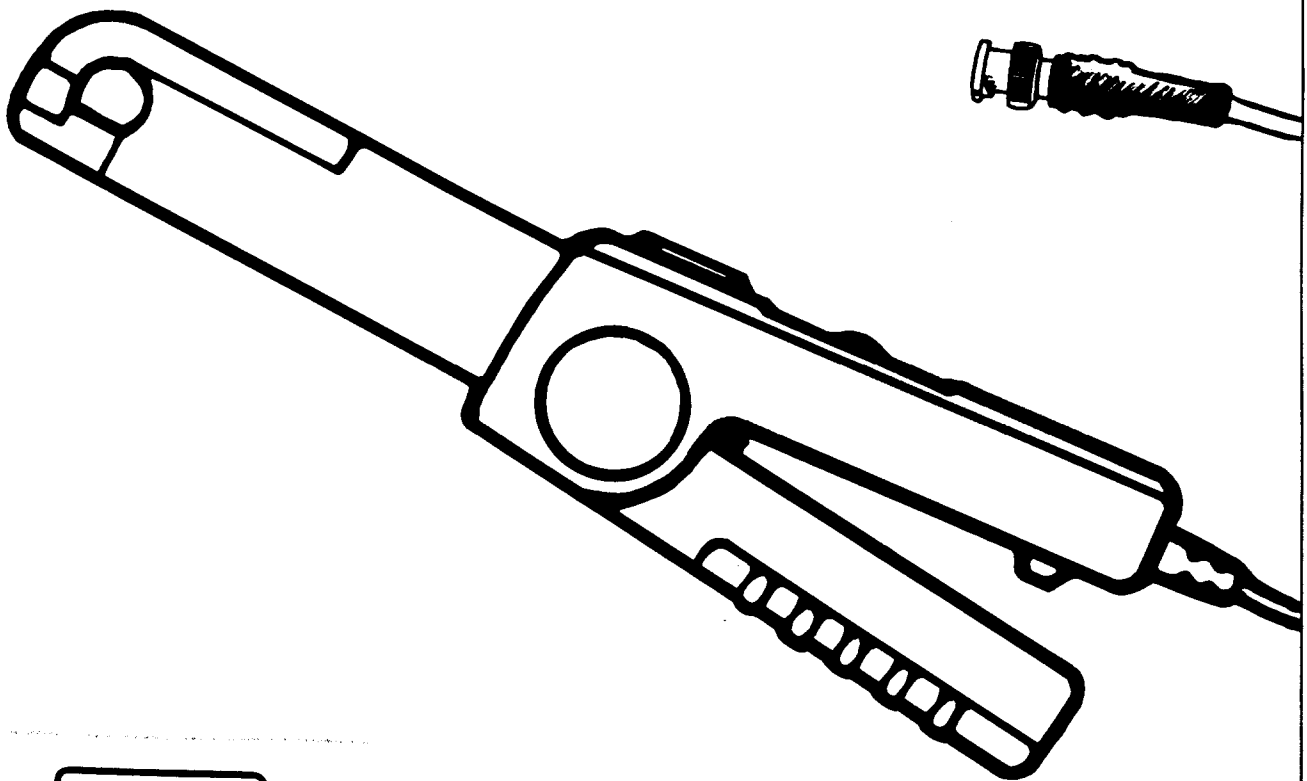


PINCE E 3N

E 3N CLAMP



8915



RS Components

Mode d'emploi / *User's manual*

 **CHAUVIN
ARNOUX**



SAFETY PRECAUTIONS

Do not use the clamp on conductors in which the voltage is more than 600 V rms.

Keep the jaw faces clean. Clean them if necessary with a lightly oiled soft cloth to prevent rusting.

Keep the cable or the busbar centred in the clamp which should be perpendicular to the conductor.

Avoid proximity to other conductors which may create fields of interference.

The clamp must be totally disconnected in the OFF position when the battery is changed.

In order for a measurement chain to conform to a standard, it is necessary that each item of the chain also conforms to this standard. For your safety, ensure that the instruments used with your clamp are also in accordance with IEC 1010 and its conditions of application. In particular, check that the terminals of the instruments used are protected by an earth link or by adequate insulation.

SUMMARY

P resentation.....	23
D escription.....	24
E lectrical specifications.....	25
E lectrical safety.....	35
M echanical specifications.....	36
G eneral specifications.....	37
O perating mode.....	38
M aintenance.....	39

AMENDMENTS TO E3 OPERATORS MANUAL

**IMPORTANT : PLEASE READ THE FOLLOWING NOTES IN CONJUNCTION
WITH THE E3 OPERATORS MANUAL**

Page 21 :

The E3 clamp is not supplied with a 9V battery as printed in the manual.

PRESENTATION

The E3N clamp is a current probe for oscilloscope which uses a Hall effect cell for the measurement of DC or AC current without modification of the installation (without switching off the circuit)

It can measure currents from 50 mA to 100 A peak.

It has 2 ranges and 2 lights indicating:

- "ON", correct power supply to the clamp,
- "OL", overload of the range in use (saturation or peak).

In addition a thumbwheel can be used to reset zero for adaptation to the measurement environment.

This clamp adapts to all measurement instruments which have a BNC input and an impedance of $1\text{M}\Omega$, $< 100\text{ pF}$.

TO ORDER

Clamp E3N
supplied with a 9V battery and an Operator's Manual

Ref.1200.43A

Spares
9V alkaline battery

Ref.1006.20

DESCRIPTION

Switch

The switch has 3 positions:

- Off: The clamp is no longer supplied with power
- Range 10 mV/A: measurement of DC or AC peak currents on the basis of 10 mV per ampere.
- Range 100 mV/A: measurement of DC or AC peak currents on the basis of 100 mV per ampere. This range increases the sensitivity of the clamp whilst reducing the measurement extent.

Battery indicator

This LED is unlit when the switch is OFF.

In normal use, the green LED is lit. When the switch is no longer in the OFF position and the LED is unlit, this warns that the value of the battery voltage is too low or that the cell is no longer supplied with power, thus showing that there is a fault in the clamp.

Resetting zero on the clamp

The thumbwheel makes it possible to reset the output voltage to zero. It is thus possible to overcome the different errors due to thermal shifts, the Earth's magnetic field, the environment, and residual induction.

Indicator of range overload

This indicator symbolised by «OL» shows as a red light when the measurement signal is outside the capabilities of the range. It can also indicate the presence of an impulse outside the capabilities of the range or that the measurement made on the clamp isn't valid.

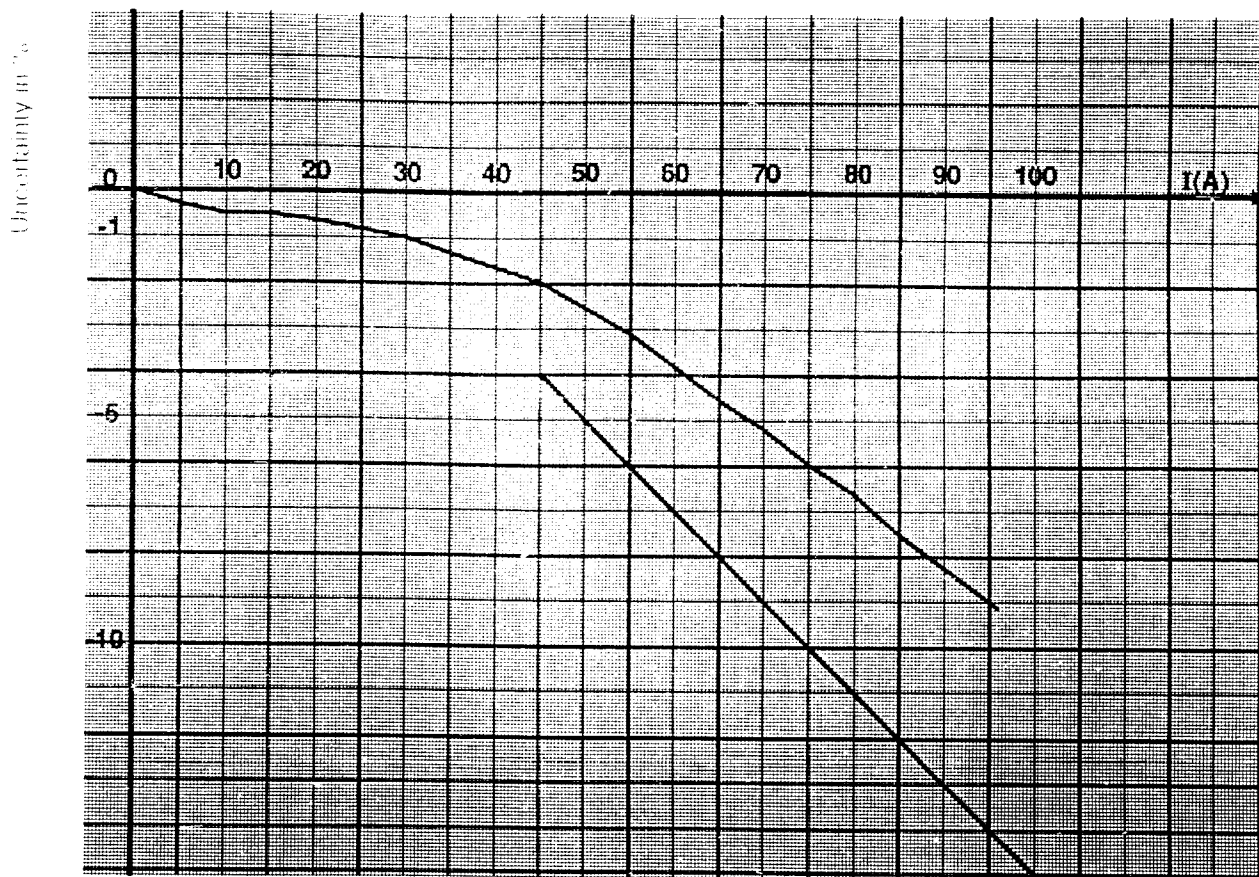
Battery compartment

To change the 9V battery, the clamp should be in the normal position (jaws closed) and disconnected from the oscilloscope, it must not clamp any conductor and the switch must be in the «OFF» position. Unscrew the tool release screw then pull off the cover in the handle extension to access the battery to be changed.

ELECTRICAL SPECIFICATIONS

Range	Measurement extent	Intrinsic error
Range 100mV/A	50mA to 10A peak	$3\% R + 50\text{mA}$
Range 10mV/A	50mA to 40A peak	$4\% R + 50\text{mA}$
Range 10mV/A	40A to 100A peak	Graph value below R: reading

Linearity for a DC signal (Range 10 mV/A)



Typical noise level at output (peak-peak value)

Frequency band	DC 100kHz
Range 10mV/A	480 μ V
Range 100mV/A	3mV

- These specifications are given for an ambient temperature of $23^{\circ} \pm 3^{\circ}\text{C}$, humidity 20 to 75% RH, frequency DC to 1 kHz, load impedance: 1 M Ω /100 pF, conductor centred and parallel to the mark.
- Pass band: DC to 100 kHz
The pass band of the oscilloscope used depends on the frequency to be measured. A pass band of more than 4 times the frequency of the signal to be measured is sufficient.
- Operating frequency (not causing an additional error of more than 3% in relation to the reference range): DC to 20 kHz
- Breaking frequency: - 3 dB at 100 kHz
- Rise or fall time: < 4 μ s

INPUT/OUTPUT MAGNITUDES

- Typical output noise level (crest to crest value): set with: Oscilloscope Tektronix 7603 drawer 7A22. BP: 100 kHz.

Frequency range	DC-100kHz
Range 10mV/A	480 μ V
Range 100mV/A	3mV

- Zero offset: 1 A max

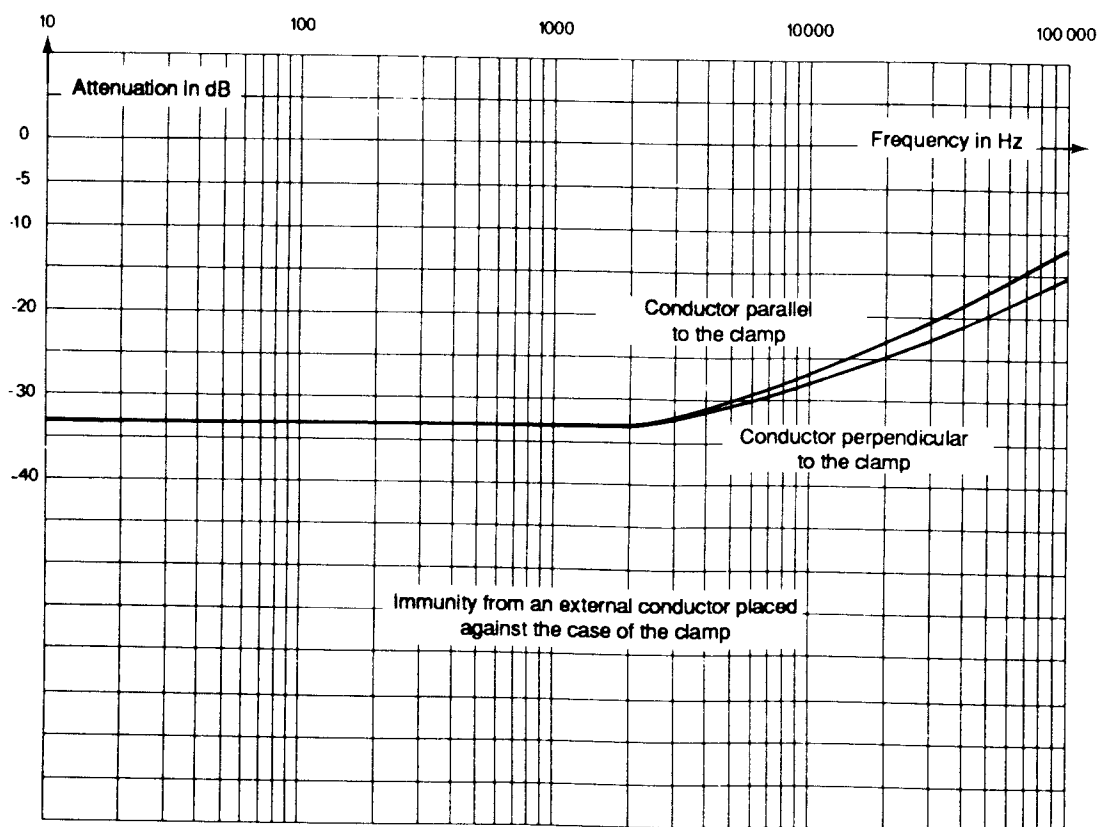
The zero thumbwheel makes it possible to roughly correct this offset. The zero reset on the measurement instrument makes it possible to obtain a finer adjustment.

NB: It is advisable to check the zero offset after having measured a high power current. To do this, mark a reference on the oscilloscope on the GND position, then connect up on DC, if an offset is present which is too high, this means that the clamp is magnetized.

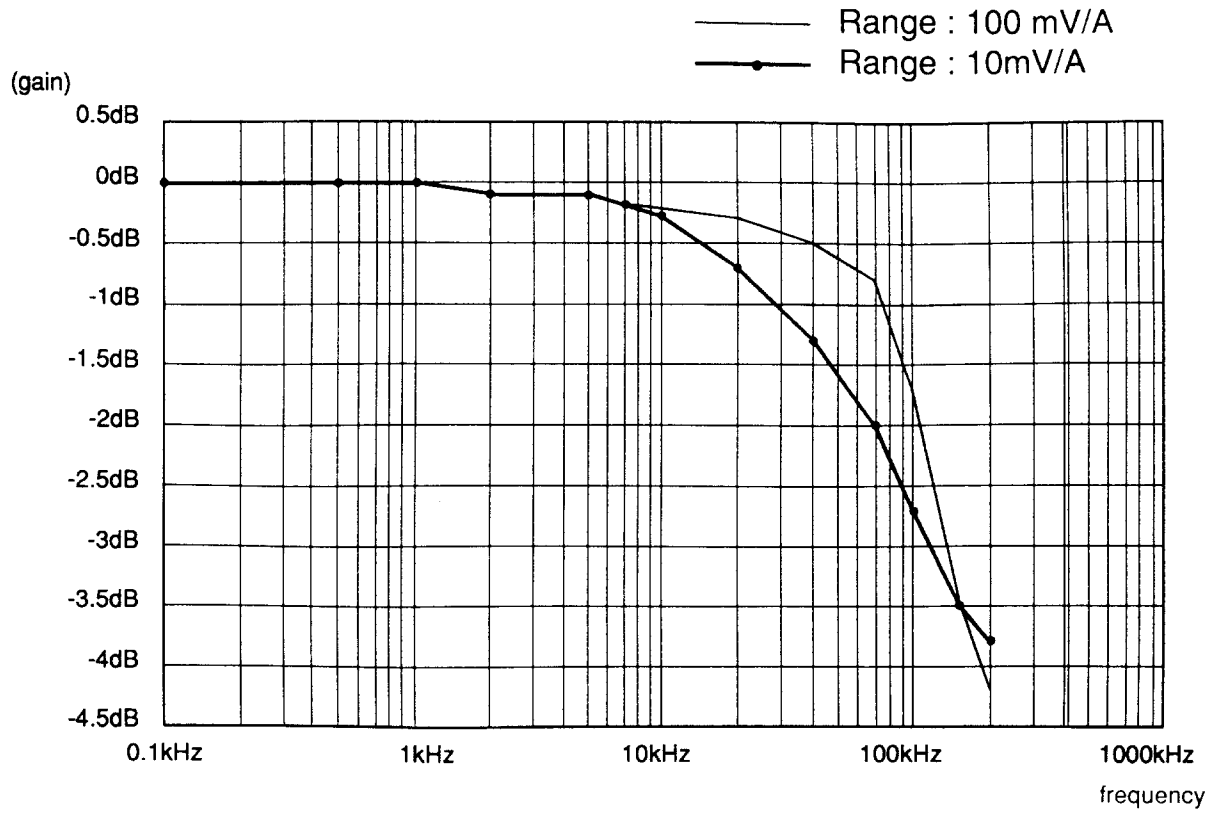
To demagnetize the clamp, simply open and close the clamp several times without enclosing a conductor or apply a decreasing magnetic field to it.

DISTORTION MAGNITUDES

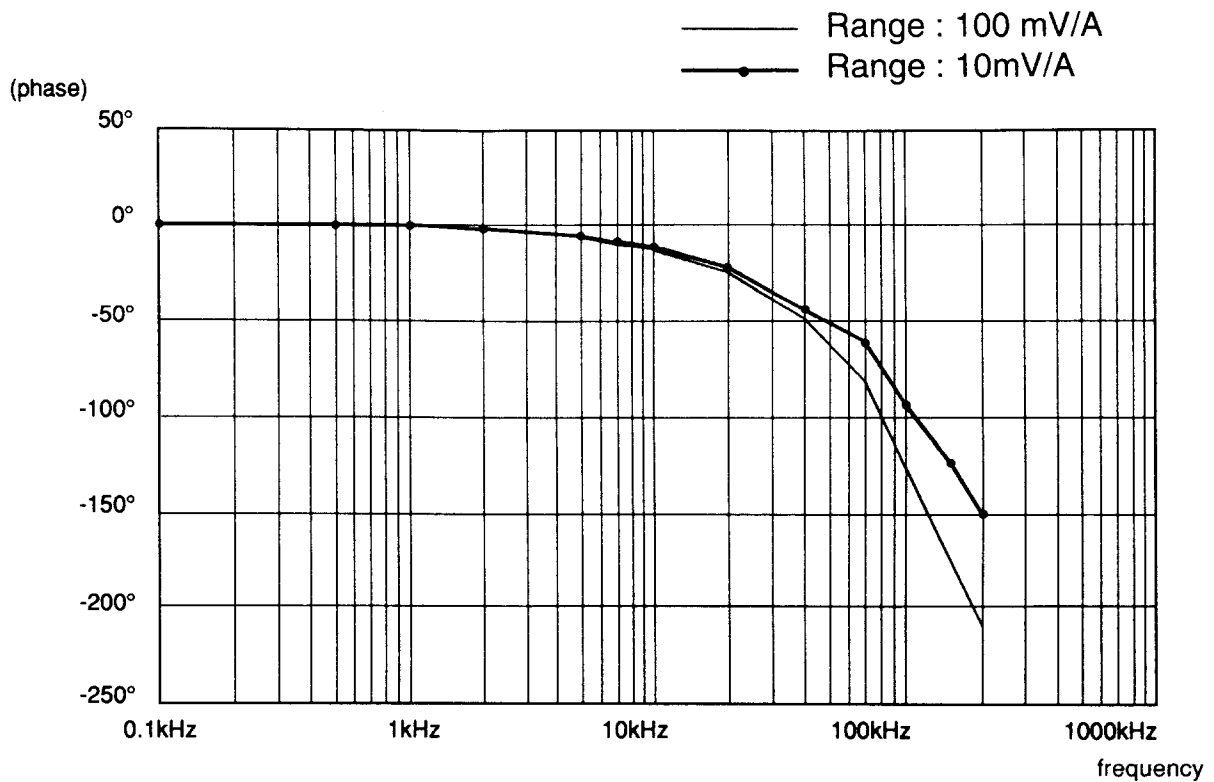
- Battery voltage from 6.5 V to 10 V: ± 6 mA/V typical, ± 10 mA/V max
- Temperature from 0 to 50°C: ± 2000 ppm/°C max
- Position of the conductor in the window (AC signal of frequency 1 kHz): max $\pm 0.5\%$ of the reading.
- External magnetic fields generated by an AC or DC current of 1A flowing in a conductor placed in immediate proximity (see graph below).
- Errors of linearity, accuracy, temperature shift and other specifications of the oscilloscope should be taken into account during measurement.



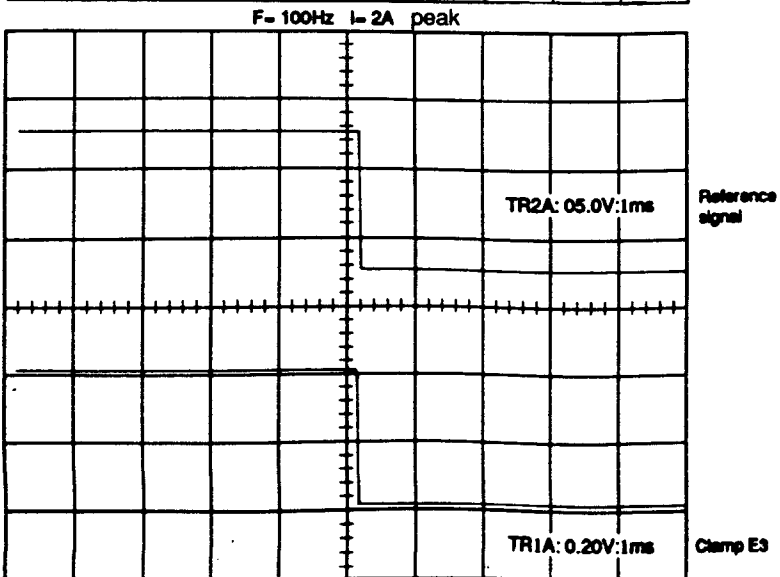
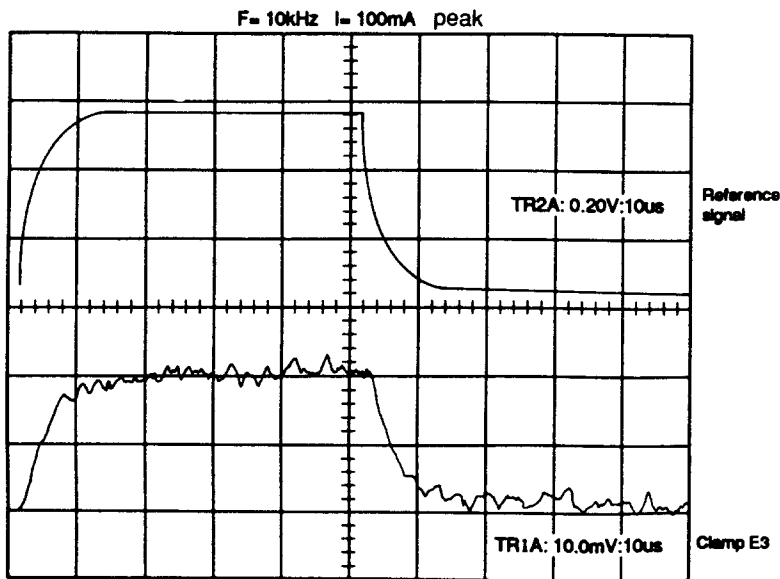
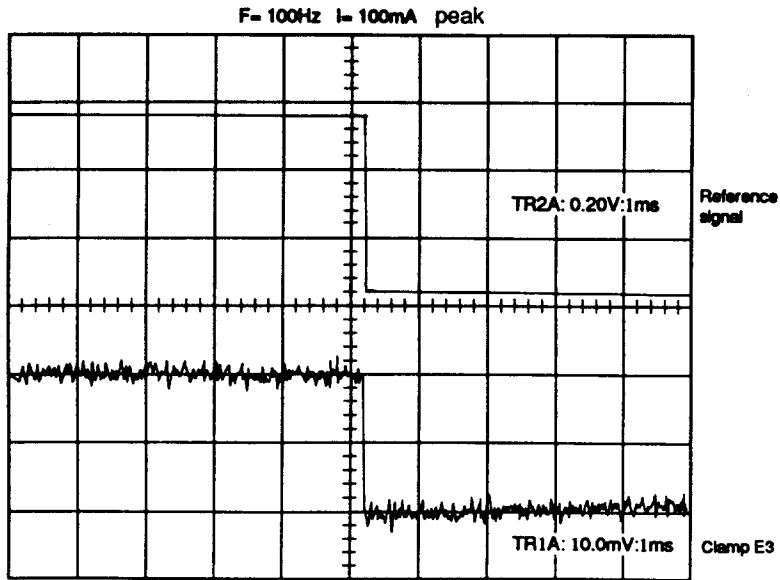
Typical response curves for frequency and phase shift.
measurement current : 1A peak

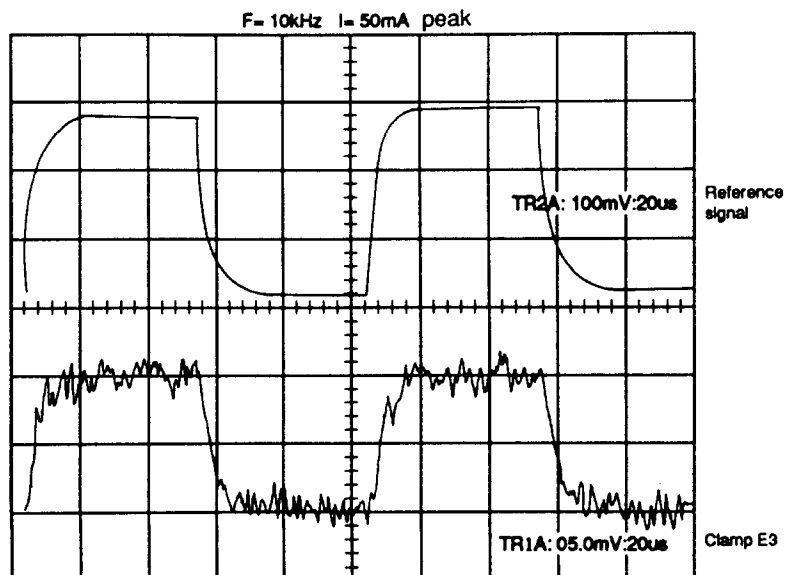
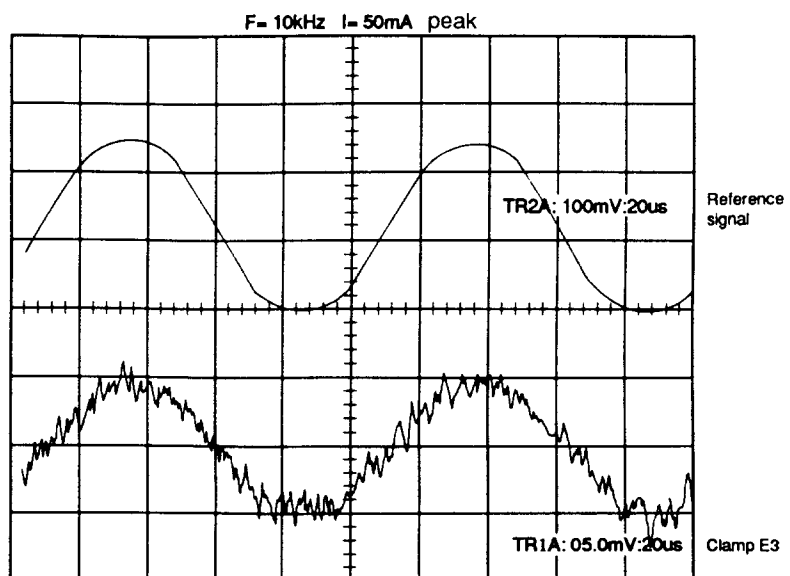
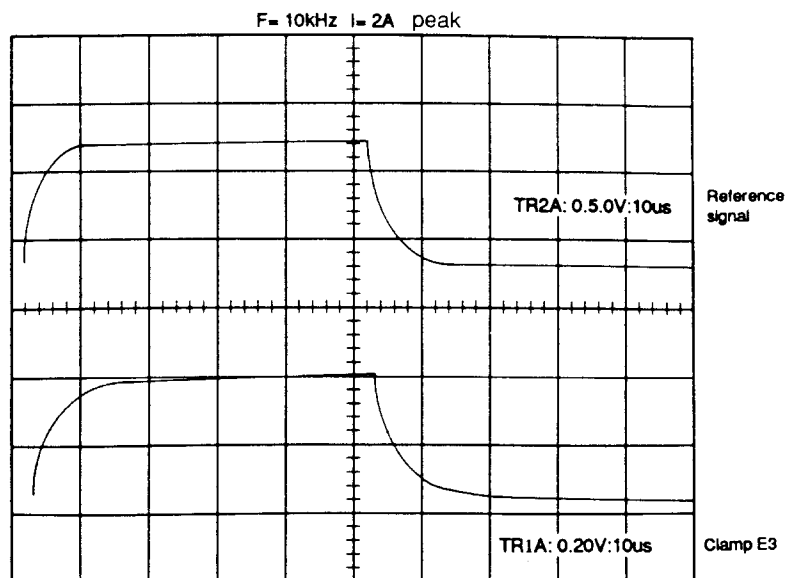


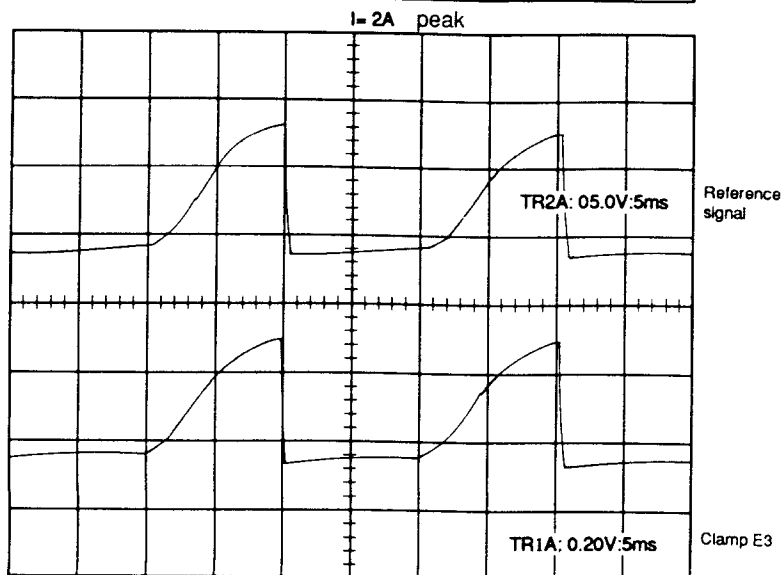
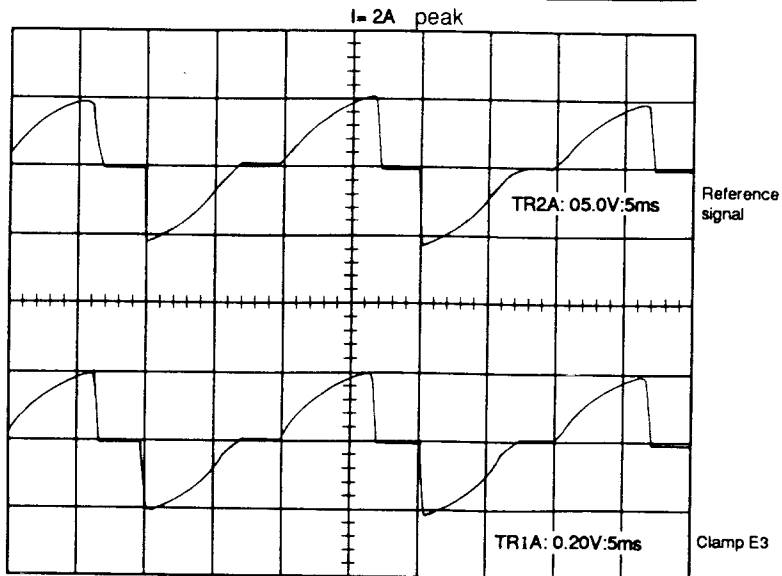
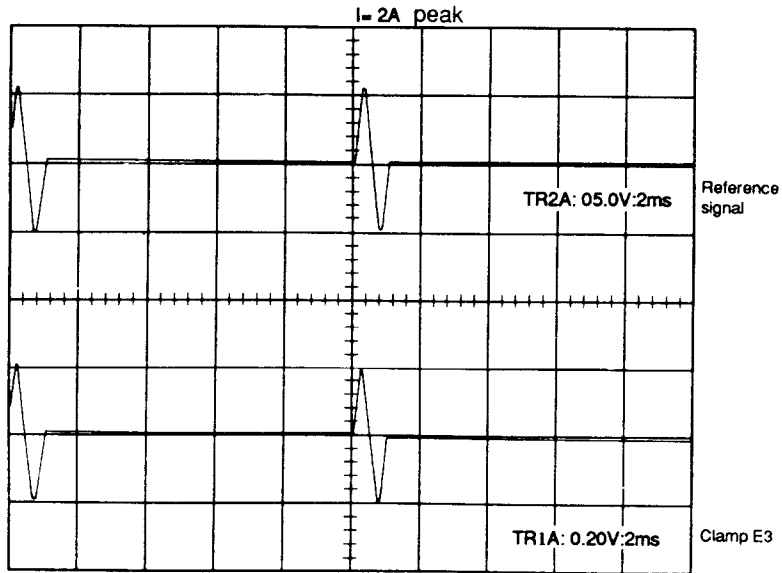
measurement current : 1A peak

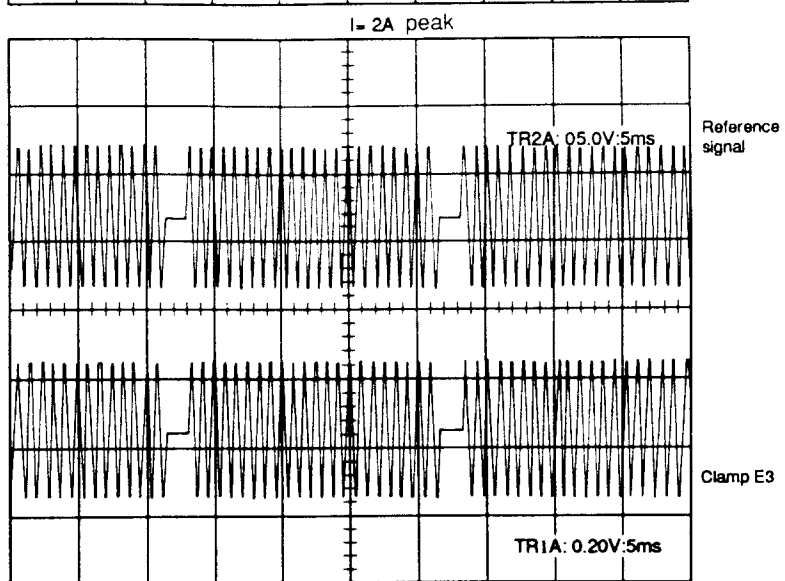
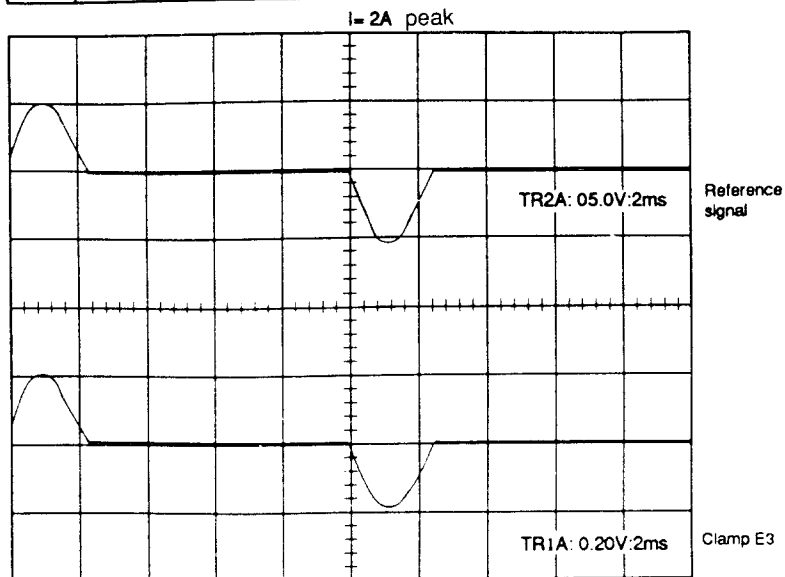
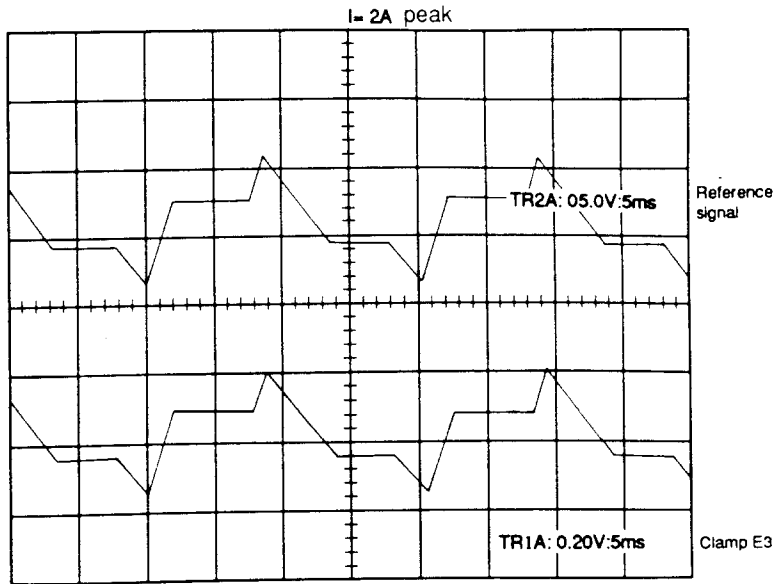


Different limiting examples of the response of the E3N Clamp









ELECTRICAL SAFETY

PROTECTION FROM ELECTRIC SHOCKS

Instrument with double insulation or strengthened insulation in the part that is hand held in normal use, and with single insulation or additional insulation between the primary and the secondary output.

Maximum service voltage in accordance with IEC 1010 :

600V in installations of category III and degree of pollution 2.

300V in installations of category IV and degree of pollution 2.

Dielectric strength test voltage in accordance with IEC 1010 :

5550V 50/60Hz between the parts that are hand-held in normal use, on one hand, and the primary with the secondary on the other hand.

3250V 50/60Hz between the primary on one hand, and the secondary on the other hand.

ELECTROMAGNETIC COMPATIBILITY

Electrostatic discharge : 4kV without disturbance

8kV without destruction in accordance with IEC 801-2.

Radiated field : 3V/m in accordance with IEC 801-3

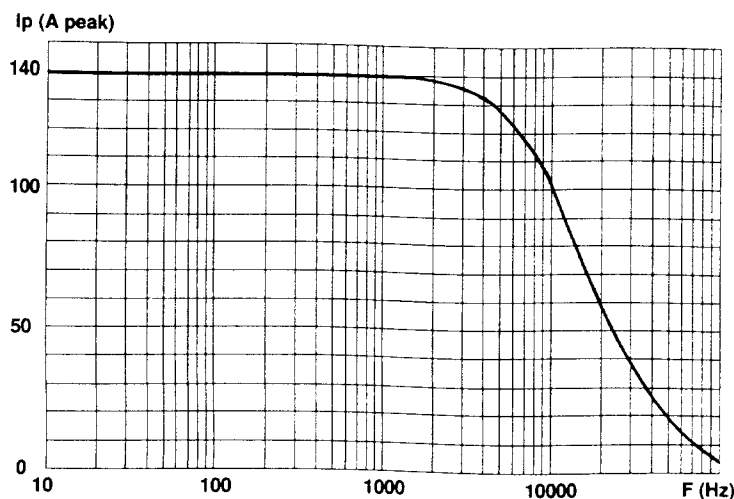
Rapid transients : 1kV class 1 without disturbance

2kV class 2 with minor defects in accordance with IEC 801-4.

Electric shocks : 1kV - 0.5kA class 2 without disturbance

2kV - 1kA class 3 with minor defects in accordance with IEC 801-5.

LIMIT OF THE NON DESTRUCTIVE PEAK CURRENT AS A FUNCTION OF THE FREQUENCY



MECHANICAL SPECIFICATIONS

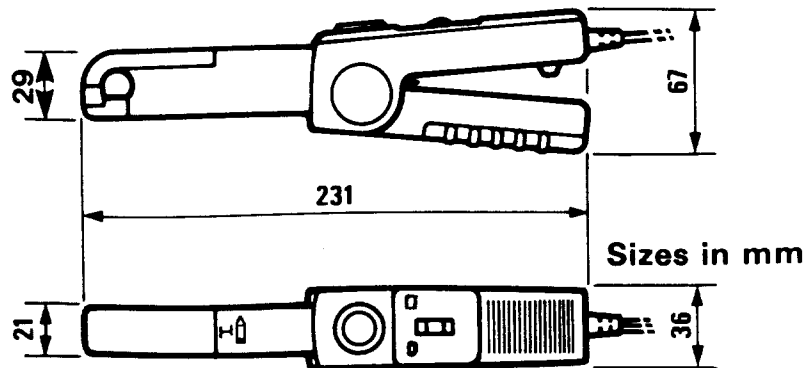
Max. cable dimensions: \varnothing 11.8 mm

Jaw opening: 12.5 mm maximum

Dimensions: 231 x 67 x 36 mm

Twin core lead (coaxial) 2m ended by a BNC plug insulated and moulded

Weight: 330 g with battery



PROTECTIONS:

Degrees of protection: IP 20 to IEC 529

Protection from shocks: 100 G, 6 ms, half-cycle, to IEC 68-2-27

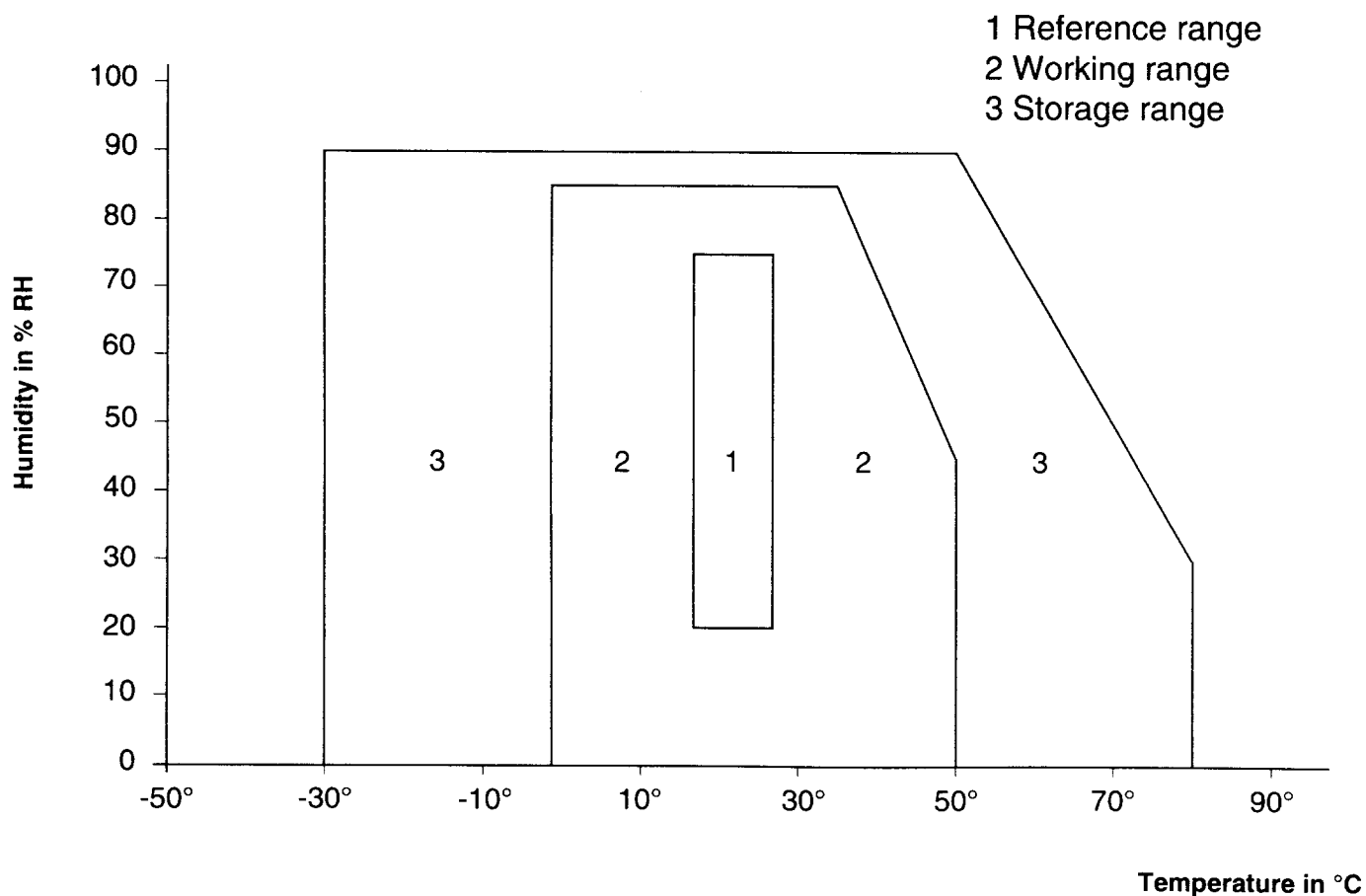
Drop height from all angles: 1 m

Resistance to vibrations: 10/55/10 Hz 0.15 mm, to IEC 68-2-6

Bumps: 40 G, 6 ms, 4000 bumps, to IEC 68-2-29

GENERAL SPECIFICATIONS

Environmental conditions



Battery: Alkaline 9V type 6 LR 61

Consumption: 8.6 mA typical, 12 mA max

Service life: 55 h typical, 40 h min.

Indicator: Green light goes out for a battery voltage < 6.5 V

Class of protection: Class II according to IEC 348

Dielectric strength: 4 kV

Leakage current: < 0.5 mA

OPERATING MODE

- To make a current measurement, switch on the clamp by selecting the 100 mV/A range. Check that the battery indicator (green) is lit and that the «OL» indicator is not lit.
- Connect the clamp to the oscilloscope.
With the clamp closed and without clamping a conductor, select the highest sensitivity (for example 1 mV/cm) on the oscilloscope and 100 mV/A on the clamp, then set zero on the clamp with the thumbwheel in relation to a reference chosen on the oscilloscope. Zero on the oscilloscope makes it possible to adjust this setting.
- Select the measurement sensitivities of the clamp and the oscilloscope.
- Choose the connection method which is the best adapted to measurement on the oscilloscope.
- Note the direction of the primary current by means of the arrow marked on and under the case.
- Insert the conductor carrying the current to be measured in the clamp and take the measurement.
- If necessary, re-check the origin of the graph, with the jaws not clamped around the conductor, and make the measurement again.

MAINTENANCE

- **Jaw faces** : It is necessary to always keep the jaw faces clean. Clean them and lightly oil them to avoid rust. Do not leave the clamp in very damp places, or directly exposed to water.
- **Handles and case** : Clean with a cloth or a sponge soaked with soapy water, rinse in the same way without ever getting water on the clamp. Dry with a cloth or in an air flow.
- To maintain the performance of the clamp, it is advisable to carry out a check or recalibration every year.