

8.2 TREFASET VEKSELSTRØM MED RESISTANSER I ASYMMETRI 33  
8.2.1

$$b) I_1 = \sqrt{I_{f12}^2 + I_{f31}^2 + (I_{f12} \cdot I_{f31})} = \sqrt{12A^2 + 20A^2 + (12A \cdot 20A)} = \underline{\underline{28,0A}}$$

$$I_2 = \sqrt{I_{f23}^2 + I_{f12}^2 + (I_{f23} \cdot I_{f12})} = \sqrt{15A^2 + 12A^2 + (15A \cdot 12A)} = \underline{\underline{23,4A}}$$

$$I_3 = \sqrt{I_{f31}^2 + I_{f23}^2 + (I_{f31} \cdot I_{f23})} = \sqrt{20A^2 + 15A^2 + (20A \cdot 15A)} = \underline{\underline{30,4A}}$$

$$c) P_{f12} = I_{f12} \cdot U_{f12} = 12A \cdot 240V = \underline{\underline{2880W}}$$

$$P_{f23} = I_{f23} \cdot U_{f23} = 15A \cdot 240V = \underline{\underline{3600W}}$$

$$P_{f31} = I_{f31} \cdot U_{f31} = 20A \cdot 240V = \underline{\underline{4800W}}$$

$$P = P_{f12} + P_{f23} + P_{f31} = 2880W + 3600W + 4800W = \underline{\underline{11280W}}$$

8.2.2

$$a) I_{f12} = \frac{U_f}{R_{f12}} = \frac{440V}{12\Omega} = \underline{\underline{36,67A}}$$

$$I_{f23} = \frac{U_f}{R_{f23}} = \frac{440V}{17\Omega} = \underline{\underline{25,88A}}$$

$$I_{f31} = \frac{U_f}{R_{f31}} = \frac{440V}{8\Omega} = \underline{\underline{55,0A}}$$

$$I_1 = \sqrt{I_{f12}^2 + I_{f31}^2 + (I_{f12} \cdot I_{f31})} = \sqrt{36,67A^2 + 55,0A^2 + (36,67A \cdot 55,0A)} = \underline{\underline{78,76A}}$$

$$I_2 = \sqrt{I_{f23}^2 + I_{f12}^2 + (I_{f23} \cdot I_{f12})} = \sqrt{25,88A^2 + 36,67A^2 + (25,88A \cdot 36,67A)} = \underline{\underline{54,44A}}$$

$$I_3 = \sqrt{I_{f31}^2 + I_{f23}^2 + (I_{f31} \cdot I_{f23})} = \sqrt{55,0A^2 + 25,88A^2 + (55,0A \cdot 25,88A)} = \underline{\underline{71,54A}}$$

$$c) P_{f12} = I_{f12} \cdot U_{f12} = 36,67A \cdot 440V = 16134,8W$$

$$+ P_{f23} = I_{f23} \cdot U_{f23} = 25,88A \cdot 440V = 11387,2W$$

$$+ P_{f31} = I_{f31} \cdot U_{f31} = 55,0A \cdot 440V = 24200,0W$$

$$= P = \underline{\underline{51722,0W}}$$

8.2.3

$$b) I_1 = \sqrt{I_{f12}^2 + I_{f31}^2 + (I_{f12} \cdot I_{f31})} = \sqrt{120A^2 + 140A^2 + (120A \cdot 140A)} = \underline{\underline{225,4A}}$$

$$I_2 = \sqrt{I_{f23}^2 + I_{f12}^2 + (I_{f23} \cdot I_{f12})} = \sqrt{100A^2 + 120A^2 + (100A \cdot 120A)} = \underline{\underline{190,8A}}$$

$$I_3 = \sqrt{I_{f31}^2 + I_{f23}^2 + (I_{f31} \cdot I_{f23})} = \sqrt{140A^2 + 100A^2 + (140A \cdot 100A)} = \underline{\underline{208,8A}}$$

$$c) P_{f12} = U_{f12} \cdot I_{f12} \cdot \cos \varphi_{12} = 250V \cdot 120A \cdot 0,866 = 25980 \text{ W}$$

$$+ P_{f23} = U_{f23} \cdot I_{f23} \cdot \cos \varphi_{23} = 250V \cdot 100A \cdot 0,866 = 21650 \text{ W}$$

$$+ P_{f31} = U_{f31} \cdot I_{f31} \cdot \cos \varphi_{31} = 250V \cdot 140A \cdot 0,866 = \underline{\underline{30310 \text{ W}}}$$

= P

$$= \underline{\underline{77940 \text{ W}}}$$

$$d) \cos \varphi = 0,866 \Rightarrow \angle \varphi 30^\circ \Rightarrow \sin \varphi = 0,5$$

$$Q_{f12} = U_{f12} \cdot I_{f12} \cdot \sin \varphi_{12} = 250V \cdot 120A \cdot 0,5 = 15000 \text{ VAR}$$

$$+ Q_{f23} = U_{f23} \cdot I_{f23} \cdot \sin \varphi_{23} = 250V \cdot 100A \cdot 0,5 = 12500 \text{ VAR}$$

$$+ Q_{f31} = U_{f31} \cdot I_{f31} \cdot \sin \varphi_{31} = 250V \cdot 140A \cdot 0,5 = \underline{\underline{17500 \text{ VAR}}}$$

= Q

$$= \underline{\underline{45000 \text{ VAR}}}$$

$$e) S_{f12} = U_{f12} \cdot I_{f12} = 250V \cdot 120A = 30000 \text{ VA}$$

$$+ S_{f23} = U_{f23} \cdot I_{f23} = 250V \cdot 100A = 25000 \text{ VA}$$

$$+ S_{f31} = U_{f31} \cdot I_{f31} = 250V \cdot 140A = \underline{\underline{35000 \text{ VA}}}$$

= S

$$= \underline{\underline{90000 \text{ VA}}}$$