

## i310s

### AC/DC Current Clamp

#### Instruction Sheet









#### **Introduction**

The i310s Current Clamp (“Clamp”) has been designed for use with oscilloscopes and digital multimeters for accurate non-intrusive measurement of ac, dc and complex waveform currents.

Using advanced Hall Effect technology, the Clamp can accurately measure currents up to 450 A peak over the frequency range of dc to 20 kHz. These features make it a powerful tool for use in inverters, switch mode power supplies, industrial controllers, automotive diagnostics, and other applications requiring current measurements and/or waveform analysis.

#### **Symbols**

The table below lists the symbols used on the Clamp and/or in this manual.

Symbol	Description
	Do not dispose of this product as unsorted municipal waste. Go to Fluke’s website for recycling information.
	Important Information. See manual.
	Hazardous Voltage. Risk of electric shock.
	Double insulation.
	Application around and removal from HAZARDOUS LIVE conductors is permissible.
	Conforms to Canadian Standards Association.
	Complies with the relevant European standards.
	Conforms to Australian standards.

## **Safety Instructions**

Please read this section carefully. It will make you familiar with the most important safety instructions for handling your product. In this instruction sheet, a **Warning** identifies conditions and actions that pose hazard(s) to the user. A **Caution** identifies conditions and actions that may damage the calibrator or the test instruments.

### **Warning**

**The Clamp may only be used and handled by qualified personnel. To avoid personal injury, follow these precautions:**

- **To avoid electric shock, use caution during installation and use of this product; high voltages and currents may be present in circuit under test.**
- **Do not use the Clamp if damaged. Always connect to display device before it is installed around the conductor.**
- **Always ensure the Clamp is removed from any live electric circuit, and leads are disconnected before removing the battery cover.**
- **Use the Clamp only as specified in the operating instructions; otherwise the safety features may not protect you.**
- **Adhere to local and national safety codes. Individual protective equipment must be used to prevent the shock and arc blast injury where hazardous live conductors are exposed.**
- **Do not hold the Clamp anywhere beyond the tactile barrier.**
- **Before each use, inspect the Clamp. Look for cracks or missing portions of the housing or output cable insulation. Also look for loose or weakened components. Pay particular attention to the insulation surrounding the jaws.**
- **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.**
- **Use of this 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.**

- **CAT III equipment is designed to protect against the transients in the equipment in fixed equipment installations, such as distribution panels, feeders and short branch circuits, and the lighting systems in large buildings.**
- **Do not use Clamp in wet environments or in locations that hazardous gases exist.**

## **Specifications**

### **Electrical Characteristics**

All accuracies stated at 23°C ± 1°C (73.4 °F ± 33.8 °F)

Current Range	30 A and 300 A ac rms or ± 45 A and 450 A dc
Inrush Current	600 A ac rms Max
Output Sensitivity	10 mV/A (30 A) 1 mV/A (300 A)
Accuracy	(30 A range) ± 1 % of reading ± 50 mA (300 A range) ± 1 % of reading ± 300 mA @25 °C, Bandwidth dc to 1 kHz
Bandwidth to Meet Accuracy Specification	1 kHz
Phase Shift below 1 kHz	< 2 degrees
Resolution	± 50 mA (30 A) ± 100 mA (300 A)
Load impedance	> 10 k Ω and ≤ 100 pF
Conductor Position Sensitivity	± 1.5 % relative to center reading
Frequency Range (small signal)	DC to 20 kHz (-3 dB)
Temperature Coefficient	± 0.01 % of reading / °C
Power Supply	9 V Alkaline, NEDA 1604/PP3 IEC 6LR61
Working Voltage	300 V ac rms or dc
Battery Life	30 hours, low battery indicator

## **General Characteristics**

Maximum Conductor Size	19 mm (0.748 in) diameter
Output Cable and Connections	Safety BNC connector supplied with safety 4 mm adapter
Output Zero	Manual adjust via thumbwheel
Cable Length	2 meters
Operating Temperature Range	-10 to +50 °C (14 to +122 °F)
Storage Temperature Range (with battery removed)	-20 to +85 °C (-4 to +185 °F)
Operating Humidity	15 % to 85 % (non-condensing)
Weight	250 g (8.812 oz)

## **Safety Standards**

EN 61010-1: 2001

EN 61010-2-032: 2002

EN 61010-031: 2002

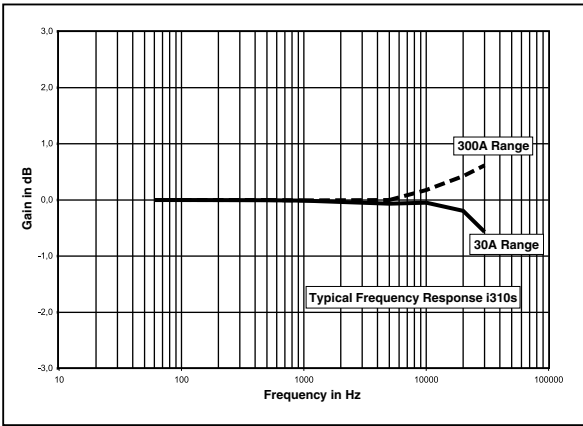
300 V rms Category III, Pollution Degree 2

Use of the Clamp on **non-insulated conductors** is limited to 300 V ac rms or dc and frequencies below 1 kHz.

## **EMC Standards**

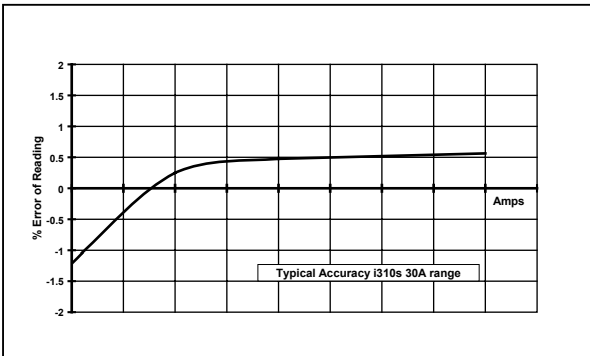
EN 61236 :1998 +A1, A2, & A3

# Typical Performance Plots



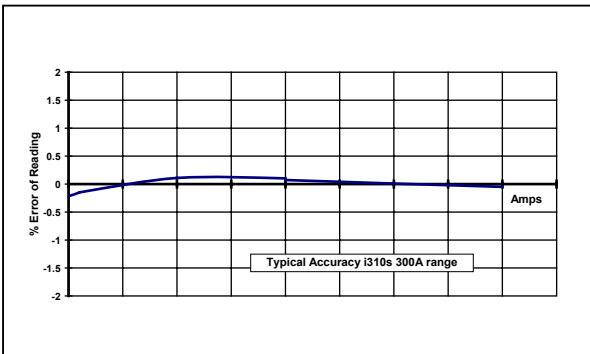
evy01\_4.eps

### Typical Frequency Response



evy02.eps

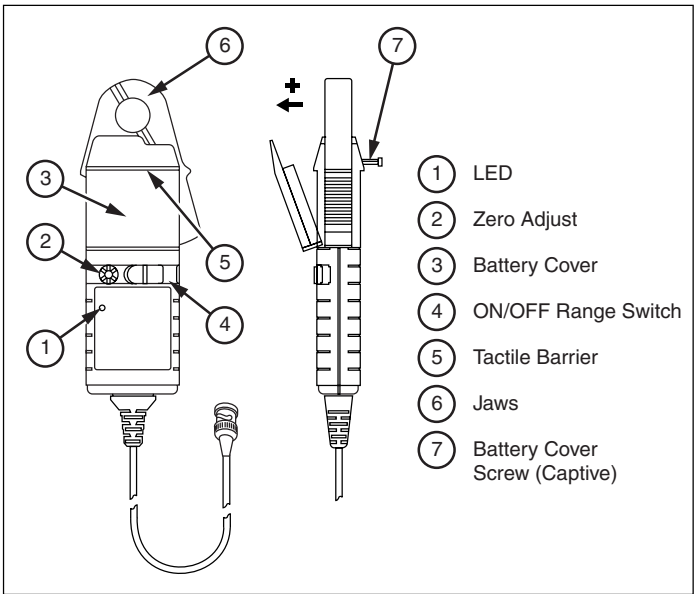
### Typical Accuracy Curve



evy03.eps

### Typical Accuracy Curve

# Operating Instructions



evy04.eps

Figure 1. i310s AC/DC Current Clamp

## **⚠ ⚠ Warning**

To avoid injury, when using the Clamp, ensure that your fingers are behind the protective barrier as shown in Figure 1.

Do not use the Clamp if any part, including the lead and connector(s), appears to be damaged or if a malfunction of the instrument is suspected.

### **Switch On**

Switch the Clamp to the required current range, and check that the LED is lit. The LED starts flashing when the battery voltage is too low for normal operation and warns the user that it requires changing. This procedure is described below.

### **Zero Adjustment**

The output zero offset voltage of the Clamp may change due to thermal shifts and other environmental conditions. To adjust the output voltage to zero, depress the thumbwheel and rotate. Ensure that the Clamp is away from the current carrying conductor whilst the adjustment is made.

## **Current Measurement**

1. Switch on the Clamp to the required current range and check that the LED is lit.
2. Connect the output lead to an oscilloscope, multimeter, or other measuring equipment.
3. If necessary, adjust the Clamp output voltage to zero as described in section *Zero Adjustment*.
4. Clamp the jaw around the conductor ensuring a good contact between the closing faces of the jaws.
5. Observe and take measurements as required. Positive output indicates that the current flow is in the direction shown by the arrow on the Clamp.

## **Maintenance**

### **Cleaning**

Clean the case periodically by wiping it with a damp cloth and detergent. Do not use abrasive cleaners or solvents. Do not immerse the Clamp in liquids.

### **Battery Replacement**



**To avoid personal injury, always ensure the Clamp is removed from any live electric circuit, and leads are disconnected before removing the battery cover.**

**Never operate the Clamp without the battery cover fitted.**

The red LED will flash when the minimum operating voltage is approached. Refer to Figure 1. Use the following procedure:

1. Unclamp from the conductor, turn it off using the On – Off switch and disconnect the output leads, from external equipment.
2. Loosen the captive screw that secures the battery cover. Lift the cover through 30° and pull it clear of the Clamp body as shown in Figure 1. The battery is then accessible. Replace the battery and re-fit the battery cover and fasten the screw.

#### *Note*

*Replacement with other than the specified type of battery will invalidate the warranty.*

*Fit only the type 9 V PP3 Alkaline (MN 1604).*

## LIMITED WARRANTY AND 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, alteration, contamination, 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, contact your nearest Fluke authorized service center to obtain return authorization information, then send the product to that 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.

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