



calculatoratoz.com



unitsconverters.com

Symmetric Components 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 27 Symmetric Components Formulas

Symmetric Components

Line Sequence Impedance

1) Fault Impedance using A-Phase Current

$$\text{fx } Z_{f(\text{line})} = \frac{V_{1(\text{line})} + V_{2(\text{line})} + V_{0(\text{line})}}{I_{a(\text{line})}}$$

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

$$\text{ex } 7.831281\Omega = \frac{13.51\text{V} + 16.056\text{V} + 17.5\text{V}}{6.01\text{A}}$$

2) Fault Impedance using Positive Sequence Current

$$\text{fx } Z_{f(\text{line})} = \frac{V_{1(\text{line})} + V_{2(\text{line})} + V_{0(\text{line})}}{3 \cdot I_{1(\text{line})}}$$

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

$$\text{ex } 7.840021\Omega = \frac{13.51\text{V} + 16.056\text{V} + 17.5\text{V}}{3 \cdot 2.0011\text{A}}$$

3) Negative Sequence Impedance for Delta Connected Load

$$\text{fx } Z_{2(\text{line})} = \frac{V_{2(\text{line})}}{I_{2(\text{line})}}$$

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

$$\text{ex } -44.476454\Omega = \frac{16.056\text{V}}{-0.361\text{A}}$$



4) Positive Sequence Impedance for Delta Connected Load

$$\text{fx } Z_{1(\text{line})} = \frac{V_{1(\text{line})}}{I_{1(\text{line})}}$$

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

$$\text{ex } 6.751287\Omega = \frac{13.51\text{V}}{2.0011\text{A}}$$

5) Sequence Impedance

$$\text{fx } Z_{s(\text{line})} = \frac{V_{s(\text{line})}}{I_{s(\text{line})}}$$

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

$$\text{ex } 1.75\Omega = \frac{7\text{V}}{4\text{A}}$$

6) Zero Sequence Impedance for Delta Connected Load

$$\text{fx } Z_{0D(\text{line})} = \frac{V_{0(\text{line})}}{I_{0(\text{line})}}$$

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

$$\text{ex } 7.954545\Omega = \frac{17.5\text{V}}{2.20\text{A}}$$

7) Zero Sequence Impedance for Star Connected Load

$$\text{fx } Z_{0S(\text{line})} = Z_{s(\text{line})} + (3 \cdot Z_{f(\text{line})})$$

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

$$\text{ex } 25.271\Omega = 1.751\Omega + (3 \cdot 7.84\Omega)$$



Sequence Current & Voltage

8) Negative Phase Current for Delta Connected Load

$$\text{fx } I_2 = \frac{3 \cdot V_2}{Z_d}$$

[Open Calculator !\[\]\(23d9fc146e83b5c3013cfa32c784f8d5_img.jpg\)](#)

$$\text{ex } -0.466667\text{A} = \frac{3 \cdot -1.4\text{V}}{9\Omega}$$

9) Negative Sequence Current for Star Connected Load

$$\text{fx } I_2 = \frac{V_2}{Z_y}$$

[Open Calculator !\[\]\(aa53ad6fea213b8b2226d3077e30533a_img.jpg\)](#)

$$\text{ex } -0.339806\text{A} = \frac{-1.4\text{V}}{4.12\Omega}$$

10) Negative Sequence Voltage for Delta Connected Load

$$\text{fx } V_2 = \frac{Z_d \cdot I_2}{3}$$

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

$$\text{ex } -1.38\text{V} = \frac{9\Omega \cdot -0.46\text{A}}{3}$$

11) Negative Sequence Voltage for Star Connected Load

$$\text{fx } V_2 = I_2 \cdot Z_y$$

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

$$\text{ex } -1.8952\text{V} = -0.46\text{A} \cdot 4.12\Omega$$



12) Positive Sequence Current for Delta Connected Load

$$\text{fx } I_1 = \frac{3 \cdot V_1}{Z_d}$$

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

$$\text{ex } 2\text{A} = \frac{3 \cdot 6\text{V}}{9\Omega}$$

13) Positive Sequence Current for Star Connected Load

$$\text{fx } I_1 = \frac{V_1}{Z_y}$$

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

$$\text{ex } 1.456311\text{A} = \frac{6\text{V}}{4.12\Omega}$$

14) Positive Sequence Voltage for Delta Connected Load

$$\text{fx } V_1 = \frac{Z_d \cdot I_1}{3}$$

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

$$\text{ex } 6\text{V} = \frac{9\Omega \cdot 2\text{A}}{3}$$

15) Positive Sequence Voltage for Star Connected Load

$$\text{fx } V_1 = Z_y \cdot I_1$$

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

$$\text{ex } 8.24\text{V} = 4.12\Omega \cdot 2\text{A}$$



16) Symmetric Component Current using Sequence Impedance

$$\text{fx } I_s = \frac{V_s}{Z_s}$$

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

$$\text{ex } 4.005714\text{A} = \frac{7.01\text{V}}{1.75\Omega}$$

17) Symmetric Component Voltage using Sequence Impedance

$$\text{fx } V_s = I_s \cdot Z_s$$

[Open Calculator !\[\]\(e1d6102fe77919492c04879c8450f1f5_img.jpg\)](#)

$$\text{ex } 7.0175\text{V} = 4.01\text{A} \cdot 1.75\Omega$$

18) Zero Sequence Current for Star Connected Load

$$\text{fx } I_0 = \frac{V_0}{Z_y + (3 \cdot Z_f)}$$

[Open Calculator !\[\]\(ab4e2b3fc7e7887b7a72f548aa6f5e60_img.jpg\)](#)

$$\text{ex } 2.187365\text{A} = \frac{60.59\text{V}}{4.12\Omega + (3 \cdot 7.86\Omega)}$$

19) Zero Sequence Voltage for Star Connected Load

$$\text{fx } V_0 = (Z_y + 3 \cdot Z_f) \cdot I_0$$

[Open Calculator !\[\]\(5abce1a84a655b073239ab33e1199487_img.jpg\)](#)

$$\text{ex } 60.663\text{V} = (4.12\Omega + 3 \cdot 7.86\Omega) \cdot 2.19\text{A}$$



Transformer Sequence Impedance

20) Delta Impedance using Star Impedance

$$\text{fx } Z_{d(xmer)} = Z_{y(xmer)} \cdot 3$$

[Open Calculator !\[\]\(83f22ed94ec5517769dd76d702c6bfd8_img.jpg\)](#)

$$\text{ex } 20.223\Omega = 6.741\Omega \cdot 3$$

21) Leakage Impedance for Transformer given Positive Sequence Voltage

$$\text{fx } Z_{\text{Leakage}(xmer)} = \frac{V_{1(xmer)}}{I_{1(xmer)}}$$

[Open Calculator !\[\]\(3cb60d42b10e53f9522bb0b392c1c4cd_img.jpg\)](#)

$$\text{ex } 6.746627\Omega = \frac{13.5\text{V}}{2.001\text{A}}$$

22) Leakage Impedance for Transformer given Zero Sequence Current

$$\text{fx } Z_{\text{Leakage}(xmer)} = \left(\frac{V_{0(xmer)}}{I_{0(xmer)}} \right) - 3 \cdot Z_{f(xmer)}$$

[Open Calculator !\[\]\(0d7ca0919e6c47bbd874bfa0189fe22e_img.jpg\)](#)

$$\text{ex } 6.703801\Omega = \left(\frac{17.6\text{V}}{2.21\text{A}} \right) - 3 \cdot 0.42\Omega$$



23) Negative Sequence Impedance for Transformer

$$\text{fx } Z_{2(xmer)} = \frac{V_{2(xmer)}}{I_{2(xmer)}}$$

[Open Calculator !\[\]\(6605b201d6f14d9b3bcb8ab5f274d107_img.jpg\)](#)

$$\text{ex } -44.597222\Omega = \frac{16.055V}{-0.36A}$$

24) Neutral Impedance for Star Connected Load using Zero Sequence Voltage

$$\text{fx } Z_{f(xmer)} = \frac{\left(\frac{V_{0(xmer)}}{I_{0(xmer)}} \right) - Z_{y(xmer)}}{3}$$

[Open Calculator !\[\]\(e8fb589d58dad1692debababa5e928b6_img.jpg\)](#)

$$\text{ex } 0.4076\Omega = \frac{\left(\frac{17.6V}{2.21A} \right) - 6.741\Omega}{3}$$

25) Positive Sequence Impedance for Transformer

$$\text{fx } Z_{1(xmer)} = \frac{V_{1(xmer)}}{I_{1(xmer)}}$$

[Open Calculator !\[\]\(4688aadfd656ded00cd6bdfae55089a9_img.jpg\)](#)

$$\text{ex } 6.746627\Omega = \frac{13.5V}{2.001A}$$



26) Star Impedance using Delta Impedance

[Open Calculator !\[\]\(666e09182d4cd268646ea700ea60dcdf_img.jpg\)](#)

$$\text{fx } Z_{y(xmer)} = \frac{Z_{d(xmer)}}{3}$$

$$\text{ex } 6.74\Omega = \frac{20.22\Omega}{3}$$

27) Zero Sequence Impedance for Transformer

[Open Calculator !\[\]\(003082e50e3009141f59bd5df831749f_img.jpg\)](#)

$$\text{fx } Z_{0(xmer)} = \frac{V_{0(xmer)}}{I_{0(xmer)}}$$

$$\text{ex } 7.963801\Omega = \frac{17.6V}{2.21A}$$



Variables Used




- I_0 Zero Sequence Current (Ampere)
- $I_{0(\text{line})}$ Zero Sequence Current Line (Ampere)
- $I_{0(\text{xmer})}$ Zero Sequence Current Xmer (Ampere)
- I_1 Positive Sequence Current (Ampere)
- $I_{1(\text{line})}$ Positive Sequence Current Line (Ampere)
- $I_{1(\text{xmer})}$ Positive Sequence Current Xmer (Ampere)
- I_2 Negative Sequence Current (Ampere)
- $I_{2(\text{line})}$ Negative Sequence Current Line (Ampere)
- $I_{2(\text{xmer})}$ Negative Sequence Current Xmer (Ampere)
- $I_a(\text{line})$ A-Phase Current Line (Ampere)
- I_s Symmetric Component Current (Ampere)
- $I_{s(\text{line})}$ Symmetric Component Current Line (Ampere)
- V_0 Zero Sequence Voltage (Volt)
- $V_{0(\text{line})}$ Zero Sequence Voltage Line (Volt)
- $V_{0(\text{xmer})}$ Zero Sequence Voltage Xmer (Volt)
- V_1 Positive Sequence Voltage (Volt)
- $V_{1(\text{line})}$ Positive Sequence Voltage Line (Volt)
- $V_{1(\text{xmer})}$ Positive Sequence Voltage Xmer (Volt)
- V_2 Negative Sequence Voltage (Volt)
- $V_{2(\text{line})}$ Negative Sequence Voltage Line (Volt)



- $V_{2(xmer)}$ Negative Sequence Voltage Xmer (Volt)
- V_s Symmetric Component Voltage (Volt)
- $V_{s(line)}$ Symmetric Component Voltage Line (Volt)
- $Z_{0(xmer)}$ Zero Sequence Impedance Xmer (Ohm)
- $Z_{0D(line)}$ Zero Sequence Impedance Delta Line (Ohm)
- $Z_{0S(line)}$ Zero Sequence Impedance Star Line (Ohm)
- $Z_{1(line)}$ Positive Sequence Impedance Line (Ohm)
- $Z_{1(xmer)}$ Positive Sequence Impedance Xmer (Ohm)
- $Z_{2(line)}$ Negative Sequence Impedance Line (Ohm)
- $Z_{2(xmer)}$ Negative Sequence Impedance Xmer (Ohm)
- Z_d Delta Impedance (Ohm)
- $Z_{d(xmer)}$ Delta Impedance Xmer (Ohm)
- Z_f Fault Impedance (Ohm)
- $Z_{f(line)}$ Fault Impedance Line (Ohm)
- $Z_{f(xmer)}$ Fault Impedance Xmer (Ohm)
- $Z_{Leakage(xmer)}$ Leakage Impedance Xmer (Ohm)
- Z_s Sequence Impedance (Ohm)
- $Z_{s(line)}$ Sequence Impedance Line (Ohm)
- Z_y Star Impedance (Ohm)
- $Z_{y(xmer)}$ Star Impedance Xmer (Ohm)



Constants, Functions, Measurements used

- **Measurement: Electric Current** in Ampere (A)
Electric Current 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

- [Open Conductor Fault Formulas](#) 
- [Shunt Faults Formulas](#) 
- [Symmetric Components Formulas](#) 

Feel free to SHARE this document with your friends!

PDF Available in

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

12/18/2023 | 3:19:58 PM UTC

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

