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DC Shunt Generator Formulas

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List of 16 DC Shunt Generator Formulas

DC Shunt Generator

Current

1) Armature Current for DC Shunt Generator

$$\text{fx } I_a = I_{sh} + I_L$$

[Open Calculator !\[\]\(de95854c7ee024cfadc48187bbb781b2_img.jpg\)](#)

$$\text{ex } 1.7\text{A} = 0.75\text{A} + 0.95\text{A}$$

2) Field Current of DC Shunt Generator

$$\text{fx } I_{sh} = \frac{V_t}{R_{sh}}$$

[Open Calculator !\[\]\(6a9b39b98eb945faa14c645ec99e4eaa_img.jpg\)](#)

$$\text{ex } 0.756757\text{A} = \frac{140\text{V}}{185\Omega}$$

3) Field Current of DC Shunt Generator given Load Current

$$\text{fx } I_{sh} = I_a - I_L$$

[Open Calculator !\[\]\(f1c5da15572e3e09d343161be98f508d_img.jpg\)](#)

$$\text{ex } 0.75\text{A} = 1.7\text{A} - 0.95\text{A}$$



Efficiency

4) Electrical Efficiency of DC Shunt Generator

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

[Open Calculator !\[\]\(a03a7eb2f4046e1d3c76772003e549ea_img.jpg\)](#)

$$\text{ex } 0.933333 = \frac{238\text{W}}{255\text{W}}$$

5) Overall Efficiency in DC Shunt Generator

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

[Open Calculator !\[\]\(5361750c22c4e047a52f4eac1ec2d4cc_img.jpg\)](#)

$$\text{ex } 0.476 = \frac{238\text{W}}{500\text{W}}$$

Losses

6) Armature Copper Loss for DC Shunt Generator

$$\text{fx } P_{\text{cu}} = I_a^2 \cdot R_a$$

[Open Calculator !\[\]\(7d1d6890825e83a6a4a51febe2dcc7f3_img.jpg\)](#)

$$\text{ex } 101.8725\text{W} = (1.7\text{A})^2 \cdot 35.25\Omega$$


7) Core Losses of DC Shunt Generator given Converted Power

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

[Open Calculator !\[\]\(28f72b996fc97883dfd9d4e8b1b16b4e_img.jpg\)](#)

$$\text{ex } 112.5\text{W} = 500\text{W} - 12\text{W} - 255\text{W} - 120.5\text{W}$$




8) Shunt Field Copper Loss for DC Shunt Generator 

$$fx \quad P_{cu} = I_{sh}^2 \cdot R_{sh}$$

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

$$ex \quad 104.0625W = (0.75A)^2 \cdot 185\Omega$$

9) Stray Losses of DC Shunt Generator given Converted Power 

$$fx \quad P_{stray} = P_{in} - P_m - P_{core} - P_{conv}$$

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


$$ex \quad 120.5W = 500W - 12W - 112.5W - 255W$$

Mechanical Specifications 10) Back Pitch for DC Shunt Generator 

$$fx \quad Y_B = \left(\frac{2 \cdot S}{P} \right) + 1$$

[Open Calculator !\[\]\(626ce8ac21792b9405bfddfea8e0c96a_img.jpg\)](#)

$$ex \quad 51 = \left(\frac{2 \cdot 100}{4} \right) + 1$$


11) Commutator Pitch for DC Shunt Generator 

$$fx \quad Y_C = \frac{Y_B + Y_F}{2}$$

[Open Calculator !\[\]\(c1168d6a8b365d11e842ece304635fa7_img.jpg\)](#)

$$ex \quad 50 = \frac{51 + 49}{2}$$



12) Front Pitch for DC Shunt Generator 

$$fx \quad Y_F = \left(\frac{2 \cdot S}{P} \right) - 1$$

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


$$ex \quad 49 = \left(\frac{2 \cdot 100}{4} \right) - 1$$

Power 13) Converted Power of DC Shunt Generator 

$$fx \quad P_{conv} = \frac{P_o}{\eta_e}$$

[Open Calculator !\[\]\(8bba887393ca45b761e5cb49e755e762_img.jpg\)](#)


$$ex \quad 255.914W = \frac{238W}{0.93}$$

14) Power Generated given Armature Current in DC Shunt Generator 

$$fx \quad P_o = V_t \cdot I_a$$

[Open Calculator !\[\]\(0fb13ad0bfa3d86868cdd3883e5665b3_img.jpg\)](#)

$$ex \quad 238W = 140V \cdot 1.7A$$

Voltage & EMF 15) Back EMF for DC Shunt Generator 

$$fx \quad E_b = K_f \cdot \Phi \cdot \omega_s$$

[Open Calculator !\[\]\(4436e6b00b9d5e62c2a161129eb3e4d0_img.jpg\)](#)

$$ex \quad 11.30973V = 2 \cdot 0.2Wb \cdot 270r/ \text{min}$$



16) Terminal Voltage for DC Shunt Generator

fx $V_t = V_a - I_a \cdot R_a$

Open Calculator 

ex $140.075V = 200V - 1.7A \cdot 35.25\Omega$



Variables Used







- E_b Back EMF (Volt)
- I_a Armature Current (Ampere)
- I_L Load Current (Ampere)
- I_{sh} Shunt Field Current (Ampere)
- K_f Machine Constant
- P Number of Poles
- 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_{sh} Shunt Field Resistance (Ohm)
- S Number of Slots
- V_a Armature Voltage (Volt)
- V_t Terminal Voltage (Volt)
- Y_B Back Pitch
- Y_C Commutator Pitch
- Y_F Front Pitch



- η_e Electrical Efficiency
- η_o Overall Efficiency
- Φ Magnetic Flux (*Weber*)
- ω_s Angular Speed (*Revolution per Minute*)



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 Revolution per Minute (r/min)
Angular Velocity Unit Conversion 



Check other formula lists

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

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