



calculatoratoz.com



unitsconverters.com

DC Generator Characteristics Formulas

Calculators!

Examples!

Conversions!

Bookmark calculatoratoz.com, unitsconverters.com

Widest Coverage of Calculators and Growing - **30,000+ Calculators!**
Calculate With a Different Unit for Each Variable - **In built Unit Conversion!**
Widest Collection of Measurements and Units - **250+ Measurements!**

Feel free to SHARE this document with your friends!

[Please leave your feedback here...](#)



List of 17 DC Generator Characteristics Formulas

DC Generator Characteristics

1) Armature Current of DC Generator given Power

$$\text{fx } I_a = \frac{P_{\text{conv}}}{V_a}$$

[Open Calculator !\[\]\(a870788d6ed9b8fd294b7654a8c8526b_img.jpg\)](#)

$$\text{ex } 0.7525\text{A} = \frac{150.5\text{W}}{200\text{V}}$$

2) Armature Power in DC Generator

$$\text{fx } P_a = V_a \cdot I_a$$

[Open Calculator !\[\]\(c50c8b7b2cc2cf9ff925edec0ee94c0d_img.jpg\)](#)

$$\text{ex } 150\text{W} = 200\text{V} \cdot 0.75\text{A}$$

3) Armature Resistance of DC Generator using Output Voltage

$$\text{fx } R_a = \frac{V_a - V_o}{I_a}$$

[Open Calculator !\[\]\(f60b7a900783ac3fd531bfd9c111be6d_img.jpg\)](#)

$$\text{ex } 80\Omega = \frac{200\text{V} - 140\text{V}}{0.75\text{A}}$$




4) Back EMF of DC Generator given Flux 

$$E = K_e \cdot \omega_s \cdot \Phi_p$$

[Open Calculator !\[\]\(cbe80b694ebd74fcfe136a095b608235_img.jpg\)](#)

$$\text{ex } 14.3184\text{V} = 0.76 \cdot 314\text{rad/s} \cdot 0.06\text{Wb}$$

5) Converted Power in DC Generator 

$$P_{\text{conv}} = V_o \cdot I_L$$

[Open Calculator !\[\]\(3e2231b1ad3ca8da8658228c00dd08e0_img.jpg\)](#)

$$\text{ex } 150.5\text{W} = 140\text{V} \cdot 1.075\text{A}$$

6) Core Losses of DC Generator given Converted Power 

$$P_{\text{core}} = P_{\text{in}} - P_{\text{m}} - P_{\text{conv}} - P_{\text{stray}}$$

[Open Calculator !\[\]\(0d5ec72f61334709c3fc9450209b754f_img.jpg\)](#)

$$\text{ex } 17\text{W} = 220\text{W} - 9.1\text{W} - 150.5\text{W} - 43.4\text{W}$$

7) Electrical Efficiency of DC Generator 

$$\eta_e = \frac{P_o}{P_{\text{conv}}}$$

[Open Calculator !\[\]\(b64b40baaee5acddc1eab8538ba84754_img.jpg\)](#)

$$\text{ex } 0.797342 = \frac{120\text{W}}{150.5\text{W}}$$

8) EMF for DC Generator for Wave Winding 

$$E = \frac{P \cdot N_r \cdot \Phi_p \cdot Z}{120}$$

[Open Calculator !\[\]\(aff7c69c44a5e015f18c35867ef3f5c3_img.jpg\)](#)

$$\text{ex } 14.32566\text{V} = \frac{19 \cdot 1200\text{rev/min} \cdot 0.06\text{Wb} \cdot 12}{120}$$



9) EMF for DC Generator with Lap Winding

$$\text{fx } E = \frac{N_r \cdot \Phi_p \cdot Z}{60}$$

[Open Calculator !\[\]\(e78f798d4ea5c530c9db49e7d26e6b95_img.jpg\)](#)

$$\text{ex } 14.4\text{V} = \frac{1200\text{rev}/\text{min} \cdot 0.06\text{Wb} \cdot 12}{60}$$

10) Field Copper Loss in DC Generator

$$\text{fx } P_{\text{cu}} = I_f^2 \cdot R_f$$

[Open Calculator !\[\]\(05be7c7a8995decd503647c99211f7c2_img.jpg\)](#)

$$\text{ex } 4.5125\text{W} = (0.95\text{A})^2 \cdot 5\Omega$$

11) Induced Armature Voltage of DC Generator given Converted Power

$$\text{fx } V_a = \frac{P_{\text{conv}}}{I_a}$$

[Open Calculator !\[\]\(fe3aebe81acea8d45108cd2768939da7_img.jpg\)](#)

$$\text{ex } 200.6667\text{V} = \frac{150.5\text{W}}{0.75\text{A}}$$

12) Mechanical Efficiency of DC Generator using Armature Voltage

$$\text{fx } \eta_m = \frac{V_a \cdot I_a}{\omega_s \cdot \tau}$$

[Open Calculator !\[\]\(899d8b7697d64725bf017d3296cfcf1b_img.jpg\)](#)

$$\text{ex } 0.682439 = \frac{200\text{V} \cdot 0.75\text{A}}{314\text{rad}/\text{s} \cdot 0.7\text{N}^*\text{m}}$$



13) Mechanical Efficiency of DC Generator using Converted Power

$$\text{fx } \eta_m = \frac{P_{\text{conv}}}{P_{\text{in}}}$$

[Open Calculator !\[\]\(e2376d476d06eb31946dc01a69a4403a_img.jpg\)](#)

$$\text{ex } 0.684091 = \frac{150.5\text{W}}{220\text{W}}$$

14) Output Voltage in DC Generator using Converted Power

$$\text{fx } V_o = \frac{P_{\text{conv}}}{I_L}$$

[Open Calculator !\[\]\(0b5e7e25e8775f7e7e80906ada4f0021_img.jpg\)](#)

$$\text{ex } 140\text{V} = \frac{150.5\text{W}}{1.075\text{A}}$$

15) Overall Efficiency of DC Generator

$$\text{fx } \eta_o = \frac{P_o}{P_{\text{in}}}$$

[Open Calculator !\[\]\(bd3b31712ad9bab5a241210fa6925cdd_img.jpg\)](#)

$$\text{ex } 0.545455 = \frac{120\text{W}}{220\text{W}}$$

16) Power Drop in Brush DC Generator

$$\text{fx } P_{\text{BD}} = I_a \cdot V_{\text{BD}}$$

[Open Calculator !\[\]\(7bc43b319a082987e20f7bf78f4bab80_img.jpg\)](#)

$$\text{ex } 4.3875\text{W} = 0.75\text{A} \cdot 5.85\text{V}$$



17) Stray Losses of DC Generator given Converted Power

$$\text{fx } P_{\text{stray}} = P_{\text{in}} - P_{\text{m}} - P_{\text{core}} - P_{\text{conv}}$$

[Open Calculator !\[\]\(d3fb9f94af8b26d1c844efa9a98805b0_img.jpg\)](#)

$$\text{ex } 43.4\text{W} = 220\text{W} - 9.1\text{W} - 17\text{W} - 150.5\text{W}$$



Variables Used








- **E** EMF (Volt)
- **I_a** Armature Current (Ampere)
- **I_f** Field Current (Ampere)
- **I_L** Load Current (Ampere)
- **K_e** Back EMF Constant
- **N_r** Rotor Speed (Revolution per Minute)
- **P** Number of Poles
- **P_a** Amature Power (Watt)
- **P_{BD}** Brush Power Drop (Watt)
- **P_{conv}** Converted Power (Watt)
- **P_{core}** Core Loss (Watt)
- **P_{cu}** Copper Loss (Watt)
- **P_{in}** Input Power (Watt)
- **P_m** Mechanical Losses (Watt)
- **P_o** Output Power (Watt)
- **P_{stray}** Stray Loss (Watt)
- **R_a** Armature Resistance (Ohm)
- **R_f** Field Resistance (Ohm)
- **V_a** Armature Voltage (Volt)
- **V_{BD}** Brush Voltage Drop (Volt)
- **V_o** Output Voltage (Volt)



- **Z** Number of Conductor
- **η_e** Electrical Efficiency
- **η_m** Mechanical Efficiency
- **η_o** Overall Efficiency
- **T** Torque (*Newton Meter*)
- **Φ_p** Flux per Pole (*Weber*)
- **ω_s** Angular Speed (*Radian per Second*)



Constants, Functions, Measurements used

- **Measurement: Electric Current** in Ampere (A)
Electric Current Unit Conversion 
- **Measurement: Power** in Watt (W)
Power Unit Conversion 
- **Measurement: Magnetic Flux** in Weber (Wb)
Magnetic Flux Unit Conversion 
- **Measurement: Electric Resistance** in Ohm (Ω)
Electric Resistance Unit Conversion 
- **Measurement: Electric Potential** in Volt (V)
Electric Potential Unit Conversion 
- **Measurement: Angular Velocity** in Radian per Second (rad/s), Revolution per Minute (rev/min)
Angular Velocity Unit Conversion 
- **Measurement: Torque** in Newton Meter (N*m)
Torque Unit Conversion 



Check other formula lists

- [DC Generator Characteristics Formulas](#) 
- [DC Series Generator Formulas](#) 
- [DC Shunt Generator Formulas](#) 

Feel free to SHARE this document with your friends!

PDF Available in

[English](#) [Spanish](#) [French](#) [German](#) [Russian](#) [Italian](#) [Portuguese](#) [Polish](#) [Dutch](#)

8/16/2023 | 12:43:10 PM UTC

[Please leave your feedback here...](#)

