

The analog output with offset and expand is

$$\text{Output} = (\text{signal}/\text{sensitivity} - \text{offset}) \times \text{Expand} \times 10\text{V}$$

where offset is a fraction of 1 (50%=0.5), expand is 1, 10 or 100, and the output can not exceed 10 V. In the above example,

$$\text{Output} = (0.91\text{mV}/1\text{mV} - 0.9) \times 10 \times 10\text{V} = 1\text{V}$$

for a signal which is 10 μV greater than the 0.9 mV nominal. (Offset = 0.9 and expand =10).

The X and Y offset and expand functions in the SR830 are output functions, they do NOT affect the calculation of R or θ . R has its own output offset and expand.

CH1 and CH2 Displays

The CH1 display can show X, R, X Noise, Aux Input 1 or 2, or any of these quantities divided by Aux Input 1 or 2. The CH2 display can show Y, θ , Y Noise, Aux Input 3 or 4, or any of these quantities divided by Aux Input 3 or 4.

Output offsets ARE reflected in the displays. For example, if CH1 is displaying X, it is affected by the X offset. When the X output is offset to zero, the displayed value will drop to zero also. Any display which is showing a quantity which is affected by a non-zero offset will display a highlighted **Offset** indicator below the display.

Output expands do NOT increase the displayed values of X, Y or R. Expand increases the resolution of the X, Y or R value used to calculate the displayed value. For example, CH1 when displaying X does not increase its displayed value when X is expanded. This is because the expand function increases the resolution with which the signal is measured, not the size of the input signal. The displayed value will show an increased resolution but will continue to display the original value of X minus the X offset. Any display which is showing a quantity which is affected by a non-unity expand will display a highlighted **Expand** indicator below the display.

Ratio displays are displayed as percentages. The displayed percentage for X/Aux 1 would be

$$\text{Display \%} = \frac{(\text{signal}/\text{sensitivity}-\text{offset})\times\text{Expand}\times 100}{\text{Aux In 1 (in Volts)}}$$

where offset is a fraction of 1 (50%=0.5), expand is 1, 10 or 100, and the display can not exceed 100%.

For example, if the sensitivity is 1V and CH1 display is showing X/Aux 1. If X= 500 mV and Aux 1= 2.34 V, then the display value is $(0.5/1.0)\times 100/2.34$ or 21.37%. This value is affected by the sensitivity, offset and X expand.

In the case of θ , the full scale sensitivity is always 180°.

The **Ratio** indicator below the display is on whenever a display is showing a ratio quantity.

Display output scaling

What about CH1 or CH2 outputs proportional to ratio displays? The output voltage will simply be the displayed percentage times 10V full scale.

In the above example, the displayed ratio of 21.37% will output 2.137V from the CH1 output.