Question – My DMM displays about 100 counts of offset in the ACV function when the input is shorted. Should I use the REL function to zero this offset?

Answer – No. There are two reasons for this.
For most DMMs the accuracy specification does not take effect until the applied signal is at least five percent of the selected range. This means that on the 100mV range, specification does not take affect until there is at least 5mV of signal.

The Model 2000 for example, at 5 1/2 digits resolution, will typically display about 100 counts of offset on AC volts with the input shorted. This offset is cause by the offset of the TRMS converter. This offset will not affect reading accuracy and should NOT be zeroed out using the REL feature. The following equation expresses how this offset (Voffset) is added to the signal input (Vin).

Displayed reading = square root of $(Vin)^2 + (Voffset)^2$. This is known as the RSS: Root of the sum of the squares.

Example
Range = 1VAC
Offset = 100 Counts (1.0mv)
Input = 100mV RMS

Displayed reading = $\sqrt{(0.100)^2 + (0.001)^2}$

Displayed reading = 0.100005V

The offset is seen as the last digit, which is not displayed. Therefore, the offset is negligible. If the REL feature were used to zero the display, the 100 counts of offset would be subtracted from Vin, resulting in an error of 100 counts in the displayed reading.