
en Translation of the original instructions
**OIL-FREE, AIR OPERATED
DOUBLE DIAPHRAGM PUMPS**

Metallic pumps

Model

1/2"

1"

1 1/2"

2"

3"

Non-metallic pumps

Model

1/4"

2"



Please read this manual before starting up.

To be retained for future reference.

Table of Contents

1. Safety	4
1.1 Danger associated with this machine	4
1.2 Safety information and tips.....	4
1.3 Proper use.....	4
1.3.1 Specifications metallic pumps.....	6
1.3.2 Specifications non-metallic pumps	7
1.3.3 Operation in hazardous location or pumping flammable liquids	8
1.3.3.1 Traceability.....	8
2. Installation	9
2.1 Submerged Applications	10
2.2 High Viscosity Applications.....	10
2.3 Low Temperature and UV Exposure	10
3. Maintenance	11
3.1 General Maintenance	11
3.2 Maintenance Model 1/2" (Metallic)	11
3.2.1 Maintenance of Check Valve and O-Ring.....	11
3.2.2 Maintenance of Diaphragm and Pilot Sleeve Assembly	11
3.2.3 External fastener torque requirements.....	12
3.2.4 Maintenance of Air Valve.....	13
3.3 Maintenance Model 1" (Metallic)	14
3.3.1 Maintenance of Check Valve and O-Ring.....	14
3.3.2 Maintenance of Diaphragm and Pilot Sleeve Assembly	14
3.3.3 External fastener torque requirements.....	15
3.3.4 Maintenance of Air Valve.....	15
3.4 Maintenance Model 1 1/2" (Metallic)	16
3.4.1 Maintenance of Check Valve and O-Ring.....	16
3.4.2 Maintenance of Diaphragm and Pilot Sleeve Assembly	16
3.4.3 External fastener torque requirements.....	17
3.4.4 Maintenance of Air Valve.....	17
3.5 Maintenance Model 2" (Metallic)	18
3.5.1 Maintenance of Check Valve and O-Ring.....	18
3.5.2 Maintenance of Diaphragm and Pilot Sleeve Assembly	18
3.5.3 External fastener torque requirements.....	18
3.5.4 Maintenance of Air Valve.....	19

3.6	Maintenance Model 3" (Metallic)	20
3.6.1	Maintenance of Check Valve and O-Ring	20
3.6.2	Maintenance of Diaphragm and Pilot Sleeve Assembly	20
3.6.3	External fastener torque requirements	21
3.6.4	Maintenance of Air Valve	22
3.7	Maintenance Model 2" (Non-metallic)	23
3.7.1	Maintenance of Check Valve and O-Ring	23
3.7.2	Maintenance of Diaphragm and Pilot Sleeve Assembly	23
3.7.3	External fastener torque requirements	24
3.7.4	Maintenance of Air Valve	24
4.	Repairs	25
5.	Trouble shooting	25
6.	Accessories	26
6.1	Accessories Model 1/4" (Non-metallic)	26
6.1.1	Electronic pulse connection	26
	Declaration of Conformity	27

Notice: In the operating instructions figures are mentioned in brackets. These refer to the item specifications in the spare parts list of the respective model.

1. Safety

1.1 Danger associated with this machine

The air operated double diaphragm pumps are tested prior to delivery.

In case of maloperation or improper use there is danger for

- life and health of the user,
- the pump and other material assets of the user
- the efficiency of the machine.

All persons who are dealing with the installation/assembly, starting, operation, servicing and maintenance of the machine have

- to be accordingly qualified
- to exactly follow these operating instructions.

It is your safety!

1.2 Safety information and tips

In these operating instructions the following explanations are used:



Danger!

Refers to a direct danger.

Non-observance of the precaution will cause death or extremely serious injury.



Warning!

Defines a possibly dangerous situation.

Non-observance of the precaution can cause death or extremely serious injury.



Caution!

Defines a possibly harmful situation.

The product or something in its environment may be damaged if this instruction is not observed.

1.3 Proper use

The air operated double diaphragm pumps are suitable for pumping pure, turbid, flammable and non-flammable, aggressive and non-aggressive liquids. Following regulations however must be observed.

Please note the following chapters. No liability whatsoever can be assumed for failure of the pump or parts of the pump, for personal injury or other claims if the pump is used for other purposes.

For safety reasons, the pump must not be converted or modified in any way without authorization!

**Danger!****Dangerous liquids can damage your health and the environment.**

- When handling dangerous or toxic liquids you have to wear goggles and protective clothing.
- Before starting the pump check that the medium being pumped is compatible. Changes of temperature, concentrations or combinations of chemicals may vary resistance of material. Always consult Material Safety Data Sheets and Engineering Resistance Tables for chemical compatibility.
- If a diaphragm ruptures, the pumped liquid can enter the air side of the pump and exit through the air exhaust (muffler). If a diaphragm rupture occurs immediately stop the pump, close suction- and discharge lines and have pump repaired.
- When the fluid source is at a higher level than the pump (flooded suction), the exhaust should be piped to a higher level than the fluid source. After operation of pump it should be possible to close the suction line by means of e.g. a ball valve. Running out of the container can be effectively avoided in case a damage occurs at the piping system or at the pump.

**Danger!**

Do not clean or service pump, hoses or dispensing valves when the system is **pressurized** – serious injury may result.

Disconnect air supply line and relieve pressure from the system prior to disassembly.

**Warning!**

Maximum temperatures are based on mechanical stress only.

Certain chemicals will significantly reduce maximum safe operating temperature. Consult engineering guides for chemical compatibility and temperature limits.

Always use minimum air pressure when pumping at elevated temperatures.

**Warning!**

Excessive air pressure or connection of the air supply on the pump outlet can cause pump damage, personal injury or property damage.

**Warning!**

Excessive positive suction pressure can cause pump damage. The maximum positive suction pressure must not exceed 0.6 bar.

**Warning!**

Pump must be reassembled properly after maintenance.

**Caution!**

Do not use the pump for the structural support of the piping system. Be certain the system components are supported to prevent stress on the pump parts. The pump must be installed free of tension.

Flexible connections will avoid damage to piping due to vibration.

**Caution!**

The characteristic feature of double diaphragm pumps is a pulsating volume flow. For reduction use a pulsation dampener if necessary.

1.3.1 Specifications metallic pumps

Model	1/2"	1"	1 1/2"	2"	3"
Capacity					
FPM-Diaphragms	adjustable 0-53 l/min.	adjustable 0-182 l/min.	—	—	adjustable 0-897 l/min.
TPV (NBR-PP)-Diaphragms	adjustable 0-57 l/min.	adjustable 0-182 l/min.	adjustable 0-435 l/min.	adjustable 0-719 l/min.	—
TPV (EPDM-PP)-Diaphragms					adjustable 0-954 l/min.
PTFE-Diaphragms	adjustable 0-49 l/min.	adjustable 0-170 l/min.	adjustable 0-435 l/min.	adjustable 0-681 l/min.	adjustable 0-836 l/min.
Urethan-Diaphragms	—	—	—	—	adjustable 0-897 l/min.

Maximum temperature					
Aluminium with					
PTFE-Diaphragms	93°C	93°C	93°C	93°C	93°C
FPM-Diaphragms	93°C	93°C	—	—	93°C
TPV (NBR-PP)-Diaphragms	82°C	82°C	82°C	82°C	—
TPV (EPDM-PP)-Diaphragms	82°C	82°C	82°C	82°C	93°C
Urethan-Diaphragms	—	—	—	—	66°C
Stainless steel with					
PTFE-Diaphragms	93°C	93°C	93°C	93°C	93°C
TPV (EPDM-PP)-Diaphragms	93°C	93°C	93°C	93°C	93°C
FPM-Diaphragms	93°C	93°C	—	—	93°C
TPV (NBR-PP)-Diaphragms	82°C	82°C	82°C	82°C	—
Urethan-Diaphragms	—	—	—	—	66°C

Maximum air pressure	8.2 bar				
-----------------------------	---------	---------	---------	---------	---------

Minimum air pressure					
Models with PTFE-Diaphragms	2.5 bar				
other models	1.4 bar				

Dry lift capacity at:	8.2 bar				
Models with PTFE balls	4.3 m	5.2 m	5.5 m	5.9 m	5.2 m
other models	4.5 m	5.2 m	6.7 m	7.4 m	6.1 m

Weight					
Stainless steel	9.1 kg	17 kg	32 kg	59 kg	136 kg
Aluminium	4.5 kg	8 kg	20 kg	28 kg	62 kg

Maximum solids	3.2 mm	6.4 mm	6.4 mm	6.4 mm	11 mm
-----------------------	--------	--------	--------	--------	-------

Air supply					
Inlet	1/4" NPT female	1/4" NPT female	3/4" NPT female	3/4" NPT female	3/4" NPT female
Outlet	3/8" NPT female	3/4" NPT female	3/4" NPT female	3/4" NPT female	3/4" NPT female

Fluid inlet/discharge					
Stainless steel	1/2" BSP female, 1" BSP male	1" BSP female	1 1/2" BSP fe- male	2" DIN/AN- SI-flange	3" DIN/AN- SI-flange
Aluminium				2" BSP female	3" BSP female

1.3.2 Specifications non-metallic pumps

Model	1/4"	2"
--------------	-------------	-----------

Capacity		
TPV (NBR-PP)-Diaphragms	adjustable 0-21.6 l/min.	adjustable 0-605 l/min.
TPV (EPDM-PP)-Diaphragms		
PTFE-Diaphragms	adjustable 0-21.6 l/min.	adjustable 0-568 l/min.

Maximum temperature		
PP with		
PTFE-Diaphragms	66°C	66°C
TPV (NBR-PP)-Diaphragms	66°C	66°C
TPV (EPDM-PP)-Diaphragms	66°C	66°C
PVDF with		
PTFE-Diaphragms	93°C	93°C

Minimal temperature	0°C	0°C
----------------------------	-----	-----

Maximum air pressure	8.2 bar	8.2 bar
-----------------------------	---------	---------

Minimum air pressure		
Models with PTFE-Diaphragms	2.5 bar	2.5 bar
other models	1.4 bar	1.4 bar

Dry lift capacity at:	8.2 bar	8.2 bar
Models with PTFE balls	3 m	4.6 m
other models	4.2 m	5.2 m

Weight		
PP	1.2 kg	25 kg
PVDF	1.7 kg	38 kg

Maximum solids	1.6 mm	6.4 mm
-----------------------	--------	--------

Air supply		
Inlet	1/4" NPSF female	3/4" NPT female
Outlet	1/4" NPST female	3/4" NPT female

Fluid inlet/discharge		
Suction	1/4" BSP female / 3/4" NPT male	2" DIN/ANSI-flange
Pressure joint	1/4" BSP female / 3/4" NPT male	2" DIN/ANSI-flange

1.3.3 Operation in hazardous location or pumping flammable liquids

Pump may only be used at atmospheric conditions of 0.8 bar up to 1.1 bar, normal air moisture conditions and within a temperature range of -20°C up to +40°C. The pump may only be used to pump liquids.

 **Danger!** Pumping flammable liquids can lead to static charging within an not electrically conductive pump! Static spark can cause explosion resulting in severe injury or death. Ground pump and pumping systems when pumping flammable liquids or when used in a location where surrounding atmosphere is conductive to spontaneous combustion.

The rating plate of the pump must show a respective Ex-identification according to the application. (Caution: The TX identification refers to the maximum surface temperature, which is not dependent on the appliance itself, but mainly on the operating conditions. In this case, the maximum surface temperature depends on the temperature of the process liquids.)

Use grounding plugs and always connect to a good ground source. Actual valid regulations concerning the grounding have to be observed.

- Secure pump, connections and all contact points to avoid vibrations and generation of contact or static spark. Periodically verify continuity of electrical path to ground with an ohmmeter from each component. Resistance of grounding must not exceed 10⁶ ohm.
- Double diaphragm pumps with pulse measurement must be connected onto an intrinsically safe electric circuit with a suitable barrier according to EN 60079-11 or onto intrinsically safe apparatus with ATEX approval.
- Note local building codes and regulations for explosion protection.
- Use conductive hoses.
- Use proper ventilation.
- Keep flammables away from heat, open flames and sparks.
- Keep containers closed when not in use.
- Use only new original spare parts for repairs.
- **Pumps which are modified by the customer may vary from the EC-Declaration of Conformity. Observe rating plate!**

1.3.3.1 Traceability

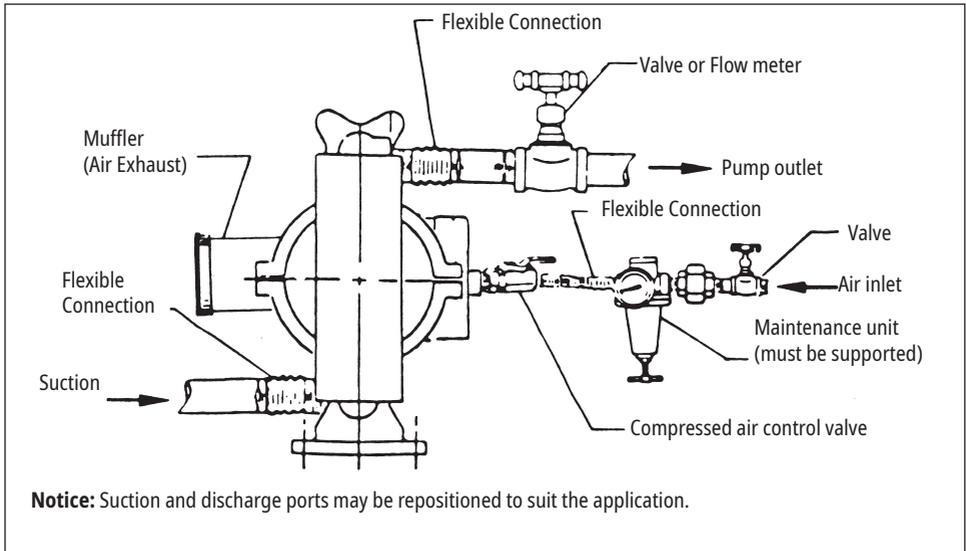
Products manufactured by Lutz Pumpen for potentially explosive atmospheres are identified by an individual batch number which allows them to be traced. This number provides the year of construction and the design of the equipment.

This product is an appliance for potentially explosive atmospheres. In this regard and in compliance with the ATEX Directive, provisions must be made to ensure ascending and descending traceability.

Our ATEX notified quality system ensures this traceability up to the initial point of delivery.

Except as otherwise agreed in writing, anyone that guarantees to redeliver said equipment undertakes to put in place a system that allows for equipment that is not conform to be recalled if necessary.

2. Installation



Notice: Re-torque fasteners prior to use. See respective chapter in this maintenance manual.



Danger!

Danger of fire and explosion due to flammable compressed gases within the air supply system!
 Combustion hazard. Blast wave: Flying parts can kill you.
 Do not operate the pump with compressed flammable gases.

1. A lube-free, clean, dry, compressed air source is recommended. Use a filter that is capable of filtering out particles larger than 5 μm .
2. Mount the muffler at the pump exhaust.
3. All pumps should be mounted in an upright position.
4. Clean and flush the pump thoroughly before installation in a process line.
5. When particles exceed the maximum particle specification of the pump or are sharp enough to cut elastomers, install a particle fluid filter on the fluid suction line.
6. Fluid suction lines and air exhaust lines should never be smaller than the specified pipe size of pump.
7. Apply PTFE tape to threads upon assembly to prevent leakage.
8. Never use pipe dope on air line connections.
9. Never use collapsible tube on fluid inlet.
10. Do not exceed 14 Nm of torque on plastic pipe threads.
11. For installation with connection flanges tighten fasteners to 25 Nm of torque.
12. If changing to a different application reconfirm compatibility of fluid.

2.1 Submerged Applications

1. Fluid must be compatible with fasteners and with intermediate material.
2. Pipe exhaust above the level of the fluid.

2.2 High Viscosity Applications

1. Position the pump close to or below the level of the fluid source.
2. Suction lines should be increased in size – up to three times the size of the inlet manifold. The use of dual manifolds may increase flow rate (only possible with 1/2" models).
3. Start the pump slowly by throttling the air supply of the pump.

2.3 Low Temperature and UV Exposure

1. Polypropylene tends to embrittle at freezing temperature. Pump must be insulated or heated, otherwise use pumps with different materials of construction.
2. If excessive icing occurs at the pump exhaust, air source must be dried using mechanical means or through the introduction of ethyl alcohol in the air line (note explosion protection!).
3. UV rays will damage polypropylene pumps. Either shroud the pumps from UV rays or use pumps with UV stabilized materials.

3. Maintenance

3.1 General Maintenance

**Warning!**

Close and disconnect the compressed air and liquid lines before servicing.
Use personal protective equipment.

1. Check periodically for product or air leakage. Tighten any joint where leakage is occurring.
2. When pumping hazardous or toxic liquids, diaphragms should be replaced at regularly scheduled intervals based upon pump usage.
3. When pumping highly abrasive fluids reduce discharge flow rate to prolong life of diaphragm, valve balls, valve seats etc. or optionally use a larger pump which can be operated at a lower stroke frequency.
4. If you are pumping a fluid that will settle or compact the pump must be flushed before shut down.
5. In freezing temperatures, the pump must be completely drained when idle.
6. Clean components only with liquids that are chemically resistant to them.

3.2 Maintenance Model 1/2" (Metallic)

3.2.1 Maintenance of Check Valve and O-Ring

1. Flush and neutralize the pump to be certain all corrosives or hazardous materials are removed prior to any maintenance. This procedure should always be followed when returning pumps for factory service also.
2. Remove screws (34) in both the discharge and suction manifolds. Suction check valve seats and check balls (11, 14) are located inside of the bottom of the outer chamber (10). Gently remove and inspect for excessive wear, pitting or other signs of degradation. Inspect valve seats' (11) o-rings (22). Replace if necessary. Discharge check valves are located inside of the bottom of the discharge elbows (18).
3. When re-assembling, the check ball should fit within the ball cavity of the chamber and discharge manifold. Press fit the valve seats into position with the curved portion facing the ball. Lightly tighten the screws. Tighten all external fasteners to final torque requirement after pump is completely assembled.

**Caution!**

When using pumps built with PTFE o-rings always replace with new PTFE o-rings, since the original o-rings may not reseal the pump.

3.2.2 Maintenance of Diaphragm and Pilot Sleeve Assembly

4. To inspect diaphragms remove nuts (40) from bolts (38) from the outer pumping chambers (10). If replacement is necessary due to abrasion or rupture unscrew the outer diaphragm plates (16). Models that are built with PTFE elastomers will have a PTFE overlay (19) that faces the outer pumping chamber and a back-up diaphragm (9) on the air side of pump. Pumps without PTFE will contain only the back-up diaphragms (9).
5. If a diaphragm has been ruptured and corrosive or viscous fluid has entered the air side of the pump, the complete air system should be inspected. After removing diaphragms and inner diaphragm plate (15), the pilot sleeve assembly (1-3, 24-26) and diaphragm rod assembly (4, 5) may be removed by removing the retaining plates (41) (you may only need to remove one retaining plate) and pushing the entire unit out through the bore in the intermediate. The diaphragm rod assembly (4, 5) must be unscrewed to remove the pilot sleeve (1).

**Caution!**

To aid in reassembly use a non-synthetic, petroleum based lubricating grease without EP additives.

6. Clean or replace any components that have excessive wear, dirt build-up, or chemical attack. Lube all components prior to reassembling. Reassemble pilot sleeve spacers (3), o-rings (25) and lip seals (26) within bore of intermediate. Make sure that the open side of the lip seals (26) is facing outward toward the diaphragms. Also make sure that the end pilot spacers (3) are at the end on either side of the pilot sleeve assembly and all inner spacers (2) are separated by o-rings (24). Next carefully insert the diaphragm rod assembly (4, 5) with pilot sleeve (1) inside the assembly in the bore. Reattach retaining plates (41). Do not over tighten self-tapping screws (35).
7. Take one diaphragm and invert (reverse the natural bow of the material) and with the curved side of the inner diaphragm plate (15) facing the diaphragm assemble onto outer diaphragm plate stud (31) and then screw assembly into diaphragm rod. Push diaphragm rod to opposite side of intermediate and add the opposite diaphragm assembly. Tighten the outer diaphragm plates to 8 Nm of torque. After tightening, reverse the inverted diaphragm back to its original state, allowing the outer bead to seat in the groove of the intermediate.

**Caution!**

Inverting the first diaphragm aids reassembly.

8. When positioning outer diaphragm chambers onto intermediate make sure that witness lines are matching.

**Caution!**

If air valve has been removed, proper orientation of air system with fluid chambers must be observed. The bottom of the intermediate has the smaller hook shaped air passage slot on the air valve mounting face and the outer chamber check ball cavity should be pointing downward.

9. Tighten all external fasteners to final torque requirement after pump is completely assembled.
10. Position the manifolds making sure of the proper orientation in relation to the air valve for your application. Also make sure that the manifold o-rings do not shift from their grooves during reassembly. Tighten all external fasteners to final torque requirement after pump is completely assembled.

3.2.3 External fastener torque requirements

**Caution!**

When reassembling, loosely tighten all external fasteners adjusting and aligning and gradually, in an alternating fashion, tighten to torque requirements listed below.

Air valve cap screws	4.5 Nm
Manifold bolts	8.8 Nm
Chambers' cap screws	9.6 Nm

3.2.4 Maintenance of Air Valve

11. To evaluate air valve components, remove the four cap screws (36), washers, (33, 31) and nuts (39) from the air valve body (44). The shuttle plate (7) and shuttle (6) may be inspected by removing them from their location in the slot in the back of the air valve. Inspect for scratches or surface irregularities. Replace if necessary. Remove the plug (21) at the bottom of the air valve. Next push the air valve spool (8) out of the air valve body. Gently reach in and pull lip seals (27) out of inside bore of the air valve body. Check for cracks, splitting or scratches. Clean components if replacement is not necessary. Inspect plug o-ring (23) for any damage and replace if necessary and reinsert in o-ring groove.



Caution!

Make sure that the open sides of the two lip seals (27) face each other when reassembling air valve. Lube all components with suggested maintenance grease as an aid in reassembly.

12. Reinsert air valve spool (8) inside of air valve body (44). Place shuttle (6) on middle rib of air valve spool (8) through the square slot in back of air valve (44). Lubricate side of plate (7) that faces the shuttle (6) and reposition valve plate over shuttle. Press the valve plug (21) into air valve body, chamfered end first.
13. Check that gasket (28) is not cracked. If damaged replace.
14. After gasket (28) is pressed back into position align air valve onto intermediate and reinsert the four cap screws (36) with lock washer (33) and flat washers (31). Apply 4.5 Nm of torque to fasteners.

3.3 Maintenance Model 1" (Metallic)

3.3.1 Maintenance of Check Valve and O-Ring

1. Flush and neutralize the pump to be certain all corrosives or hazardous materials are removed prior to any maintenance. This procedure should always be followed when returning pumps for factory service also.
2. Remove nuts (35) and washers (28) from bolts (33) in both the discharge and suction manifolds. Suction check valve seats and check balls (11, 12) are located inside of the bottom of the outer chamber (10). Gently remove and inspect for excessive wear, pitting or other signs of degradation. Inspect valve seats' (11) o-rings (23). Replace if necessary. Discharge check valves are located inside of the bottom of the discharge elbows (15). Repeat procedure for inspection of discharge check valves and o-rings.
3. When re-assembling, the check ball should fit within the ball cavity of the chamber and discharge manifold. Press fit the valve seats into position with the curved portion facing the ball. Lightly tighten fasteners. Tighten all external fasteners to final torque requirement after pump is completely assembled.

**Caution!**

When using pumps built with PTFE o-rings always replace with new PTFE o-rings, since the original o-rings may not reseal the pump.

3.3.2 Maintenance of Diaphragm and Pilot Sleeve Assembly

4. To inspect diaphragms remove nuts (35) and washers (28) from bolts (33) from the outer pumping chambers (10). If replacement is necessary due to abrasion or rupture unscrew the outer diaphragm plates (14). Models that are built with PTFE elastomers will have a PTFE overlay (50) that faces the outer pumping chamber and a back-up diaphragm (9) on the air side of pump. Pumps without PTFE will contain only the back-up diaphragms (9).
5. If a diaphragm has been ruptured and corrosive or viscous fluid has entered the air side of the pump, the complete air system should be inspected. After removing diaphragms and inner diaphragm plate (13), the pilot sleeve assembly (1-3, 21, 22, 24) and diaphragm rod assembly (4, 5) may be removed by removing the retaining plates (36) (you may only need to remove one retaining plate) and pushing the entire unit out through the bore in the intermediate. The diaphragm rod assembly (4, 5) must be unscrewed to remove the pilot sleeve (1).

**Caution!**

To aid in reassembly use a non-synthetic, petroleum based lubricating grease without EP additives.

6. Clean or replace any components that have excessive wear, dirt build-up, or chemical attack. Lube all components prior to reassembling. Reassemble pilot sleeve spacers (3), o-rings (22) and lip seals (24) within bore of intermediate. Make sure that the open side of the lip seals (24) is facing outward toward the diaphragms. Also make sure that the end pilot spacers (3) are at the end on either side of the pilot sleeve assembly and all inner spacers (2) are separated by o-rings (21). Next carefully insert the diaphragm rod assembly (4, 5) with pilot sleeve (1) inside the assembly in the bore. Reattach retaining plates (36). Do not over tighten self-tapping screws (34).
7. Take one diaphragm (9) with the curved side of the inner diaphragm plate (13) facing the diaphragm assembly onto outer diaphragm plate stud (14) and then screw assembly into diaphragm rod. Push diaphragm rod to opposite side of intermediate and add the opposite diaphragm assembly. Tighten the outer diaphragm plates to 7.9 Nm of torque.
8. When positioning outer diaphragm chambers onto intermediate make sure that witness lines are matching.



Caution!

If air valve has been removed, proper orientation of air system with fluid chambers must be observed. The bottom of the intermediate has the smaller hook shaped air passage slot on the air valve mounting face and the outer chamber check ball cavity should be pointing downward.

9. Replace all external fasteners and tighten to final torque requirement after pump is completely assembled.
10. Position the manifolds making sure of the proper orientation in relation to the air valve for your application. Also make sure that the manifold o-rings do not shift from their grooves during reassembly. Tighten all external fasteners to final torque requirement after pump is completely assembled.

3.3.3 External fastener torque requirements



Caution!

When reassembling, loosely tighten all external fasteners adjusting and aligning and gradually, in an alternating fashion, tighten to torque requirements listed below.

Air valve cap screws	4.5 Nm
Manifold bolts	13 Nm
Chambers' cap screws	9.6 Nm



Caution!

Always torque the chamber bolts prior to the manifold bolts.

3.3.4 Maintenance of Air Valve

11. To evaluate the air valve components, remove the four cap screws (31), washers (27, 30) from the air body (18). The shuttle plate (7) and shuttle (6) may be inspected by removing them from their location in the slot in the back of the air valve. Inspect for scratches or surface irregularities. Replace if necessary. Remove the plug (19) at the bottom of the air valve. Next push the air valve spool (8) out of the air valve body. Gently reach in and pull lip seals (25) out of inside bore of the air valve body. Check for cracks, splitting or scratches. Clean components if replacement is not necessary. Inspect plug o-ring (20) for any damage and replace if necessary and reinsert in o-ring groove.



Caution!

Make sure that the open sides of the two lip seals (25) face each other when reassembling air valve. Lube all components with suggested maintenance grease as an aid in reassembly.

12. Reinsert air valve spool (8) inside of air valve body (18). Place shuttle (6) on middle rib of air valve spool (8) through the square slot in back of air valve (18). Lubricate side of plate (7) that faces the shuttle (6) and reposition valve plate over shuttle. Press the valve plug (19) into air valve body, chamfered end first.
13. Check that gasket (26) is not cracked. If damaged replace.
14. After gasket (26) is pressed back into position align air valve onto intermediate and reinsert the four cap screws (31) with lock washer (27) and flat washers (30). Apply 4.5 Nm of torque to fasteners.

3.4 Maintenance Model 1 1/2" (Metallic)

3.4.1 Maintenance of Check Valve and O-Ring

1. Flush and neutralize the pump to be certain all corrosives or hazardous materials are removed prior to any maintenance. This procedure should always be followed when returning pumps for factory service also.
2. To inspect the check valves, remove the cap screws (38) from manifold sections (15, 16). Suction check valve seats (11) and check balls (12) are located inside of the bottom of the outer chamber (10). Gently remove and inspect for excessive wear, pitting or other signs of degradation. Inspect valve seat o-rings (24). Replace if necessary. Discharge check valves are located inside of the bottom of the discharge elbows (15). Repeat procedure for inspection of discharge check valves.
3. The check ball should fit into the curved portion of the valve seat and be facing upward when reinserted into the valve seat location. Tighten all external fasteners to final torque requirement after pump is completely assembled.

**Caution!**

When using pumps built with PTFE o-rings always replace with new PTFE o-rings, since the original o-rings may not reseal the pump.

3.4.2 Maintenance of Diaphragm and Pilot Sleeve Assembly

4. To inspect diaphragms remove cap screws (38/39) from the outer pumping chambers (10). If replacement is necessary due to abrasion or rupture unscrew the outer diaphragm plates (14). Models that are built with PTFE elastomers will have a PTFE overlay (50) that faces the outer pumping chamber and a back-up diaphragm (9) on the air side of pump. Pumps without PTFE will contain only the back-up diaphragms (9).
5. If a diaphragm has been ruptured and corrosive or viscous fluid has entered the air side of the pump, the complete air system should be inspected. After removing diaphragms and inner diaphragm plate (13), the pilot sleeve assembly (1, 2, 3, 22, 23, 25) and diaphragm rod assembly (4+5) may be removed by removing the retaining plates (40) (you may only need to remove one retaining plate) and pushing the entire unit out through the bore in the intermediate. Diaphragm rod assembly must be unscrewed to remove pilot sleeve.

**Caution!**

To aid in reassembly use a non-synthetic, petroleum based lubricating grease without EP additives.

6. Clean or replace any components that have excessive wear, dirt build-up, or chemical attack. Lube all components prior to reassembling. Reassemble pilot sleeve spacers (2, 3), o-rings (22) and lip seals (25) within bore of intermediate. Make sure that the open side of the lip seals (25) is facing outward toward the diaphragms. Also make sure that the end pilot spacers (3) are at the end on either side of the pilot sleeve assembly and all inner spacers (2) are separated by o-rings (23). Next carefully insert the diaphragm rod assembly (4+5) with pilot sleeve assembly (1, 2, 3, 22, 23, 25) inside the bore. Reattach retaining plates (40). Do not overtighten self-tapping screws (36).
7. Assemble the diaphragm (9) (optionally PTFE diaphragm (50)) and the inner diaphragm plate (13), with the curved side to the diaphragm, on the outer diaphragm plate (14) and screw assembly into diaphragm rod. Push diaphragm rod to opposite side of intermediate and add the opposite diaphragm assembly. Tighten the outer diaphragm plates hand-tight and following still 1/8 up to 1/4 rotation more. Assemble the outer chamber (10) with the cap screws (38) first on the side where the diaphragm has been inverted. Next reach under the opposite diaphragm assembly and pull diaphragm rod to opposite side (a large flat screw driver may be used as an aid in this process) and assemble remaining outer chamber with the cap screws. When positioning outer diaphragm chambers onto intermediate make sure that witness lines are matching.



Caution!

If air valve has been removed, proper orientation of air system with fluid chambers must be observed. The top of the intermediate has a single vertical air passage slot on the air valve mounting face while the outer chamber check ball cavity should be pointing downward.

8. Also make sure that the valve seat o-rings do not shift from their grooves during reassembly. Tighten fasteners on bolts loosely.

3.4.3 External fastener torque requirements



Caution!

When reassembling, loosely tighten all external fasteners adjusting and aligning and gradually, in an alternating fashion, tighten to torque requirements listed below.

Pumping chamber	20.5 Nm
Elbow to Chamber Bolts	41 Nm
Air valve cap screws	4.5 Nm
Inner diaphragm plate	68 Nm
Intermediate screw	15 Nm

3.4.4 Maintenance of Air Valve

9. To evaluate the air valve components, remove the four cap screws (34), washers (29, 33) from the air body (18). The shuttle plate (7) and shuttle (6) may be inspected by removing them from their location in the slot in the back of the air valve. Inspect for scratches or surface irregularities. Replace if necessary. Remove the plug (19) at the bottom of the air valve, point the bottom of the air valve safely away from people, direct compressed air through one of the lower holes in the back of the air valve body and the plug will shoot out. Next push the air valve spool (8) out of the air valve body. Gently reach in and pull lip seals (26) out of inside bore of the air valve body. Check for cracks, splitting or scratches. Clean components if replacement is not necessary. Inspect plug o-ring (21) for any damage and replace if necessary and reinsert in o-ring groove.



Caution!

Make sure that the open sides of the two lip seals (26) face each other when reassembling air valve. Lube all components with suggested maintenance grease as an aid in reassembly.

10. Reinsert air valve spool (8) inside of air valve body (18). Place shuttle (6) on middle rib of air valve spool (8) through the square slot in back of air valve (18). If using original valve plate (7) lubricate side of plate that was facing the shuttle (6) (or if new valve plate is used lubricate the lapped and polished side of plate) and place the lubricated side next to the shuttle in the slot. Press the valve plug (19) into air valve body, chamfered end first.
11. Check that gasket (28) is not cracked. If damaged replace.
12. After gasket (28) is pressed back into position align air valve onto intermediate and reinsert the four cap screws (34) with flat washers (29, 33). Apply 4.5 Nm of torque to fasteners.

3.5 Maintenance Model 2" (Metallic)

3.5.1 Maintenance of Check Valve and O-Ring

1. Flush and neutralize the pump to be certain all corrosives or hazardous materials are removed prior to any maintenance. This procedure should always be followed when returning pumps for factory service also.
2. To inspect the check valves, remove the cap screws (1) from manifold sections (3, 43). Suction check valve seats (5) and check balls (4) are located inside of the bottom of the outer chamber (8). Gently remove and inspect for excessive wear, pitting or other signs of degradation. Inspect valve seat o-rings (6). Replace if necessary. Discharge check valves are located inside of the bottom of the discharge elbows (3). Repeat procedure for inspection of discharge check valves.
3. The check ball should fit into the curved portion of the valve seat and be facing upward when reinserted into the valve seat location. Tighten all external fasteners to final torque requirement after pump is completely assembled.



Caution

When using pumps built with PTFE o-rings always replace with new PTFE o-rings, since the original o-rings may not reseal the pump.

3.5.2 Maintenance of Diaphragm and Pilot Sleeve Assembly

4. To inspect diaphragms remove cap screws (1) from the outer pumping chambers (7, 8). If replacement is necessary due to abrasion or rupture unscrew the outer diaphragm plates (25). Models that are built with PTFE elastomers will have a PTFE overlay (23) that faces the outer pumping chamber and a back-up diaphragm (22) on the air side of pump. Pumps without PTFE will contain only the back-up diaphragms (22).
5. If a diaphragm has been ruptured and corrosive or viscous fluid has entered the air side of the pump, the complete air system should be inspected. Remove the outer diaphragm plates (25) by opposing turning. Remove the diaphragms (22) resp. (22+23) regarding PTFE diaphragms and the inner diaphragm plate (21). Remove one of the retaining plates (13). After that you can push out the entire unit consisting of the assemblies of pilot sleeve (14, 15, 16, 17, 28, 30) and diaphragm rod (29, 31) through the bore in the intermediate. Diaphragm rod assembly must be unscrewed to remove pilot sleeve.



Caution

To aid in reassembly use a non-synthetic, petroleum based lubricating grease without EP additives.

6. Clean or replace any components that have excessive wear, dirt build-up, or chemical attack. Lube all components prior to reassembling. Reassemble pilot sleeve spacers (16, 28), o-rings (17) and lip seals (14) within bore of intermediate. Make sure that the open side of the lip seals (14) is facing outward toward the diaphragms. Also make sure that the end pilot spacers (16) are at the end on either side of the pilot sleeve assembly and all inner spacers (28) are separated by o-rings (15). Next carefully insert the diaphragm rod assembly (29, 31) with pilot sleeve (30) inside the assembly in the bore. Reattach retaining plates (13). Do not overtighten self-tapping screws (27).
7. Assemble the diaphragm (22) (optionally PTFE diaphragm (23)) and the inner diaphragm plate (21), with the curved side to the diaphragm, on the outer diaphragm plate (25) and screw assembly into diaphragm rod. Push diaphragm rod to opposite side of intermediate and add the opposite diaphragm assembly. Tighten the outer diaphragm plates hand-tight and following still 1/8 up to 1/4 rotation more. Assemble the outer chamber (8) with the cap screws (1) first on the side where the diaphragm has been inverted. Next reach under the opposite diaphragm assembly and pull diaphragm rod to opposite side (a large flat screw driver may be used as an aid in this process) and assemble remaining outer chamber with the cap screws. When positioning outer diaphragm chambers onto intermediate make sure that witness lines are matching.



Caution

If air valve has been removed, proper orientation of air system with fluid chambers must be observed. The top of the intermediate has a single vertical air passage slot on the air valve mounting face while the outer chamber check ball cavity should be pointing downward.

- Also make sure that the valve seat o-rings do not shift from their grooves during reassembly. Tighten fasteners on bolts loosely.

3.5.3 External fastener torque requirements



Caution

When reassembling, loosely tighten all external fasteners adjusting and aligning and gradually, in an alternating fashion, tighten to torque requirements listed below.

Pumping chamber	20.5 Nm
Elbow to Chamber Bolts	50 Nm
Air valve cap screws	4.5 Nm
Inner diaphragm plate	68 Nm
Intermediate screws	15 Nm

3.5.4 Maintenance of Air Valve

- To evaluate the air valve components, remove the four cap screws (40), washers (38, 39) from the air body (37). The shuttle plate (33) and shuttle (34) may be inspected by removing them from their location in the slot in the back of the air valve. Inspect for scratches or surface irregularities. Replace if necessary. Remove the plug (42) at the bottom of the air valve, point the bottom of the air valve safely away from people, direct compressed air through one of the lower holes in the back of the air valve body and the plug will shoot out. Next push the air valve spool (36) out of the air valve body. Gently reach in and pull lip seals (35) out of inside bore of the air valve body. Check for cracks, splitting or scratches. Clean components if replacement is not necessary. Inspect plug o-ring (41) for any damage and replace if necessary and reinsert in o-ring groove.



Caution

Make sure that the open sides of the two lip seals (35) face each other when reassembling air valve. Lube all components with suggested maintenance grease as an aid in reassembly.

- Reinsert air valve spool (36) inside of air valve body (37). Place shuttle (34) on middle rib of air valve spool (36) through the square slot in back of air valve (37). If using original valve plate (33) lubricate side of plate that was facing the shuttle (34) (or if new valve plate is used lubricate the lapped and polished side of plate) and place the lubricated side next to the shuttle in the slot. Press the valve plug (42) into air valve body, chamfered end first.
- Check that gasket (32) is not cracked. If damaged replace.
- After gasket (32) is pressed back into position align air valve onto intermediate and reinsert the four cap screws (40) with lock washer (39) and flat washers (38). Apply 4.5 Nm of torque to fasteners.

3.6 Maintenance Model 3" (Metallic)

3.6.1 Maintenance of Check Valve and O-Ring

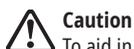
1. Flush and neutralize the pump to be certain all corrosives or hazardous materials are removed prior to any maintenance. This procedure should always be followed when returning pumps for factory service also.
2. Remove the suction and discharge manifolds fasteners (355). The check valve seats (30) and check balls (20) are located inside the bottom of the outer chamber (50) or inside the discharge manifold (10). Remove the seat and balls and inspect for excessive wear, pitting, or other signs of degradation. On models using PA check valve seats (30) and o-rings (40), check the seats, balls, for excessive wear, pitting, or other signs of degradation.

**Caution**

When using pumps built with PTFE o-rings always replace with new PTFE o-rings, since the original o-rings may not reseal the pump.

3.6.2 Maintenance of Diaphragm and Pilot Sleeve Assembly

3. To inspect the diaphragms, remove the eight fasteners (354.355) from the outer chamber. If replacement is necessary due to abrasion or rupture, remove the outer diaphragm plates (210) by turning counter-clockwise. Models that are built with PTFE elastomers will have a PTFE overlay (190) that faces the outer pumping chamber and a back-up diaphragm (180) on the air side of pump. Pumps without PTFE will contain only the back-up diaphragms (180).
4. If diaphragm replacement is required, remove the inner diaphragm plate by removing fasteners (353, 383).
5. If a diaphragm has been ruptured and corrosive or viscous fluid has entered the air side of the pump, the complete air system should be inspected.
6. After removing the diaphragm-plate assemblies (170, 210), bumpers (160) and flat washers (385, only aluminium version) the pilot sleeve assembly (80,100,110,120,130,140) and diaphragm rod assembly (70+90) may be removed after removing the retaining plate (150) fasteners and pushing the entire unit out through the bore in the intermediate (61). The diaphragm rod assembly (70+90) must be unscrewed to remove the pilot sleeve (80).

**Caution**

To aid in reassembly apply a non-synthetic petroleum based lubricating grease without EP additives on all the o-rings and the intermediate bore.

7. Clean or replace any components that have excessive wear, dirt build-up, or chemical attack. Lube all components prior to reassembling. Reassemble pilot sleeve spacers (120), o-rings (130) and lip seals (140) within bore of intermediate. Make sure that the open side of the lip seals (140) is facing outward toward the diaphragms. Also make sure that the end pilot spacers (120) are at the end on either side of the pilot sleeve assembly and all inner spacers (100) are separated by o-rings (110). Next carefully insert the diaphragm rod assembly (70+90) with pilot sleeve (80) inside the assembly in the bore. Reattach retaining plates (150). Do not over tighten screws (341).



Caution

To aid in reassembly of the diaphragms apply a non-synthetic petroleum based lubricating grease without EP additives to the diaphragm's outside diameter sealing bead.

8. Reassemble the diaphragms (180) by placing the "liquid side" on the outer diaphragm plate (210), place the inner diaphragm plate (170) on the opposite side of the diaphragm, insert fasteners (353) with washers (383) and tighten fasteners to 17.0 Nm of torque.



Caution

For models with PTFE overlays (190), position the overlay between the outer diaphragm plate (210) and the diaphragm (180) before attaching the inner diaphragm plate (170).

9. Screw the stud (200, only aluminium version) into the end of the diaphragm rod and slide the bumper (160) onto the diaphragm rod and the washer (385, only aluminium version) onto the stud (200, only aluminium version). Tighten the outer diaphragm assembly hand-tight and following with 1/8 up to 1/4 rotation more to the end of the diaphragm rod. Position the outer chamber (50) and lightly tighten fasteners (384,372,360,354,355). Insert a pry bar into the chamber's suction opening until it touches the hex boss of the outer diaphragm plate (210). Move the diaphragm rod toward the open chamber. Wedge a block of wood between the pry bar and the side of the suction opening to hold the diaphragm rod in position. Mount the bumper (160) onto the diaphragm rod and the washer (385, only aluminium version) onto the stud (200, only aluminium version). Screw the second diaphragm assembly to the end of the diaphragm rod. Roll the outside bead of the diaphragm toward the outer chamber. Position the outer chamber (50) and tighten fasteners (384,372,360,354,355) to 40.7 Nm of torque. Return to the first outer chamber, align the suction opening flanges until they are level and on the same plane, tighten fasteners (384,372,360,354,355) to 40.7 Nm of torque.
10. Place the check balls (20) and check valve seats (30) in the discharge manifold (10), position on the outer chamber (50) and reassemble using fasteners (384,372,360,355). Place the check balls (20) and check valve seats (30) in the outer chambers (50), position the suction manifold (220) and reassemble using fasteners (384,372,360,355). Torque all manifold fasteners to 67.8 Nm.
- 10a. For models using PTFE elastomers, check valve seats (30), and o-rings (40), make sure that the o-rings (40) are facing the machined flanges of the suction manifold (220) and/or discharge manifold (10). Also make sure that the o-rings do not shift from their grooves during reassembly.

3.6.3 External fastener torque requirements



Caution

When reassembling loosely tighten all external fasteners adjusting and aligning and gradually, in an alternating fashion, tighten to torque requirements listed below.

Inner/outer diaphragm plate screws	17 Nm
Chambers' cap screws	40.7 Nm
Manifolds/Chamber	67.8 Nm
Air valve cap screws	4.5 Nm
Chamber/Intermediate screws	13.6 Nm

3.6.4 Maintenance of Air Valve

11. To evaluate the air valve components, remove the eight cap screws (351), washers (382, 371) from the air body (260). Inspect the gasket (230), valve plate (240) and shuttle (250) for scratches, surface irregularities, and excessive wear. Replace if necessary. Remove one of the end plugs (300) by inserting two of the cap screws (351) back into one end of the air valve body, point the other end of the air valve body safely away from people, and apply compressed air through one of the holes located on the gasket surface of the air valve body and the end plug will shoot out. Remove the two cap screws and push the air valve spool (270) toward the remaining end plug until both the end plug and air valve spool are removed being careful not to damage the machined bore in the air valve body. Gently reach in and pull the lip seal (280) and o-rings (290) out of inside bore of the air valve body. Check the air valve spool, lip seal and o-rings for cracks, splitting, scratches, and wear. Replace and/or clean items as necessary.
12. Lubricate lip seals (280) and o-rings (290). Reinstall the o-rings and lip seals making sure that the lips of the seals are facing each other.
Lubricate and insert the air valve spool (270) with the chamfered end entering the air valve body's inside bore through the end that has the spool image. Press the end plugs into position. Lubricate and reinstall the shuttle valve (250) and valve plate (240). Place the gasket (230) with the words "This side up" facing the valve plate. Re-assemble to the intermediate using cap screws (351) and washers (382,371). Flat washers should be touching the plastic air valve body. Tighten the screws to 4.5 Nm.

3.7 Maintenance Model 2" (Non-metallic)

3.7.1 Maintenance of Check Valve and O-Ring

1. Flush and neutralize the pump to be certain all corrosives or hazardous materials are removed prior to any maintenance. This procedure should always be followed when returning pumps for factory service also.
2. To inspect the check valves, remove the cap screws (354) from manifold sections (10, 220). Suction check valve seats (30) and check balls (20) are located inside of the bottom of the outer chamber (50). Gently remove and inspect for excessive wear, pitting or other signs of degradation. Inspect valve seat o-rings (40). Replace if necessary. Discharge check valves are located inside of the bottom of the discharge elbows (10). Repeat procedure for inspection of discharge check valves.
3. The check ball should fit into the curved portion of the valve seat and be facing upward when reinserted into the valve seat location. Tighten all external fasteners to final torque requirement after pump is completely assembled.



Caution

When using pumps built with PTFE o-rings always replace with new PTFE o-rings, since the original o-rings may not reseal the pump.

3.7.2 Maintenance of Diaphragm and Pilot Sleeve Assembly

4. To inspect diaphragms remove cap screws (354) and reinforcement bracket (62) from the outer pumping chambers (50). If replacement is necessary due to abrasion or rupture unscrew the outer diaphragm plates (210). Models that are built with PTFE elastomers will have a PTFE overlay (190) that faces the outer pumping chamber and a back-up diaphragm (180) on the air side of pump. Pumps without PTFE will contain only the back-up diaphragms (180).
5. If a diaphragm has been ruptured and corrosive or viscous fluid has entered the air side of the pump, the complete air system should be inspected. Remove the outer diaphragm plates (210) by opposing turning. Remove the diaphragms (180) resp. (180+190) regarding PTFE diaphragms and the inner diaphragm plate (170). Remove one of the retaining plates (150). After that you can push out the entire unit consisting of the assemblies of pilot sleeve (80, 100, 110, 120, 130, 140) and diaphragm rod (70, 90) through the bore in the intermediate. Diaphragm rod assembly must be unscrewed to remove pilot sleeve.



Caution!

To aid in reassembly use a non-synthetic, petroleum based lubricating grease without EP additives.

6. Clean or replace any components that have excessive wear, dirt build-up, or chemical attack. Lube all components prior to reassembling. Reassemble pilot sleeve spacers (120, 100), o-rings (130) and lip seals (140) within bore of intermediate. Make sure that the open side of the lip seals (140) is facing outward toward the diaphragms. Also make sure that the end pilot spacers (120) are at the end on either side of the pilot sleeve assembly and all inner spacers (100) are separated by o-rings (110). Next carefully insert the diaphragm rod assembly (70, 90) with pilot sleeve (80) inside the assembly in the bore. Reattach retaining plates (150). Do not overtighten self-tapping screws (351).
7. Assemble the diaphragm (180) (optionally PTFE diaphragm (190)) and the inner diaphragm plate (170), with the curved side to the diaphragm, on the outer diaphragm plate (210) and screw assembly into diaphragm rod. Push diaphragm rod to opposite side of intermediate and add the opposite diaphragm assembly. Apply 42 Nm of torque to outer diaphragm plates (210). Assemble the outer chamber (50), reinforcement brackets (62) and bolts (354) first on the side where the diaphragm has been inverted. Next reach under the opposite diaphragm assembly and pull diaphragm rod to opposite side (a large flat screw driver may be used as an aid in this process) and assemble remaining outer chamber and reinforcement brackets with the cap screws. When positioning outer diaphragm chambers onto intermediate make sure that witness lines are matching.

- Caution!**
 If air valve has been removed, proper orientation of air system with fluid chambers must be observed. The top of the intermediate has a single vertical air passage slot on the air valve mounting face while the outer chamber check ball cavity should be pointing downward.

8. Also make sure that the valve seat o-rings do not shift from their grooves during reassembly. Tighten fasteners on bolts loosely.

3.7.3 External fastener torque requirements

- Caution!**
 When reassembling loosely tighten all external fasteners adjusting and aligning and gradually, in an alternating fashion, tighten to torque requirements listed below.

Pumping chamber	27.1 Nm
Elbow to Chamber Bolts	27.1 Nm
Air valve cap screws	4.5 Nm
Diaphragm plate	42 Nm

3.7.4 Maintenance of Air Valve

9. To evaluate air valve components, remove the six cap screws (353), washers, (381, 371) and nuts (361) from the air valve body (260). The shuttle plate (240) and shuttle (250) may be inspected by removing them from their location in the slot in the back of the air valve. Inspect for scratches or surface irregularities. Replace if necessary. Remove the plug (300) at the bottom of the air valve, point the bottom of the air valve safely away from people, direct compressed air through one of the lower holes in the back of the air valve body and the plug will shoot out. Next push the air valve spool (270) out of the air valve body. Gently reach in and pull lip seals (280) out of inside bore of the air valve body. Check for cracks, splitting or scratches. Clean components if replacement is not necessary. Inspect plug o-ring (290) for any damage and replace if necessary and reinsert in o-ring groove.

- Caution!**
 Make sure that the open sides of the two lip seals (280) face each other when reassembling air valve. Lube all components with suggested maintenance grease as an aid in reassembly.

10. Reinsert air valve spool (270) inside of air valve body (260). Place shuttle (250) on middle rib of air valve spool (270) through the square slot in back of air valve (260). If using original valve plate (240) lubricate side of plate that was facing the shuttle (250) (or if new valve plate is used lubricate the lapped and polished side of plate) and place the lubricated side next to the shuttle in the slot. Press the valve plug (300) into air valve body, chamfered end first.
11. Check that gasket (230) is not cracked. If damaged replace.
12. After gasket (230) is pressed back into position align air valve onto intermediate and reinsert the six cap screws (353) with lock washer (381) and flat washers (371). Apply 4.5 Nm of torque to fasteners.

4. Repairs

Repairs should only be made by the manufacturer or authorized Lutz-dealers. Only use original Lutz spare parts. Before sending back the appliance, following must be observed:

- Residuals in the appliance can cause danger to the environment and human health. Completely empty the device. Then flush and clean with liquids that are chemically resistant to the device.
- Please advise which liquid has been pumped. A respective safety data sheet must be attached to the return consignment.

5. Trouble shooting

Air is applied to pump but pump is not starting

1. Clean filters and debris from all fluid lines.
2. Make sure all valves on fluid lines are open.
3. Inspect diaphragms for rupture.
4. Air pressure must not be below 1.4 bar.

Pump is pumping but not priming.

1. Check all suction line connections for leakage.
2. Inspect check valves for wear or debris.
3. Suction lift specifications may be exceeded.
4. If fluid is viscous use larger suction lines.

Leakage

1. Retorque all fasteners to specified torque requirements.
2. Replace o-rings.
3. Inspect diaphragms for rupture.

Low Flow rate

1. Confirm air pressure and air capacity at the air valve as required.
2. Check for leaks in suction line or obstructions in lines.
3. If fluid is viscous use larger suction lines.

Air in discharge lines

1. Check for leaks in suction lines.
2. Inspect diaphragms for rupture.

Erratic cycling

1. Inspect check valve seats for debris.
2. Inspect fluid lines for debris.
3. Automatic valves must be properly functioning.
4. Viscosity of product may be changing.

Premature destruction of wetted components

1. If fluid is abrasive slow down pump or increase size of pump.
2. Filter fluid for sharp objects.
3. Make sure fluid is compatible with wetted materials.

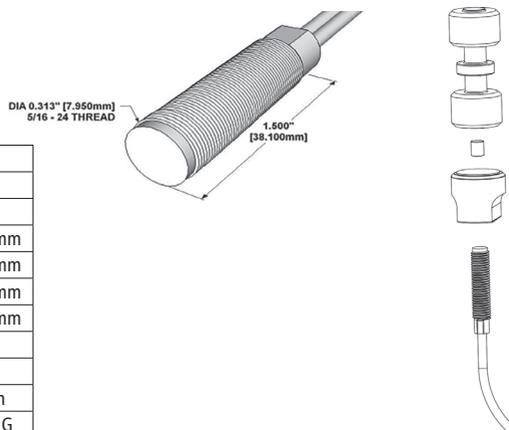
6. Accessories

6.1 Accessories Model 1/4" (Non-metallic)

6.1.1 Electronic pulse connection

Description of the function:

For the pulse connection, a magnetically actuated proximity switch is installed in the main air valve. The switch closes when the spool is in the lower position. This allows counting operations.



Physical	Configuration	SPST	
	Form*	A	
	Contact position	Center	
	Glass L	14.50	mm
	Glass D	2.54	mm
	Total L*	46	mm
	Wire D	0.60	mm
	Air gap location	Center	
	Assembly spec.*	Press	
	Contact material	Ruthenium	
	Max. vibration resistance	10	G
	Max. shock resistance	150	G
Wire tear strength	N/A	kg	
Operation	Tighten (± 2 AT)	15 - 23	AT
	Dropping	7.5-17.5	AT
	Switching time	0.10	ms
	Bounce time	0.15	ms
	Release time	30	μ s
	Resonance frequency	5100	Hz
	Max. operating frequency	N/A	Hz
	Operating temperature	-55 - 105	$^{\circ}$ C
	Storage temperature	N/A	$^{\circ}$ C
Electrical	DC switching capacity	15	W
	AC switching capacity	N/A	W
	DC switching voltage	200	VDC
	AC switching voltage	140	VAC
	DC switching current	1.00	A
	AC switching current	1.00	A
	DC max. current when contact is closed	1.75	A
	AC max. current when contact is closed	1.75	A
	Min. breakdown voltage	275	VDC
	Max. contact resistance	100	m Ω
	Typical contact resistance	70	m Ω
	Max. capacity	0.30	pF
	Min. insulation resistance	10	M Ω

Assembly characteristics

Housing:	2250
Housing material	Celanex 3316
Reed	1051
Configuration	SPST
Form	A

Wire/cable characteristics

Type	Cable	
Length	6.0/152.4	in/mm
Number of wires	2	
Colour	Black	
Insulation material	PVC	
Cross section	24	AWG
Multi-stranded copper	7	STR-TC
Maximum temperature	105	$^{\circ}$ C

Standard drive / minimum tightening range

2250-4002-000, Alnico 5, cylinder	0.13/3.3	in/mm
-----------------------------------	----------	-------

Assembly certifications

UL recognized (File#: E102207)		
RoHS	yes	

Translation of the original declaration of conformity

We herewith declare under the sole responsibility that the following product complies with the EU Directives listed.

Manufacturer: Lutz Pumpen GmbH, Erlenstraße 5-7, D-97877 Wertheim

Product: **Double diaphragm pump**

Type of device:		1/4"		3/8"		1/2"		1"		1 1/2"		2"		3"	
		PP, KN	N...C Ex	PP, KN	N...C Ex	PP, KN, AL, SS	N...C Ex	AL... Ex, SS... Ex	PP, KN, AL, SS	AL... Ex, SS... Ex	PP, KN, AL, SS	AL... Ex, SS... Ex	AL	AL... Ex, SS... Ex	
Relevant European Directives:	ATEX-Directive 2014/34/EU		•		•		•	•	•		•		•		•
	Machinery Directive 2006/42/EC	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Registered number:	INTERTEK TESTING & CERTIFICATION LTD 0359 ¹⁾ , Intertek House, Cleeve Road, Leatherhead, Surrey KT22 7SB, UK ITS 15 ATEX 18261 X Marking:  II 2 GD c TX X		•		•		•	•	•		•		•		•
Applicable harmonized standards:	EN ISO 12100:2010	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	EN 13463-1:2009		•		•		•	•	•		•		•		•
	EN 13463-5:2011		•		•		•	•	•		•		•		•

¹⁾ The notified body is keeping the technical documentation according to ATEX-Directive, annex VIII, number 2 with the specified registration number.



Lutz Pumpen GmbH

Erlenstraße 5-7

D-97877 Wertheim

Tel. (+49 93 42) 8 79-0

Fax (+49 93 42) 87 94 04

e-mail: info@lutz-pumpen.de

<http://www.lutz-pumpen.de>