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# 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

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

[Open Calculator !\[\]\(de95854c7ee024cfadc48187bbb781b2\_img.jpg\)](#)

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

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

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

[Open Calculator !\[\]\(6a9b39b98eb945faa14c645ec99e4eaa\_img.jpg\)](#)

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

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

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

[Open Calculator !\[\]\(f1c5da15572e3e09d343161be98f508d\_img.jpg\)](#)

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



#### 4) Ripple Voltage of Three Phase 6 Pulse Diode Rectifier

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

[Open Calculator !\[\]\(cbe80b694ebd74fcfe136a095b608235\_img.jpg\)](#)

$$\text{ex } 4.69608\text{V} = 0.0408 \cdot 115.1\text{V}$$

#### 5) RMS Output Current of Three Phase 6 Pulse Diode Rectifier

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

[Open Calculator !\[\]\(3e2231b1ad3ca8da8658228c00dd08e0\_img.jpg\)](#)

$$\text{ex } 7.858041\text{A} = 0.9558 \cdot \frac{115.1\text{V}}{14\Omega}$$

#### 6) RMS Output Voltage of Three Phase 6 Pulse Diode Rectifier

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

[Open Calculator !\[\]\(0d5ec72f61334709c3fc9450209b754f\_img.jpg\)](#)

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

### Full Wave

#### 7) Average Diode Current of Three Phase Uncontrolled Rectifier

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

[Open Calculator !\[\]\(84f47badaad7772cd95667a7c387a639\_img.jpg\)](#)


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



8) Average Load Current of Three Phase Uncontrolled Rectifier [Open Calculator !\[\]\(dfbd6b3763a6d1d9afaa974f64e2e4b5\_img.jpg\)](#)

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

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

9) Load Current of DC Three Phase Uncontrolled Rectifier [Open Calculator !\[\]\(ec9132f1d27c8919987d92907322654d\_img.jpg\)](#)


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

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

10) Load Voltage of DC Three Phase Uncontrolled Rectifier [Open Calculator !\[\]\(758ebdf4629c903da74c2e079717ae32\_img.jpg\)](#)

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

$$\text{ex } 181.9385\text{V} = \frac{3 \cdot \sqrt{3} \cdot 220\text{V}}{2 \cdot \pi}$$

11) Load Voltage of Full Wave Three Phase Uncontrolled Rectifier [Open Calculator !\[\]\(248b91fcdac4810ffd15cf33fb6aec6f\_img.jpg\)](#)

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

$$\text{ex } 2100.845\text{V} = \frac{2 \cdot 15 \cdot 220\text{V}}{\pi}$$



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

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

[Open Calculator !\[\]\(e2376d476d06eb31946dc01a69a4403a\_img.jpg\)](#)

$$\text{ex } 230882.9\text{W} = 2100.845\text{V} \cdot 109.9\text{V}$$

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

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

[Open Calculator !\[\]\(0b5e7e25e8775f7e7e80906ada4f0021\_img.jpg\)](#)

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

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

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

[Open Calculator !\[\]\(bd3b31712ad9bab5a241210fa6925cdd\_img.jpg\)](#)

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



## 15) RMS Load Voltage of Three Phase Uncontrolled Rectifier

[Open Calculator !\[\]\(eafc244b53721dd1ec133f0772f70fc7\_img.jpg\)](#)

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

$$\text{ex } 3154.042\text{V} = \frac{15 \cdot 220\text{V}}{\sqrt{2}} \cdot \sqrt{1 + \frac{3 \cdot \sqrt{3}}{2 \cdot \pi}}$$

## Half Wave

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

[Open Calculator !\[\]\(e1d6102fe77919492c04879c8450f1f5\_img.jpg\)](#)

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

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

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

[Open Calculator !\[\]\(ab4e2b3fc7e7887b7a72f548aa6f5e60\_img.jpg\)](#)

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

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



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

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

[Open Calculator !\[\]\(9dfdaff1d86ba3c1f8353b4d1b61b8c5\_img.jpg\)](#)

$$\text{ex } 95.18693\text{V} = \left( \frac{3 \cdot \sqrt{3}}{2 \cdot \pi} \right) \cdot 115.1\text{V}$$

## 19) Ripple Voltage of Three Phase Half Wave Diode Rectifier

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

[Open Calculator !\[\]\(2b376d1a92330ab09dad2665d2f89bf5\_img.jpg\)](#)

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

## 20) RMS Output Current of Three Phase Half Wave Diode Rectifier with R Load

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

[Open Calculator !\[\]\(c444627dab9fee9a1550c053ffaaaae2\_img.jpg\)](#)

$$\text{ex } 1.992567\text{A} = 0.4854 \cdot 4.105\text{A}$$

## 21) RMS Output Voltage of Three Phase Half Wave Diode Rectifier with Resistive Load

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

[Open Calculator !\[\]\(06a315363e7801bba8c7489a6694af19\_img.jpg\)](#)

$$\text{ex } 96.76227\text{V} = 0.84068 \cdot 115.1\text{V}$$



## Variables Used

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









- $V_{\text{rms}}$  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 ( $\Omega$ )  
*Electric Resistance Unit Conversion* 
- **Measurement:** **Electric Potential** in Volt (V)  
*Electric Potential Unit Conversion* 



## Check other formula lists

- [Single Phase Uncontrolled Rectifiers Formulas](#) 
- [Three Phase Uncontrolled Rectifiers Formulas](#) 

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