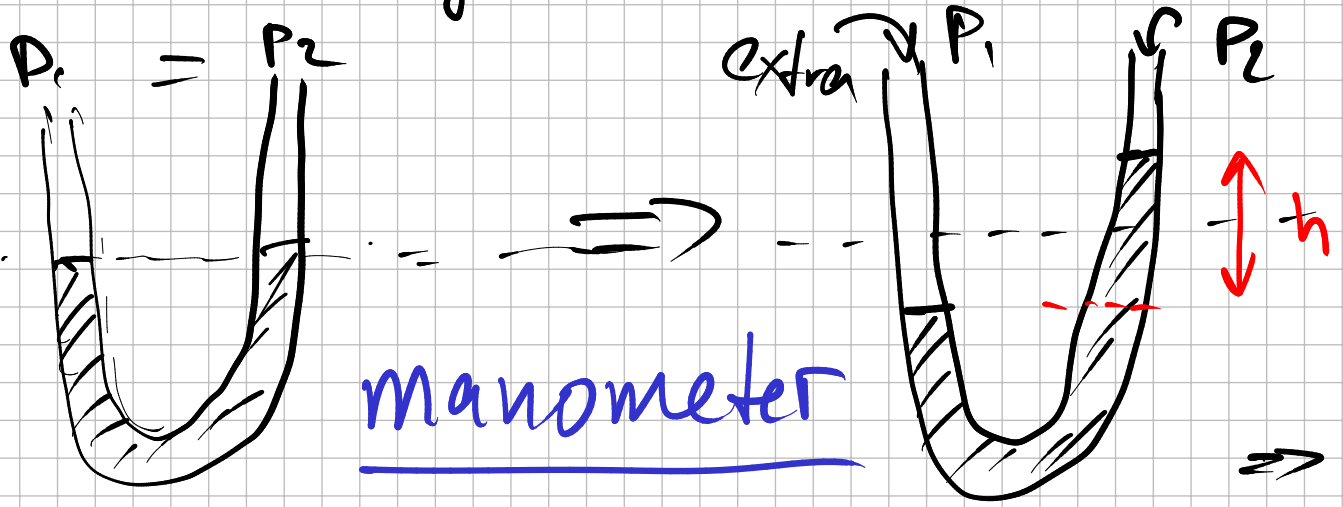
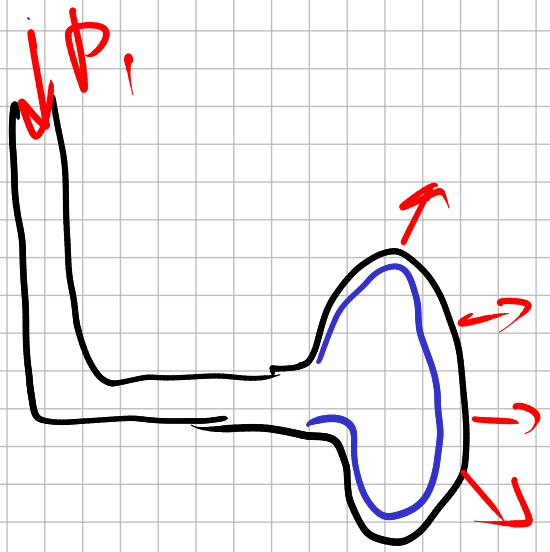
Gauges for pressure

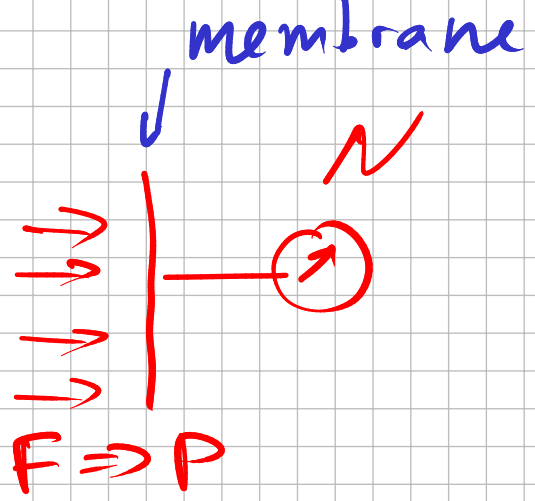


$P_1 - P_2 = \rho g h$

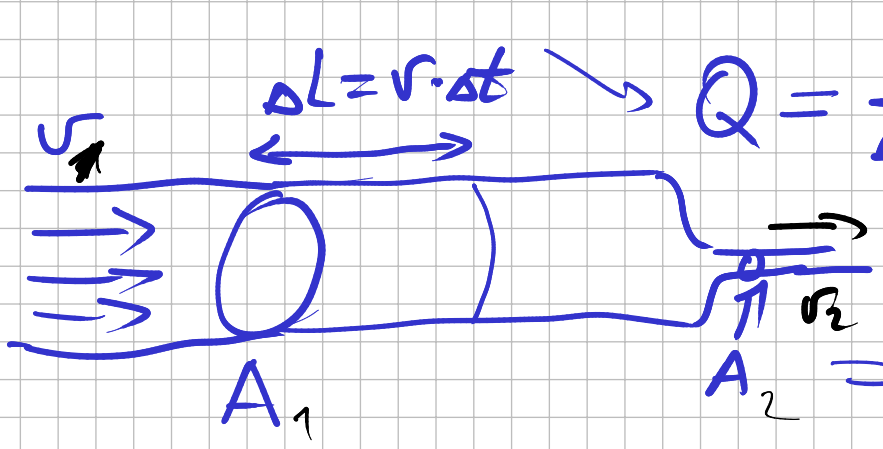
manometer

⇒ gauge pressure ⇒ relative to something





Flow rate



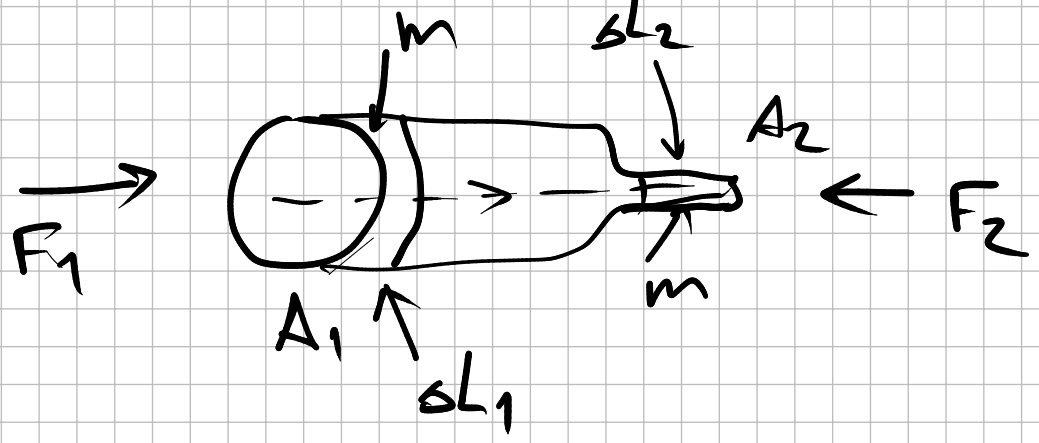
$$Q = \frac{V}{\Delta t} = \frac{\Delta L \cdot A}{\Delta t} = \frac{v \Delta t \cdot A}{\Delta t}$$

$$\Rightarrow \boxed{Q = v \cdot A}$$

Ideal Fluids are not compressible

$$\Rightarrow Q_1 = Q_2 \Rightarrow \boxed{v_1 \cdot A_1 = v_2 A_2}$$

changed $\Rightarrow \Delta K$



$= mgh_2 - mgh_1$

$$\Delta K = W_{ext} - \Delta U_{gravity}$$

$$\frac{1}{V}\left(\frac{mv_2^2}{2} - \frac{mv_1^2}{2} = F_1 \cdot \Delta L_1 - F_2 \Delta L_2 \right)$$

$V_1 = V_2 = \Delta L \cdot A$

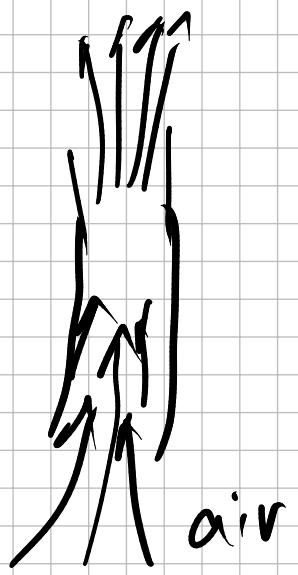
$$\rho \frac{v_2^2}{2} - \rho \frac{v_1^2}{2} = \frac{F_1}{A_1} - \frac{F_2}{A_2} = P_1 - P_2$$

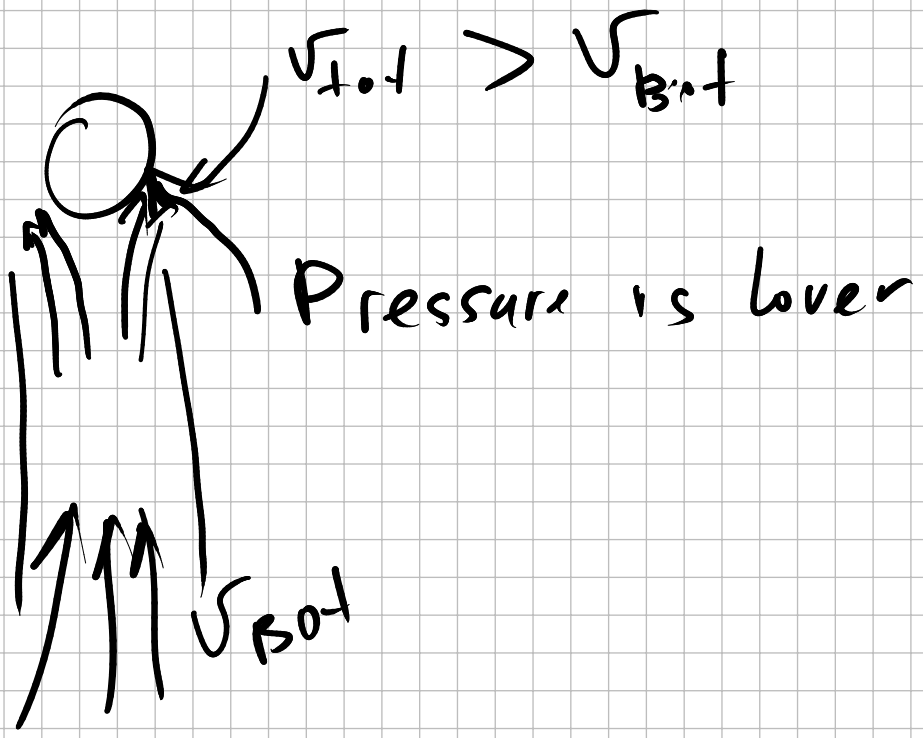
$$\boxed{\rho \frac{v_2^2}{2} + P_2 = \rho \frac{v_1^2}{2} + P_1}$$

$$\boxed{\rho \frac{v_2^2}{2} + \rho g h_2 + P_2 = \rho \frac{v_1^2}{2} + \rho g h_1 + P_1}$$

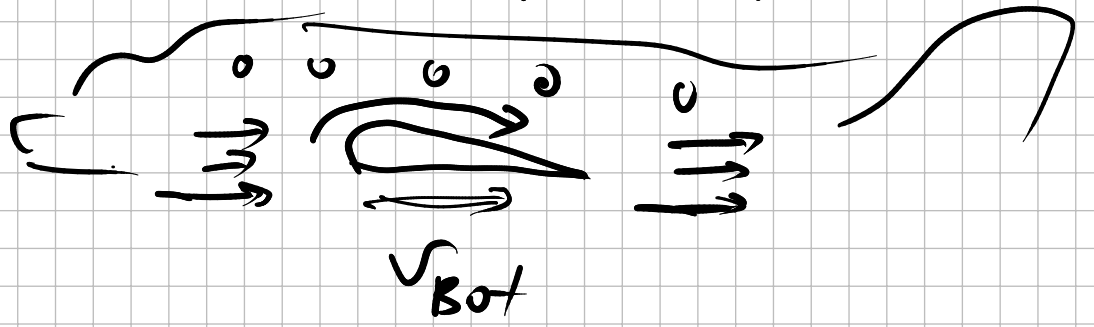
Bernoulli equation

$\Longleftrightarrow$ energy conservation


air


$v_{Top} > v_{Bot}$
Pressure is lower
v_{Bot}

$v_{top} > v_{bot} \Rightarrow P_{top} < P_{bot}$



v_{bot}

$\Delta p = m \Delta v$