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i200/i200s AC Current Clamp

Instruction Sheet

Introducing the i200/i200s

The i200 is a single range 200A clamp-on AC Current Clamp with current output via safety shrouded banana plugs.
The i200s is a dual range 20A and 200A clamp-on AC Current Clamp with voltage output via a safety insulated BNC connector. A dual banana to BNC adapter is supplied to allow the i200s to be connected to multimeters with banana input.

Unpacking

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

- Current Clamp
- Dual Banana to BNC Adapter model PM9081 (only with i200s)
- 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 1.
- 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.

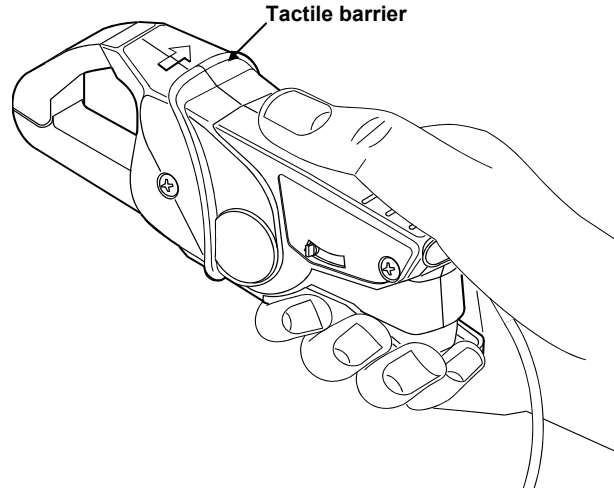


Figure 1. Safely holding the Current Clamp

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 floating voltage to ground	Complies with American industry standards UL61010B-1 & UL61010B-2-032 and European standards EN/IEC 61010-1 2nd Edition & EN/IEC 61010-02-032 for 600V CAT III, pollution degree 2.
EMC		Complies with standards EN/IEC 50081-1 & EN/IEC 50082-2

ELECTRICAL SPECIFICATIONS

All Electrical Specifications are valid at the following reference conditions:

- Ambient temperature 23±3°C (73±3°F)
- Relative Humidity 20 to 75%
- Frequency 48 to 65 Hz
- Continuous external field < 40 A/m
- Load impedance i200: 0.2Ω ... 15Ω
i200s: >1 MΩ // 100 pF
- The current may not contain any DC component
- No influence from adjacent currents
- The conductor must be centered within the jaw aperture

20A Range (i200s only)

Measuring range	0.1 to 24A
Maximum current	24A
Crest factor *	< 3
Maximum non-destructive current	200A (Frequency ≤ 1 kHz and crest factor < 3)
Output signal	100 mV/A
Output impedance	≤ 20 Ω @ 1 kHz
Basic accuracy	
48 Hz to 65 Hz	≤ 2% + 0.5A
Additional error:	
40 Hz to 48 Hz and 65 Hz to 1 kHz	+ < 10%
1 kHz to 10 kHz	+ < 15%
Phase shift	Unspecified

200A Range

	i200	i200s
Measuring range	0.5 to 240A	0.5 to 240A
Maximum current	240A	240A
Crest factor *	< 3	< 3
Maximum non-destructive current	@ Frequency ≤ 1 kHz and crest factor < 3	
Continuous	200A	
10 min ON / 30 min OFF	240A	
Output signal	1 mA/A	10 mV/A
Output impedance	-	≤ 10 Ω @ 1 kHz
Basic accuracy		
48 Hz to 65 Hz		
0.5A to 10A	≤ 3% + 0.5A	≤ 3.5% + 0.5A
10A to 40A	≤ 2.5% + 0.5A	≤ 3% + 0.5A
40A to 100A	≤ 2% + 0.5A	≤ 2.5% + 0.5A
100A to 240A	≤ 1% + 0.5A	≤ 1.5% + 0.5A
Additional error:		
40 Hz to 48 Hz and 65 Hz to 1 kHz	+ < 3%	+ < 3%
1 kHz to 10 kHz	+ < 12%	+ < 12%
Phase shift		
0.5A to 10A	Unspecified	Unspecified
10A to 40A	≤ 5 °	≤ 6 °
40A to 100A	≤ 3 °	≤ 4 °
100A to 240A	≤ 2.5 °	≤ 3 °

All ranges	i200	i200s
Load on output	0.2...15 Ω	>1 MΩ // < 100 pF
Load Influence	Current: < 1%	-
	Phase: < 1°	-
Bandwidth	-1.5 dB -3dB	40 Hz to 10 kHz 40 kHz
Additional errors		
With temperature		≤ 0.15 % / 10 K
With position of conductor in the clamp aperture		≤ 0.5 % @ 50 Hz
With adjacent conductors		≤ 15 mA / A @ 50 Hz

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

GENERAL

Clamp Dimensions	135 x 50 x 30 mm (5.3 x 2 x 1.2 in)
Protection index	IP40
Jaw Opening	21 mm (0.82 in)
Height of open Jaws	69 mm (2.7 in)
Maximum conductor size	∅ 20 mm (0.8 in) or busbar 20 x 5 mm (0.8 x 0.2 in)
Weight	180 g (6.4 oz)
Cable length	i200 1.5 m (59 in) i200s 2m (79 in)
Temperature	
Operating	-10 to +55°C (+14 to +131°F)
Non-operating	-40 to + 70°C (-40 to +158°F)
Relative Humidity	
Operating	85%, up to +30°C (+86°F) 75%, up to +55°C (+131°F)
Altitude	
Operating	to 2000 m (6500 ft)
Non-operating	to 12000 m (40000 ft)
EMC	EN/IEC 50081-1 EN/IEC 50082-2 (3V/m, 2.74V/yard)

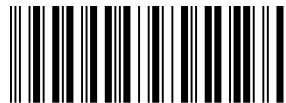
Instrument Compatibility

The i200s 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 100 pF.
- A pass-band of more than four times the frequency of the waveform to be measured.

The i200 is compatible with any Fluke Multimeter or any other current measurement device that has the following features:

- Banana inputs.
- Input accuracy of 2% or better to take full advantage of the accuracy of the Current Clamp.
- Input impedance of 0.2Ω ... 15Ω
- A pass-band 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 i200/i200s Current Clamp to the desired input on the measuring instrument.
i200: See Figure 2.
i200s: See Figure 3. When you are using a multimeter, use the Dual Banana to BNC Adapter (PM9081) to connect the Current Clamp to the input.
2. i200s: On the Current Clamp, select the least sensitive range (10 mV/A).
3. i200s: Select the appropriate clamp sensitivity on your ScopeMeter test tool or oscilloscope.
4. Position the Current Clamp perpendicular to and centered around the conductor.
5. Make sure that the arrow marked on the clamp jaw points toward the load for phase measurements or away from the load (toward the source) for neutral measurements. (See Figure 4.)
6. Observe the current value and waveform on the instrument's display.
7. i200s: 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.

Example with multimeters for i200:

Current Clamp sensitivity = 1 mA/A. Multimeter displays 168 mA.

$$\text{Actual current} = \frac{\text{display value}}{\text{sensitivity Current Clamp}} = \frac{168 \text{ mA}}{1 \text{ mA/A}} = 168 \text{ A}$$

Example with multimeters for i200s:

Current Clamp set to 10 mV/A. Multimeter displays 1.85V.

$$\text{Actual current} = \frac{\text{display value}}{\text{sensitivity Current Clamp}} = \frac{1.85 \text{ V}}{10 \text{ mV/A}} = \frac{1850 \text{ mV}}{10 \text{ mV/A}} = 185 \text{ A}$$

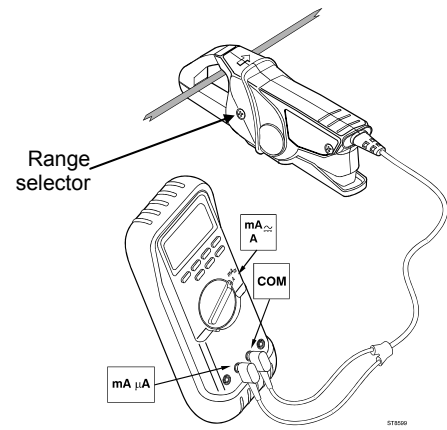


Figure 2. Measurement Setup for i200

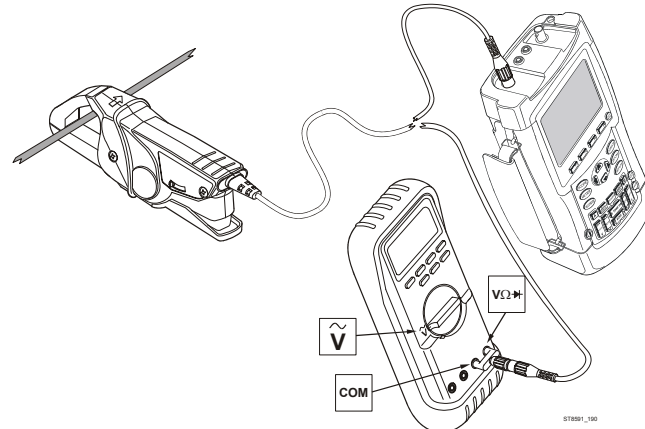


Figure 3. Measurement Setup for i200s

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 ScopeMeter test tool or oscilloscope may display a much lower current than the actual value. This may result in a false and misleading reading and, as a consequence, incorrect measures to be taken.

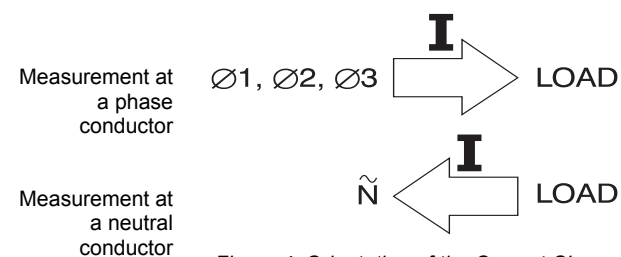


Figure 4. Orientation of the Current Clamp

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:

- Avoid taking measurements close to other current-carrying conductors.
- On the i200s Current Clamp, select the most appropriate range for the current being measured to get the best accuracy.

Maintenance

Before each use, inspect 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. Do not use a damaged clamp. If a clamp is damaged, tape it shut to prevent unintended operation. A damaged 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 and range on the Multimeter, ScopeMeter test tool or oscilloscope are correct and adjusted to the sensitivity of the Current Clamp.

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.

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