Compound Refrigeration Cycles

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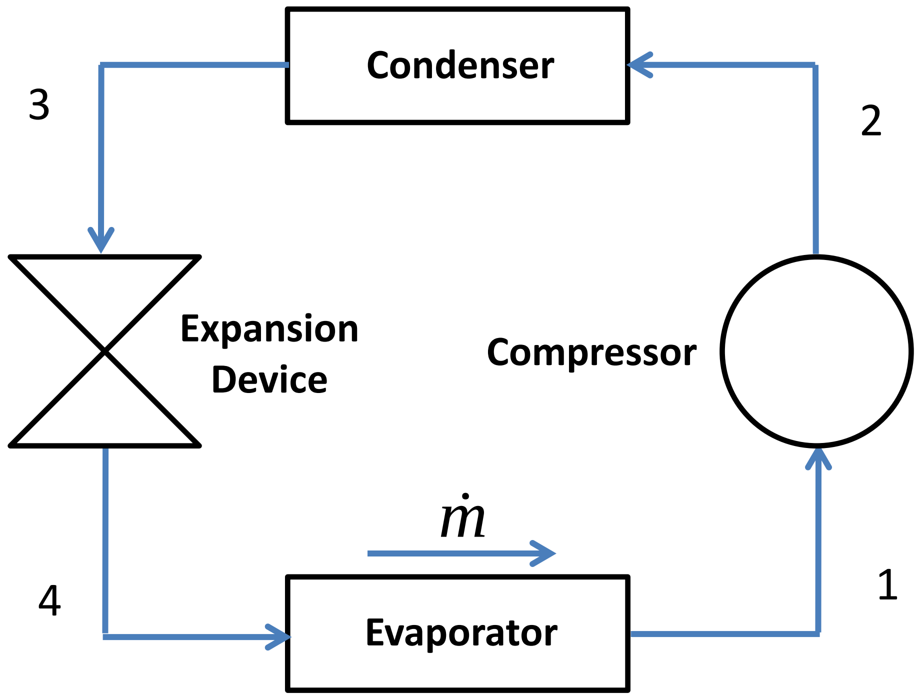
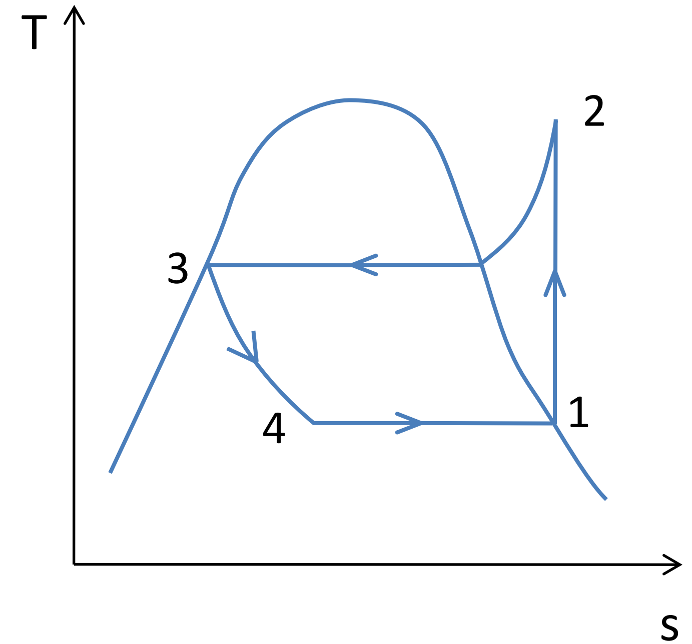
كانون الثاني ٢٠٢١

Simple Refrigeration Cycle (single fluid)



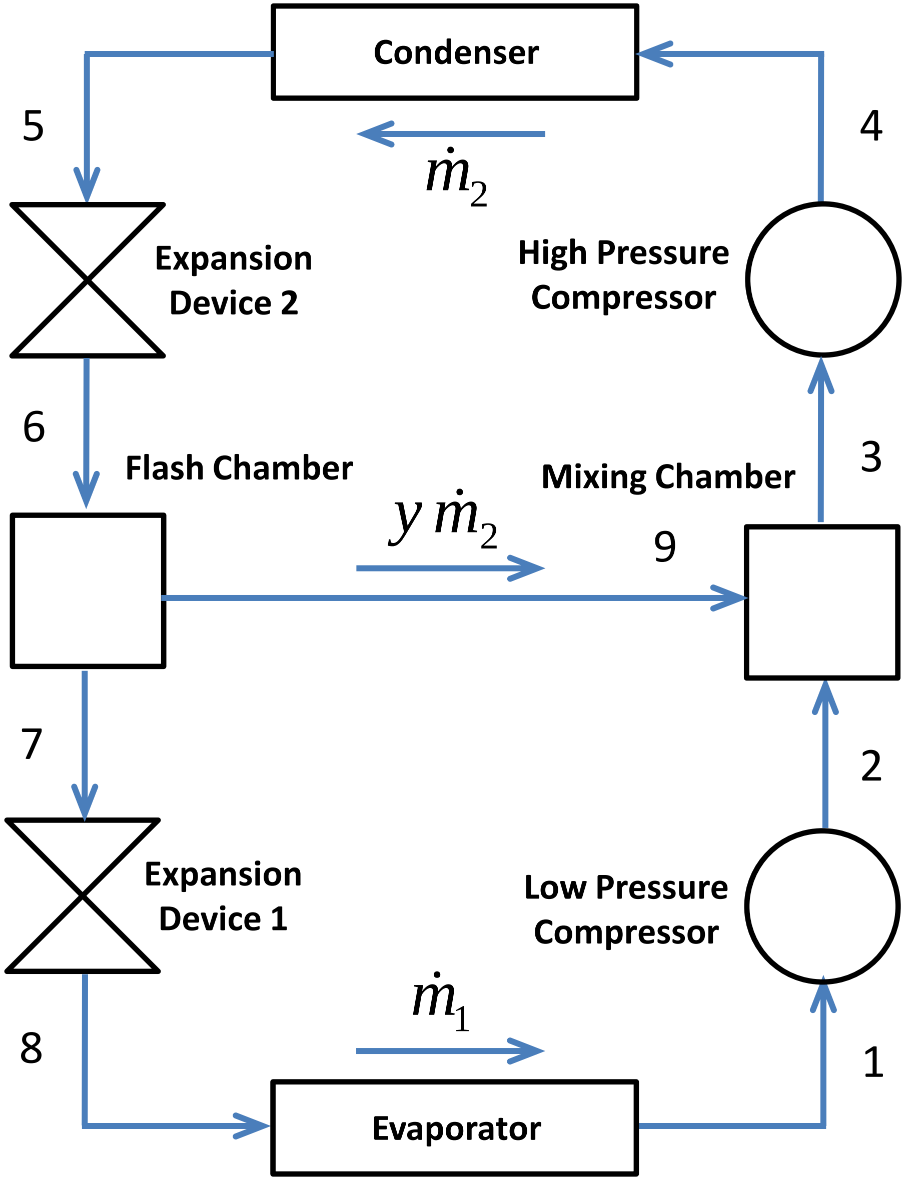


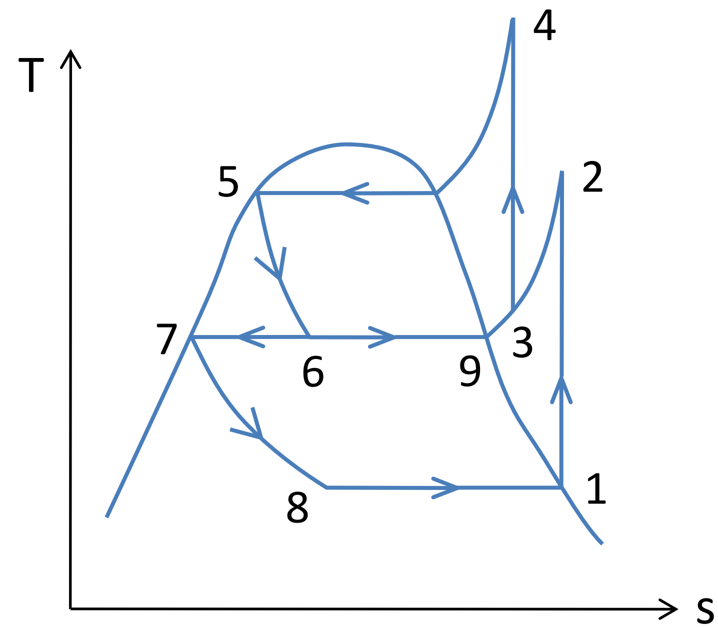
Refrigeration Capacity (W) $Q_c = \dot{m}(h_1 - h_4)$

Compressor Work (W) $W = \dot{m}(h_2 - h_1)$

Coefficient of Performance $COP = \frac{Q_c}{W}$

Refrigeration Cycle with Flash Chamber (single fluid)





Refg. Capacity (W) $\quad Q_c = \dot{m}_1 (h_1 - h_8)$

Comp. Work (W) $\quad W_1 + W_2 = \dot{m}_1 (h_2 - h_1) + \dot{m}_2 (h_4 - h_3)$

$\dot{m}_1 =$ Evapr. Mass flow Rate (kg/s)

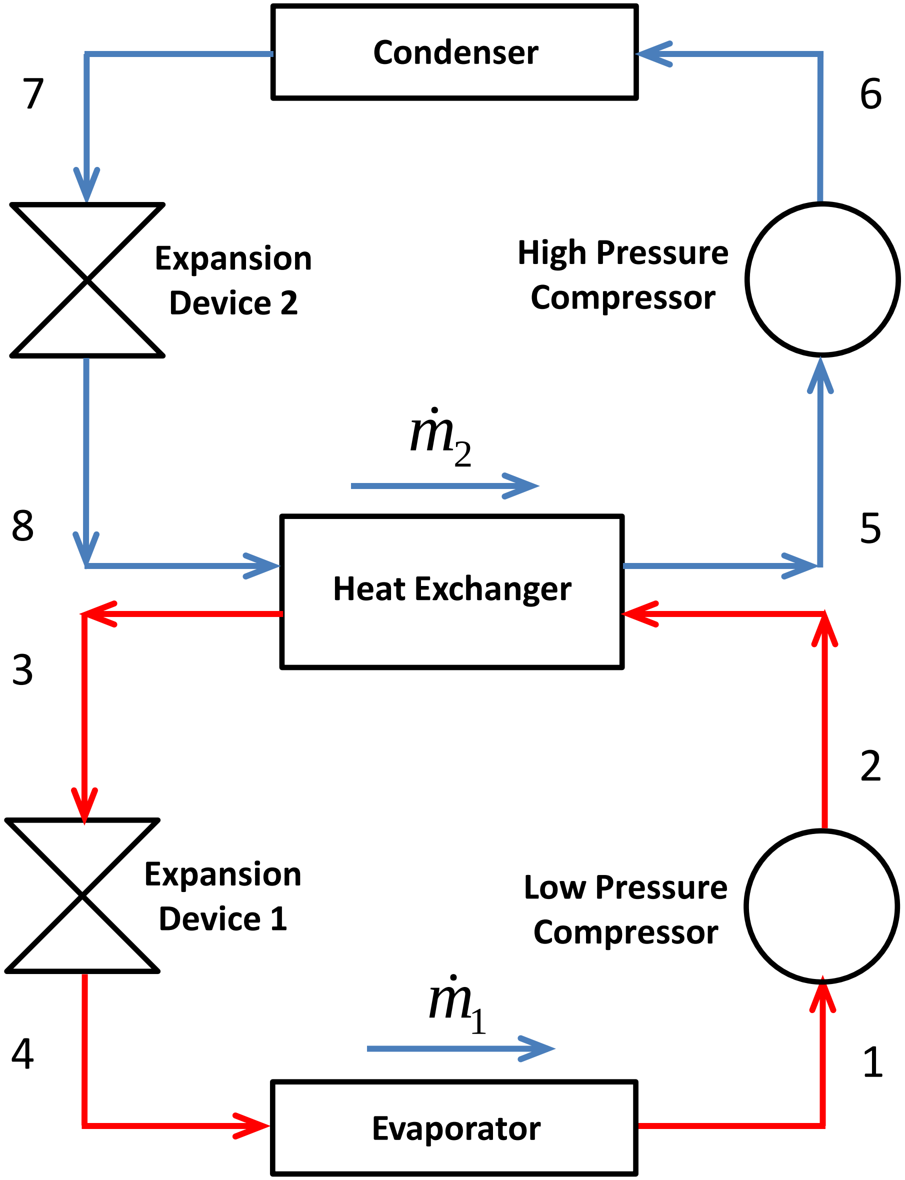
$\dot{m}_2 =$ Total Mass Flow Rate (kg/s)

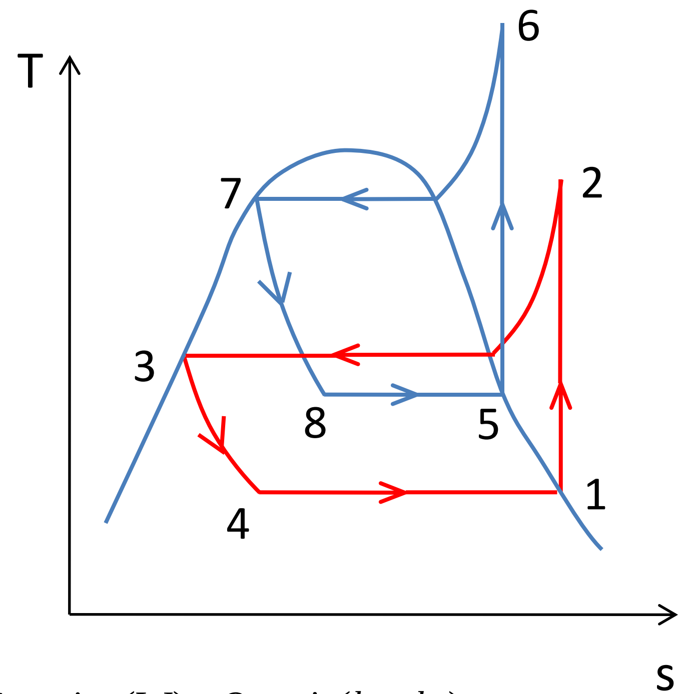
$\dot{m}_1 = (1 - y)\,\dot{m}_2$

$y =$ Ratio of the vapor in line No. 9

Coefficient of Performance $\quad COP = \dfrac{Q_c}{W}$

Two-Stage Cascade Refrigeration Cycle (single or two fluids)





Refg. Capacity (W) $Q_c = \dot{m}_1 (h_1 - h_4)$

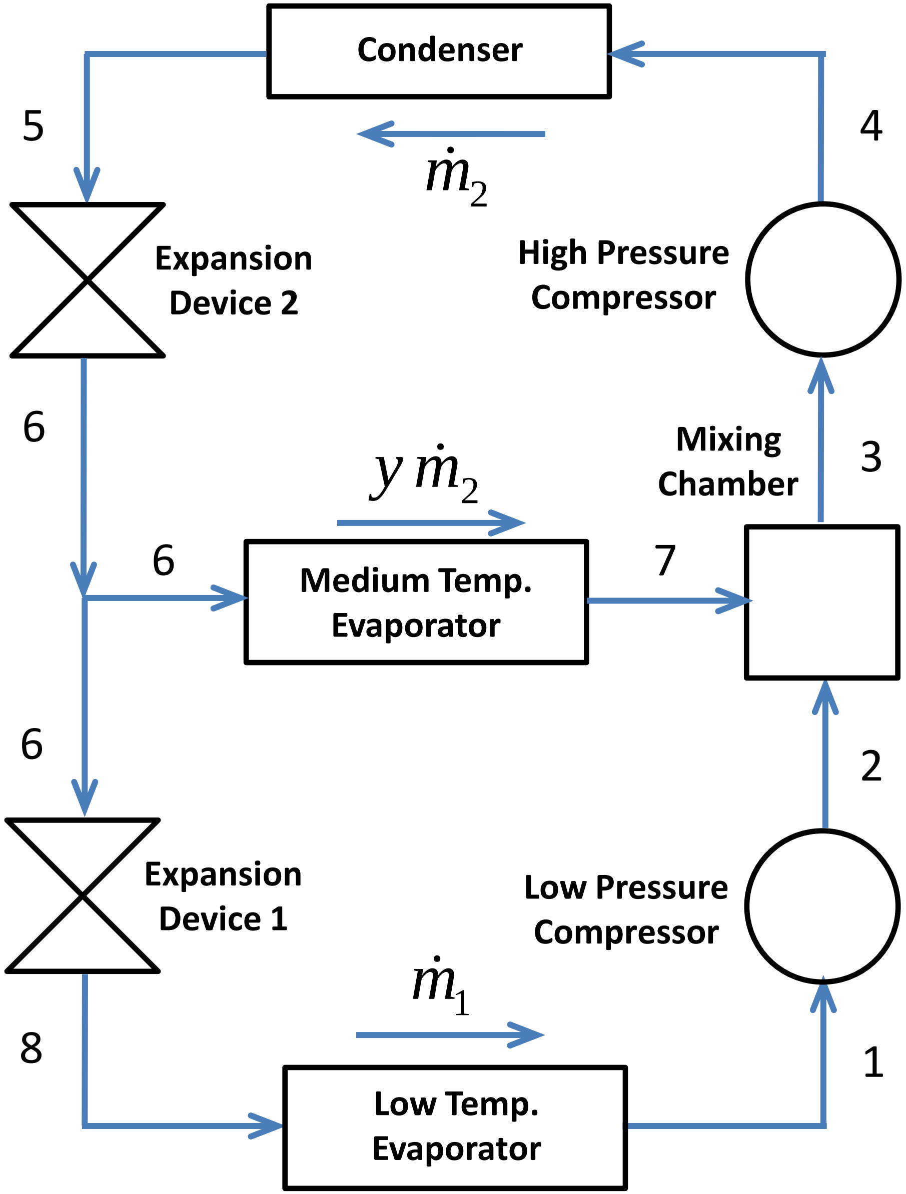
Comp. Work (W) $W_1 + W_2 = \dot{m}_1 (h_2 - h_1) + \dot{m}_2 (h_6 - h_5)$

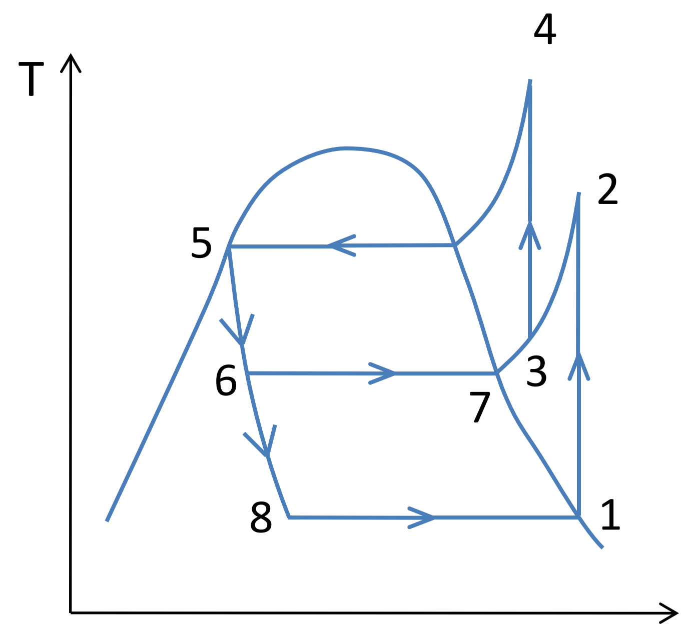
$\dot{m}_1$ = Lower Loop Mass flow Rate (kg/s)

$\dot{m}_2$ = Upper Loop Mass Flow Rate (kg/s)

Coefficient of Performance $COP = \frac{Q_c}{W}$

Multi-Evaporator Refrigeration Cycle (single fluid)





Refg. Capacity (W) $Q_c = \dot{m}_1(h_1 - h_8) + y\dot{m}_2(h_7 - h_6)$

Comp. Work (W) $W_1 + W_2 = \dot{m}_1(h_2 - h_1) + \dot{m}_2(h_4 - h_3)$

$\dot{m}_1$ = Low Temp. Evapr. Mass flow Rate (kg/s)

$\dot{m}_2$ = Total Mass Flow Rate (kg/s)

$\dot{m}_1 = (1 - y)\,\dot{m}_2$

y = Ratio of the vapor in Medium Evapr.

Coefficient of Performance $COP = \dfrac{Q_c}{W}$