Digital Multimeter(DMM) Tutorial (Agilent U3401A)

ECE 401

Perspectives in Electrical and Computer Engineering

Outlines:

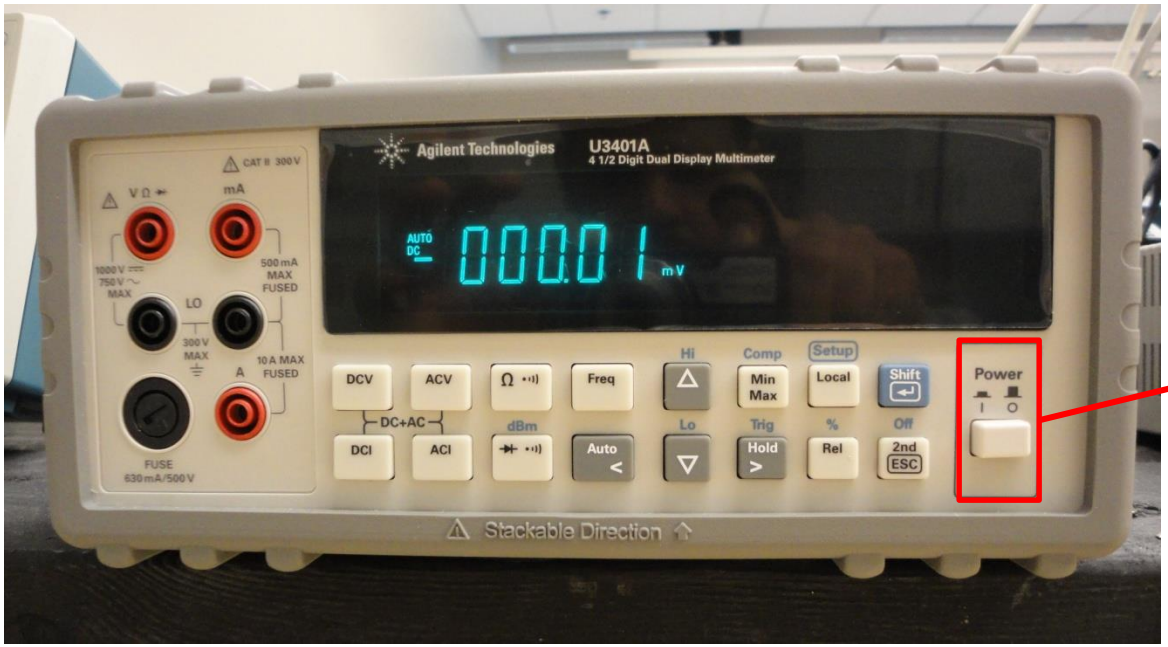
- ✓ What is multimeter? What does multimeter measures?
- ✓ Multi-function description
- ✓ Multimeter connections

What is multimeter? What does multimeter measures?

- It is an electronic instrument used to measure electric voltage, current and resistivity.

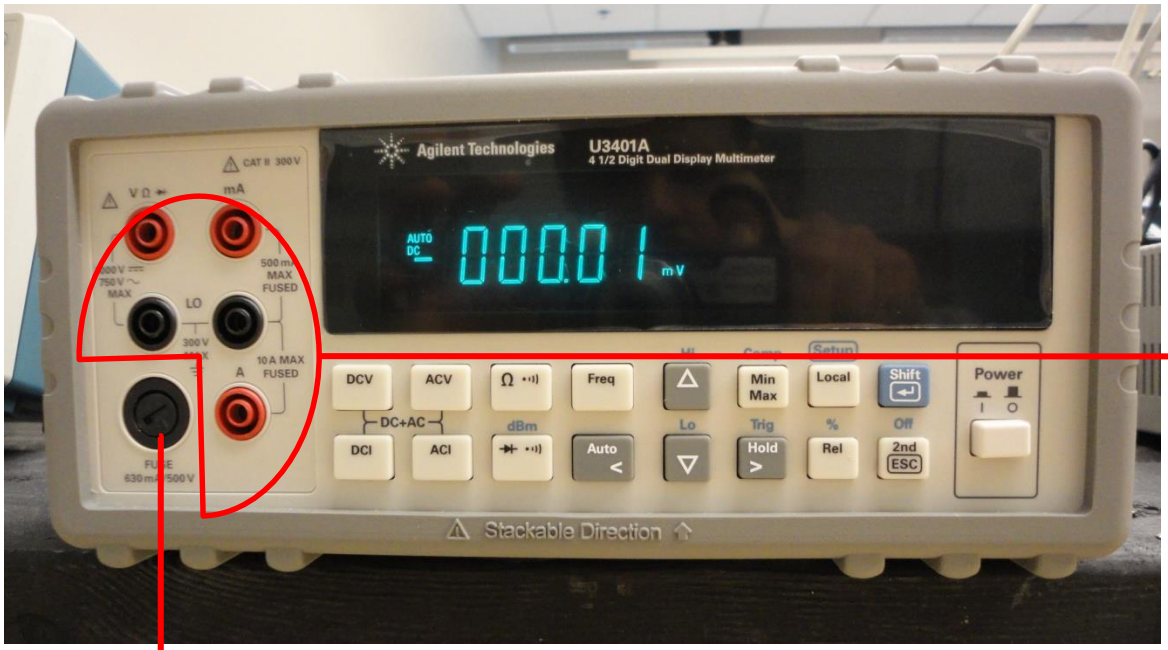
- Multimeters provide the flexibility to measure different electrical properties rather than using individual meters.

Multi-function description

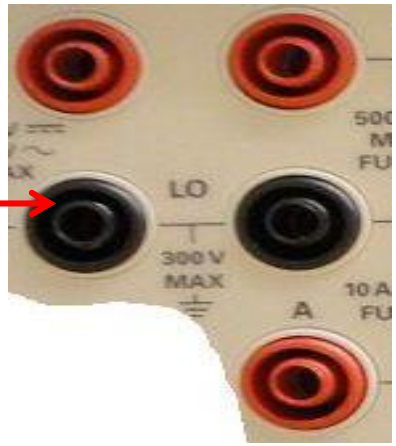


Press to power-on or power-off the U3401A multimeter.

Multi-function description cont.

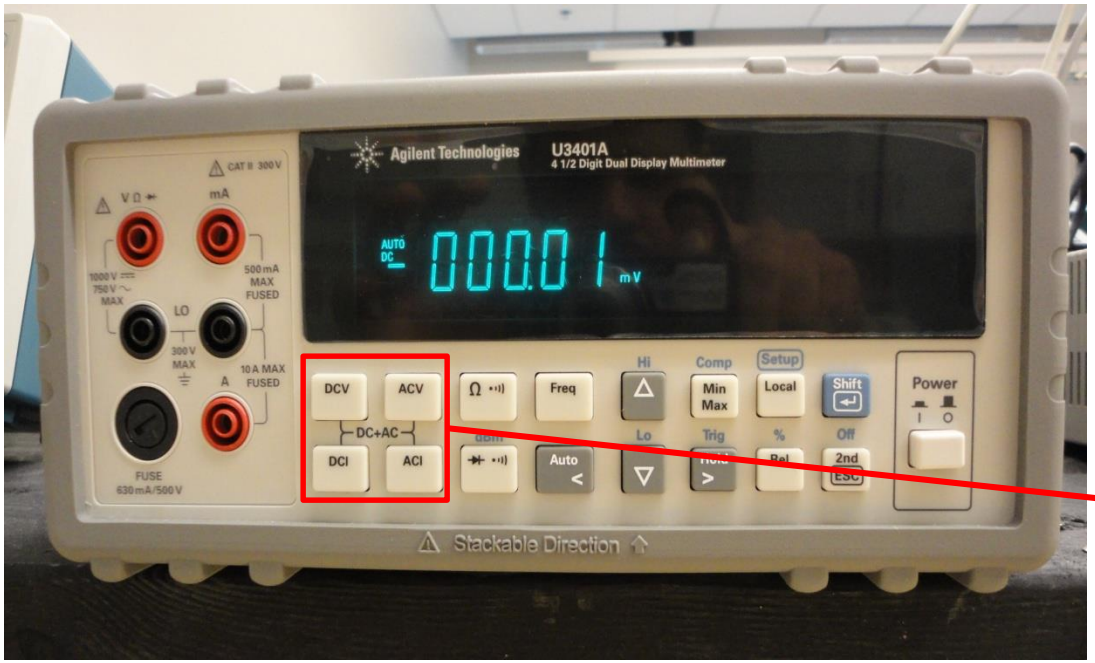


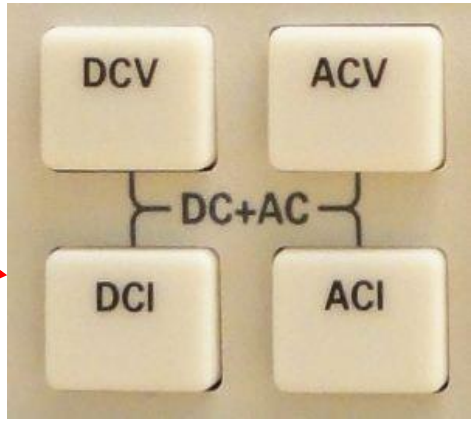
Voltage, current and resistance input terminals



Fuse

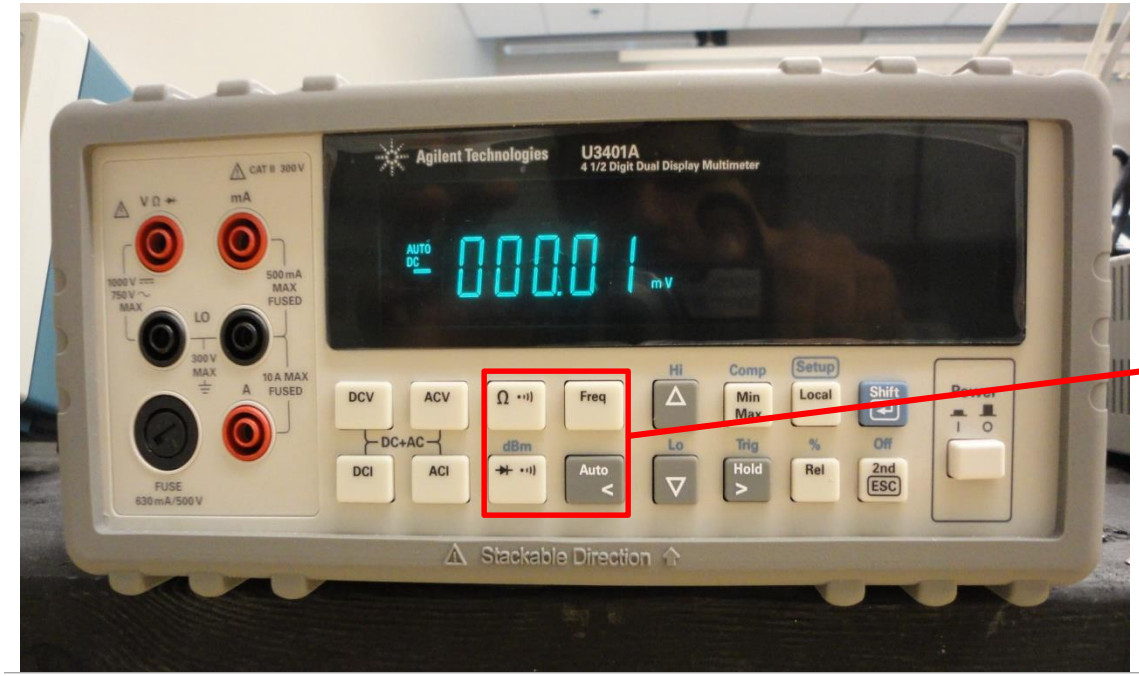
Multi-function description cont.





DCV	Press to select the DC voltage measurement.
ACV	Press to select the AC voltage measurement.
DCI	Press to select the DC current measurement.
ACI	Press to select the AC current measurement.

Multi-function description cont.

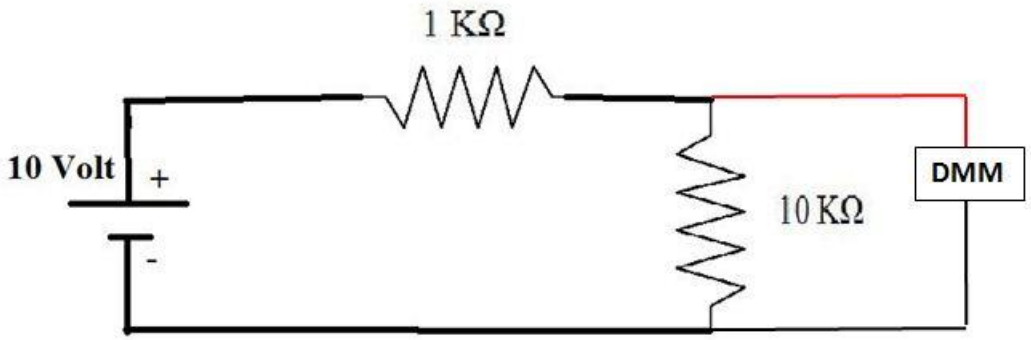


Freq	Press to select the frequency measurement.
dBm	Press to toggle between the diode and continuity measurement.
Ω	Press to toggle between resistance or resistance continuity.
Auto	Press to toggle between manual ranging and autoranging

Multimeter connections

To explain the measurement features of DMM, two resistor-based circuits are presented.

- The First circuit is consists of a D.C power supply and two resistors connected in series as follows:

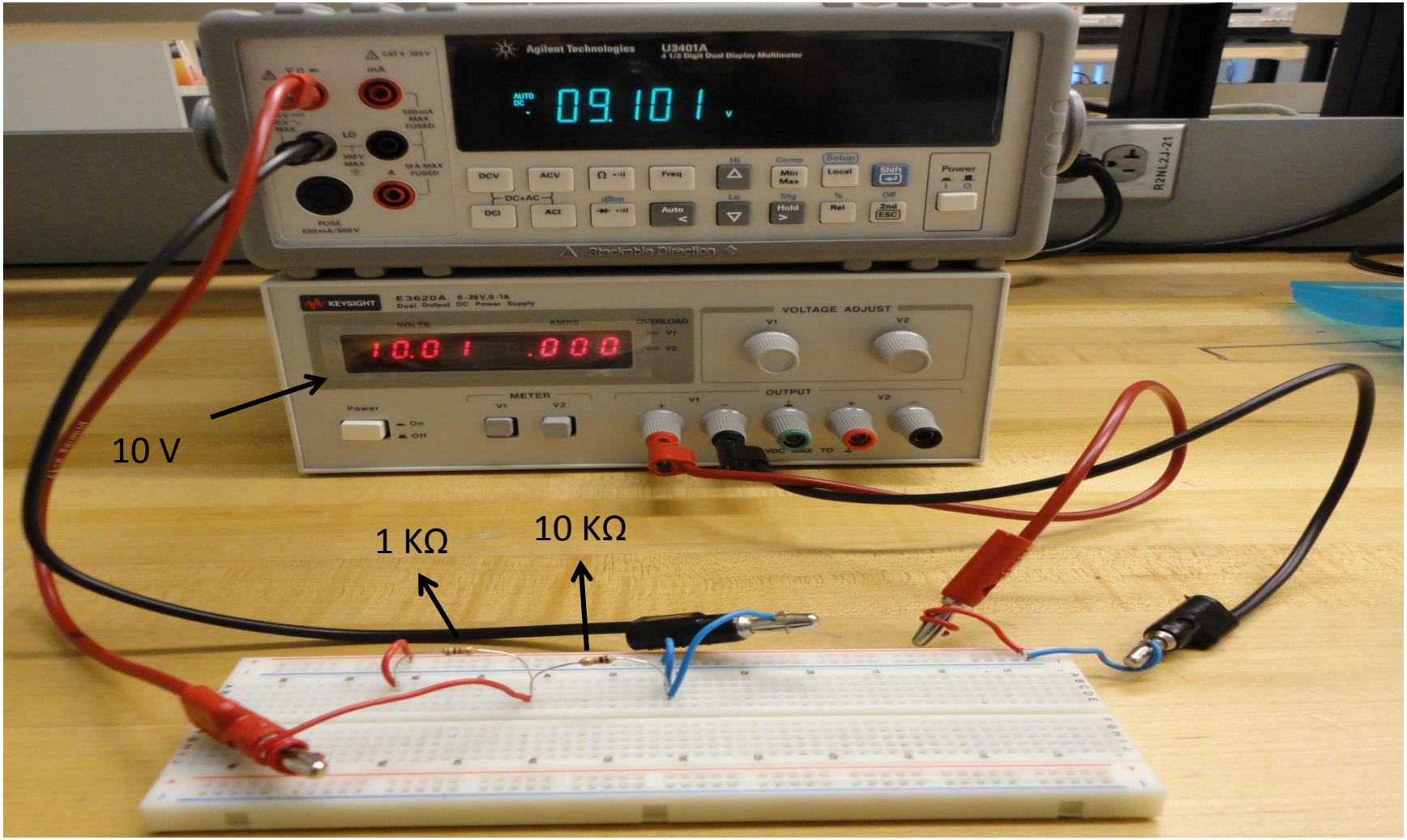


Multimeter connections cont.

To measure the voltage a cross a particular resistor (see the illustration figure next slide):

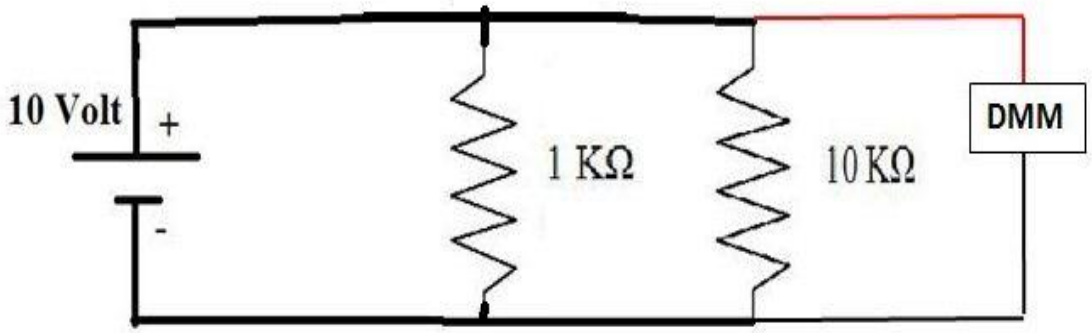
- Connect the red prop between the DMM red voltage terminal and the positive side of the resistor in the circuit.
- Connect the black prop between the DMM black voltage terminal and the negative side of the resistor in the circuit.
- Press the pushbutton (DCV) on the DMM to read the voltage measurement across the resistor.

Multimeter connections cont.

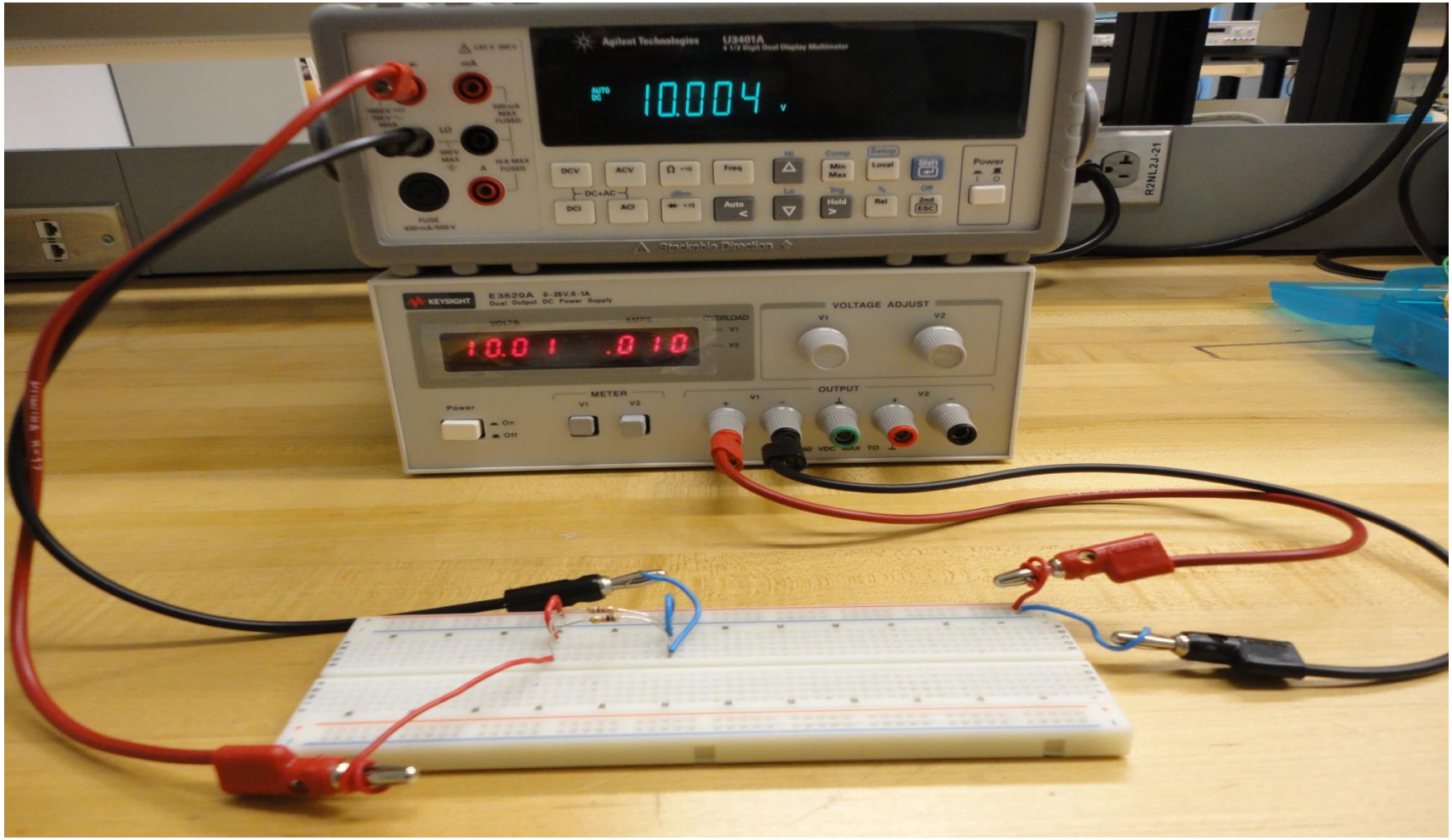


Multimeter connections cont.

The second circuit is consists of a D.C power supply and two resistors connected in parallel (as it is illustrated in next slide):



Multimeter connections cont.



Multimeter connections cont.

The current (I_R) can be measured using the obtained voltages in previous circuits (series, parallel) by applying Ohm's law:

$$I_R(Amp) = \frac{V_{R(Volt)}}{R(\Omega)}$$

Where V_R is the voltage across resistor (R)