AIR/OIL BOOSTER

The pressure multiplier uses a combination of air and oil to generate considerable pressures. The principle is based on the difference of the surface of the two pistons, which are connected by a single piston rod, so the pressure increases in proportion to the ratio of the two areas. The circuit is connected to the oil container allowing automatic compensation for minor leakage at each stroke. The pressure multipliers can be mounted in any position, but the recovery tank must be positioned vertically, higher than the multiplier. The use of FRL units of a suitable capacity in nl/min is required for efficient air treatment. It is advisable to mount a non-return valve before the pneumatic valve for use when the compressed air supply fails.

APPLICATIONS

For operating single-acting and dual-acting hydraulic cylinders. Clamping tools, vices, dies and moulds, device for bending, cutting, punching, drawing, calking and marking, and riveting modules.

\[(P) = \text{COMPRESSED-AIR RETURN}\]

\[(M) = \text{SPRING-LOADED RETURN}\]

TECHNICAL DATA

<table>
<thead>
<tr>
<th></th>
<th>SERIES 01</th>
<th>SERIES 02</th>
<th>SERIES 03</th>
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</thead>
<tbody>
<tr>
<td>Bore</td>
<td>100</td>
<td>100</td>
<td>160</td>
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<tr>
<td>Volume of oil supplied</td>
<td>11.57</td>
<td>31.196</td>
<td>19.149</td>
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<tr>
<td>Maximum pneumatic input pressure</td>
<td>8</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Maximum hydraulic output pressure</td>
<td>312</td>
<td>100</td>
<td>500</td>
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<tr>
<td>Working temperature range °C</td>
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<td>-10° to +70</td>
<td></td>
</tr>
<tr>
<td>Recommended oil</td>
<td></td>
<td>DEXRON ATF</td>
<td></td>
</tr>
<tr>
<td>Fluid</td>
<td></td>
<td>Filtered lubricated or unlubricated air</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>If lubricated air is used, lubrication must be continuous</td>
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KEY TO CODES

<table>
<thead>
<tr>
<th>Z52</th>
<th>02</th>
<th>100</th>
<th>28</th>
<th>05</th>
<th>P</th>
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<tr>
<td></td>
<td>SERIES</td>
<td>BORE</td>
<td>PISTON ROD DIAMETER</td>
<td>STROKE (CM)</td>
<td>RETURN</td>
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<td>100</td>
<td>16</td>
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<td>160</td>
<td>22</td>
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</tbody>
</table>

Pneumatic
M Spring-loaded (stroke 05 only)

P

P

COMPONENTS OF MULTIPLIERS 01 AND 03

1. TAPPO TER: coperchio sconsolato
2. CARICA 020: acciaio sconosciuto
3. VIOLI DI SPINGE: acciaio sconosciuto
4. TESTATA ANTERIORE: alluminio da finestra
5. BANB: acciaio sconosciuto
6. TESTATA POSTERIORE: alluminio da finestra
7. DADO CIECO: acciaio sconosciuto
8. GRANDENE 03: sconosciuto
9. GRANDENE 04: alluminio C 4410
10. GRANDENE 05: acciaio FBR
11. GOLLE: acciaio C 44 (multiplicator version '02')
12. CABECIA: tubo alluminio anodizzato 0160 alluminio profilo ed anodizzato 0130
13. STELO: coperchio con cavo lato anteriore
14. GRANDENE 05: alluminio (versione '010')
15. FUSIONE: alluminio da finestra
16. CERCHIO: acciaio sconosciuto
17. SERBATOIO OLEO
18. SERBATOIO: offene sconosciuto
COMPONENTS OF MULTIPLIER 02 e riferimenti

1. TAPPO TR: acciaio zincato
2. CASSA OLO: acciaio verniciato
3. VITE DI SPEG: acciaio zincato
4. FILTRO SINTERIZZATO: bronzo
5. CAMICIA: alluminio profilato ed anodizzato 0100
6. BRACCIO: acciaio zincato
7. RESTA POST: alluminio da fusione
8. DADO CIECO: acciaio zincato
9. GUARNIZIONE STEL: poliuretano
10. GUARNIZIONE: Klingersil C-4430
11. GUARNIZIONE OR: gamma NBR
12. GUARNIZIONE STEL: gamma NBR
13. STEL: acciaio cromato temprato
14. PROLUNGA STEL: acciaio zincato
15. PISTONE: gamma
16. GUARNIZIONE OR: gamma NBR
17. SERBATOIO OLO
SAMPLE APPLICATIONS

As explained above, the operating principle of pressure multipliers is based on the different surface of the two pistons, so the pressure increases directly in proportion to the area conversion ratio. An example of this concept is explained below.

Let us suppose the first piston has a surface area of 200 cm² and pushes a second piston with a surface area of 8 cm². The pressure reached by the oil is as follows:

\[
200 \text{ cm}^2 / 8 \text{ cm}^2 = 25 \times 6 \text{ bar (air)} = 150 \text{ bar (oil)}
\]

Therefore a hydraulic cylinder with an inside diameter of 40mm will generate the following force:

\[
12.56 \text{ cm}^2 \times 150 \text{ bar} = 1884 \text{ Kg (1884 DaN)}
\]

EXAMPLE 1 – Control diagram for single-acting hydraulic cylinders

When a 5/2 valve sends a signal, air enters the multiplier and pushes the first piston. The second piston, which is connected to the first, plunges into an oil chamber, generating a pressure that is converted into a thrust force operating the two connected cylinders.

When the opposite signal is sent, the oil re-enters the chamber, aided by the springs in the cylinder.

Oil in the tank is used to make up for any leaks.
EXAMPLE 2 – Control diagram for dual-acting hydraulic cylinders

When a 5/2 valve sends a signal, air enters the multiplier and pushes the first piston. The second piston, which is connected to the first, plunges into an oil chamber, generating a pressure that is converted into a thrust force operating the two connected cylinders. The cylinder return is regulated in this case by the pressure of the air in the compensator A. Another multiplier can be installed instead of the compensator.

OIL FILLING METHODS

When designing the hydraulic circuit, it is necessary to take an important operation into consideration. The oil tank must be positioned at the highest point of the circuit so that excess air can be released and the pressure maintained without any residual air.

1. Multiplier not pressurised
2. Fill with oil

METHOD 1 – Multiplier not pressurised

Connect the high-pressure pipe to the multiplier outlet.
Do not pressurize the surface, leaving the piston in the home position (1).
Fill the recovery tank (2) with oil until it starts to come out of the pipe.
The circuit is now full of oil, so connect the cylinder to the end of the pipe.

Aganciare il tubo alta pressione all’uscita del moltiplicatore.
Non immettere aria nel circuito lasciando il pistone a riposo(1).
Inserire olio nel serbatoio di recupero fino a farlo fuoriuscire dal tubo (2).
A questo punto tutto il circuito è pieno di olio quindi agganciare il cilindro all’estremità del tubo.
METHOD 2 – Multiplier pressurised

Connect one end of the high-pressure pipe to the multiplier outlet. Pressurise the multiplier, WITHOUT FILLING WITH OIL (1). Connect the other end of the pipe to the cylinder (2) and fill the tank (3) with oil. Depressurise the multiplier – you can see the oil in the tank returning to the steel chamber. Unscrew the cylinder lead screw (4) slightly and feed LOW pressure air into the multiplier. Oil will start to come out of the hole in the cylinder after a few cycles. Close the valve.

N.B. Do not unscrew the bleed screw completely as you would lose control of the oil.