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Inverters Formulas

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List of 10 Inverters Formulas

Inverters

Series Resonant Inverter

1) Maximum Output Frequency for Bidirectional Switches

Open Calculator

fx $$f_m = \frac{1}{2 \cdot t_{off}}$$

ex $$0.25\text{Hz} = \frac{1}{2 \cdot 2\text{s}}$$

2) Maximum Output Frequency for Unidirectional Switches

Open Calculator

fx $$f_m = \frac{1}{2 \cdot \left(t_{off} + \left(\frac{\pi}{f_o}\right)\right)}$$

ex $$0.234643\text{Hz} = \frac{1}{2 \cdot \left(2\text{s} + \left(\frac{\pi}{24\text{Hz}}\right)\right)}$$

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3) Resonant Frequency for Unidirectional Switches

Open Calculator

fx $$f_o = \left(\left(\frac{1}{L \cdot C}\right) + \left(\frac{R^2}{4 \cdot L^2}\right)\right)^{0.5}$$

ex $$23.86868\text{Hz} = \left(\left(\frac{1}{0.57\text{H} \cdot 0.2\text{F}}\right) + \left(\frac{(27\Omega)^2}{4 \cdot (0.57\text{H})^2}\right)\right)^{0.5}$$

4) Time when Current becomes Maximum for Unidirectional Switches

Open Calculator

fx $$t_r = \left(\frac{1}{f_o}\right) \cdot a\tan\left(\frac{f_o \cdot 2 \cdot L}{R}\right)$$

ex $$0.033001\text{s} = \left(\frac{1}{24\text{Hz}}\right) \cdot a\tan\left(\frac{24\text{Hz} \cdot 2 \cdot 0.57\text{H}}{27\Omega}\right)$$

Single Phase Inverters

5) RMS Output Voltage for Single Phase Inverter

Open Calculator

fx $$V_{rms} = \frac{V_i}{2}$$

ex $$112.5\text{V} = \frac{225\text{V}}{2}$$

6) RMS Value of Fundamental Component of Voltage for Full Bridge

Open Calculator

fx $V_{0(full)} = 0.9 \cdot V_i$

ex $202.5V = 0.9 \cdot 225V$

7) RMS Value of Fundamental Component of Voltage for Half Bridge

Open Calculator

fx $V_{0(half)} = 0.45 \cdot V_i$

ex $101.25V = 0.45 \cdot 225V$

Three Phase Inverters

8) Line-to-Line RMS Voltage

Open Calculator

fx $V_{ll} = 0.8165 \cdot V_i$

ex $183.7125V = 0.8165 \cdot 225V$

9) Line-to-Neutral Voltage

Open Calculator

fx $V_{ln} = 0.4714 \cdot V_i$

ex $106.065V = 0.4714 \cdot 225V$

10) RMS of Fundamental Component of Line-to-Line Voltage

Open Calculator

fx $V_{0(3rms)} = 0.7797 \cdot V_i$

ex $175.4325V = 0.7797 \cdot 225V$

Variables Used

- **C** Capacitance *(Farad)*
- f_m Peak Frequency *(Hertz)*
- f_o Resonant Frequency *(Hertz)*
- **L** Inductance *(Henry)*
- **R** Resistance *(Ohm)*
- t_{off} Off Time of Thyristor *(Second)*
- t_r Time *(Second)*
- $V_{0(3rms)}$ Fundamental Component RMS Voltage *(Volt)*
- $V_{0(full)}$ Fundamental Component Voltage Full Wave *(Volt)*
- $V_{0(half)}$ Fundamental Component Voltage Half Wave *(Volt)*
- V_i Input Voltage *(Volt)*
- V_{ll} Line to Line RMS Output Voltage *(Volt)*
- V_{ln} Line to Neutral Voltage *(Volt)*
- V_{rms} RMS Output Voltage *(Volt)*

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Constants, Functions, Measurements used

- Constant: **pi**, 3.14159265358979323846264338327950288
  Archimedes' constant
- Function: **atan**, atan(Number)
  Inverse trigonometric tangent function
- Function: **tan**, tan(Angle)
  Trigonometric tangent function
- Measurement: **Time** in Second (s)
  Time Unit Conversion
- Measurement: **Frequency** in Hertz (Hz)
  Frequency Unit Conversion
- Measurement: **Capacitance** in Farad (F)
  Capacitance Unit Conversion
- Measurement: **Electric Resistance** in Ohm (Ω)
  Electric Resistance Unit Conversion
- Measurement: **Inductance** in Henry (H)
  Inductance Unit Conversion
- Measurement: **Electric Potential** in Volt (V)
  Electric Potential Unit Conversion

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