

Side-by-Side Comparison: Agilent 34405A and Fluke 45 Digital Multimeter

Application Note



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Introduction

Some digital multimeters (DMMs) are better suited for bench and system use than others. The key attributes of a DMM go beyond expanded ranges and accuracy, significantly faster measurement and system speeds along with added functions such as capacitance, temperature, and Min/Max capability provide the ability to measure more complex signals.

In this literature, we compare two benchtop products: Agilent 34405A and Fluke 45 digital multimeter. Agilent has verified or tested all of the features and specifications discussed in this literature.

The points of comparison include:

- features comparison
- SCPI capabilities
- programming interfacing differences
- mechanical compatibility

For a more detailed product information, see page 4 for other relevant product literatures.

Throughout this literature we use the following shorthands when referring to the various products and product families:

- **“34405A”** refers to the Agilent 34405A 5.5-digits Digital Multimeter
- **“Fluke 45”** refers to the Fluke 45 5-digits Digital Multimeter



Compare Key Features

A DMM's resolution, digits, and counts are the key factors that determine its fit with any applications and uses. If the available features match your needs, then it will be worthwhile to evaluate the other features the DMM offers.

Resolution, Digits, Counts, and Speed

Resolution refers to how good a measurement a DMM can make. The terms digits and counts are used to describe a DMM's resolution. Table 1 shows that 34405A has higher resolution, digits and counts as compared to Fluke 45. 34405A is a 5.5-digits DMM with 120000 counts resolution whereas Fluke 45 is a 5-digits DMM with 99999 counts resolution. For reading speed at 4.5 digits, 34405A can take up to 70 readings/sec while 20 readings/sec for Fluke 45.

Measurement Functions, Math Operations, and Ranges

Referring to Table 2, 34405A offers two additional measurement functions – temperature and capacitance, compared to Fluke 45.

As for the math operations, Fluke 45 provides 8 math operations and 34405A offers 6 math operations.

Table 3 shows the different ranges for the DC and AC functions for both 34405A and Fluke 45.

Table 1 Comparison of digits, resolution and reading speed

	34405A	Fluke 45
Digits	5.5	5
Resolution	120000	99999
Reading speed	70 readings/s	20 readings/s

Table 2 Comparison of measurement functions and math operations

	34405A	Fluke 45
Measurement functions	DC voltage DC current AC voltage AC current 2W resistance Frequency Diode Continuity Temperature Capacitance	DC voltage DC current AC voltage AC current 2W resistance Frequency Diode Continuity
Math operations	Min/Max dB dBm Null Limit Hold	Min/Max dB Hold REL Comp (compare) REF# REFΩ THRESH

Table 3 Comparison of ranges

		34405A	Fluke 45
DC functions and ranges	DC voltage	100 mV to 1000 V	300 mV to 1000 V
	DC accuracy	250 ppm	250 ppm
	DC current	10 mA to 10 A	30 mA to 10 A
	2W resistance	100 Ω to 100 MΩ	300 Ω to 100 MΩ
	Diode test	1 V 0.8 mA	3.2 V 0.75 mA
	Capacitance	1 nF to 10000 μF	none
	Temperature	–80 °C to 150 °C	none
AC functions and ranges	True RMS AC Voltage	100 mV to 750 V	300 mV to 750 V
		10 Hz to 100 kHz	20 Hz to 100 kHz
	True RMS AC Current	10 mA to 10 A	10 mA to 10 A
		10 Hz to 5 kHz	20 Hz to 2 kHz
	Frequency	1 Hz to 300 kHz	5 Hz to 1 MHz

Evaluate Programming Capabilities

In this section, some aspects of instrument programming will be considered: Connectivity, Software, and SCPI compatibility.

Connectivity

GPIB has been the de facto standard for test system input/output (I/O) for many years. In the computer world, cost-effective, easy-to-use LAN and USB interfaces have become pervasive, and most current-generation personal computers (PCs) include both types of ports. LAN and USB ports are becoming more and more common in test equipment and they offer test-system developers distinct advantages.

Fluke 45 DMM provides RS-232 and GPIB (Option) interfaces; whereas 34405A offers USB 2.0 interface. USB 2.0 provides an inexpensive, auto-detect, robust, and easy-to-use connection to your PC and no extra GPIB card needed.

Software

Both 34405A and Fluke 45 can be programmed with IVI-COM and VISA driver provided. 34405A is compliant with TMC-488.2 standard where the USB interface works seamlessly with Agilent connectivity software and can be controlled remotely with industry standard SCPI commands or through DMM Intuilink Connectivity software.

SCPI Compatibility

SCPI (Standard Commands for Programmable Instruments) is an ASCII-based instrument command language designed for test and measurement instruments. Both 34405A and Fluke 45 can be programmed using SCPI commands set. However, they have different hierarchical structure (tree system), and the SCPI commands set for both DMMs are almost entirely not compatible. Figure 1 shows that 34405A and Fluke 45 are having an entirely different SCPI commands

hierarchical structure (tree system) except for one subsystem – IEEE-488 common commands set.

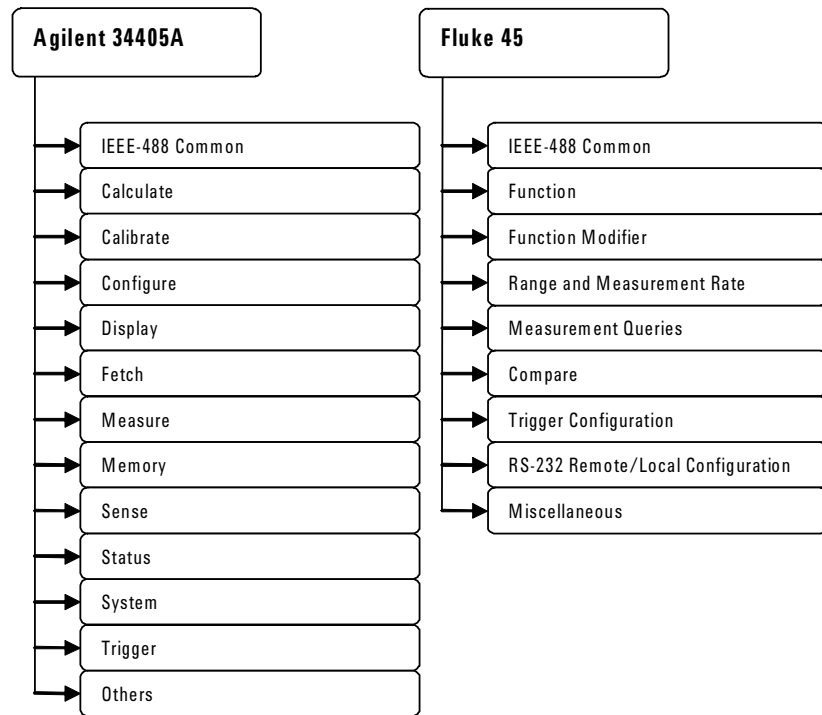


Figure 1 Hierarchical structure (tree system) of 34405A and Fluke 45 DMMs

Mechanical Differences

34405A and Fluke 45 have approximately the same dimensions. 34405A measures at 212.6 mm wide, 88.5 mm deep and 272.3 mm high whereas Fluke 45's dimensions are 216 mm X 93 mm X 286 mm. This means Fluke 45 is slightly bigger than 34405A. Although these two DMMs are having the approximately same dimension, however the design for both front and rear panel is completely different. Both DMMs' front panels also have their own function's buttons with dual displays. The main difference on the rear panel is, 34405A has only one USB interface while Fluke 45 has a RS-232 interface with an optional GPIB (IEEE 488) interface.

Conclusion

Throughout the literature, you have been listed with numerous comparative points between Agilent 34405A and Fluke 45. The comparisons drew out the below summaries:

- Agilent 34405A is rich in features, fast, accurate, reliable and easy to use.
- Agilent 34405A provides a broad range of measurement functions.
- Most of SCPI commands between the two DMMs are not compatible due to the differences hierarchical structure.
- USB interface provides a robust, fast and easy connection for Agilent 34405A.
- There are not many mechanically differences.

Related Literatures

Agilent product literature can help you select the best Digital Multimeter for your application:

- Agilent 34405A Digital Multimeter *Data Sheet*, 5989-4906EN
<http://cp.literature.agilent.com/litweb/pdf/5989-4906EN.pdf>
- Agilent 34405A Digital Multimeter *User's and Service Guide*, 34405-91000
<http://cp.literature.agilent.com/litweb/pdf/34405-91000.pdf>

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