument equipped with Ø 4 mm female banana plugs.
The AmpFlex® A130 can be powered by batteries or a standard external power supply. If the power supply fails, the instrument's batteries take over. To maximize the battery life, the MiniFlex® A130 has an automatic standby system which can be deactivated at start-up to perform long-term measurement campaigns.
The MiniFlex® A130 has 3 green, yellow and red LEDs indicating, respectively, the power supply status, the status of the automatic standby function and any overruns of the measurement capacity.

## SPECIFICATIONS FOR CURRENT MEASUREMENT (1)

| Calibre ($I_N$) | 30 A | 300 A | 3,000 A |
|---|---|---|---|
| Measurement range in use | 0.5 .. 30 A AC | 0.5 .. 300 A AC | 0.5 .. 3,000 A AC |
| Specified measurement range | 5 .. 30 A AC | 5 .. 300 A AC | 50 .. 3,000 A AC |
| Output/input ratio | 100 mV / A | 10 mV / A | 1 mV / A |
| Bandwidth at -3 dB | 10 Hz .. 20 kHz | 10 Hz .. 20 kHz | 10 Hz .. 20 kHz |
| Frequency limitation | Null | Null | See curve |
| Intrinsic uncertainty | ≤ 1 % + 4 mV | ≤ 1.5 % (I < 10 % $I_N$)<br>≤ 1 % (I ≥ 10 % $I_N$) | ≤ 1.5 % (I < 10 % $I_N$)<br>≤ 1 % (I ≥ 10 % $I_N$) |
| Phase shift at 50 Hz | ≤ 1° (0.5° typical) | ≤ 1° (0.5° typical) | ≤ 1° (0.5° typical) |

## ELECTRICAL SPECIFICATIONS (1)

- **Operating voltage:**
  1,000 VRMS (Cat. IV)
- **Battery:**
  Two 1.5 V batteries (NEDA 15A, IEC LR6, AA)
  +5 VDC with a type B micro-USB connector
- **Battery life (2):**
  500 hours typical
  3,000 10-minute approx. measurements
- **Consumption:**
  10 µA (position OFF)
  90 µA (sleep mode)
- **Battery level indication:**
  Flashing green LED (batteries voltage > 2 V)
- **Influence of battery voltage:**
  ≤ 0.1 % (0.02 % typical) from 3.1 V to 2 V
- **Influence of temperature:**
  ≤ 0.5 % (0.15 % typical) of output signal per 10 °K
- **Influence of relative humidity:**
  ≤ 0.5 % (0.2 % typical) of output signal
- **Influence of conductor position in the sensor (3)**
  ≤ 2.5 % (1 % typical)
- **Influence of sensor deformation (4):**
  ≤ 1 % (0.2 % typical)
- **Influence of adjacent conductor (5):**
  ≤ $I_{ADJ}$ x 1 % (2 % near click-lock system)
  (0.2 % typical)
- **Input impedance of the measuring instrument:**
  ≥ 1 MΩ
- **Common mode rejection (6):**
  ≤ 80 dB (100 dB typical)
- **Influence of the measurement instrument's impedance Z:**
  ≤ 0.1 % at 10 kΩ

# Flexible probe for AC current
# Model A130 30-300-3000/3 Three-phase

## MECHANICAL SPECIFICATIONS

- **Clamping capacity:**
  Model 80 mm: Ø max 12.5 mm
- **Bending radius:**
  ≥ 40 mm
- **Operating temperature:**
  -10 °C to +55 °C
- **Storage temperature:**
  -40 °C to +70 °C
- **Max temperature of measured cable:**
  90 °C for 10 minutes max.
- **Relative humidity for operation:**
  0 to 85 % RH decreasing linearly above 35 °C
- **Operating altitude:**
  0 to 2,000 m
- **Casing protection rating (leakproofing):**
  Casing: IP54
  Flexible sensor: IP 67
  According to IEC 60529 Ed. 2.2-2013
- **Drop test:**
  1 m (IEC 68-2-32)
- **Self-extinguishing capability:**
  Casing: UL94-V2
  Sensor: UL94 V0
- **Dimensions:**
  Casing: 120 x 55 x 39 (overall)
  Connector lead: 3 m (connects sensor to casing)
  Length of output cable: 0.5 m
  Ø of sensor: 12 mm
  Connection cable Ø: 4 mm
- **Weight:**
  1 kg
- **Colours:**
  Sensor: red
  Click-lock system: dark grey
  Casing: dark grey
- **Output:**
  3 coaxial cables with reinforced or double isolation terminated by 1 black isolated male BNC plug

## SAFETY SPECIFICATIONS

- **Electrical safety:**
  Class II equipment with double or reinforced insulation between the primary and the secondary (winding connected to the connection cable) as per EN 61010-1 and 61010-2-032 Ed. 03-2012:

  Sensor:
  - Type B
  - 1,000 V Cat. IV pollution degree 2

  Casing:
  - 600 V Cat. III between the terminals and the external enclosure of the casing
- **Electromagnetic compatibility (EMC):**
  Complies with the industrial environments according to EN 61326-1 Ed. 02-2012:
  - Immunity to radiated fields: at 3 V/m, error ≤ 5 % of measurement range (criterion A)

(1) Conditions of reference: 23 °C ± 5 °K, 20 % to 75 % RH
Battery voltage 3.2 V ± 0.1 VDC
Frequency and form of signal measured: 30 to 440 Hz sinusoidal
Continuous magnetic field < 40 A/m
Absence of external AC magnetic field
Absence of external electrical field
Measured conductor centred in the circular sensor (coil) after operation for 1 minute
Measurement instrument input impedance ≥ 1 MΩ

(2) With 3,000 mA/h batteries, for a supplied voltage between 3.2 V and 1.8 V (1.6 V to 0.9 V per battery), giving an average voltage of 2.8 V

(3) Whatever the conductor's position within the loop, as long as the sensor is not distorted (circular sensor)

(4) Oblong shape

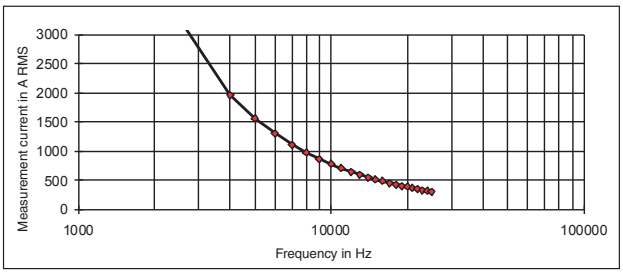
(5) Adjacent conductor carrying an AC current $I_{ADJ}$, in contact with the sensor

(6) For a 600 V voltage applied between the enclosure and the secondary

(7) Delivered with a set of 3 female BNC/ Ø 4 mm isolated male banana adapters with 19 mm spacing and a set of identifiers (12 colours)

3,000 A calibre

Limitation of current measured according to frequency



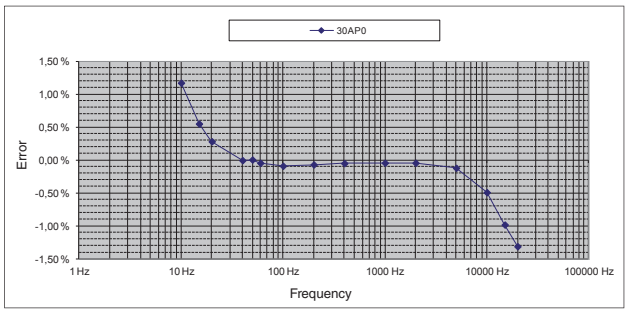

| To order | | Reference |
|---|---|---|
| AmpFlex® **A130** | **30-300-3,000 A / 3 V,** length **80 cm**<br>Output via 3 coaxial cables terminated by 1 isolated male BNC plug | P01120633 |

# Flexible probe for AC current
# Model A130 30-300-3000/3 Three-phase

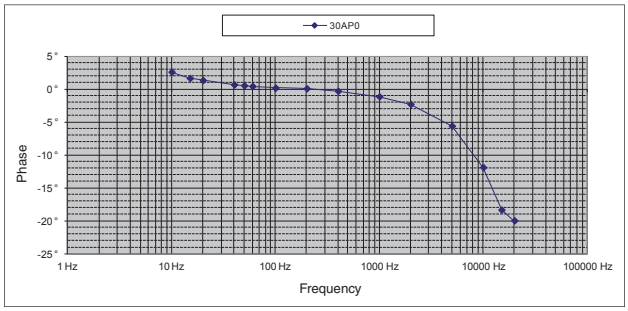
## FREQUENCY RESPONSE

### 30 A calibre

Typical error on measurement according to frequency for a current of 20 A

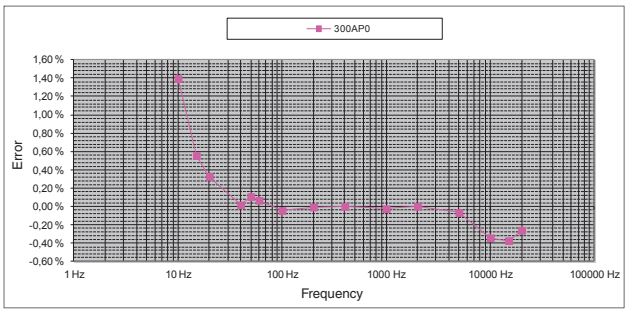



Typical phase shift according to frequency for a current of 20 A

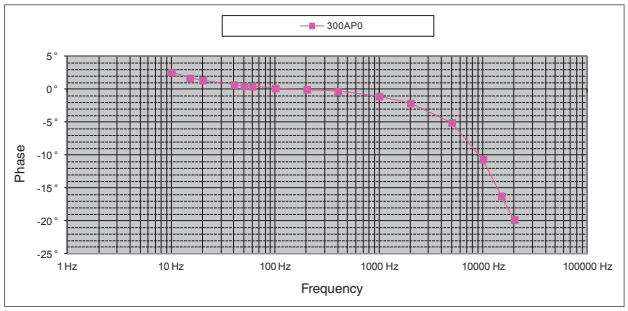



### 300 A calibre

Typical error on measurement according to frequency for a current of 20 A

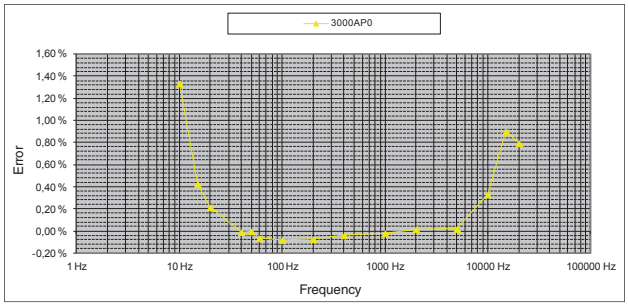



Typical phase shift according to frequency for a current of 20 A

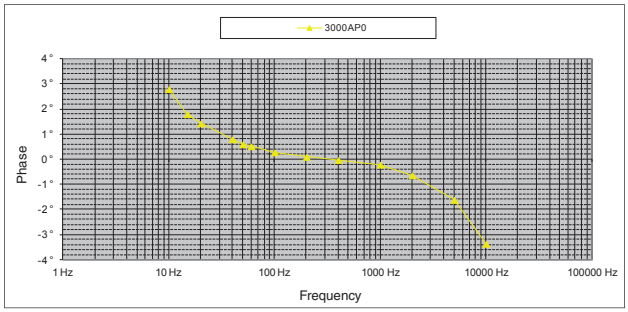



### 3,000 A calibre

Typical error on measurement according to frequency for a current of 20 A




Typical phase shift according to frequency for a current of 20 A



# Flexible probe for AC current
# Model A130 on request

## CONFIGURATIONS

Level 1 | A | 1 | 3 | 0 | | | | | | | | | | | |

**1 Category**

**2 Lead length in centimeters**

Min value : **050** (50 cm)
Max value : **995** (9.95 m)

Increment per 5 cm section

| A | 1 | 3 | 0 |
|---|---|---|---|
| .. | .. | .. | |

On request - Modulo 5 cm
Coding over 3 characters
E.g. 50 cm = 050; 9 m = 900

**3 Length of connection lead in centimeters**

Min value : **050** (50 cm)
Max value : **995** (9.95 m)

Increment per 5 cm section

| .. | .. | .. |
|---|---|---|

On request - Modulo 5 cm
Coding over 3 characters
E.g. 50 cm = 050; 9 m = 900

**4 Output via**

**A:** coaxial cable of the length to be defined in 5 terminated by a 600 V CAT III isolated male BNC socket
**B:** cable 50 cm long terminated by 2 red/black Ø 4 mm isolated male banana plugs rated 600 V CAT III
**C:** shielded cable with 2 bared, tin-plated conductors of the length to be defined in 5, rated 600 V CAT III

| .. |
|---|

**5 Output cable length in cm**

If 4 = "A"

Min value : **050** (50 cm)
Max value : **110** (1.10 m)

Increment per 5 cm section

| .. | .. | .. |
|---|---|---|

On request - Modulo 5 cm
Coding over 3 characters
E.g. 50 cm = 050; 1.10 m = 110

If 4 = "C"

Min value : **050** (50 cm)
Max value : **995** (9.95 m)

Increment per 5 cm section

| Reference: (products available in stock) | Codes |
|---|---|
| A 1 3 0 0 8 0 3 0 0 A 0 5 0 | P01120633 |


## K SERIES

The K series is a new product range with exceptional measurement capabilities.

Extremely compact in design, these “micro-probes” are designed for highly accurate measurement of very low currents.

Their small dimensions and shape make them ideal for probing into tight spaces where access is limited, as is the case on most switchboards, 4-20 A process loops or vehicle wiring looms for example.

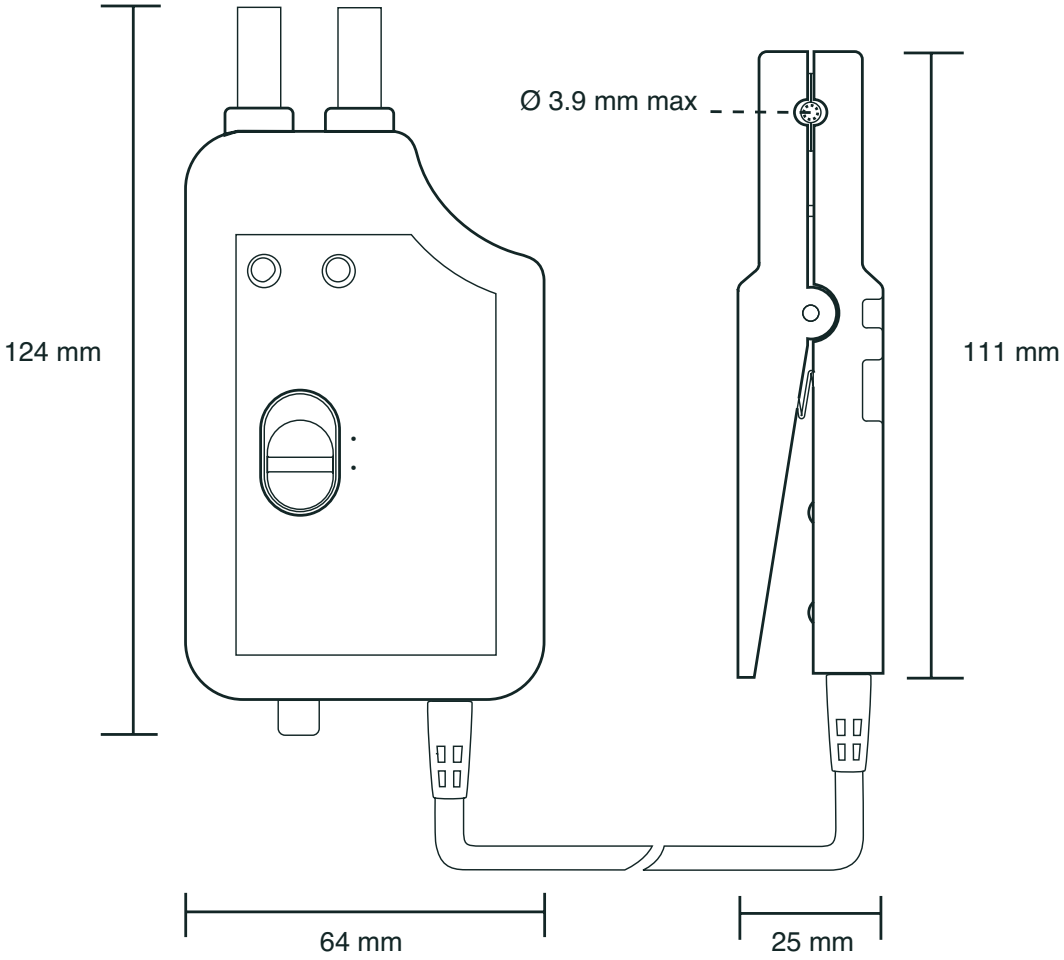
These “K” series current probes make excellent work companions for multimeters and any other instrument able to make use of their high sensitivity, dynamic range and ability to indicate the shapes of signals and waveforms.

They give an AC+DC output signal that is proportional to the measured current, without needing to change the range or filter the signal. RMS measurements are possible with DC+AC components.

There are two different types of K series current probes available.

Model K1 gives a 1 mV/mA output and lends itself to a variety of different applications, oriented towards low-current measurement.

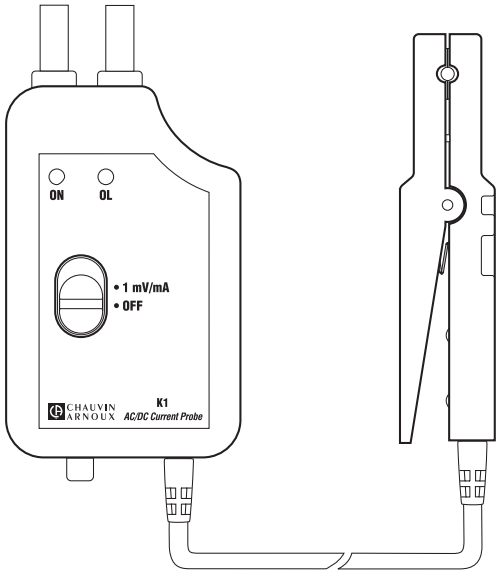
Model K2 has a greater level of sensitivity with its 10 mV/mA output.


Ø 3.9 mm max
124 mm
111 mm
64 mm
25 mm

# AC/DC current probe
# Model K1



| | |
|---|---|
| **Current** | 4500 mA DC<br>3000 mA AC |
| **Output** | 1 mV/mA |




## DESCRIPTION

The K1 model measures currents as low as 100 µA AC or DC. The clamp provides a proportional output signal enabling direct readings on multimeters.

## ELECTRICAL SPECIFICATIONS

- **Current calibres:**
  1 mA DC .. ± 4.5 A DC
  1 mA RMS .. 3 A RMS (sinusoidal)
  1 mA .. 4.5 A peak, square and steps
- **Output (output voltage):**
  1 mV/mA
- **Resolution:**
  DC: 50 µA typical
  AC: 100 µA typical
- **Accuracy (1):**

▪ DC current

| Primary current | 1 mA .. 10 mA | 10 mA .. 120 mA | 120 mA .. 4500 mA |
|---|---|---|---|
| % Accuracy of output signal | 2 % ± 0.2 mV | 2 % ± 0.1 mV | 1 % |

▪ AC current from 45 Hz to 65 Hz

| Primary current | 1 mA .. 10 mA | 10 mA .. 120 mA | 120 mA .. 3000 mA |
|---|---|---|---|
| % Accuracy of output signal | 3 % ± 0.3 mV | 3 % ± 0.1 mV | 1 % |

- **Frequency response:**
  DC to 2 kHz (at -3 dB)
- **Load impedance:**
  ≥ 1 MΩ and ≤ 100 pF
- **Output noise:**
  < 100 µV, DC to 3 kHz
- **Output impedance:**
  220 Ω
- **Inductance of clamp:**
  < 1 µH
- **Rise time:**
  < 200 µs, 10 % at 90 %
- **Fall time:**
  < 200 µs, 90 % at 10 %
- **Influence of adjacent conductors:**
  (50 Hz at 23 mm from the clamp): < 100 µA/A
- **Influence of earth field:**
  < 120 µA
- **Battery:**
  Alkaline 9 V, NEDA 1604, 6LR61 or IEC 6 LF22
- **Low battery signal:**
  Green LED when battery voltage > 6.5 V
- **Battery charge life:**
  Approximately 20 hours
- **Overload indication:**
  Red LED indicating momentary or continuous overload
- **Max. current:**
  200 A AC or DC with current limitation according to with frequency, above 400 Hz

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  -10 °C to +55 °C
- **Storage temperature:**
  -40 °C to +80 °C
- **Influence of temperature:**
  < 1,000 ppm/°K or 1 % /10 °C
- **Humidity:**
  < 95 % for < 35 °C, 75 % at +55 °C
- **Operating altitude:**
  0 to 2,000 m
- **Adjustment of DC zero:**
  approximately ±25 mA by turning the button on the bottom of the housing
- **Max. jaw insertion capacity:**
  Ø 3.9 mm
- **Protection rating:**
  Casing: IP 40 in accordance with IEC 529
- **Drop test:**
  1.0 in accordance with IEC 68-2-32
- **Shock resistance:**
  100 g in accordance with IEC 68-2-27
- **Vibration resistance:**
  in accordance with IEC 68-2-6
- **Frequency range:**
  5 to 15 Hz, amplitude: 1.5 mm
  15 to 25 Hz: amplitude: 1 mm
  25 to 55 Hz: amplitude: 0.25 mm
- **Dimensions:**
  Electronic module: 124 x 64 x 28 mm
  Probe: 111 x 15 x 25 mm
- **Cable length:**
  1.5 m
- **Weight:**
  250 g
- **Colour:**
  Dark grey
- **Output:**
  Two 4 mm safety terminals 19 mm apart. (standard)

## SAFETY SPECIFICATIONS

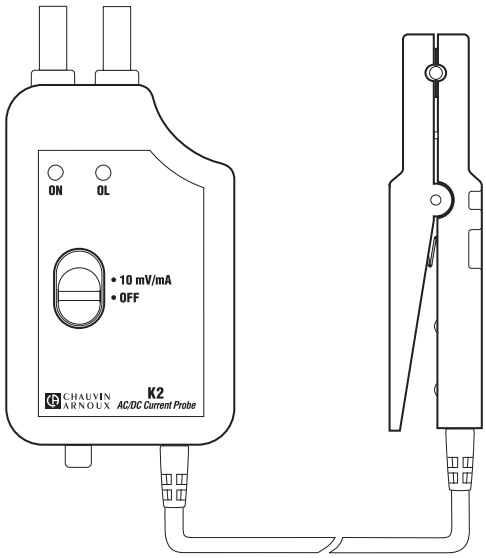
- **Operating voltage:**
  300 V in accordance with IEC 1010-1 Cat. II
- **Electromagnetic compatibility:**
  Immunity (EN 50082-1): class A
  DC: 15 mV for 0
  AC (60 Hz): 2 dB from 10 mA .. 4.5 A
  Emissivity (EN 50081-1): negligible

(1) Conditions of reference: 23 °C ± 3 °C, 20 % to 75 % RH, batteries 9 V ± 0.1 V, earth's magnetic field < 40 A/m, no AC field, DC or sinusoidal current from 45 Hz to 65 Hz

| To order | Reference |
|---|---|
| AC/DC current clamp model **K1** in carrying case with battery and user's manual | P01120067A |

# AC/DC current probe
# Model K2

| | |
|---|---|
| **Current** | 450 mA DC<br>300 mA AC |
| **Output** | 10 mV/mA |




## DESCRIPTION

The K2 model measures currents as low as 100 µA AC or DC. The probe has a proportional output for direct readings on multimeters.

## ELECTRICAL SPECIFICATIONS

- **Current calibres:**
  0.1 mA DC .. ± 450 mA DC
  0.1 mA RMS .. 300 mA RMS (sinusoidal)
  0.1 mA peak .. 450 mA peak, signal square and steps
- **Output (output voltage):**
  10 mV/mA
- **Resolution:**
  DC: 50 µA typical
  AC: 100 µA typical
- **Accuracy** (1)**:**

▪ DC current

| Primary current | 0.1 mA .. 1 mA | 1 mA .. 12 mA | 12 mA .. 450 mA |
|---|---|---|---|
| % Accuracy of output signal | 3 % ± 2 mV | 2 % ± 2 mV | 1 % |

▪ AC current from 45 Hz to 65 Hz

| Primary current | 0.1 mA .. 1 mA | 1 mA .. 12 mA | 12 mA .. 300 mA |
|---|---|---|---|
| % Accuracy of output signal | 3 % ± 0.5 mV | 2 % ± 0.5 mV | 1 % |

- **Frequency response:**
  DC to 1.5 kHz (at -3 dB)
- **Load impedance:**
  ≥ 1 MΩ and ≤ 100 pF
- **Output noise:**
  < 100 µV DC to 1.5 kHz
- **Output impedance:**
  200 Ω
- **Inductance of clamp:**
  < 1 µH
- **Rise time:**
  < 200 µs, 10 % at 90 %
- **Fall time:**
  < 200 µs, 90 % at 10 %
- **Influence of adjacent conductors:**
  (50 Hz at 23 mm from the clamp): < 100 µA / A
- **Influence of earth field:**
  < 120 µA, 0 .. max
- **Battery:**
  Alkaline 9 V, NEDA 1604, 6LR61 or IEC 6 LF22
- **Low battery signal:**
  Green LED when battery voltage > 6.5 V
- **Battery charge life:**
  Approximately 20 hours
- **Overload indication:**
  Red LED indicating momentary or continuous overload
- **Max. current:**
  100 A AC RMS or DC with current limitation according to with frequency, above 800 Hz

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  -10 °C to +55 °C
- **Storage temperature:**
  -40 °C to +80 °C
- **Influence of temperature:**
  < 500 ppm/°K or 0.5 % / 10 °C
- **Humidity:**
  < 95 % at < 35 °C, 75 % at 55 °C
  Operating altitude: 0 to 2,000 m
- **Adjustment of DC zero:**
  Approximately ±15 mA by turning the button on the bottom of the housing (10 turns)
- **Max. jaw insertion capacity:**
  3.9 mm
- **Protection rating:**
  IP40 par IEC 529
- **Drop test:**
  1.0 in accordance with IEC 68-2-32
- **Shock resistance:**
  100 g par IEC 68-2-27
- **Vibration resistance:**
  in accordance with IEC 68-2-6
- **Frequency range:**
  5 Hz .. 15 Hz, amplitude: 1.5 mm
  15 Hz .. 25 Hz: amplitude: 1 mm
  25 Hz .. 55 Hz: amplitude: 0.25 mm
- **Dimensions (electronic module):**
  124 x 64 x 28 mm
- **Dimension (probe):**
  111 x 15 x 25 mm
- **Cable length:**
  1.5 m
- **Weight:**
  250 g
- **Colour:**
  Dark grey
- **Output:**
  Two 4 mm safety terminals 19 mm apart (standard)

## SAFETY SPECIFICATIONS

- **Operating voltage:**
  300 V in accordance with IEC 1010-1 Cat. II
- **Electromagnetic compatibility:**
  Immunity (EN 50082-1): class A
  DC: 15 mV for 0
  AC (60 Hz): 2 dB from 10 mA .. 4.5 A
  Emissivity (EN 50081-1): negligible

(1) Conditions of reference: 23 °C ± 3 °C, 20 °C to 75 % RH, batteries 9 V ±0.1 V, earth's magnetic field < 40 A/m, no AC field, DC or sinusoidal current from 45 Hz to 65 Hz

| To order | Reference |
|---|---|
| AC/DC current clamp model **K2** in carrying case with battery and user's manual | P01120074A |

## SERIE EN

The EN series clamps use Hall-effect technology for the measurement of AC and DC currents from several milliamps to over 100 A.

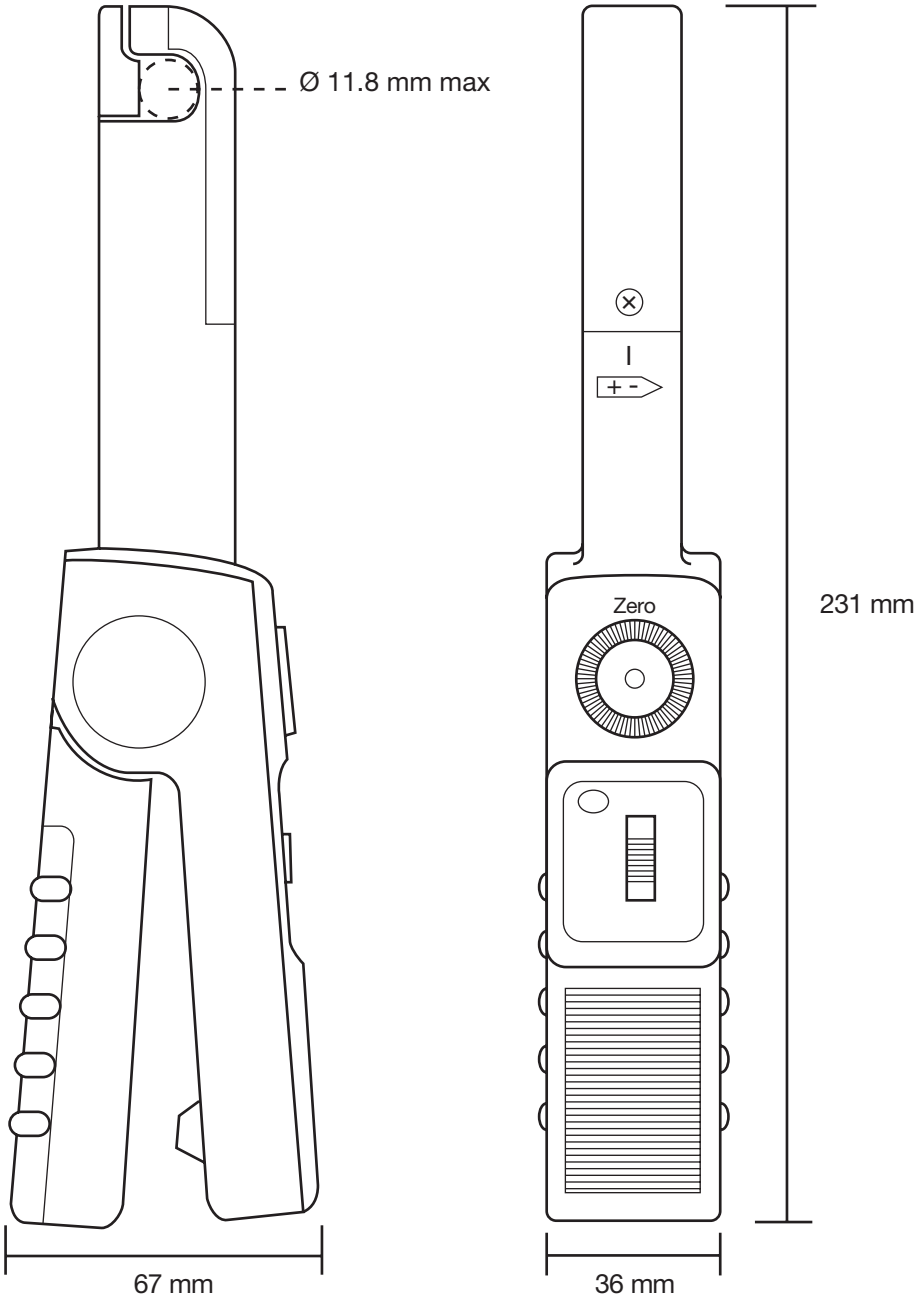
These clamps' narrow, elongated design makes them ideal for measurements in cable bundles or in other confined areas like circuit boards, motor controls or motor vehicle electrical circuits.

Their low phase shifting also ensures excellent performance for power measurements.

These clamps have a voltage output (mv) and their ability to measure AC and DC signals is useful for true RMS measurements.

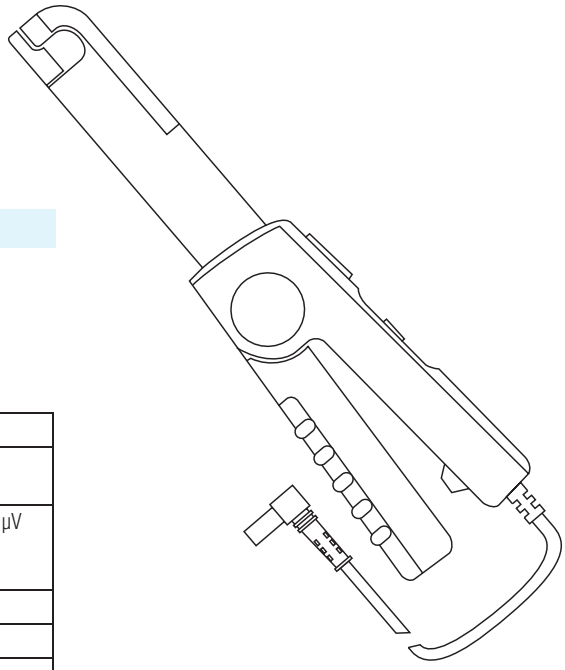
Model E6N is the most sensitive for low current measurements.

The E series clamps all make excellent work mates for multimeters, recorders and logging equipment, etc. Model E3N can even be connected directly to an oscilloscope.


Ø 11.8 mm max
Zero
231 mm
67 mm
36 mm

# Current clamp for AC/DC current
# Model E1N

| | | |
|---|---|---|
| **Current** | 2 A AC/DC | 150 A AC/DC |
| **Output** | 1 mV/mA | 1 mV/A |



## ELECTRICAL SPECIFICATIONS

- **Current range:**
  50 mA .. 150 A AC/DC over two calibres
- **Output signal:**
  1 mV/mA and 1 mV/A AC or DC
- **Accuracy and phase shift (1):**

| Calibre | 1 mV/mA (1 V/A) | 1 mV/A |
|---|---|---|
| Current range | 50 mA .. 2 A DC<br>50 mA .. 1.5 A AC | 500 mA .. 150 A |
| Accuracy in %<br>of output signal | 2 % ± 20 mV | 500 mA .. 100 A AC/DC: 1.5 % ± 30 µV<br>100 A .. 150 A DC: 3 %<br>100 A .. 120 A AC: 3 % |
| Frequency range | DC .. 65 Hz: 3° | DC .. 65 Hz: 1° |
| Phase shift | not specified | not specified |
| Load impedance minutes | ≥ 10 kΩ | ≥ 2 kΩ |
| Noise | DC .. 1 Hz: 3 mV<br>1 Hz .. 10 kHz: 10 mV<br>10 kHz .. 100 kHz: 18 mV | DC .. 1 Hz: 3 µV<br>1 Hz .. 10 kHz: 10 µV<br>10 kHz .. 100 kHz: 18 µV |

- **Operating voltage:**
  600 V RMS max
- **Common mode voltage:**
  600 V RMS max
- **Battery:**
  9 V alkaline (NEDA 1604A, IEC 6LR61)
- **Battery life:**
  70 hours typical
- **Typical consumption:**
  6 mA
- **Battery level indicator:**
  Green LED when > 6.5 V

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  0° to +50 °C
- **Storage temperature:**
  -30 °C to +80 °C
- **Influence of temperature:**
  < 0.2 % per °C
- **Relative humidity for operation:**
  +10 °C to +30 °C:
  85 ± 5 % RH (without condensation)
  +40 °C to +50 °C:
  45 ± 5 % RH (without condensation)
- **Operating altitude:**
  0 to 2,000 m
- **Max. jaw insertion capacity:**
  11.8 mm
- **Zero adjustment:**
  20 turns of potentiometer (± 1.5 A minutes)
- **Drop test:**
  1 m on a 38 mm container of oak on concrete, test in accordance with IEC 1010
- **Shock resistance:**
  100 g, in accordance with IEC 68-2-27
- **Vibration resistance:**
  10/55/10 Hz, 0.15 mm
  test in accordance with IEC 68-2-6
- **Casing protection rating:**
  IP20 in accordance with IEC 529
- **Self-extinguishing capability:**
  Casing: UL94 V2
- **Dimensions:**
  231 x 36 x 67 mm
- **Weight:**
  330 g with batteries
- **Colour:**
  Dark grey
- **Output:**
  1.5 m two-wire lead with double or reinforced insulation terminated by 2 elbowed male safety plugs (4 mm)

## SAFETY SPECIFICATIONS

- **Electrical safety:**
  600 V category III, pollution 2
  300 V category IV, pollution 2
- **Electromagnetic compatibility (EMC):**
  EN 50081-1: class B
  EN 50082-2:
  - Electrical discharge IEC 1000-4-2
  - Radiated field IEC 1000-4-3
  - Fast transients IEC 1000-4-4
  - Magnetic field at 50/60 Hz: IEC 1000-4-8

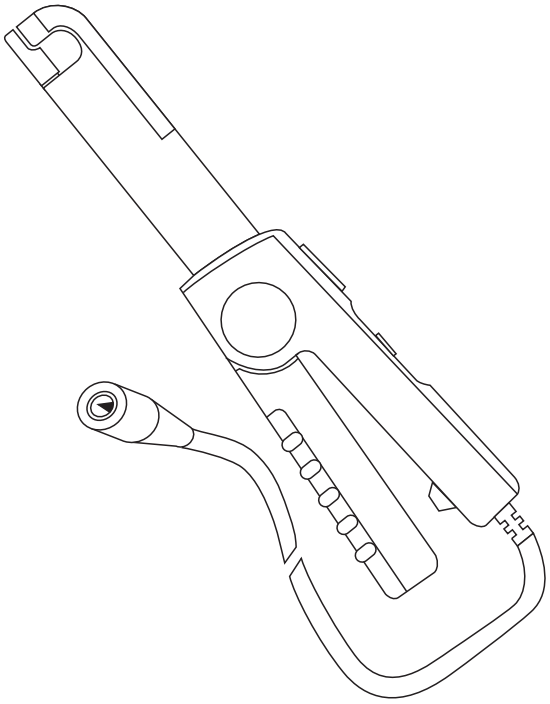
(1) Conditions of reference: 23 °C ±5°K, 20 to 75 % RH, 48 to 65 Hz, external magnetic field < 40 A/m, no current-carrying conductor nearby, centred test sample, load impedance 1 MΩ.

| To order | Reference |
|---|---|
| AC current clamp/DC model **E1N** with battery and user's manual | P01120030A |

# Oscilloscope clamp for AC/DC current

## Model E3N (insulated AC current probe/DC)

| | | |
|---|---|---|
| **Current** | 10 A peak | 100 A peak |
| **Output** | 100 mV/A | 10 mV/A |



## DESCRIPTION

The E3N clamp is designed to measure AC and DC currents by using Hall-effect technology. Its narrow, elongated shape makes it ideal for measurements in cable bundles or in confined spaces such as the wiring on switchboards, motor control units and electrical circuits on motor vehicles. It is particularly appreciated for its True RMS measurements on AC+DC signals. It offers 2 different sensitivities.

## ELECTRICAL SPECIFICATIONS

- **Current range:**
  0.1 A .. 10 A peak
  0.5 A .. 100 A peak
- **Output signal:**
  100 mV AC+DC / A AC+DC (1 V for 10 A)
  10 mV AC+DC / A AC+DC (1 V for 100 A)
- **Accuracy and phase shift (1):**

| Calibre | 10 A | 100 A | |
|---|---|---|---|
| Current range | 100 mA .. 10 A peak | 500 mA .. 40 A peak | 40 A .. 100 A peak |
| % Accuracy of output signal | ≤ 3 % + 5 mV | ≤ 4 % + 500 µV | ≤ 15 % |
| Phase shift | ≤ 1.5° | ≤ 1° | ≤ 1° |

- **Bandwidth:**
  DC .. 100 kHz (-3 dB) (depending on current value)
- **Rise/fall time from 10 % to 90 %:**
  10 A calibre: 3 µs
  100 A calibre: 4 µs
- **10 % delay time:**
  10 A calibre: 2,7 µs
  100 A calibre: 1,8 µs
- **Insertion impedance (at 10 kHz / 50 kHz):**
  < 1.3 mΩ / < 10 mΩ
- **DC zero adjustment:**
  20 turns of potentiometer
- **Typical output noise level (peak-peak) from DC to 100 kHz:**
  10 A calibre: 6 mV
  100 A calibre: 600 µV
- **Battery:**
  9 V alkaline (NEDA 1604A, IEC 6LR61)
- **Battery life:**
  55 hours typical
- **Typical consumption:**
  8.6 mA typical / 12 mA max.
- **Battery level indicator:**
  Green LED when > 6.5 V
- **Overload indication:**
  Red LED indicates the measured current is too high for the selected range
- **Influence of temperature:**
  ≤ 2,000 ppm /°C
- **Influence of conductor position in jaws:**
  ≤ 0.5 % of output signal at 1 kHz
- **Common mode voltage (600 V max) for AC measurements (typical/max):**
  10 A calibre:
  At 50 Hz: 3.48 mA/100 V / 5 mA/100 V
  At 400 Hz: 25.91 mA/100 V / 50 mA/100 V
  100 A calibre: no measurement

## MECHANICAL SPECIFICATIONS

- **Clamping capacity:**
  Cable: Ø max 11.8 mm
- **Output:**
  Via 2 m coaxial cable terminated by BNC insulated plug
- **Dimensions:**
  231 x 67 x 36 mm
- **Weight:**
  330 g with battery
- **Operating temperature:**
  0° à +50°C
- **Storage temperature:**
  -30 °C to +80 °C
- **Relative humidity for operation:**
  0 to 85 % RH with a linear decrease above 35°C
- **Operating altitude:**
  0 to 2,000 m
- **Casing protection rating:**
  IP20 (IEC 529)
- **Drop test:**
  1 m (IEC 68-2-32)
- **Shock resistance:**
  100 g / 6 ms / half-periode (IEC 68-2-27)
- **Vibration resistance:**
  10/55/10 Hz, 0.15 mm (IEC 68-2-6)
- **Self-extinguishing capability:**
  UL94 V2
- **Colour:**
  Dark grey

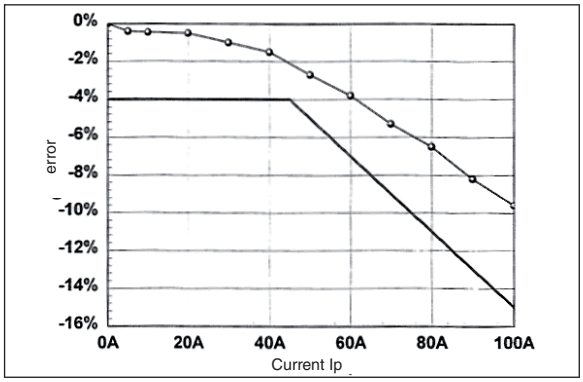
## SAFETY SPECIFICATIONS

- **Electrical safety:**
  Instrument with double insulation or reinforced insulation between the primary the secondary and the grippable part located under the guard as per IEC 1010-1 & IEC 1010-2-032
  - 600 V category III, pollution degree 2
  - 300 V category IV, pollution degree 2
- **Electromagnetic compatibility (EMC):**
  EN 50081-1: class B
  EN 50082-2:
  - Electrostatic discharge IEC 1000-4-2:
    4 kV level 2 performance criterion B
    8 kV in the air level 3 performance criterion B
  - Radiated field IEC 1000-4-3:
    10 V/m performance criterion A
  - Fast transients IEC 1000-4-4:
    1 kV level 2 performance criterion B
    2 kV level 3 performance criterion B
  - Magnetic field at the network frequency (IEC 1000-4-8):
    field of 400 A/m at 50 Hz: < 1 A

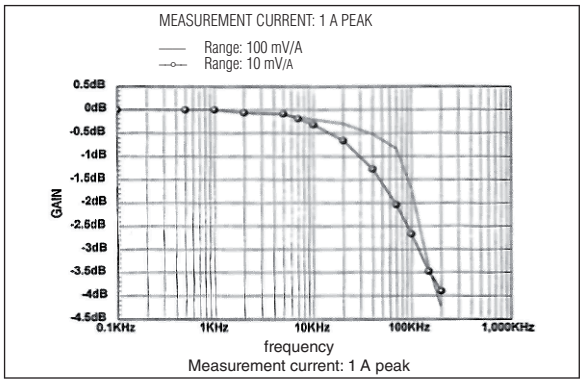
## CURVES

100 A calibre

Linearity with DC

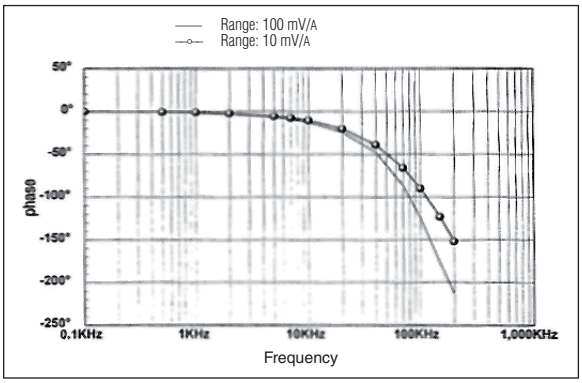



Frequency response

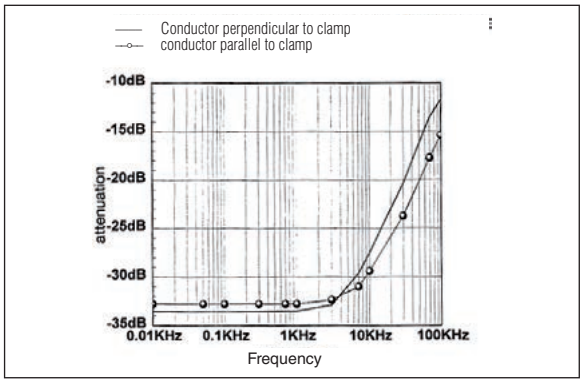



Measurement current: 1 A peak

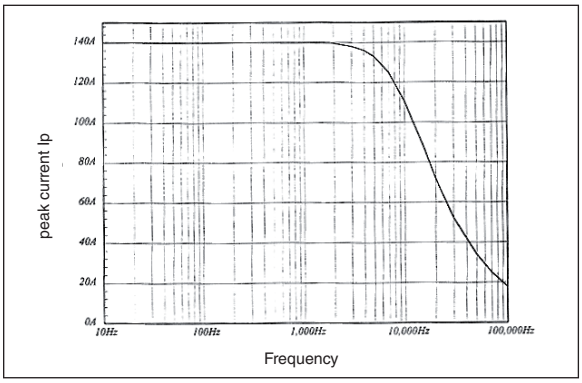
Phase shift




Immunity regarding an external conductor



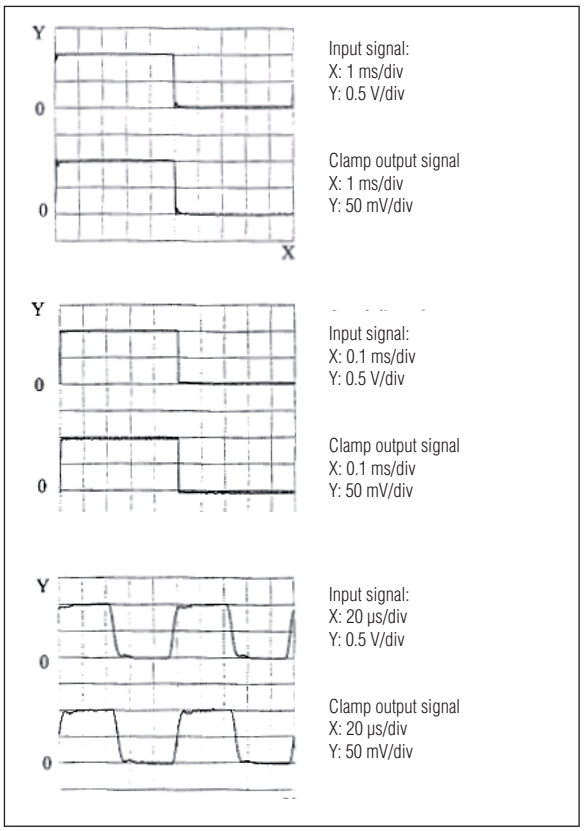

Limitation of measurable current according to the frequency



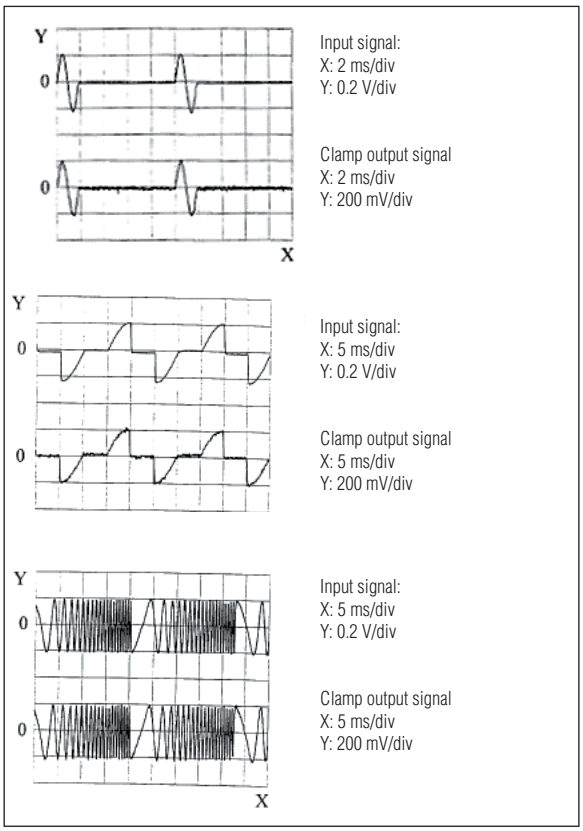
## CURVES

100 A calibre

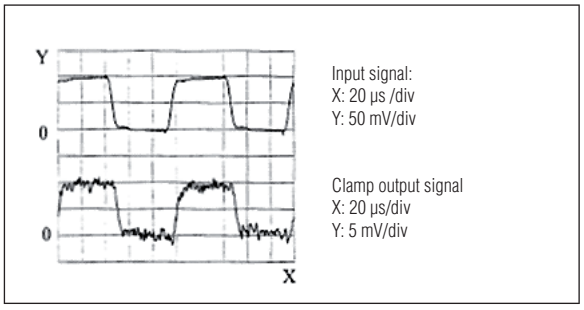
1 A peak




2 A peak



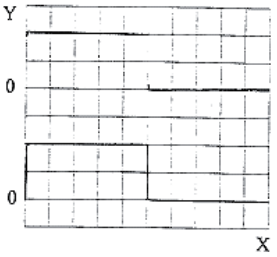

0.1 A peak



## CURVES

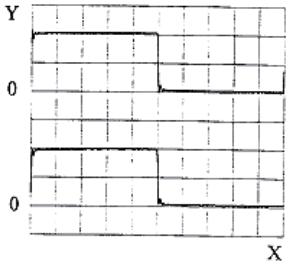
10 A calibre

10 A peak



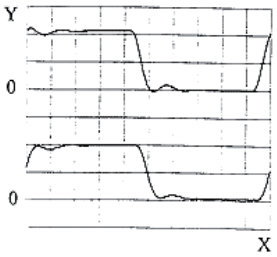

Input signal:
X: 1 ms/div
Y: 0.5 V/div

Clamp output signal
X: 1 ms/div
Y: 50 mV/div




Input signal:
X: 0.1 ms/div
Y: 0.5 V/div

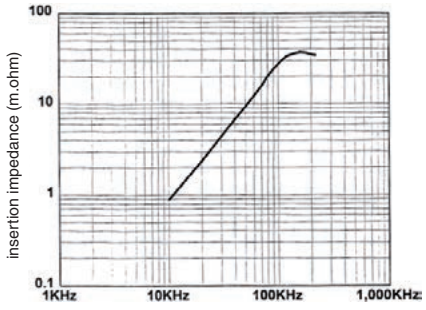
Clamp output signal
X: 0.1 ms/div
Y: 50 mV/div




Input signal:
X: 10 µs/div
Y: 0.5 V/div

Clamp output signal
X: 10 µs/div
Y: 50 mV/div

Insertion impedance

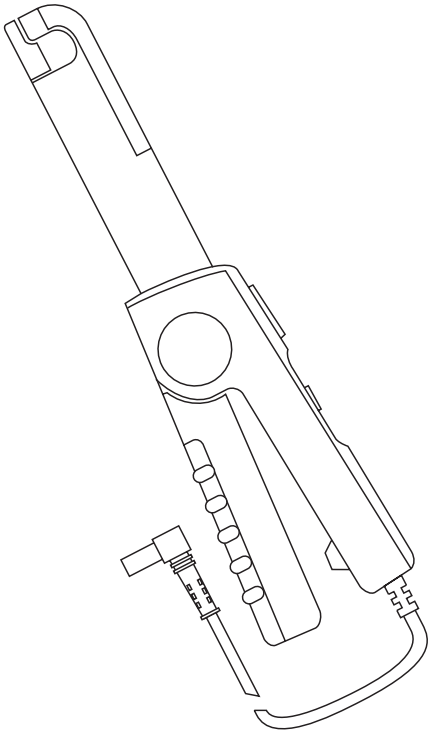



(1) Conditions of reference: 23 °C ± 5 °K, 20 % to 75 % RH, power supply voltage 8 V ± 0.1 V DC sinusoidal signal with frequency of DC to 1 kHz, external magnetic field < 40 A/m, no DC components, no external conductor with circulating current, conductor centred for measurement, load impedance >1 MΩ / < 100 pF.

| To order | Reference |
|---|---|
| AC/DC current clamp model **E3N** for oscilloscope, with battery and user's manual | P01120043A |
| AC/DC current clamp model **E3N** for oscilloscope, with mains power, battery and user's manual | P01120047 |

# Current clamp for AC/DC current
# Model E6N

| Calibre | 2 A AC/DC | 80 A AC/DC |
|---|---|---|
| Output | 1 mV/mA | 10 mV/A |



## ELECTRICAL SPECIFICATIONS

- **Current range:**
  5 mA .. 80 A AC/DC over two calibres
- **Output signal:**
  1 mV/mA and 10 mV/A AC or DC
- **Accuracy and phase shift** (1):

| Calibre | 1 mV/mA (1 V/A) | 10 mV/A |
|---|---|---|
| Current range | 5 mA .. 2 A DC<br>5 mA .. 1.5 A AC | 20 mA .. 80 A DC<br>20 mA .. 80 A AC |
| % Accuracy of output signal | 2 % ± 5 mV | 20 mA .. 50 A DC: 4 % ± 200 µV<br>50 A to 80 A DC: 12 %<br>20 mA .. 40 A AC: 4 % ± 200 µV<br>40 A to 60 A AC: 12 % |
| Frequency range | DC .. 2 kHz | DC .. 8 kHz |
| Phase shift | DC .. 65 Hz: 1° | DC .. 65 Hz: 1° |
| Load impedance minutes | > 10 kΩ | > 2 kΩ |
| Noise | DC .. 1 Hz: 2 mV<br>1 Hz .. 10 kHz: 10 mV<br>10 .. 100 kHz: 10 mV | DC .. 1 Hz: 20 µV<br>1 Hz .. 10 kHz: 100 µV<br>10 .. 100 kHz: 100 µV |

- **Overload:**
  120 A continuous
- **Operating voltage:**
  600 VRMS max
- **Common mode voltage:**
  600 VRMS max
- **Battery:**
  9 V alkaline (NEDA 1604A, IEC 6LR61)
- **Battery life:**
  70 hours typical
- **Typical consumption:**
  6 mA
- **Battery level indicator:**
  Green LED when > 6.5 V

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  0 °C to +50 °C
- **Storage temperature:**
  -30 °C to +80 °C
- **Influence of temperature:**
  < 0.2 % per °C
- **Relative humidity for operation:**
  +10° to +30 °C:
  85 ± 5 % RH (without condensation)
  +40 °C to +50 °C:
  45 ± 5 % RH (without condensation)
- **Operating altitude:**
  0 to 2,000 m
- **Max. jaw insertion capacity:**
  11.8 mm
- **Zero adjustment:**
  20 turns of potentiometer (± 1.5 A minutes)
- **Drop test:**
  1 m on a 38 mm container of oak on concrete, test in accordance with IEC 1010
- **Shock resistance:**
  100 g, in accordance with IEC 68-2-27
- **Vibration resistance:**
  10/55/10 Hz, 0.15 mm
  test in accordance with IEC 68-2-6
- **Casing protection rating:**
  IP20 in accordance with IEC 529
- **Self-extinguishing capability:**
  Casing: UL94 V2
- **Dimensions:**
  231 x 36 x 67 mm
- **Weight:**
  330 g with batteries
- **Colour:**
  Dark grey
- **Output:**
  1.5 m two-wire lead with double or reinforced insulation terminated by 2 elbowed male safety plugs (4 mm)

## SAFETY SPECIFICATIONS

- **Electrical safety:**
  600 V category III, pollution: 2
  300 V category IV, pollution: 2
- **Electromagnetic compatibility (EMC):**
  EN 50081-1: class B
  EN 50082-2:
  - Electrical discharge IEC 1000-4-2
  - Radiated field IEC 1000-4-3
  - Fast transients IEC 1000-4-4
  - Magnetic field at 50/60 Hz IEC 1000-4-8

(1) Conditions of reference: 23 °C ±5°K, 20 to 75 % RH, 48 to 65 Hz, external magnetic field < 40 A/m, no current-carrying conductor nearby, centred test sample, load impedance 1 MΩ

| To order | Reference |
|---|---|
| AC current clamp/DC model **E6N** with battery and user's manual | P01120040A |

# Current clamp for AC/DC current

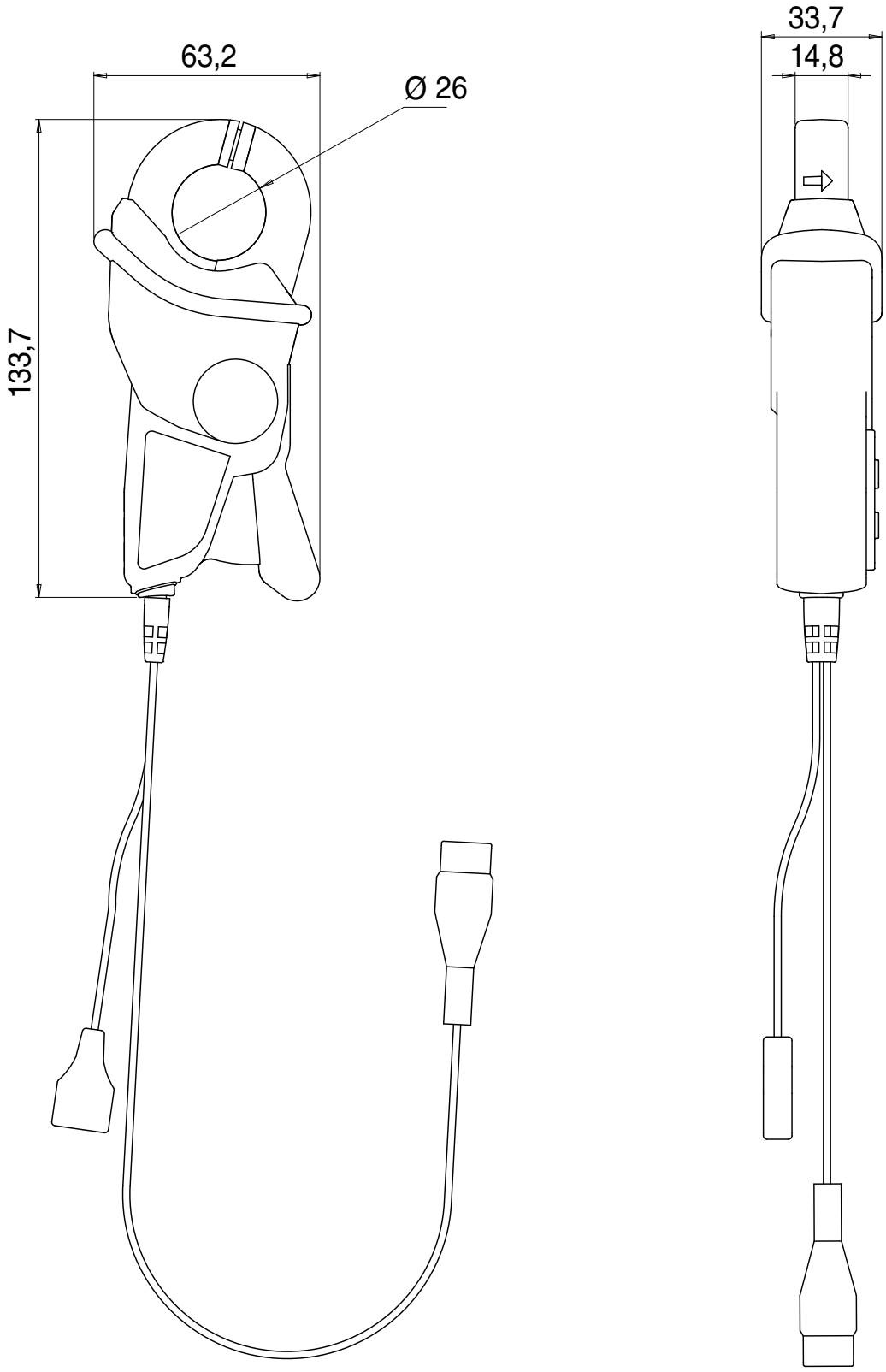
## MH SERIES

The MH60 clamp is designed to measure DC and AC currents up to 1 MHz using dual Hall effect/Transformer technology.

It includes an internal NiMh rechargeable battery and can be recharged or powered using a 5 VDC power supply via the female type-B µUSB connector with which it is equipped.

It has an automatic standby system (which can be deactivated), an automatic “DCzero” system for compensation of magnetic and electronic drift, a switchable selective filter (3 kHz, 30 kHz) and a system for compensating the effects of the earth field and other constant DC fields.

Its ability to measure AC+DC signals is useful for True RMS measurements.


63,2
Ø 26
133,7
33,7
14,8

# Current probe for AC/DC current

# Model MH60 (insulated AC/DC current probe)

| | |
|---|---|
| **Current** | 140 A peak |
| **Output** | 10 mV / A |

## DESCRIPTION

The MH60 clamp is designed to measure DC and AC currents up to 1 MHz using dual Hall effect/ Transformer technology.

## ELECTRICAL SPECIFICATIONS

- **Current range:**
  0.5 .. 100 A DC (140 A peak)
- **Output signal:**
  10 mV AC+DC / A AC+DC (1 V at 100 A)
- **Accuracy and phase shift (1):**

| Calibre | 100 A | | | |
|---|---|---|---|---|
| Primary current | 15 mA .. 0.7 A peak (10 mA .. 0.5 Arms or DC) | 0.7 A .. 90 A peak (0.5 A .. 64 Arms or DC) | 90 A .. 125 A peak (64 A .. 90 Arms or DC) | 125 A .. 140 A peak (90 A .. 100 Arms or DC) |
| % Accuracy of output signal | NS | ≤ 1.5 % + 100 µV | ≤ 4 % | ≤ 5 % |
| Phase shift @ 50 Hz (2) | NS | ≤ 1° | ≤ 1° | ≤ 1° |

- **Bandwidth:**
  DC .. 1 MHz (-3 dB) (depending on current value)
- **Rise time and fall time:**
  From 10 % to 90 %
  Without filter: 350 ns
  With filter 30 kHz: 11.7 µs
  With filter 3 kHz: 117 µs
- **dI/dt @ 2 A peak-peak:**
  5 A / µs
- **Delay time @ 2 A peak-peak:**
  0.35 µs typical
- **Insertion impedance:**
  ~ 0.25 mΩ @ 400 Hz
  ~ 0.628 mΩ @ 1 MHz
- **DC zero adjustment:**
  ±3 A by pushbutton
- **Noise RMS:**
  Without filter: 15 mA typical (< 88 mA peak-peak)
  30 kHz filter: 5 mA typical (< 36.6 mA peak-peak)
  3 kHz filter: 4 mA typical (< 35.8 m A peak-peak)
- **Battery:**
  Internal NiMh rechargeable battery + 5 VDC external via female µUSB type B connection
- **Battery life:**
  8 hours typical with fully-charged battery
- **Typical consumption:**
  < 150 mA (battery charging)
- **Low battery signal:**
  Flashing green LED x 2 hours
- **Overload indication:**
  RED "OL" LED to indicate excessive measurement current
- **Influence of temperature:**
  -10 °C .. +45 °C: ≤ 1,200 /°C
  +45 °C .. +50 °C: ≤ 2,200 ppm /°C
- **Influence of conductor position in jaws:**
  ≤ 1.5 % of output signal
- **Common mode voltage (600 V max) for AC measurements (typical/max):**
  at 50 Hz: 3.5 mA/5 mA @ 100 V
  at 400 Hz: 25.9 mA/50 mA @ 100 V

## MECHANICAL SPECIFICATIONS

- **Clamping capacity:**
  Cable: Ø max 26 mm
- **Max. jaw insertion capacity:**
  ≤ 90 °C
- **Output:**
  Built-in cable 2 m long with moulded isolated male BNC plug
- **Dimensions:**
  138 x 49 x 28 mm
- **Weight:**
  200 g approx.
- **Operating temperature:**
  -10 °C to +50 °C
- **Storage temperature:**
  -20 °C to +50 °C
- **Relative humidity for operation:**
  0 to 85 % RH with a linear decrease above 35 °C
- **Operating altitude:**
  0 to 2,000 m
- **Casing protection rating:**
  IP 40 (EN 60529)
- **Drop test:**
  1 m (EN 60068-2-32)
- **Shock resistance:**
  100 g / 6 ms / half-periode (IEC 68-2-27)
- **Vibration resistance:**
  10/55/10 Hz, 0.15 mm (IEC 68-2-6)
- **Self-extinguishing capability:**
  UL94 V2
- **Colours:**
  Casing: dark grey
  Jaws: red

## SAFETY SPECIFICATIONS

- **Electrical safety:**
  Instrument with double insulation or reinforced insulation between the primary the secondary and the grippable part located under the guard as per IEC 1010-1 & IEC 1010-2-032
  - 600 V category II, pollution degree 2
  - 300 V category III, pollution degree 2
- **Electromagnetic compatibility (EMC):**
  EN 50081-1: class B
  EN 50082-2:
  - Electrostatic discharge (IEC 1000-4-2):
    4 kV level 2 performance criterion B
    8 kV in the air level 3 performance criterion B
  - Radiated field (IEC 1000-4-3):
    10 V/m performance criterion A
  - Fast transients (IEC 1000-4-4):
    1 kV level 2 performance criterion B
    2 kV level 3 performance criterion B
  - Magnetic field at the network frequency (IEC 1000-4-8):
    field of 400 A/m at 50 Hz: < 1 A

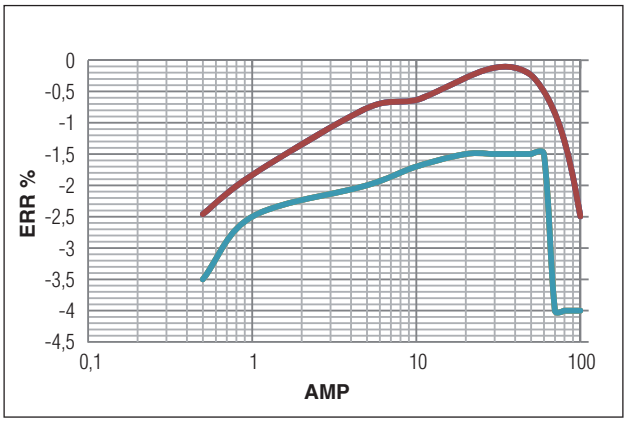
(1) Conditions of reference: 23 °C ± 5 °K, 20 at 75 % RH, power supply voltage 5 V ± 5 % V DC sinusoidal signal with frequency of DC at 400 Hz, external magnetic field < 40 A/m, no DC components, no external conductor with circulating current, conductor centred for measurement, load impedance > 1 MΩ / < 100 pF.

(2) without filter.

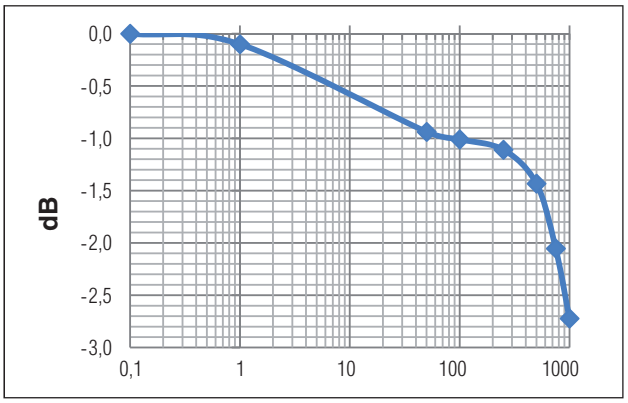
| To order | Reference |
|---|---|
| AC/DC clamp model **MH60** with a 100 V-240 V 50/60 Hz mains adapter, 1.5 A USB-A, type-A male USB ↔ type-B male µUSB cable 1.80 m long, verification certificate and 5-language user manual | P01120612 |

## CURVES

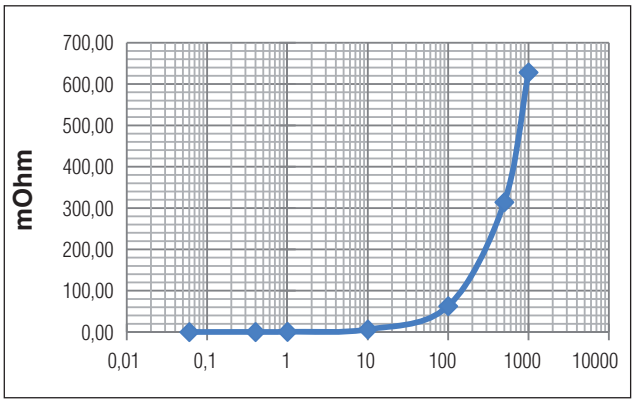
Linearity in DC 100 A calibre



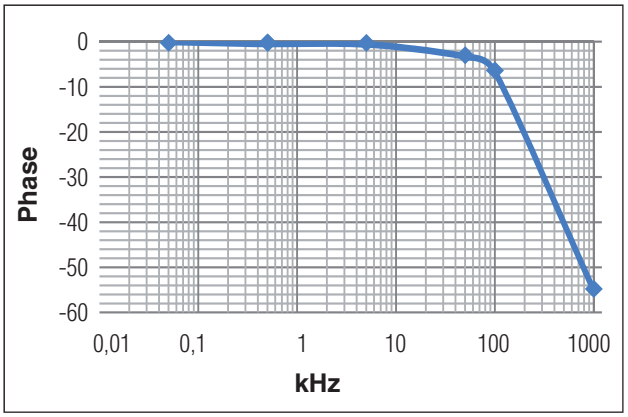

Frequency response to 0.5 A



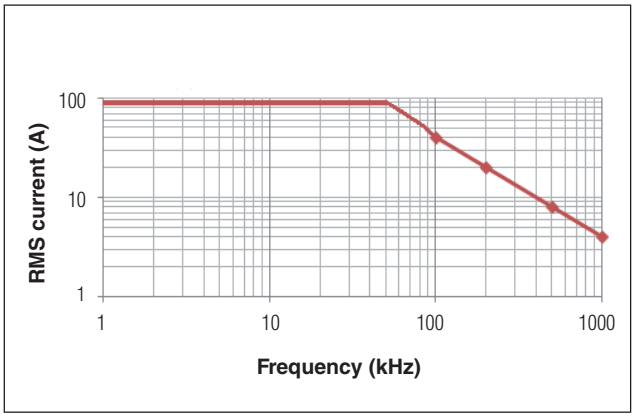

Insertion impedance




Phase shift at 3 A



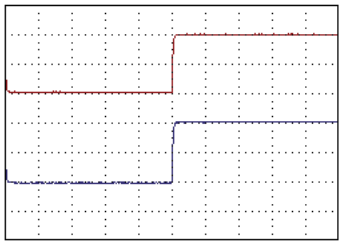

Limitation of measurable current according to the frequency



# Current clamp for AC/DC current
# Model MH60 (insulated AC/DC current probe)

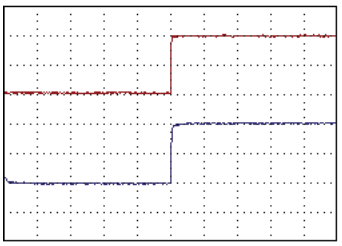
## CURVES

1 A peak



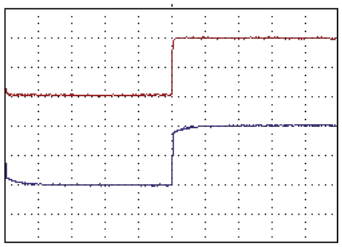
Input signal:
X: 1 ms/div
Y: 1 A V/div

Clamp output signal
X: 1 ms/div
Y: 1 A/div



Input signal:
X: 0.1 ms/div
Y: 1 A V/div

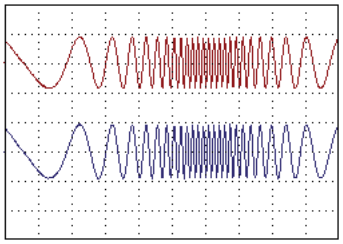
Clamp output signal
X: 0.1 ms/div
Y: 1 A/div



Input signal:
X: 20 µs/div
Y: 1 A V/div

Clamp output signal
X: 20 µs/div
Y: 1 A/div

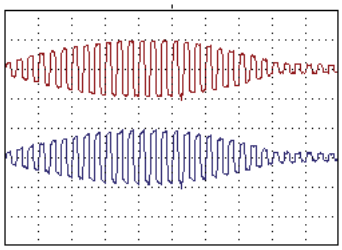
2 A peak



Input signal:
X: 5 ms/div
Y: 2 A/div

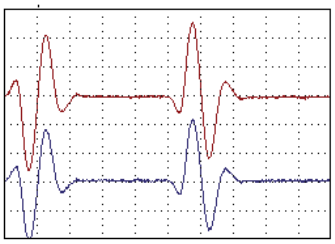
Clamp output signal
X: 5 ms/div
Y: 2 A/div

1 A peak



Input signal:
X: 50 µs/div
Y: 1 A/div

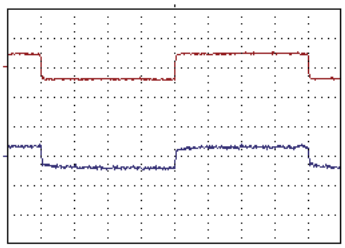
Clamp output signal
X: 1 µs/div
Y: 1 A/div



Input signal:
X: 200 µs/div
Y: 0.5 A/div

Clamp output signal
X: 200 µs/div
Y: 0.5 A/div

0.1 A peak



Input signal:
X: 20 µs/div
Y: 0.25 A V/div

Clamp output signal
X: 20 µs/div
Y: 0.25 A/div


## PAC SERIES

The PAC series is a range of professional AC/DC current clamps.

There are two different jaw designs available for clamping cables and small busbars.

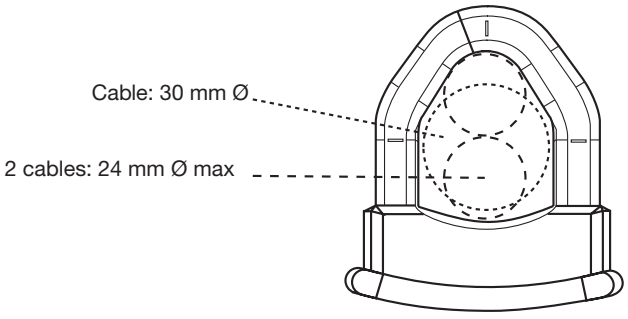
The PAC series clamps operate on the Hall effect principle, allow current measurement up to 1,500 A DC and 1,000 A AC. The electronics and the batteries are all located in the clamp handles. There are two sensitivity levels available: 1 mV/A and 10 mV/A.

A push button operates the automatic DC zeroing on models PAC 11, 12, 21 and 22.

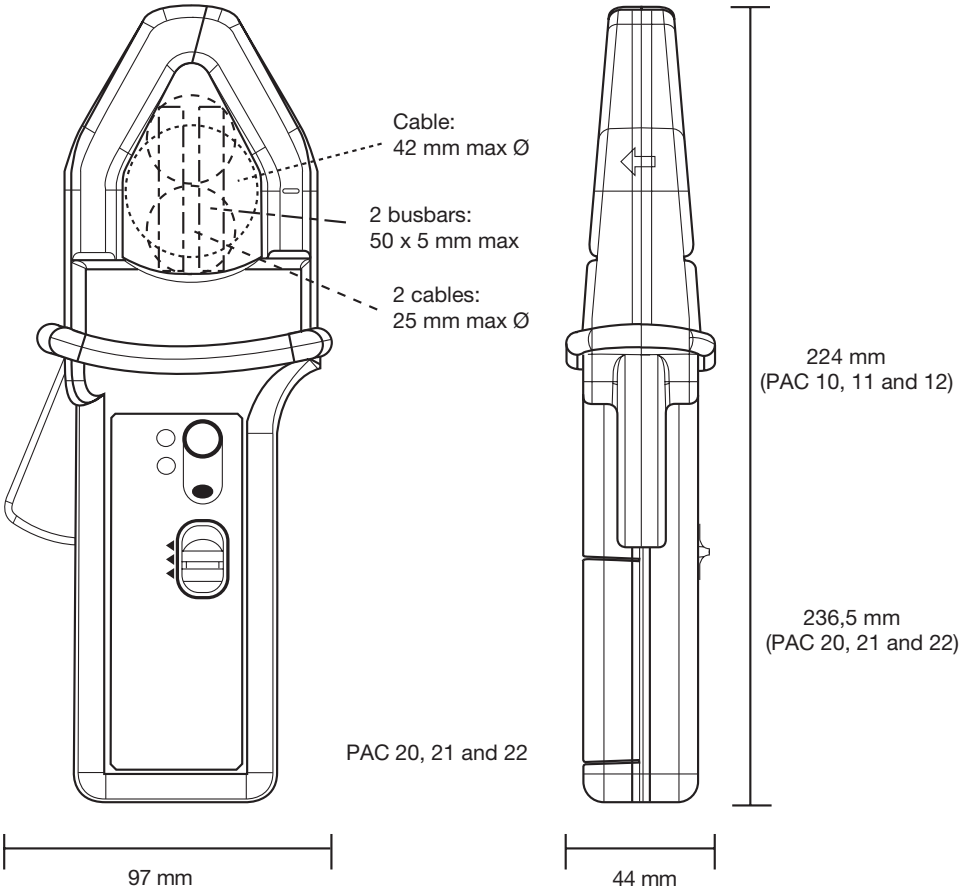
Models PAC 10 and PAC 20 have potentiometer-operated zero adjustment.

TRMS measurement with the DC component is possible using a multimeter or power meter with suitable capabilities.

Models PAC 12 and PAC 22 are designed for use with oscilloscopes and other BNC-input instruments.



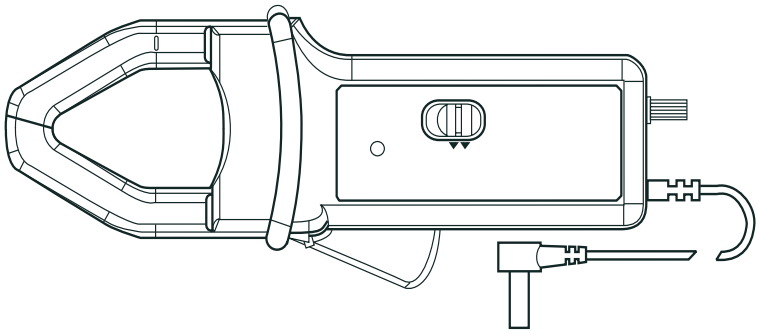

Jaws
PAC10, 11 and 12




PAC 20, 21 and 22

# Current clamp for AC/DC current
# Model PAC10

| | |
|---|---|
| **Current** | 400 A AC<br>600 A DC |
| **Output** | 1 mV/A |



## DESCRIPTION

Model PAC10 operates using the Hall effect, for precise measurement of AC or DC currents.
It has a mV output so that a direct reading may be made on a multimeter or logging equipment, etc.

## ELECTRICAL SPECIFICATIONS

- **Current calibres:**
  0.5 A AC .. 400 A AC (600 A peak)
  0.5 A AC .. 600 A DC
- **Output signal:**
  1 mV/A
- **Accuracy** (1):

| Current range | 1 A .. 100 A | 100 A .. 400 A |
|---|---|---|
| Accuracy in % of output signal | 1.5 % ± 1 mV | 2 %<br>400 A .. 600 A DC: 2.5 % |

- **Phase shift** (1):

| Current range | 10 A .. 200 A | 200 A .. 400 A |
|---|---|---|
| Phase shift from 45 Hz .. 65 Hz | < 2.5° | < 2° |

- **Overload:**
  2,000 A DC and 1,000 A AC up to 1 kHz
- **Bandwidth:**
  DC .. 5 kHz
- **Noise:**
  DC at 1 kHz: < 1 mV
  DC at 5 kHz: < 1.5 mV
  0.1 Hz at 5 kHz: < 500 µV
- **Load impedance:**
  1 MΩ and ≤ 100 pF
- **Insertion impedance:**
  0.39 mΩ at 50 Hz, 58 mΩ at 1,000 Hz
- **Rise time and fall time:**
  < 100 µs from 10 % to 90 % of the voltage value
- **Operating voltage:**
  600 VRMS
- **Common mode voltage:**
  600 VRMS
- **Influence of adjacent conductor:**
  < 10 mA/A at 50 Hz
- **Influence of conductor position in jaws:**
  0.5 % of the reading
- **Battery:**
  9 V alkaline (NEDA 1604 A, IEC 6LR61)
- **Low battery signal:**
  Green LED when the battery voltage > 6.5 V
- **Battery life:**
  120 hours with Alkaline battery

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  -10 °C to +55 °C
- **Storage temperature:**
  -40 °C to +80 °C
- **Relative humidity for operation:**
  +10 °C to +35 °C: 90 ± 5 % RH
  (without condensation)
  +40 °C to +55 °C: 70 ± 5 % RH
  (without condensation)
- **Influence of temperature:**
  < 300 ppm/°K or 0.3 %/10 °K
  < 0.3 A/°K
- **Influence of humidity:**
  10 % to 90 % RH at reference temperature: < 0.1 %
- **Operating altitude:**
  0 to 2,000 m
- **DC zero adjustment:**
  ±12 A (10-turn potentiometer)
- **Max. jaw insertion capacity:**
  1 cable Ø 30 mm or 2 cables from Ø 24 mm
- **Casing protection rating:**
  IP30 in accordance with IEC 529
- **Drop test:**
  1 m on a 38 mm container of oak on concrete, test in accordance with IEC 1010
- **Shock resistance:**
  100 g, in accordance with IEC 68-2-27
- **Vibration resistance:**
  Test in accordance with IEC 68-2-6
- **Frequency range:**
  5 Hz to 15 Hz: amplitude: 1.5 mm
  15 Hz to 25 Hz: amplitude: 1 mm
  25 Hz to 55 Hz: amplitude: 0.25 mm
- **Self-extinguishing capability:**
  Casing and jaws: UL94 V0
- **Dimensions:**
  224 x 97 x 44 mm
- **Weight:**
  440 g
- **Colours:**
  Dark grey and red jaws
- **Output:**
  Via 1.5 m double insulated cable with 4 mm male safety plug

## SAFETY SPECIFICATIONS

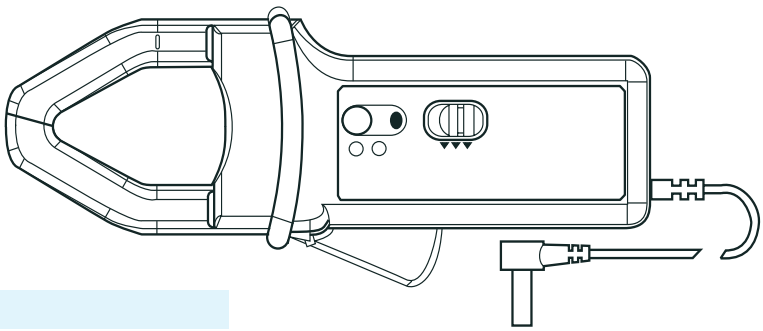
- **Electrical safety:**
  Double or reinforced insulation between the primary, the secondary and outer casing in accordance with IEC 1010-1-2 (indoor use).
  600 V category III, pollution 2
  300 V category IV, pollution 2
- **Electromagnetic compatibility (EMC):**
  EN 50081-1: class B
  EN 50082-2:
  - Electrical discharge IEC 1000-4-2
  - Radiated field IEC 1000-4-3
  - Fast transients IEC 1000-4-4
  - Magnetic field at 50/60 Hz
    IEC 1000-4-8

(1) Conditions of reference: 18 °C at 28 °C, 20 % to 75 % RH, 48 to 65 Hz, external magnetic field < 40 A/m, no DC component, no current-carrying conductor nearby, centred test sample, charge ≥ 1 MΩ and ≤ 100 pF, reset to zero before measurement (only DC) DC to 65 Hz, batteries 9 V ±0.1 V

| To order | Reference |
|---|---|
| AC/DC current clamp model **PAC10** with battery and user's manual | P01120070 |

# Current clamp for AC/DC current
# Model PAC11

| | | |
|---|---|---|
| **Current** | 40 A AC<br>60 A DC | 400 A AC<br>600 A DC |
| **Output** | 10 mV/A | 1 mV/A |



## DESCRIPTION

The PAC11 model accurately measures AC or DC currents using the Hall-effect principle. This clamp with mV output on BNC (direct reading on multimeters, etc.) is equipped with an automatic DC zero system.

## ELECTRICAL SPECIFICATIONS

| Calibre | 60 A | 600 A |
|---|---|---|
| Current range | 0.2 A .. 40 A (60 A peak)<br>0.4 A .. 60 A DC | 0.5 A .. 400 A (600 A peak)<br>0.5 A .. 600 A DC |
| Output signal | 10 mV/A | 1 mV/A |
| % Accuracy of output signal (1) | 0.5 A .. 40 A: 1.5 % ±5 mV<br>40 A .. 60 A DC: 1.5 % | 0.5 A .. 100 A: 1.5 % ±1 mV<br>100 A .. 400 A DC: 2 %<br>400 A .. 600 A DC: 2.5 % |
| Phase shift (45 .. 65 Hz) (1) | 10 A .. 20 A: < 3°<br>20 A .. 40 A: < 2° | 10 A .. 100 A: < 2°<br>100 A .. 400 A: < 1.5° |
| Noise | DC .. 1 kHz: < 8 mV<br>DC .. 5 kHz: < 12 mV<br>0.1 Hz .. 5 kHz: < 2 mV | DC .. 1 kHz: < 1 mV<br>DC .. 5 kHz: < 1.5 mV<br>0.1 Hz .. 5 kHz: < 500 µV |
| Rise/fall time | ≤ 100 µs from 10 % to 90 %<br>of the voltage value | ≤ 70 µs from 10 % to 90 %<br>of the voltage value |

- **Overload:**
  2,000 A DC and 1,000 A AC up to 1 kHz
- **Bandwidth:**
  DC .. 10 kHz at -3 dB
- **Load impedance:**
  ≥ 1 MΩ and ≤ 100 pF
- **Insertion impedance:**
  0.39 mΩ at 50 Hz, 58 mΩ at 1,000 Hz
- **Operating voltage:**
  600 VRMS
- **Common mode voltage:**
  600 VRMS
- **Influence of adjacent conductor:**
  < 10 mA/A at 50 Hz
- **Influence of conductor position in jaws:**
  0.5 % of the reading
- **Battery:**
  9 V alkaline (NEDA 1604 A, IEC 6LR61)
- **Low battery signal:**
  Green LED when the battery voltage > 6.5 V
- **Battery life:**
  50 hours with Alkaline battery.
- **Overload indication:**
  Red LED
  Auto switch-off: 0 minute

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  -10 °C to +55 °C
- **Storage temperature:**
  -40 °C to +80°C
- **Relative humidity for operation:**
  +10 °C to +35 °C:
  90 ± 5 % RH (without condensation)
  +40 °C to +55 °C:
  70 ± 5 % RH (without condensation)
- **Influence of temperature:**
  < 300 ppm/°K or 0.3 %/10 °K
  < 0.3 A/°K
- **Influence of humidity:**
  10 % at 90 % RH at reference temperature: < 0.1 %
- **Operating altitude:**
  0 to 2,000 m
- **DC zero adjustment:**
  Automatically operated by button (± 10 A)
- **Max. jaw insertion capacity:**
  1 cable Ø 30 mm or 2 cables from Ø 24 mm or
  2 busbars from 31.5 x 10 mm
- **Casing protection rating:**
  IP30 in accordance with IEC 529
- **Drop test:**
  1 m on a 38 mm container of oak on concrete, test in accordance with IEC 1010
- **Shock resistance:**
  100 g, in accordance with IEC 68-2-27
- **Vibration resistance:**
  Test in accordance with IEC 68-2-6
- **Frequency range:**
  5 Hz to 15 Hz: amplitude: 1.5 mm
  15 Hz to 25 Hz: amplitude: 1 mm
  25 Hz to 55 Hz: amplitude: 0.25 mm
- **Self-extinguishing capability:**
  Casing and jaws: UL94 V0
- **Dimensions:**
  224 x 97 x 44 mm
- **Weight:**
  440 g
- **Colours:**
  Dark grey and red jaws
- **Output:**
  Via 1.5 m double insulated cable with 4 mm male safety plug

## SAFETY SPECIFICATIONS

- **Electrical safety:**
  Double or reinforced insulation between the primary and secondary circuits and the outer casing in accordance with IEC 1010-1-2 (indoor use).
  600 V category III, pollution 2
  300 V category IV, pollution 2
- **Electromagnetic compatibility (EMC):**
  EN 50081-1: class B
  EN 50082-2:
  - Electrical discharge IEC 1000-4-2
  - Radiated field IEC 1000-4-3
  - Fast transients IEC 1000-4-4
  - Magnetic field at 50/60 Hz IEC 1000-4-8

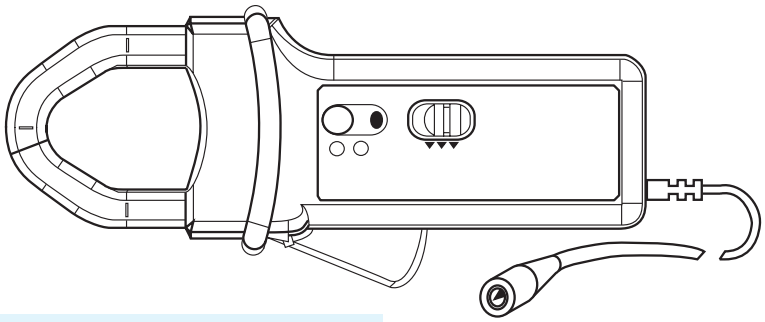
(1) Conditions of reference: 18 °C at 28 °C, 20 to 75 % RH, 48 to 65 Hz, external magnetic field < 40 A/m, no DC component, no current-carrying conductor nearby, centred test sample, charge ≥ 1 MΩ and ≤ 100 pF, reset to zero before measurement (only DC) DC to 65 Hz, batteries 9 V ±0.1 V

| To order | Reference |
|---|---|
| AC/DC current clamp model **PAC11** with battery and user's manual | P01120068 |

# Oscilloscope clamp for AC/DC current

## Model PAC12 (insulated AC/DC current probe)

| | | |
|---|---|---|
| **Current** | 40 A AC<br>60 A DC | 400 A AC<br>600 A DC |
| **Output** | 10 mV/A | 1 mV/A |



## DESCRIPTION

The PAC12 model accurately measures AC or DC currents by using the Hall-effect principle.

This clamp with mV output on BNC (direct reading on oscilloscopes, etc.) is equipped with an automatic DC Zero system.

## ELECTRICAL SPECIFICATIONS

- **Current range:**
  0.2 A AC .. 40 A AC (60 A peak) / 0.4 A DC .. 60 A DC
  0.5 A AC .. 400 A AC (600 A peak) / 0.5 A DC .. 600 A DC
- **Output signal:**
  10 mV AC+DC / A AC+DC (0.6 V for 60 A)
  1 mV AC+DC / A AC+DC (0.6 V for 600 A)
- **Accuracy and phase shift [1]:**
  - 60 A calibre

| Primary current | 0.5 A .. 10 A | 10 A .. 20 A | 20 A .. 40 A | 40 A .. 60 A (only DC) |
|---|---|---|---|---|
| % Accuracy of output signal | ≤ 1.5 % + 5 mV | ≤ 1.5 % + 5 mV | ≤ 1.5 % + 5 mV | ≤ 1.5 % |
| Phase shift | not specified | ≤ 3° | ≤ 2.2° | – |

  - 600 A calibre

| Primary current | 0.5 A .. 10 A | 10 A .. 100 A | 100 A .. 300 A | 300 A .. 400 A | 400 A .. 600 A (only DC) |
|---|---|---|---|---|---|
| % Accuracy of output signal | ≤ 1.5 % + 1 mV | ≤ 1.5 % + 1 mV | ≤ 2 % | ≤ 2 % | ≤ 2.5 % |
| Phase shift | not specified | ≤ 2.2° | ≤ 2.2° | ≤ 1.5° | - |

- **Bandwidth:**
  DC .. 10 kHz (-3 dB) (depending on current value)
- **Rise/fall time from 10 % to 90 %:**
  29 µs
- **10 % delay time:**
  15 µs
- **Insertion impedance (at 400 Hz / 10 kHz):**
  < 2.7 mΩ / < 72 mΩ
- **Maximum currents:**
  3,000 A DC or 1,000 A AC continuous for a frequency ≤ 1 kHz (limitation proportional to the inverse of one third of the frequency above that)
- **DC zero adjustment:**
  Automatic
  - 60 A calibre:
    ± 10 A in 25 to 40 mA increments
  - 600 A calibre:
    ± 10 A in 25 to 40 mA increments
- **Typical output noise level (peak-peak) from DC to 100 kHz:**
  - 60 A calibre:
    DC to 1 kHz: ≤ 8 mV or 0.8 A DC
    DC to 5 kHz: ≤12 mV or 1.2 A DC
    0.1 Hz to 5 kHz: ≤ 2.0 mV RMS or 0.2 ARMS
  - 600 A calibre:
    DC to 1 kHz: ≤ 1 mV or 1 A DC
    DC to 5 kHz: ≤ 1.5 mV or 1.5 A DC
    1 Hz to 5 kHz: ≤ 500 µVRMS or 0.5 ARMS
- **Battery:**
  9 V alkaline (NEDA 1604A, IEC 6LR61)
- **Battery life:**
  50 hours typical
- **Typical consumption:**
  10 mA typical / 14 mA max.
- **Battery level indicator:**
  Green LED
- **Overload indication:**
  Red LED indicates if measured current is too high for the selected range
  Influence of power supply voltage:
  ≤ 0.1 % of the reading
- **Influence of temperature:**
  Measurement: ≤ 300 ppm/K or 0.3 % of output signal per 10 °K
  DC zero: 40 mA/10 °K
- **Influence of relative humidity:**
  < 0.5 % of output signal
- **Influence of adjacent conductor at 23 mm:**
  ≤ 10 mA/A at 50 Hz
- **Influence of external field:**
  ≤ 1.3 A at 400 A/m
- **Influence of Ø 20 mm conductor position in jaws:**
  DC to 440 Hz: ≤ 0.5 % of the reading
  DC to 1 kHz: ≤ 1 % of the reading
  DC to 2 kHz: ≤ 3 % of the reading
  DC to 5 kHz: ≤ 10 % of the reading
- **Influence of frequency [2]:**
  < 1 % of output signal from 65 Hz .. 440 Hz
  < 3.5 % of output signal from 440 Hz .. 2 kHz
  3 dB % of output signal from 2 kHz .. 10 kHz
- **Common mode rejection:**
  > 65 dB A/V at 50 Hz
- **Remanence:**
  0 to 50 A DC: 0.8 A typical
  0 to 100 A DC: 1.3 A typical
  0 to 200 A A DC: 2.1 A typical
  0 to 400 A A DC: 3.3 A typical
  0 to 600 A A DC: 4.0 A typical

## MECHANICAL SPECIFICATIONS

- **Max. jaw opening:**
  31 mm
- **Clamping capacity:**
  Cables: Ø 30 mm
  Ø 24 mm x 2
  Bars: 1 busbar 50 x 10 mm
  2 busbars 31.5 x 10 mm
  3 busbars 25 x 8 mm
  4 busbars 25 x 5 mm

# Oscilloscope clamp for AC/DC current
# Model PAC12 (insulated AC/DC current probe)

- **Output:**
  Coaxial cable 2 m long, terminated by an insulated BNC connector
- **Dimensions:**
  224 x 97 x 44 mm
- **Weight:**
  440 g with battery
- **Operating temperature:**
  -10 °C to +55 °C
- **Storage temperature:**
  -40 °C to +80 °C
- **Relative humidity for operation:**
  0 to 85 % RH with a linear decrease above 35 °C
- **Operating altitude:**
  0 to 2,000 m
- **Casing protection rating:**
  IP40 (IEC 529)
- **Drop test:**
  1 m (IEC 68-2-32)
- **Shock resistance:**
  100 g / 6 ms / half-periode (IEC 68-2-27)
- **Protection against impacts:**
  IK04 0.5 J (EN 50102)
- **Vibration resistance:**
  5-15 Hz: 1.5 mm peak
  15-25 Hz: 1 mm peak
  25-55 Hz: 0.25 mm peak
  (IEC 68-2-6)
- **Self-extinguishing capability:**
  UL94 V2
- **Colours:**
  Dark grey casing with red jaws

## SAFETY SPECIFICATIONS

- **Electrical safety:**
  Instrument with double insulation or reinforced insulation between the primary the secondary and the grippable part located under the guard as per IEC 1010-1 & IEC 1010-2-032
  - 600 V category III, pollution degree 2
  - 300 V category IV, pollution degree 2
- **Electromagnetic compatibility (EMC):**
  EN 50081-1: class B
  EN 50082-2:
  - Electrostatic discharge IEC 1000-4-2:
    4 kV in contact, performance criterion B
    8 kV in the air, performance criterion B
  - Radiated field IEC 1000-4-3:
    3 V/m level 2: influence < 5 % of measurement range
  - Fast transients IEC 1000-4-4:
    1 kV performance criterion B
  - Magnetic field at the network frequency
    IEC 1000-4-8: field of 30 A/m at 50 Hz level 4 performance criterion A
  - Conducted disturbances (IEC 1000-4-6):
    3 V performance criterion A

(1) Conditions of reference: 23 °C ± 5 °K, 20 % at 75 % RH, power supply voltage 9 V ± 0.1 V DC sinusoidal signal with frequency of DC to 65 Hz, external magnetic field < 40 A/m, no DC components, no external conductor with circulating current, conductor centred for measurement, load impedance > 1 MΩ / < 100 pF.

(2) Out of reference domain.

| To order | Reference |
|---|---|
| AC/DC current clamp model **PAC12** for oscilloscope with battery and user's manual | P01120072 |

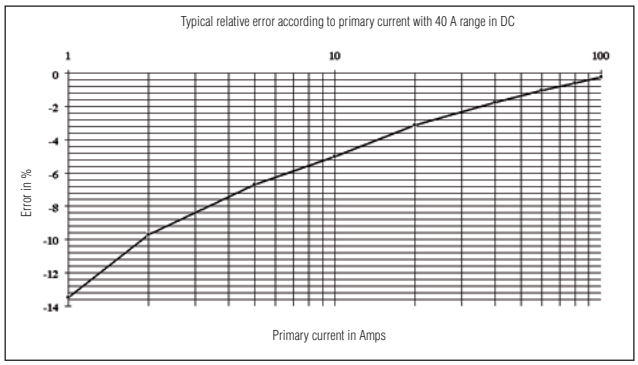
# Oscilloscope clamp for AC/DC current
# Model PAC12 (insulated AC/DC current probe)

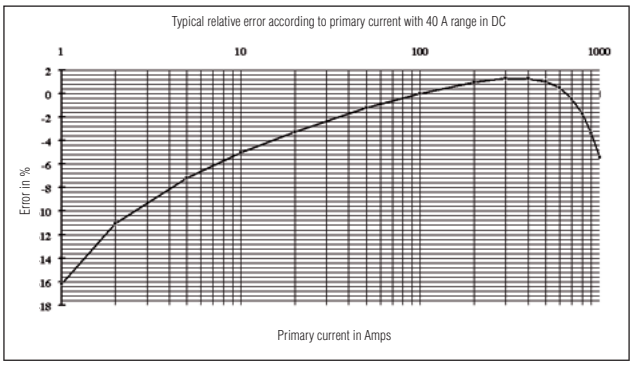
## CURVES

60 A calibre

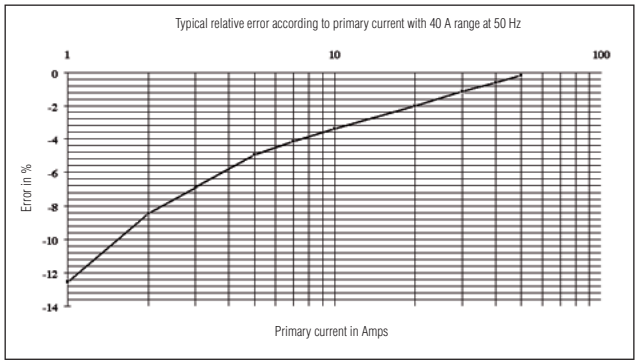
600 A calibre

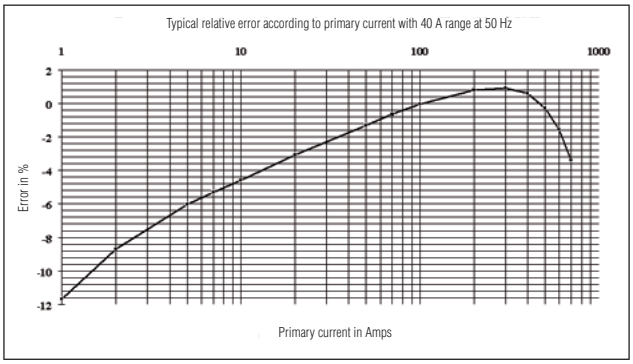
Linearity with DC



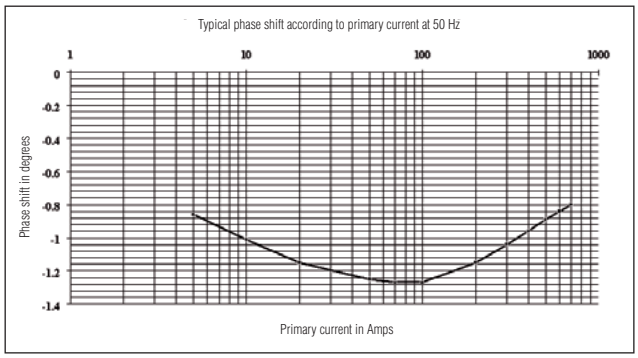




Linearity with AC

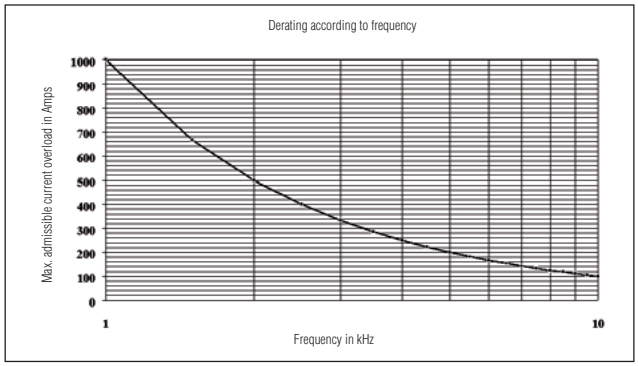



Phase shift




Limitation of measurable current according to the frequency

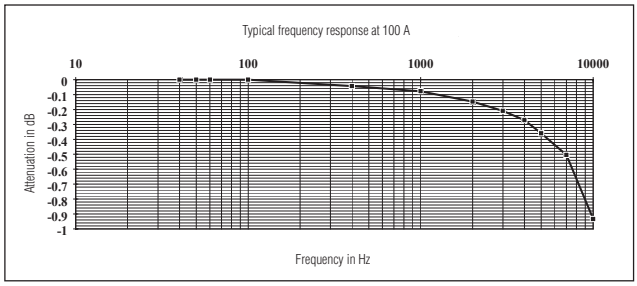


# Oscilloscope clamp for AC/DC current
# Model PAC12 (insulated AC/DC current probe)

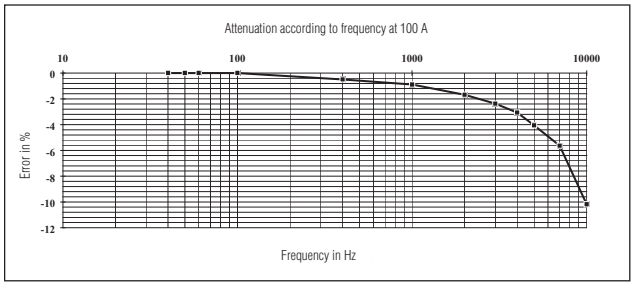
## CURVES

600 A calibre

Frequency response

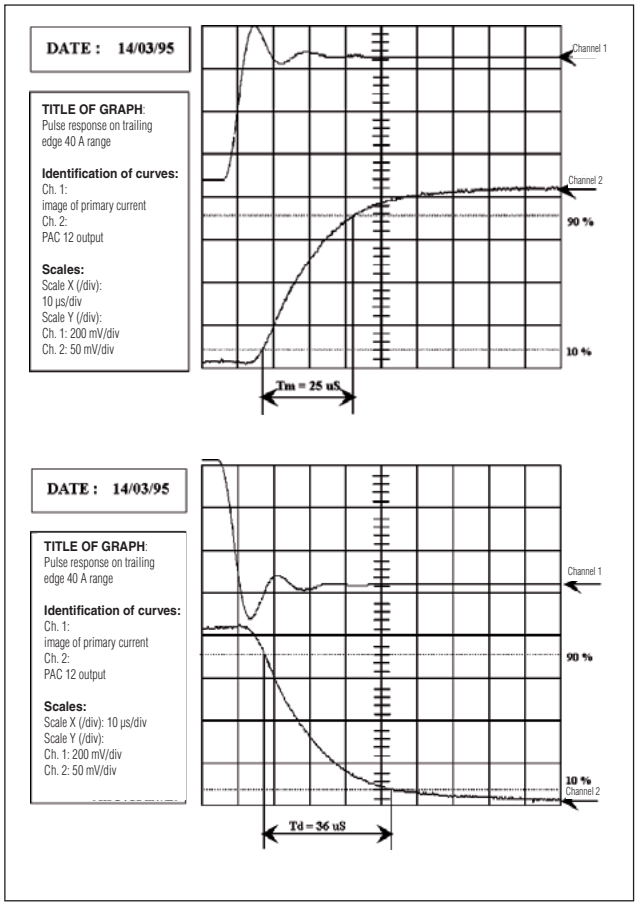



Attenuation according to the frequency

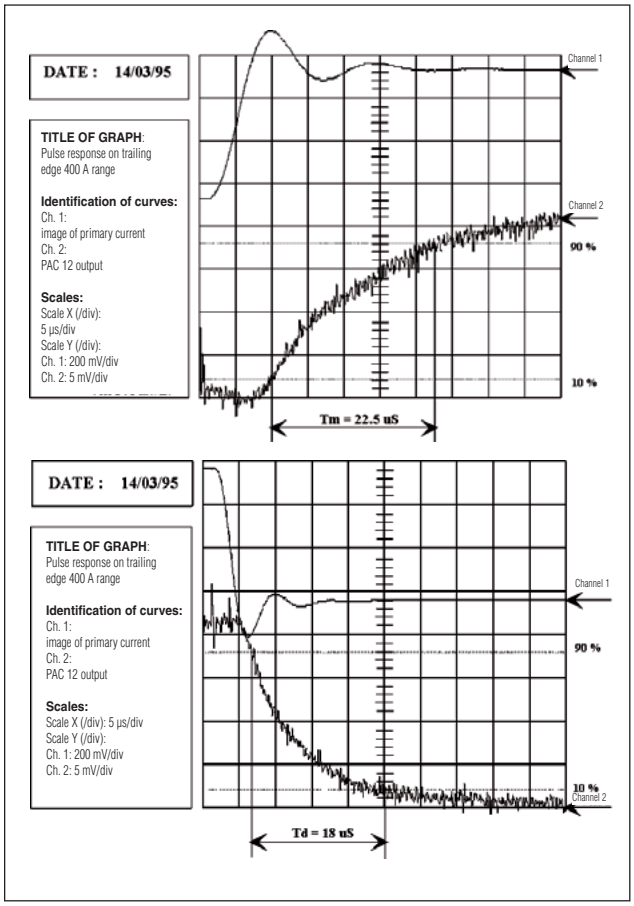



Pulse response

60 A calibre

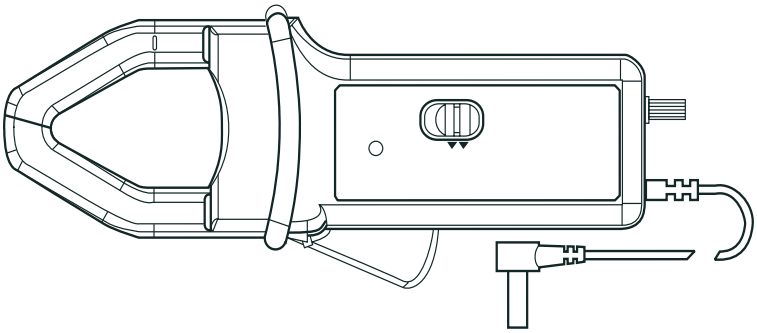



600 A calibre



# Current clamp for AC/DC current
# Model PAC20

| | |
|---|---|
| **Current** | 1,000 A AC<br>1,400 A DC |
| **Output** | 1 mV/A |



## DESCRIPTION

The PAC20 model accurately measures AC or DC currents by using the Hall-effect principle.
This clamp has a mV output so that direct readings may be made with a multimeter or logging equipment, etc.

## ELECTRICAL SPECIFICATIONS

- **Current range:**
  0.5 A .. 1,000 A AC (1,400 A peak)
  0.5 A .. 1,400 A DC
- **Output signal:**
  1 mV/A
- **Accuracy** (1):

| Current range | 1 A .. 100 A | 100 A .. 800 A | 800 A ..1,000 A |
|---|---|---|---|
| Accuracy in % of output signal | 1.5 % ± 1 mV | 2.5 % | 4 %<br>1,000 A .. 1,400 A DC: 4 % |

- **Phase shift** (1):

| Current range | 10 A .. 200 A | 200 A .. 1,000 A |
|---|---|---|
| Phase shift 45 Hz .. 65 Hz | < 2.5° | < 2° |

- **Overload:**
  3,000 A DC and 2,000 A AC up to 1 kHz
- **Bandwidth:**
  DC .. 5 kHz
- **Noise:**
  DC .. 1 kHz: < 1 mV
  DC .. 5 kHz: < 1.5 mV
  0.1 Hz .. 5 kHz: < 500 µV
- **Load impedance:**
  > 100 kΩ at 100 pF
- **Insertion impedance:**
  0.39 mΩ at 50 Hz, 58 mΩ at 1,000 Hz
- **Rise time and fall time:**
  Rise:
  < 100 µs from 10 % to 90 % of the voltage value
  Fall:
  < 100 µs from 10 % to 90 % of the voltage value
- **Operating voltage:**
  600 VRMS
- **Common mode voltage:**
  600 VRMS
- **Influence of adjacent conductor:**
  < 10 mA/A at 50 Hz
- **Influence of conductor position in jaws:**
  0.5 % of the reading
- **Battery:**
  9 V alkaline (NEDA 1604 A, IEC 6LR61)
- **Low battery signal:**
  Green LED when the battery voltage > 6.5 V
- **Battery life:**
  120 hours with Alkaline battery

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  -10 °C to +55 °C
- **Storage temperature:**
  -40 °C to +80 °C
- **Relative humidity for operation:**
  +10 °C to +35 °C: 90 ± 5 % RH
  (without condensation)
  +40 °C to +55 °C: 70 ± 5 % RH
  (without condensation)
- **Influence of temperature:**
  < 300 ppm/°K or 0.3 %/10 °K
  < 0.3 A/°K
- **Influence of humidity:**
  10 % .. 90 % RH at reference temperature: < 0.1 %
- **Operating altitude:**
  0 to 2,000 m
- **Zero adjustment:**
  ±12 A (10-turn potentiometer)
- **Max. jaw insertion capacity:**
  1 cable Ø 42 mm, 2 cables from Ø 25.4 mm or 2 busbars from 50 x 5 mm
- **Casing protection rating:**
  IP30 in accordance with IEC 529
- **Drop test:**
  1 m on a 38 mm container of oak on concrete, test in accordance with IEC 1010
- **Shock resistance:**
  100 g, in accordance with IEC 68-2-27
- **Vibration resistance:**
  Test in accordance with IEC 68-2-6
- **Frequency range:**
  5 to 15 Hz: amplitude: 1.5 mm
  15 to 25 Hz: amplitude: 1 mm
  25 to 55 Hz: amplitude: 0.25 mm
- **Self-extinguishing capability:**
  Casing and jaws: UL 94 V0
- **Dimensions:**
  236.5 x 97 x 44 mm
- **Weight:**
  520 g
- **Colours:**
  Dark grey and red jaws
- **Output:**
  via 1.5 m double insulated cable with 4 mm male safety plug

## SAFETY SPECIFICATIONS

- **Electrical safety:**
  Double or reinforced insulation between the primary and secondary circuits and the outer casing in accordance with IEC 1010-1-2 (indoor use).
  600 V category III, pollution 2
  300 V category IV, pollution 2
- **Electromagnetic compatibility (EMC):**
  EN 50081-1: class B
  EN 50082-2:
  - Electrical discharge IEC 1000-4-2
  - Radiated field IEC 1000-4-3
  - Fast transients IEC 1000-4-4
  - Magnetic field at 50/60 Hz
    IEC 1000-4-8

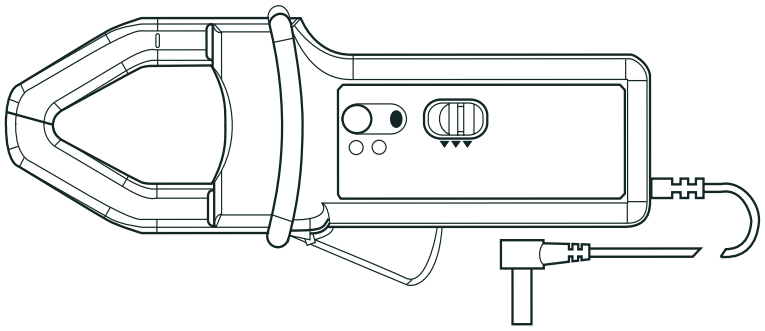
(1) Conditions of reference: 18 °C at 28 °C, 20 % to 75 % RH, 48 Hz to 65 Hz, external magnetic field < 40 A/m, no DC component, no current-carrying conductor nearby, centred test sample, charge ≥ 1 MΩ and ≤ 100 pF, reset to zero before measurement (only DC) DC to 65 Hz, battery 9 V ±0.1 V

| To order | Reference |
|---|---|
| AC/DC current clamp model **PAC20** with battery and user's manual | P01120071 |

# Current clamp for AC/DC current
# Model PAC21



| | | |
|---|---|---|
| **Current** | 100 A AC<br>150 A DC | 1,000 A AC<br>1,400 A DC |
| **Output** | 10 mV/A | 1 mV/A |



## DESCRIPTION

The PAC21 model accurately measures AC or DC currents using the Hall-effect principle.
This clamp with mV output (direct reading on multimeters, etc.) is equipped with an automatic DC zero system.

## ELECTRICAL SPECIFICATIONS

| Calibre | 150 A | 1,400 A |
|---|---|---|
| Current range | 0.2 A ..100 A (150 A peak)<br>0.4 A .. 150 A DC | 0.5 A .. 1,000 A (1,400 A peak)<br>0.5 A .. 1,400 A DC |
| Output signal | 10 mV/A | 1 mV/A |
| Accuracy in % of output signal | 0.5 A .. 20 A: 1.5 % ±5 mV<br>20 A .. 100 A DC: 1.5 %<br>100 A .. 150 A DC: 2.5 % | 0.5 A .. 100 A: 1.5 % ±1 mV<br>100 A .. 800 A DC: 2.5 %<br>800 A .. 1,000 A DC: 4 %<br>1,000 A .. 1,400 A DC: 4 % |
| Phase shift (45 .. 65 Hz) (1) | 10 A .. 20 A: < 3°<br>20 A .. 100 A: < 2° | 10 A .. 200 A: < 2°<br>200 A .. 1,000 A: < 1.5° |
| Noise | DC .. 1 kHz: < 8 mV<br>DC .. 5 kHz: < 12 mV<br>0.1 Hz .. 5 kHz: < 2 mV | DC .. 1 kHz: < 1 mV<br>DC .. 5 kHz: < 1.5 mV<br>0.1 Hz .. 5 kHz: < 500 µV |
| Rise/fall time | ≤ 100 µs from 10 % to 90 %<br>of the voltage value | ≤ 70 µs from 10 % to 90 %<br>of the voltage value |

- **Overload:**
  3,000 A DC and 2,000 A AC up to 1 kHz
- **Bandwidth:**
  DC .. 10 kHz at -3 dB
- **Load impedance:**
  ≥ 1 MΩ and ≤ 100 pF
- **Insertion impedance:**
  0.39 mΩ at 50 Hz, 58 mΩ at 1,000 Hz
- **Operating voltage:**
  600 VRMS
- **Common mode voltage:**
  600 VRMS
- **Influence of adjacent conductor:**
  < 10 mA/A at 50 Hz
- **Influence of conductor position in jaws:**
  0.5 % of the reading
- **Battery:**
  9 V alkaline (NEDA 1604 A, IEC 6LR61)
- **Low battery signal:**
  Green LED when the battery voltage > 6.5 V
- **Battery life:**
  50 hours with Alkaline battery
- **Overload indication:**
  Red LED
- **Auto switch-off:**
  10 minutes

## MECHANICAL SPECIFICATIONS

- **Operating temperature:**
  -10 °C to +55 °C
- **Storage temperature:**
  -40 °C to +80 °C
- **Relative humidity for operation:**
  +10 °C to +35°C: 90 ± 5 % RH
  (without condensation)
  +40 °C to +55 °C: 70 ± 5 % RH
  (without condensation)
- **Influence of temperature:**
  < 300 ppm/°K or 0.3 %/10 °K
  < 0.3 A/°K
- **Influence of humidity:**
  10 % at 90 % RH at reference temperature: < 0.1 %
- **Operating altitude:**
  0 to 2,000 m
- **Zero adjustment:**
  ±10 A by push-button
- **Max. jaw insertion capacity:**
  1 cable Ø 42 mm, 2 cables from Ø 25.4 mm or
  2 busbars from 50 x 5 mm
- **Casing protection rating:**
  IP30 in accordance with IEC 529
- **Drop test:**
  1 m on a 38 mm container of oak on concrete, test in accordance with IEC 1010
- **Shock resistance:**
  100 g, in accordance with IEC 68-2-27
- **Vibration resistance:**
  test in accordance with IEC 68-2-6
- **Frequency range:**
  5 to 15 Hz: amplitude: 1.5 mm
  15 to 25 Hz: amplitude: 1 mm
  25 to 55 Hz: amplitude: 0.25 mm
- **Self-extinguishing capability:**
  Casing and jaws: UL94 V0
- **Dimensions:**
  236.5 x 97 x 44 mm
- **Weight:**
  520 g
- **Colours:**
  Dark grey and red jaws
- **Output:**
  Via 1.5 m double insulated cable with 4 mm male safety plug

## SAFETY SPECIFICATIONS

- **Electrical safety:**
  Double or reinforced insulation between the primary and secondary circuits and the outer casing in accordance with IEC 1010-1-2 (indoor use).
  600 V category III, pollution 2
  300 V category IV, pollution 2
- **Electromagnetic compatibility (EMC):**
  EN 50081-1: class B
  EN 50082-2:
  - Electrical discharge IEC 1000-4-2
  - Radiated field IEC 1000-4-3
  - Fast transients IEC 1000-4-4
  - Magnetic field at 50/60 Hz: IEC 1000-4-8

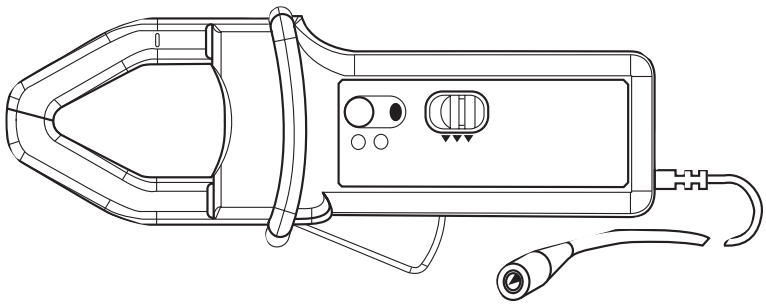
(1) Conditions of reference: 18 °C at 28 °C, 20 % to 75 % RH, 48 Hz to 65 Hz, external magnetic field < 40 A/m, no DC component, no current-carrying conductor nearby, centred test sample, charge ≥ 1 MΩ and ≤ 100 pF, reset to zero before measurement (only DC) DC to 65 Hz, battery 9 V ±0.1 V

| To order | Reference |
|---|---|
| AC/DC current clamp model **PAC21** with battery and user's manual | P01120069 |
| AC/DC current clamp model **PAC21** in carrying case with battery and user's manual | P01120069D |

# Oscilloscope clamp for AC/DC current

## Model PAC22 (insulated AC/DC current probe)

| | | |
|---|---|---|
| **Current** | 100 A AC<br>150 A DC | 1,000 A AC<br>1,400 A DC |
| **Output** | 10 mV/A | 1 mV/A |



## DESCRIPTION

The PAC22 model accurately measures AC or DC currents using the Hall-effect principle.
This clamp with mV output on BNC (direct reading on oscilloscopes, etc.) is equipped with an automatic DC zero system.

## ELECTRICAL SPECIFICATIONS

- **Current range:**
  0.2 A AC .. 100 A AC (150 A peak) / 0.4 A DC .. 150 A DC
  0.5 A AC .. 1,000 A AC (1,400 A peak) / 0.5 A DC .. 1,400 A DC
- **Output signal:**
  10 mV AC+DC / A AC+DC (1.5 V for 150 A)
  1 mV AC+DC / A AC+DC (1.4 V for 1,400 A)
- **Accuracy and phase shift (1):**
  - 150 A calibre

| Primary current | 0.5 A .. 10 A | 10 A .. 20 A | 20 A .. 100 A | 100 A .. 150 A (only DC) |
|---|---|---|---|---|
| % Accuracy of output signal | ≤ 1.5 % + 5 mV | ≤ 1.5 % + 5 mV | ≤ 1.5 % | ≤ 1.5 % |
| Phase shift | not specified | ≤ 3° | ≤ 2.2° | – |

  - 1,400 A calibre

| Primary current | 0.5 A .. 10 A | 10 A .. 100 A | 100 A .. 200 A | 200 A .. 800 A | 800 A .. 1,000 A | 1,000 A .. 1,400 A (only DC) |
|---|---|---|---|---|---|---|
| % Accuracy of output signal | ≤ 1.5 % + 1 mV | ≤ 1.5 % + 1 mV | ≤ 2.5 % | ≤ 2.5 % | ≤ 4 % | ≤ 4 % |
| Phase shift | not specified | ≤ 2° | ≤ 2° | ≤ 1.5° | ≤ 1.5° | - |

- **Bandwidth:**
  DC .. 10 kHz (-3 dB) (depending on current value)
- **Rise/fall time from 10 % to 90 %:**
  24 µs
- **10 % delay time:**
  15 µs
- **Insertion impedance (at 400 Hz / 10 kHz)**
  < 2.7 mΩ / < 67 mΩ
- **Maximum currents:**
  3,000 A DC or 1,000 A AC continuous for a frequency ≤ 1 kHz (limitation proportional to the inverse of one third of the frequency above that)
- **DC zero adjustment:**
  Automatic
  - 60 A calibre:
    ± 10 A in 25 mA to 40 mA increments
  - 600 A calibre:
    ± 10 A in 25 mA to 40 mA increments
- **Typical output noise level (peak-peak) from DC to 100 kHz:**
  - 150 A calibre:
    DC to 1 kHz: ≤ 8 mV or 0,8 A DC
    DC to 5 kHz: ≤12 mV or 1.2 A DC
    0.1 Hz to 5 kHz: ≤ 2.0 mVRMS or 0.2 ARMS
  - 1,400 A calibre:
    DC to 1 kHz: ≤ 1 mV or 1 A DC
    DC to 5 kHz: ≤ 1.5 mV or 1.5 A DC
    1 Hz to 5 kHz: ≤ 500 µV RMS or 0.5 A RMS
- **Output impedance:**
  100 Ω
- **Battery:**
  9 V alkaline (NEDA 1604A, IEC 6LR61)
- **Battery life:**
  50 hours typical
- **Typical consumption:**
  10 mA typical / 14 mA max.
- **Battery level indicator:**
  Green LED
- **Overload indication:**
  Red LED indicates the measured current is too high for the selected range
  Influence of power supply voltage:
  ≤ 0.1 % of the reading
- **Influence of temperature:**
  Measurement: ≤ 300 ppm/K or 0.3 % of output signal per 10 °K
  DC zero: 40 mA/10 °K
- **Influence of relative humidity:**
  < 0.5 % of output signal
- **Influence of adjacent conductor at 23 mm:**
  ≤ 10 mA/A at 50 Hz
- **Influence of external field:**
  ≤ 1.3 A for 400 A/m
- **Influence of Ø 20 mm conductor position in jaws:**
  DC to 440 Hz: ≤ 0.5 % of the reading
  DC to 1 kHz: ≤ 1 % of the reading
  DC to 2 kHz: ≤ 3 % of the reading
  DC to 5 kHz: ≤ 10 % of the reading
- **Influence of frequency (2):**
  < 1 % of output signal from 65 Hz .. 440 Hz
  < 3.5 % of output signal from 440 Hz .. 2 kHz
  3 dB % of output signal from 2 kHz .. 10 kHz
- **Common mode rejection:**
  > 65 dB A/V at 50 Hz
- **Remanence:**
  0 to 100 A DC: 1 A typical
  0 to 250 A DC: 1.7 A typical
  0 to 500 A DC: 2.5 A typical
  0 to 1,000 A DC: 3.6 A typical
  0 to 1,400 A DC: 4.4 A typical

# Oscilloscope clamp for AC/DC current
# Model PAC22 (insulated AC/DC current probe)

## MECHANICAL SPECIFICATIONS

- **Max. jaw opening:**
  31 mm
- **Clamping capacity:**
  Cables: Ø 39 mm
  Ø 25.4 mm x 2
  Bars: 1 busbar 50 x 12.5 mm
  2 busbars 50 x 5 or 31.5 x 10 mm
  3 busbars 25 x 8 mm
  4 busbars 25 x 5 mm
- **Output:**
  Coaxial cable 2 m long, terminated by an insulated BNC connector
- **Dimensions:**
  236.5 x 97 x 44 mm
- **Weight:**
  520 g with battery
- **Operating temperature:**
  -10 °C to +55 °C
- **Storage temperature:**
  -40 °C to +80 °C
- **Relative humidity for operation:**
  0 to 85 % RH with a linear decrease above 35 °C
- **Operating altitude:**
  0 to 2,000 m
- **Casing protection rating:**
  IP40 (IEC 529)
- **Drop test:**
  1 m (IEC 68-2-32)
- **Shock resistance:**
  100 g / 6 ms / half-periode (IEC 68-2-27)
- **Protection against impacts:**
  IK04 0.5 J (EN 50102)
- **Vibration resistance:**
  5-15 Hz: 1.5 mm peak
  15-25 Hz: 1 mm peak
  25-55 Hz: 0.25 mm peak
  (IEC 68-2-6)
- **Self-extinguishing capability:**
  UL94 V2
- **Colours:**
  Dark grey case with red jaws

## SAFETY SPECIFICATIONS

- **Electrical safety:**
  Instrument with double insulation or reinforced insulation between the primary the secondary and the grippable part located under the guard as per IEC 1010-1 & IEC 1010-2-032
  - 600 V category III, pollution degree 2
  - 300 V category IV, pollution degree 2
- **Electromagnetic compatibility (EMC):**
  EN 50081-1: class B
  EN 50082-2:
  - Electrostatic discharge IEC 1000-4-2:
    4 kV in contact, performance criterion B
    8 kV in the air, performance criterion B
  - Radiated field IEC 1000-4-3:
    3 V/m level 2: influence < 5 % of measurement range
  - Fast transients IEC 1000-4-4:
    1 kV performance criterion B
  - Magnetic field at the network frequency (IEC 1000-4-8): field of 30 A/m at 50 Hz level 4 performance criterion A
  - Conducted disturbances (IEC 1000-4-6):
    3 V performance criterion A

(1) Conditions of reference: 23 °C ± 5 °K, 20 % at 75 % RH, power supply voltage 9 V ± 0.1 V DC sinusoidal signal with frequency of DC to 65 Hz, external magnetic field < 40 A/m, no DC components, no external conductor with circulating current, conductor centred for measurement, load impedance > 1 MΩ / < 100 pF.

(2) Out of reference domain.

| To order | Reference |
|---|---|
| Current clamp for AC/DC current model **PAC22** for oscilloscope with battery and user's manual | P01120073 |

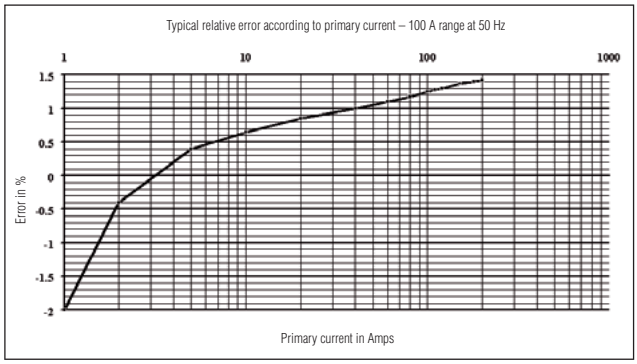
# Oscilloscope clamp for AC/DC current
# Model PAC22 (insulated AC/DC current probe)

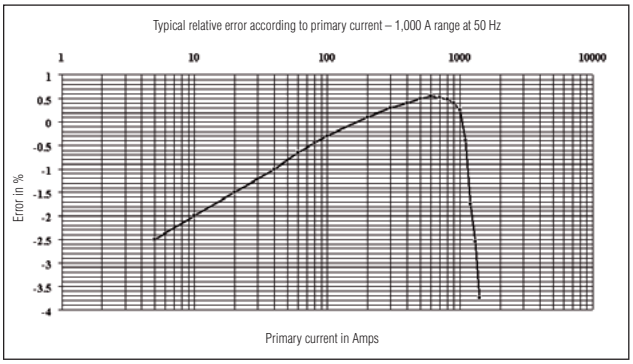
## CURVES

150 A calibre

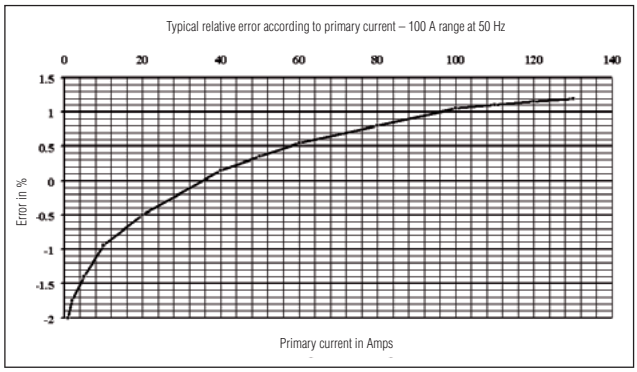
1,400 A calibre

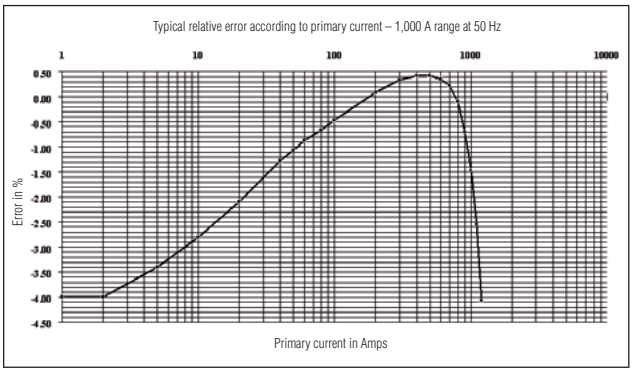
Linearity in DC



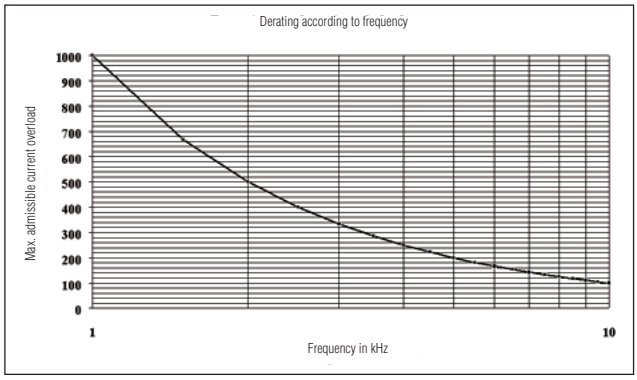




Linearity in AC

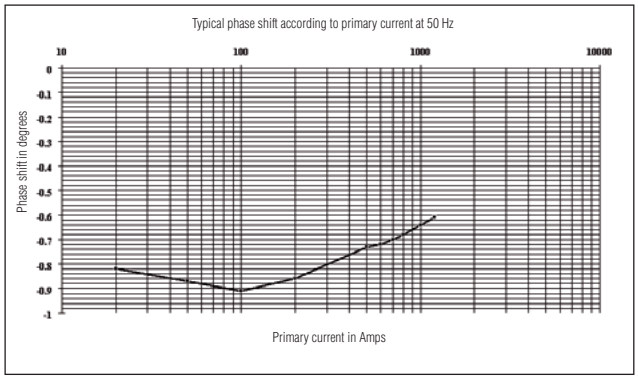



Limitation of measurable current according to the frequency



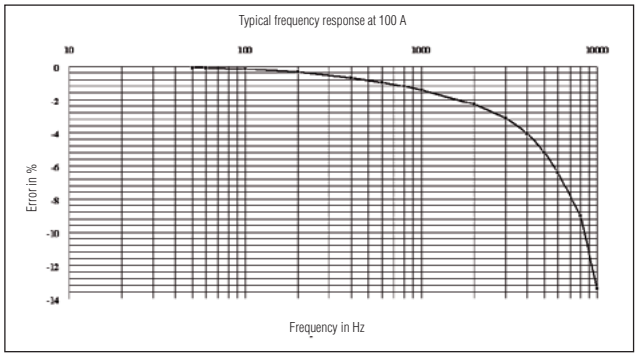

Phase shift



# Oscilloscope clamp for AC/DC current
# Model PAC22 (insulated AC/DC current probe)

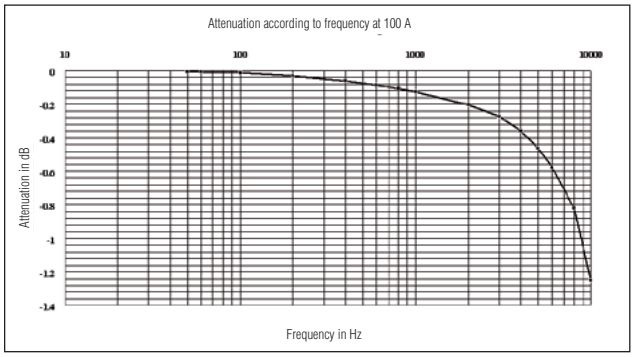
## CURVES

Frequency response



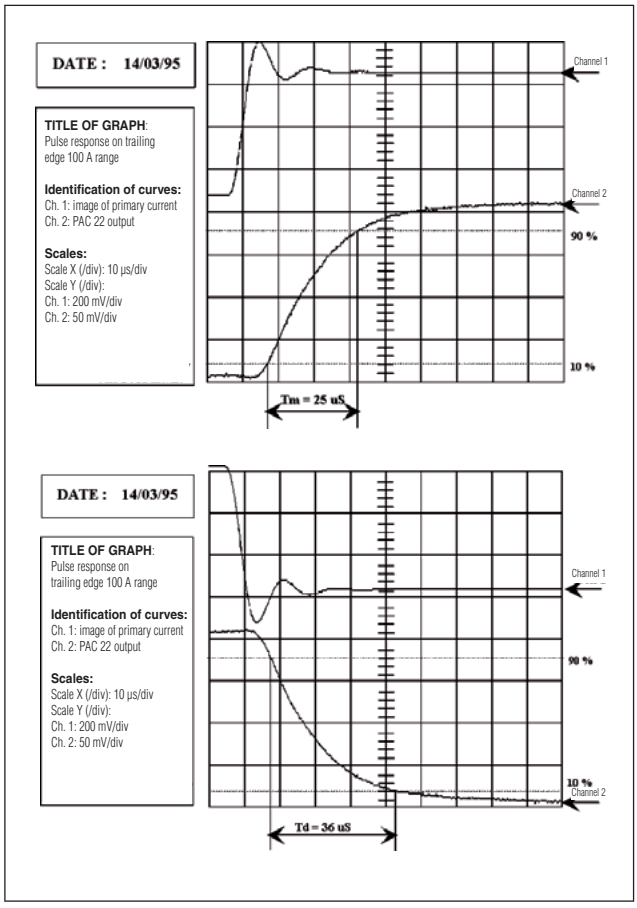

150 A calibre

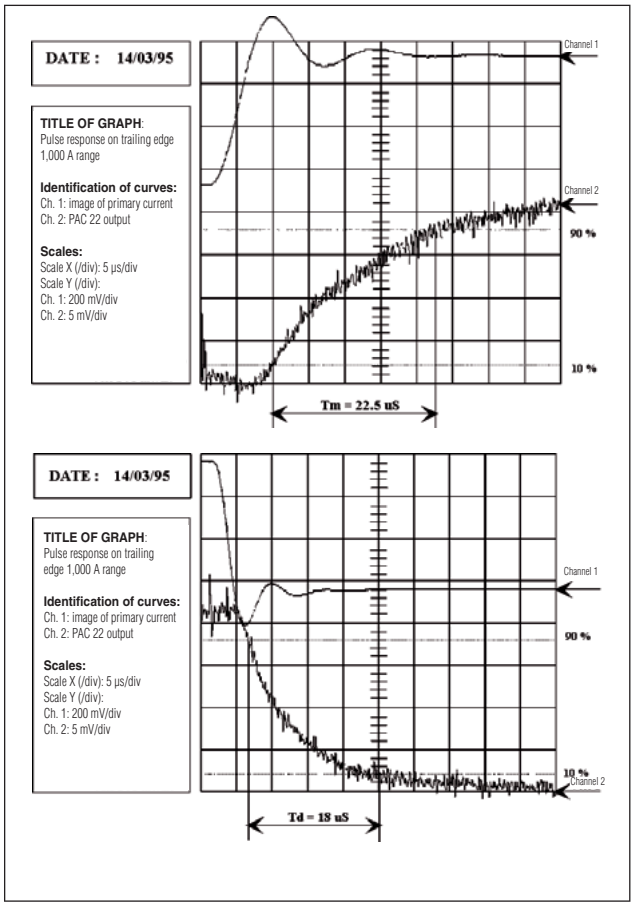
Attenuation according to frequency

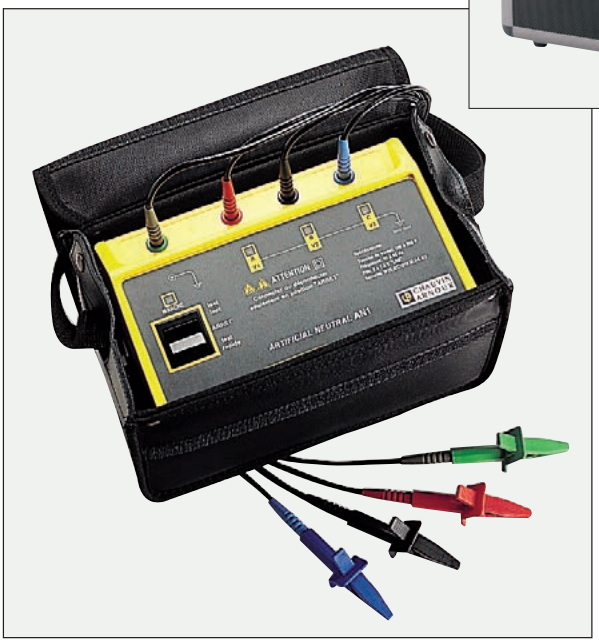



1,400 A calibre

Pulse response





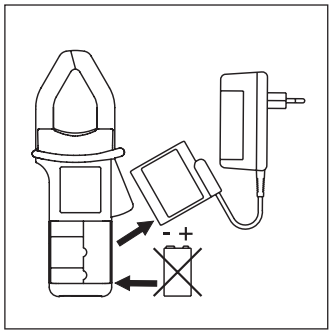
## CLAMP ACCESSORIES

Having made test, control and measurement instruments for over a century now, Chauvin Arnoux products are the result of years of experience in the field. A knowledge of measurement techniques and daily experience in safety practices has led to the development of an entire range of practical and safety-conscious test accessories. Throughout the range, from the artificial neutral to the BNC/ female safety socket, or silicone leads with banana plugs (straight or elbowed), the IEC 61010 standard is the benchmark by which all products are judged.

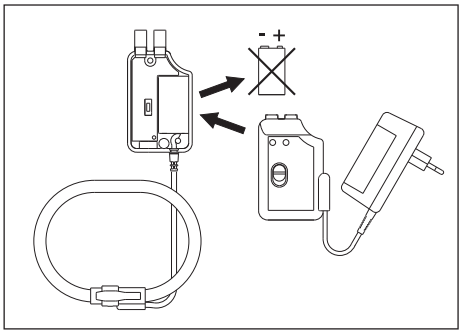
However, even a device that complies with this standard does not guarantee complete safety, so make sure that you are equipped with suitable accessories with which you can verify that your equipment meets the most demanding safety standards.

# Mains adapters

For unlimited operation of your current clamps, replace the battery with the mains adapter.



For PAC clamp

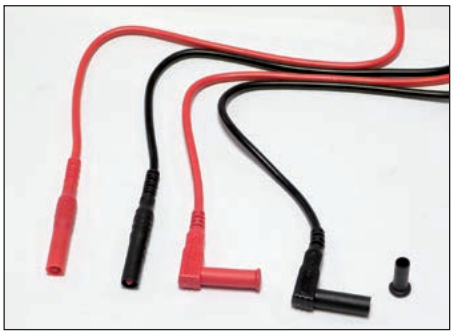


For AmpFlex® A100 clamp, MiniFlex® MA100 clamp and K clamp

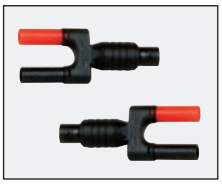
For MiniFlex® MA110 clamp, MiniFlex® MA130 clamp, AmpFlex® A110, AmpFlex® A130 clamp and MH60 clamp

| To order | Reference |
|---|---|
| Mains adapter for E clamp | P01101965 |
| Mains adapter for K clamp | P01101966 |
| Mains adapter for PAC clamp | P01101967 |
| Mains adapter for AmpFlex® A100 | P01101968 |
| Mains adapter for MiniFlex® MA100 clamp | P01102086 |
| Mains adapter for MiniFlex® MA200 clamp | P01102087 |
| Mains adapter for MiniFlex® MA110, MiniFlex® MA130, AmpFlex® A110, AmpFlex® A130 and MH60 | P01651023 |

# Leads and adapters



- **Standard PVC leads**
  Straight male plug Ø 4 mm
  Elbowed male plug Ø 4 mm
  15 A / 1.5 m
  600 V CAT IV
  1,000 V CAT III



- **BNC / banana adapter**
  Insulated female socket
  Insulated male plugs
  Ø 4 mm with 19 mm spacing
  600 V CAT III

- **Banana-BNC leads**
  Insulated BNC
  Male plug Ø 4 mm
  with rear connection
  500 V CAT III

- **BNC / banana adapter**
  Male BNC
  Female sockets
  500 V CAT I
  150 V CAT III

- **BNC / banana adapter**
  Male BNC
  Male plugs
  500 V CAT I
  150 V CAT III

| To order | Reference |
|---|---|
| Standard PVC leads (1 red + 1 black) | P01295289Z |
| Banana-BNC leads | AG-1066Z |
| Male BNC / Female banana adapter (set of 2) | P01101846 |
| Male BNC / Male banana adapter (set of 2) | P01101847 |
| Female BNC / Isolated banana adapter (set of 2) | P01102101Z |

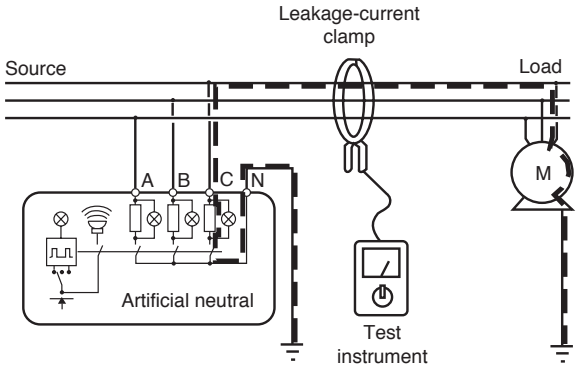
# Artificial neutral box
# Model AN1

## DESCRIPTION

This instrument is designed for use with MN73, C173 and B102 leakage-current detection clamps to enable fault current measurements on 3-phase circuits without a neutral conductor.

There is a switch for selecting the test rate so that the MN73, C173 and B clamps can be used with digital or analogue multimeters.

A built-in buzzer indicates when the artificial neutral is connected to the earth. Three LEDs indicate when a voltage is present on each of the 3 phases and during measurement.


## ELECTRICAL SPECIFICATIONS

- **Operating voltage:**
  30 V at 600 V
- **Frequency range:**
  45 at 65 Hz
- **Resistance per phase:**
  3.9 kΩ ± 5 %
- **Make/break period:**
  Slow position: 0.5 s
  Fast position: 2.3 s
- **Battery:**
  12 V DC, 8 × 1.5 V "AA" batteries
- **Consumption:**
  180 mA
- **Battery life:**
  40 hours

## MECHANICAL SPECIFICATIONS

- **Reference temperature:**
  23 °C ± 3 °C
- **Operating temperature:**
  0 °C to +50 °C, between 10 % and 90 % RH
- **Storage temperature:**
  -40 °C to +70 °C, between 10 % and 90 % RH
- **Self-extinguishing capability:**
  UL94 V0
- **Colour:**
  yellow
- **Dimensions:**
  220 x 136 x 150 mm
- **Weight:**
  1.3 Kg

## SAFETY SPECIFICATIONS

- **Dielectric test:**
  6 kV between the lead and the unit
- **Operating voltage:**
  600 V RMS

| To order | Reference |
|---|---|
| **AN1** artificial neutral box<br>with shoulder bag, batteries, set of leads, croc-clips and user's manual | P01197201 |
| Accessories: spare shoulder bag **no. 2** | P01298006 |

# Application for customized model

"special" model

Date: _____ / ____ / ____

## ADDRESS DETAILS

Surname: _____
First name: _____
Company: _____
Address: _____
_____
Town: _____
Post code: _____
Country: _____

Profession: _____
Sector of industry: _____
_____
_____
_____

Tel: _____
Fax: _____

## APPLICATION DETAILS

Description/comments: _____
_____
_____
_____

## DESIRED SPECIFICATION

- Type of measurement: ❑ AC ❑ DC ❑ AC + DC
- Measurement range: from _____ A to _____ A
- Accuracy: _____ % of output signal
- Bandwidth: from _____ Hz to _____ Hz
- Output signal: ❑ A AC ❑ V AC ❑ V DC
- Number of calibres: _____
  1 calibre: _____ A Sensitivity: _____ /A
  2 calibre: _____ A Sensitivity: _____ /A
  3 calibre: _____ A Sensitivity: _____ /A
- Operating open circuit (or working) voltage of the installation where the measurements are to be carried out:

❑ 230 V ❑ 400 V ❑ 600 V ❑ 1000 V ❑ Other: _____ V

- Diameter of measured conductor: ___mm or dimensions: x_____mm
- Temperature of conductor in use: from _____° to _____° ❑ °C ❑ °F
- Output connector:

❑ Safety sockets Ø 4 mm
❑ Length of lead 1.5 m + safety plug Ø 4 mm
❑ 2 m coaxial lead with isolated BNC
❑ Other: _____

- Colour:

Jaws: ❑ Red CHAUVIN ARNOUX (standard) ❑ Other: _____
Casing: ❑ Grey CHAUVIN ARNOUX (standard) ❑ Other: _____

## DELIVERY FORMAT

❑ Without instruction manual
❑ With CHAUVIN ARNOUX instruction manual (standard)
❑ With customized operating instructions
❑ CHAUVIN ARNOUX product marking (standard)
❑ Customized brand markings (supply all plans, diagrams, logo, etc. necessary for personalisation)

- **Packaging**

❑ Standard CHAUVIN ARNOUX cardboard box
❑ Plain cardboard box
❑ Other _____
_____
_____

## YOUR ORDER

First delivery quantity: _____
Quantity per year: _____

Desired delivery time: _____
Frequency of deliveries: _____

FAX THIS PAGE TO: **+33 1 46 27 73 89**



CHAUVIN ARNOUX®
CHAUVIN ARNOUX GROUP

# 4 expert measurement
companies in one Group

CHAUVIN ARNOUX GROUP

CHAUVIN ARNOUX
CHAUVIN ARNOUX GROUP

## Portable test and measurement instrumentation

**CHAUVIN ARNOUX** draws on its two brands, Chauvin Arnoux® and Metrix®, to propose a wide range of measuring instruments. The offering covers electrical measurement (testers, multimeters and current clamps), electrical safety checking, wattmeters and electrical network quality analyzers. Oscilloscopes, electronic equipment testers and environmental measurements complete the range of its expertise.

PYRO CONTROLE
CHAUVIN ARNOUX GROUP

## Temperatures in industrial processes

**PYROCONTROLE** proposes tailored solutions for the temperature measurement and control requirements of all process industries. A wide range of sensors and total mastery of the industrial process chain make **PYROCONTROLE** an essential partner for industries such as the nuclear sector, petrochemicals, glass-making, metallurgy, etc.

MANUMESURE
CHAUVIN ARNOUX GROUP

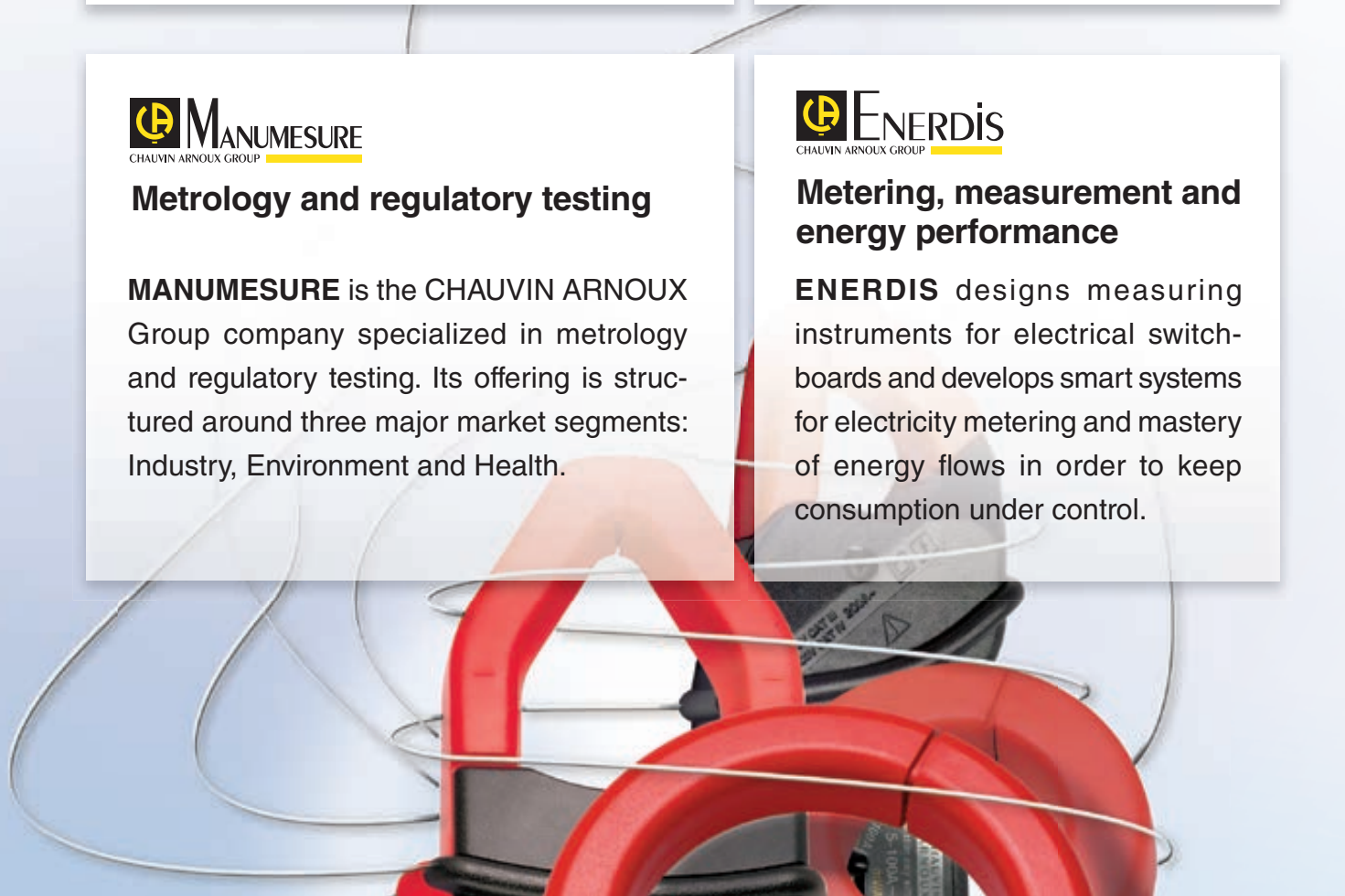
## Metrology and regulatory testing

**MANUMESURE** is the CHAUVIN ARNOUX Group company specialized in metrology and regulatory testing. Its offering is structured around three major market segments: Industry, Environment and Health.

ENERDIS
CHAUVIN ARNOUX GROUP

## Metering, measurement and energy performance

**ENERDIS** designs measuring instruments for electrical switchboards and develops smart systems for electricity metering and mastery of energy flows in order to keep consumption under control.



# A local service for a better service

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www.aemc.com

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Fax: +46 8 50 52 68 10
info@camatsystem.com
www.camatsystem.com

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Fax: +43 1 61 61 9 61-61
vie-office@chauvin-arnoux.at
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Fax: +1 (508) 698-2118
sales@aemc.com
www.aemc.com

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