Function Definitions:

Equivalent resistance , two parallel resistances: $R_{par}(r1, r2) := \frac{r1 \cdot r2}{r1 + r2}$

Line current: $I_L(p) := \frac{p}{\sqrt{3} \cdot V_{LL}}$

Balanced delta to wye conversion: $R_{\Delta Y}(r_\Delta) := \frac{r_\Delta}{3}$

Balanced wye to delta conversion: $R_{Y\Delta}(r_Y) := 3 \cdot r_Y$

Variable Definitions:

Heating element resistance $R := 10\ \Omega$

Nominal system voltage $V_{LL} := 208\ \text{V}$

Calculations:

Nominal line-to-neutral voltage	$V_{LN} := \frac{V_{LL}}{\sqrt{3}}$	$V_{LN} = 120\ \text{V}$		
Delta, parallel heating elements	$P_{\Delta p} := 3 \cdot \frac{V_{LL}^2}{\left(\frac{R}{2}\right)}$	$P_{\Delta p} = 25.96\ \text{kW}$ Define this as the base power.		Line current, each phase: $I_L(P_{\Delta p}) = 72.05\ \text{A}$
Delta, single heating element	$P_\Delta := 3 \cdot \frac{V_{LL}^2}{R}$	$P_\Delta = 12.98\ \text{kW}$	Percentage of base power: $\frac{P_\Delta}{P_{\Delta p}} = 50\ \%$	$I_L(P_\Delta) = 36.03\ \text{A}$
Delta, series heating elements	$P_{\Delta s} := 3 \cdot \frac{V_{LL}^2}{2 \cdot R}$	$P_{\Delta s} = 6.49\ \text{kW}$	$\frac{P_{\Delta s}}{P_{\Delta p}} = 25\ \%$	$I_L(P_{\Delta s}) = 18.01\ \text{A}$
Wye, parallel heating elements	$P_{Yp} := 3 \cdot \frac{V_{LN}^2}{\left(\frac{R}{2}\right)}$	$P_{Yp} = 8.65\ \text{kW}$	$\frac{P_{Yp}}{P_{\Delta p}} = 33.33\ \%$	$I_L(P_{Yp}) = 24.02\ \text{A}$
Wye, single heating element	$P_Y := 3 \cdot \frac{V_{LN}^2}{R}$	$P_Y = 4.33\ \text{kW}$	$\frac{P_Y}{P_{\Delta p}} = 16.67\ \%$	$I_L(P_Y) = 12.01\ \text{A}$
Wye, series heating elements	$P_{Ys} := 3 \cdot \frac{V_{LN}^2}{2 \cdot R}$	$P_{Ys} = 2.16\ \text{kW}$	$\frac{P_{Ys}}{P_{\Delta p}} = 8.33\ \%$	$I_L(P_{Ys}) = 6\ \text{A}$
Delta with internal wye (convert internal wye to delta equivalent; eq. is in parallel with original delta)	$P_{\Delta Y} := 3 \cdot \frac{V_{LL}^2}{R_{par}(R, R_{Y\Delta}(R))}$	$P_{\Delta Y} = 17.31\ \text{kW}$	$\frac{P_{\Delta Y}}{P_{\Delta p}} = 66.67\ \%$	$I_L(P_{\Delta Y}) = 48.04\ \text{A}$
Wye with internal delta (convert internal delta to wye equivalent; eq. is in series with original wye)	$P_{Y\Delta} := 3 \cdot \frac{V_{LN}^2}{R + R_{\Delta Y}(R)}$	$P_{Y\Delta} = 3.24\ \text{kW}$	$\frac{P_{Y\Delta}}{P_{\Delta p}} = 12.5\ \%$	$I_L(P_{Y\Delta}) = 9.01\ \text{A}$