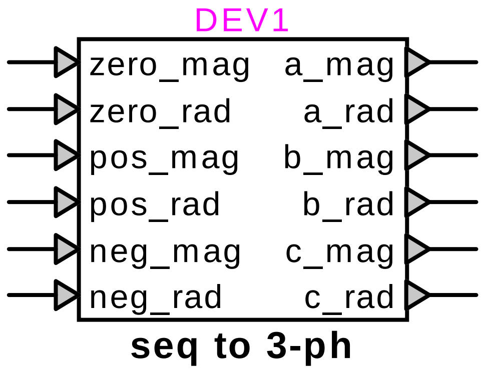
Meter : sequence to 3-phase polar



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1 Description

This device converts the zero-, positive-, and negative-sequence phasor transformation of a 3-phase quantity to the polar coordinates of the phasor representation of each phase in a reference frame rotating at the fundamental frequency. By definition, only the first harmonic of the 3 phase quantities are considered.

1.1 Pins

This meter has twelve pins:

pin	*type*	*description*	*units*
zero_mag	input pin	magnitude of zero-sequence phasor	any
zero_rad	input pin	angle of zero-sequence phasor	rad
pos_mag	input pin	magnitude of pos-sequence phasor	same as zero_mag
pos_rad	input pin	angle of pos-sequence phasor	rad
neg_mag	input pin	magnitude of neg-sequence phasor	same as zero_mag
neg_rad	input pin	angle of neg-sequence phasor	rad
a_mag	output pin	magnitude of phase-a phasor	same as zero_mag
a_rad	output pin	angle of phase-a phasor	rad
b_mag	output pin	magnitude of phase-b phasor	same as zero_mag
b_rad	output pin	angle of phase-b phasor	rad
c_mag	output pin	magnitude of phase-c phasor	same as zero_mag
c_rad	output pin	angle of phase-c phasor	rad

1.2 Parameters

No parameters are required for this device.

1.3 Input

The input pins may be connected to any control signals.
The 3 signals are the instantaneous values of a 3-phase quantity.

1.4 Output

The outputs are the polar phasor representation of the zero-, positive-, and negative-sequence transformations of the instantaneous values of the 3-phase input signals. The polar coordinates are the magnitude and angle of the phasors in a reference frame rotating at the fundamental frequency.

The outputs are the polar representation of the zero-, positive-, and negative-sequence transformations of the instantaneous values of the 3-phase input signals.

The transformation from sequence to phase is calculated as follows.

$$\begin{bmatrix} S_a \\ S_b \\ S_c \end{bmatrix} = \begin{bmatrix} 1 & 1 & 1 \\ 1 & a^2 & a \\ 1 & a & a^2 \end{bmatrix} \begin{bmatrix} S_0 \\ S_1 \\ S_2 \end{bmatrix} \tag{1}$$

This is equivalent to the matrix notations:

$$\mathbf{S_{abc}} = \mathbf{AS_{012}} \tag{2}$$

Where $\mathbf{S_{abc}}$ is in phase domain and $\mathbf{S_{012}}$ is in sequence domain and a is a phasor rotation of $2\pi/3$. The real and imaginary parts of each signal S represent the x and y coordinates which are used to calculate the magnitude and angle:

$$\begin{aligned} \text{magnitude} &= \sqrt{x^2 + y^2} \\ \text{angle} &= \tan^{-1}\left(\frac{y}{x}\right) \end{aligned} \tag{3}$$

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