FLUKE® Calibration

Instruction Sheet

Model 52120A/COIL6KA

50-Turn, 6000 Amp Current Coil

Introduction

The 52120A/COIL6KA (the Product or Coil) is a 50-Turn Current Coil used to calibrate Rogowski coil current meters. It is impractical to calibrate 6000A rated Rogowski coil meters with a 6000A source. With 50 turns of the Product in conjunction with a 52120A Transconductance Amplifier, you can multiply the current of the current source by 50. This configuration supplies sufficient current to calibrate and verify these types of meters.

⚠⚠Warning

To prevent possible electrical shock, fire, or personal injury:

- **Use the Product only as specified, or the protection supplied by the Product can be compromised.**
- **Do not connect the Coil to voltages more than 4.5 V rms to earth.**
- **Do not touch the Coil while in use.**
- **Do not use, and disable the Product if it is damaged.**

Table 1 is a list of symbols used on the Product and in this instruction sheet.

Table 1. Symbols

Symbol	Description	Symbol	Description
⚠	Risk of Danger. Important information. See manual.	⚠	Hazardous voltage
	Do not dispose of this product as unsorted municipal waste. Go to Fluke's website for recycling information.		Caution. Hot surface.

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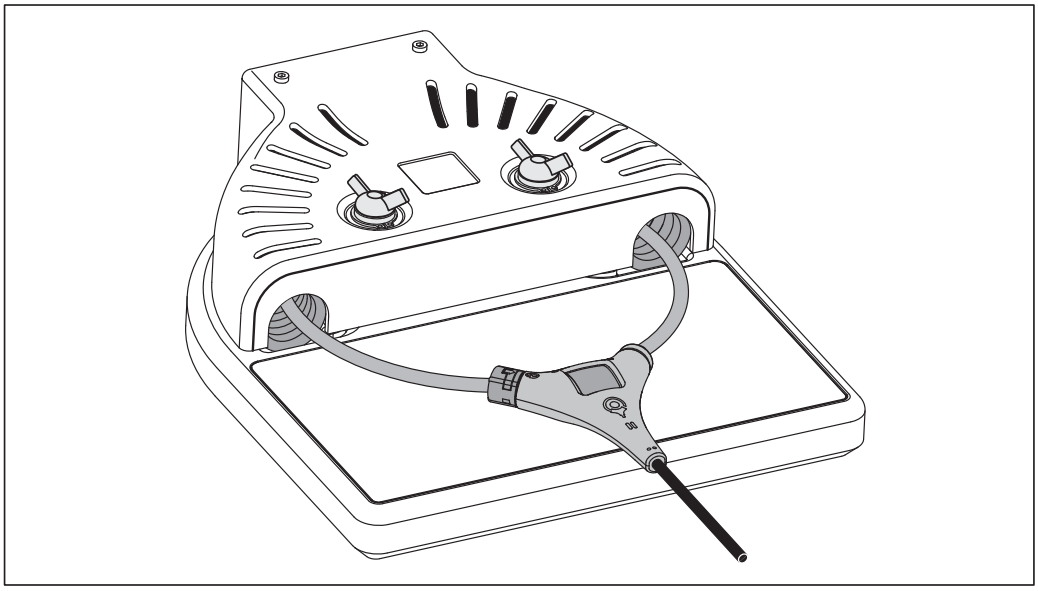
How to Use the Coil

Always connect the fan of the Product to a 12 V dc source when the Product is in operation. When used with a 52120A, connect the power cable to the Option Power Outlet on the front panel of the 52120A. When not used with a 52120A, connect to power with a Fluke 52120A/COIL12V dc supply.

Rogowski coils are air-cored current transformers that have more advantages than other AC current measurement transducers. Unlike clamp meters, they do not contain iron and are not constrained as much by mechanical and calibration constraints. Air-cored current transformers usually have a wider bandwidth than iron cored devices and are less sensitive to their position around a conductor.

Rogowski coils are usually a closed loop that goes around a conductor. In some measurements, it is not necessary to close the Rogowski coil loop because the Rogowski coil winding end goes back to the start through the center of the Coil.

It is possible to calibrate a Rogowski coil with the 52120A/COIL6KA with the Rogowski coil loop open. You must make sure that the two ends of the Rogowski coil are not in the windings of the Product. This is important because the magnetic field of the Product extends off the end of the windings. In this configuration, the Rogowski coil does not pickup the complete magnetic field and causes a reduction in measurement accuracy. To get the best accuracy, keep the two ends of the Product aligned on the center line. See Figure 1.



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Figure 1. Rogowski Coil Position

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Specifications

Number of turns 50
Minimum flexible probe length ..... 500 mm
Maximum input current ..... 120 A continuous with built-in 12 V fan on
Maximum voltage ..... 4.5 V rms

Table 2. Accuracy Specifications

Input Current [1]	Frequency	Effective Current Amp-turns	52120A + Coil Accuracy [2] ±(% of Amp-turns + % of 52120A range)	
			% of Amp-turns	% of 52120A Range
0 A to 100 A	DC	0 to 5000	0.7 %	0.7 %
0 A to 120 A	10 Hz to 65 Hz	0 to 6000	0.7 %	0.7 %
0 A to 120 A	65 Hz to 300 Hz	0 to 6000	0.7 %	0.7 %
0 A to 120 A	300 Hz to 1 kHz	0 to 6000	0.7 %	0.7 %
0 A to 120 A	1 kHz to 3 kHz	0 to 6000	0.8 %	1.0 %
0 A to 25 A	3 kHz to 6 kHz	0 to 1250	1.5 %	1.0 %
0 A to 13 A	6 kHz to 10 kHz	0 to 650	5.0 %	1.0 %

[1] The inductance and mutual inductance of the 50 turn coil causes a frequency dependent compliance voltage across the coil. Maximum frequency for 120 A input current is approximately 600 Hz. Maximum current input decreases to approximately 13 A at 10 kHz.

[2] Includes coil/probe interaction.

Note

The specifications for the Product are at 99 % confidence level and are the combined accuracy of the coil and a 52120A. If the Product is used with other current sources, the calibration uncertainty of the coil alone is 0.65 % (99 % confidence level) from 0 Hz to 10 kHz.

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How to Calculate Total Specification

The total specification of the current the Rogowski coil meter measures is a function of the clamp/coil interaction, the current calibrator, and the 52120A amplifier. To find the total specification, use:

$$S_{total} = \sqrt{S^2_{coil} + S^2_{source} + S^2_{amplifier}}$$

Example 1:

A Fluke 5522A calibrator supplies 4 A at 60 Hz directly to the Product. No amplifier is used. The Rogowski coil sees an equivalent current of 200 A (50 x 4 A) at 60 Hz. The 1-year specification of the Calibrator at 4 A is ±(0.06 % + 2 mA), so the effective current in the 52120A/6KA will have a specification of ±(0.06 % + 0.1 A). The total specification of the calibrator and the Produt as a percentage of the output:

The calibration uncertainty of the Product is 0.65 %.
Specification of effective calibrator current in coil bundle = ± (0.06% + 0.1A) = 0.11%

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

$$S_{TOTAL} = \sqrt{0.65^2 + 0.11^2} = 0.66\ \%$$

Example 2:

A Fluke 5522A calibrator supplies 50 mA at 60 Hz to the input of a 52120A amplifier set to the 120 A range. The 52120A output supplies 50 A to the 50-turn coil for a total of 2500Amp-turns. The one year specification of the calibrator at 50 mA is 0.04 % of output plus 20 µA. The specification of the 52120A amplifier and the Product together is 0.7 % of amp-turns plus 0.7 % of 52120A range. The total specification of the calibrator and the amplifier / coil as a percentage of the output:

Specification of the calibrator = ±(0.04 % +20 µA) = 0.08 %
Specification of coil / amp combination = ±(0.7 % x 2500 +0.7 % x 120) =0.73 %

The RSS of these specifications is the total specification of the calibrator and the coil / amp combination:

$$S_{TOTAL} = \sqrt{0.08^2 + 0.73^2} = 0.74\ \%$$

Maintenance

Use only a soft damp cloth to clean the Product. Use only water on the cloth. Do not use abrasives or solvents.

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