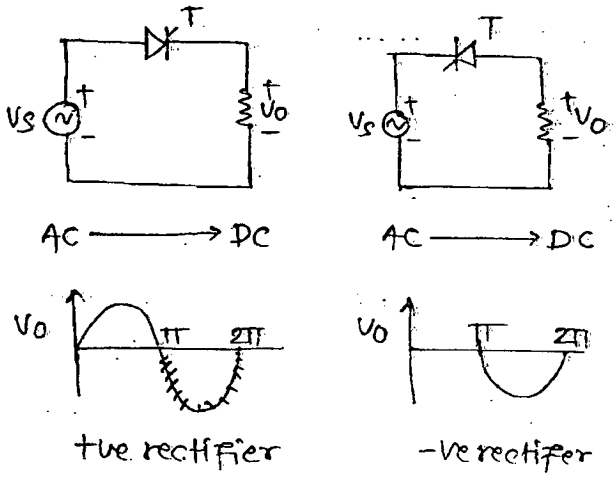
Cycloconverter

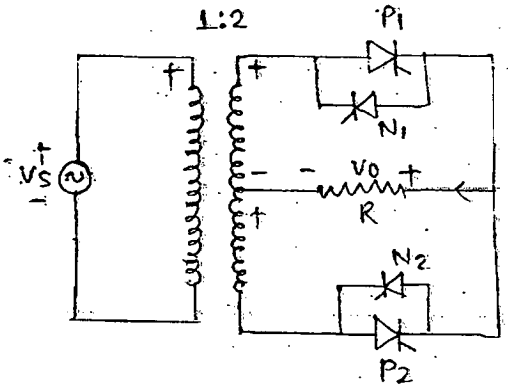
Fixed AC ⟶ variable AC
(V_s, f_s) (V_o, f_o)

$f_o < f_s$ → step down cyclocon^r

$f_o > f_s$ → step up cyclocon^r

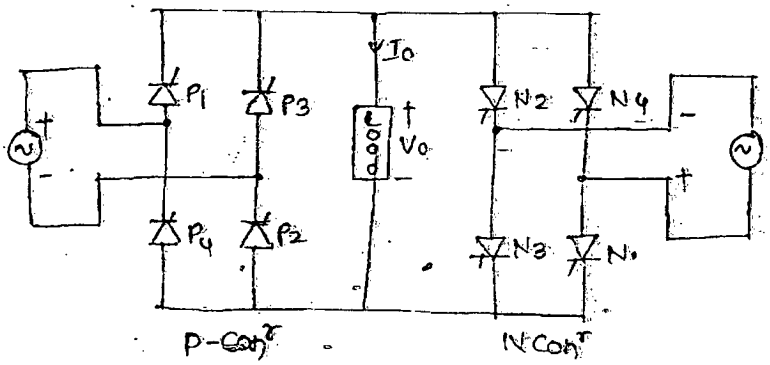


* mid point cycloconverter →



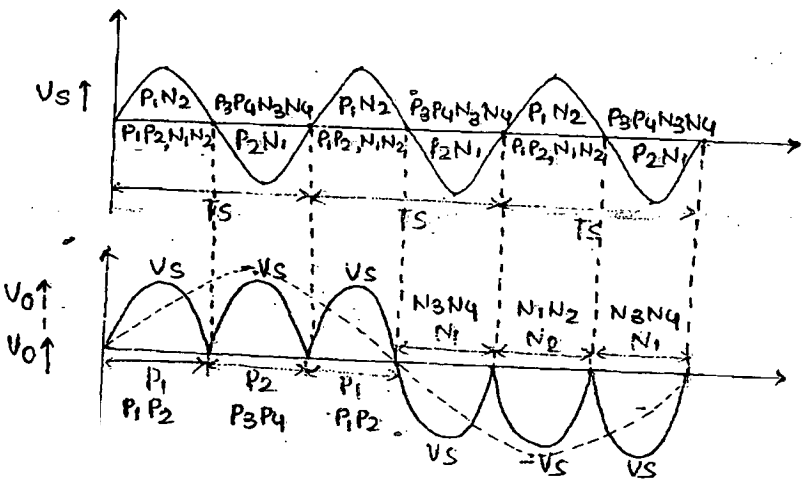
+ve, P_1N_2(F)
-ve, P_2N_1(F)

* Bridge cycloconverter →



+ve P_1P_2, N_1N_2(F)
-ve P_3P_4, N_3N_4(F)

Stepdown cyclo [$f_o < f_s$] → Let $f_o = \frac{1}{3} f_s$, $T_o = 3T_s$



$f_o = \frac{1}{3} f_s$	$P_1 P_2 P_1$	$N_1 N_2 N_3$
	+ − +	− + −
$f_o = \frac{1}{4} f_s$	$P_1 P_2 P_1 P_2$	$N_2 N_1 N_2 N_1$
	+ − + −	+ − + −

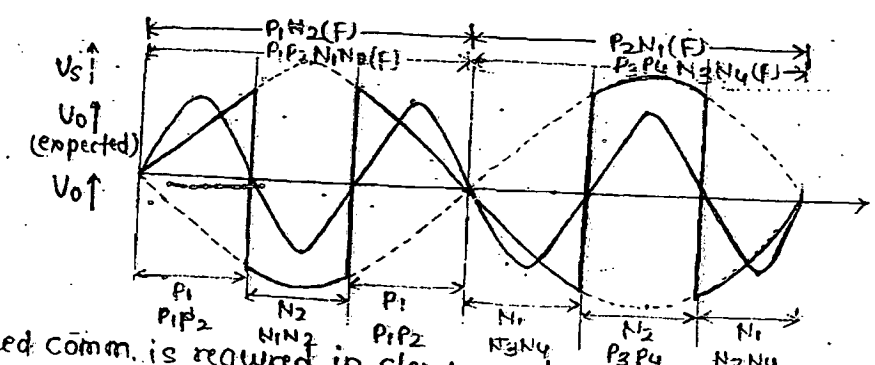
R Load →

$$V_{or} = \frac{V_m}{\sqrt{2\pi}} \left\{ (\pi - \alpha) + \frac{1}{2} \sin 2\alpha \right\}^{1/2}$$

RL Load →

$$V_{or} = \frac{V_m}{\sqrt{2\pi}} \left\{ (\beta - \alpha) + \frac{1}{2} (\sin 2\alpha - \sin 2\beta) \right\}^{1/2}$$

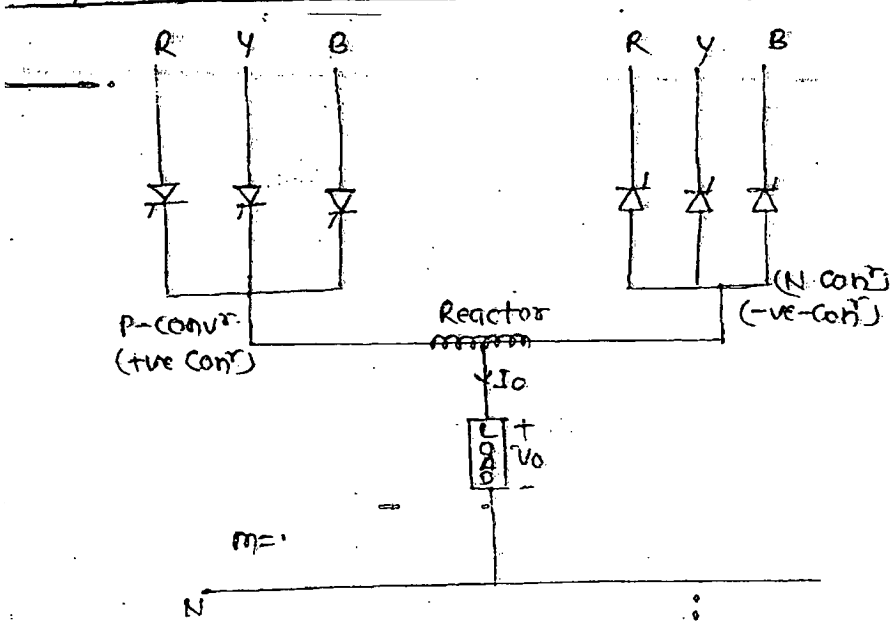
Stepup cycloconverter → ($f_o > f_s$) Let $f_o = 3f_s$, $T_s = 3T_o$



* Forced comm. is required in step up cyclo.
* Harmonic distortion is high in cyclocon^r therefore it operates with low PF.

Application → It is used for high power, low speed & reversible AC drives.

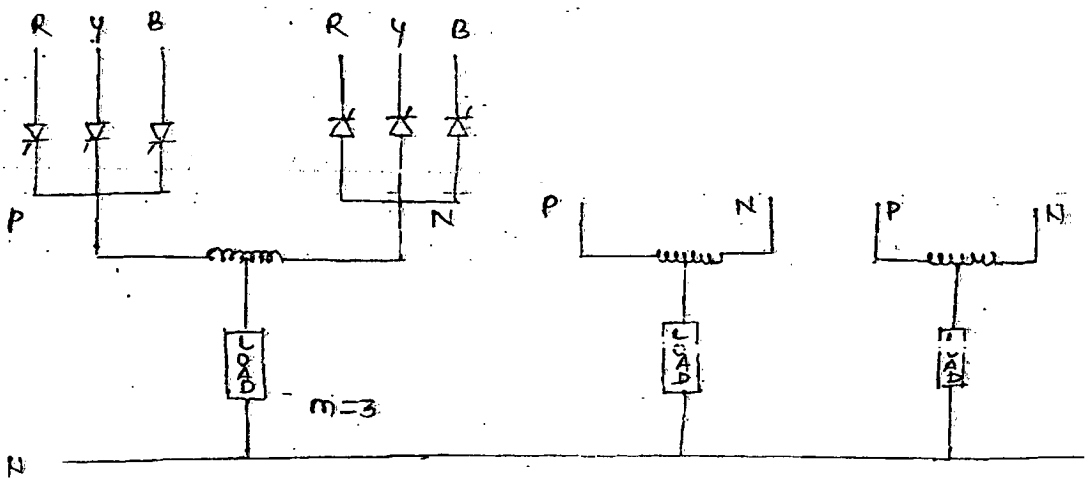
*3ϕ to 1ϕ cycloconverter →



(1.) $\alpha_P + \alpha_N = 180^\circ$
(2.) Reactor

$$V_{o1} = V_{ph} \cdot \frac{m}{\pi} \sin\frac{\pi}{m} \cdot \cos\alpha$$

3ϕ to 3ϕ cycloconverter → (18 thy. cycloconverter)



$$V_{o1}/\text{phase} = V_{ph} \cdot \frac{m}{\pi} \sin\frac{\pi}{m} \cdot \cos\alpha$$

[redacted] pulse con^{r} is used in 3ph to 3ph. cycloconverter then we require 36 thy.

Therefore it is also known as 36 thy. cyclo.

$$\boxed{V_{o1}/\text{Phase} = V_L \cdot \frac{m}{\pi} \sin\frac{\pi}{m} \cdot \cos\alpha}$$