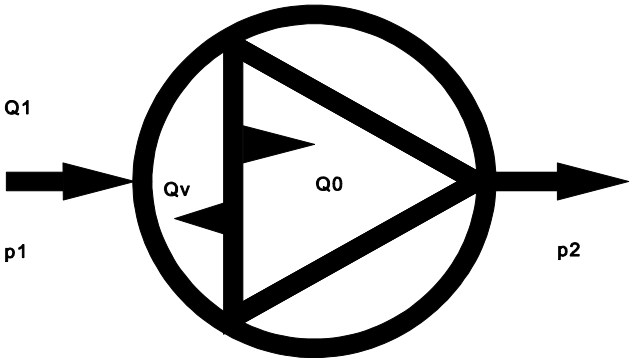
Convey-air pumps

Generally two types of air pumps are used.

1) positive displacement pumps :
   - Roots-type blowers
   - Screw-compressors with internal compression
   - Screw-compressors with internal compression and pre-inlet
   - piston compressors
2) flow-pumps :
   - turbine compressors
   - fans

Positive displacement pumps



Characteristic data for positive displacement pumps are :

p1 = pressure at inlet
p2 = pressure at outlet
q0 = internal displaced volume per rotation
n = number of rotation per minute
Q0 = internal displaced volume per unit of time
Qv100 = internal leakage-losses at a dp of 100 mbar per unit of time.
Qv = internal leakage-losses at dp per unit of time
Q1 = External displaced volume at p1 per unit of time
ci = internal compression-ratio

Characteristic data for flow pumps are :

p1 = pressure at inlet
p2 = pressure at outlet
Q1 = External displaced volume at p1 per unit of time
ci = internal compression-ratio
The thermo-dynamic energy for compression is determined

by the working principle of the air-pump.

Roots-type blower :

$Q0 = n * q0$

$$Qv = Qv100 * \sqrt{\frac{(p2-p1) * 1{,}293}{100 * rho(l)}}$$

in which : $rho(l) = 1{,}293 * p1 * 273/(273+t(amb))$

follows :

$$Qv = Qv100 * \sqrt{\frac{(p2-p1) * (273 + t(amb))}{100 * p1 * 273}}$$

$Q1 = Q0 - Qv$

$eta(vol) = Q1/Q0 = (Q0-Qv)/Q0$

$P(th.dyn) = Q0 * (p2-p1)$ (isochoric compression)

$P(shaft) = P(th.dyn) + P(losses)$