

Easy Steps to Integrate the 34405A Multimeter into a System

Application Note



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Introduction

More than 30 years after its creation, GPIB remains the popular choice for input/output (I/O) in test equipment due to its ease-of-use and robustness. In addition, most test systems, especially in the production line, are still using GPIB connectivity. Today, as USB ports are built into today's PCs, many test system developers are ready to explore the benefits of using USB for instrument I/O.

Affordable and Feature-Rich Measurement Tool

The Agilent 34405A digital multimeter (DMM) is the latest member in Agilent's range of digital multimeters, expanding Agilent's offerings in electronic measuring tools. The 34405A is designed to meet general industrial needs, providing a broad range of features and measurement functions such as

DC voltage, DC current, true RMS AC voltage and AC current, 2-wire resistance, frequency measurement, diode test, and continuity test. Furthermore, it can measure temperature ranging from -80°C to 150°C . It also improves efficiency and accuracy with its built-in math operations. See Table 1 for the 34405A's specifications.

USB 2.0 Interface Connection

Agilent 34405A comes with a USB 2.0 interface which offers an easy and robust connection between the PC and DMM. The USB interface, that is compliant with the TMC-488.2 standards, works seamlessly with Agilent connectivity software and can be controlled remotely via industry-standard SCPI commands or through DMM Intuilink connectivity software. IVI-COM and LabView drivers are included to ensure easy integration with different programming



environments. This application note gives you tips on how to integrate the 34405A DMM to a test system. Two topics will be covered:

1. “Setting up a new test system with the USB based 34405A”
2. “Switching to 34405A DMM in your test system”

Table 1 Agilent 34405A specifications

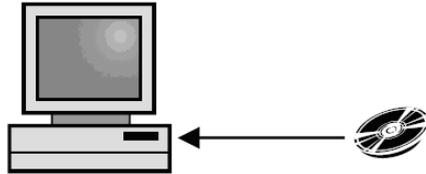
Agilent 34405A Specifications (0 °C to 50 °C, unless otherwise specified)		
DC functions and ranges	DC Voltage	100 mV to 1000 V
	DC Accuracy	0.03 %
	DC Current	10 mA to 10 A, 0.05 %
	2 W/4 W Resistance	100 Ω to 100 MΩ, 0.05 %
	Continuity	1000, 0.8 mA
	Diode Test	1 V, 0.8 mA
	Capacitance	1 nF to 10,000 F
	Temperature	–80 °C to 150 °C
AC functions and ranges	True RMS Voltage	100 mV to 750 V (10 Hz to 100 kHz) 0.20 %
	True RMS Current	10 mA to 10A (10 Hz to 5 kHz) 0.50 %
	Frequency and Period	100 mV to 750 V (1 Hz to 300 kHz) 0.02 %
DC system throughput	4.5 digits	15 readings/s
	5.5 digits	70 readings/s
AC system throughput	5.5 digits	2.5 readings/s
Math functions	Null, hold, min/max/average, dB/dBm, limit test	
I/O and connectivity	USB 2.0 (TMC-488.2 compliant)	
Software	Agilent IO Libraries Suite	
Drivers	LabView, IVI-COM	
Programming	SCPI, IEEE-488	
Weight	3.75 kg	
Size	103.88 mm x 261.1 mm x 303.2 mm	
Safety	Certified by CSA for IEN/EN/CSA/UL 61010-1 2nd edition, CAT I 1000V, CAT II 300V	
Warranty	1 year	

Setting up a New System with the 34405A DMM

Follow the step-by-step instructions below:

Step 1: Install I/O Software on Your PC

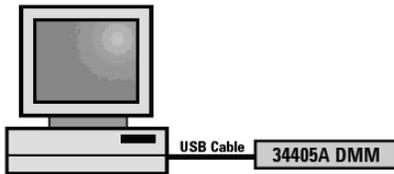
Install **Agilent IO Libraries Suite** from a CD or the Web.



Install Agilent IO Libraries Suite to PC before connecting the 34405A to the USB port.

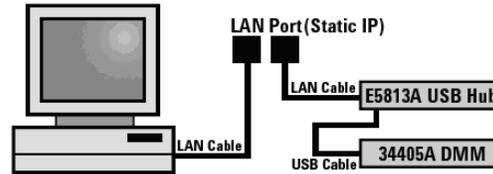
Step 2: Connect 34405A to PC

Connect 34405A directly to PC by using a USB Cable



or

Connect 34405A by using an E5813A Hub through a LAN port



The simplest and recommended method to connect the 34405A DMM to the PC is by using the USB cable, which comes with the 34405A DMM.

Another alternative method is connecting via E5813A hub through a LAN port. This method requires some networking knowledge. The E5813A must be connected to the same local area network as the configuration of the PC, with static IP. The PC must be installed with the specific configuration software in order to run the E5813A networked hub. For detailed setup, refer to *E5813A User's Guide*.

Step 3 : Detect 34405A Automatically

With Agilent Connection Expert running, your PC will detect the 34405A automatically.

After the 34405A is powered on and connected to the PC, Agilent Connection Expert executes identification queries automatically.



After the 34405A is connected to PC and powered up, the Agilent Connection Expert executes identification queries automatically because of the USB plug-and-play feature.

Step 4 : Communicate with 34405A

Use **Interactive IO** within **Connection Expert** to send commands and read responses via the USB interface.

Use **Interactive IO** to send commands such as 488.2 `""IDN?"` to 34405A



This step shows how to send SCPI commands to 34405A DMM and read responses using the Interactive IO.

Step 5 : Program 34405A

You can program 34405A via the USB interface using application such as IVI-COM, VXI*pn*p, or VISA.

```
VISA: viOpen (...,"USB0::2391::1560::TW46000053::0::INSTR",...)  
SICL: iopen("USB0::2391::1560::TW46000053::0::INSTR")
```

This step involves communicating programmatically with 34405A using I/O software such as IVI-COM or VXI *plug&play* instrument drivers, or I/O libraries such as VISA.

Below is the example to set up the Agilent 34405A when programmed using Visual Basic.

When using Visual Basic, click on **Project**, then select **References**. Select **“Agilent VISA COM Resource Manager 1.0”** and **“VISA COM 1.0 Type Library”** and click the **“OK”** button. After adding the two references, users can start with their programming. Below is one of the sample codes for 34405A:

```
Private Sub cmdSetUp_Click()
Dim io_mgr As VisaComLib.ResourceManager
Dim DigitalMultiMeter As VisaComLib.FormattedIO488
Set io_mgr = New AgilentRMLib.SRMClS
Set DigitalMultiMeter = New VisaComLib.FormattedIO488
'Set the instrument VISA alias address
Set DigitalMultiMeter.IO=io_mgr.Open("USB0::2391::1560::TW46000053::0::INSTR")
On Error GoTo MyError
'Reset the function generator
DigitalMultiMeter.WriteString "*RST"
'Clear errors and status register
DigitalMultiMeter.IO.Clear
'Set the measurement
DigitalMultiMeter.WriteString "CONF:VOLT:DC"
'Get the reading
DigitalMultiMeter.WriteString "Read?"
'Query result
VoltDCReading = DigitalMultiMeter.ReadString
'Close the instrument
DigitalMultiMeter.IO.Close
Exit Sub
MyError:
    MsgBox Err.Description & vbCrLf
End Sub
```

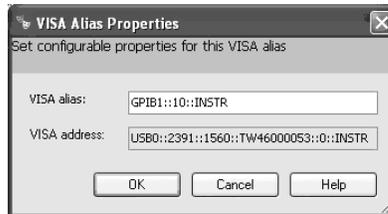
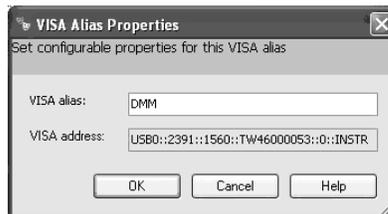
Switching to 34405A DMM in Your Test System

The steps for replacing a DMM with 34405A for current system and setting up a new system with an USB based 34405A are almost the same however there are several things that you need to take note of.

Follow the step-by-step instructions on page 3 to set up your new system with the 34405A DMM. Ignore Step 1 if the Agilent IO Libraries Suite has already been installed in your test system. Continue steps 2 to 4 after disconnecting and unplugging the old DMM from the test system. After completing Step 4, continue with Step A below.

Step A : Change the VISA alias Address

Right Click the 34405A on Agilent Connection Expert and change the VISA alias.



The alias capability is a helpful way to manage device names, since the standard VISA resource naming convention for USB devices can be rather cumbersome (USB0::2391::1560::TW46000053::0::INSTR, for example). The alias capability also enables the same test system software to work on multiple automated test systems, provided the same alias names are used, such as the alias "DMM" for a voltmeter. And if you have an existing program that communicates with an instrument over a GPIB or other

non-USB interface, you can create a VISA alias that looks like a GPIB address, such as "GPIB1::10::INSTR" and the program will function as though it were still communicating over a GPIB interface.

For example: Your previous DMM address is "GPIB1::10::INSTR" or VISA alias is "DMM", you will then enter the exactly same "GPIB1::10::INSTR" or the VISA alias "DMM" for the VISA alias for 34405A on the 34405A properties under the Agilent Connection Expert.

Conclusion

Integrating the 34405A Digital Multimeter to a system is easy; just connect the 34405A to your PC with an USB cable. This helps system developers to eliminate the cost of having to purchase new test systems for GPIB card and cable. And now with the Agilent IO Libraries Suite (Agilent Connection Expert) managing the VISA alias address, system developers do not even have to worry about rewriting existing test programs.

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