

Model 5500A/COIL

50-Turn Current Coil

Technical Data

Introduction

The 5500A/COIL is a 50-turn current coil used as an accessory device for calibrating clamp-type current meters. These clamp meters must operate by one of two different principles—either as current transformers (ac only), or by the Hall Effect (both ac and dc). It is impractical to calibrate 1000 A rated current clamp meters using a 1000 A source. However, by using the 50 turns of the 5500A/COIL in conjunction with a current source calibrator, one can effectively multiply the current of the current source calibrator by a factor of 50 to support the calibration and verification of these clamp-type current meters.

Using the coil

Clamp-type current meters operate as current transformers, with differing degrees of magnetic coupling between primary and secondary that vary from meter to meter. The position of the clamp meter with respect to the cable also affects the magnetic coupling between primary and secondary of the current transformer, which causes variation in reading of the current meter. This is important to understand in order to make the most accurate and repeatable measurements. The base of the 5500A/COIL was designed so the current clamp can be centered carefully on the coil, minimizing

operator error for best repeatability. Calibration accuracy to specifications is guaranteed only when proper clamp alignment is made. The clamp-type current meter should be centered as much as possible on the base during calibration and verification. If the clamp-type current meter has alignment marks, the alignment marks should align the clamp with the center bundled wire of the 50-turn 5500A/COIL.



WARNING UNFUSED.
Exceeding current and voltage ratings can cause burn or fire hazard.

General specifications

Number of turns	50
Maximum current	11 A rms, continuous 20.5 A rms, 2 minutes
Maximum duty cycle derating	< 11 A, continuous > 11 A, 2 minutes ON, 8 minutes OFF
Maximum voltage	3 V rms
Minimum inside diameter of clamp jaws	2.54 cm (1 in.)



Specifications

Calibrator Output		Effective Current Output	Coil Specifications (clamp/coil interaction)			
Magnitude	Frequency	Amp-turns	Toroidal-type clamps (such as the Fluke 80i-600 and 80i-1000)		"Other-type" of clamps (such as the Fluke 80i-KW, -400, 80i-410, -500, -1010 and 30-series)	
			± (% of output + Amps)		± (% of output + Amps)	
0.2 A to 0.329999 A	DC	10 to 16.4999	0.25	0.002	0.50	0.02
0.33 A to 2.99999 A	DC	25 to 149.999	0.25	0.015	0.5	0.14
3.0 A to 20.5 A	DC	150 to 1025	0.25	0.05	0.5	0.5
0.2 A to 0.329999 A	45 Hz to 65 Hz	10 to 16.4999	0.28	0.003	0.56	0.03
0.33 A to 2.99999 A	45 Hz to 65 Hz	25 to 149.999	0.28	0.025	0.56	0.25
3.0 A to 20.5 A	45 Hz to 65 Hz	150 to 1025	0.28	0.09	0.56	0.9
0.2 A to 0.329999 A	65 Hz to 440 Hz	10 to 16.4999	0.79	0.003	1.00	0.03
0.33 A to 2.99999 A	65 Hz to 440 Hz	25 to 149.999	0.79	0.027	1.00	0.25
3.0 A to 20.5 A**	65 Hz to 440 Hz	150 to 1025	0.79	0.1	1.00	0.9

**Some calibrators may not have adequate compliance voltage to drive coil in this range.

Calculating total specification

The total specification of the effective current that the clamp-type meter measures is a function of the clamp/coil interaction and of the effective current output from the calibrator. To determine the total specification, use the following formula:

$$S_{\text{total}} = \sqrt{(S_{\text{coil}})^2 + (S_{\text{source}})^2}$$

Example:

Assume we are driving the coil with the Fluke Calibration 5500A at 4 A, 60 Hz (the clamp meter will see an effective current of 200 A, 60 Hz) and we are calibrating a toroidal-type clamp meter. The calibrator's one year specification at 4 A is $\pm (0.06 \% + 2 \text{ mA})$, so the effective current in the coil bundle will have a specification of $\pm (0.06 \% + 0.1 \text{ A})$. Next, we find the total specification of the calibrator and the coil as a percentage of the output:

Specification of effective calibrator current in coil bundle = $\pm (0.06 \% + 0.1 \text{ A}) = 0.11 \%$

Specification due to clamp-meter/coil interaction = $\pm (0.28 \% + 0.09 \text{ A}) = 0.325 \%$

The RSS of these two specifications determines the total specification of the clamp/source combination:

$$S_{\text{total}} = \sqrt{0.325\%^2 + 0.11\%^2} = 0.343\%$$

Where:

S_{coil} = specification due to clamp-meter/coil interaction, and

S_{source} = specification of effective calibrator current in coil bundle

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