

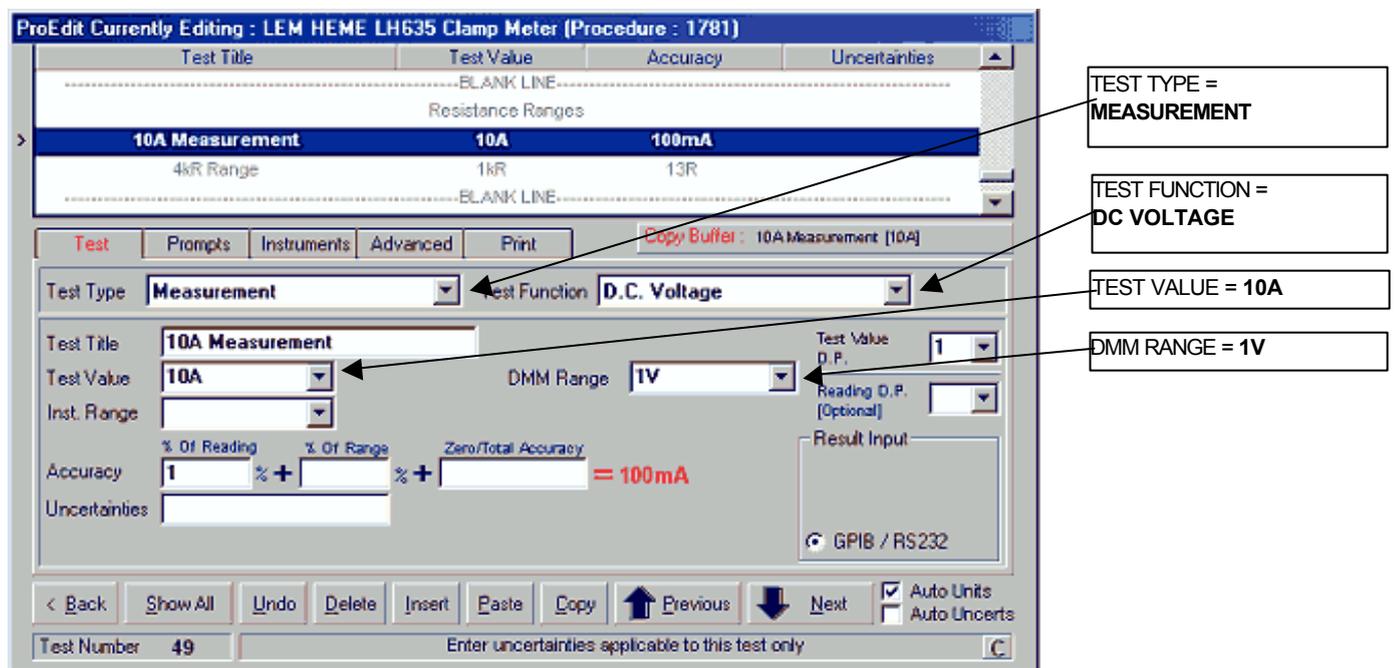
The *dual units* function within ProCal allows the user to set, for example, a measurement from a meter in AMPS but actually read back VOLTS – in this case it would be when a shunt resistor is used to convert a high current to a voltage in order to read back currents higher than a meter can do directly.

Setting up a test to use Dual Units

The test in this example is designed to readback a high current through a resistor as voltage – the actual test value to be recorded is in Amps. The test is a **voltage measurement** test type which, when used to measure the **voltage** generated by the **current** flowing through a resistor will actually be **recorded as current**.

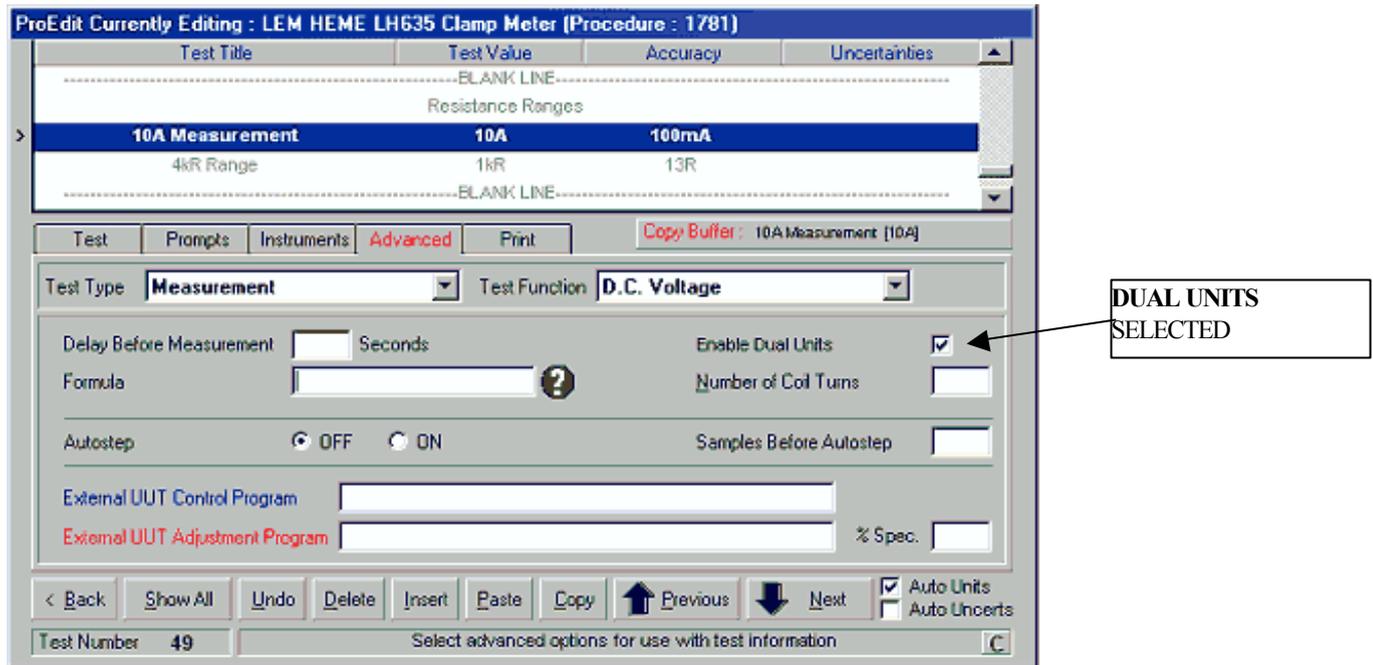
- The test value = 10A
- The resistor used = 1Ohm
- The voltage returned = 10V (V=I/R : 10/1=10)

**STEP 1 :** Create a measurement test with the test function set to DC voltage as shown below :



The screenshot shows the ProCal software interface for editing a test. The window title is "ProEdit Currently Editing : LEM HEME LH635 Clamp Meter (Procedure : 1781)". At the top, there is a table with columns "Test Title", "Test Value", "Accuracy", and "Uncertainties". The table contains a "10A Measurement" test with a test value of "10A" and an accuracy of "100mA". Below the table, there are tabs for "Test", "Prompts", "Instruments", "Advanced", and "Print". The "Test" tab is active, showing the test configuration. The "Test Type" is set to "Measurement" and the "Test Function" is set to "D.C. Voltage". The "Test Title" is "10A Measurement", the "Test Value" is "10A", and the "DMM Range" is "1V". The "Accuracy" is set to "1 % +", and the "Zero/Total Accuracy" is "= 100mA". The "Test Value D.P." is "1" and the "Reading D.P. [Optional]" is "1". The "Result Input" is "GPIB / RS232". At the bottom, there are navigation buttons: "< Back", "Show All", "Undo", "Delete", "Insert", "Paste", "Copy", "Previous", "Next", "Auto Units", and "Auto Uncerts". The "Test Number" is "49" and the "Enter uncertainties applicable to this test only" button is visible.

**STEP 2** : Click the ADVANCED tab, then click dual units as shown below :



When the test is run using ProCal, the voltage measured will be displayed as a current (amps) reading.

If necessary a *formula* can be used to scale the reading from the DMM. For example if a 10A reading through a 0.1Ohm resistor was required :

- The test value = 10A
- The resistor used = 0.1Ohm
- The voltage returned = 100mV ( $V=I \cdot R : 10 \cdot 0.1=100\text{mV}$ )

The formula required to enable a readback of 10 would be

$$X=X \cdot 0.1$$

Where **X** = The current reading

And **0.1** = the multiplier.

This allows the expected result of 10 to be returned from the multimeter ( $100 * 0.1 = 10$ )

(Note : Even though the value being returned from the meter is in mV this is irrelevant as the scaling of the measurement means the units can be ignored)

As detailed above, the readback from the meter should be equal to the test value set regardless of units, so if the test value is 10 (with any type of units) then the actual measurement coming back from the multimeter needs to equal this test value (regardless of units).

### NOTE

The Dual Units function is only available for **measurement type tests** at present.