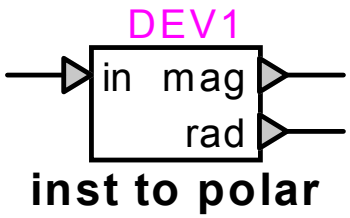
Phasor operation : instantaneous to polar



1 Description

This device converts the first harmonic of the instantaneous value of a signal to a polar phasor representation.

1.1 Pins

This device has three pins:

pin	*type*	*description*	*units*
in	input pin	probed signal	any
mag	output pin	phasor magnitude	same as input
rad	output pin	phasor angle	rad

1.2 Parameters

The following parameter must be defined:

parameter	*description*	*units*
freq	rotation frequency of the phasor reference frame	Hz

1.3 Input

The input pin may be connected to any control signal.

1.4 Output

The output is the polar phasor representation of the first harmonic of the instantaneous value of the probed signal. The polar coordinates are the magnitude and angle of the phasor in a rotating reference frame.

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:

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

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

The x-y coordinates of the phasor are converted to their polar equivalent of magnitude and angle.

The phasor magnitude is the peak amplitude, not the RMS value. The phasor angle is expressed in radians.