

# **Grundlagen der Heizungspumpe**

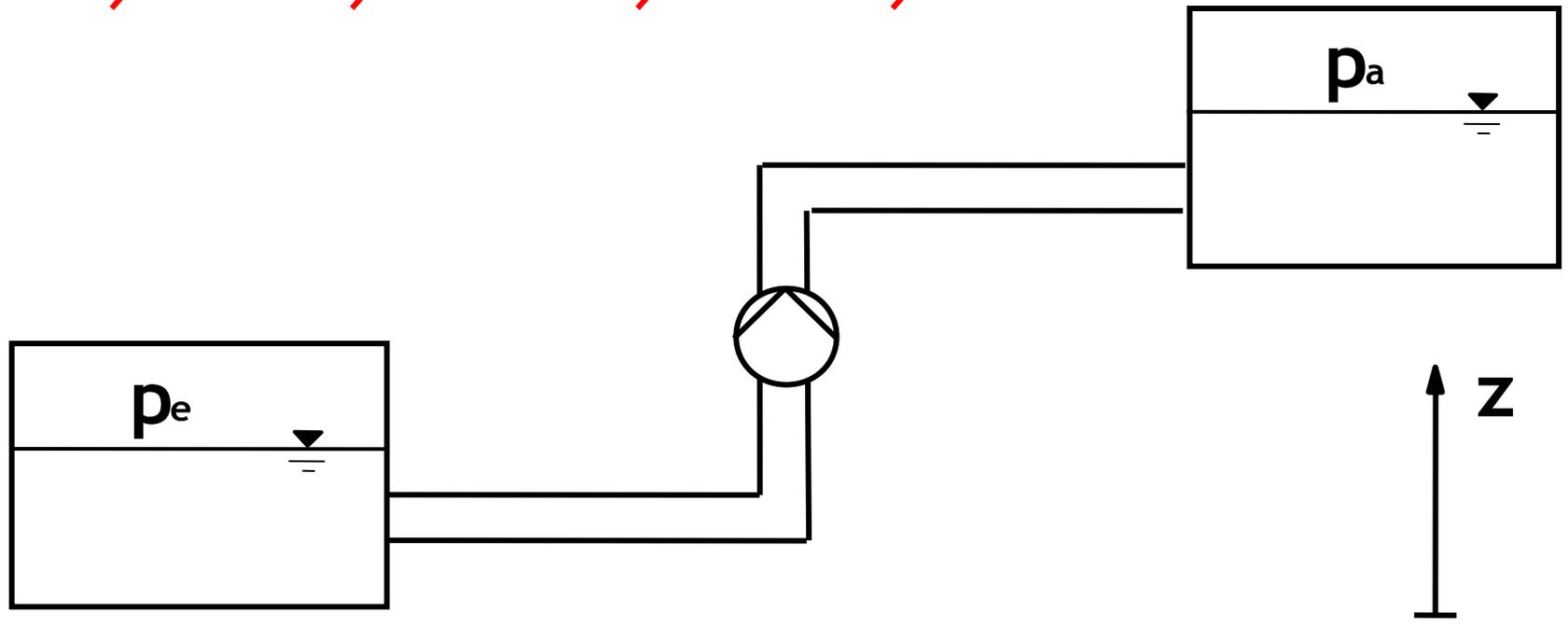
**Der Förderstrom  $Q$  wird vom Verbraucher bestimmt!**



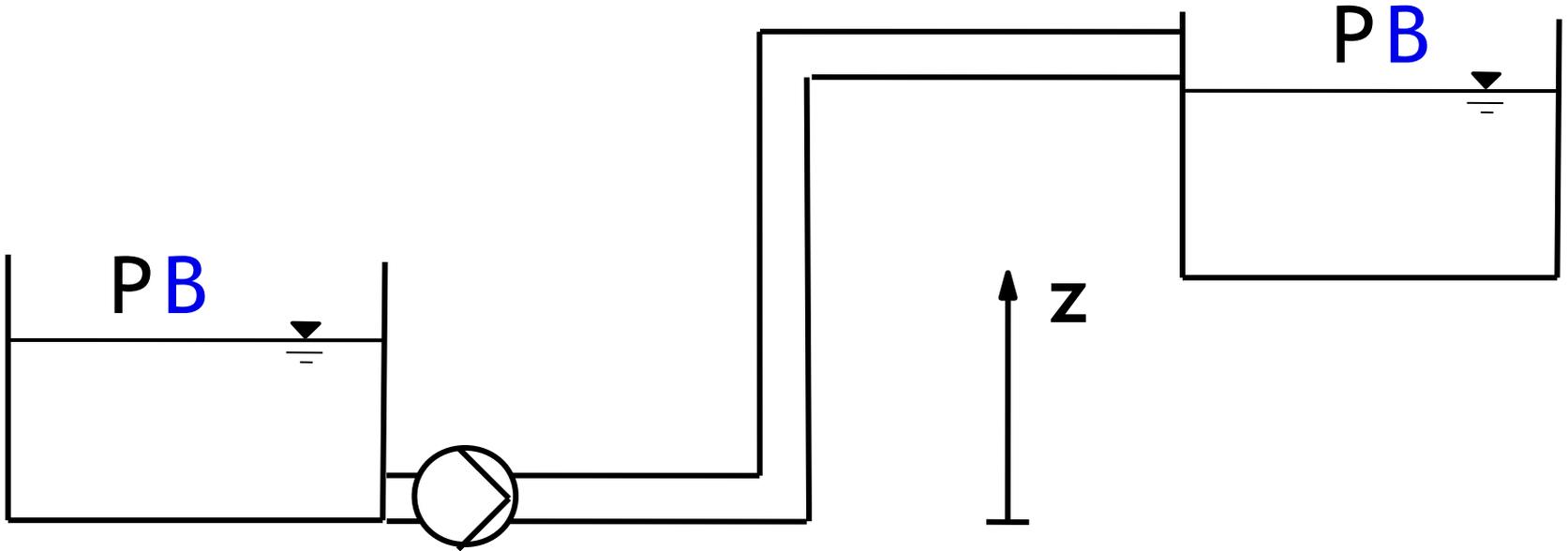
Die Förderhöhe H wird nach Anlagendaten ermittelt

**stat.**     **0**     **stat.**     **dyn.**

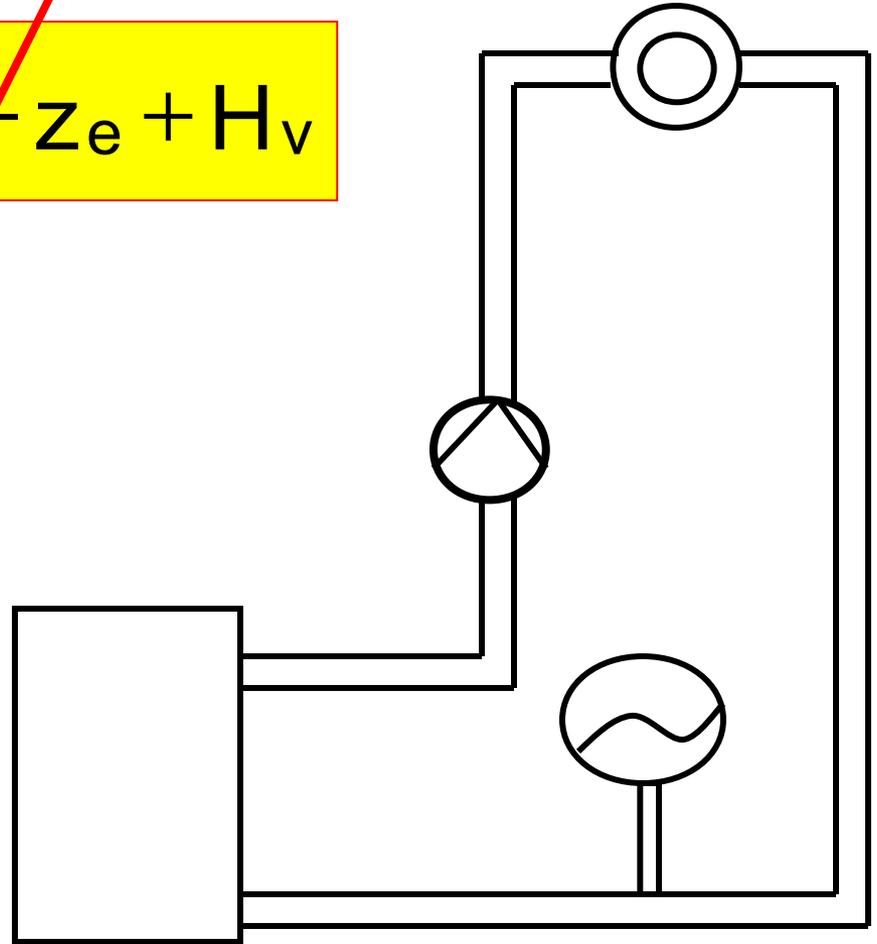
$$H = \frac{\rho_a - \rho_e}{\rho \cdot g} + \frac{v_a^2 - v_e^2}{2g} + z_a - z_e + H_v$$



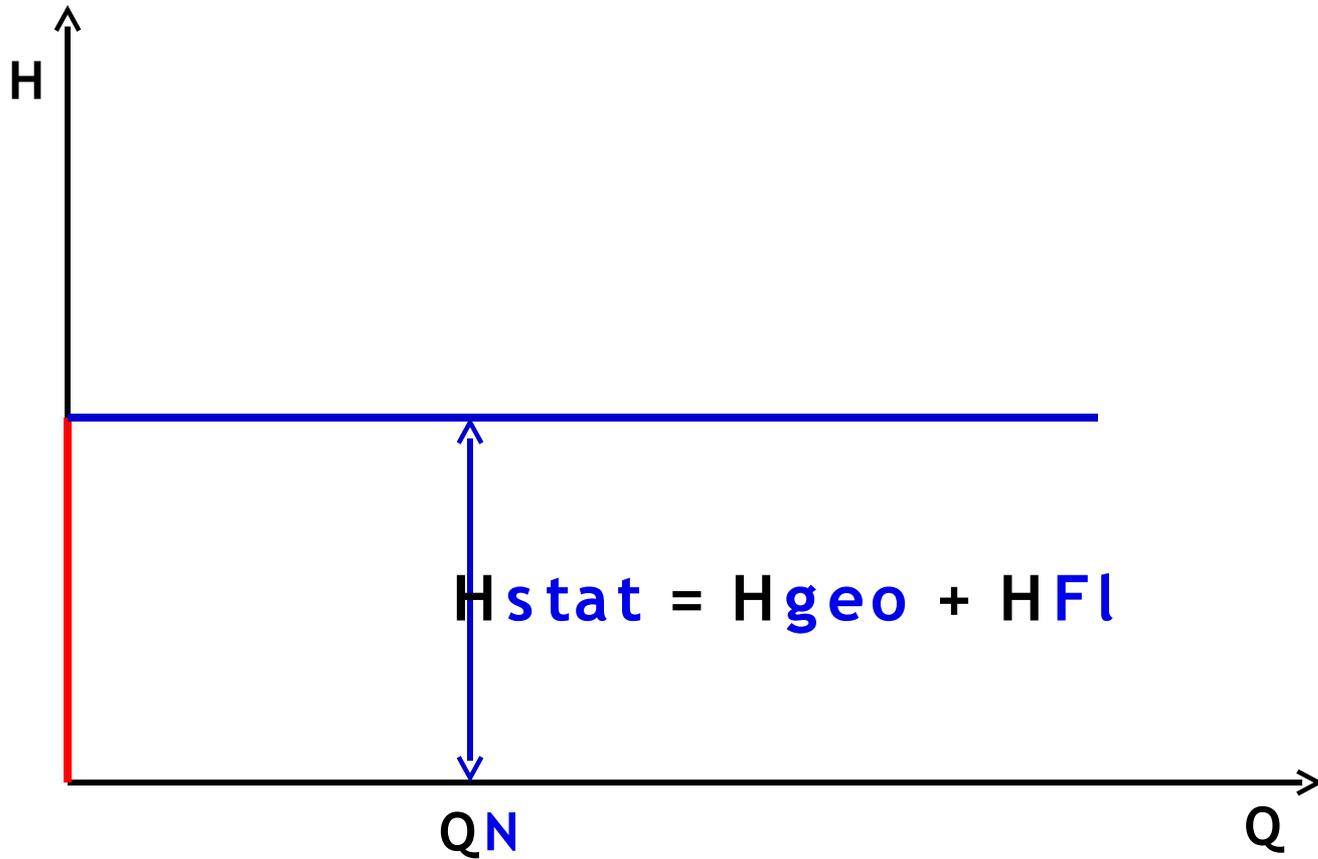
$$H = \frac{p_a - p_e}{\rho \cdot g} + \frac{v_a^2 - v_e^2}{2g} + z_a - z_e + H_v$$

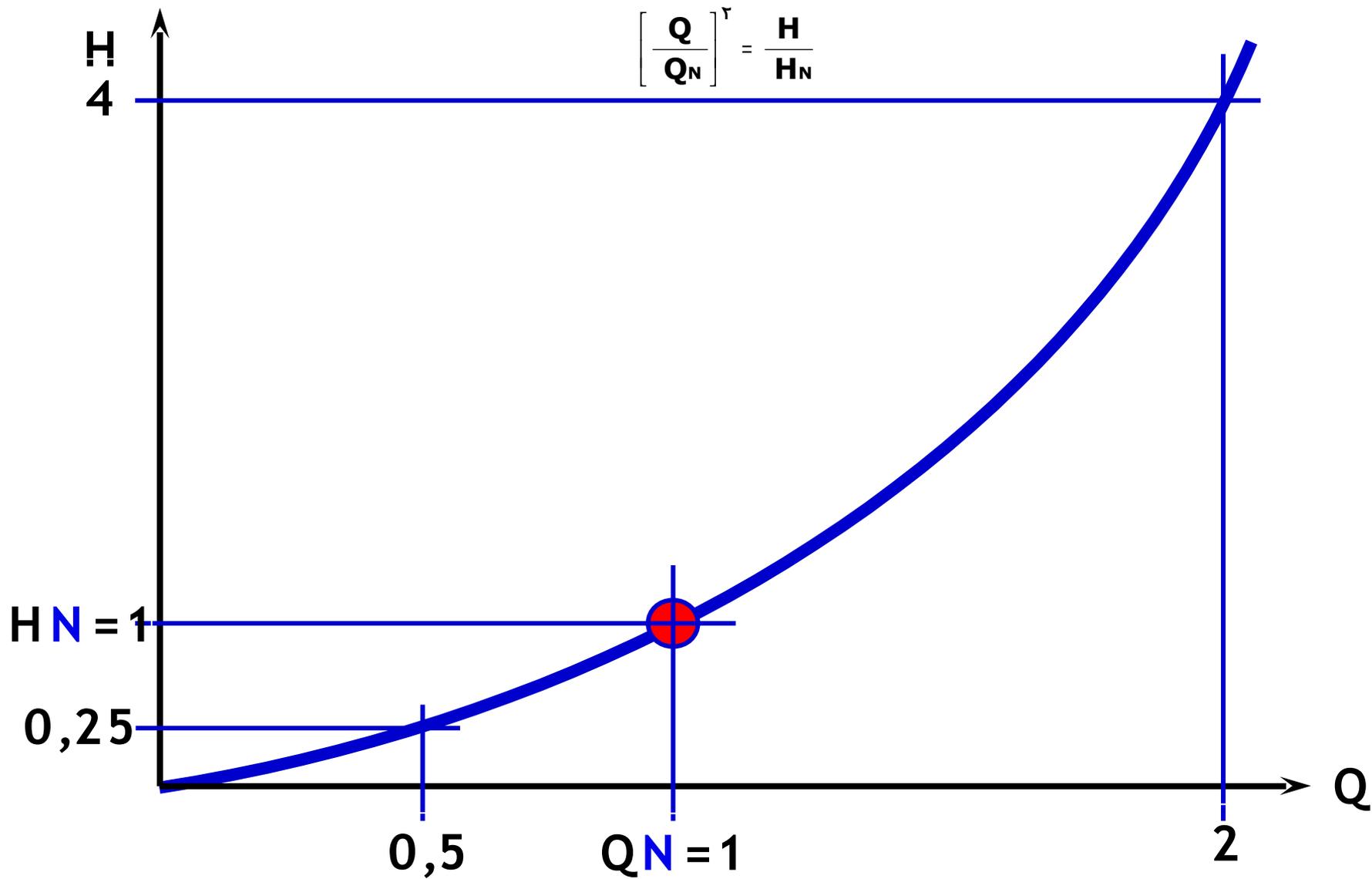


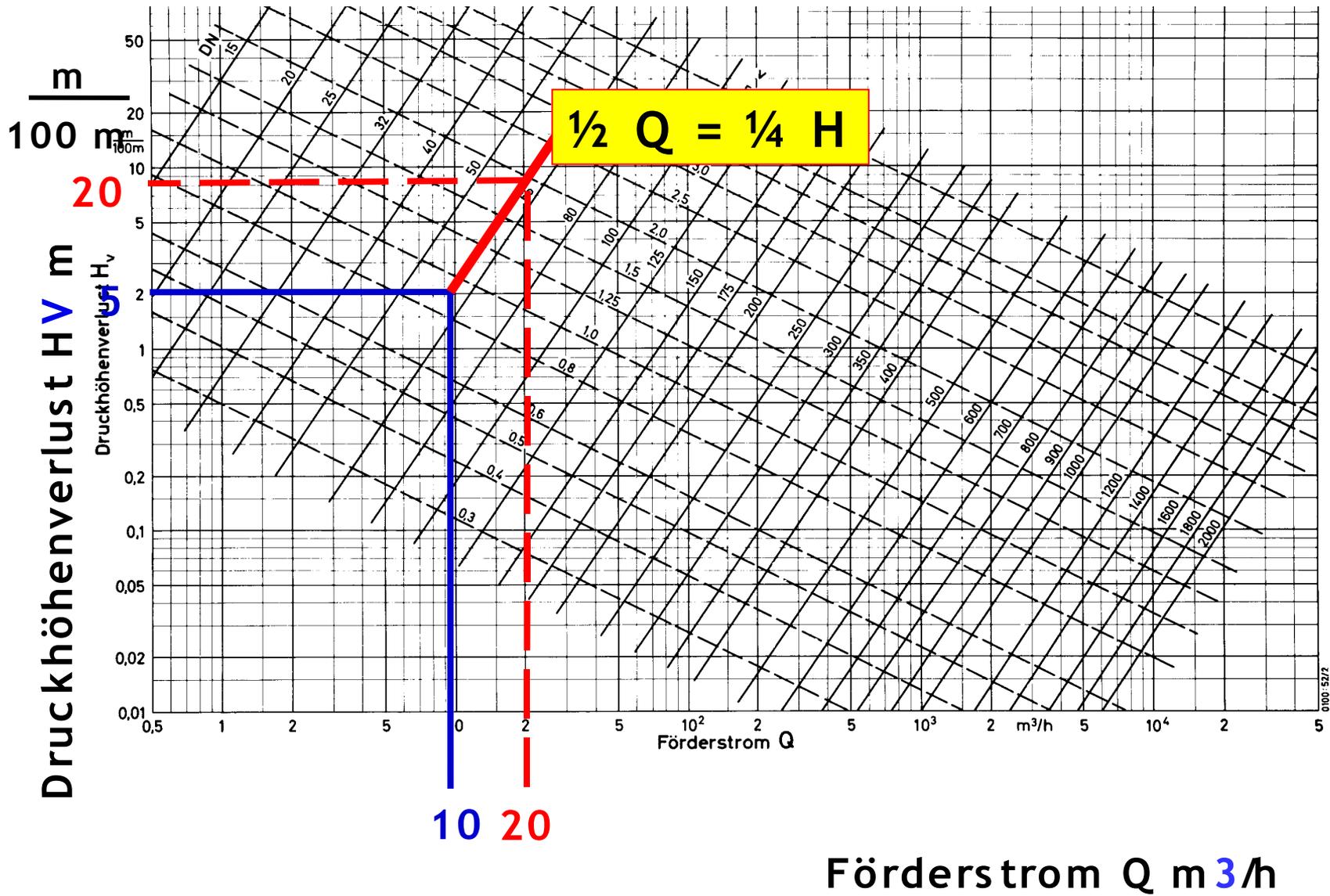
$$H = \frac{\cancel{p_a} - \cancel{p_e}}{\cancel{\rho} \cdot g} + \frac{\cancel{v_a^2} - \cancel{v_e^2}}{2g} + \cancel{z_a} - \cancel{z_e} + H_v$$

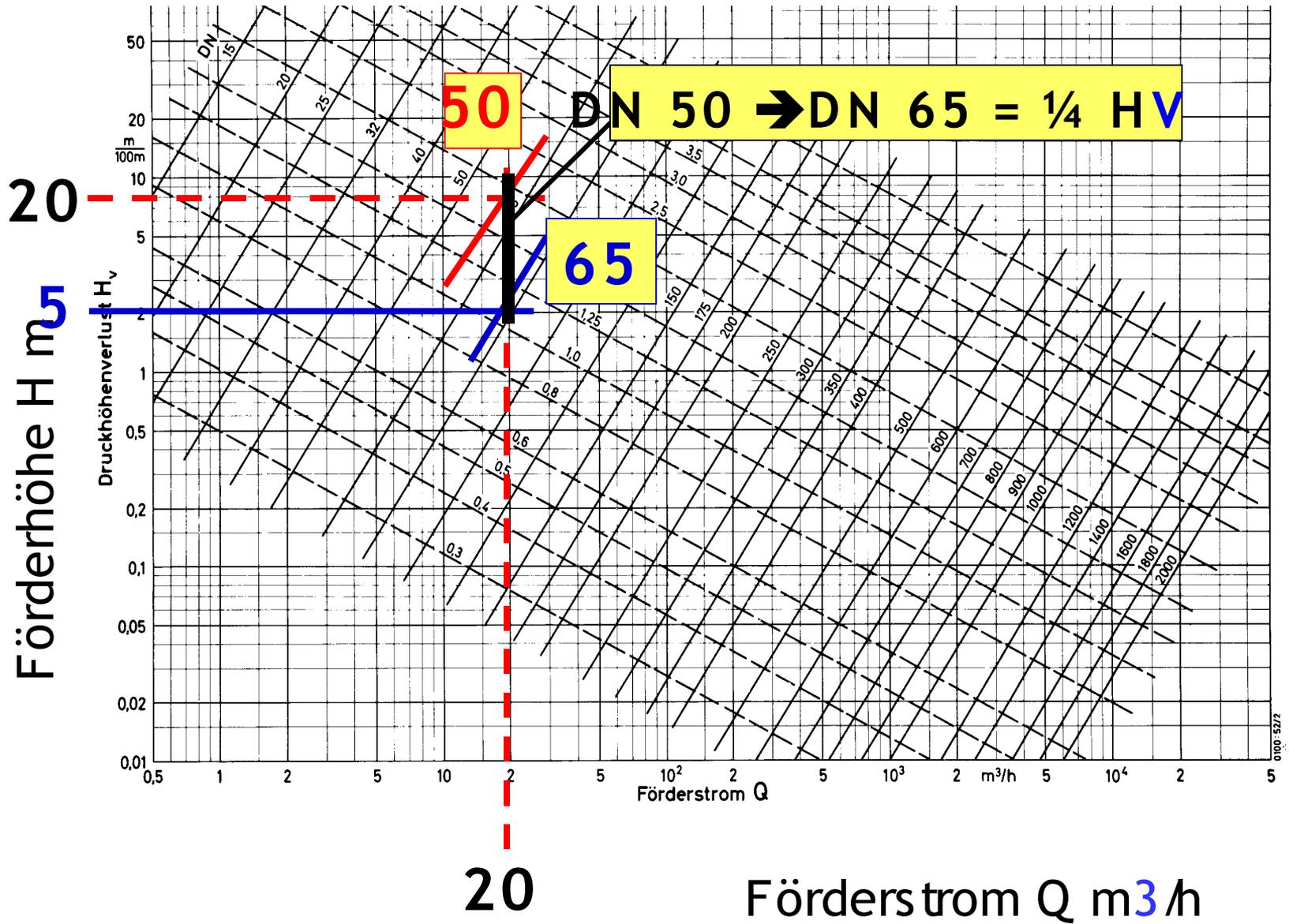


$$H_N = H_{stat} + H_{dyn}$$









**Jedes Rohrstück, jedes Formteil, jede Armatur und jeder Filter hat bei einem**

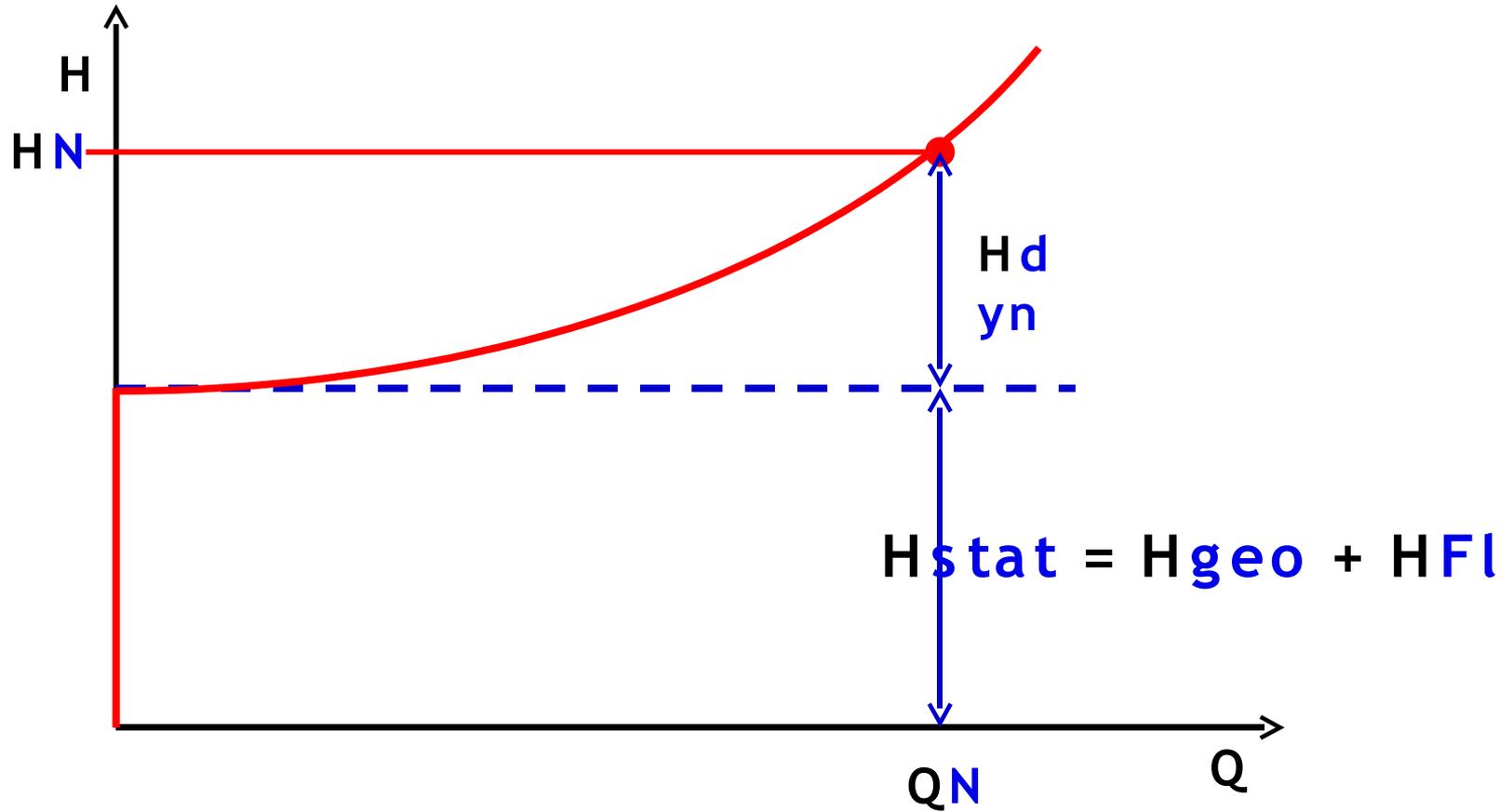
**Q einen HV!**

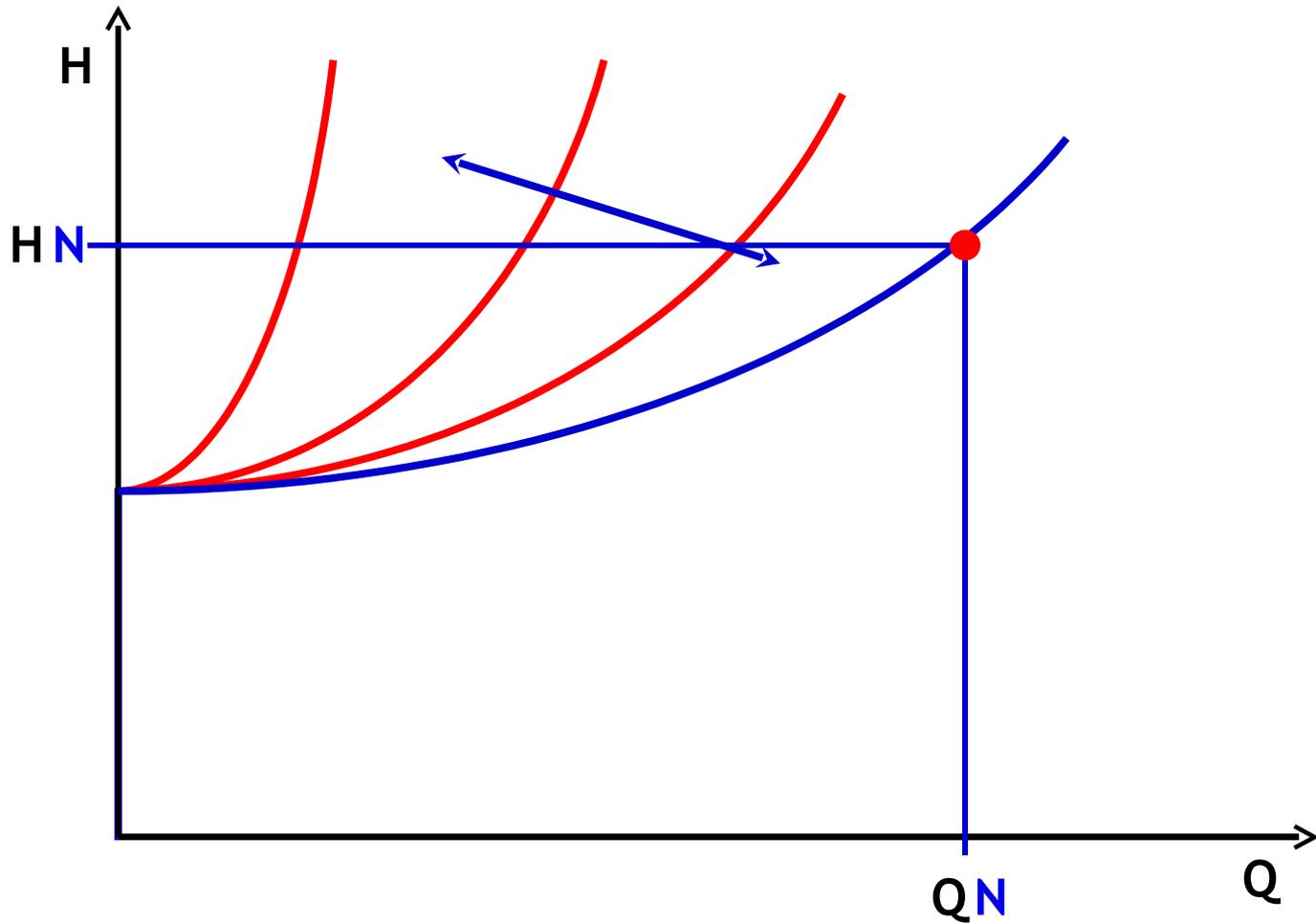
**Viele Armaturen verändern im Betrieb der Anlage ihre Widerstände!**

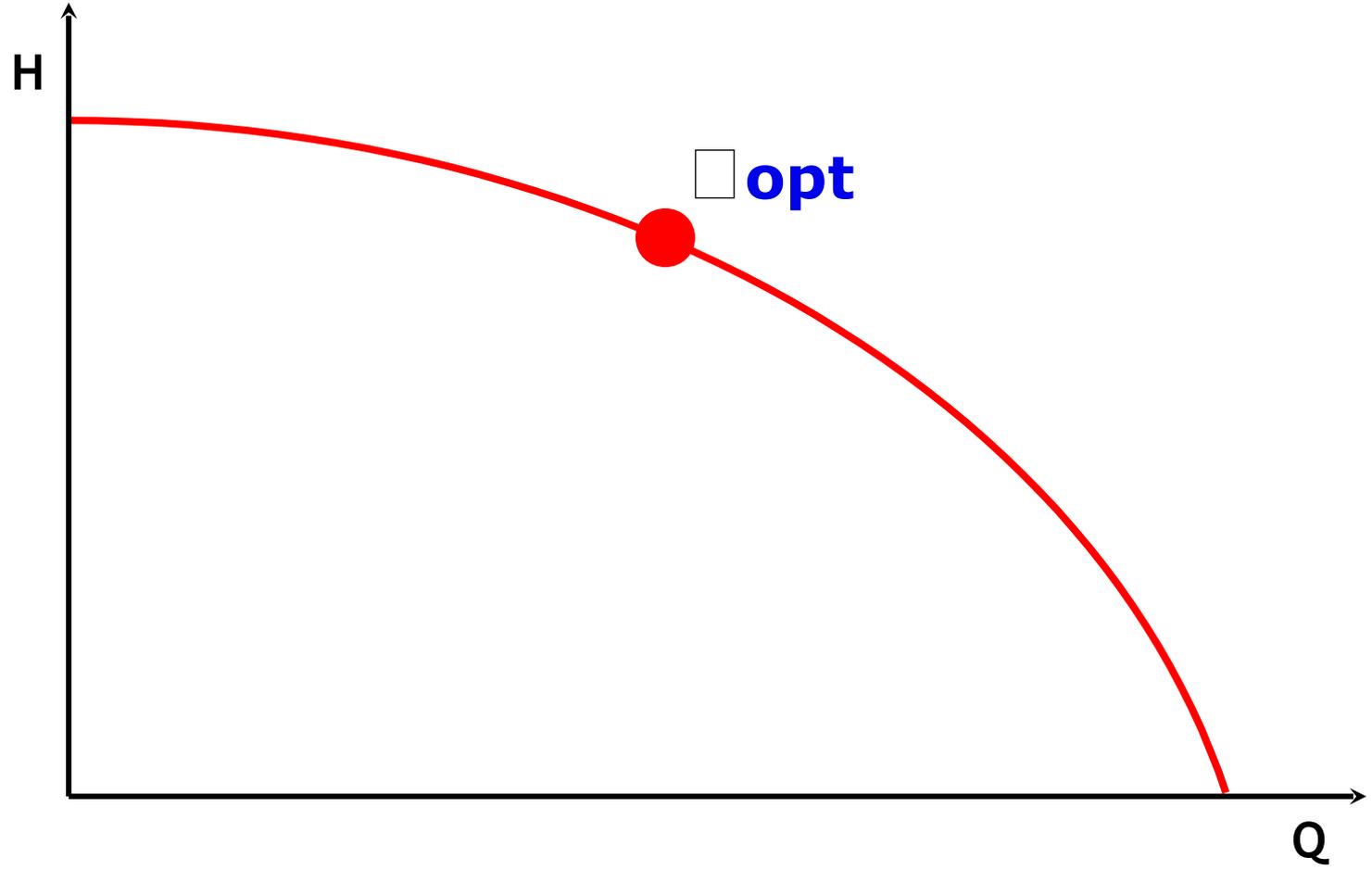
**(Schmutzfänger, Filter, usw.)**

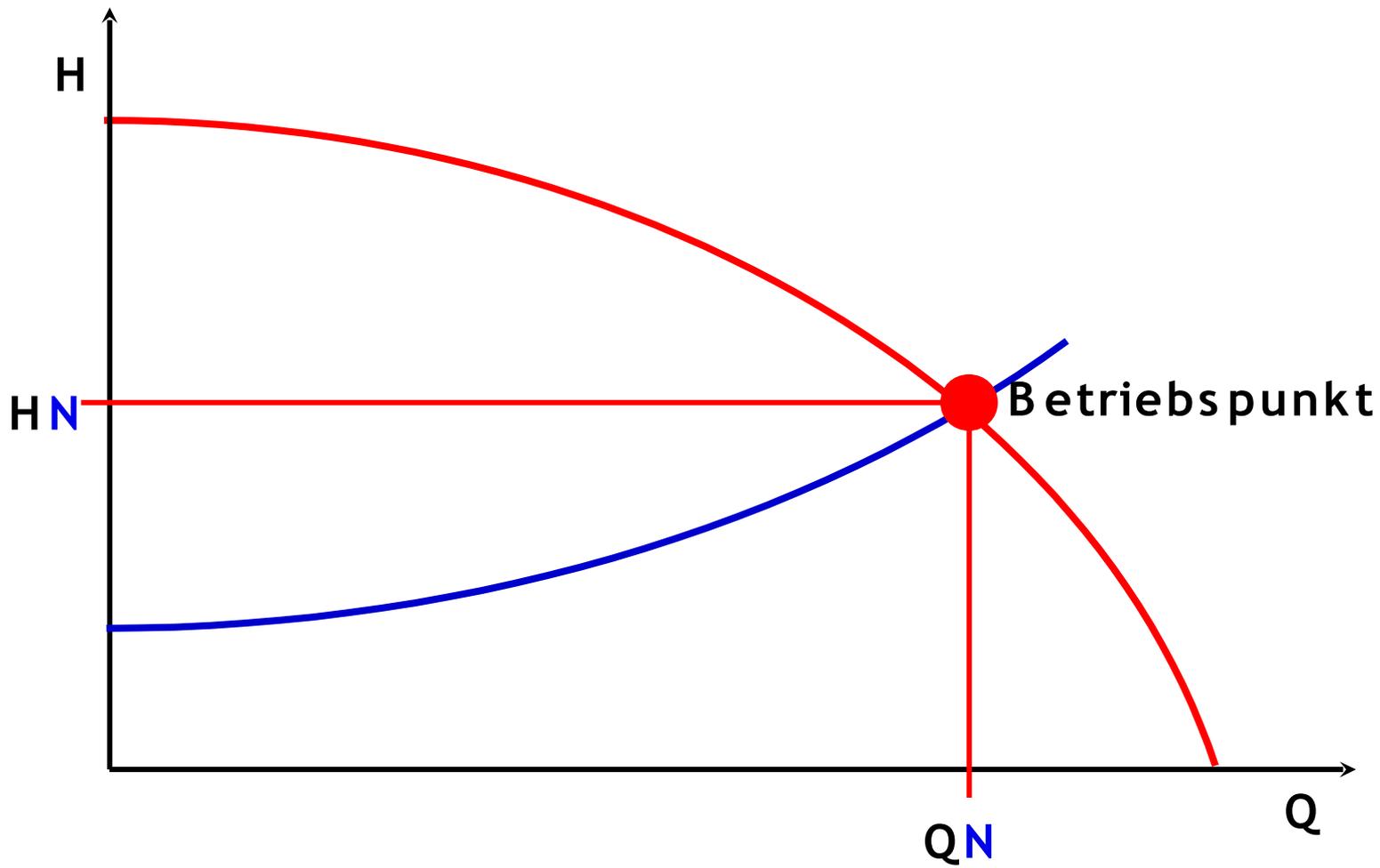
**Regelmäßiges Reinigen nicht vergessen!**

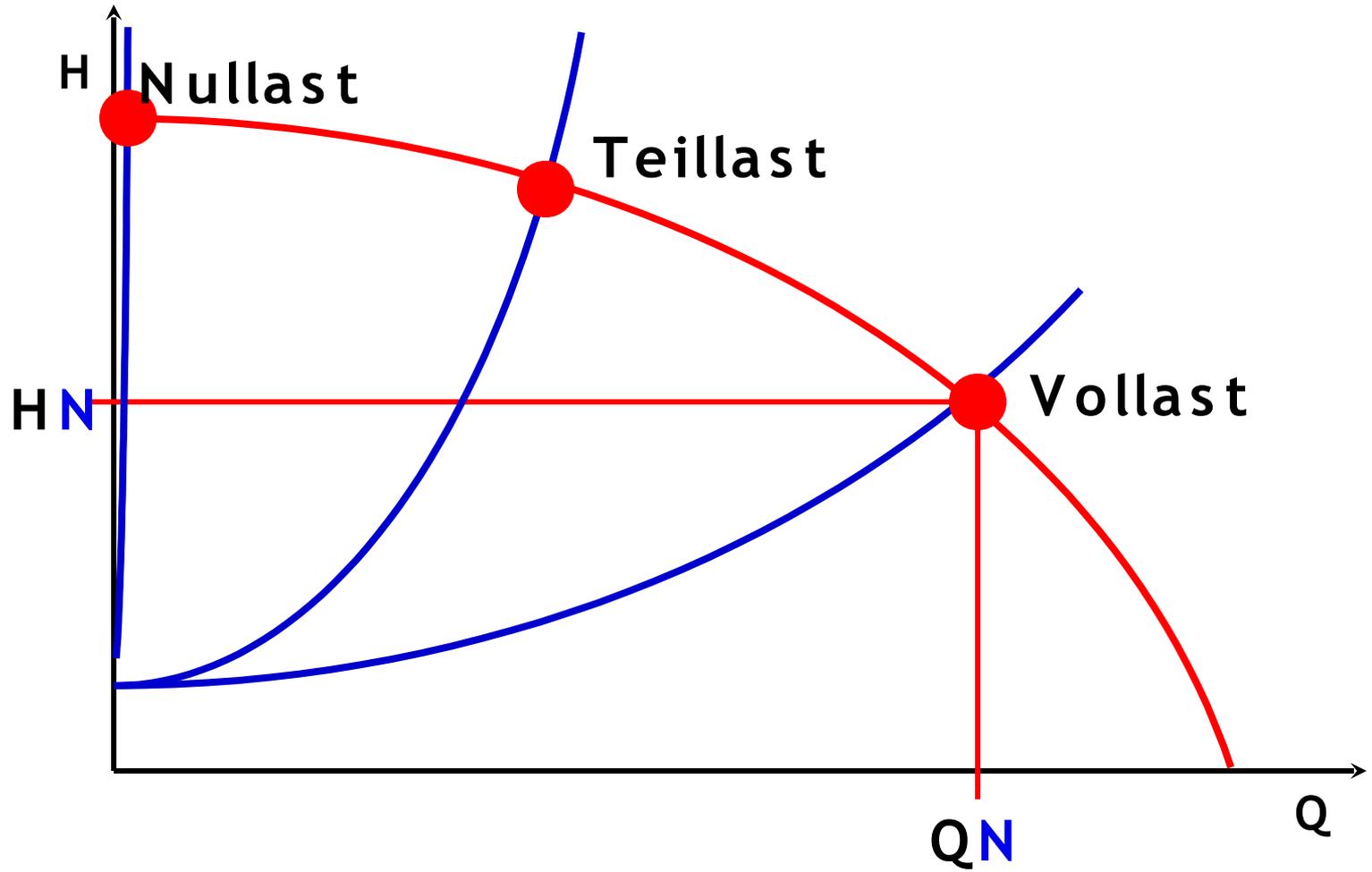
$$H_N = H_{stat} + H_{dyn}$$



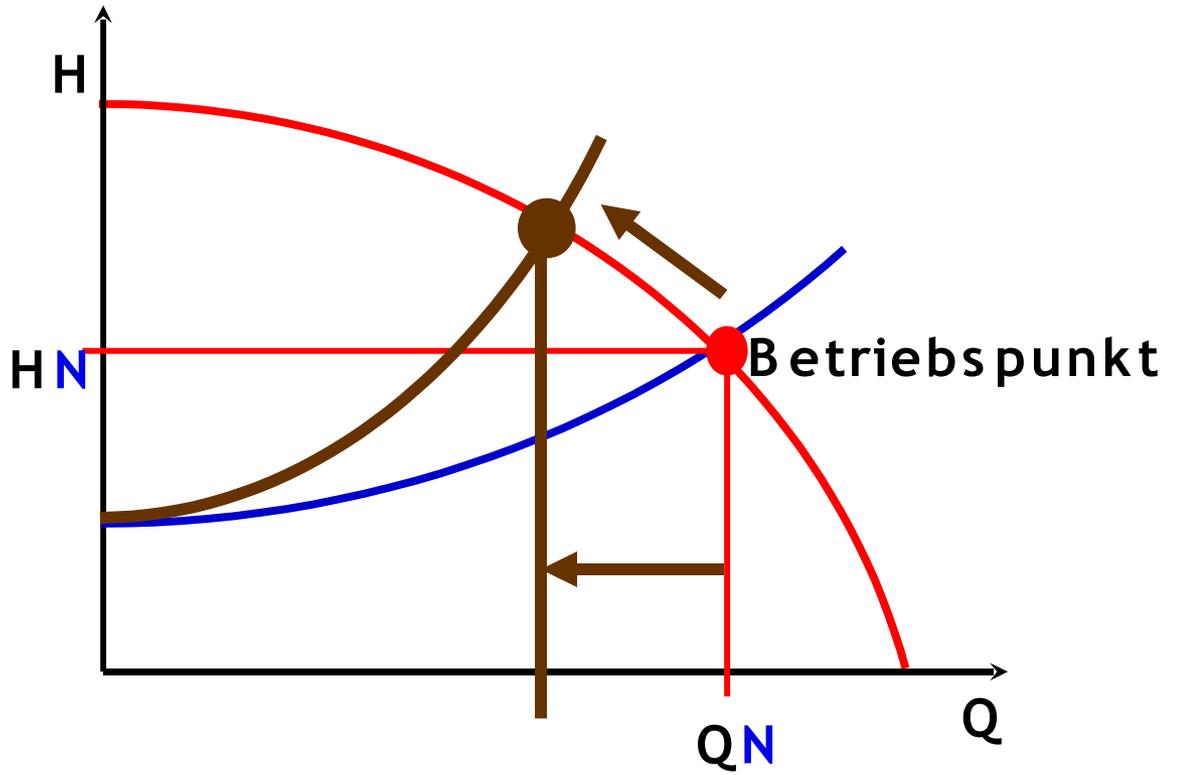




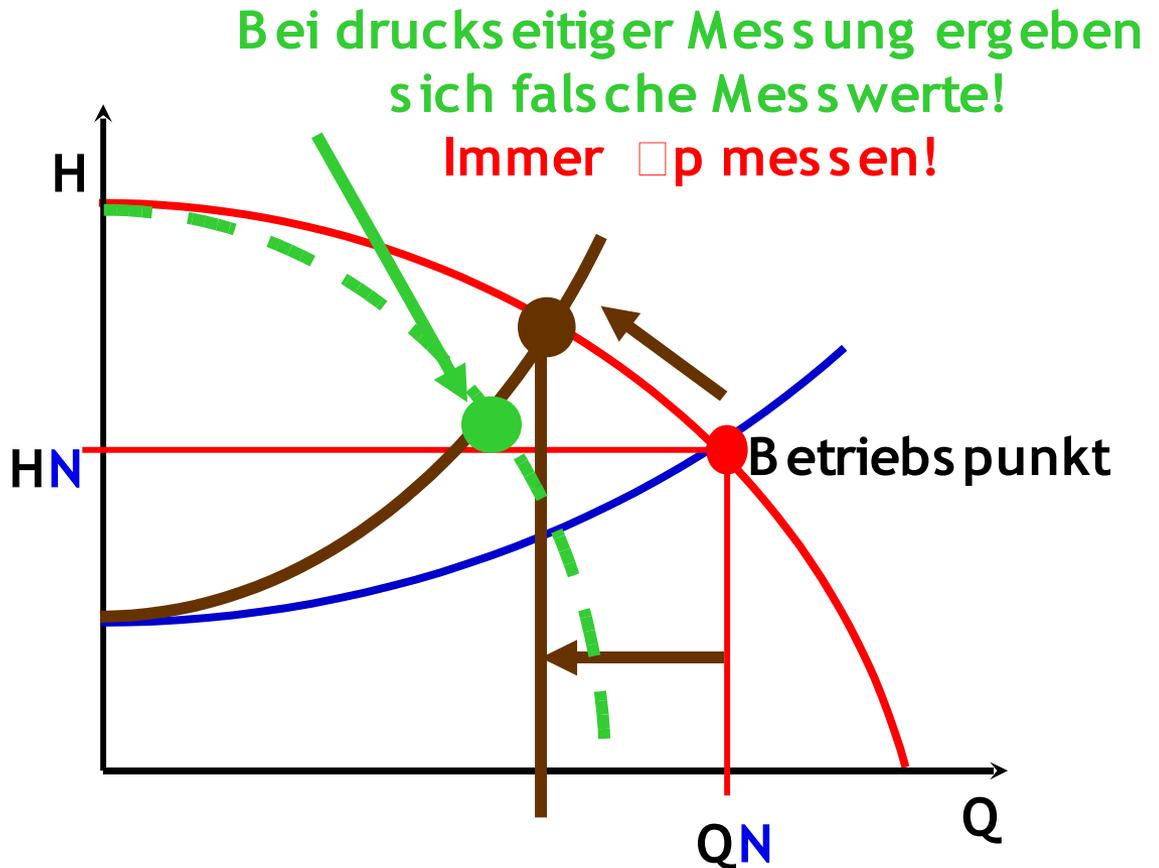




# 1. Druckseitig



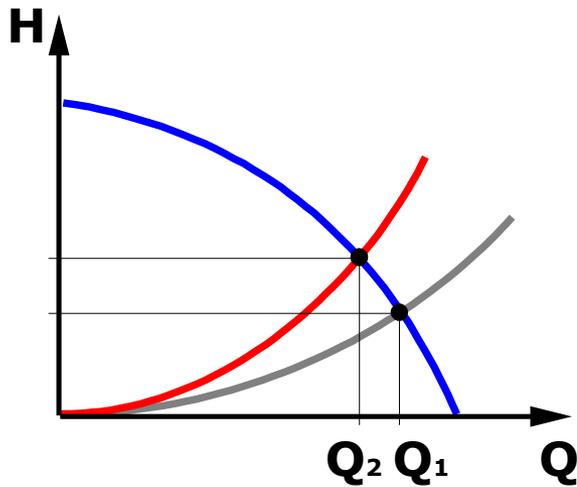
## 2. Saugseitig



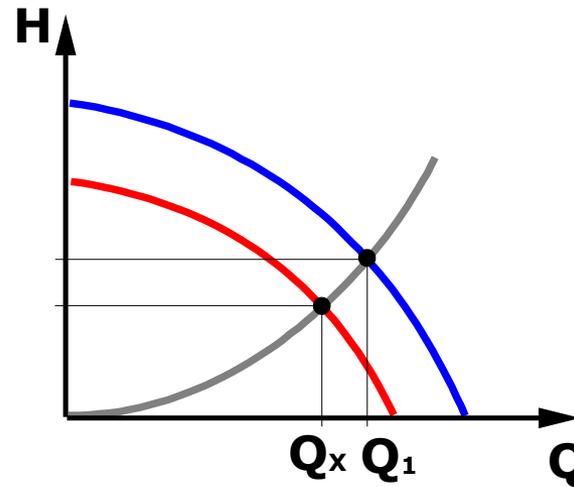
Immer saug- und druckseitig  
Manometer und Schieber einbauen!

# ... an den gewünschten Betriebspunkt

1. Drosselung

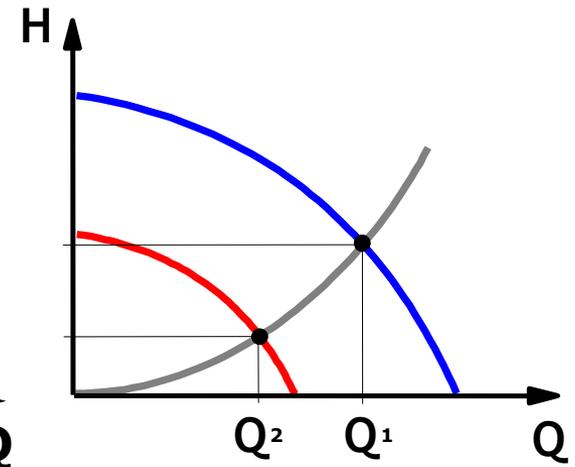


2. Abdrehen des Laufrades

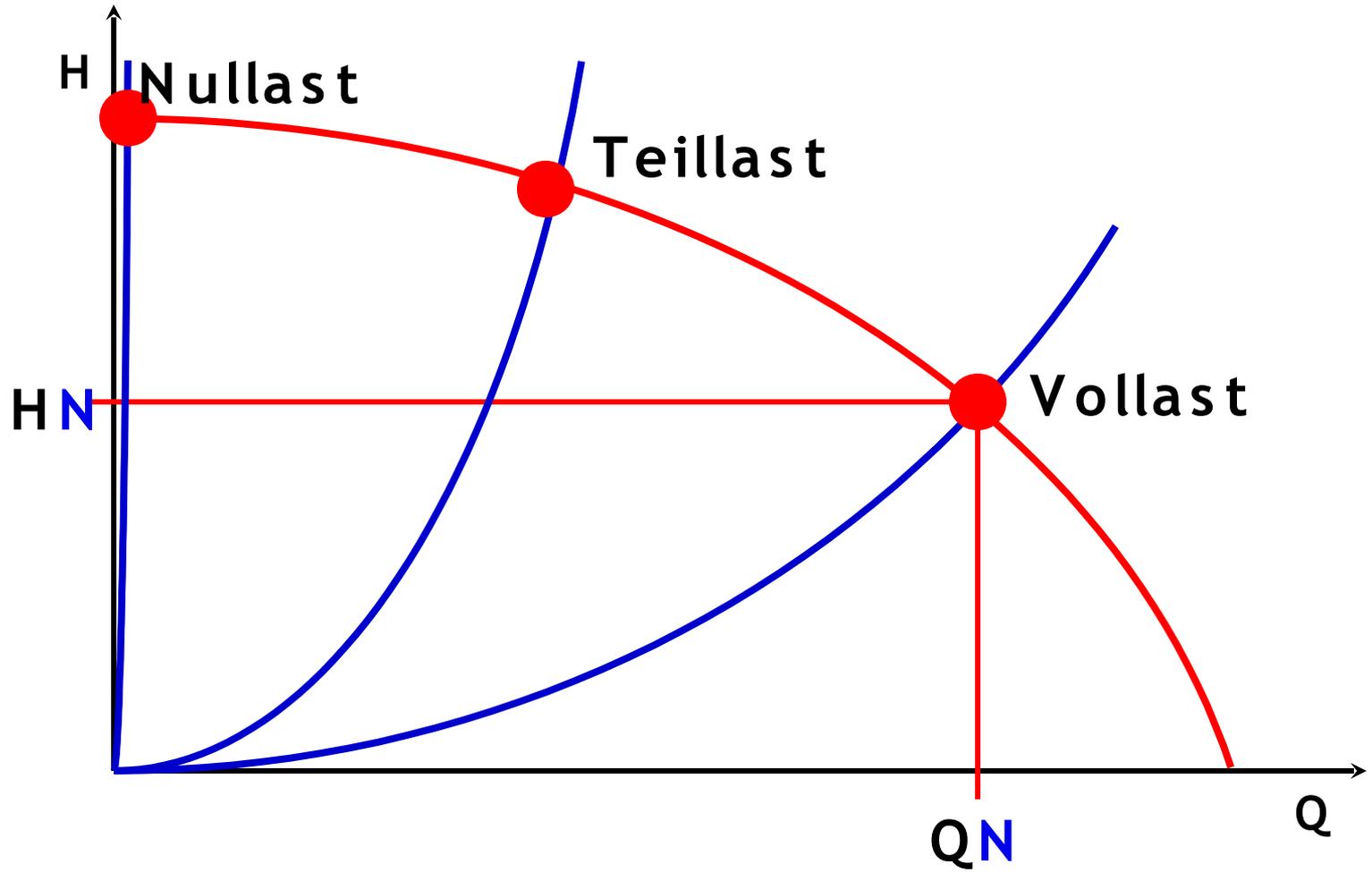


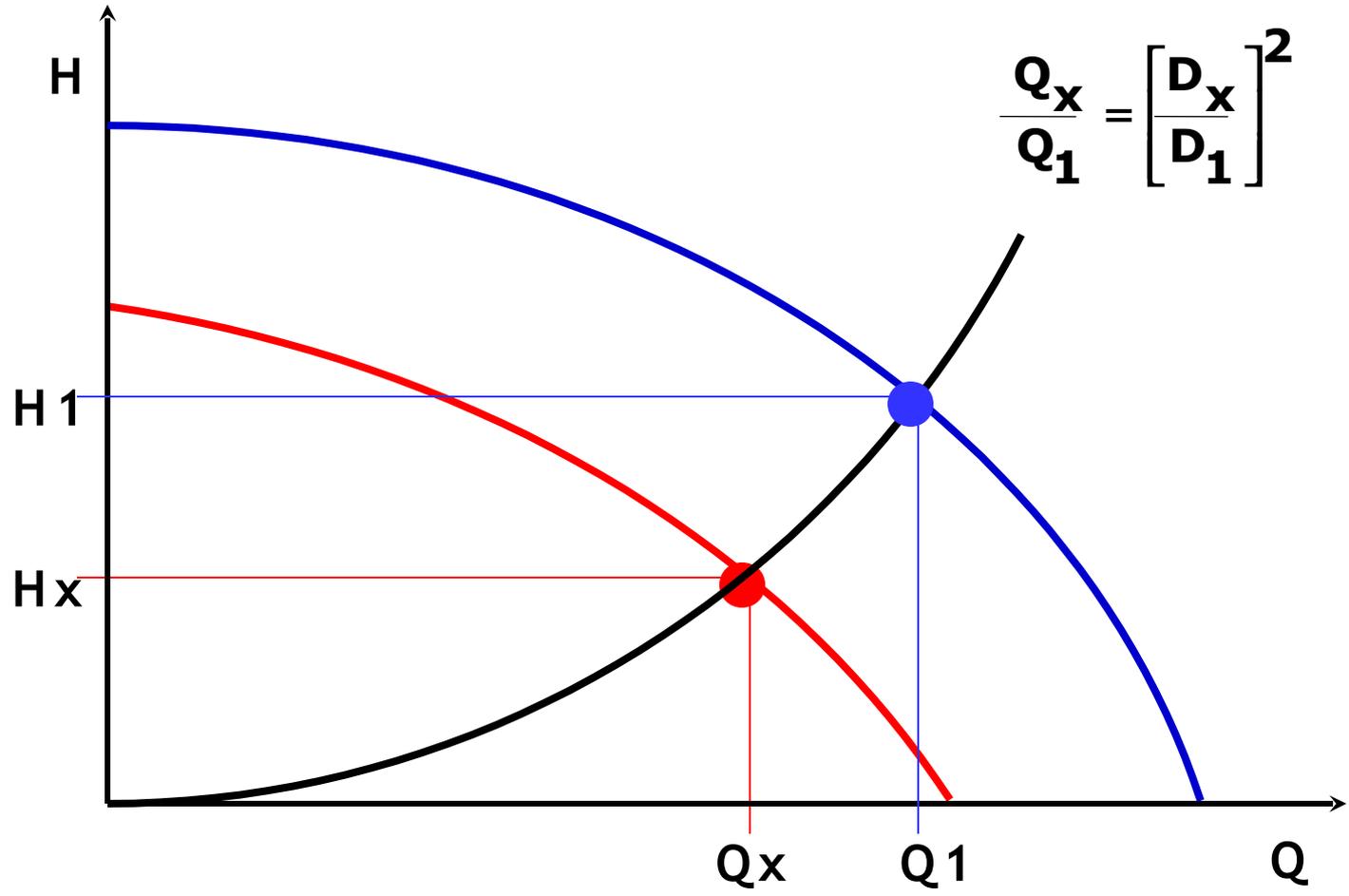
$$\frac{Q_x}{Q_1} = \left[ \frac{D_x}{D_1} \right]^2$$

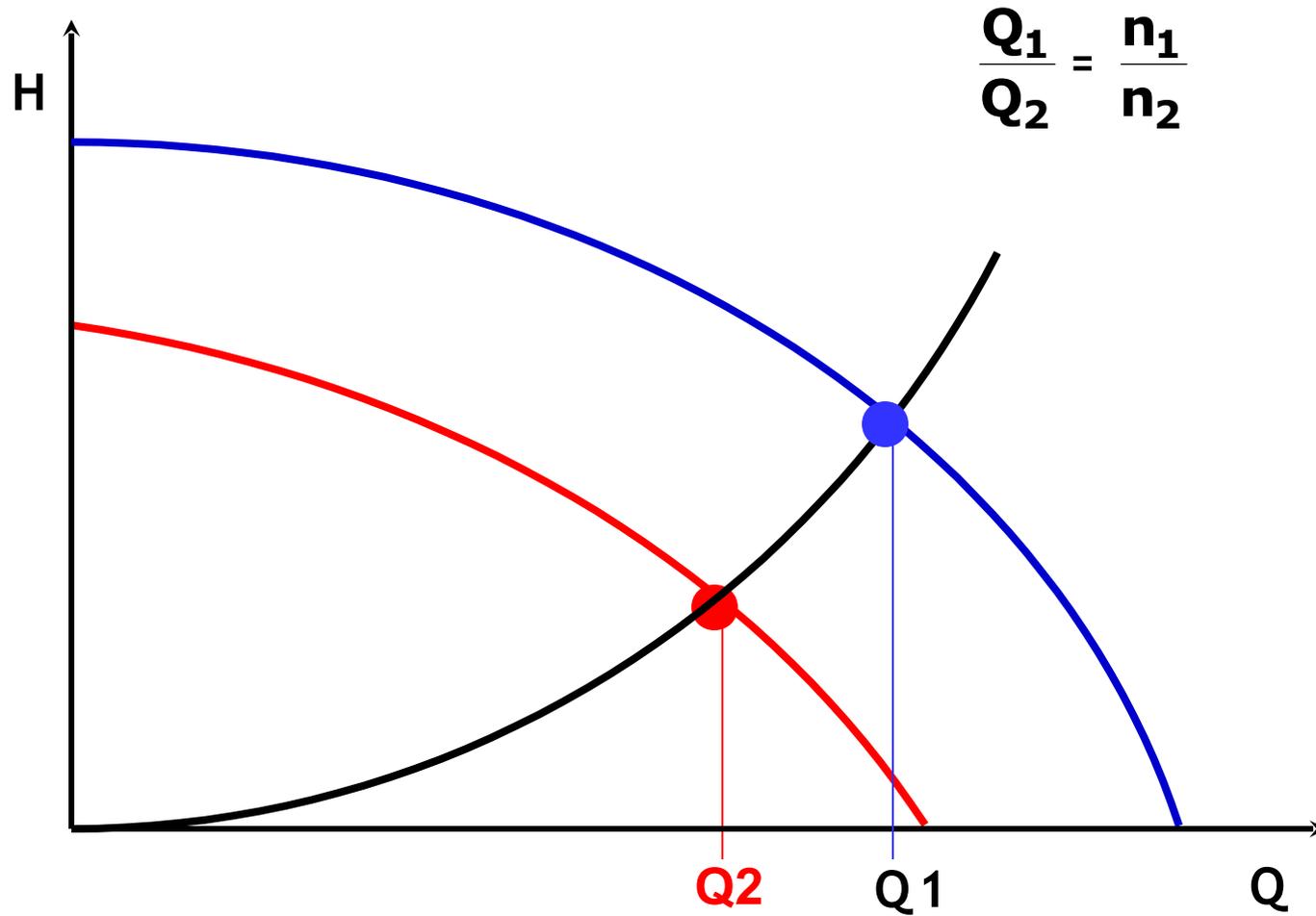
3. Drehzahländerung

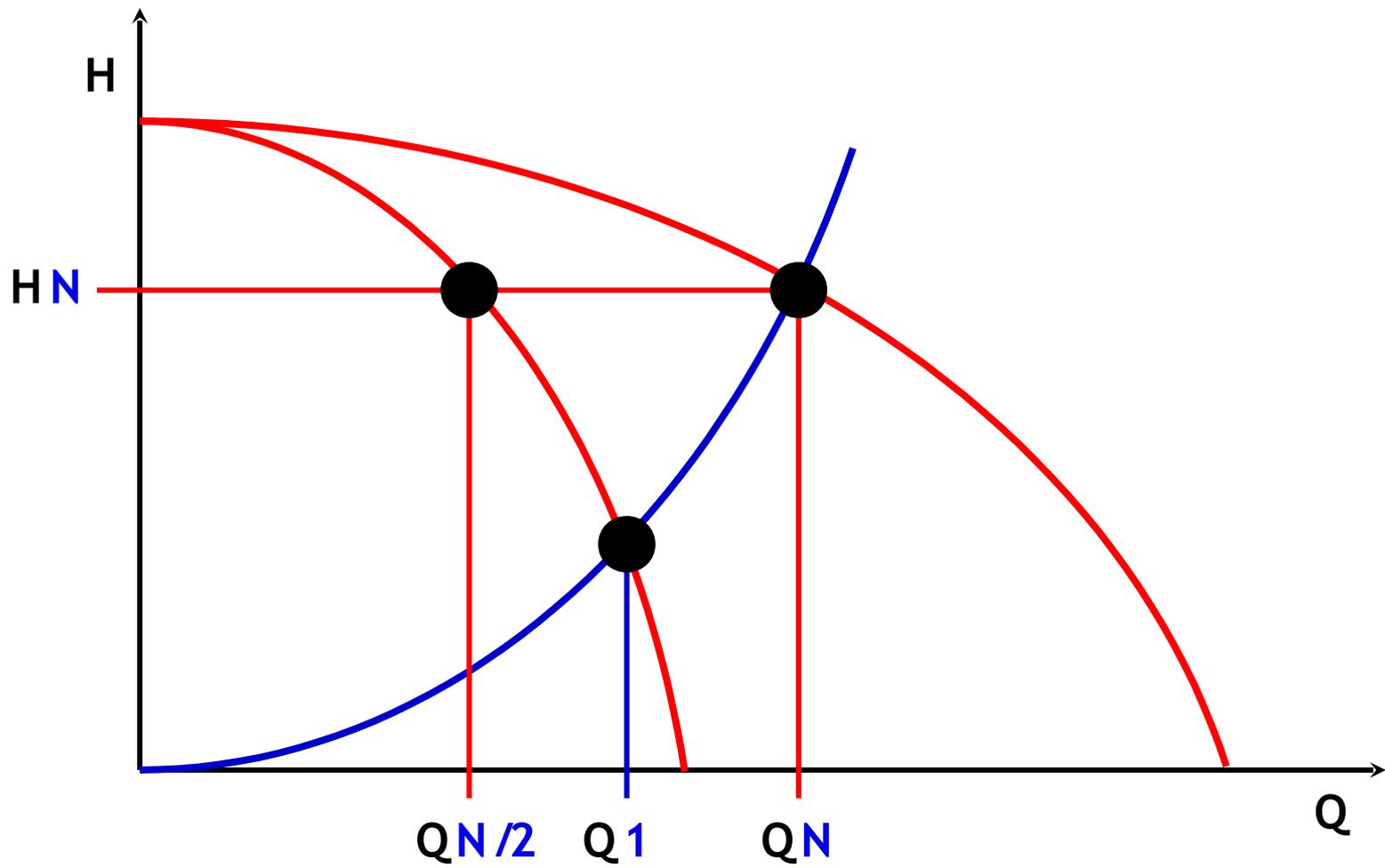


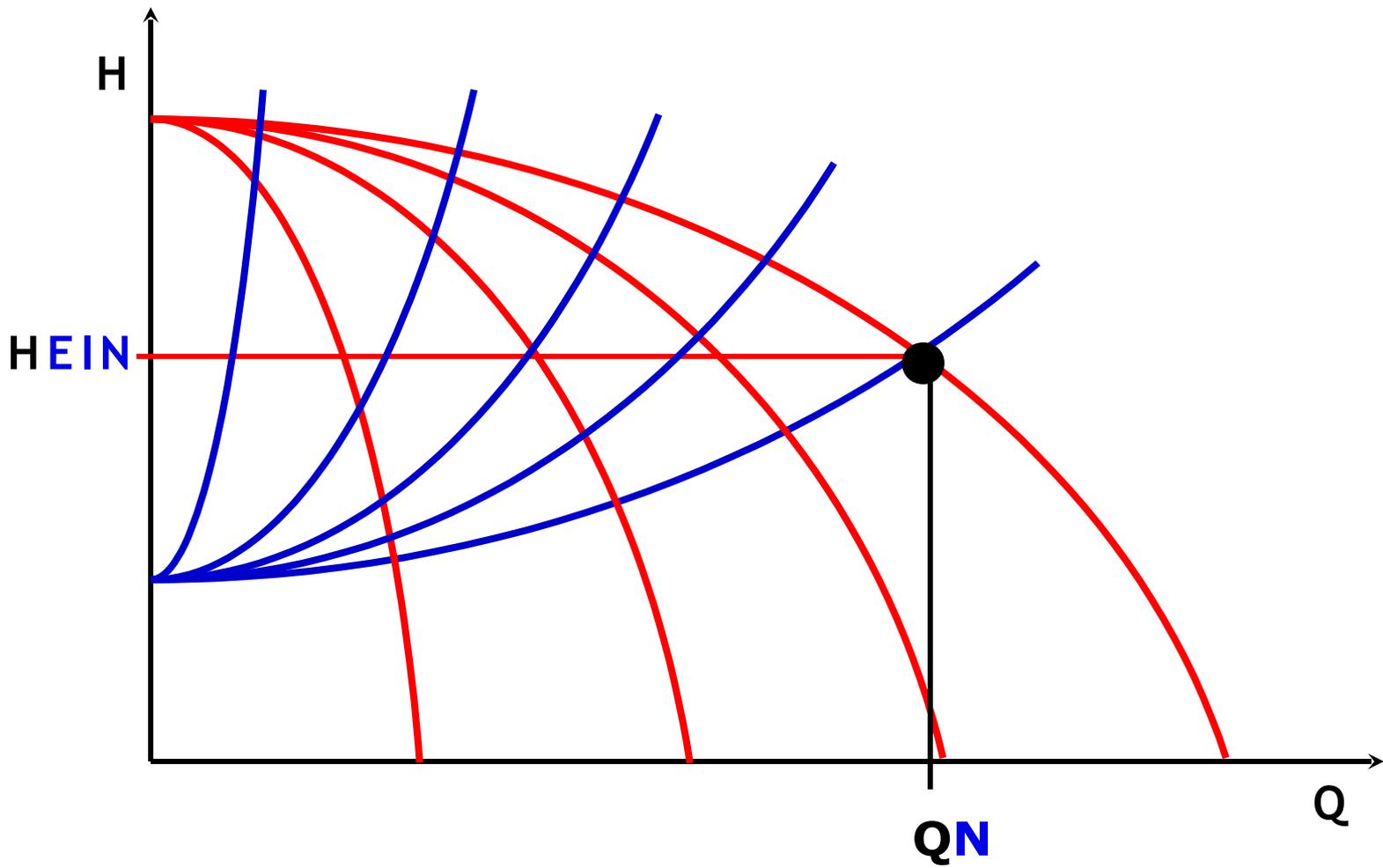
$$\frac{Q_1}{Q_2} = \frac{n_1}{n_2}$$

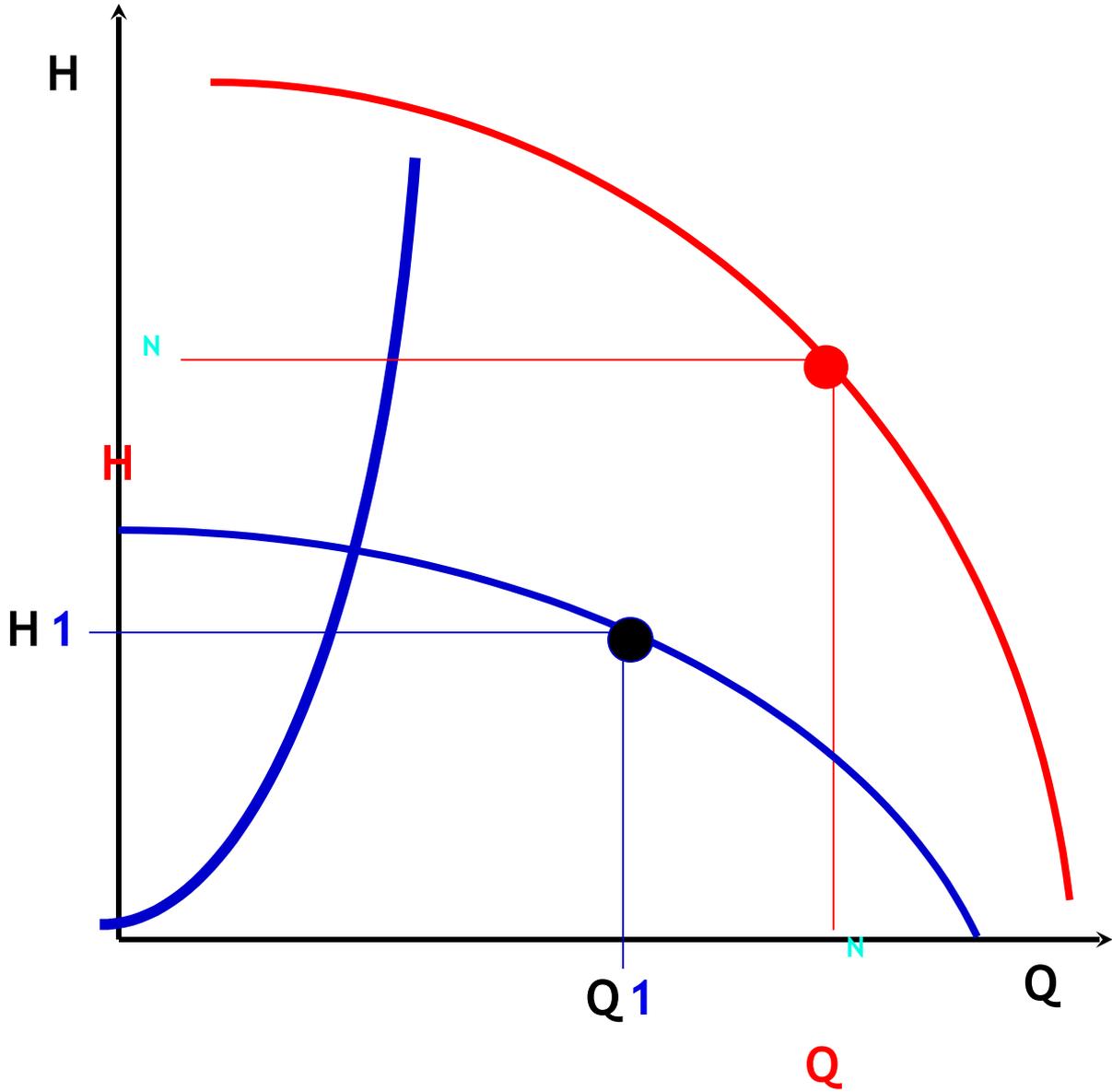




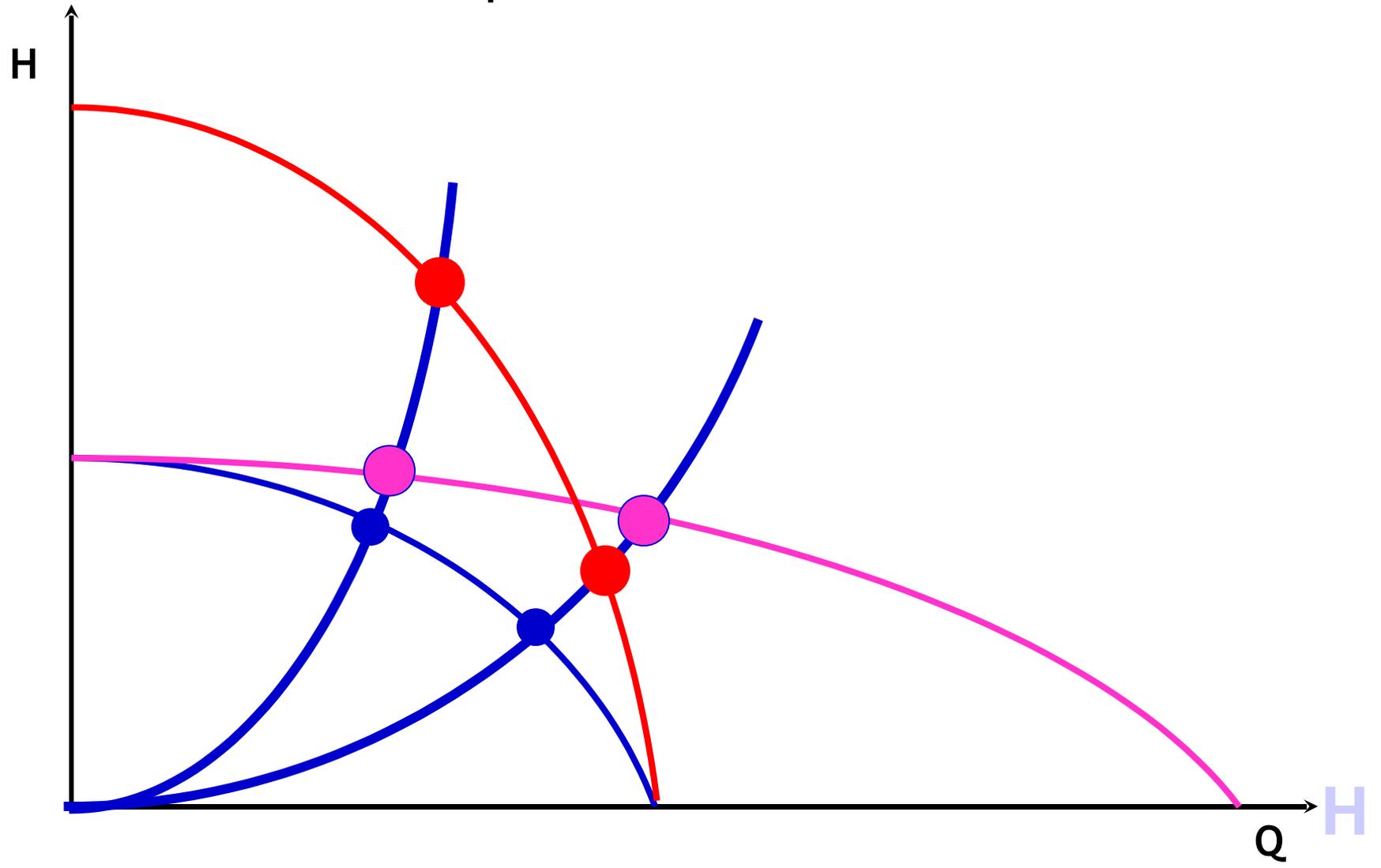








Ermitteln Sie die Betriebspunkte bei Parallel- und Reihenschaltung



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