



## Three Phase Uncontrolled Rectifiers Formulas

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## List of 21 Three Phase Uncontrolled Rectifiers Formulas

## Three Phase Uncontrolled Rectifiers 🕑

#### 6 Pulse 🗹

1) Average Output Power of Three Phase 6 Pulse Diode Rectifier 🕑

fx 
$$\mathrm{P}_{\mathrm{avg}} = 0.912 \cdot \mathrm{V}_{\mathrm{m(phase)}} \cdot \mathrm{I}_{\mathrm{m(phase)}}$$

**ex**  $430.9068W = 0.912 \cdot 115.1V \cdot 4.105A$ 

#### 2) Average Output Voltage of Three Phase 6 Pulse Diode Rectifier 🕑

fx 
$$V_{
m dc} = \left(rac{3}{\pi}
ight) \cdot V_{
m m(phase)}$$

ex 
$$109.9124$$
V $=\left(rac{3}{\pi}
ight)\cdot 115.1$ V

#### 3) Output DC Power of Three Phase 6 Pulse Diode Rectifier

fx 
$$\mathrm{P_{dc}} = \left(rac{3}{\pi}
ight)^2 \cdot \mathrm{V_{m(phase)}} \cdot \mathrm{I_{m(phase)}}$$

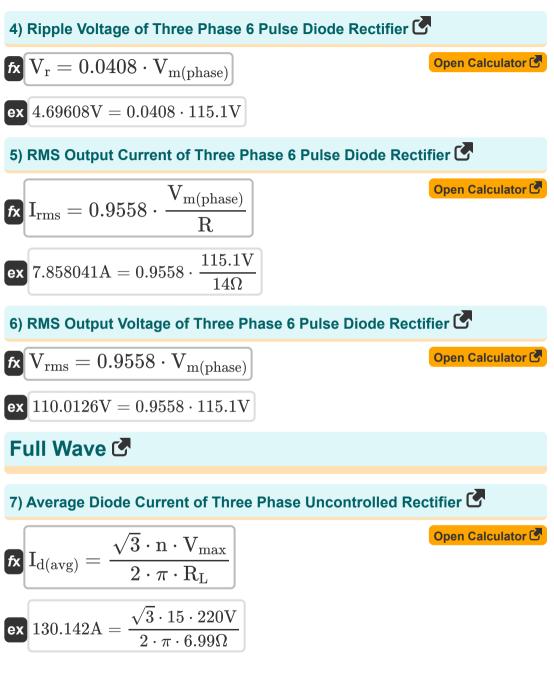
ex 
$$430.8551W = \left(\frac{3}{\pi}\right)^2 \cdot 115.1V \cdot 4.105A$$





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#### 8) Average Load Current of Three Phase Uncontrolled Rectifier 🕑

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

$$ex 390.426A = \frac{3 \cdot \sqrt{3} \cdot 15 \cdot 220V}{2 \cdot \pi \cdot 6.99\Omega}$$

9) Load Current of DC Three Phase Uncontrolled Rectifier 🕑

fx 
$$I_{
m L(dc)} = rac{3 \cdot \sqrt{3} \cdot V_{
m max}}{2 \cdot \pi \cdot R_{
m L}}$$

ex 
$$26.0284 \mathrm{A} = rac{3 \cdot \sqrt{3} \cdot 220 \mathrm{V}}{2 \cdot \pi \cdot 6.99 \Omega}$$

#### 10) Load Voltage of DC Three Phase Uncontrolled Rectifier 🕑

$$\mathbf{\tilde{K}} \mathbf{V}_{\mathrm{L(dc)}} = \frac{3 \cdot \sqrt{3} \cdot \mathrm{V}_{\mathrm{max}}}{2 \cdot \pi}$$

$$\mathbf{\tilde{K}} \mathbf{V}_{\mathrm{L(dc)}} = \frac{3 \cdot \sqrt{3} \cdot 220 \mathrm{V}}{2 \cdot \pi}$$

$$\mathbf{\tilde{K}} \mathbf{V}_{\mathrm{L(dc)}} = \frac{3 \cdot \sqrt{3} \cdot 220 \mathrm{V}}{2 \cdot \pi}$$

#### 11) Load Voltage of Full Wave Three Phase Uncontrolled Rectifier

fx 
$$V_{ac} = \frac{2 \cdot n \cdot V_{max}}{\pi}$$
  
ex  $2100.845V = \frac{2 \cdot 15 \cdot 220V}{\pi}$ 





#### 12) Power Delivered to Load in Three Phase Uncontrolled Rectifier 🕑

fx 
$$\mathrm{P}_{\mathrm{out}} = \mathrm{V}_{\mathrm{ac}} \cdot \mathrm{V}_{\mathrm{dc}}$$

ex 
$$230882.9W = 2100.845V \cdot 109.9V$$

#### 13) RMS Diode Current of Three Phase Uncontrolled Rectifier

fx 
$$I_{
m d(rms)} = rac{{
m n}\cdot{
m V}_{
m max}}{{
m R}_{
m L}\cdot\sqrt{2}}\cdot\sqrt{rac{1}{3}+rac{\sqrt{3}}{4\cdot\pi}}$$

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

#### 14) RMS Load Current of Three Phase Uncontrolled Rectifier

fx 
$$I_{L(rms)} = \frac{n \cdot V_{max}}{R_L \cdot \sqrt{2}} \cdot \sqrt{1 + \frac{3 \cdot \sqrt{3}}{2 \cdot \pi}}$$
  
ex  $451.222A = \frac{15 \cdot 220V}{6.99\Omega \cdot \sqrt{2}} \cdot \sqrt{1 + \frac{3 \cdot \sqrt{3}}{2 \cdot \pi}}$ 

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15) RMS Load Voltage of Three Phase Uncontrolled Rectifier 🕑

fx 
$$V_{L(rms)} = \frac{n \cdot V_{max}}{\sqrt{2}} \cdot \sqrt{1 + \frac{3 \cdot \sqrt{3}}{2 \cdot \pi}}$$
  
ex  $3154.042V = \frac{15 \cdot 220V}{\sqrt{2}} \cdot \sqrt{1 + \frac{3 \cdot \sqrt{3}}{2 \cdot \pi}}$ 

#### Half Wave 🕑

## 16) Average Output Power of Three Phase Half Wave Diode Rectifier with R Load

fx 
$$\mathrm{P}_{\mathrm{avg}} = 0.684 \cdot \mathrm{V}_{\mathrm{m(phase)}} \cdot \mathrm{I}_{\mathrm{m(phase)}}$$

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ex  $323.1801W = 0.684 \cdot 115.1V \cdot 4.105A$ 

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

fx 
$$V_{
m dc} = \left(rac{3}{2\cdot\pi}
ight)\cdot V_{
m m(line)}$$

ex 
$$114.2191$$
V $=\left(\frac{3}{2\cdot\pi}\right)\cdot 239.22$ V

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

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

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

$$(v_{dc} = \left(\frac{3 \cdot \sqrt{3}}{2 \cdot \pi}\right) \cdot 115.1V$$

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

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

$$(v_{dc} = 0.151 \cdot 115.1V)$$

$$(v_{dc} = 0.151 \cdot 115.1V)$$

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

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

$$(v_{dc} = 0.4854 \cdot 4.105A)$$

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

ex  $96.76227V = 0.84068 \cdot 115.1V$ 



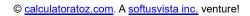


## Variables Used

- Id(avg) Average Diode Current (Ampere)
- Id(rms) RMS Diode Current (Ampere)
- IL(avg) Average Load Current (Ampere)
- IL(dc) DC Load Current (Ampere)
- IL(rms) RMS Load Current (Ampere)
- Im(phase) Peak Phase Current (Ampere)
- Irms Root Mean Square Current (Ampere)
- **n** Winding Ratio
- Pavg Average Output Power (Watt)
- Pdc DC Power Output (Watt)
- Pout Delivery Power (Watt)
- **R** Resistance (Ohm)
- R<sub>L</sub> Load Resistance (Ohm)
- Vac AC Voltage (Volt)
- Vdc Average Output Voltage (Volt)
- V<sub>L(dc)</sub> DC Load Voltage (Volt)
- VL(rms) RMS Load Voltage (Volt)
- Vm(line) Peak Line Voltage (Volt)
- Vm(phase) Peak Phase Voltage (Volt)
- Vmax Peak Input Voltage (Volt)
- V<sub>r</sub> Ripple Voltage (Volt)



• Vrms RMS Output Voltage (Volt)





### **Constants, Functions, Measurements used**

- Constant: pi, 3.14159265358979323846264338327950288 Archimedes' constant
- Function: **sqrt**, sqrt(Number) Square root function
- 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



## Check other formula lists

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

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