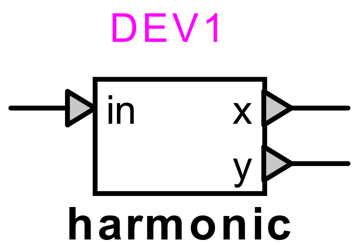
Meter : harmonic x,y



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1 Description

This device converts the *k*-th harmonic of the instantaneous value of a signal to an (x,y) phasor representation. The (x,y) representation consists of the x-y coordinates of the measured harmonic in a reference frame rotating at the fundamental frequency.

1.1 Pins

This meter has three pins:

pin	*type*	*description*	*units*
in	input pin	input signal	any
x	output pin	x-coordinate of *k*-th harmonic phasor	same as input
y	output pin	y-coordinate of *k*-th harmonic phasor	same as input

1.2 Parameters

The following parameters must be defined:

parameter	*description*	*units*
freq	fundamental frequency of the probed signal	Hz
k	index of the harmonic	

1.3 Input

The input pin may be connected to any control signal.

1.4 Output

The output is the (x,y) phasor representation of the *k*-th harmonic of the instantaneous value of the probed signal. The (x,y) coordinates are the *x*-axis and *y*-axis projections of that phasor on a reference frame rotating at the fundamental frequency.

The x-y coordinates of the phasor in that reference frame are calculated over a sliding time window of period equal to *1/freq*, as follows.

For *k*>0,

$$x = \frac{2}{period} \cdot \int_{t-period}^{t} in(t) \cdot \cos(k \cdot 2\pi \cdot freq \cdot t) \cdot dt$$
$$y = \frac{2}{period} \cdot \int_{t-period}^{t} -in(t) \cdot \sin(k \cdot 2\pi \cdot freq \cdot t) \cdot dt \qquad (1)$$

where the negative sign for *y* follows the engineering convention for an inductive (lagging) current to have a negative angle when phasor rotation is counterclockwise.

For *k*=0,

$$x = \frac{1}{period} \cdot \int_{t-period}^{t} in(t) \cdot dt \qquad (2)$$
$$y = 0$$