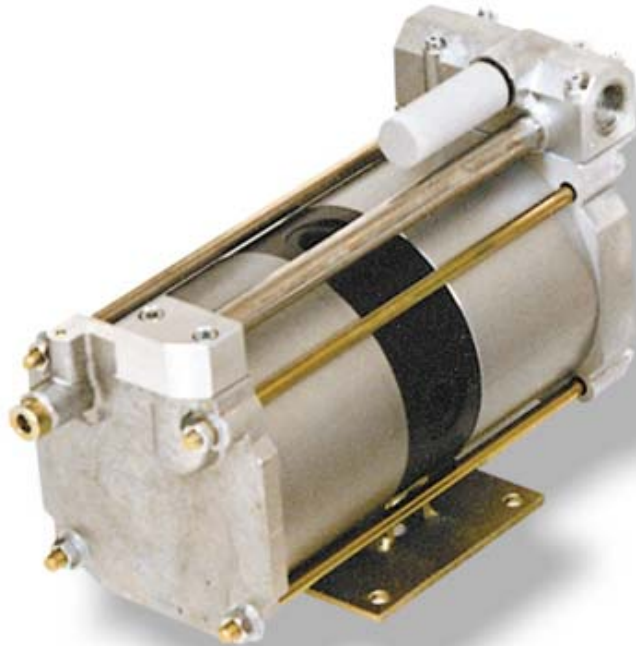


Operating, maintenance and repair  
instructions for

# MAXIMATOR<sup>®</sup> Air Amplifier

## SPLV2



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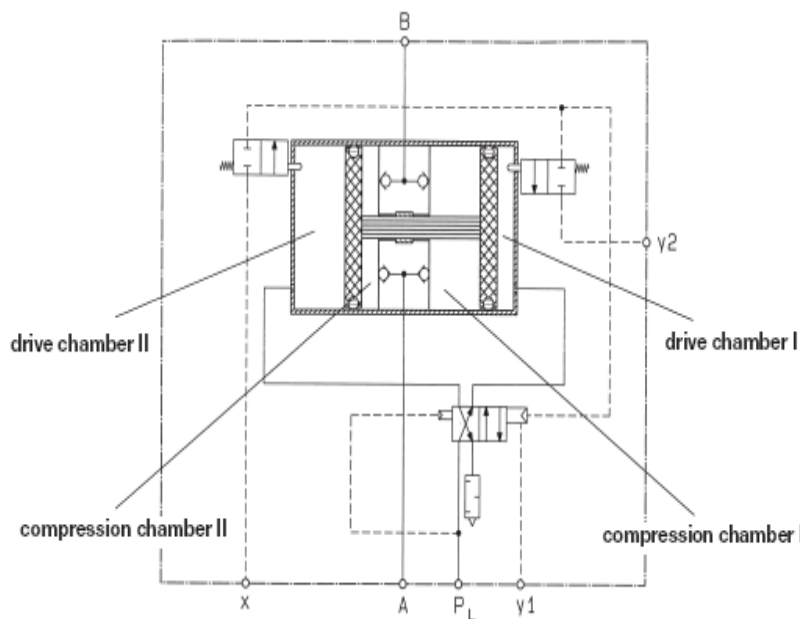
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## 1. Function principle of SPLV2

MAXIMATOR pneumatic amplifiers are driven by air pressure and increase the pressure according to the given ratio. With a constant pressure in the pneumatic system a brief or locally needed high pressure level can be generated. Pneumatic amplifier stations are equipped with a receiver which reduces pressure fluctuations and have a larger air capacity available immediately. The amplifier indicator gives the ratio. A floating slide valve pumps the piston or pistons alternately with working pressure. The reversal process is set in motion by the pilot valves which are activated in the end position of the piston or pistons. Check valves protect the intake and outlet connectors.



- $P_L$  = drive pressure air
- A = supply pressure
- B = pressure outlet
- $Y_1$  = exhaust control valve
- $Y_2$  = Exhaust pilot air
- X = Control mechanism (possible an external connection to the control mechanism)

The supply air flows through check valve b from connector A and enters compression chamber I and II. The drive pressure (connector  $P_L$ ) fills drive chamber II via the control slide valve as the pressure is released from the drive chamber I.

By means of its motion, the piston reduces the volume of the compression chamber II and the pressure is increased. The operating pressure reaches the outlet of the machine (connector B) by means of the check valve a.

Upon reaching the final position, the pilot valve switches the control slide valve, the air in drive chamber II is released and the pressure increase takes place in the compression chamber I.

Example:

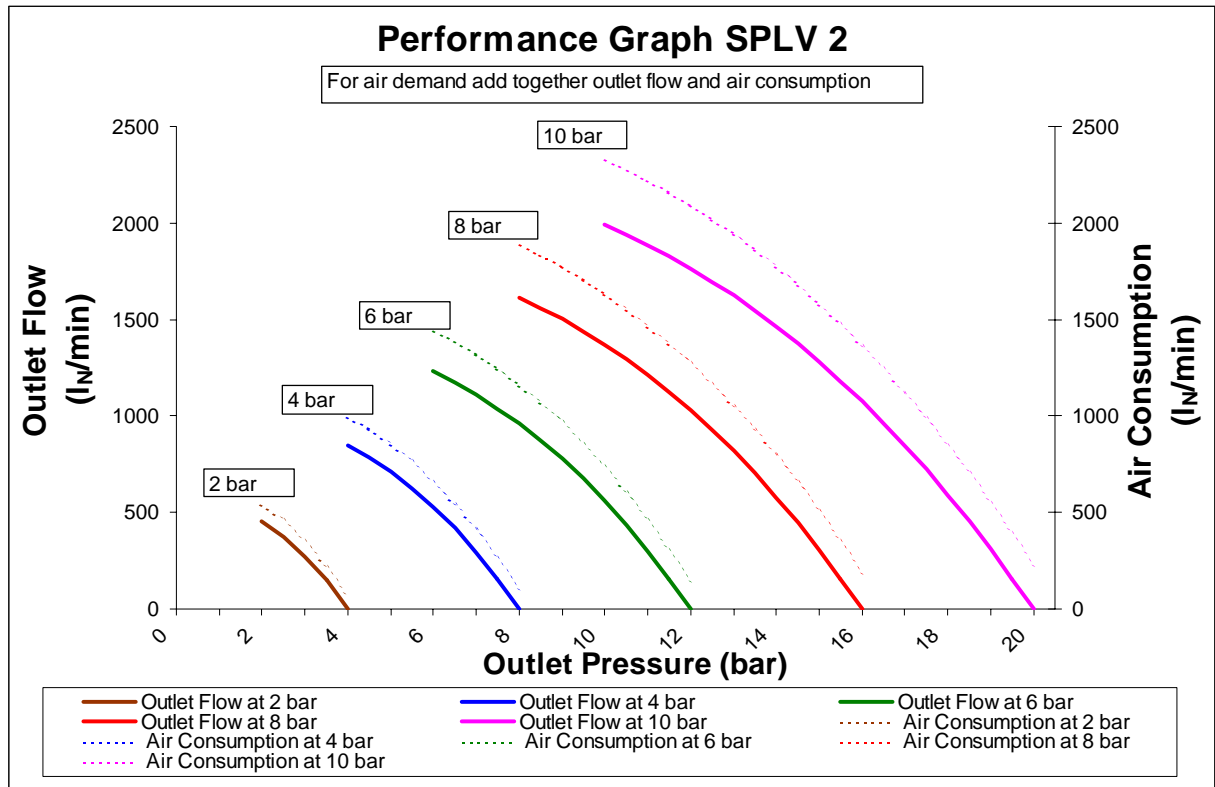
drive chamber II	= 4 bars
+ compression chamber I	= 4 bars
compression chamber II	= 8 bars

In pneumatic amplifiers with connector X, the pilot air flows in from the outside. To that end, it is branched off from the drive air pressure and reaches connector X through the conduits. A pressure switch in the control mechanism switches the amplifier on and off when the pressure is set.

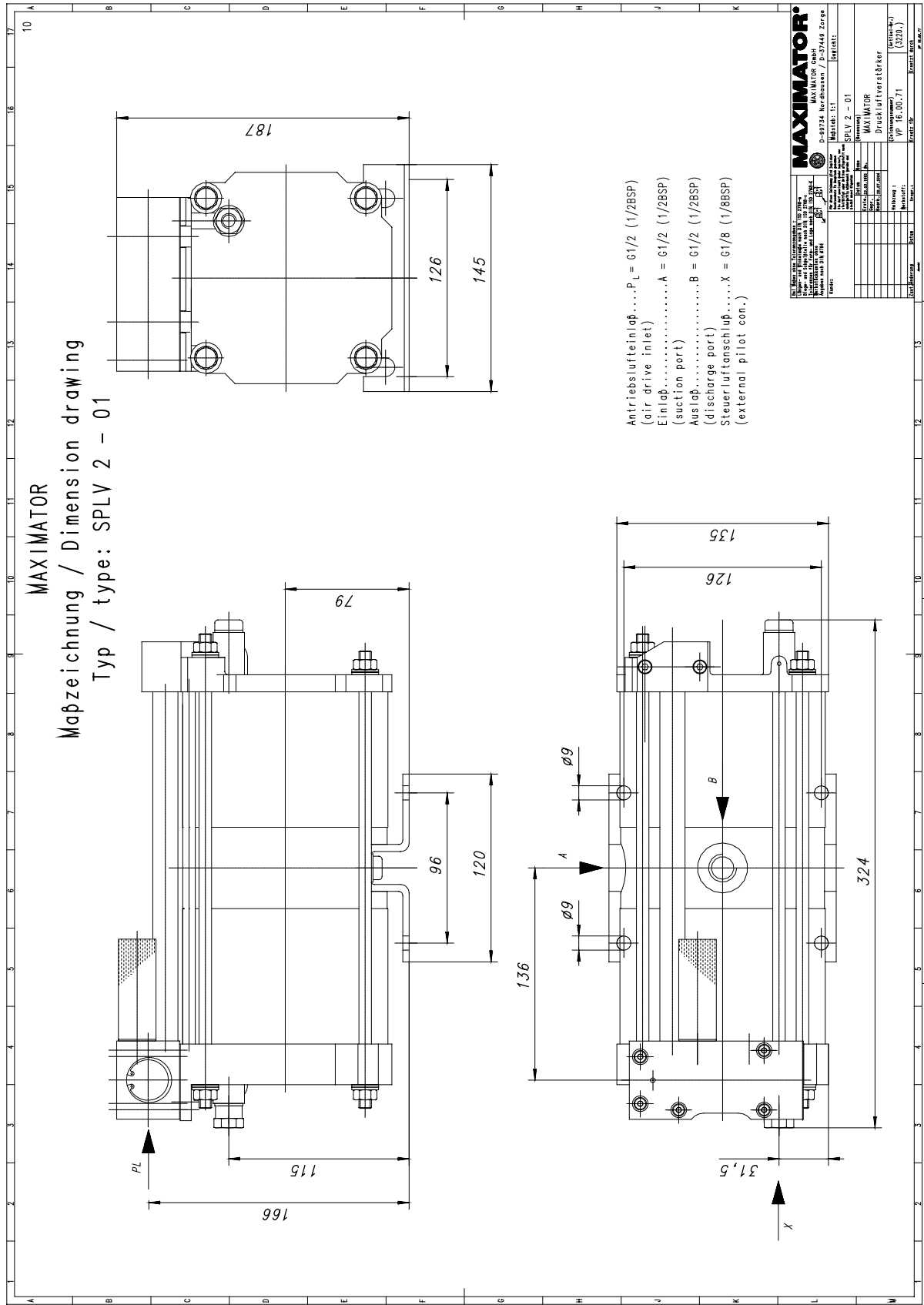
## 2. Technical data

Pressure ratio (i)	1 : 2
Air drive pressure (PL)	1-10 bar
Max. discharge pressure (PB)	16 bar
Max. noise level	79 dB (A)
Max. operating temperature (T)	60 °C
Air drive connection	BSP 1/2"
Inlet connection	BSP 1/2"
Outlet connection	BSP 1/2"
Net weight	8.5 kg

## 3. Performance graph



#### 4. Dimension and Connection Drawing



## **5. Safety**

The MAXIMATOR pneumatic amplifier was constructed in accordance with the established technical regulations as described in the law regulating technical working devices

(machines protection law), the accident protection provision and the pressure tank statute.

These provisions should also be given attention when installing or using the pneumatic amplifier. MAXIMATOR pneumatic amplifiers are only intended for air compression. Please consult the manufacturer in cases where other gases are being considered for use.

The connections and attachment parts must be compatible with the system pressure. Appropriate methods must be implemented to make certain that the drive pressure and supply pressure (pL and pa) do not exceed the permissible limit of 10 bars. The system should be completely depressurised before any repairs take place.

### **5.1 Pneumatic amplifier**

Safety devices should prevent more than 10% increase in permissible operating pressure limits. The safety devices, in accordance with the pneumatic amplifier, cannot be blocked off, should be given regular functional checks and be easily accessible. Measurement devices should be included to monitor the compressor pressure.

The provisions regulating pressure tanks should be considered when using a pressure tank that is topped up by another object or device.

### **5.2 Pneumatic amplifier stations**

Pneumatic amplifier stations are devices which meet the safety regulations described in the pneumatic tank provisions. Assuming that no damage has resulted from transportation, no checks or inspection are necessary before the first use.

However, depending on the construction size, regular pressure checks of the pneumatic tank are necessary. Stations with SPLV 2 and GPLV 2 pneumatic amplifiers are equipped with a pneumatic tank of the group III type. These tanks and the built-in safety features should be inspected at least every four years by a qualified technician.

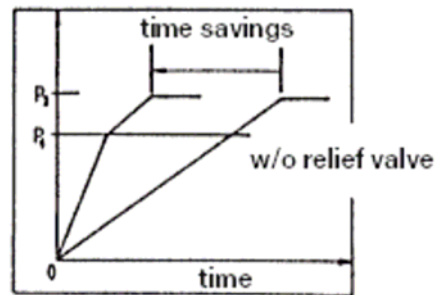
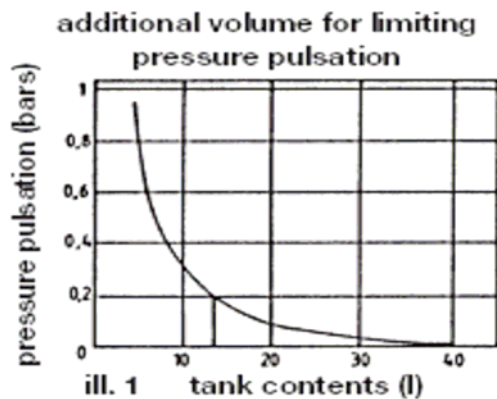
The operating conditions described on the pneumatic tank (pressure and temperature) must be met. Condensation should be released from pneumatic tank at regular intervals.

## **6. Installation / Operation**

The pneumatic amplifier used with oiling device must be still operated with oiling device in future. A filter with maximum mesh width of 5 m. should be installed into the air conduits of the drive (see also point maintenance).

## 6.1 Pneumatic amplifiers

The pneumatic amplifiers can be operated in any installed position. For the pressurized air connector we recommend our control unit "C 2" with filter, water separator, shutoff valve, pressure regulator, pressure control gauge.



As with usual piston seals, pressure pulsation sometimes result from stroke frequency. The can be reduced with an additional volume (pneumatic tank) (see illustration 1). The loading time of this additional volume, as is the case with large volumes following the pneumatic amplifier, can be reduced by means of a bypass conduit. To that end, to bypass the pneumatic amplifier a connection with a relief valve is branched off from the pneumatic connection. The pneumatic amplifier begins with a pressure increase if the operating pressure  $p_b$  is equal to the intake pressure  $p_a$  (see illustration 2). Pneumatic amplifiers with external pilot air intake valves have a connector marked with "X" (possible with SPLV 2 and GPVL 2). The conduits which are branched off from the intake pressure can be used for the installation of a pressure switch (illustrations 5 and 6).

## 7. Maintenance

The pneumatic amplifier are pre-treated with industrial strength grease and need no additional greasing. When overhauling the pneumatic amplifier, the control slides and the air pistons should be treated with acid-free and silicon-free grease.

On a high stroke frequency  $\geq 150$  strokes/min or  $> 50\%$  continuous duty an air pressurized oiling device shall be installed in front of the unit.

## **8. Maintenance tips**

Only use original MAXIMATOR replacement parts when conducting repairs. When repairing or maintaining the pneumatic amplifier, pay special attention to cleanliness so that you can increase the operation life and guarantee good functional operation. During installation, pay special attention to the torque (8Nm) for the nuts of the 4 stay rods so that you can avoid a faulty gripping and the upper or lower sections.

## **9. Compressed air quality**

The drive air should have a quality class of 3 to 4 (solids / water / oil) according to DIN ISO 8573-1:

<b>Solids:</b>	maximum particle size 5 $\mu$ maximum particle concentration 5 mg/m <sup>3</sup>
<b>Dew point:</b>	+ 10° C = water content of 9.4 g/m <sup>3</sup> to + 2° C = water content of 5.6 g/m <sup>3</sup>
<b>Oil content:</b>	1.0 to 5 mg/m <sup>3</sup>

By observing this drive air quality, an optimum life time of the seals and packing will be achieved.

### **Operating time:**

All MAXIMATOR products are designed for intermittent operation. Please consult factory for special applications.

### **Technical data:**

All technical and dimensional information subject to change. We reserve the right to alter our products due to technical improvement.

### **Copyright / Patent-right:**

All MAXIMATOR products are subject to copyrights. The protective rights to DIN 34 have to be observed.

### **Important:**

All MAXIMATOR pumps, boosters and amplifiers are treated with silicon free grease during the assembly.



## **10. Guarantee**

All repair work is to be carried out by qualified skilled personnel under extremely clean conditions. Even smallest impurification may cause serious damage at the precision-machined pneumatic components.

All individual pump and compressor parts are available from MAXIMATOR as spare parts. The respective purchase order numbers can be gathered from the drawings attached to each compressor. Typically, there is more than one sealing defective or worn out, hence, we have compiled different sealing kits. The compositions of sealing kits can be gathered from the drawings, like the respective purchase order numbers. Make sure to indicate the compressor serial number when ordering spare parts. The serial number is located in the machine plate of the compressor and is also punched into the compressor housing (as a 6-digit number).

It goes without saying that the most convenient approach for you is to ship a defective unit to us. All repairs are carried out by qualified persons in our workshops, where there are no metal-cutting activities and thus extreme cleanliness is ensured. As a rule we acknowledge the receipt of the forwarded unit and send you a cost estimate and, after your confirmation, repair your unit as quickly as possible and return it to you.

## 11. Amplifier Disassembling

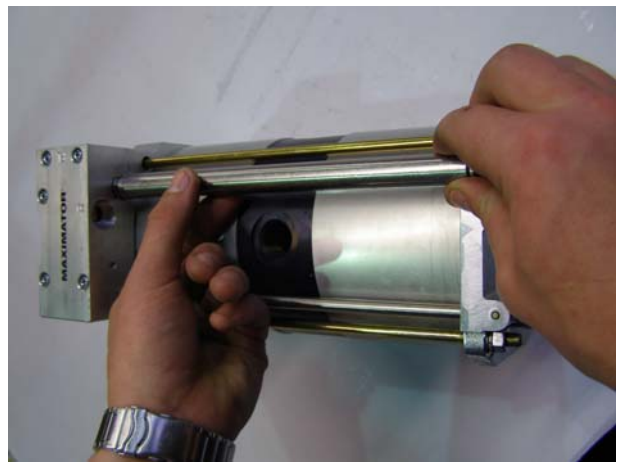
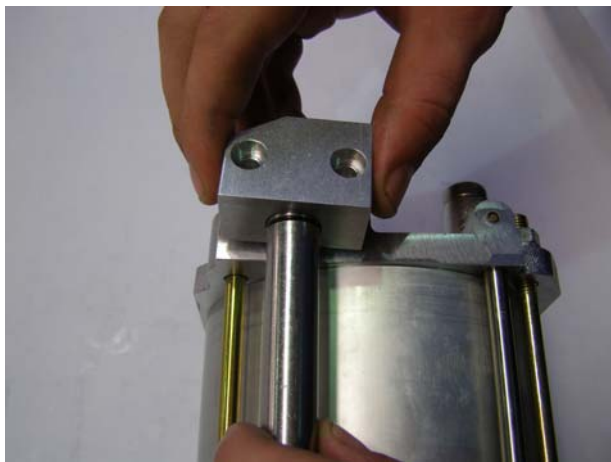
Loosing and disassembling the exhaust muffler (item 14)



Unscrew and disassembling of the two screws (item 46).

Tool size 6

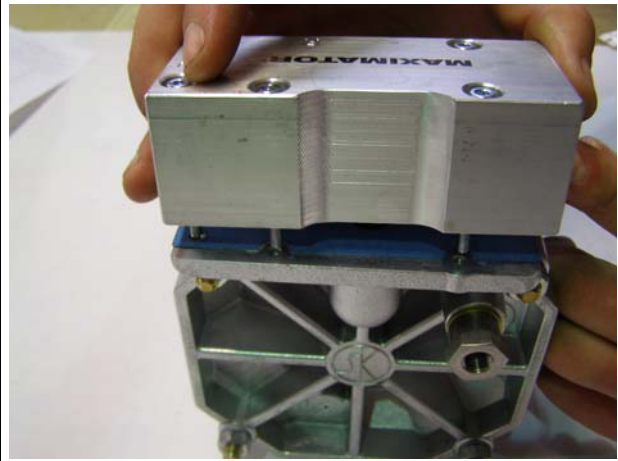
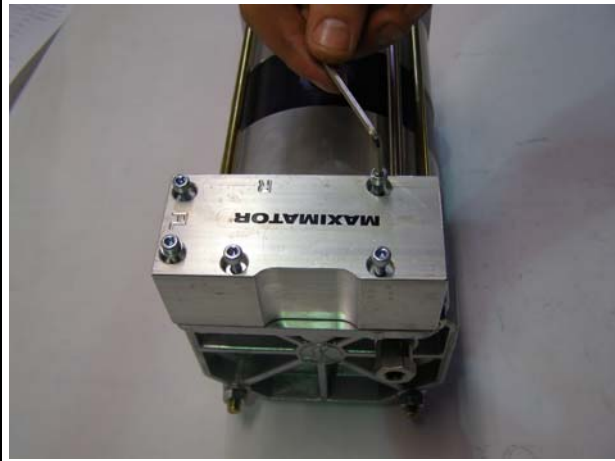
Disassemble the connection block (item 48) and draw the air tube (item 51) out of the spool valve housing.



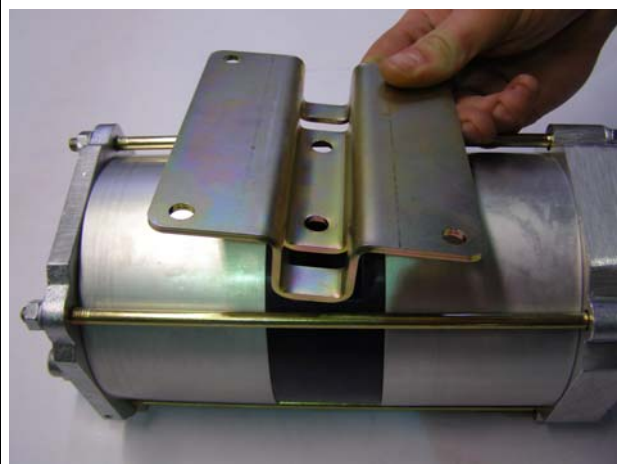
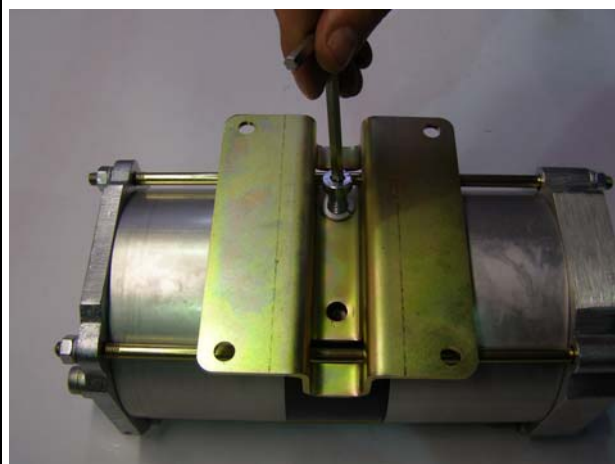


Loosen the five socket head screws (item 13+12) in the spool valve housing.

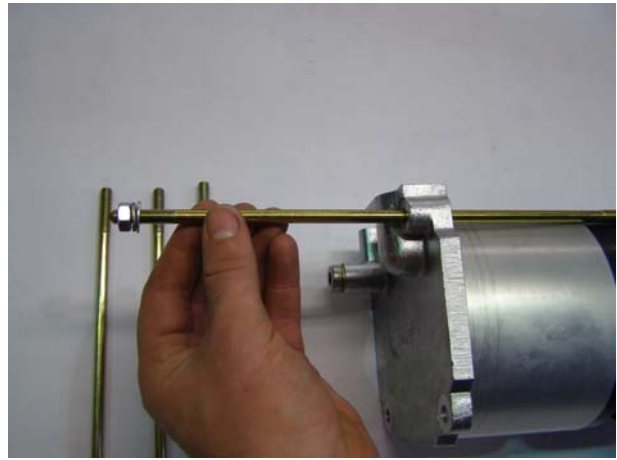
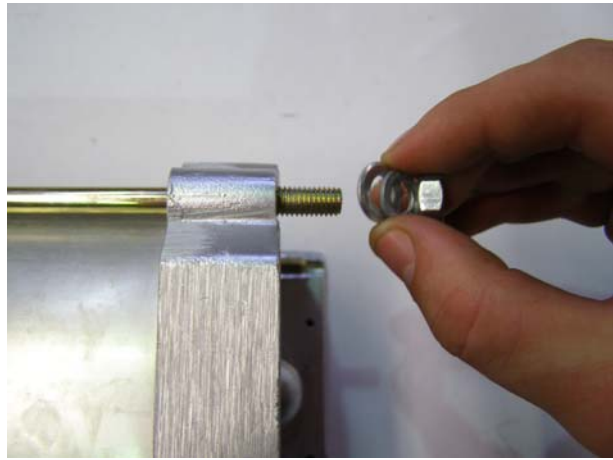
Disassemble the spool valve housing.



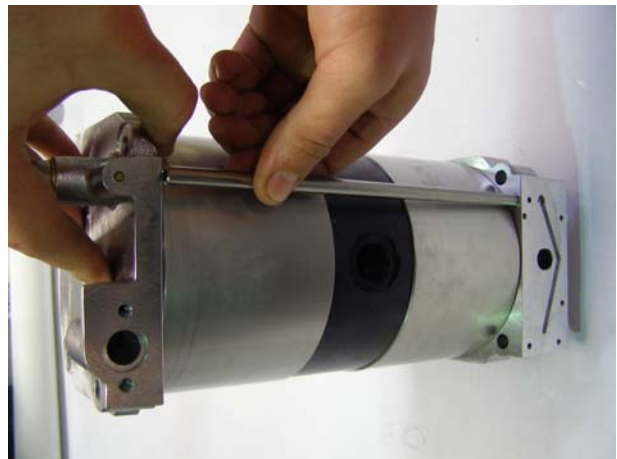
Loosen the two socket head screws (item 44 and 43) and disassemble the base plate (item 42).



Loosen the four hexagon nuts (item 56) and remove the u-washer (item 54) and spring washer (item 55) from the stud bolts.



Carefully separate the bottom cap (item 46), maybe by means of light hammer taps with a plastic hammer, from the air cylinder (item 26) and disassemble the air tube (item 24).



Disassemble the bottom cap (item 46) compl. from the air cylinder (item 26).





Carefully separate the top cap (item 1) by means of light taps with a plastic hammer from the air cylinder (item 26).

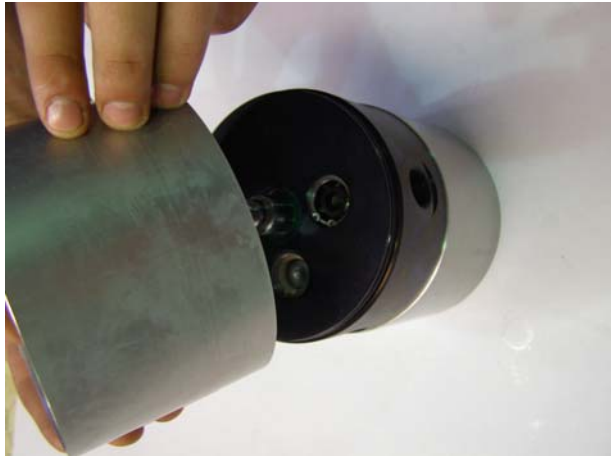
Loosen the two hexagon screws (item 33).

Key size : 19



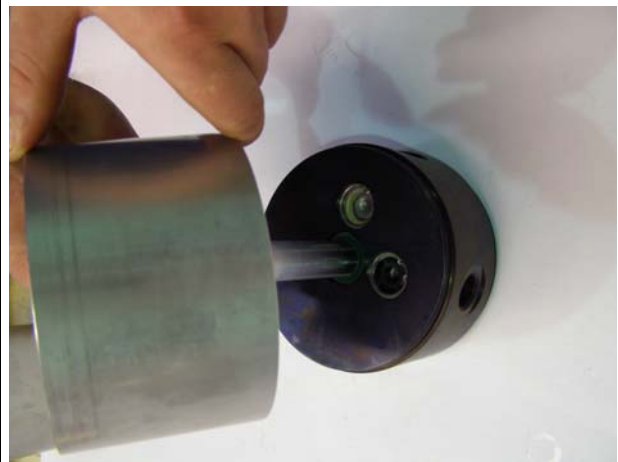
Disassemble the both hexagon nuts (item 33) and u-washers (item 32) from the piston rod (item 27).





Carefully separate the first air cylinder (item 26) from the air separation plate (item 34), maybe by means of light taps with a plastic hammer.

Carefully separate the second air cylinder (item 26) in the same way.



Pull the piston rod (item 27) out of the air separation plate (item 34) and disassemble the two o-ring (item 31) on both ends.



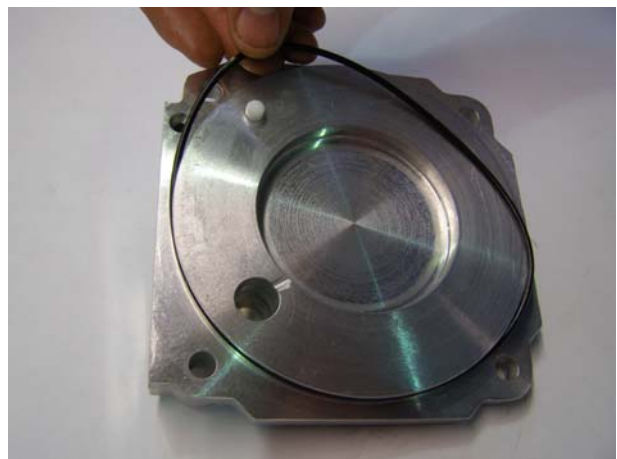


Remove the piston sealing ring (item 30) from the piston (item 28).

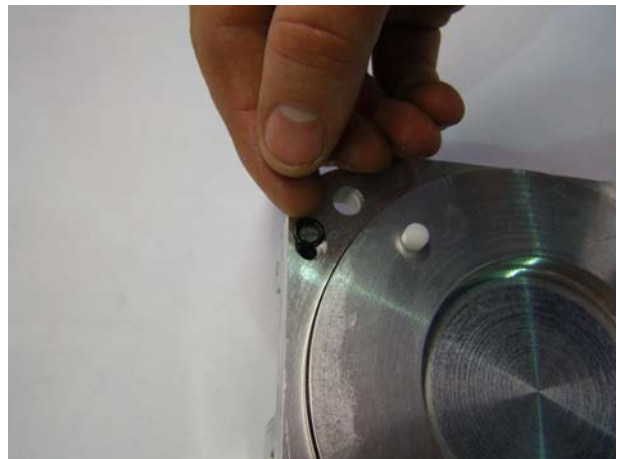
Remove the o-ring (item 29) from the piston (item 28).



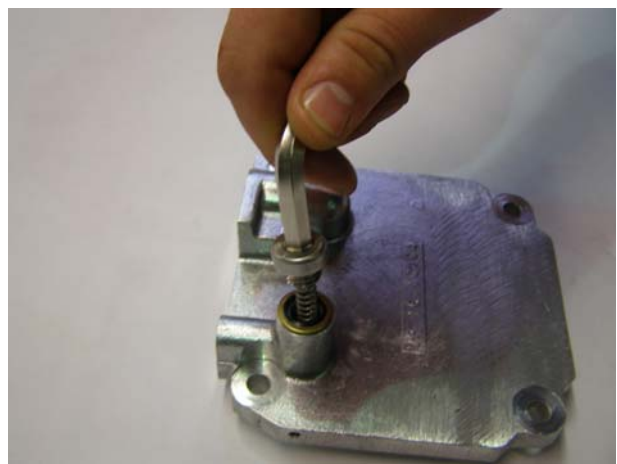
Dismantle the o-ring (item 25) from the bottom cap (item 46).



Dismantle the o-ring (item 23) out of the groove in the bottom cap (item 46).



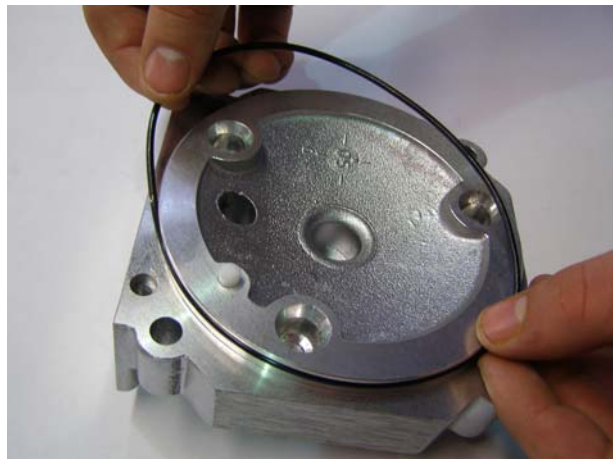
Loosen completely and unscrew the pilot valve screw (item 16).



Disassemble the gasket (item 21), the spring (item 18) and pilot valve tappet (item 19).







Dismantle the o-ring (item 25) from the top cap (item 1).

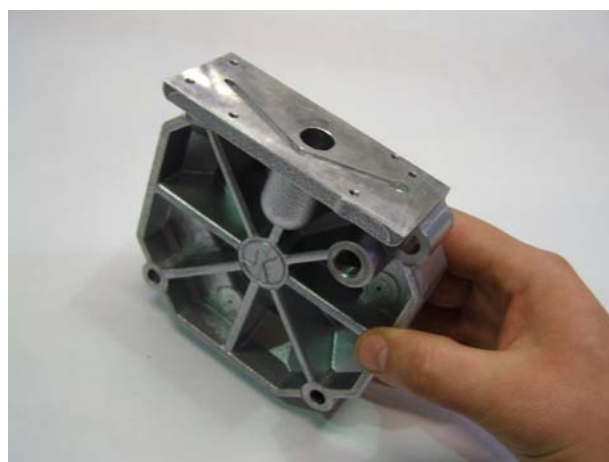
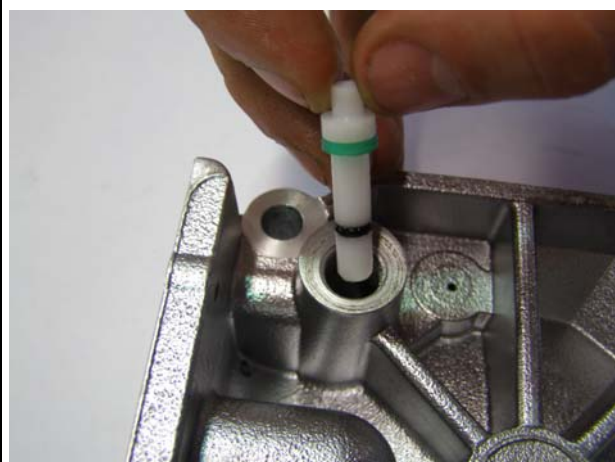
Dismantle the o-ring (item 23) out of the groove in the top cap (item 1).



Loosen completely and unscrew the pilot valve screw (item 15).  
Disassemble the gasket (item 21) and the spring (item 18).



Dismantle the pilot valve tappet (item 19) out of the top cap (item 1).



Air separation plate (item 34) with the compl. check valves .



**11.1 Check valve disassembling**



Remove the locking ring (item 41).

Remove the retainer ring (item 40).



Remove the spring holder (item 39).



Remove the spring (item 38).

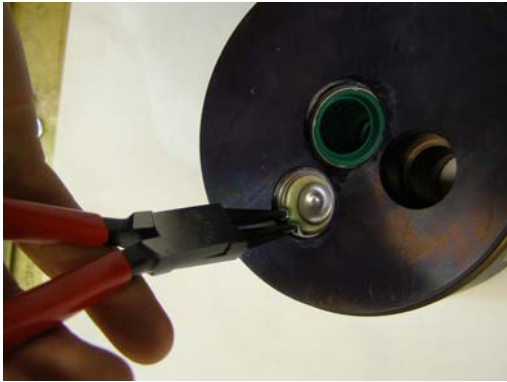
Remove the check plate (item 37).



Remove the check seat (item 36).

Separate the o-ring (item 9) from the check seat (item 36).





Remove the locking ring (item 41).

Remove the retainer ring (item 40).



Remove the check seat (item 36).

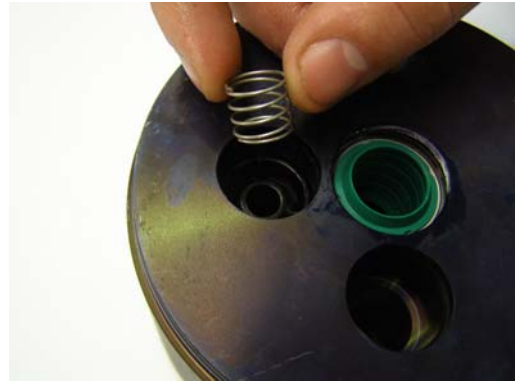
Separate the o-ring (item 9) from the check seat (item 36).





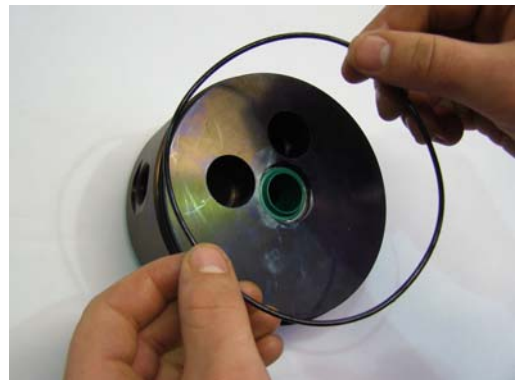
Remove the check plate (item 37).

Remove the spring (item 38).

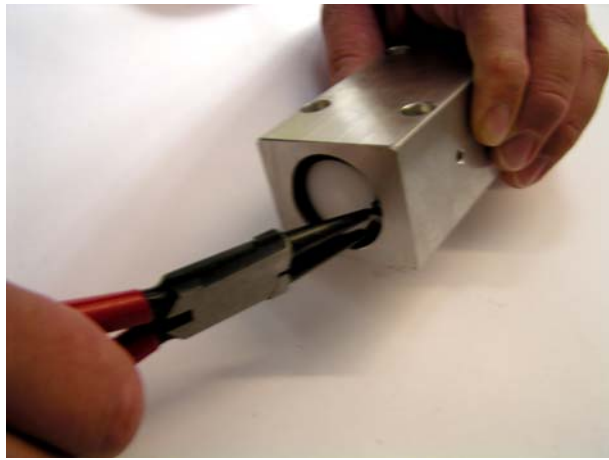


Remove the spring holder (item 39).

Dismantle the o-ring (item 25) from the air separation plate (item 34).



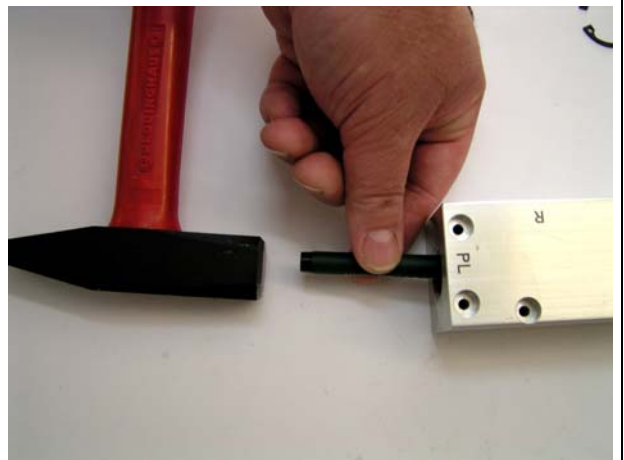
## 11.2 Spool valve disassembling



Dismantle the locking ring (item 11) at the spool valve housing (item 3) with suitable locking ring pliers. (The ring is located opposite the compressed air inlet).

Use a mandrel to force out the spool (item 7) and the spool valve sleeve (item 4) with light strokes of the spool valve housing (item 3).

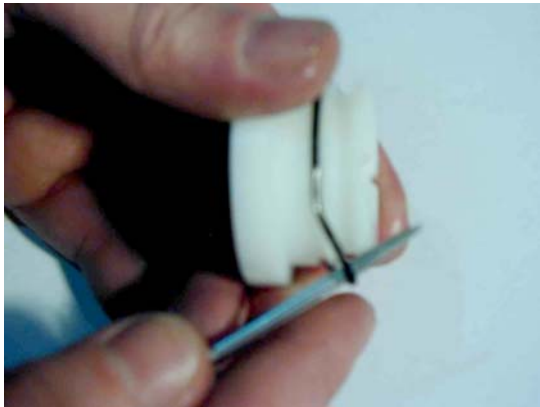
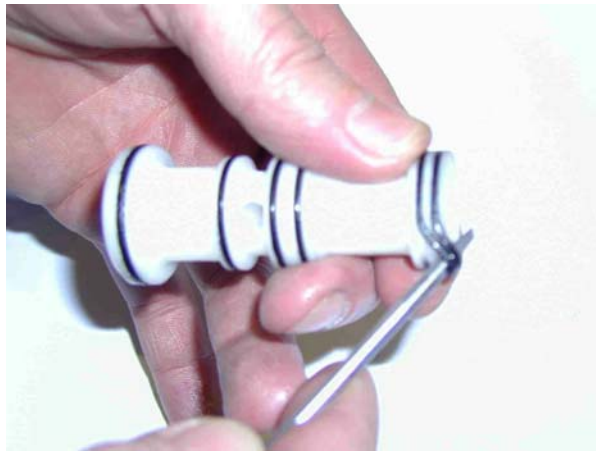
Caution: Make sure to avoid damaging the spool. Preferably use a plastic or wooden mandrel.



The O rings on the spool valve sleeve are statically sealing, i.e. they are not subject to wear and tear. This means that the spool valve sleeve has only to be dismantled when it is damaged. Use a mandrel to force the spool valve sleeve out of the spool valve housing.

Caution: Make sure to avoid damaging the spool valve sleeve. Preferably use a plastic or wooden mandrel with an appropriate diameter.

Remove the O rings from the spool and, if applicable, from the spool valve sleeve.



Remove the O-ring (item 6) from the sealing cap.



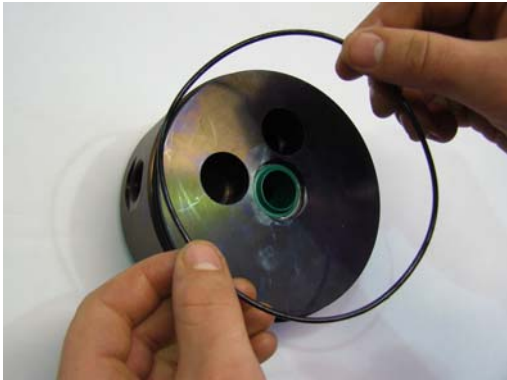
## 12. Amplifier assembling

### 12.1 Check valve assembling



Grease the two o-rings (item 25) and assemble on the air separation plate (item 34).

Assemble the spring holder (item 39) into the air separation plate (item 34).



Assemble the spring (item 38) into the air separation plate (item 34).

Assemble the check valve plate (item 37) into the air separation plate (item 34).





Grease the o-ring (item 9).

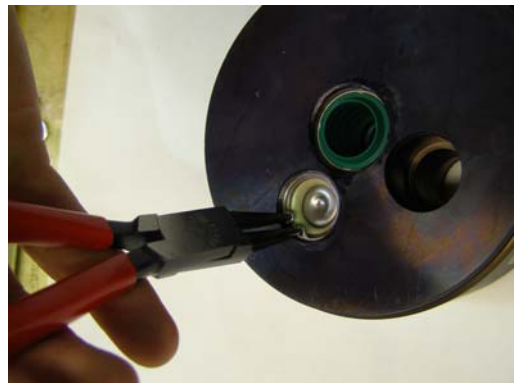
Assemble the o-ring (item 9) on the check valve seat (item 36).

Assemble the valve seat into the air separation plate (item 34).



Assemble the retaining ring (item 40) into the air separation plate (item 34).

Protect the first check valve by assembling the snap ring (item 41).





Grease the o-ring (item 25).

Assemble the o-ring (item 25) on the check valve seat (36).

Assemble the check valve seat (item 36) into the air separation plate (item 34).



Put the check valve plate (item 37) into the air separation plate (item 34).

Put the spring (item 38) into the air separation plate (item 34) and on the on the top side of the check valve plate (item 37).





Assemble the spring holder (item 39).

Put the retaining ring (item 40) on the top side of the spring holder into the air separation plate (item 34).



Protect the second check valve by the snap ring (item 41).

The picture show the compl. pre-assembled air separation plate. Please respect and attend the direction of check valve.



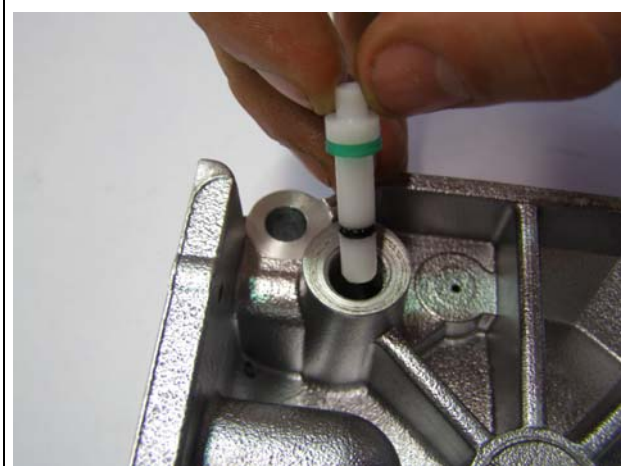
## 12.2 Air drive section assembling



The right picture show the top cap (item 1).

Grease the pilot valve tappet (item 19).

Assemble the pilot valve tappet (item 19) in the top cap (item 1).



Put the pilot valve spring (item 18) into the pilot hole on the top side of cap (item 1).  
Assemble the gasket (item 17).





Insert and tighten the pilot valve screw (item 15).



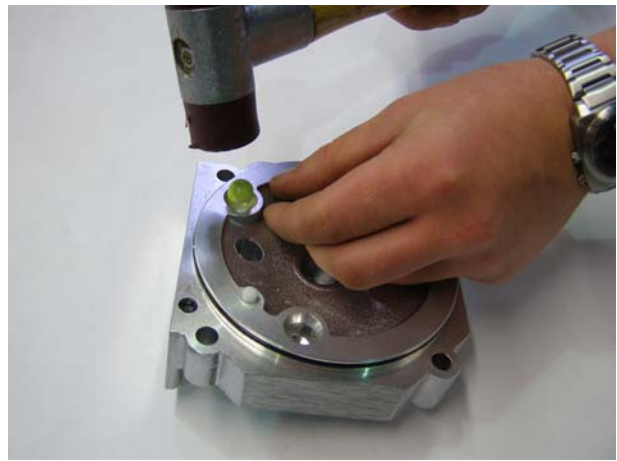
Grease the o-ring (item 25) and assemble the same on the top cap (item 1).



Grease the o-ring (item 23) and insert it into the top cap (item 1).



Insert the damper (item 58) into the top cap (item 1) by means of light taps with a plastic hammer.

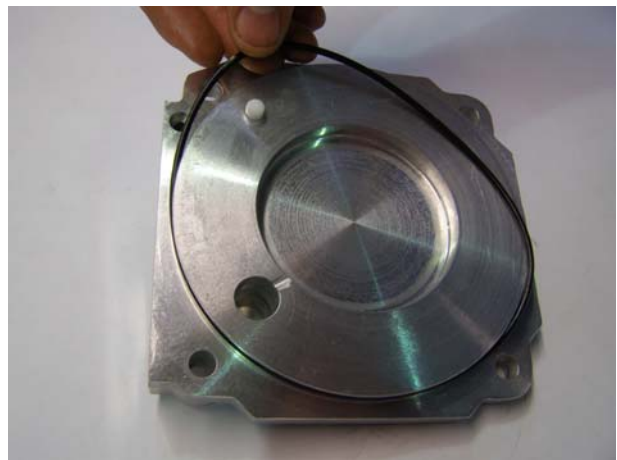


Completed top cap (item 1).



Bottom cap (item 46).

Grease the o-ring (item 25) and mount it on the bottom cap (item 46).



Grease and place the o-ring (item 9) into the bottom cap (item 46).

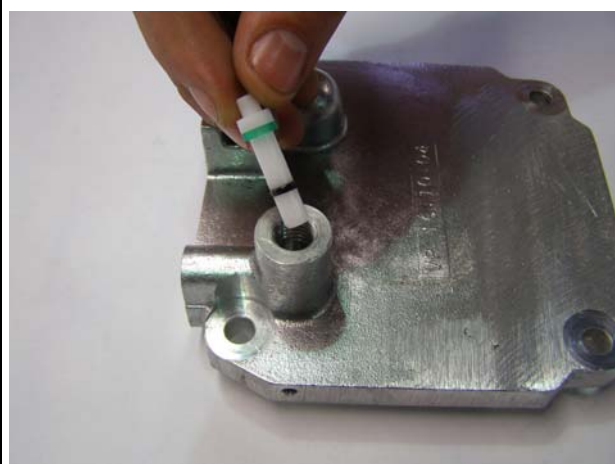






Grease the pilot valve tappet (item 19) and place it into the bottom cap (item 46).

Completed bottom cap (item 46).



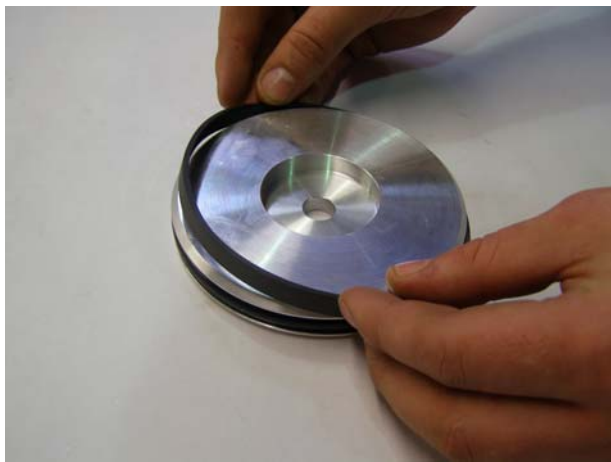
The left picture show the separate parts of air piston consisting of the slide-ring (item 30), the o-ring (item 29) and the piston (item 28). Grease the o-ring (item 29).





Slip the o-ring (item 29) on the piston (item 28).

Attach carefully the slide ring (item 30) on the piston (item 28).



Grease the two air cylinders (item 26).





Insert the pre-assembled piston into the air cylinder (item 26).



Grease the bushing (item 35).

Grease the two o-rings (item 31) for the piston rod (item 27).



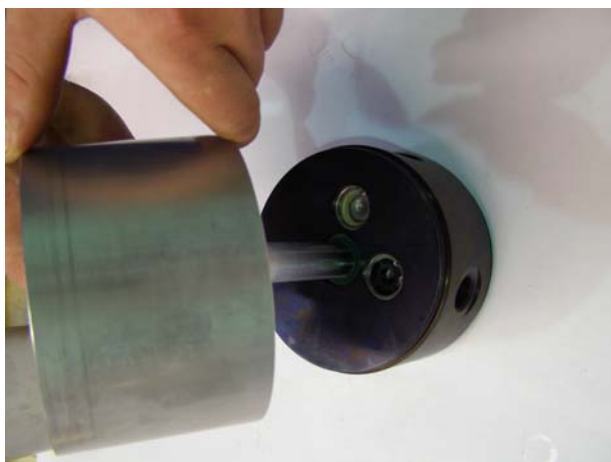


Attach the o-rings (item 31) on the piston rod (item 27).

Insert the pre-assembled piston rod into the air separation plate.



Push the air cylinder (item 26) over the piston (item 28).



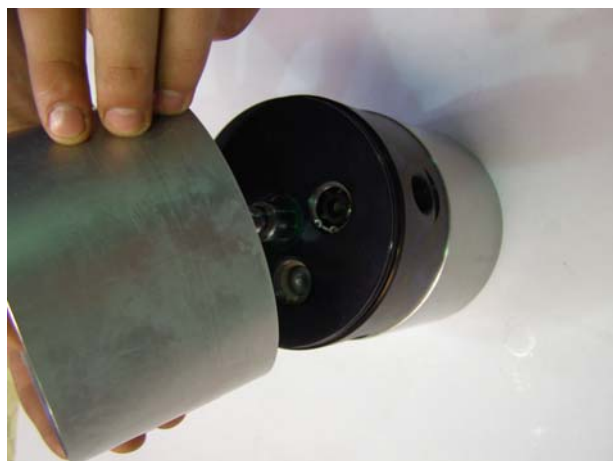


Attach the washer (item 32) and tighten the nut (item 33).

Push the air cylinder (item 26) and the air separation plate (item 34) together until the air cylinder fits closely to the bottom cover.



Push the air cylinder (item 26) over the piston (item 28). Attach the washer (item 32).





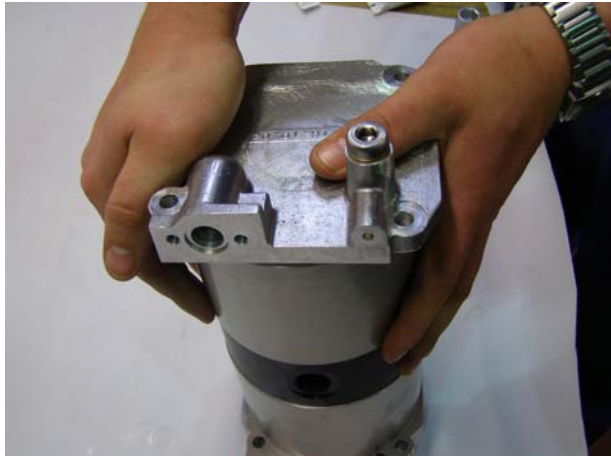
Push the air cylinder (item 26) and the air separation plate (item 34) together until the air cylinder fits closely to the bottom cover.



Tighten the two nuts (item 33) by two keys.

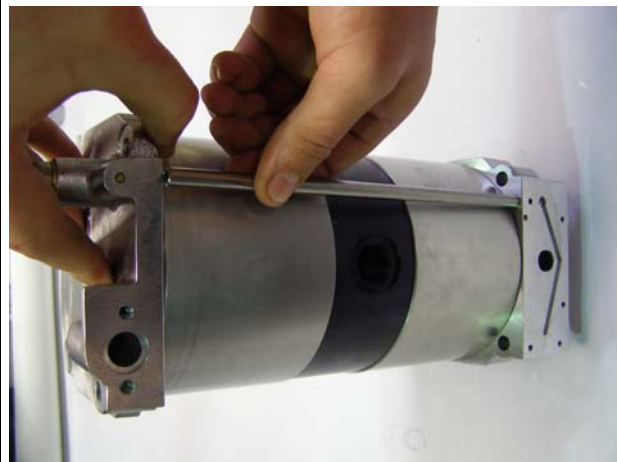
Attach the top cap (item 1) and push it to the air cylinder (item 26) until both parts fits closely.



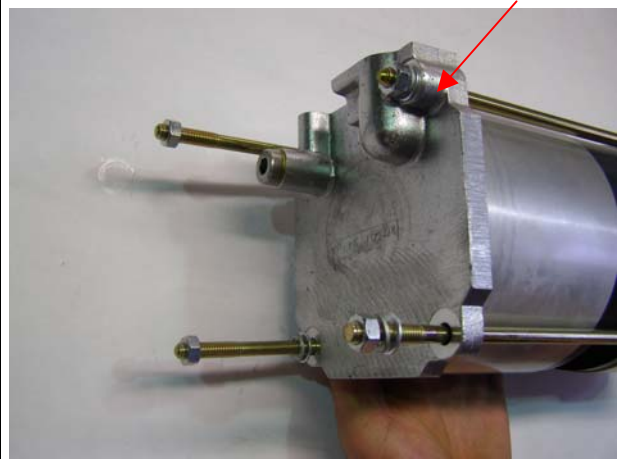
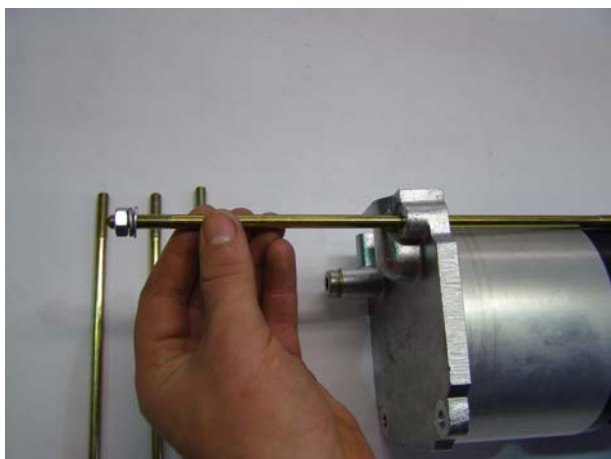


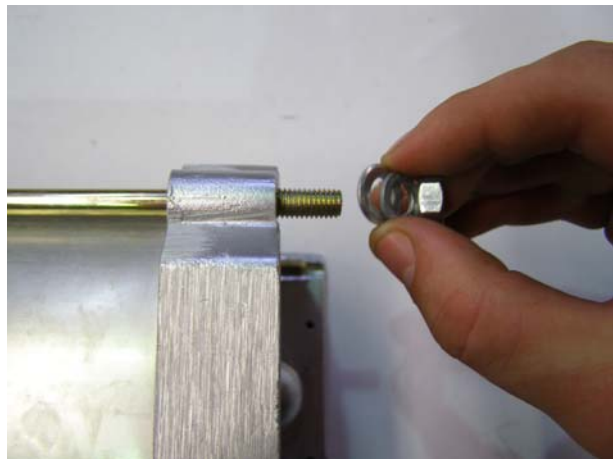
Attach the bottom cap (item 46) and push it to the air cylinder (item 26) until both parts fits closely.

Insert the air tube (item 24) and push the bottom cap (item 46) and the top cap (item 1) together.

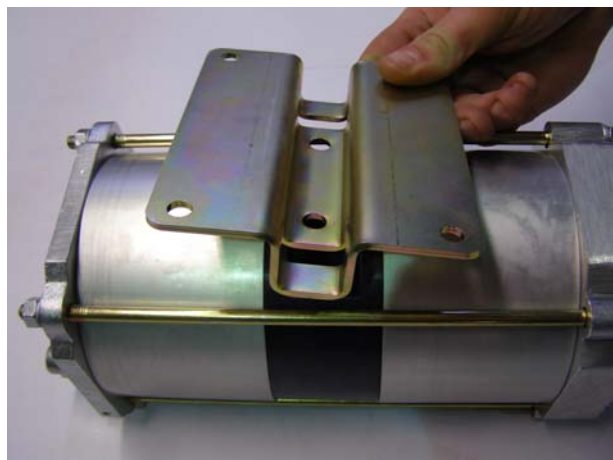


Attach the first (longer tie rod item 53) with u-washer (item 54) and spring washer (item 55) – see red arrow. Then attach also the 3 shorter tie rods (item 52) with u-washer (item 54) and spring washer (item 55).





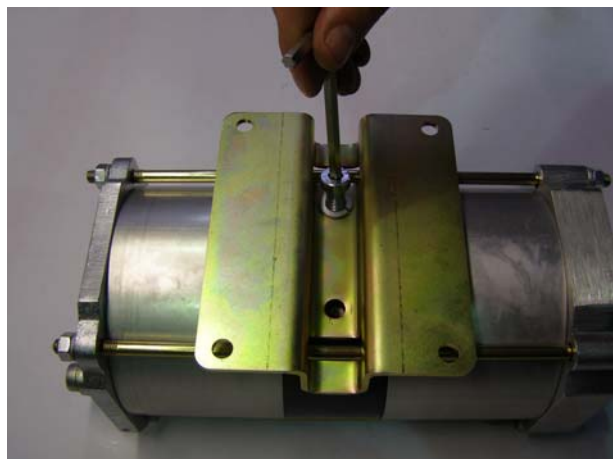
Attach the washer (item 54), the spring washer (item 55) and the nut (item 56).



Attach the base plate (item 42).

Insert the two socket head screws (item 44) and spring washer (item 43).

Tighten the two screws (item 44).





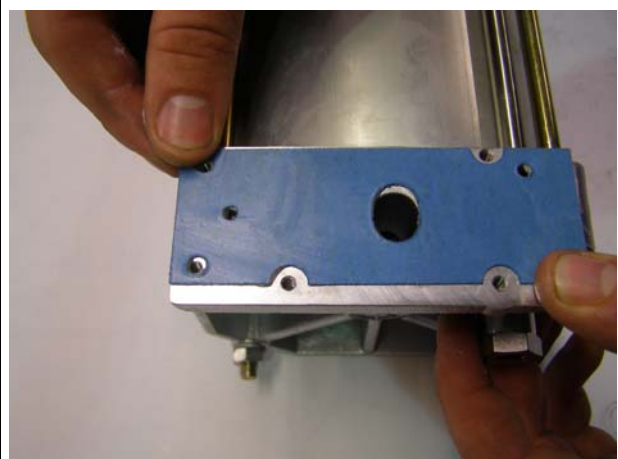


The air amplifier is placed on a workbench for alignment and a soft hammer is used to align the bottom and top cap in parallel.

Then tighten the hexagon nuts crosswise with the specified torque.



Grease the gasket (item 2) on both sides and attach it onto the top cap (item 1).

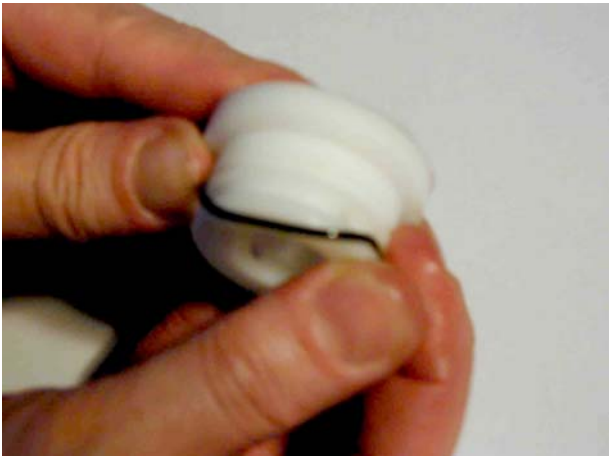


### 12.3 Spool valve assembling

Check all components for damage and replace them as required. There must not be any scoring at the spool valve sleeve.



Grease all O rings.



Slip the O-rings onto the spool (item 7), sealing cap (item 10) and, if applicable, the spool valve sleeve (item 4).



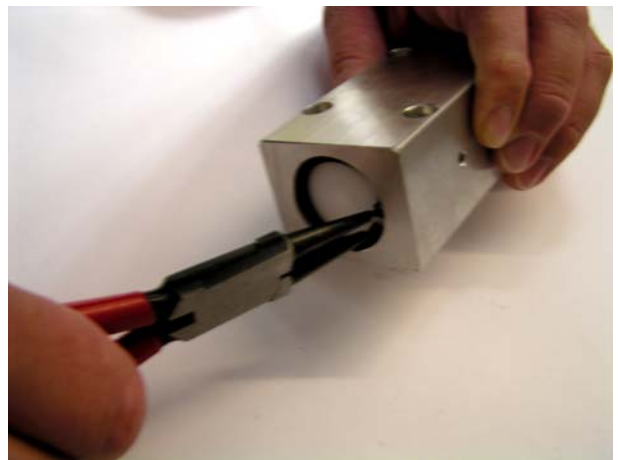
Grease the spool valve sleeve well, even when it is still installed. Insert the spool with rotating motions into the spool valve sleeve.



If applicable, grease the spool valve housing internally and install the spool valve sleeve with slight rotating motions into the spool valve housing.

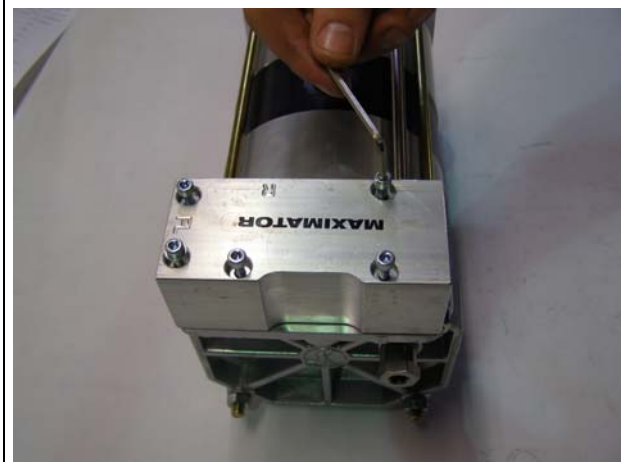
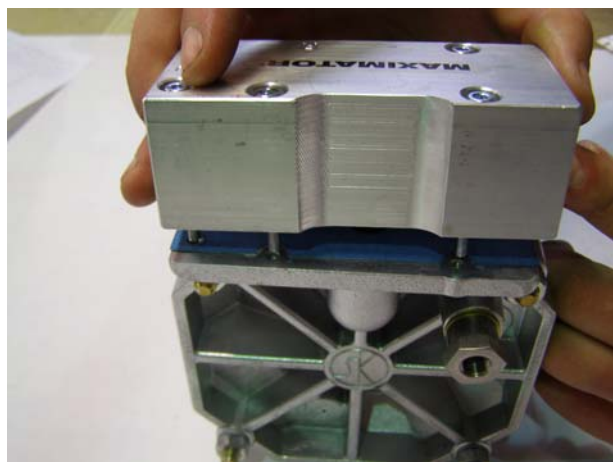


Re-insert the sealing cap (item 10) into the spool valve housing (item 3) and fasten it with the locking ring (item 11).





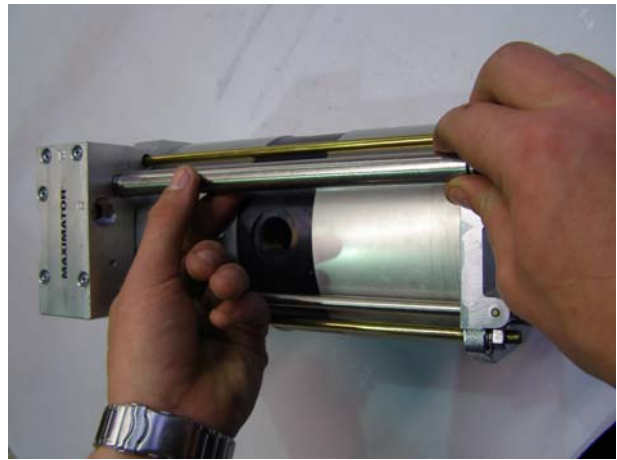
Insert the five socket head screws (item 13) with the washer (item 12) into the spool valve housing (item 3).



Grease the o-rings (item 50) for the air tube (item 51).

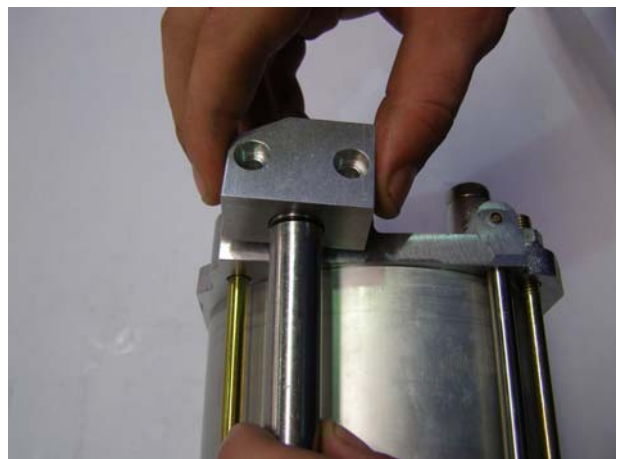


Slip on the o-rings (item 50) for the air tube (item 51) and insert it into the spool valve housing (item 3).



Grease and insert the o-ring (item 47) into the bottom cap (item 46).

Attach the connection block (item 48) on the bottom cap (item 46).





Place the two socket head screws (item 49) to fasten the connection block (item 48).

Re-insert and tighten the exhaust muffler (item 14) into the spool valve housing (item 3).



Completed air amplifier type SPLV2.