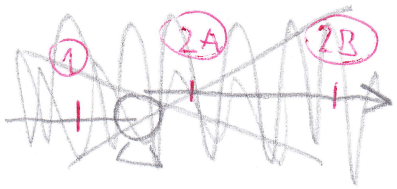
4-5 (3-14)



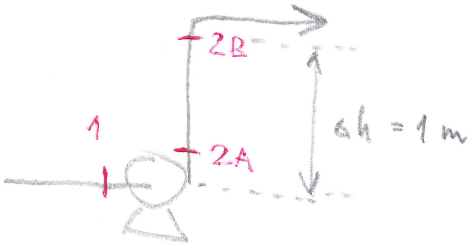
$\dot{V} = 1{,}2 \ \frac{m^3}{min}$

$p_1 = 5{,}9 \cdot 10^4 \ Pa$

$p_2 = 0{,}3 \ MPa$

$\eta_c = 60\%$

$P = ? \ W$



$t = 20°C \quad \rho = 998 \ kg/m^3$

$\eta = 1{,}002 \cdot 10^{-3} \ Pa \cdot s$

varianta A:

$$\frac{v_1^2}{2} + \frac{p_1}{\rho} + h_1 g + e_c = \frac{v_2^2}{2} + \frac{p_2}{\rho} + h_2 g + e_{dis}$$

$v_1 = v_2$

$h_1 = h_2$

$e_{dis} = 0$

$$e_c = \frac{p_2 - p_1}{\rho}$$

výkon č. $N = e_č \cdot \dot{m} = e_č \cdot \dot{V} \cdot \rho$

příkon č. $P = N / \eta_č = e_č \cdot \dot{V} \cdot \rho / \eta_č$

$$P = \frac{\dot{V}\rho}{\eta_č} \cdot \frac{p_2 - p_1}{\rho} = \frac{1{,}2/60 \cdot (300 - 59) \cdot 10^3}{0{,}6} = 8{,}03 \ kW$$

varianta B

$v_1 = v_2$

$h_1 = 0$

$h_2 = 1 \ m$

$e_{dis} = 0$

$$e_c = \frac{p_2 - p_1}{\rho} + \Delta h \cdot g$$

$$P = \frac{\dot{V}\rho}{\eta_č} \cdot \left(\frac{p_2 - p_1}{\rho} + \Delta h \, g \right)$$

$$P = \frac{\dot{V}}{\eta_č} \cdot (p_2 - p_1 + \Delta h \rho g) = \frac{1{,}2/60}{0{,}6} \cdot \left(\overbrace{300 - 59}^{241 \ kPa} + \overbrace{\frac{1 \cdot 998 \cdot 9{,}81}{1000}}^{9{,}79 \ kPa} \right) \cdot 10^3$$

$P = 8{,}36 \ kW$