

Current clamps for AC current

C100 series



"C100" series

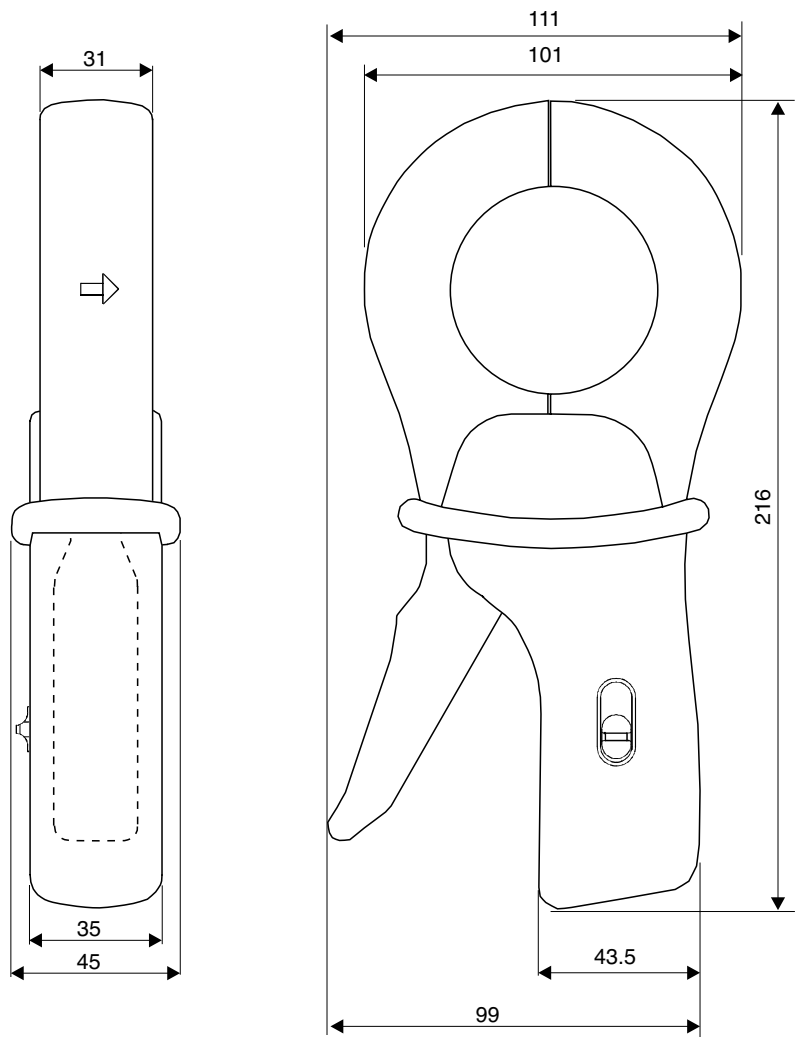
The "C100" series is a range of thirteen transformer clamps with all the advantages of our old "C30" series clamps whilst incorporating considerable improvements, particularly in the field of safety, ergonomics and performance:

- 1000 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), anti-slip 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.



Oscilloscope clamp for AC current

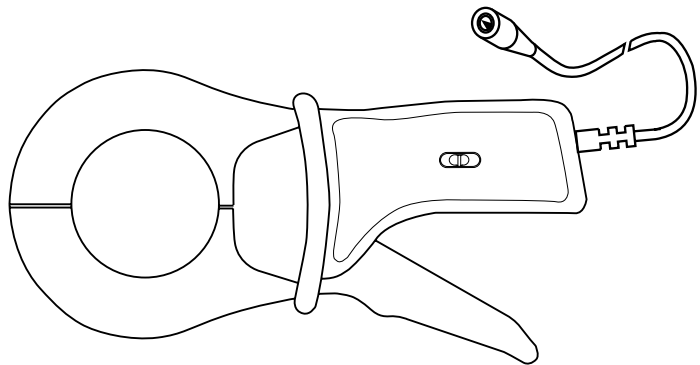
Model C160 (insulated AC current probe)

C100 series

Current	30 A peak	300 A peak	2000 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 calibres:

0.1 A AC...10 A AC (30 A peak)
1 A AC...100 A AC (300 A peak)
1 A AC...1000 A AC (2000 A peak)

Output signal:

100 mVAC/AAC (1 V for 10 A)
10 mVAC/AAC (1 V for 100 A)
1 mVAC/AAC (1 V for 1000 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	$\leq 3 \% + 10 \text{ mV}$	$\leq 3 \% + 10 \text{ mV}$	$\leq 3 \% + 10 \text{ mV}$	$\leq 3 \% + 10 \text{ mV}$
Phase shift	not specified	not specified	$\leq 15^\circ$	$\leq 15^\circ$

■ 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	$\leq 2 \% + 5 \text{ mV}$	$\leq 2 \% + 5 \text{ mV}$	$\leq 2 \% + 5 \text{ mV}$	$\leq 2 \% + 5 \text{ mV}$
Phase shift	not specified	$\leq 15^\circ$	$\leq 10^\circ$	$\leq 5^\circ$

■ 1000 A calibre

Primary current	1 A...50 A	50 A...200 A	200 A...1000 A	1000 A...1200 A
% Accuracy of output signal	$\leq 1 \% + 1 \text{ mV}$	$\leq 1 \% + 1 \text{ mV}$	$\leq 1 \% + 1 \text{ mV}$	$\leq 1 \% + 1 \text{ mV}$
Phase shift	not specified	$\leq 3^\circ$	$\leq 2^\circ$	$\leq 1^\circ$

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
- 1000 A calibre: 64 A.s

Maximum currents:

1000 A permanent
1200 A for 40 minutes max. / > 20 minutes shutdown for a frequency $\leq 1 \text{ kHz}$ (limitation proportional to the inverse of one third of the frequency beyond that)

Insertion impedance (at 400 Hz / 10 kHz)

- 10 A calibre: $< 0.3 \text{ m}\Omega / < 6.6 \text{ m}\Omega$
- 100 A calibre: $< 0.3 \text{ m}\Omega / < 2 \text{ m}\Omega$
- 1000 A calibre: $< 0.3 \text{ m}\Omega / < 1.6 \text{ m}\Omega$

Output impedance at 1 kHz:

- 10 A calibre: $\leq 515 \Omega \pm 10 \%$
- 100 A calibre: $\leq 515 \Omega \pm 10 \%$
- 1000 A calibre: $\leq 515 \Omega \pm 10 \%$

Influence of temperature:

$\leq 150 \text{ ppm/k}$ or 0.15 % of output signal per 10 °K

Influence of relative humidity:

$< 0.1 \%$ of output signal

Influence of adjacent conductor:

$\leq 1 \text{ mA/A}$ at 50 Hz

Influence of DC current superimposed on rated current:

$< 1 \%$ of output signal for a current $\leq 30 \text{ A DC}$

Influence of conductor position in jaws:

$\leq 0.1 \%$ of output signal for frequencies $\leq 400 \text{ Hz}$

Influence of frequency ⁽²⁾:

■ 10 A calibre:

$< 10 \%$ of output signal from 10 Hz to 1 kHz
 $< 5 \%$ of output signal from 1 kHz to 10 kHz
 $< 20 \%$ of output signal from 10 kHz to 50 kHz
3 dB of output signal from 50 kHz to 100 kHz

■ 100 A calibre:

$< 5 \%$ of output signal from 10 Hz to 1 kHz
 $< 3 \%$ of output signal from 1 kHz to 10 kHz
 $< 20 \%$ of output signal from 10 kHz to 50 kHz
3 dB of output signal from 50 kHz to 100 kHz

■ 1000 A calibre:

$< 1 \%$ of output signal from 10 Hz to 1 kHz
 $< 2 \%$ of output signal from 1 kHz to 10 kHz
 $< 10 \%$ of output signal from 10 kHz to 50 kHz
3 dB of output signal from 50 kHz to 100 kHz

Influence of crest factor:

$< 1 \%$ of output signal for crest factor ≤ 6 with current

- 10 A calibre: $\leq 30 \text{ A peak}$
- 100 A calibre: $\leq 300 \text{ A peak}$
- 1000 A calibre: $\leq 3000 \text{ A peak}$

Oscilloscope clamp for AC current

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■ 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-period (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:
2 m coaxial lead with 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, sine signal, frequency of 48 Hz to 1000 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

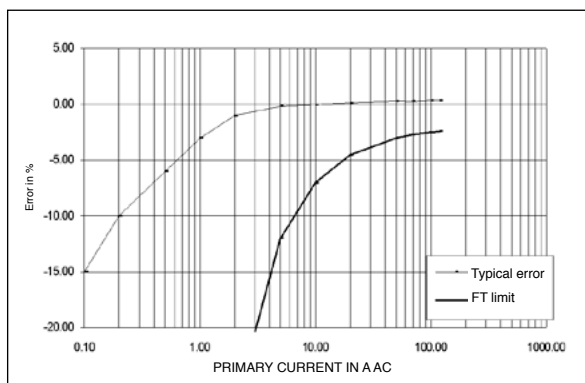
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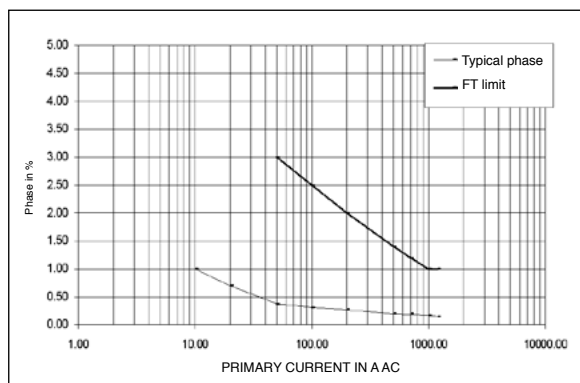
■ Curves at 50 Hz

1000 A calibre

Error on measurement

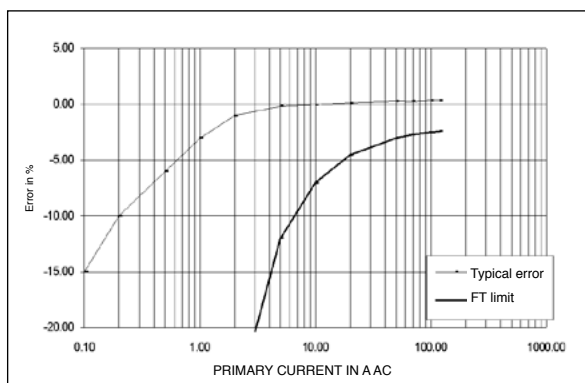


Phase shift

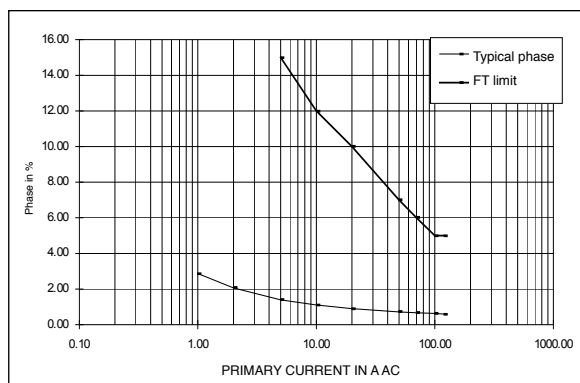


100 A calibre

Error on measurement

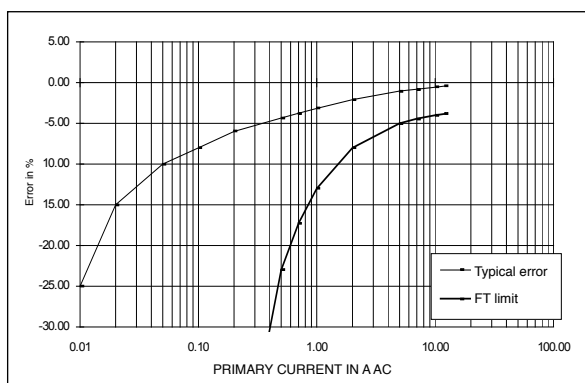


Phase shift

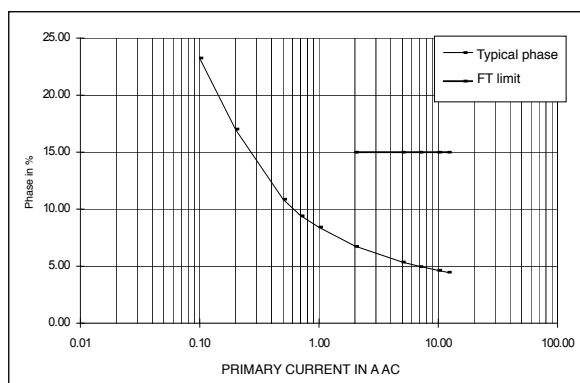


10 A calibre

Error on measurement



Phase shift



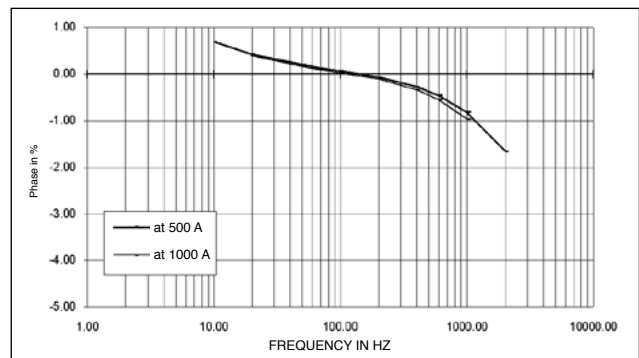
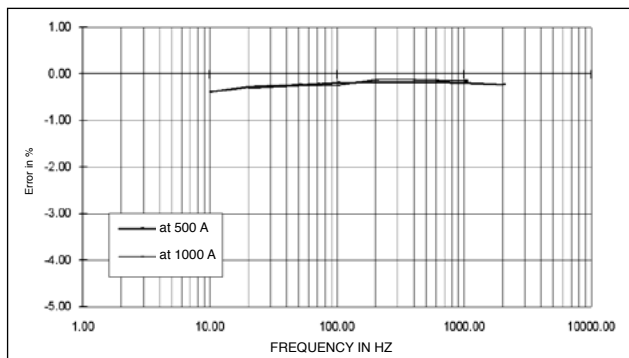
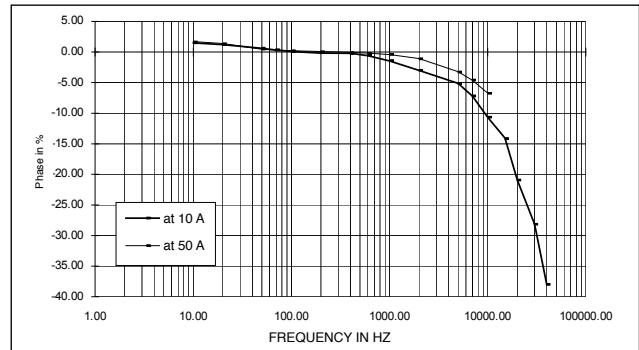
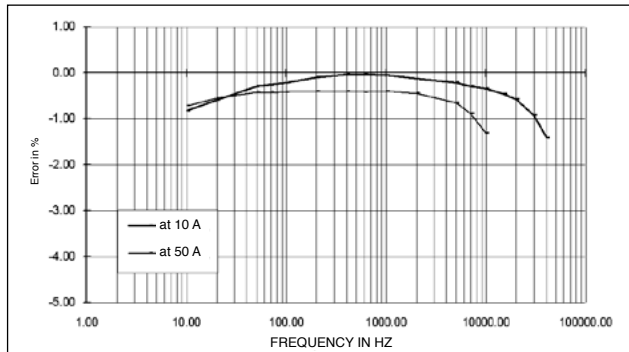
Oscilloscope clamp for AC current

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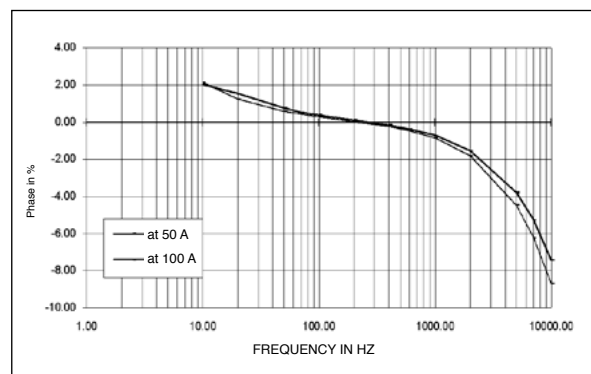
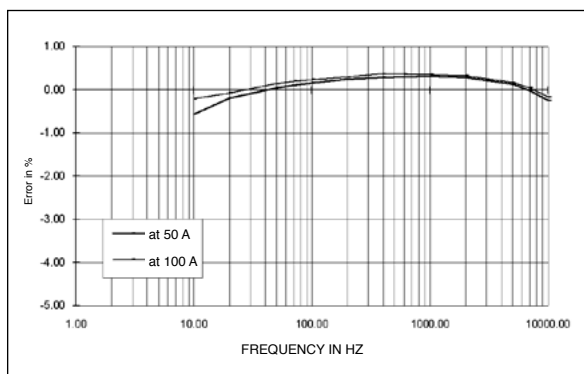
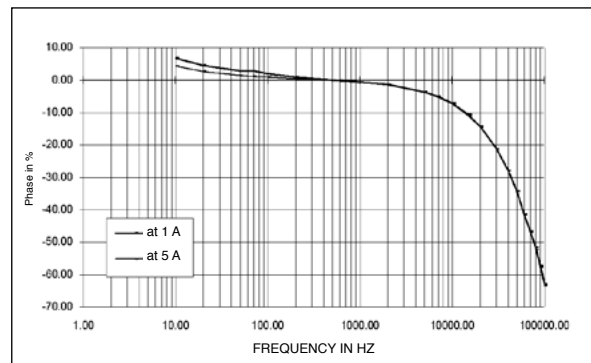
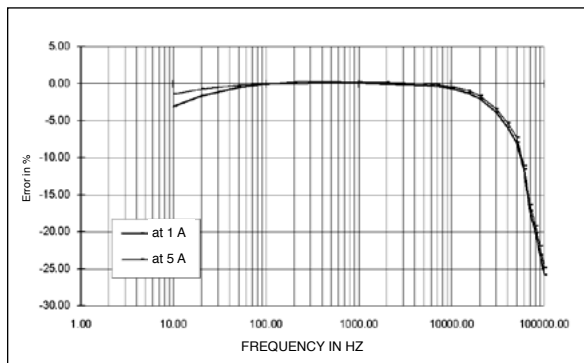
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■ Frequency response (cont.)

1000 A calibre



100 A calibre



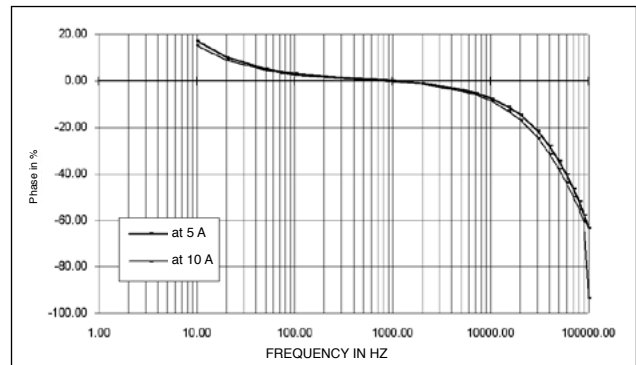
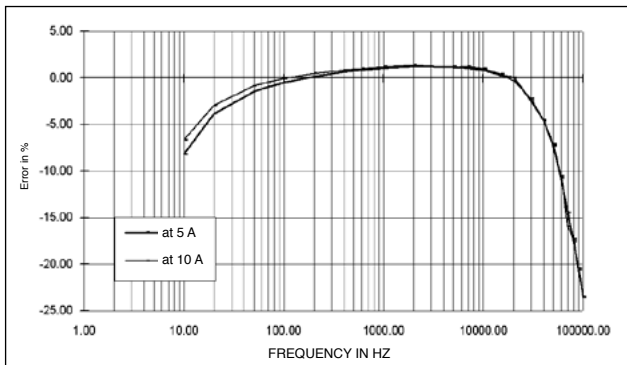
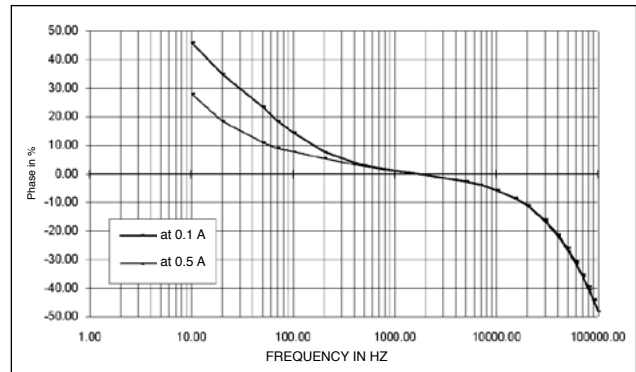
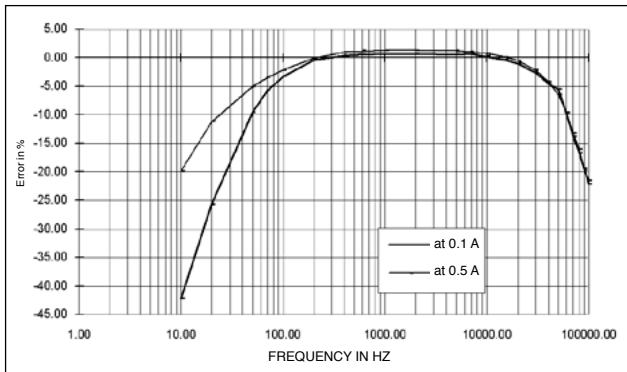
Oscilloscope clamp for AC current

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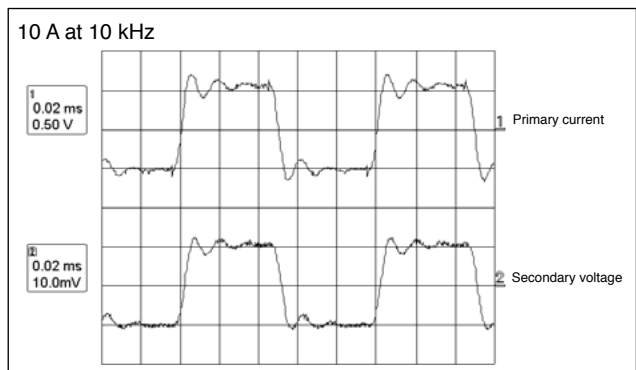
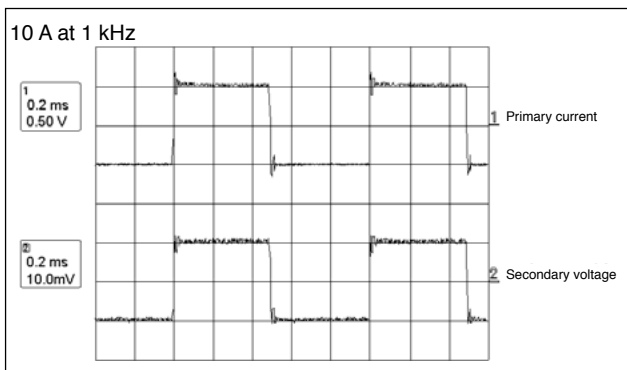
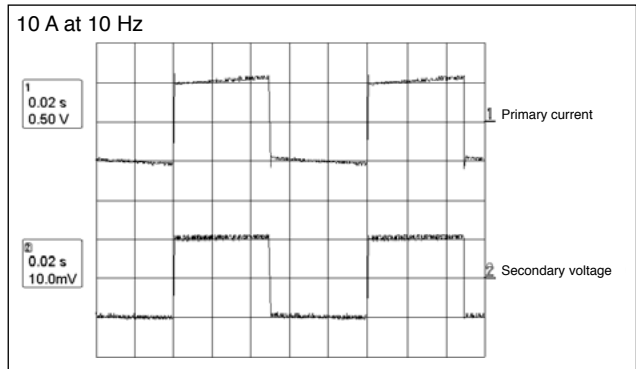
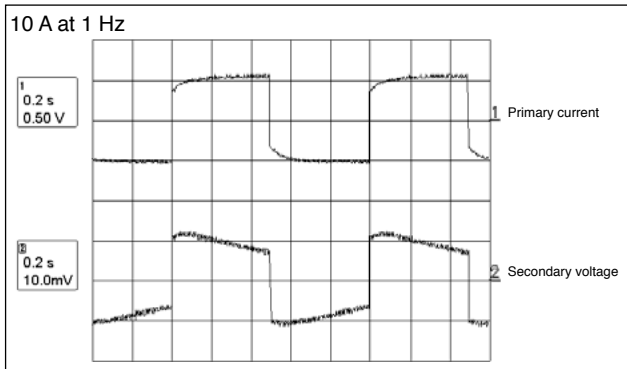
Frequency response (cont.)

10 A calibre



Response to a square signal

1000 A calibre



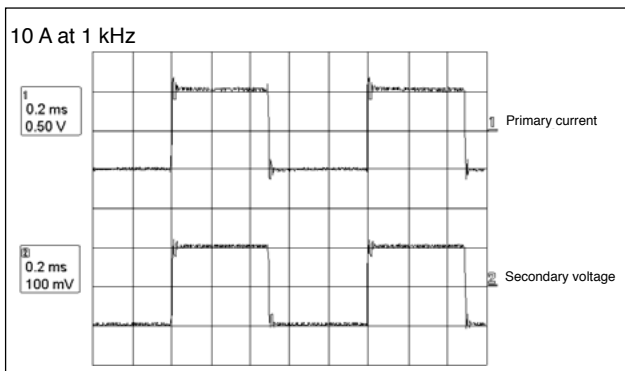
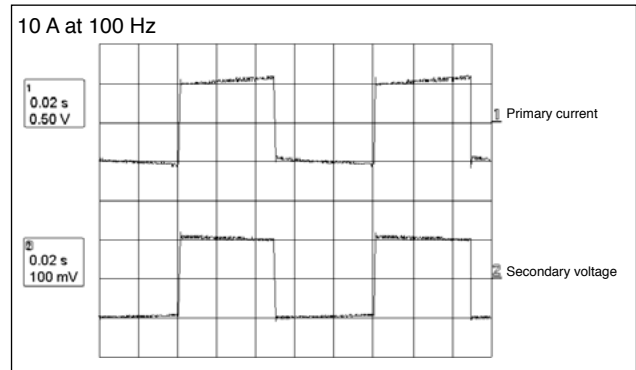
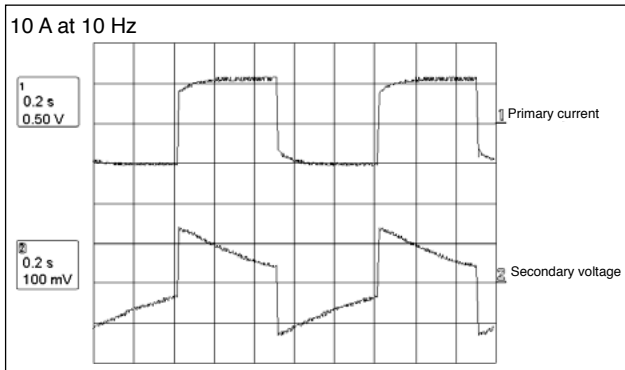
Oscilloscope clamp for AC current

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■ Response to a square signal (cont.)

100 A calibre



10 A calibre

