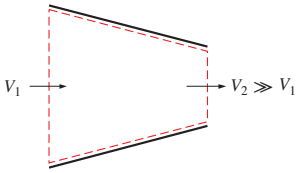
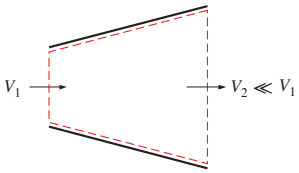
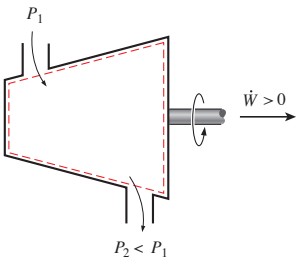
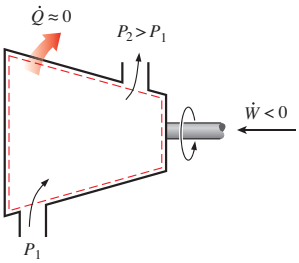
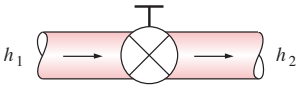
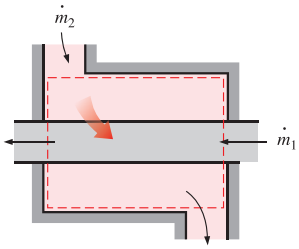
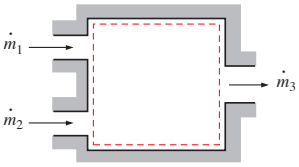
DISPOSITIVO	ESQUEMA	BALANÇO DE ENERGIA E MASSA	TRABALHO E RENDIMENTO ISENTRÓPICO
BOCAL (CONVERGENTE)		**Caso Geral** $\dot{W} = 0$ $\Delta e_p \approx 0$ $\dot{Q} = \dot{m}\left(h_2 - h_1 + \frac{V_2^2 - V_1^2}{2}\right)$ **Funcionamento ADIABÁTICO** $\dot{Q} \approx 0$ $h_2 - h_1 + \frac{V_2^2 - V_1^2}{2} = 0$	**Rendimento ISENTRÓPICO de um BOCAL** $\eta_N = \frac{V_{2r}^2}{V_{2s}^2} \approx \frac{h_1 - h_{2r}}{h_1 - h_{2s}}$
DIFUSOR (DIVERGENTE)			
TURBINA		**Caso Geral** $\Delta e_c \approx 0$ $\Delta e_p \approx 0$ $\dot{Q} - \dot{W} = \dot{m}(h_2 - h_1)$ $q - w = h_2 - h_1$ **Funcionamento ADIABÁTICO** $\dot{Q} \approx 0$ $\dot{W} = \dot{m}(h_1 - h_2)$ **Líquidos (bomba)** $\dot{W} \approx \dot{m}v(P_1 - P_2)$	**Trabalho ISENTRÓPICO de compressão de um gás ideal** $w_{\text{comp},S} = \frac{kR(T_1 - T_2)}{k-1}$ $= \frac{kRT_1}{k-1}\left[\left(\frac{P_2}{P_1}\right)^{\frac{k-1}{k}} - 1\right]$ **Trabalho ISOTÉRMICO de compressão de um gás ideal** $w_{\text{comp},T} = RT \ln\left(\frac{P_2}{P_1}\right)$ **Rendimentos ISENTRÓPICOS** $\eta_T = \frac{w_r}{w_s} \approx \frac{h_1 - h_{2r}}{h_1 - h_{2s}}$ TURBINA $\eta_C = \frac{w_s}{w_r} \approx \frac{h_{2s} - h_1}{h_{2r} - h_1}$ COMPRESSOR $\eta_B = \frac{w_s}{w_r} \approx \frac{v(P_2 - P_1)}{h_{2r} - h_1}$ BOMBA
COMPRESSOR / VENTILADOR (GASES) **BOMBA** (LÍQUIDOS)			
VÁLVULA		$h_1 \approx h_2$ $u_1 + P_1 v_1 \approx u_2 + P_2 v_2$	
PERMUTADOR DE CALOR		$\underbrace{\dot{m}_1(h_{1s} - h_{1e})}_{\dot{Q}_1} + \underbrace{\dot{m}_2(h_{2s} - h_{2e})}_{\dot{Q}_2} \approx 0$ $\dot{Q}_1 = -\dot{Q}_2$	**Funcionamento aproximadamente ISOBÁRICO**
MISTURADOR		$\dot{m}_1 + \dot{m}_2 = \dot{m}_3$ $\dot{m}_1 h_1 + \dot{m}_2 h_2 \approx \dot{m}_3 h_3$	