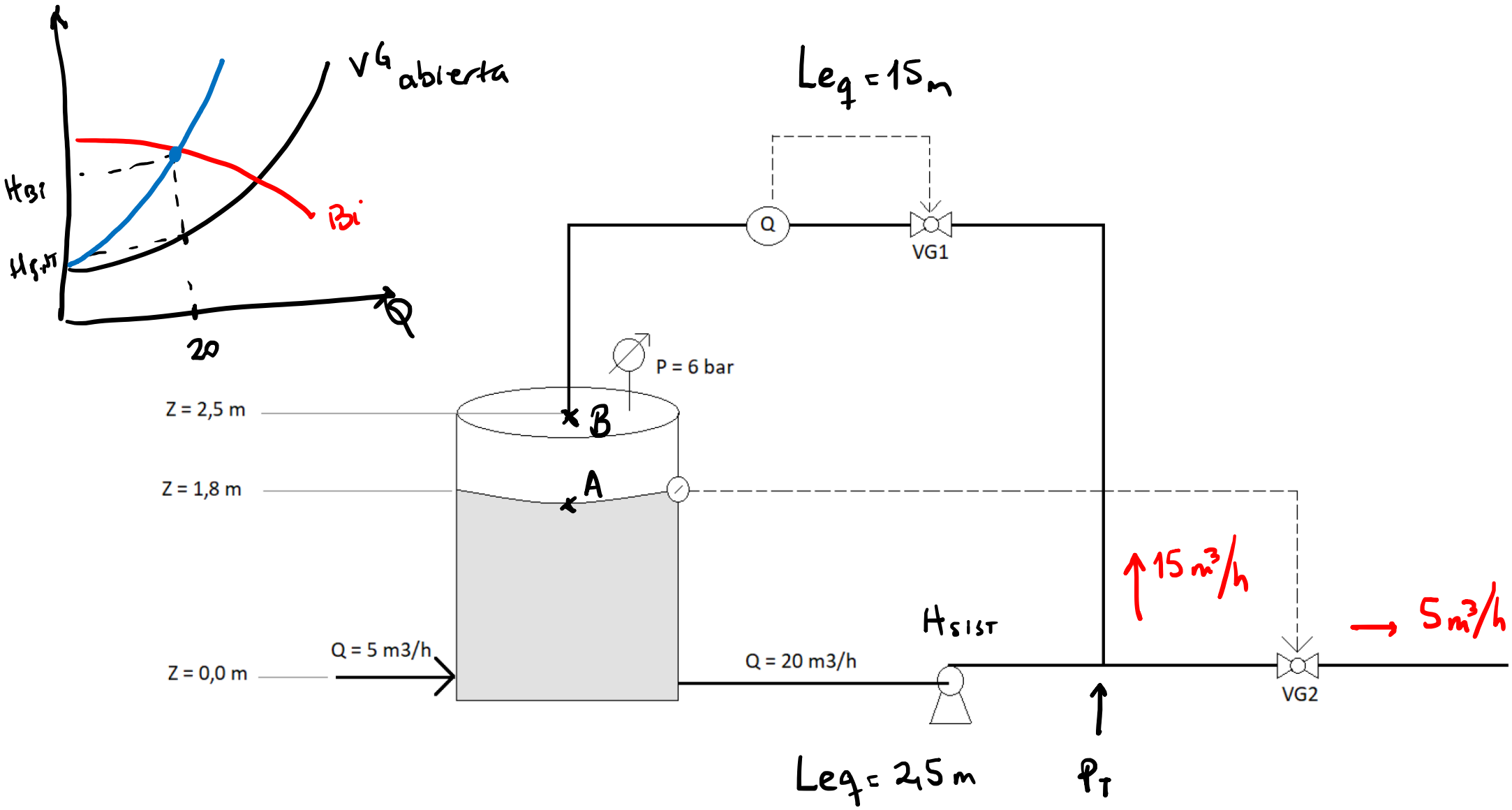
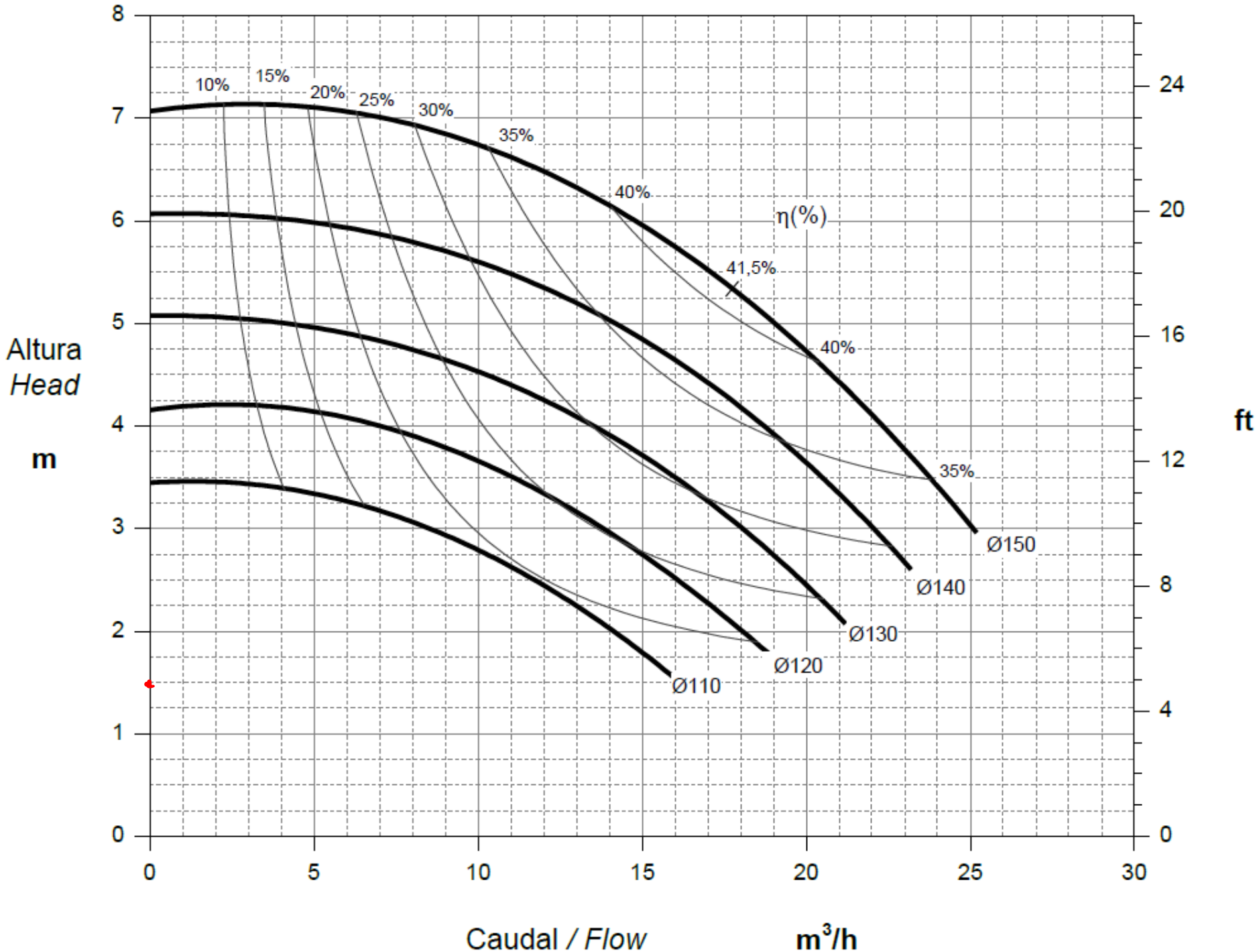

VG abierta
Hgi
Hgnt
Bi
20
Q
Leq = 15 m
VG1
P = 6 bar
Z = 2,5 m
B
Z = 1,8 m
A
Z = 0,0 m
Q = 5 m3/h
Q = 20 m3/h
Hsist
15 m3/h
5 m3/h
VG2
Leq = 2,5 m
PT


Altura
Head
m
ft
Caudal / Flow
m³/h
η(%)
10%
15%
20%
25%
30%
35%
40%
41,5%
40%
35%
Ø150
Ø140
Ø130
Ø120
Ø110
0
1
2
3
4
5
6
7
8
0
4
8
12
16
20
24
0
5
10
15
20
25
30

BEM T-B

$L_{eq} = 15\,m$

6 barg

$$\underbrace{z_B}_{2,5\,m} + \frac{P_B - P_T}{\rho g} + \underbrace{\Delta h_f}_{15 \times \frac{0,022}{0,0409} \cdot \frac{u_2^2}{2g}} = 0$$

$Q_2 = 15\,m^3/h$

$u_2 = 3,2\,m/s$

$Re = 1,2 \times 10^5 \rightarrow f = 0,022$

$\Rightarrow P_T = 755374\,Pa\ abs$

BEM A-T

$$\frac{\Delta u^2}{2g} + \Delta z + \frac{\Delta P}{\rho g} + \Delta h_f = H \Rightarrow \frac{u_1^2}{2g} - \underbrace{z_A}_{1,8} + \frac{P_T - P_A}{\rho g} + 2,5 \times \frac{0,0215}{0,0409} \cdot \frac{u_1^2}{2g} = H$$

$Q_1 = 20\,m^3/h$

$Re_1 = 1,6 \times 10^5$

$f_1 = 0,0215$

$\rightarrow$ $H_{sist} = 5,4\,m$

$H_{SIST} = 5{,}4\ m$
REQ

1 Bomba → $Q = 20\ m^3/h$ → $H_{Bi} = 4{,}75\ m$ → La bomba individual no puede cumplir el servicio

paralelo → $Q = 10\ m^3/h$ → $H_{paralelo} = 6{,}75\ m$ ✓ $H_{paralelo} > H_{S.ST}$

Serie → $Q = 20\ m^3/h$ → $H_{serie} = 2 \times H_{Bi} = 9{,}5\ m$ ✓ $H_{serie} > H_{SIST}$

→ $Q_{op} = 20\ m^3/h$ → como hay VR siempre voy a trabajar a $20\ m^3/h$

↳ no chequeo que estoy en el rango de trabajo

$Q = 20\ m^3/h \rightarrow \eta = 40\ \%_o \Rightarrow P_m = \frac{P_h}{\eta} = \frac{\rho g H Q}{\eta} = \frac{20 m^3/h \times 4{,}75 \times \rho g}{3600 \times 0{,}40}$

↑ serie

$P_m = 711{,}2\ W$ (c/bomba en serie)

$Q = 10\ m^3/h \rightarrow \eta_{paralelo} = 34\ \%_o \Rightarrow P_m = \frac{10\ m^3/h \times 6{,}75 m \times \rho g}{3600 \times 0{,}34}$

$P_m = 594{,}5\ W$ (c/bomba en paralelo)

$P_{m\ paralelo} = 2 \times 594{,}5 \simeq 1200\ W$ ←

$P_{m\ serie} = 711{,}2 \times 2 \simeq 1400\ W$

$P_{mi\ serie} < P_{m\ máx}$ ✓

$P_{mi\ paralelo} < P_{m\ máx}$ ✓