# Is there a way to measure low-level ac current using the Keysight 34401A?

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# Contents

**Yes**. The lowest specified measurement on the 1 A ac current range is 1% of the range, or 10 mA (see footnote 4 in the Data Sheet). However, there is an undocumented 10 mA range on which you can measure down to 100 uA. To enable the 10 mA ac current range, send the following command over the remote interface:

DIAG:POKE 25,0,1

Once enabled, you can access the range from the Keysight 34401A front panel or over the remote interface bus. It will typically perform to the 1 A range specifications. The 10 mA range is tested on the production line.

Why isn't the 10 mA ac current range included as one of the standard ranges for the Keysight 34401A? It is because adding a 100 mA range would have added significant cost to the instrument for a measurement that is infrequently used, and implementing the 10 mA range without the 100 mA range would require the long explanation, that you are currently reading. Therefore the decision was made to document only the 1 A and 3 A ranges.

The increased cost is due to the addition of a precision shunt resistor. The selection of shunt resistors for the rest of the design only required .1Ω and 5Ω. With a 100 mA input, the shunt voltage would be either (.1 * .1) 10 mVAC or (.1*5) .5 VAC. The 5Ω shunt cannot be used because a signal wih a crest factor of 5 would generate a burden voltage of 2.5V, and the front-end protection would clamp the volatage to 2 Volts. This leaves the .1Ω shunt; however, at 10% of full scale (10 mA), this generates only 1 mVAC, which has poor accuracy on the 100 mVAC input.

If you ever want to disable this range the command to do it is:

DIAG:POKE 25,0,0



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