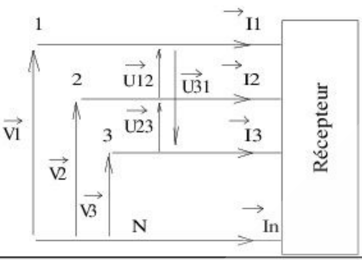
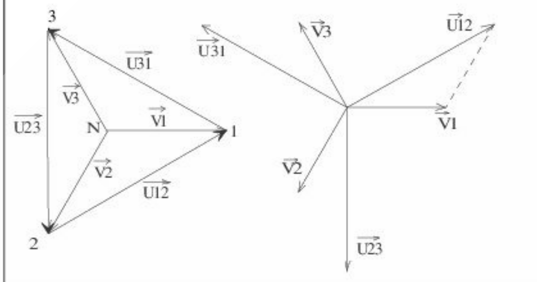
## I. Définitions



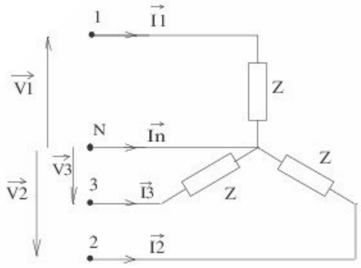
Les tensions $\vec{V}_1$, $\vec{V}_2$, $\vec{V}_3$ entre phase et neutre sont appelés *tensions simples* : $V_1=V_2=V_3=V$

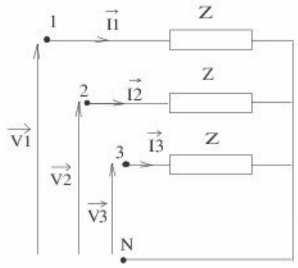
Les tensions $\vec{U}_{12}$, $\vec{U}_{23}$, $\vec{U}_{31}$ entre phases sont appelées *tensions composées* : $U_{12}=U_{23}=U_{31}=U$

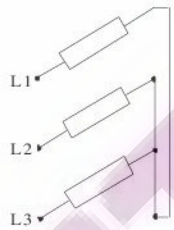
$\boxed{U=\sqrt{3}V}$

## II. Montage étoile.

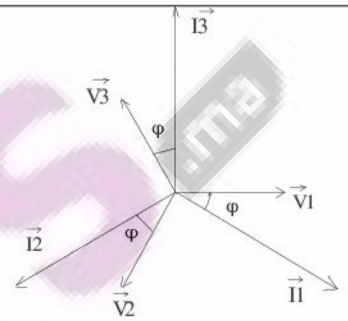
$\underline{Z}=[Z, \varphi]$ $I_1=I_2=I_3=I$ avec $\boxed{I=V/Z}$







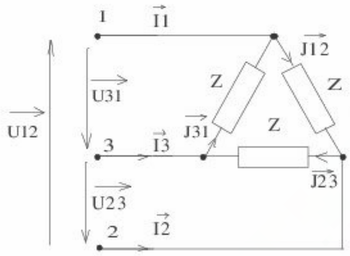
$P=3VI\cos\varphi = \sqrt{3}UI\cos\varphi$ , $Q=3VI\sin\varphi = \sqrt{3}UI\sin\varphi$ , $S=3VI=\sqrt{3}UI$

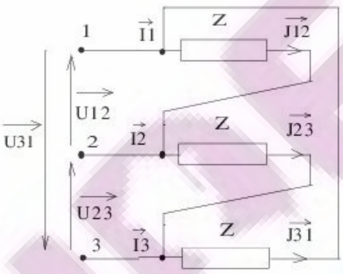


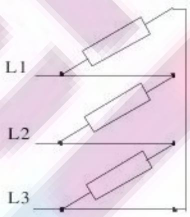
$(\vec{I}_1, \vec{V}_1) = (\vec{I}_2, \vec{V}_2) = (\vec{I}_3, \vec{V}_3) = \varphi$

## III. Montage Triangle :

$\underline{Z}=[Z, \varphi]$

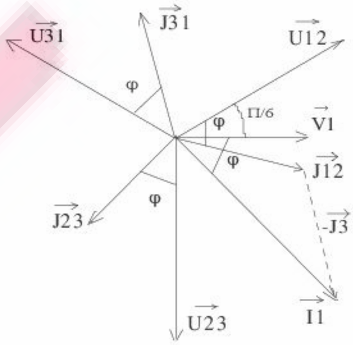






$J_{12}=J_{23}=J_{31}=J$ et $\boxed{J=U/Z}$ $I_1=I_2=I_3=I$ et $\boxed{I=J\sqrt{3}}$

$P=3UJ\cos\varphi = \sqrt{3}UI\cos\varphi$ , $Q=3UJ\sin\varphi = \sqrt{3}UI\sin\varphi$ , $S=3UJ=\sqrt{3}UI$



$(\vec{J}_{12}, \vec{U}_{12}) = (\vec{J}_{23}, \vec{U}_{23}) = (\vec{J}_{31}, \vec{U}_{31}) = \varphi$

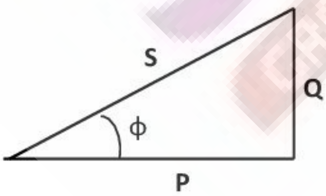
$(\vec{I}_1, \vec{V}_1) = (\vec{I}_2, \vec{V}_2) = (\vec{I}_3, \vec{V}_3) = \varphi$

## IV. Bilan des Puissances .

**Dans une installation :**

**Théorème de Boucherot donne :**

$P=\Sigma Pi$ , $Q=\Sigma Qi$

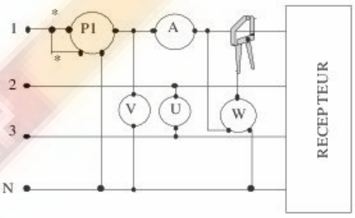



et $S = \sqrt{P^2+Q^2}$

$\tan\varphi = Q/P$

## V. Mesure des puissances .

**Réseau 4 fils équilibré:**

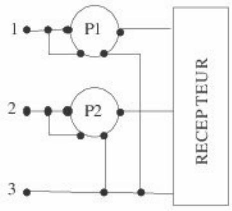



Utilisation d'un wattmètre monophasé ordinaire ou avec pince ampèremètrique :

$P = 3P_1$

$S = 3VI = \sqrt{3}.U.I = \sqrt{P^2+Q^2}$

**Réseau 3 fils équilibré :**




Méthode des 2 wattmètres

$P = P1+P2$

$Q = \sqrt{3}\,(P1-P2)$

ou

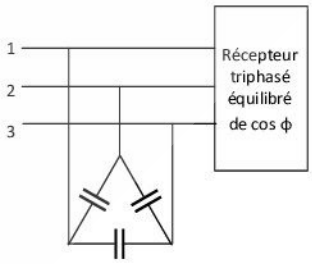
$P_{13}= U.I.\cos(\varphi-\pi/6)$

$P_{23}= U.I.\cos(\varphi+\pi/6)$

## VI. Relèvement du facteur de puissance

**Relèvement du cos φ:**

Capacités en triangle :




$$C = \frac{P\,(\tan\varphi - \tan\varphi')}{3\omega U^2}$$

Capacités en étoile :

$$C = \frac{P\,(\tan\varphi - \tan\varphi')}{3\omega V^2}$$