Important Three Phase Uncontrolled Rectifiers Formulas PDF

Formulas
Examples
with Units

List of 21
Important Three Phase Uncontrolled Rectifiers Formulas

1) 6 Pulse Formulas

1.1) Average Output Power of Three Phase 6 Pulse Diode Rectifier Formula

Evaluate Formula

Formula

$$P_{avg} = 0.912 \cdot V_{m(phase)} \cdot I_{m(phase)}$$

Example with Units

$$430.9068\,\text{W} = 0.912 \cdot 115.1\,\text{V} \cdot 4.105\,\text{A}$$

1.2) Average Output Voltage of Three Phase 6 Pulse Diode Rectifier Formula

Evaluate Formula

Formula

$$V_{dc} = \left(\frac{3}{\pi}\right) \cdot V_{m(phase)}$$

Example with Units

$$109.9124\,\text{V} = \left(\frac{3}{3.1416}\right) \cdot 115.1\,\text{V}$$

1.3) Output DC Power of Three Phase 6 Pulse Diode Rectifier Formula

Evaluate Formula

Formula

$$P_{dc} = \left(\frac{3}{\pi}\right)^2 \cdot V_{m(phase)} \cdot I_{m(phase)}$$

Example with Units

$$430.8551\,\text{W} = \left(\frac{3}{3.1416}\right)^2 \cdot 115.1\,\text{V} \cdot 4.105\,\text{A}$$

1.4) Ripple Voltage of Three Phase 6 Pulse Diode Rectifier Formula

Evaluate Formula

Formula

$$V_r = 0.0408 \cdot V_{m(phase)}$$

Example with Units

$$4.6961\,\text{V} = 0.0408 \cdot 115.1\,\text{V}$$

1.5) RMS Output Current of Three Phase 6 Pulse Diode Rectifier Formula

Evaluate Formula

Formula

$$I_{rms} = 0.9558 \cdot \frac{V_{m(phase)}}{R}$$

Example with Units

$$7.858\,\text{A} = 0.9558 \cdot \frac{115.1\,\text{V}}{14\,\Omega}$$

1.6) RMS Output Voltage of Three Phase 6 Pulse Diode Rectifier Formula

Evaluate Formula

Formula

$$V_{rms} = 0.9558 \cdot V_{m(phase)}$$

Example with Units

$$110.0126\,\text{V} = 0.9558 \cdot 115.1\,\text{V}$$

2) Full Wave Formulas

2.1) Average Diode Current of Three Phase Uncontrolled Rectifier Formula

Evaluate Formula

Formula

$$I_{d(avg)} = \frac{\sqrt{3} \cdot n \cdot V_{max}}{2 \cdot \pi \cdot R_L}$$

Example with Units

$$130.142\,\text{A} = \frac{\sqrt{3} \cdot 15 \cdot 220\,\text{V}}{2 \cdot 3.1416 \cdot 6.99\,\Omega}$$

2.2) Average Load Current of Three Phase Uncontrolled Rectifier Formula

Evaluate Formula

Formula

$$I_{L(avg)} = \frac{3 \cdot \sqrt{3} \cdot n \cdot V_{max}}{2 \cdot \pi \cdot R_L}$$

Example with Units

$$390.426\,\text{A} = \frac{3 \cdot \sqrt{3} \cdot 15 \cdot 220\,\text{V}}{2 \cdot 3.1416 \cdot 6.99\,\Omega}$$

2.3) Load Current of DC Three Phase Uncontrolled Rectifier Formula

Evaluate Formula

Formula

$$I_{L(dc)} = \frac{3 \cdot \sqrt{3} \cdot V_{max}}{2 \cdot \pi \cdot R_L}$$

Example with Units

$$26.0284\,\text{A} = \frac{3 \cdot \sqrt{3} \cdot 220\,\text{V}}{2 \cdot 3.1416 \cdot 6.99\,\Omega}$$

2.4) Load Voltage of DC Three Phase Uncontrolled Rectifier Formula

Evaluate Formula

Formula

$$V_{L(dc)} = \frac{3 \cdot \sqrt{3} \cdot V_{max}}{2 \cdot \pi}$$

Example with Units

$$181.9385\,\text{V} = \frac{3 \cdot \sqrt{3} \cdot 220\,\text{V}}{2 \cdot 3.1416}$$

2.5) Load Voltage of Full Wave Three Phase Uncontrolled Rectifier Formula

Evaluate Formula

Formula

$$V_{ac} = \frac{2 \cdot n \cdot V_{max}}{\pi}$$

Example with Units

$$2100.8452\,\text{V} = \frac{2 \cdot 15 \cdot 220\,\text{V}}{3.1416}$$

2.6) Power Delivered to Load in Three Phase Uncontrolled Rectifier Formula

Evaluate Formula

Formula

$$P_{out} = V_{ac} \cdot V_{dc}$$

Example with Units

$$230882.8655\,\text{W} = 2100.845\,\text{V} \cdot 109.9\,\text{V}$$

2.7) RMS Diode Current of Three Phase Uncontrolled Rectifier Formula

Evaluate Formula

Formula

$$I_{d(rms)} = \frac{n \cdot V_{max}}{R_L \cdot \sqrt{2}} \cdot \sqrt{\frac{1}{3} + \frac{\sqrt{3}}{4 \cdot \pi}}$$

Example with Units

$$229.144\,\text{A} = \frac{15 \cdot 220\,\text{V}}{6.99\,\Omega \cdot \sqrt{2}} \cdot \sqrt{\frac{1}{3} + \frac{\sqrt{3}}{4 \cdot 3.1416}}$$

2.8) RMS Load Current of Three Phase Uncontrolled Rectifier Formula

Evaluate Formula

Formula

$$I_{L(rms)} = \frac{n \cdot V_{max}}{R_L \cdot \sqrt{2}} \cdot \sqrt{1 + \frac{3 \cdot \sqrt{3}}{2 \cdot \pi}}$$

Example with Units

$$451.222\,\text{A} = \frac{15 \cdot 220\,\text{V}}{6.99\,\Omega \cdot \sqrt{2}} \cdot \sqrt{1 + \frac{3 \cdot \sqrt{3}}{2 \cdot 3.1416}}$$

2.9) RMS Load Voltage of Three Phase Uncontrolled Rectifier Formula

Evaluate Formula

Formula

$$V_{L(rms)} = \frac{n \cdot V_{max}}{\sqrt{2}} \cdot \sqrt{1 + \frac{3 \cdot \sqrt{3}}{2 \cdot \pi}}$$

Example with Units

$$3154.0417\,\text{V} = \frac{15 \cdot 220\,\text{V}}{\sqrt{2}} \cdot \sqrt{1 + \frac{3 \cdot \sqrt{3}}{2 \cdot 3.1416}}$$

3) Half Wave Formulas

3.1) Average Output Power of Three Phase Half Wave Diode Rectifier with R Load Formula

Evaluate Formula

Formula

$$P_{avg} = 0.684 \cdot V_{m(phase)} \cdot I_{m(phase)}$$

Example with Units

$$323.1801\,\text{W} = 0.684 \cdot 115.1\,\text{V} \cdot 4.105\,\text{A}$$

3.2) Average Output Voltage of Three Phase Half Wave Diode Rectifier with R Load in Line Voltage Terms Formula

Evaluate Formula

Formula

$$V_{dc} = \left(\frac{3}{2 \cdot \pi}\right) \cdot V_{m(line)}$$

Example with Units

$$114.2191\,\text{V} = \left(\frac{3}{2 \cdot 3.1416}\right) \cdot 239.22\,\text{V}$$

3.3) Average Output Voltage of Three Phase Half Wave Diode Rectifier with R Load in Phase Voltage Terms Formula

Evaluate Formula

Formula

$$V_{dc} = \left(\frac{3 \cdot \sqrt{3}}{2 \cdot \pi}\right) \cdot V_{m(phase)}$$

Example with Units

$$95.1869\,\text{V} = \left(\frac{3 \cdot \sqrt{3}}{2 \cdot 3.1416}\right) \cdot 115.1\,\text{V}$$

3.4) Ripple Voltage of Three Phase Half Wave Diode Rectifier Formula

Evaluate Formula

Formula

$$V_r = 0.151 \cdot V_{m(phase)}$$

Example with Units

$$17.3801\,\text{V} = 0.151 \cdot 115.1\,\text{V}$$

3.5) RMS Output Current of Three Phase Half Wave Diode Rectifier with R Load Formula

Evaluate Formula

Formula

$$I_{rms} = 0.4854 \cdot I_{m(phase)}$$

Example with Units

$$1.9926\,\text{A} = 0.4854 \cdot 4.105\,\text{A}$$

3.6) RMS Output Voltage of Three Phase Half Wave Diode Rectifier with Resistive Load Formula

Evaluate Formula

Formula

$$V_{rms} = 0.84068 \cdot V_{m(phase)}$$

Example with Units

$$96.7623\,\text{V} = 0.84068 \cdot 115.1\,\text{V}$$

Variables used in list of Three Phase Uncontrolled Rectifiers Formulas above

- $I_{d(avg)}$ Average Diode Current *(Ampere)*
- $I_{d(rms)}$ RMS Diode Current *(Ampere)*
- $I_{L(avg)}$ Average Load Current *(Ampere)*
- $I_{L(dc)}$ DC Load Current *(Ampere)*
- $I_{L(rms)}$ RMS Load Current *(Ampere)*
- $I_{m(phase)}$ Peak Phase Current *(Ampere)*
- I_{rms} Root Mean Square Current *(Ampere)*
- **n** Winding Ratio
- P_{avg} Average Output Power *(Watt)*
- P_{dc} DC Power Output *(Watt)*
- P_{out} Delivery Power *(Watt)*
- **R** Resistance *(Ohm)*
- R_L Load Resistance *(Ohm)*
- V_{ac} AC Voltage *(Volt)*
- V_{dc} Average Output Voltage *(Volt)*
- $V_{L(dc)}$ DC Load Voltage *(Volt)*
- $V_{L(rms)}$ RMS Load Voltage *(Volt)*
- $V_{m(line)}$ Peak Line Voltage *(Volt)*
- $V_{m(phase)}$ Peak Phase Voltage *(Volt)*
- V_{max} Peak Input Voltage *(Volt)*
- V_r Ripple Voltage *(Volt)*
- V_{rms} RMS Output Voltage *(Volt)*

Constants, Functions, Measurements used in list of Three Phase Uncontrolled Rectifiers Formulas above

- constant(s): **pi**, 3.14159265358979323846264338327950288 *Archimedes' constant*
- Functions: **sqrt**, sqrt(Number) *A square root function is a function that takes a non-negative number as an input and returns the square root of the given input number.*
- Measurement: **Electric Current** in Ampere (A) *Electric Current Unit Conversion*
- Measurement: **Power** in Watt (W) *Power Unit Conversion*
- Measurement: **Electric Resistance** in Ohm (Ω) *Electric Resistance Unit Conversion*
- Measurement: **Electric Potential** in Volt (V) *Electric Potential Unit Conversion*

Download other Important Uncontrolled Rectifiers PDFs

- Important Single Phase Uncontrolled Rectifiers Formulas
- Important Three Phase Uncontrolled Rectifiers Formulas

Try our Unique Visual Calculators

- Percentage error
- LCM of three numbers
- Subtract fraction

Please SHARE this PDF with someone who needs it!

This PDF can be downloaded in these languages

English Spanish French German Russian Italian Portuguese Polish Dutch

7/9/2024 | 5:16:01 AM UTC