

Controle e Automação Industrial

➤ Pneumática e Eletropneumática

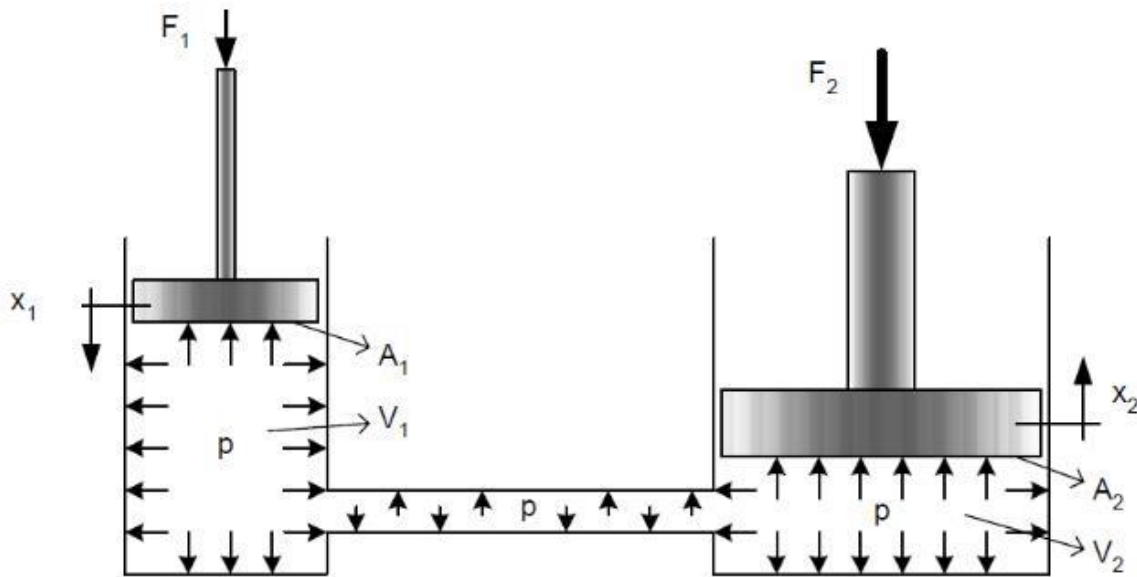
- ✓ [Ar Comprimido](#)
- ✓ [Fonte geradora de energia pneumática](#)
- ✓ Diagramas
- ✓ Elementos de trabalho e controle
- ✓ Conversão de Sinais
- ✓ Válvulas
 - Distribuição;
 - Bloqueio;
 - Fluxo.
- ✓ Métodos de Elaboração de Circuitos
 - Método intuitivo;
 - Método cascata.

➤ Hidráulica e Eletro Hidráulica

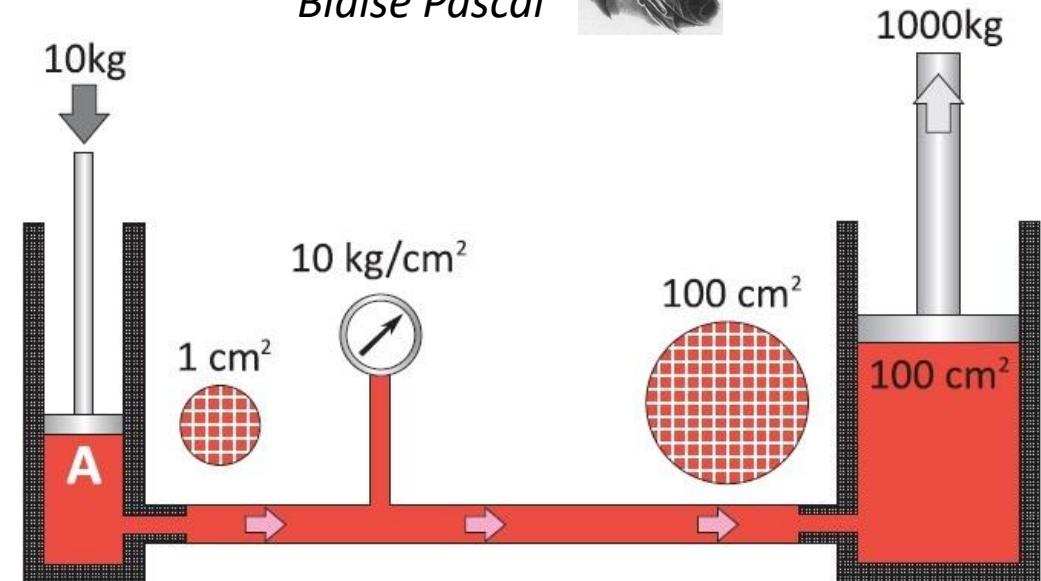
- ✓ Fluídos
- ✓ Bombas
- ✓ Atuadores e acessórios
- ✓ Diagramas
- ✓ Elementos de trabalho e controle
- ✓ Conversão de Sinais
- ✓ Válvulas
 - Distribuição;
 - Bloqueio;
 - Fluxo.
- ✓ Métodos de Elaboração de Circuitos
 - Método intuitivo;
 - Método cascata.

Princípio de Pascal

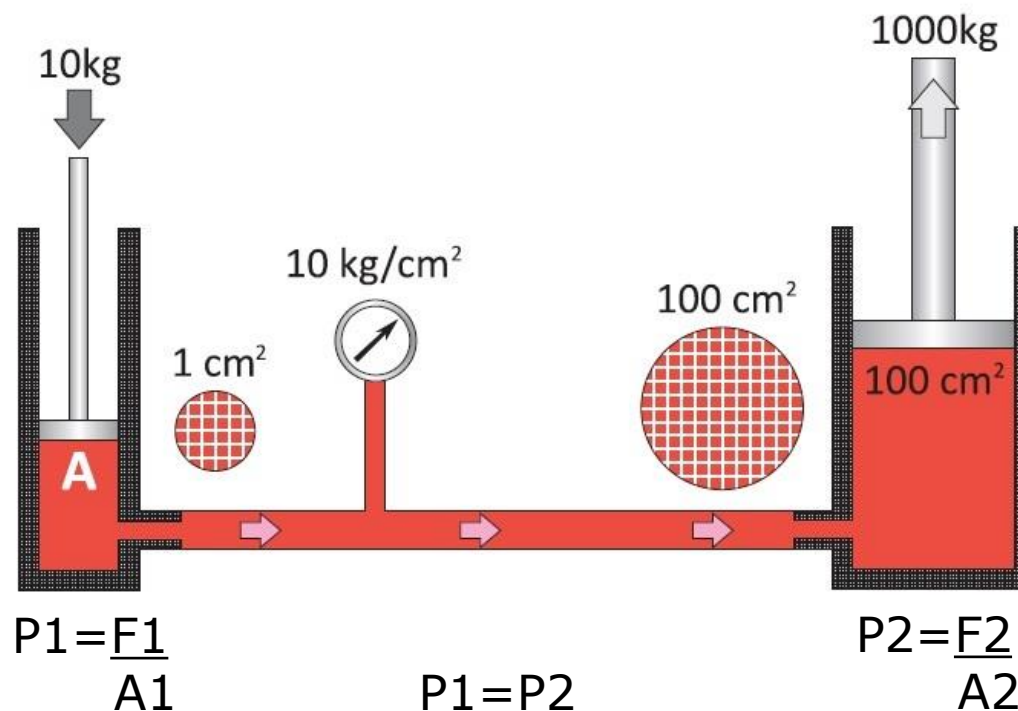
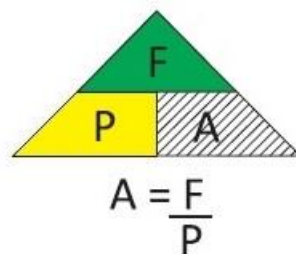
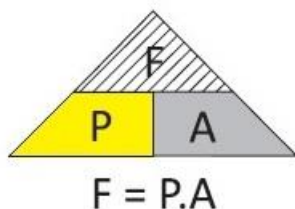
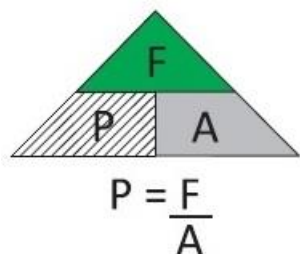
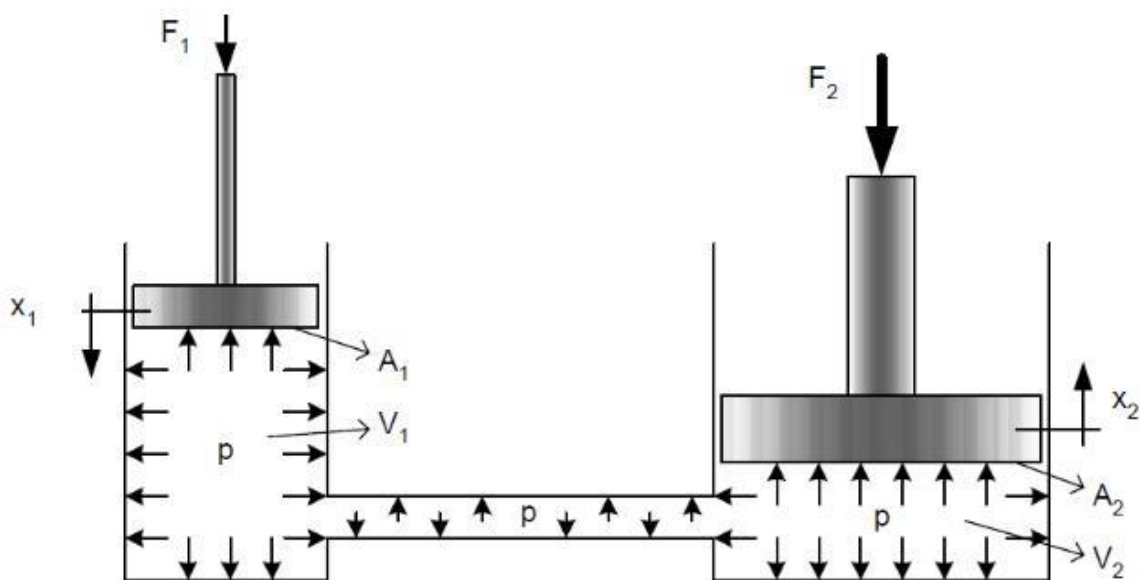
"A pressão exercida em um líquido confinado em forma estática atua em todos os sentidos e direções, com a mesma intensidade, exercendo forças iguais em áreas iguais".



Blaise Pascal



Princípio de Pascal



$$\frac{F1}{A1} = \frac{F2}{A2}$$

$$\frac{F1}{F2} = \frac{A1}{A2}$$

$$A2 > A1 \text{ e } F2 > F1$$

Unidades de Pressão

UNIDADES	ATM	kgf/cm ²	bar	PSI	Pa
ATM	1	1,033	1,013	14,69	101325
Kgf/cm ²	0,968	1	0,981	14,23	98100
bar	0,987	1,02	1	14,5	100000
PSI	0,068	0,07	0,069	1	6896
Pa	0,0000098	0,0000102	0,00001	0,000145	1

ATM - Atmosferas

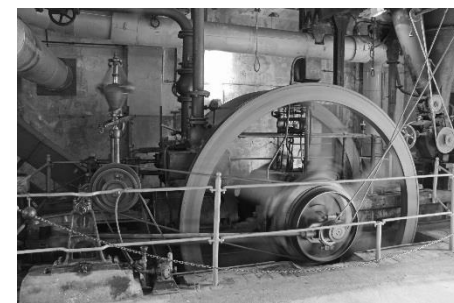
Kgf/cm² - Quilogramas por centímetro quadrado

bar - Báreas

PSI - *Pounds per Square Inches* (Libra por polegada quadrada)

Pa - Pascal

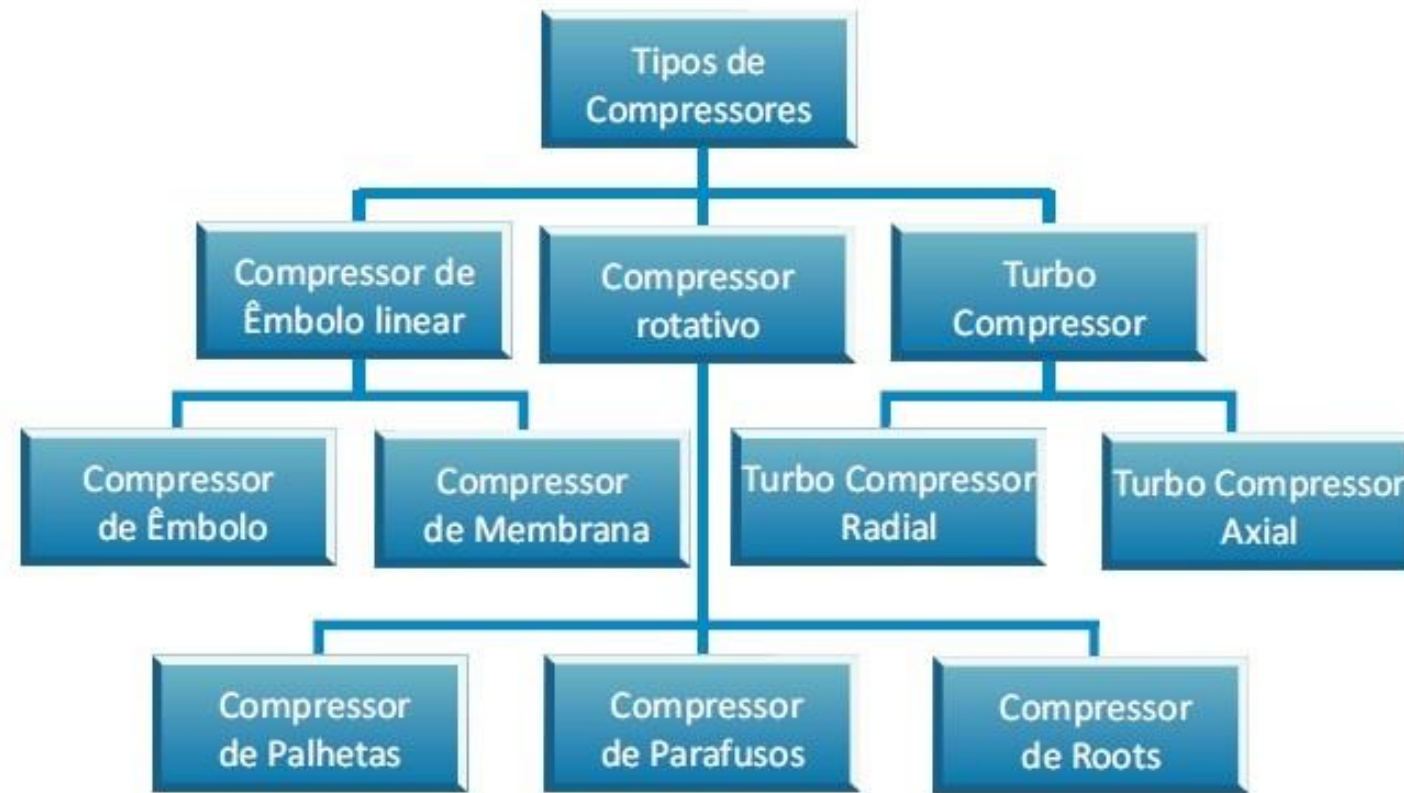
Pneumática e Eletropneumática



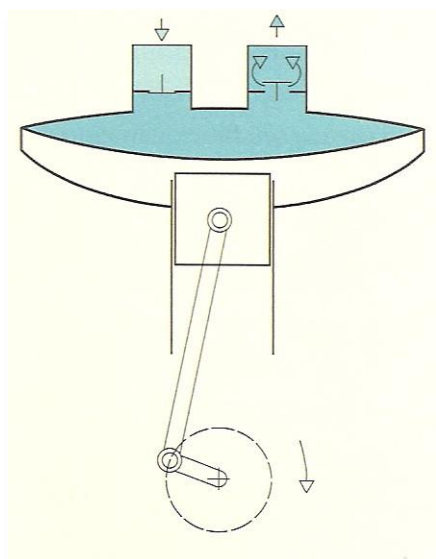
Ar Comprimido

- ✓ Fluido: ar (compressível)
- ✓ Estado: gasoso
- ✓ Circuito: aberto
- ✓ Trabalha com baixa pressão e alta velocidade

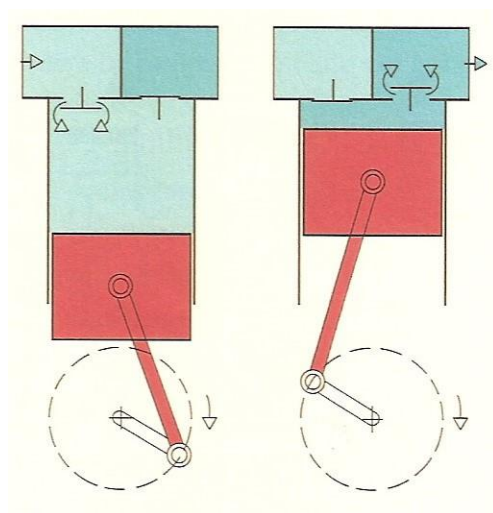
Fonte geradora de energia pneumática



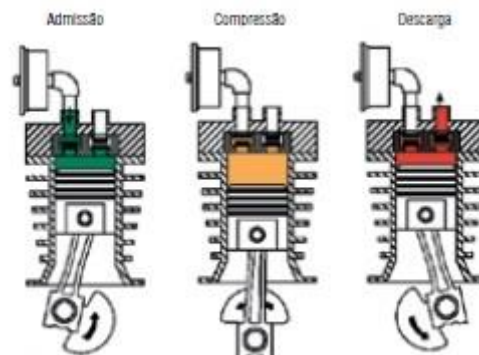
✓ Compressor de Embolo Linear (Deslocamento Positivo)



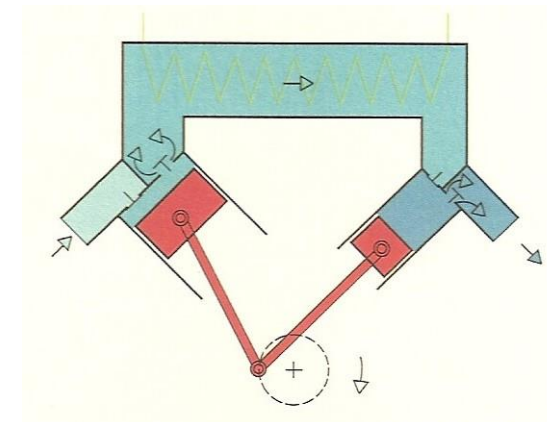
Pistão com Membrana



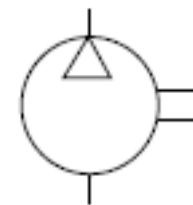
Pistão Simples Efeito



Pistão Simples Efeito

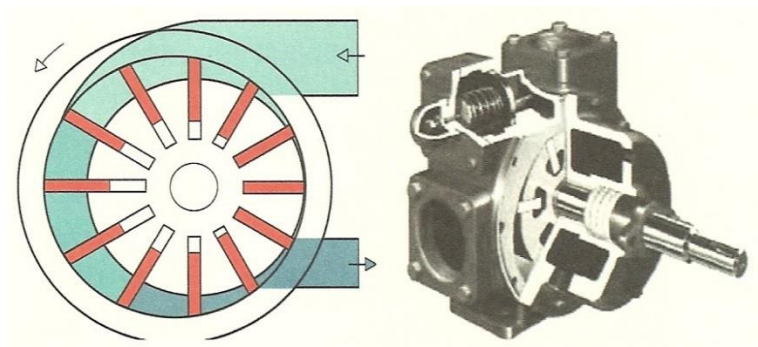


Pistão Duplo Efeito

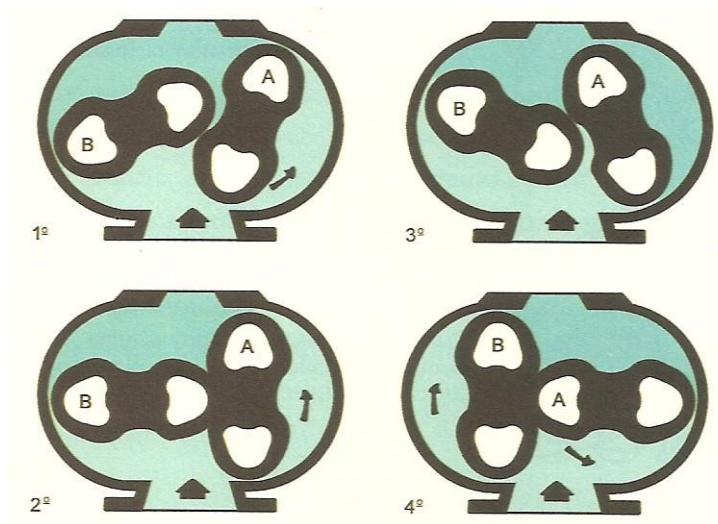


Simbologia

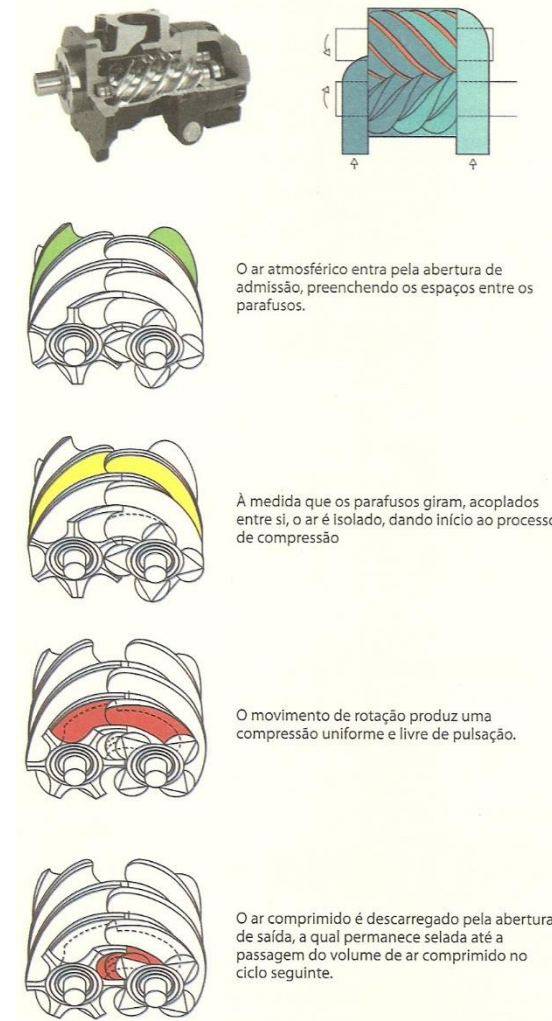
✓ Compressor Rotativo (Deslocamento Positivo)



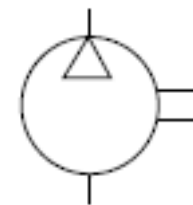
Palhetas



Roots ou
Lóbulo

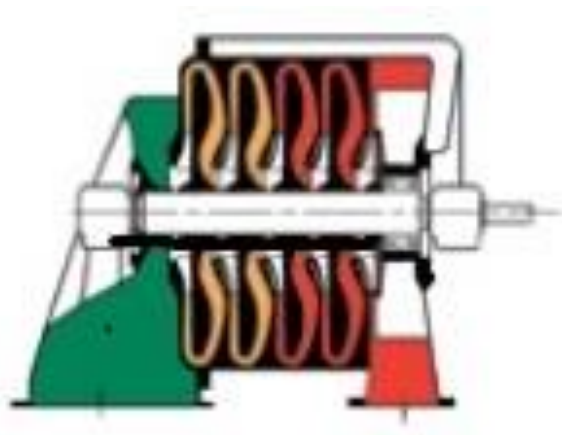


Parafuso

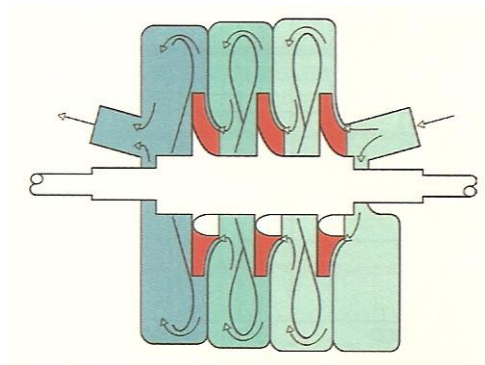


Simbologia

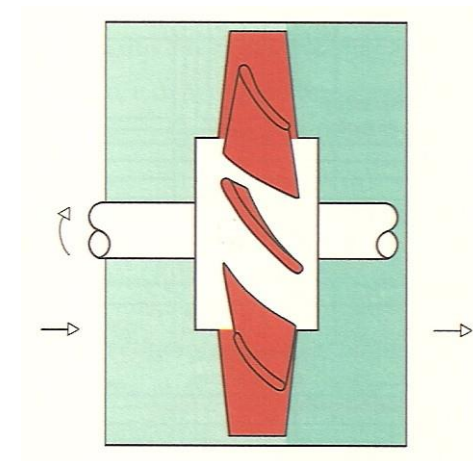
✓ Turbo Compressor (Deslocamento Dinâmico)



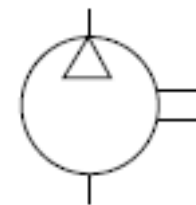
Fluxo Radial



Fluxo Radial

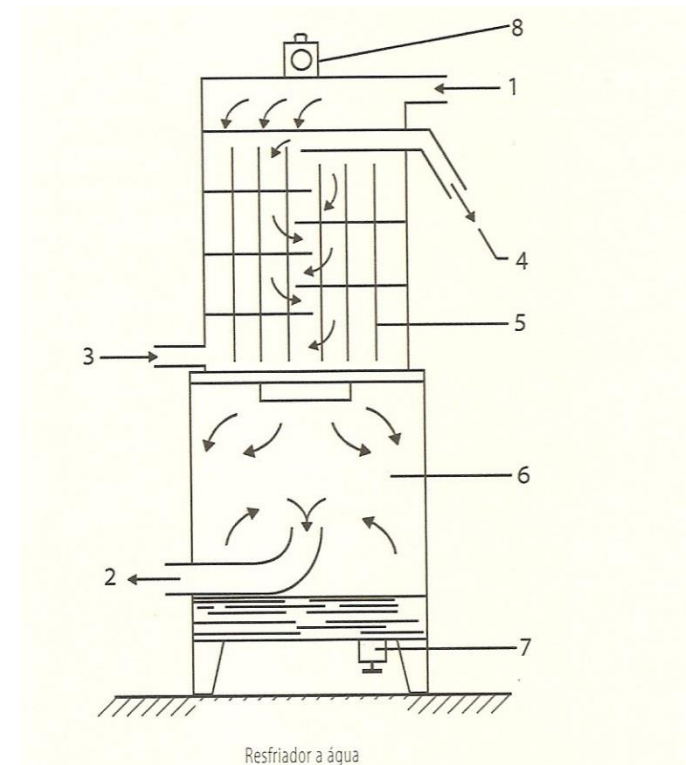
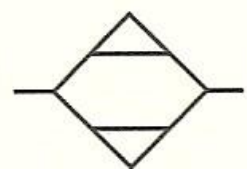
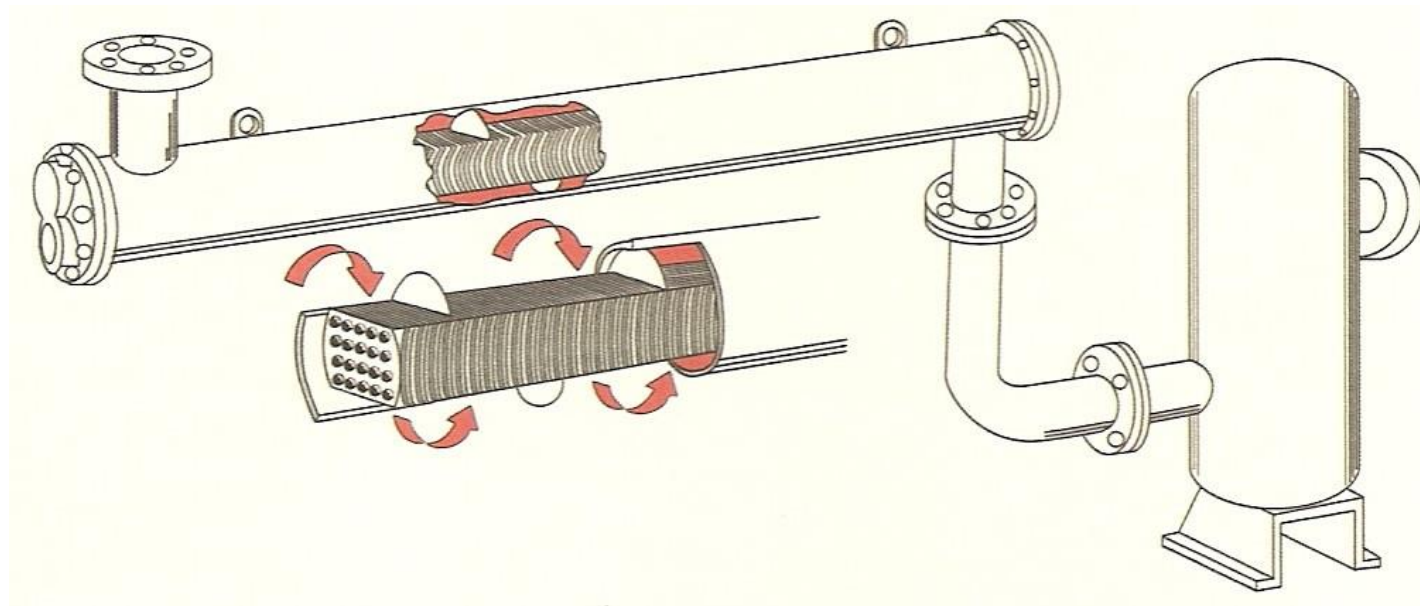


Fluxo Axial



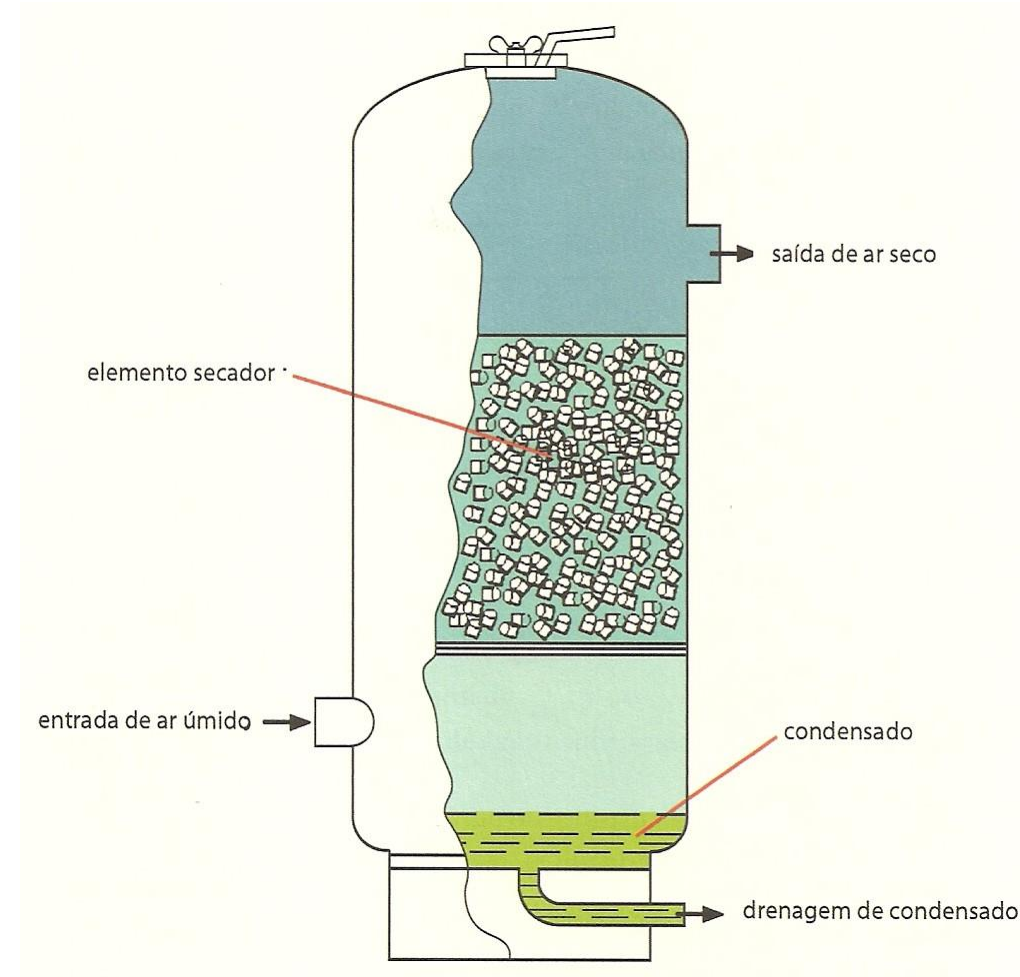
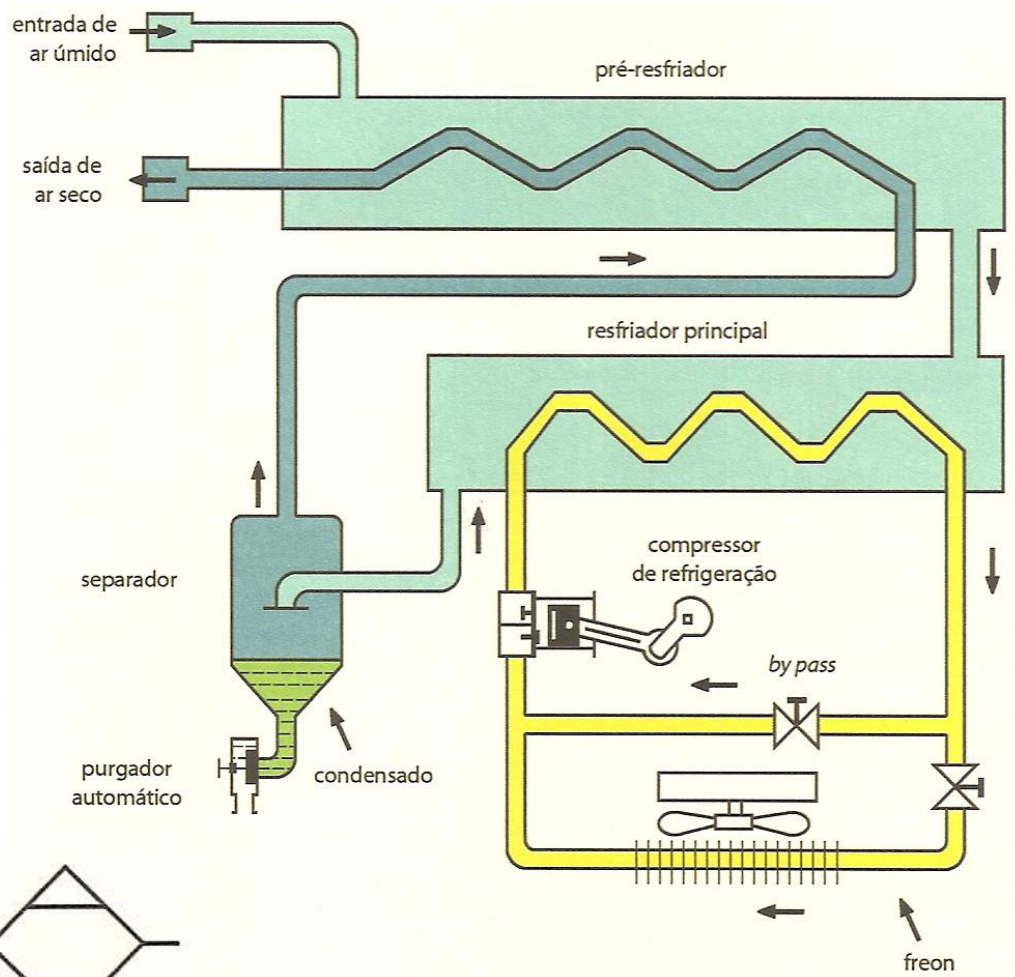
Simbologia

✓ Resfriamento

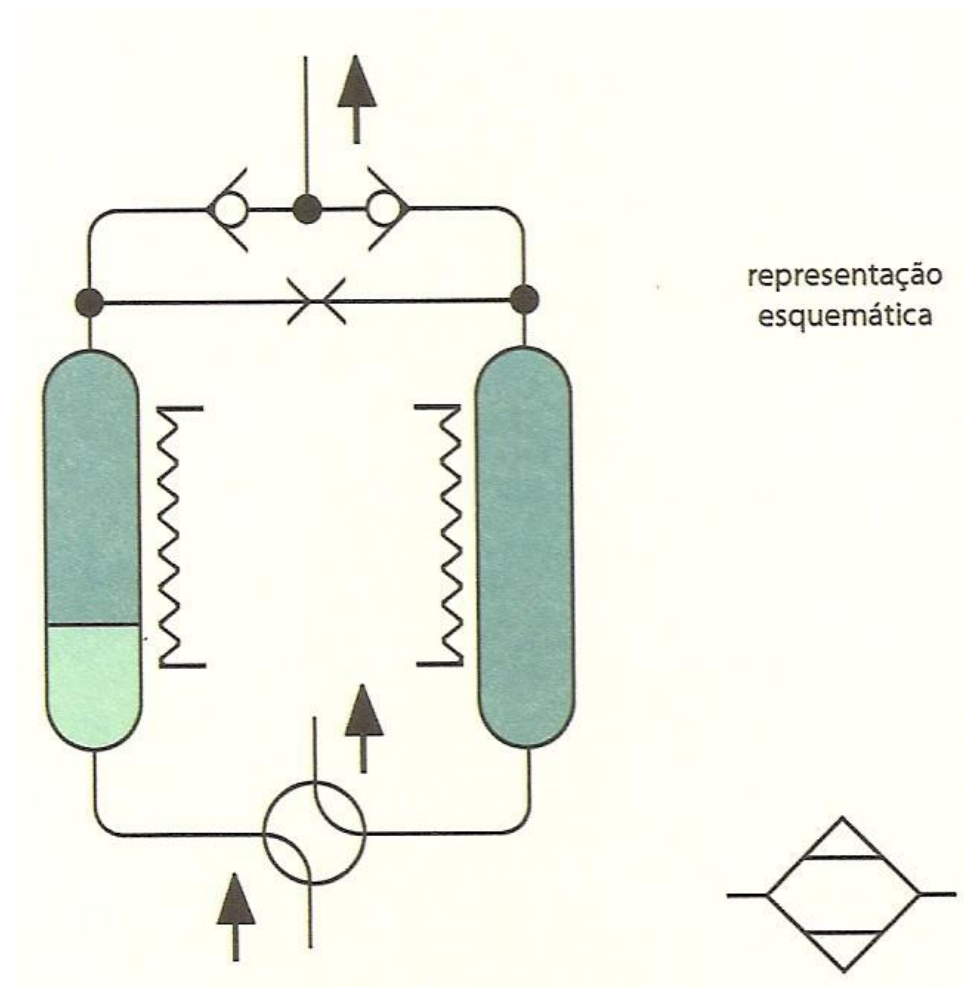
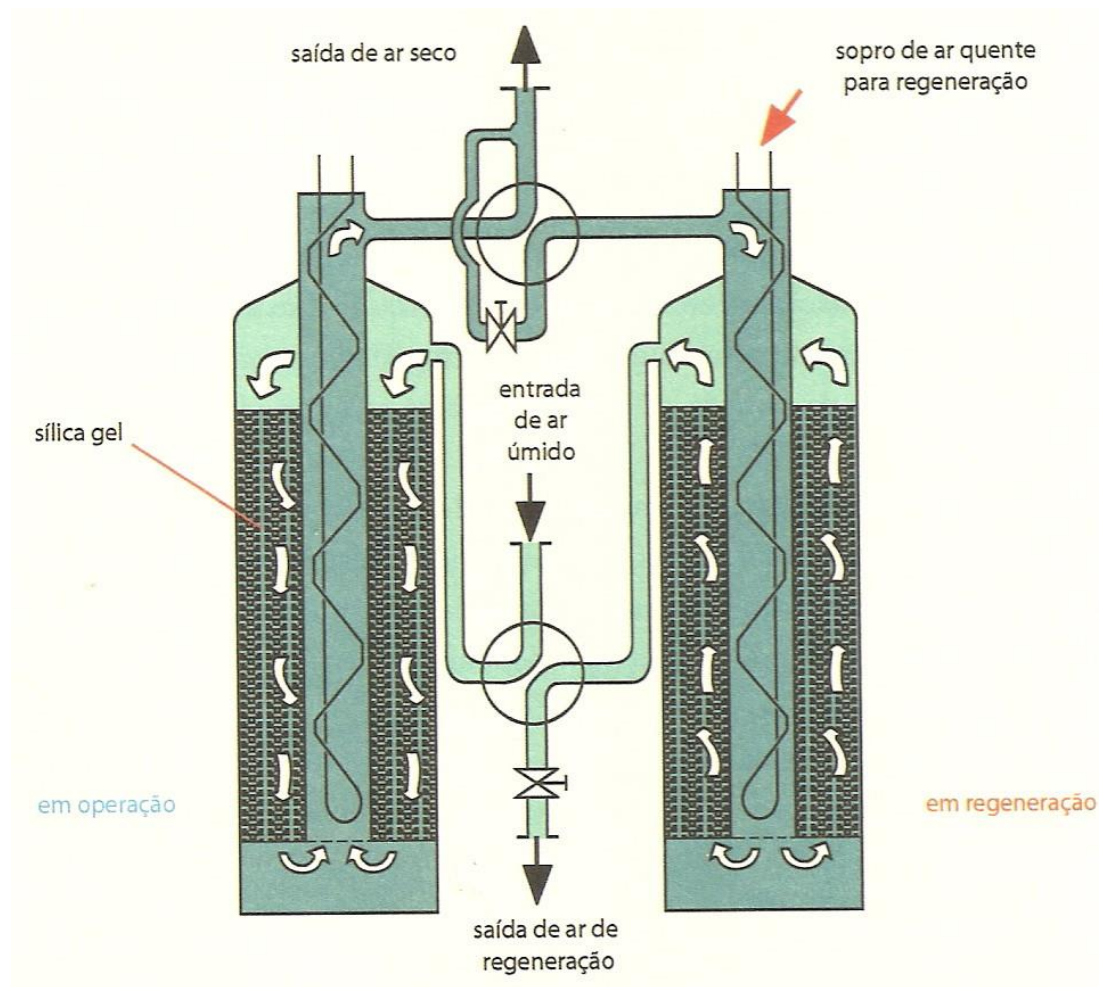


1. Entrada de ar comprimido quente, proveniente do compressor.
2. Saída de ar comprimido resfriado.
3. Entrada de água na serpentina de refrigeração.
4. Saída de água da serpentina.
5. Serpentina.
6. Vaso separador de água condensada.
7. Purgador automático de saída de água condensada.
8. Válvula de segurança.

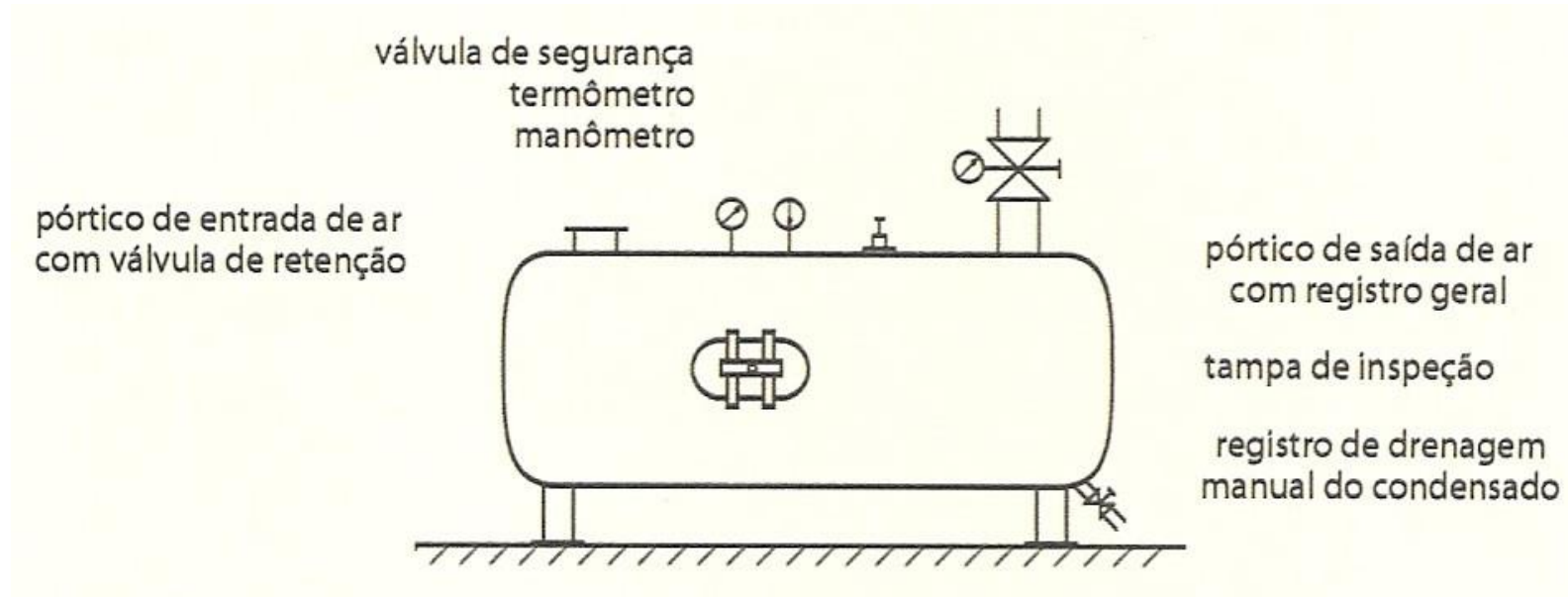
✓ Secagem



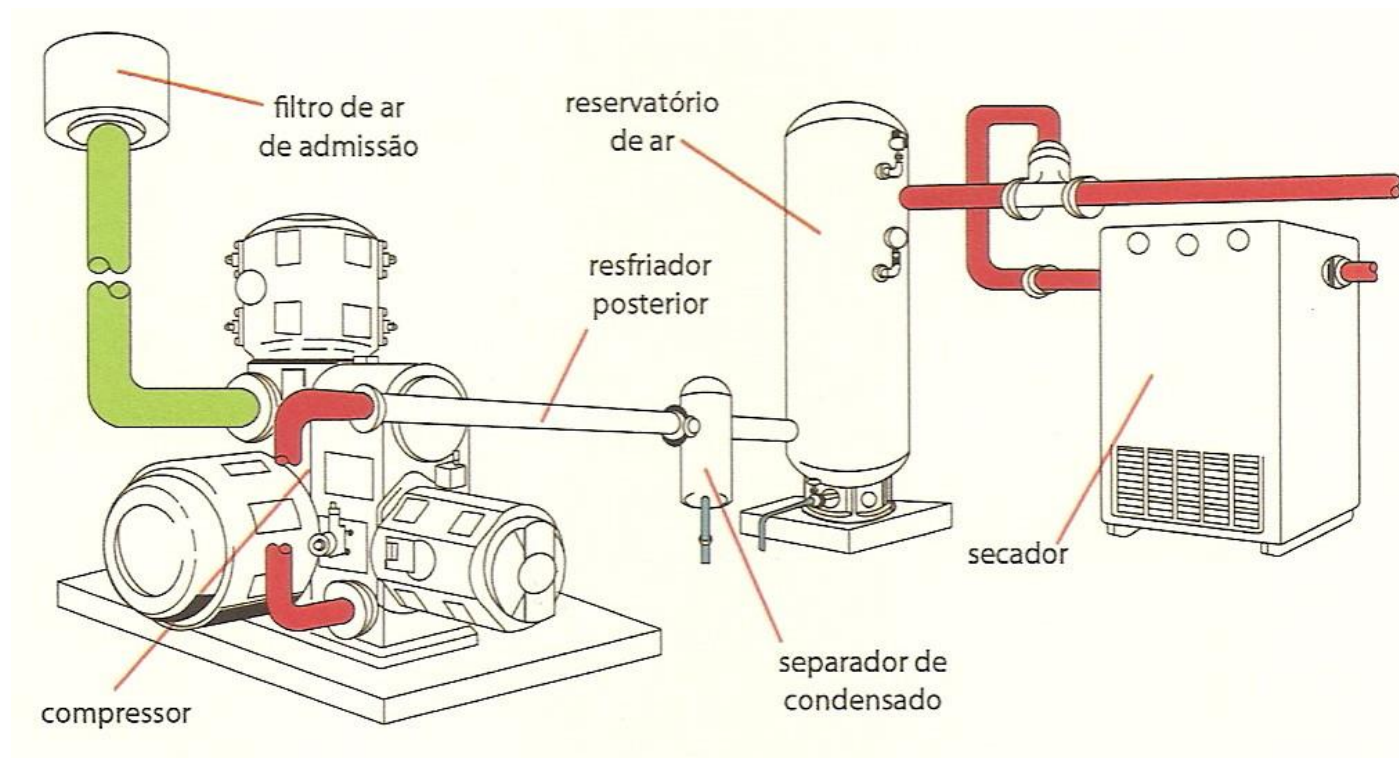
✓ Secagem



✓ Reservatório

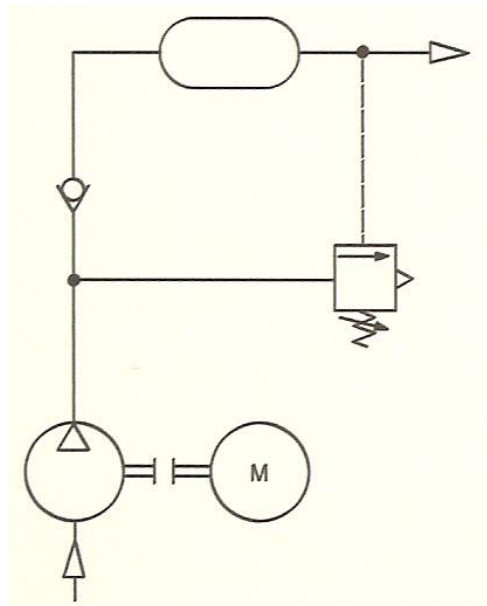


✓ Geração de Ar Comprimido

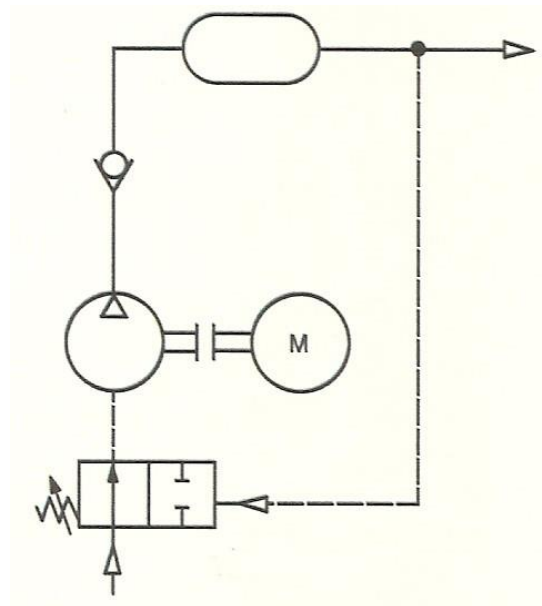


Pneumática e Eletropneumática

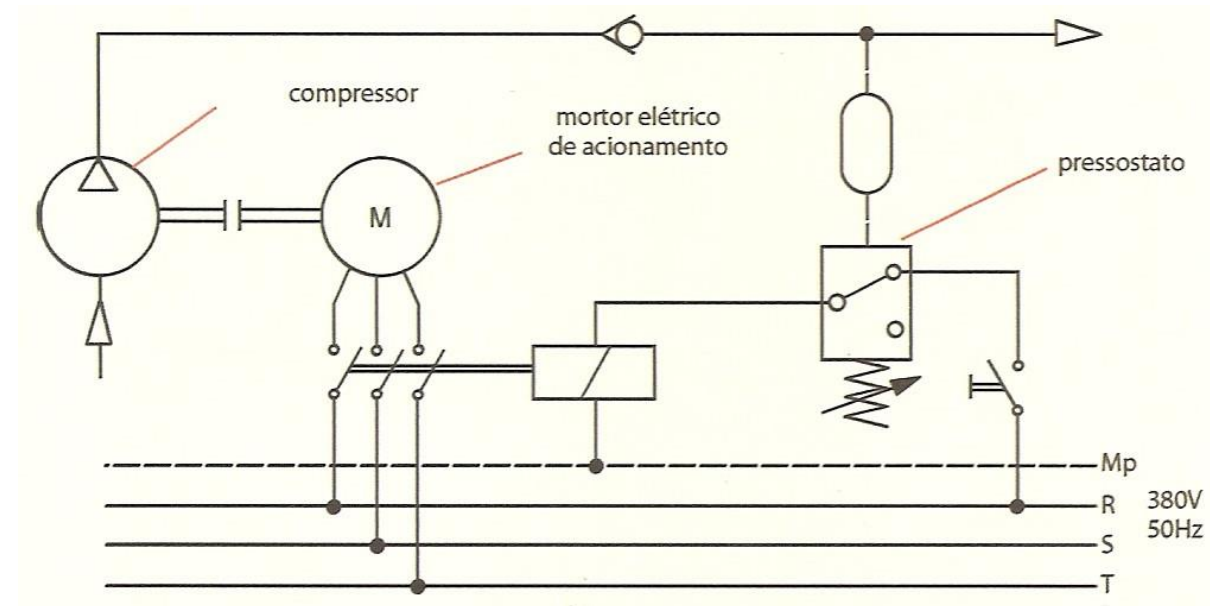
✓ Regime de trabalho



Contínuo com
Descarga

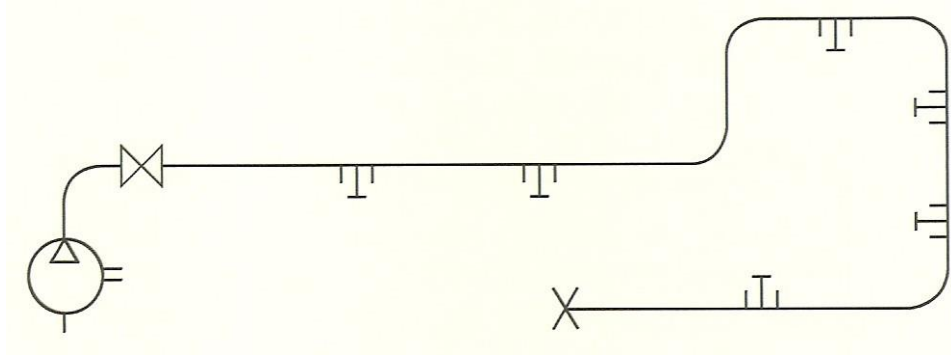


Contínuo com
Fechamento

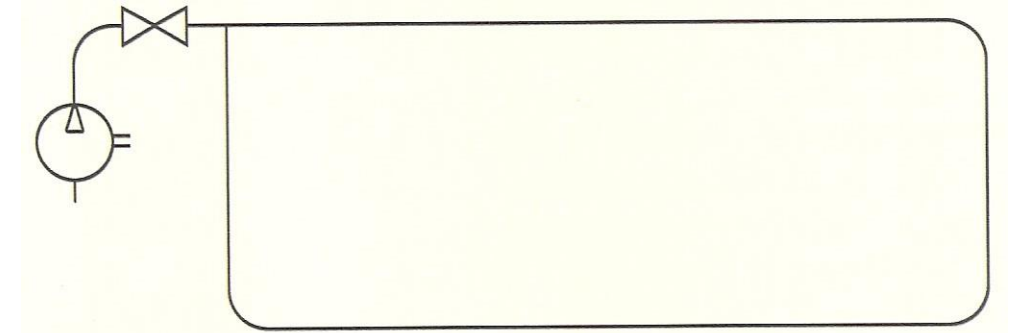


Intermitente

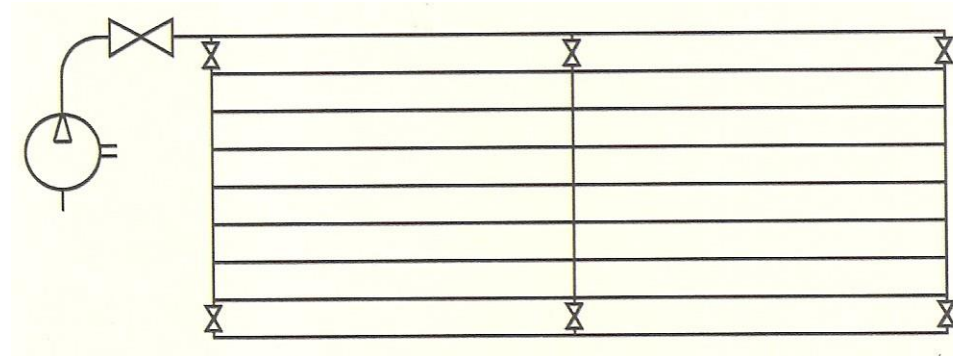
✓ Rede de Distribuição



Distribuição
Aberta

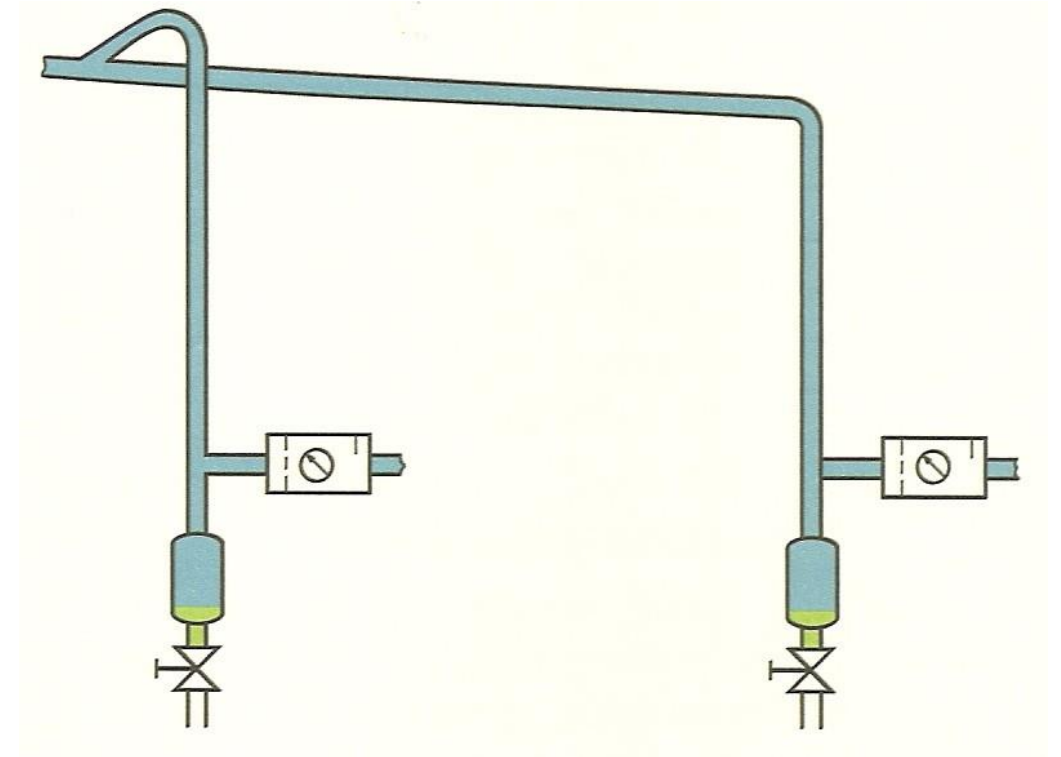
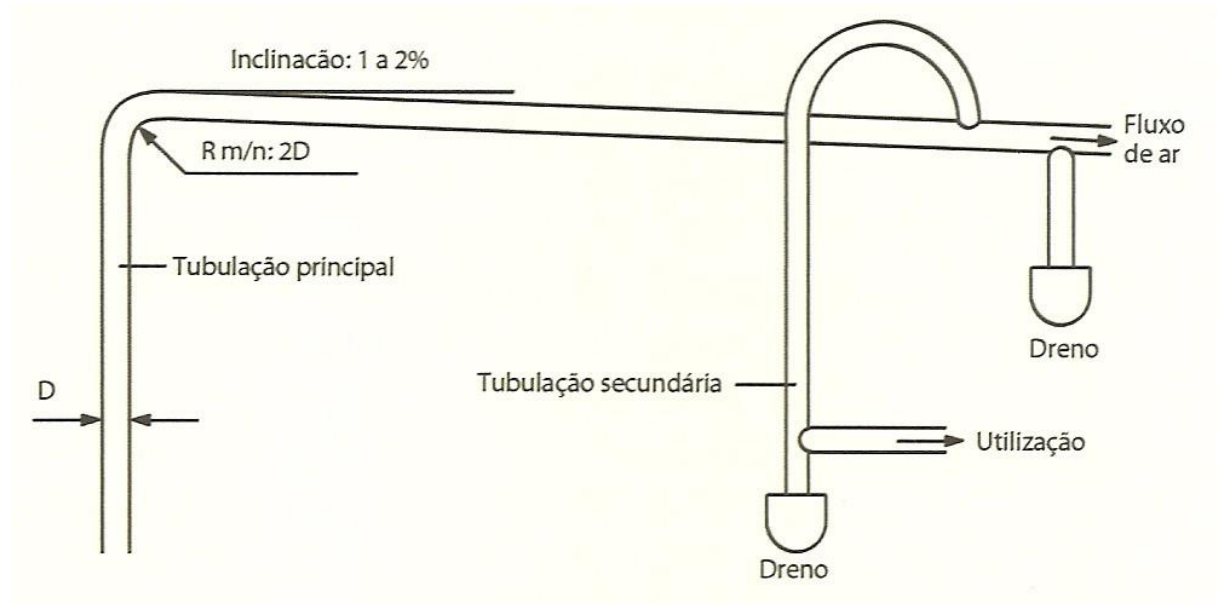


Distribuição
Fechada

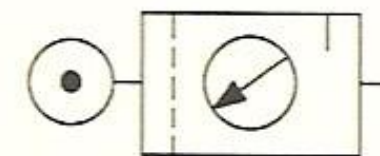
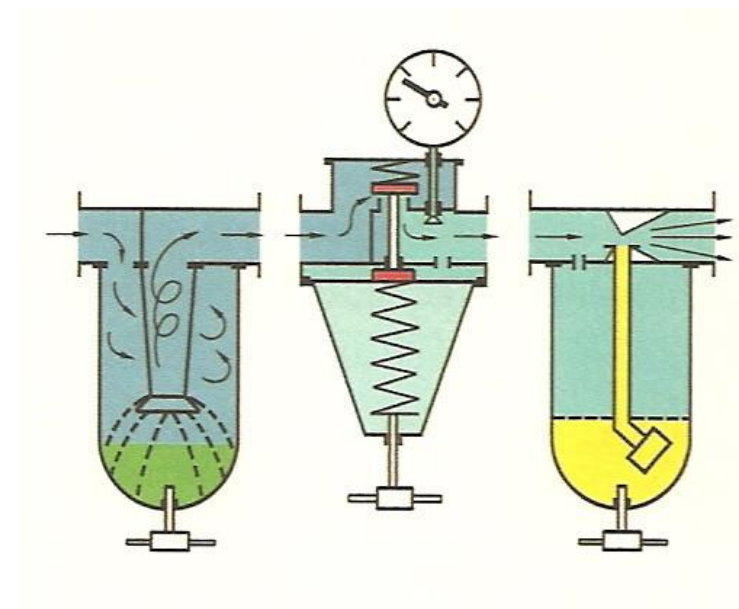


Distribuição
Combinada

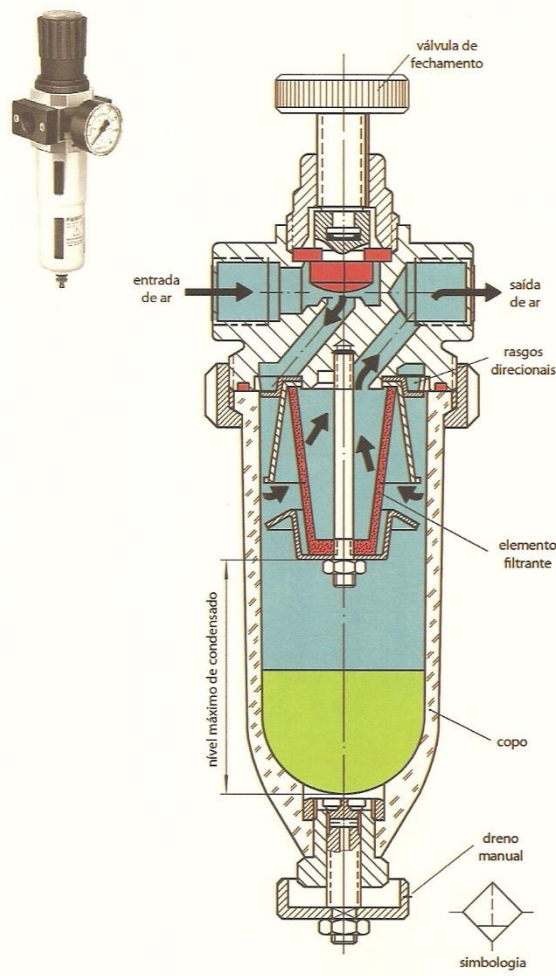
✓ Rede de Distribuição



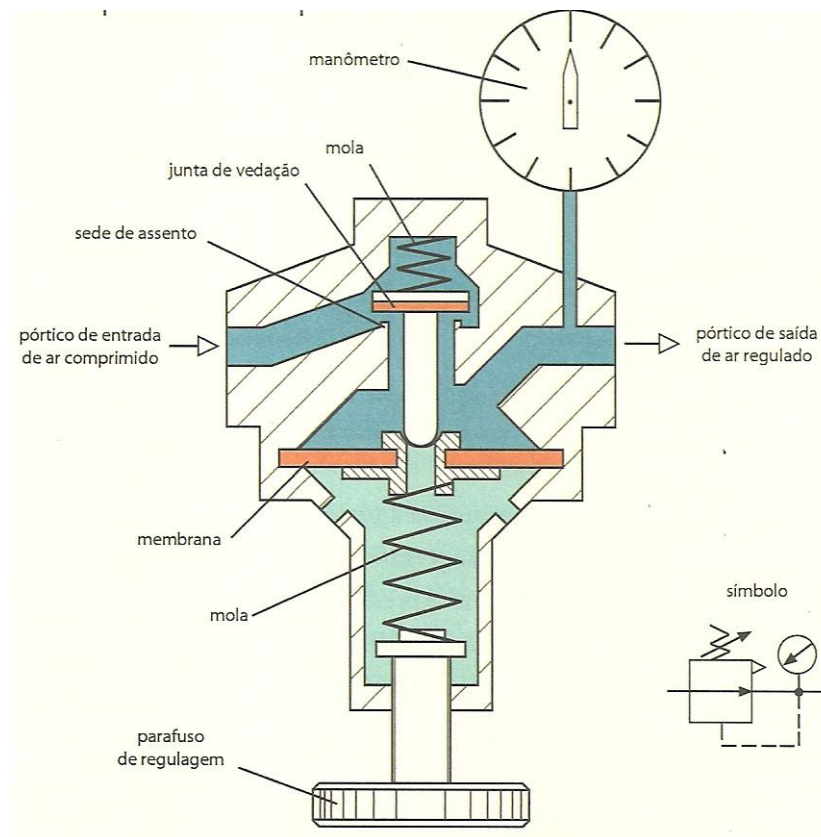
✓ Unidade de Conservação



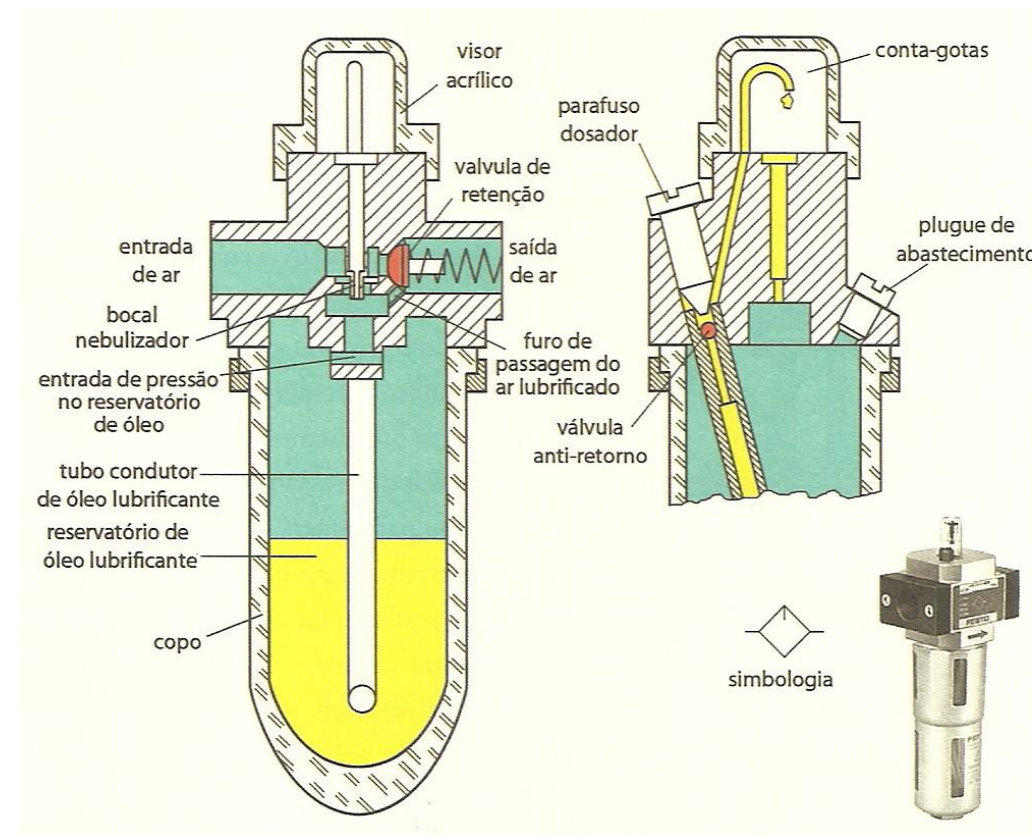
✓ Unidade de Conservação



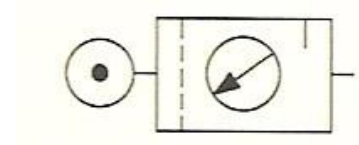
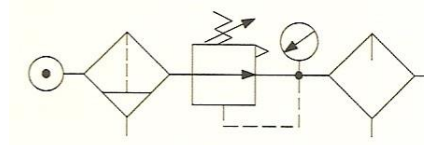
Filtro



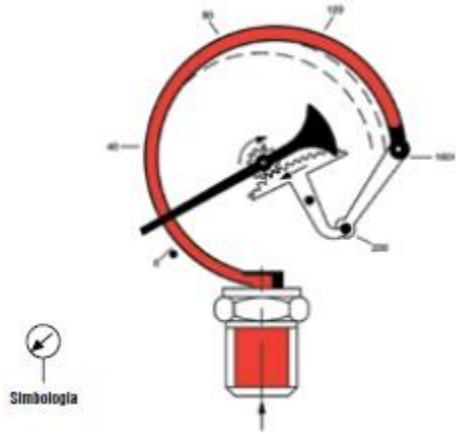
Regulador Pressão



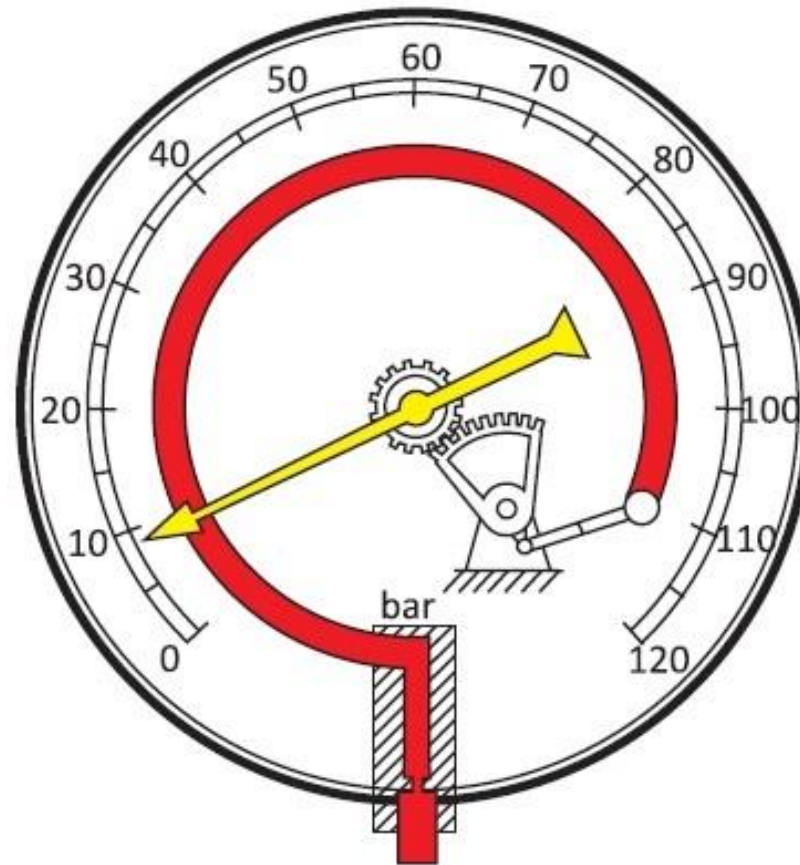
Lubrificador



✓ Unidade de Conservação



Manômetro
Indicador de Pressão



Atuadores Pneumáticos

✓ Lineares:

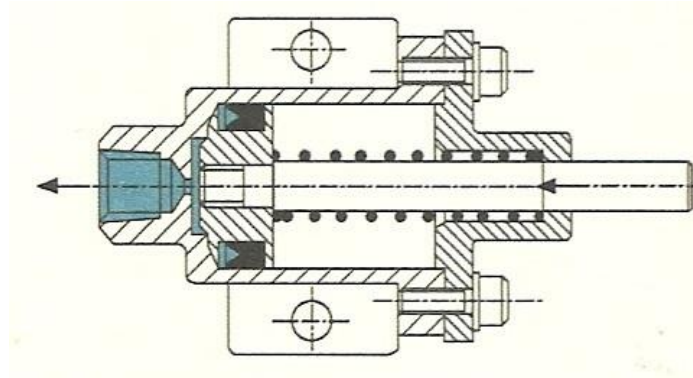
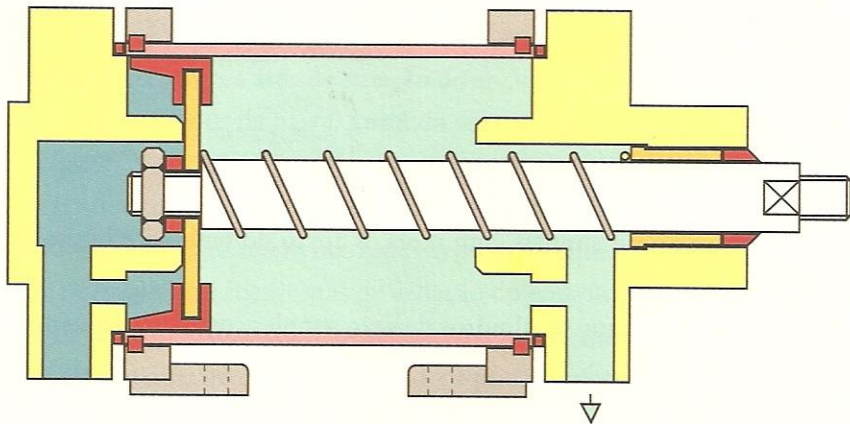
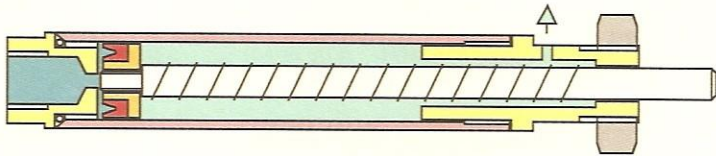
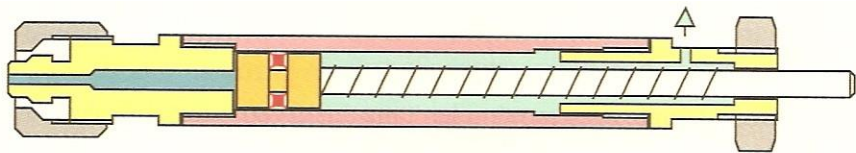
- Ação Simples;
- Ação Dupla.

✓ Rotativos:

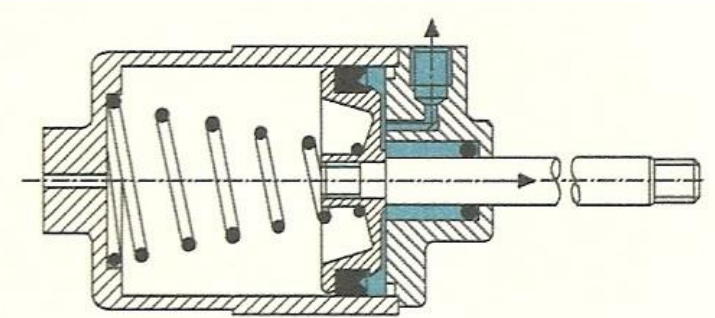
- Contínuo;
- Limitado.

✓ Atuadores Lineares

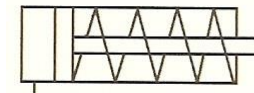
- **Simple AÇÃO**



Recuo por
Mola

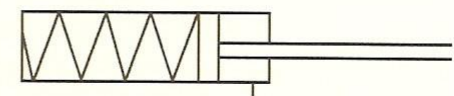
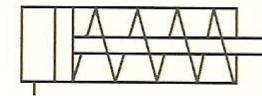
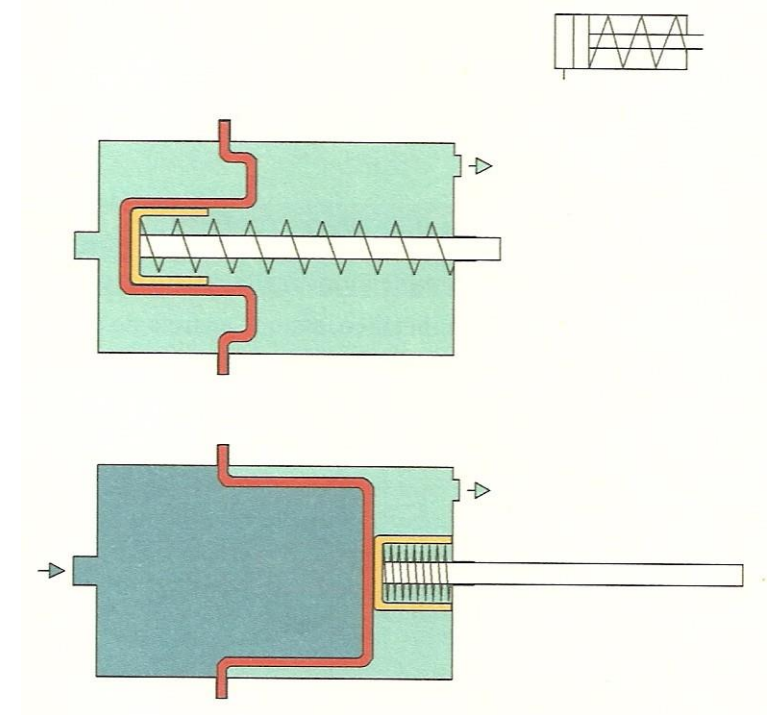
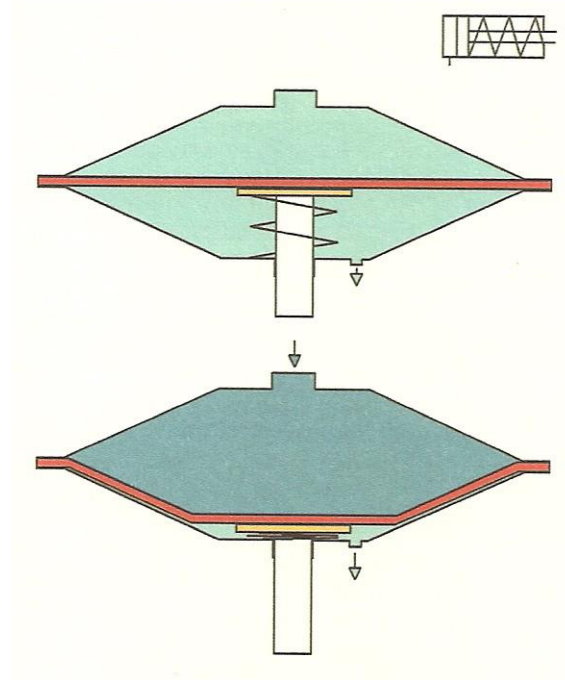
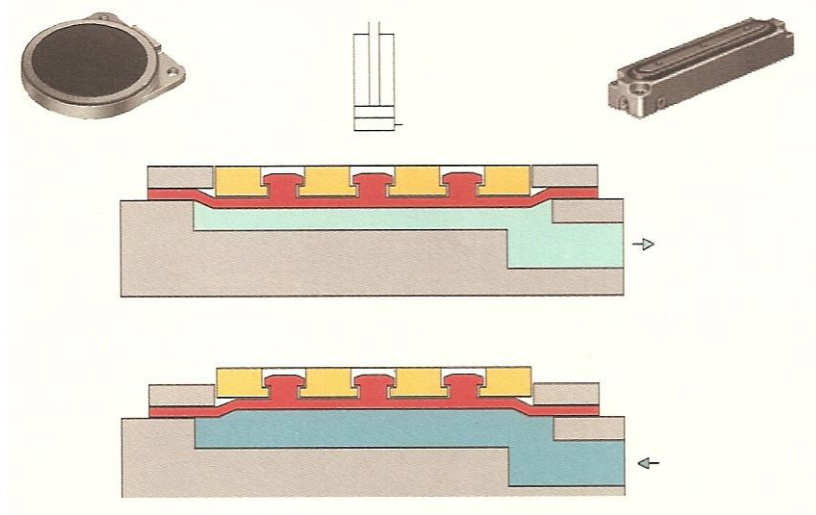


Avanço por
Mola

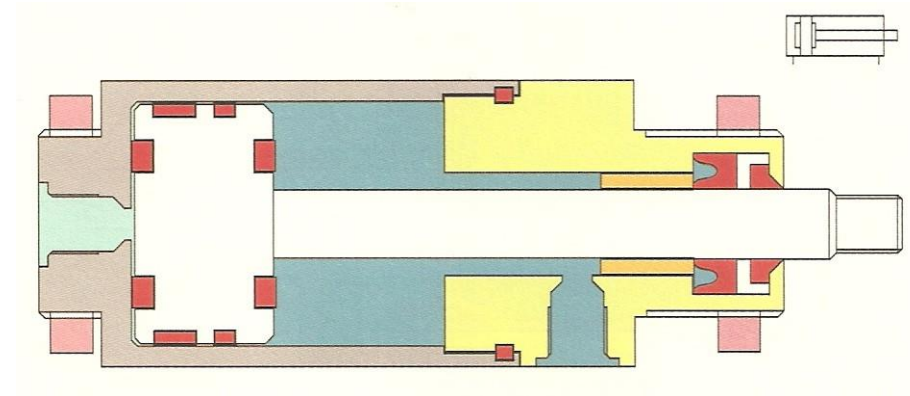
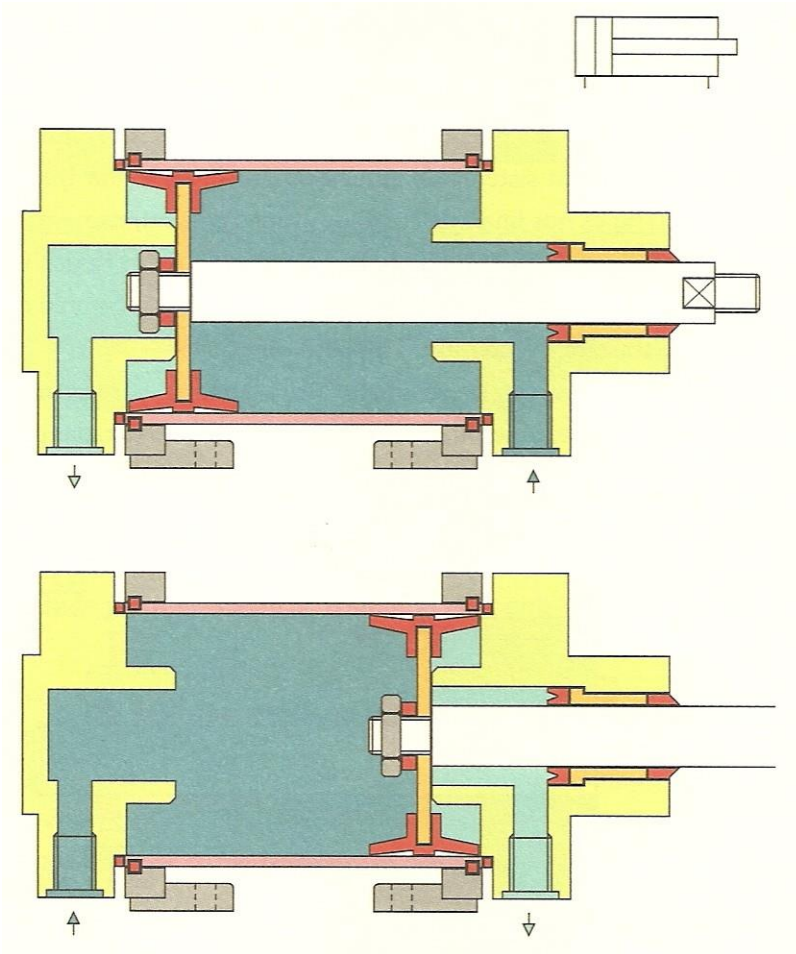


✓ Atuadores Lineares

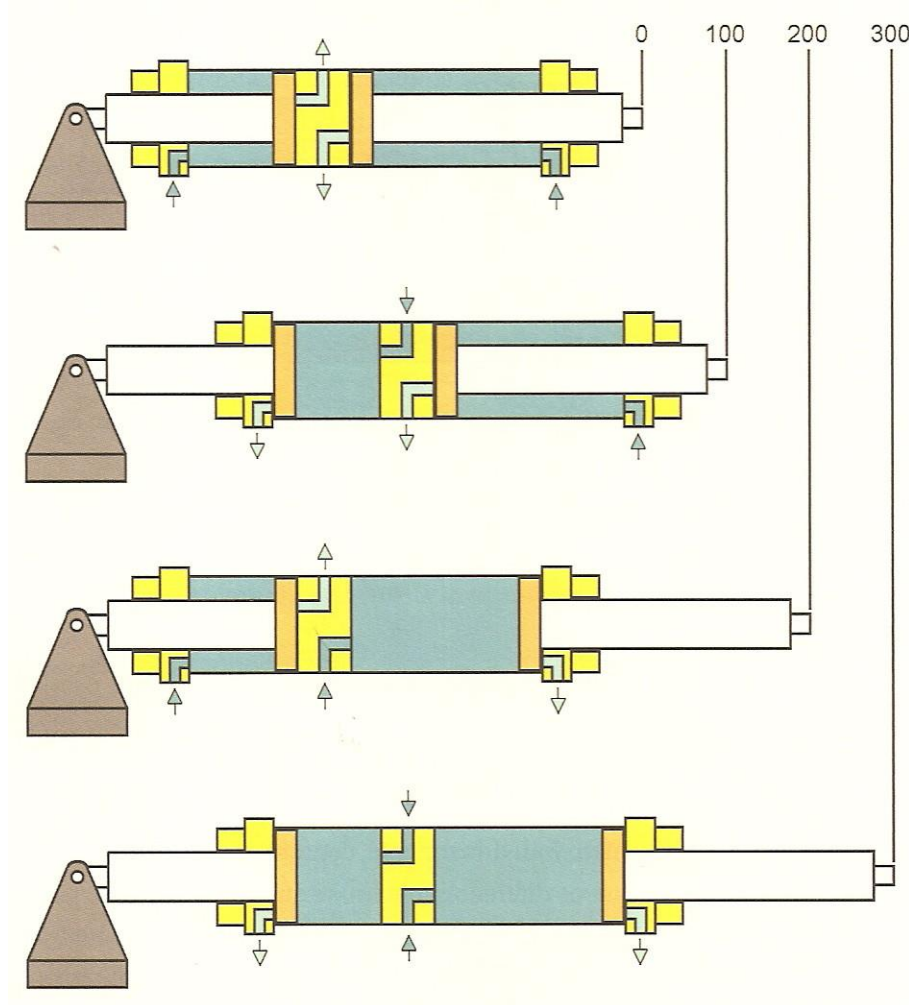
- **Simple AÇÃO**



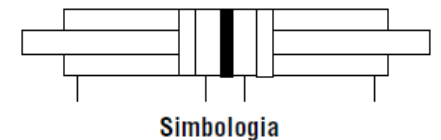
- ✓ **Atuadores Lineares**
 - **Dupla Ação**



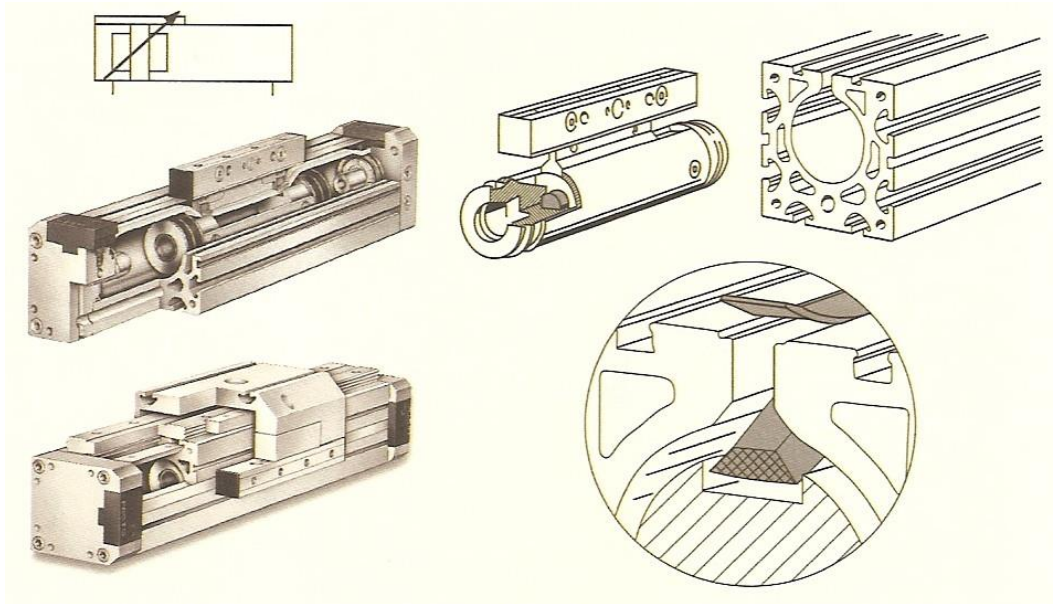
- ✓ **Atuadores Lineares**
 - **Dupla Ação**



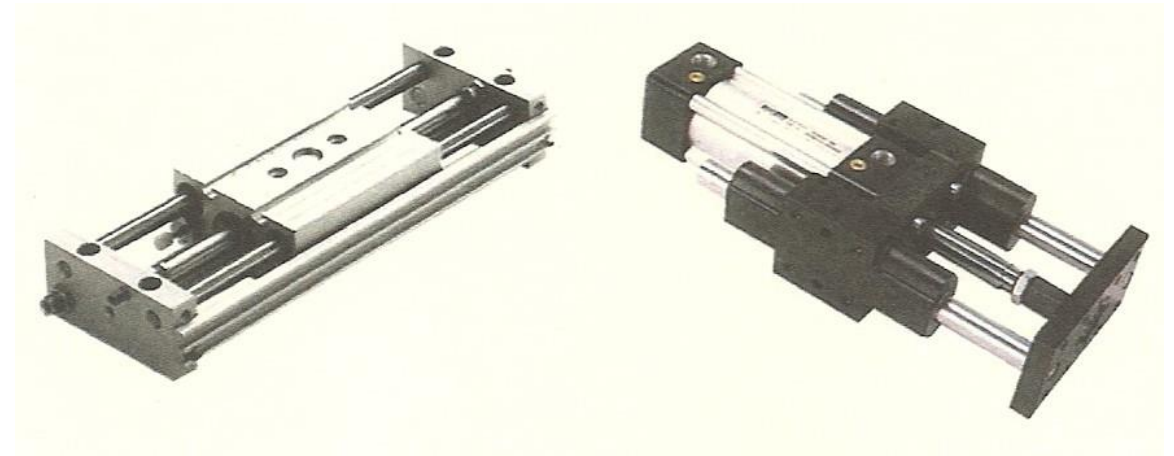
Múltipla
Posição



- ✓ **Atuadores Lineares**
 - **Dupla Ação**



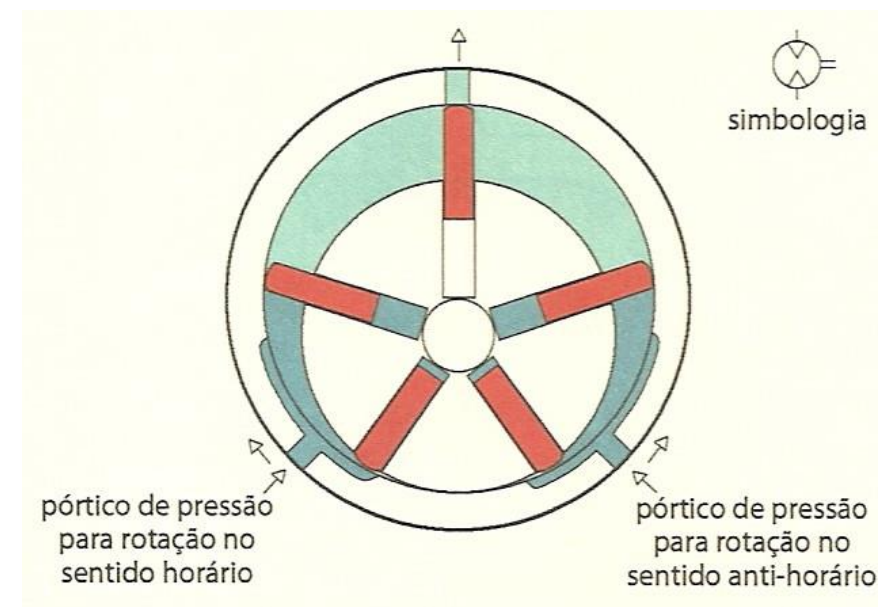
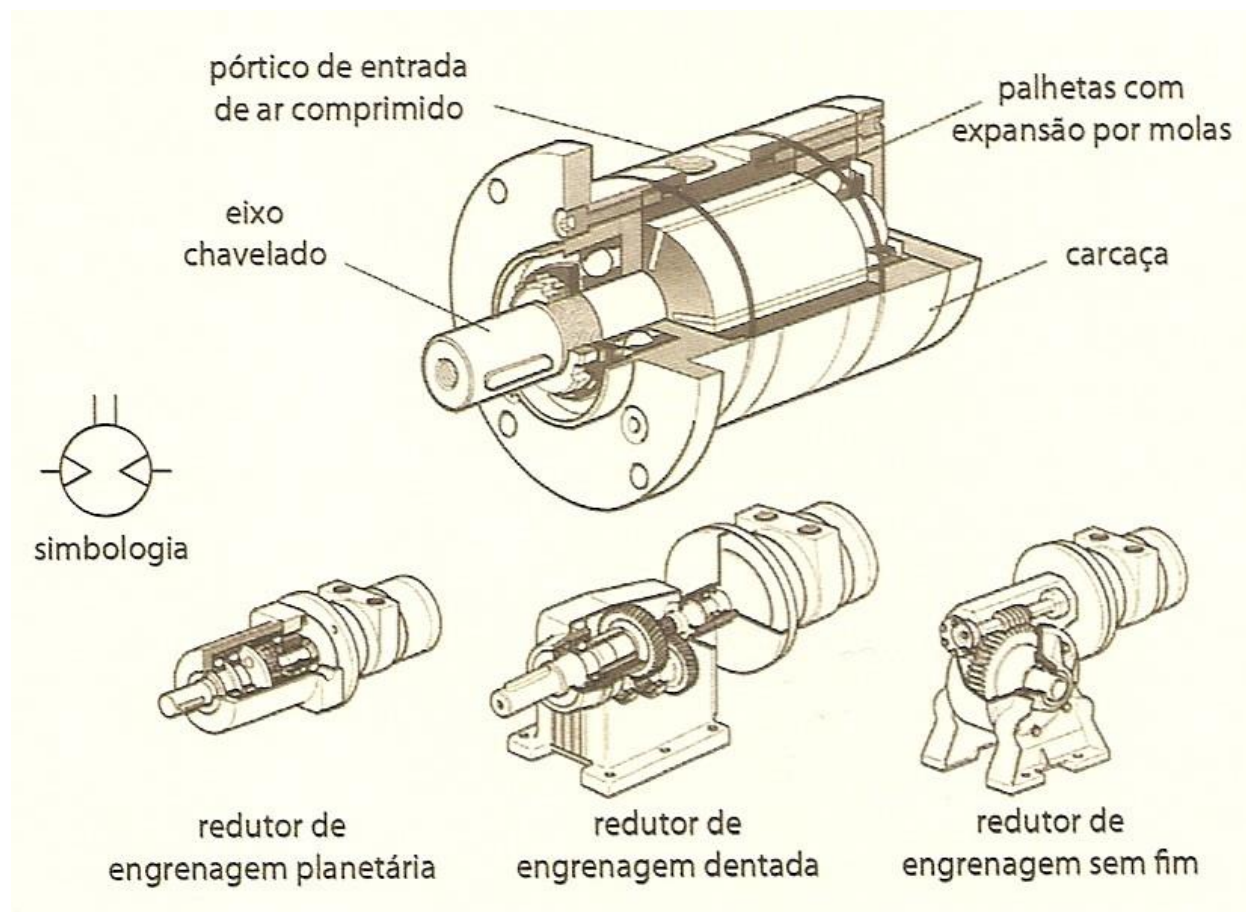
Sem Haste



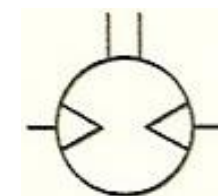
Guia Linear

✓ Atuadores Rotativos

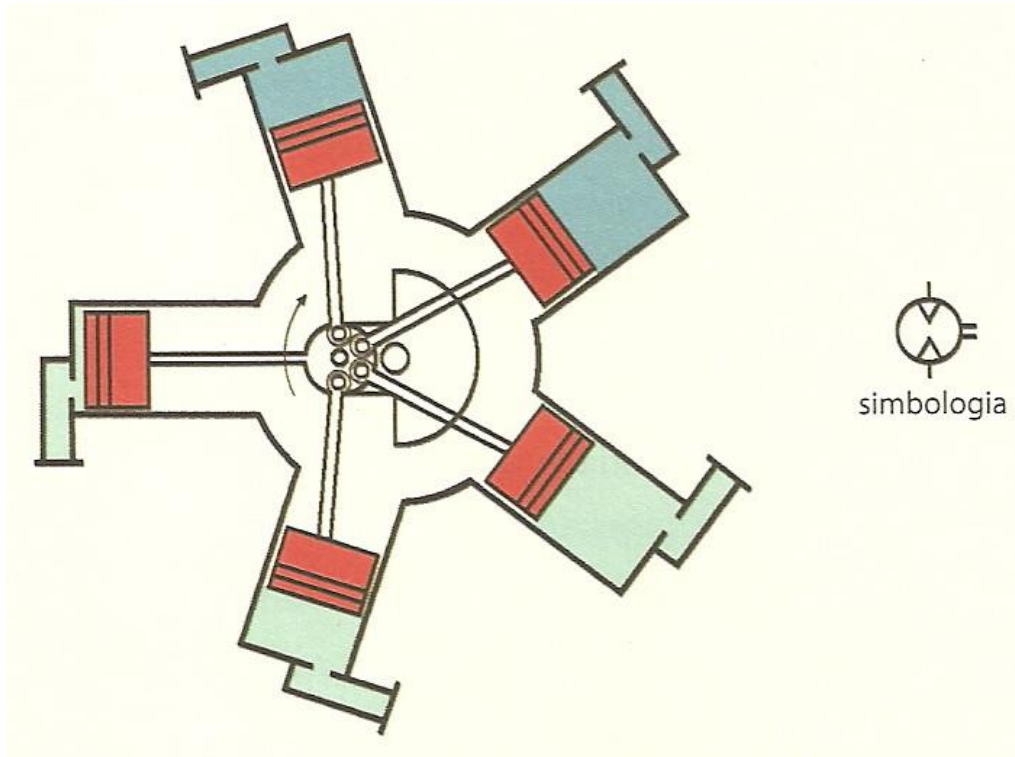
• Contínuo



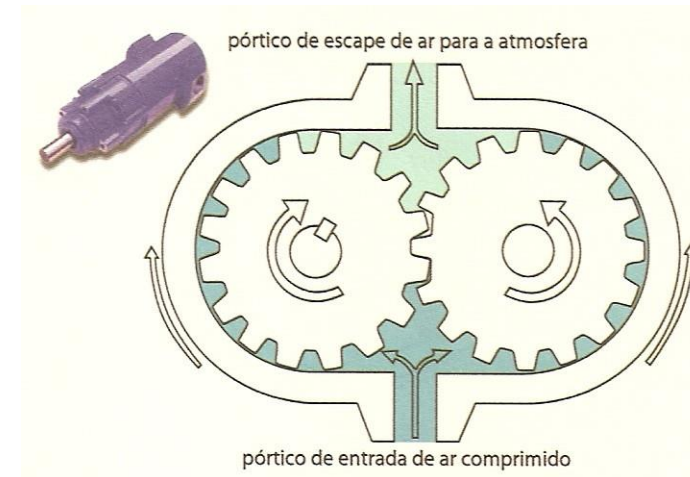
Palhetas



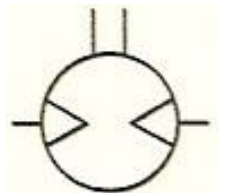
- ✓ **Atuadores Rotativos**
 - **Contínuo**



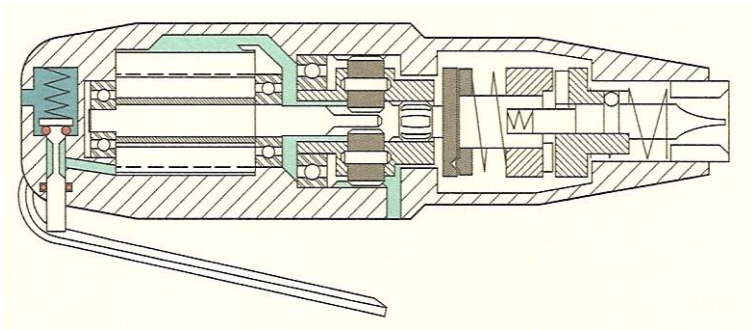
Pistão



Engrenagens



- ✓ **Atuadores Rotativos**
 - **Contínuo**



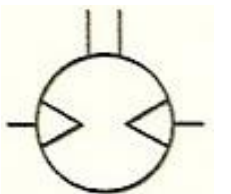
Palhetas

Parafusadeira
"Chicotinho"



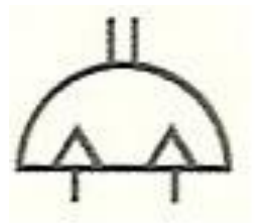
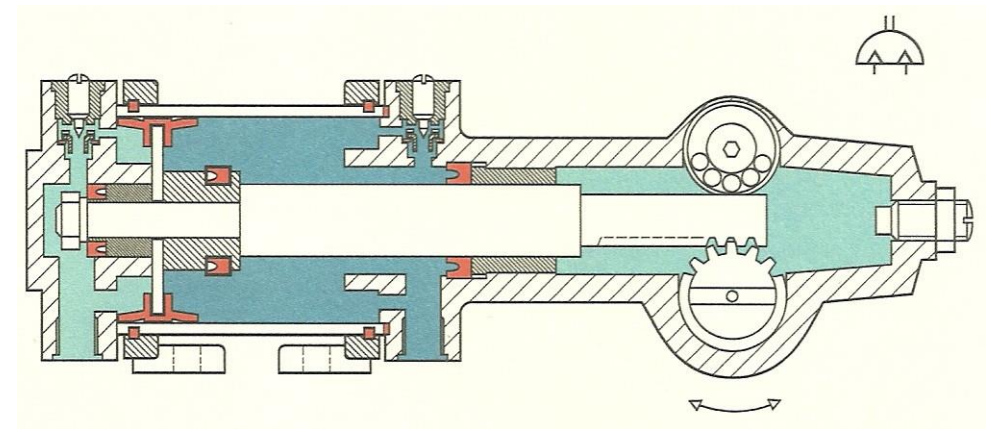
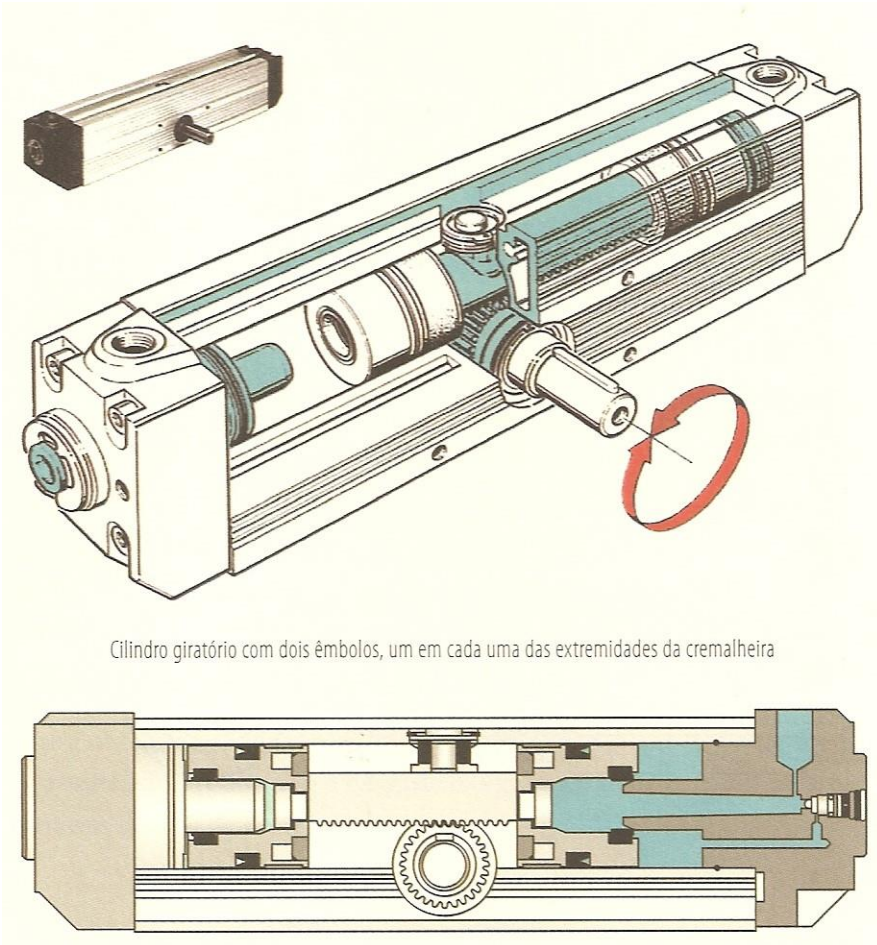
Turbo Motor

"Motorzinho de Dentista"



✓ Atuadores Rotativos

- Limitado



- ✓ **Atuadores Rotativos**
 - **Limitado**

