

FLUKE

i3000s
AC Current Clamp
Instruction Sheet

Introducing the i3000s

The i3000s is a clamp-on AC Current Clamp for use with oscilloscopes and multimeters with banana input using the supplied Dual Banana to BNC Adapter. The clamp is optimized for measurement on power distribution systems.

Unpacking

The following items should be included in your Current Clamp box:

- Current Clamp
- Dual Banana to BNC Adapter (model PM9081/001)
- Instruction Sheet (this paper)

Check the contents of the shipping box for completeness. If something in the box has been damaged or missing, contact your distributor or the nearest FLUKE sales or service office immediately.

Safety Information

Read First: Safety Information.
To ensure safe operation and service of the current clamp, follow these instructions:

- Read the operating instructions before use and follow all safety instructions.
- Use the Current Clamp only as specified in the operating instructions, otherwise the clamp's safety features may not protect you.
- Adhere to local and national safety codes. Individual protective equipment must be used to prevent shock and arc blast injury where hazardous live conductors are exposed.
- Do not hold the Current Clamp anywhere beyond the tactile barrier, see Figure 8.
- Before each use, inspect the Current Clamp. Look for cracks or missing portions of the clamp housing or output cable insulation. Also look for loose or weakened components. Pay particular attention to the insulation surrounding the jaws.
- Check the magnetic mating surfaces of the clamp jaws; these should be free of dust, dirt, rust and other foreign matter.
- Never use the clamp on a circuit with voltages higher than 600 V CAT III.
 - CAT III equipment is designed to protect against transients in equipment in fixed equipment installations, such as distribution panels, feeders and short branch circuits, and lighting systems in large buildings.

- Use extreme caution when working around bare conductors or bus bars. Contact with the conductor could result in electric shock.
- Use caution when working with voltages above 60 V dc, 30 V ac rms or 42 V ac peak. Such voltages pose a shock hazard.

Symbols

	May be used on HAZARDOUS LIVE conductors.
	Product is protected by double insulation.
	Risk of Danger. Important information. See Instruction Sheet.
	Risk of Electric Shock.
	Conforms to relevant European standards.
	Earth ground

Specifications

SAFETY

	Input jaws & Output float voltage	Complies with European standards EN/IEC 61010-1 2nd Edition & EN/IEC 61010-2-032 for 600V CAT III, pollution degree 2.
--	-----------------------------------	--

CE Conformity

EN/IEC 61010-02-032

ELECTRICAL SPECIFICATIONS

All Electrical Specifications are valid at the following reference conditions:

- Ambient temperature 23±3°C (73±3°F)
- Relative Humidity 0 to 85%
- Frequency 48 to 65 Hz
- Continuous external field < 40 A/m
- Load impedance 1 M Ω / 47 pF
- The current may not contain any DC component
- No influence from adjacent currents
- The conductor must be centered within the jaw aperture

Measuring range	Current Ranges		
	30A	300A	3000A
Crest factor	up to 3	up to 3	up to 3
Maximum non-destructive current:			
• continuous	36A	360A	2400A
• 30min.+30min. stop			2800A
• 5min.+30min. stop			4000A
Output signal	10 mV/A	1 mV/A	0.1 mV/A
Basic accuracy	2% of reading + 0.1A	2% of reading + 0.5A	2% of reading + 2A
Additional errors:			
• with temperature (-10 to +50°C)	0.02%/°C	0.02%/°C	0.02%/°C
• with position of conductor in the clamp window	1% + 0.1A	1% + 0.1A	1% + 0.1A
• with adjacent conductor	0.005A/A	0.005A/A	0.005A/A
• with frequency (10Hz to 100 kHz)	See Figure 1	See Figure 2	See Figure 3
Phase shift	20° @ 2A 10° @ 8A 5° @ 30A See Figure 4	3° @ 20A 1.5° @ 80A 1° @ 300A See Figure 5	3° @ 200A 1.5° @ 800A 1° @ 3000A See Figure 6

* This is the maximum permissible ratio between the peak value of a superimposed transient and the ac rms value.

Bandwidth (-3dB) 10 Hz to 100 kHz
(see Figure 7 for derating)

GENERAL

Clamp Dimensions	310 x 120 x 48 mm (12.2 x 4.7 x 1.9 in)
Weight	1200 g (42.3 oz)
Cable length	2.1 m (82.6 in)
Maximum conductor size	∅ 64 mm (2.5 in)
Maximum Jaw Opening	90 mm (3.5 in)
Temperature	
Operating	-10 to +50°C (+14 to +122°F)
Non-operating	-40 to +85°C (-40 to +185°F)
Relative Humidity	
Operating	0 to 85%, up to +35°C (+95°F)
Non-operating	0 to 75%, up to +50°C (+122°F)
Non-operating	0 to 85%, up to -10°C (+14°F)
Non-operating	0 to 75%, up to +85°C (+185°F)
Altitude	
Operating	to 2000 m (6500 ft)
Non-operating	to 12000 m (40000 ft)

FREQUENCY RESPONSE

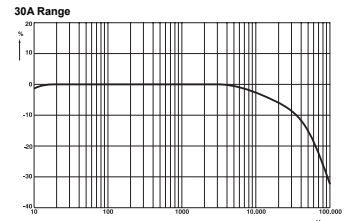


Figure 1. Frequency Response @ 10A

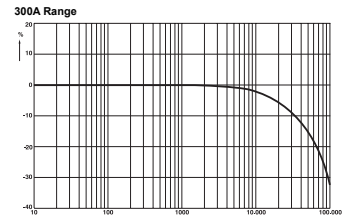


Figure 2. Frequency Response @ 10A

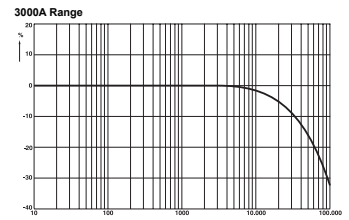


Figure 3. Frequency Response @ 100A

October 1997, Rev.3, 08/05
© 1997-2005 Fluke Corporation.
All rights reserved.
Printed in the Netherlands
All product names are trademarks
of their respective companies.



482287200839

PHASE SHIFT

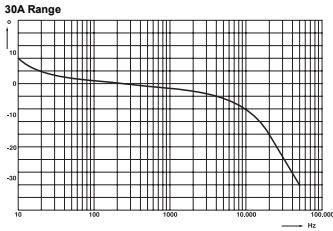


Figure 4. Phase Shift @ 10A

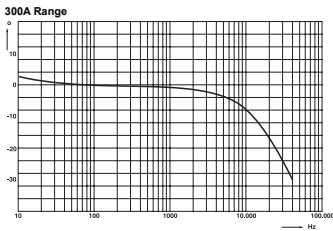


Figure 5. Phase Shift @ 10A

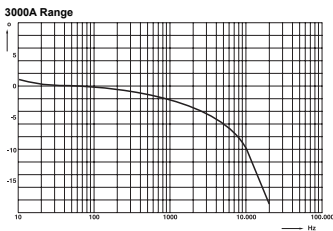


Figure 6. Phase Shift @ 100A

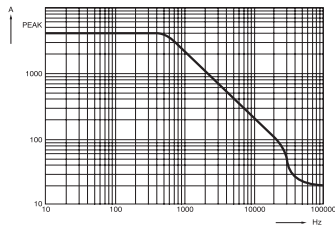


Figure 7. Maximum Current as a Function of the Frequency

Instrument Compatibility

The I3000s is compatible with any Fluke ScopeMeter test tool, Power Harmonics Analyzer, Oscilloscope, Multimeter, or other voltage measurement device that has the following features:

- BNC input connector. The Dual Banana to BNC Adapter included in the package, can be used to connect to standard inputs on multimeters. For the 120 series ScopeMeters, use the BB120 Shielded Banana to BNC Adapter.
- Input accuracy of 2% or better to take full advantage of the accuracy of the Current Clamp.
- Input impedance of greater than or equal to 1 MΩ, and for full bandwidth and accuracy, a maximum input capacity of 47 pF.
- A passband of more than four times the frequency of the waveform to be measured.

Using the Current Clamp

To use the Current Clamp, follow these instructions:

1. Connect the I3000s Current Clamp to the desired input on the measuring instrument. When you are using a multimeter, use the Dual Banana to BNC Adapter (FM9081/001) to connect the Current Clamp to the input. (See Figure 8.)
2. On the Current Clamp, select the least sensitive range (0.1 mV/A).
3. Select the appropriate clamp sensitivity on your ScopeMeter test tool or oscilloscope.
4. Position the Current Clamp perpendicularly and centered around the conductor. Make sure that the arrow marked on the clamp jaw points toward the correct orientation for correct phase display on the oscilloscope. (See Figure 9.) Use the markings on the jaws to center the conductor.
5. Observe the current value and waveform on the instrument's display.
6. If desired, select a lower range on the Current Clamp and set the corresponding sensitivity (mV/A setting) on the ScopeMeter test tool or oscilloscope.

If the corresponding sensitivity is not available on the ScopeMeter or oscilloscope, select the closest setting and calculate the actual current value from the displayed.

Example 1: Current Clamp set to 0.1 mV/A, ScopeMeter test tool set to 1 mV/A. The ScopeMeter test tool displays 50A. The real current value can be calculated with the following formula:

$$\text{Actual current} = \frac{\text{sensitivity instrument}}{\text{sensitivity Current Clamp}} \times \text{display value} = \frac{1 \text{ mV} / \text{A}}{0.1 \text{ mV} / \text{A}} \times 50 = 500 \text{ A}$$

Example 2: Current Clamp set to 10 mV/A. Multimeter displays 0.285V.

$$\text{Actual current} = \frac{\text{display value}}{\text{sensitivity Current Clamp}} = \frac{0.285 \text{ V}}{10 \text{ mV} / \text{A}} = \frac{285 \text{ mV}}{10 \text{ mV} / \text{A}} = 28.5 \text{ A}$$

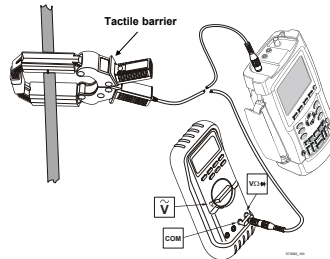


Figure 8. Measurement Setup

Warning

If the sensitivity setting (mV/A) of the ScopeMeter test tool or oscilloscope does not correspond with the setting of the Current Clamp, the instrument may display a much lower current than the actual value. This may cause misinterpretation and as a consequence incorrect handling.

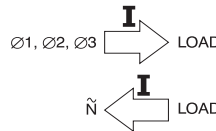


Figure 9. Orientation of the Current Clamp

Measurement Considerations

Observe the following guidelines for positioning the Current Clamp Jaws.

- Center the conductor inside the clamp jaws.
- Make sure the clamp is perpendicular to the conductor.
- Make sure that the arrow marked on the jaw of the Current Clamp points toward the correct direction.

Observe the following guidelines when making measurements:

- If possible, avoid measurements close to other current-carrying conductors.
- On the Current Clamp, select the most appropriate range for the current being measured to get the best accuracy.

Maintenance

Before each use, assure continued safety by inspecting the clamp. Look for cracks or missing portions of the clamp housing and output cable insulating cover and for loose or weakened components. Pay particular attention to the insulation surrounding the clamp jaws. If a clamp fails this inspection, tape it shut to prevent unintended operation. A clamp under warranty will be promptly repaired or replaced (at Fluke's discretion) and returned at no charge.

Cleaning and Storage

Periodically wipe the case with a damp cloth and detergent; do not use abrasives or solvents. Open the jaws and wipe the magnetic pole pieces with a lightly oiled cloth. Do not allow rust or corrosion to form on the magnetic core ends.

If your Current Clamp does not work

If the Current Clamp does not perform properly, use the following steps to help isolate the problem:

- Inspect the jaw mating surface for cleanliness. If any foreign material is present, the jaws will not close properly and errors will result.
- Verify that the function selection on the ScopeMeter test tool or oscilloscope is correct, i.e., the display vertical resolution is not too low or too high.

LIMITED WARRANTY & LIMITATION OF LIABILITY

This Fluke product will be free from defects in material and workmanship for one year from the date of purchase. This warranty does not cover fuses, disposable batteries or damage from accident, neglect, misuse or abnormal conditions of operation or handling. Resellers are not authorized to extend any other warranty on Fluke's behalf. To obtain service during the warranty period, send your defective product to the nearest Fluke Authorized Service Center with a description of the problem.

THIS WARRANTY IS YOUR ONLY REMEDY. NO OTHER WARRANTIES, SUCH AS FITNESS FOR A PARTICULAR PURPOSE, ARE EXPRESSED OR IMPLIED. FLUKE IS NOT LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LOSSES, ARISING FROM ANY CAUSE OR THEORY.

Since some states or countries do not allow the exclusion or limitation of an implied warranty or of incidental or consequential damages, this limitation of liability may not apply to you.

Fluke Corporation
P.O. Box 9090
Everett WA
98206-9090, USA

Fluke Industrial B.V.
P.O. Box 90
7600 AB Almelo
The Netherlands

SERVICE CENTERS

To locate an authorized service center, visit us on the World Wide Web:

<http://www.fluke.com>

or call Fluke using any of the phone numbers listed below:

+1-888-993-5853 in U.S.A. and Canada

+31-40-267-5200 in Europe

+1-425-446-5500 from other countries