FLUKE®

Instruction Sheet

Model 5500A/COIL

50-Turn Current Coil

Introduction

The 5500A/COIL is a 50-Turn Current Coil used as a tool for calibrating clamp type current meters that operate by two different principles—as current transformers (AC only), and by the Hall Effect (Both AC and DC). It is impractical to calibrate 500A rated current clamp meters using a 500A 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-on type current meters.

⚠ WARNING

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

Using the Coil

Clamp-on 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 current meter should be centered as much as possible on the base during calibration and verification. If the clamp-on current meter has alignment marks, the alignment marks should align the clamp with the center bundled wire of the 50-Turn 5500A/COIL. (See Figure 1).

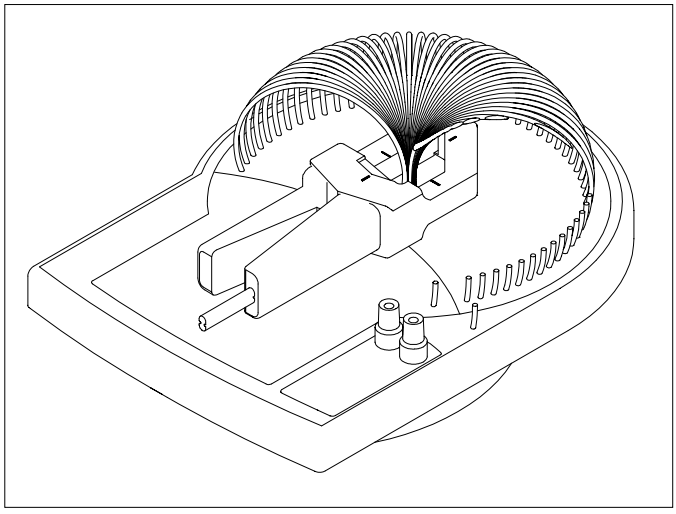

Figure 1. Positioning the Clamp

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Specifications

Number of Turns	50
Maximum Current	11A rms, continuous 20A rms, 2 minutes
Maximum Duty Cycle Derating	< 11A, continuous > 11A, 2 minutes ON, 8 minutes OFF
Maximum Voltage	3V rms
Frequency of Operation	DC, 45-440 Hz (should not exceed rms Voltage rating). For the 5500A Current Output: DC, 45-65 Hz, 0-11 A 65-440 Hz, 0-2.19999 A For the 5520A Current Output DC, 45-65 Hz, 0-20 A 65-440 Hz, 0-2.99999A This specification assumes that a Fluke 80i-600 Clamp Meter or equivalent is attached. Other clamp meters may limit the 55X0A Current Output drive capability to less than the above.
Minimum Inner Diameter of Clamp Jaws	1”

Uncertainty due to Clamp Meter/Coil interaction

Range	Toroidal-Wound Current Clamps [such as the Fluke 80i-600 and 80i-1000]		Other Current Clamps [such as the Fluke 80i-KW, 80i-400, 410, 500, 1010 and 30-series]	
	±(% of output + Amps)		±(% of output + Amps)	
DC	0.25	0.05	0.50	0.50
45-65 Hz	0.28	0.09	0.56	0.7
65-440 Hz	0.79	0.1	1.0	0.9

Calculating Uncertainty

The total uncertainty of the effective current that the clamp measures is a function of the clamp/coil interaction and of the current calibrator. To determine the total uncertainty use the following formula:

$$U_{\text{total}} = \sqrt{U^2_{\text{coil}} + U^2_{\text{source}}}$$

Example:

Assume we are driving the coil with the Fluke 5500A at 4A, 60 Hz (the clamp meter will see an effective 200A, 60 Hz). The Calibrator 1 year specification at 4 Amps is ± (0.06% + 2 mA), so the effective current in the coil bundle will have an uncertainty of ± (0.06% + 0.1A). Next, we find the total uncertainty of the calibrator and the coil as a percentage of the output:

Uncertainty of effective calibrator current in coil bundle = ± (0.06% + 0.1A) = 0.11%
Uncertainty due to clamp Meter/Coil Interaction = ± (0.28% + 0.09A) = 0.325%

The RSS of these two uncertainties determines total uncertainty of the clamp/source combination:

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