

## ScopeMeter Tips and Tricks

### Application Note

#### Tip: Create a custom pass/fail template

With FlukeView V4.1 and Fluke 190C firmware V6.1 or greater, you can send reference waveforms to the ScopeMeter and use them as a template for pass fail tests (see Figure 1).

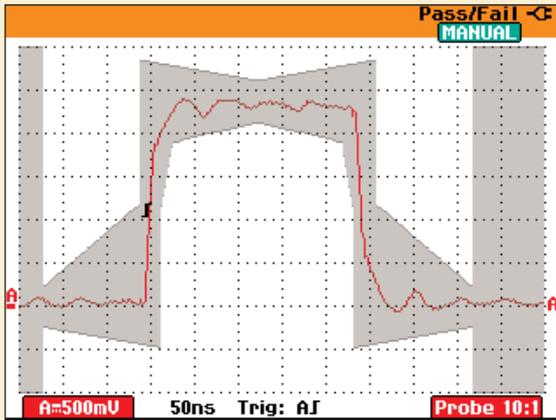


Figure 1.

To create your custom templates, save waveforms from FlukeView to a .CSV formatted file and then edit the wave shape in Excel or Notepad, entering new values for each sample point (see Figure 2). Note that the reference waveform requires 300 Min Max point waveform.

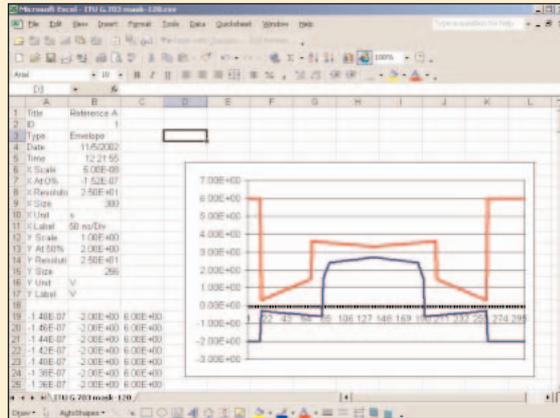


Figure 2.

#### Q: Why do I get a double trace?

**A:** When transferring waveforms from the ScopeMeter using FlukeView, the double trace indicates the min and max values captured during a period of time. One point on the screen represents multiple acquisition points.

For example, with a time base setting of 5 ms/div, the Fluke 190 series samples at 20 MS/s. Every point on screen consists of 4000 acquisition samples, of which only the min and max values are displayed. This allows you to maintain a high sample rate with a limited amount of memory.

ScopeMeter can also take one sample per timeslot and download them as 'single' waveforms. These acquisition points are stored in a separate memory and are used for calculating the true rms readings. For the 190 series ScopeMeter, select SCOPE, WAVEFORM OPTIONS, GLITCH DETECT OFF (see Figure 3).

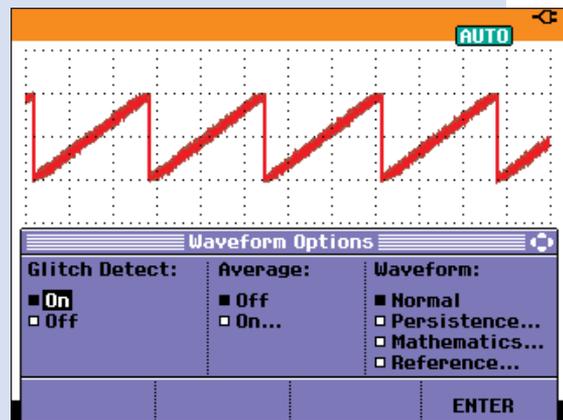


Figure 3.

## Tip: Single curve view

FlukeView 4.1 now offers 'single curve' view (see Figure 4). This view can show the average of a double trace with min/max values as typically used in scope mode, or it can show only the average in a min/max/avg trace as used in the 190 series recording modes.

**Note:** Single curve is just a viewing mode. It does not change the recorded data.

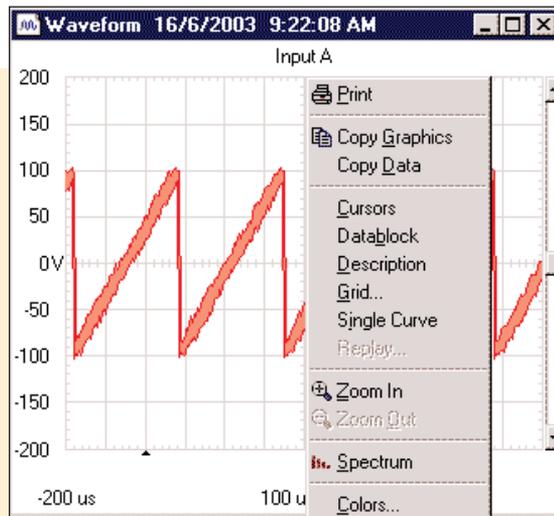


Figure 4.

## Q: What's the difference between Vac and Vac+dc?

**A:** Vac+dc measures the true rms voltage including the dc component. Vac only measures the ac component. Rms, or Root Mean Square, is a basic measurement of an ac signal.

In practical terms, it's the equivalent dc signal that produces the same amount of heat in the same resistive load. Therefore, it directly relates to signal power. Unlike most DMM's that use a dedicated converter to convert an ac rms signal to a dc signal, the ScopeMeter uses a fast sampling ADC. The ScopeMeter first samples the signal at high speed. Then, it analyzes the signal shape and determines the input signal characteristics. This makes it possible to calculate both the ac and dc component of the signal. From this the ac+dc component can be derived, since

$$V_{ac+dc} = \sqrt{V_{ac}^2 + V_{dc}^2}$$

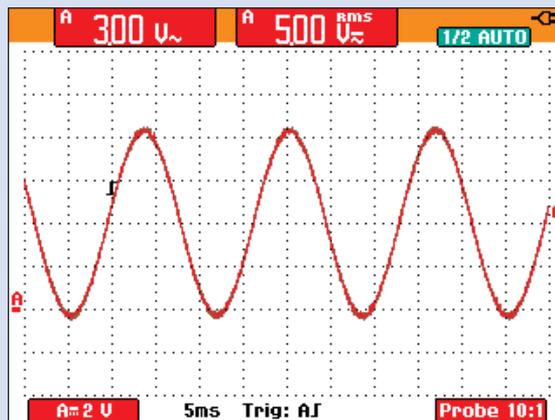
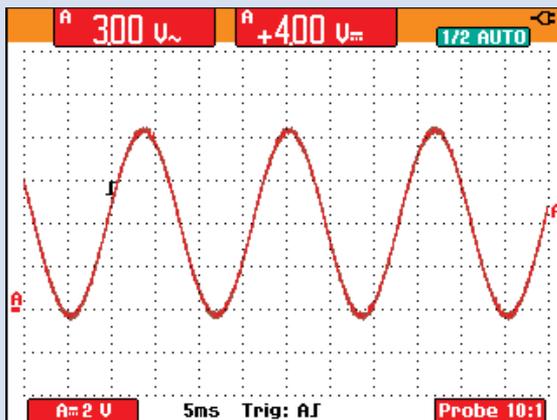


Figure 5.

If there's no dc component (offset), then the Vac and Vac+dc readings are identical. If there's a dc component, then only Vac+dc will give the true rms of the complete signal (see Figure 5.)

$$\sqrt{(4V_{dc})^2 + (3V_{ac})^2} = 5V_{ac+dc}$$

## Q: Why is there no reading?

Sometimes my ScopeMeter refuses to give a reading. It shows ---- in the readings area (see Figure 6). The screen shows a dc signal level and measuring Vac and Vdc shouldn't be a problem

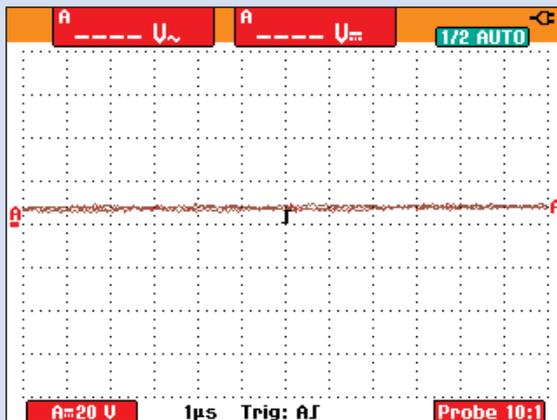


Figure 6. No readings.

**A:** Actually, it's not a DC signal at all. Slowing down the time base reveals that the screen in question was 'zoomed in' on the zero crossing of a signal. The signal is even in overload when looking at a complete cycle. Changing the attenuator range shows the complete signal, and the readings become available (see Figure 8).

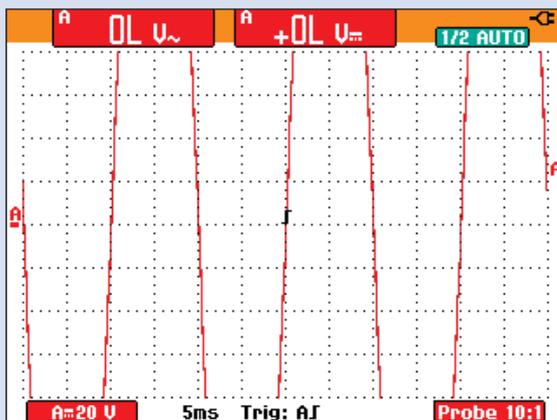


Figure 7. Slower time base setting.

This behavior is designed for safety. If the complete signal is within the 42 Vpeak range, the ScopeMeter will show the reading. If it can't detect a complete cycle, it measures the available samples shown on screen. But, if the parts of the signal not shown exceed 42 Vpeak, then it simply refuses to show readings. This prevents the ScopeMeter from showing perceived safe low voltages while the actual voltage on the test point could be lethal.

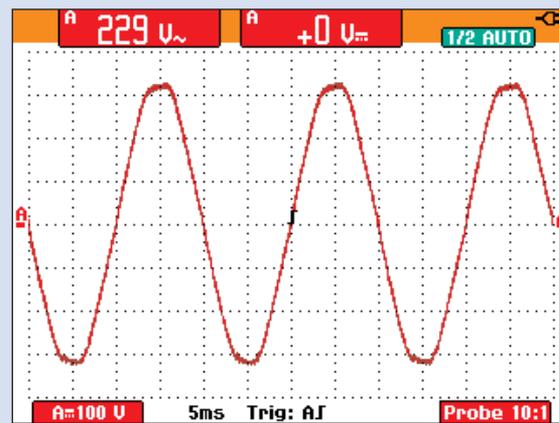


Figure 8. Signal visible, readings OK.

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