30/1/2017 AN LN

CAPABILITY

$V_n = 1500\,V$

$S_n = 2 \cdot 10^6\,VA$

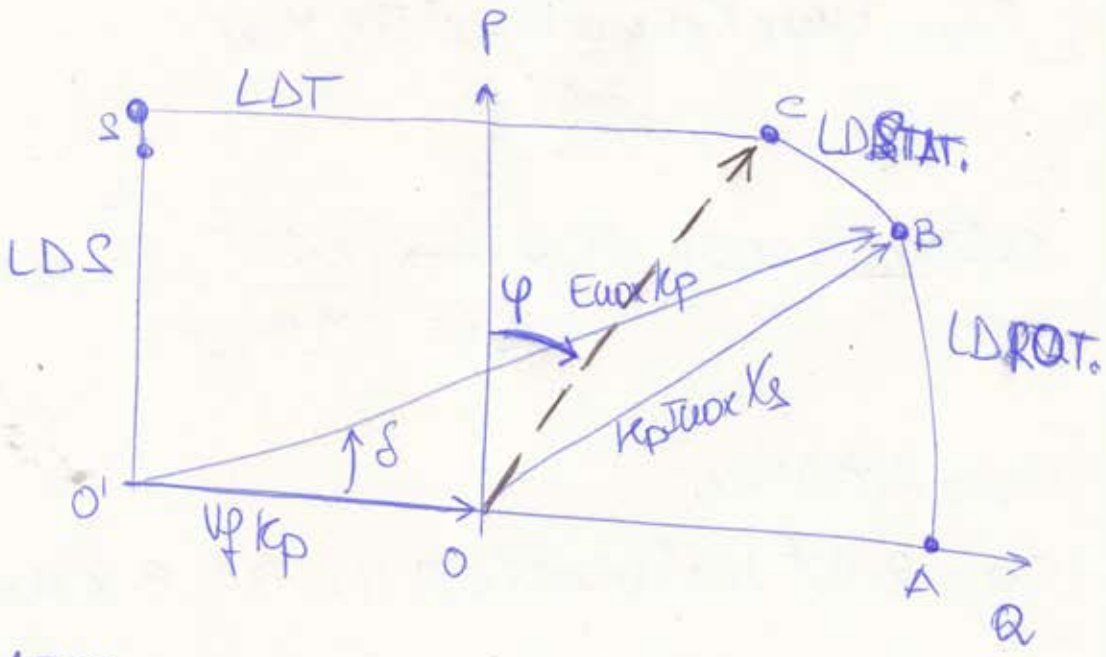
#

$f = 50\,Hz$

$X_s = 1{,}8\,\Omega$

$LDT = 1{,}8\,MW$

$E_{max} = 2{,}05\,kV$



$$K_p = \frac{3V_f}{X_s} = \frac{3 \cdot \frac{1500}{\sqrt{3}}}{1{,}8} = 1443{,}38\,A$$

$$\bar{S}_n = 3\bar{V}_f \bar{I} \rightarrow I_{max} = \frac{2 \cdot 10^6}{3 \cdot \frac{1500}{\sqrt{3}}} = 769{,}8\,A$$

O'

$O'_Q = -V_f K_p = -1{,}25\,MVAr$

$O'_P = 0\,W$

A

$O'_Q = E_{max} K_p - V_f K_p = 1{,}71\,MVAr$

$O'_P = 0$

B (CARNOT)

$$(K_p I_{max} X_s)^2 = (E_{max} K_p)^2 + (V_f K_p)^2 - 2(E_{max} K_p)(V_f K_p)\cos\delta \rightarrow$$

$$\rightarrow \cos\delta = \frac{(2 \cdot 10^6)^2 - (2{,}96 \cdot 10^6)^2 - (1{,}25 \cdot 10^6)^2}{-2(2{,}96 \cdot 10^6)(1{,}25 \cdot 10^6)} = 0{,}8546 \rightarrow$$

$\rightarrow \delta = \arccos(0{,}8546) = 31{,}28°$

- $B'_Q = E_{max} K_p \cos\delta = 2{,}53$ MVAr
- $B'_P = E_{max} K_p \sin\delta = 1{,}54$ MW

c

$$K_p I_{max} X_s \cos\varphi = C_p \rightarrow \left(\frac{2\cdot10^6}{1{,}8\cdot10^6}\right)^{-1} = \cos\varphi = 0{,}9$$

↳ LDT

- $C_p = 1{,}8$ MW
- $C_Q = 2\cdot10^6 \sin(\arccos(0{,}9)) = 871{,}8$ KVAr

S

- $S_Q = -1{,}25$ MVAr
- $S_P = 1{,}8$ MW

LDTurb

$1{,}8$ MW $= 1{,}8$ MW [OK] [$P \leq P_{max}$]

LDStabilità

~~$A = 1{,}8\cdot10^6 \cos(\arccos(0{,}9)) =$~~

$$A = \frac{1{,}8\cdot10^6}{(0{,}9)} = 2 \text{ MVA} \quad [\text{OK}]$$

[OK]

$Q = 2\cdot10^6 \cdot \sin(\arccos(0{,}9)) = +0{,}872$ MVAr $> -1{,}25$ MVAr

LDStatore

$$I = \frac{2\cdot10^6}{3V_f} = 769{,}68 = I_{max}$$

LDRot $\bar{E} = jX_s\bar{I} + \bar{V}_f = 1633{,}83$ V $< 2{,}05$ kV [OK]