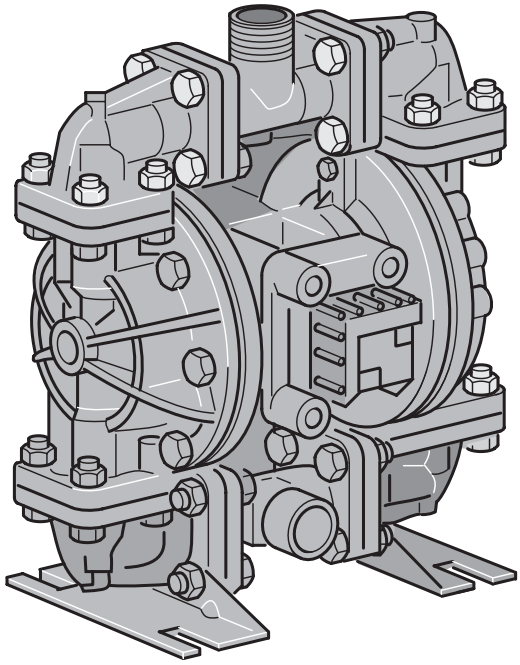
Operating Instructions

Duodos 10, 15, 20, 25

Pneumatically-operated double diaphragm pump



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Please read through operating instructions manual carefully before use. Do not discard.
The guarantee is void if the equipment is subject to misuse.

Publishing details:

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1 ProMinent® Duodos model overview

Type	Housing	Diaphragm	Capacity l/h	Order no.
Duodos 10 PP	PP	Santoprene	0 – 900	1010793
Duodos 15 PP	PP	Santoprene	0 – 3120	1010794
Duodos 20 PP	PP	Santoprene	0 – 5220	1010795
Duodos 25 PP	PP	Santoprene	0 – 10200	1010796
Duodos 10 PVDF	PVDF	Teflon	0 – 900	1010797
Duodos 15 PVDF	PVDF	Santoprene / Teflon	0 – 3120	1010798
Duodos 20 PVDF	PVDF	Santoprene / Teflon	0 – 5220	1010799
Duodos 25 PVDF	PVDF	Santoprene / Teflon	0 – 10200	1010800

2 Function principle

The Duodos double diaphragm pumps are pneumatically operated. The ball valves prevent the pumped medium from flowing backwards and thus regulate the feed direction of the pump. The internal diaphragm compartments are filled alternately with compressed air. The compartments that are not filled with compressed air are automatically deventilated. Both diaphragms are connected to each other via a spindle. In this way, the firmly connected diaphragms are moved backwards and forwards. The displacement stroke of one diaphragm pulls the other diaphragm with it, so that a positive suction pressure, and consequently a suction stroke, is created in the opposite compartment. The whole interior of the diaphragm is filled with compressed air. The exterior of the diaphragm displaces the liquid medium. In the interests of maximising the life of the diaphragm, you should place the pump as near as possible to the medium being pumped. Where there is a positive priming pressure greater than 3.0 metres WG on the suction side, it is recommended that you fit a back pressure valve in the air exit side of the pump, in order to protect the diaphragm. The minimum air pressure required to operate the Duodos pumps is approx. 1 bar.

A 4-way air valve controls the alternate filling or deventilating of the diaphragm compartments. The valve has a control plunger, which brings the equipment to the stop position, so that one diaphragm compartment is supplied with compressed air whilst the other compartment is being deventilated. When the control plunger reaches the other stop position, the pressure ratios are reversed.

The pilot valve pneumatically controls the control plunger in the air valve. The pilot valve alternately ventilates one side of the control plunger and deventilates the other side, so that the control plunger in the air valve moves from one stop position to the other.

The control pins reverse the pilot valve after each completed diaphragm stroke. The plunger within the pilot valve is pushed into the new position through the diaphragm plate and over the control pins upon completion of the suction stroke.

Each compartment is connected to a power supply on the pressure and suction side.

3 Installation and Start-up

Locate the pump as close to the product being pumped as possible. Keep the suction line length and number of fittings to a minimum. Do not reduce the suction line diameter. For installations of rigid piping, short sections of flexible hose should be installed between the pump and the piping. The flexible hose reduces vibration and strain to the pumping system. A surge suppressor is recommended to further reduce pulsation in flow. A pulsation dampener is recommended to reduce pulsation in the medium being pumped.

3.1 Air Supply

Air supply pressure cannot exceed 100 psi (7.0 bar). Connect the pump air inlet to an air supply of sufficient capacity and pressure required for desired performance. When the air supply line is solid piping, use a short length of flexible hose between the pump and the piping to reduce strain to the piping. The weight of the air supply line, regulators and filters must be supported by some

means other than the air inlet cap. Failure to provide support for the piping may result in damage to the pump. A pressure regulating valve should be installed to ensure air supply pressure does not exceed recommended limits.

3.2 Lubrication of the air valves

The air valve and the pilot valve are constructed so as not to require any lubrication and should not be lubricated.

3.3 Air Line Moisture

Water in the compressed air supply can create problems such as icing or freezing of the exhaust air, causing the pump to cycle erratically or stop operating. Provision of an air dryer is recommended. This extracts water from the compressed air and protects against problems with regard to the formation of ice.

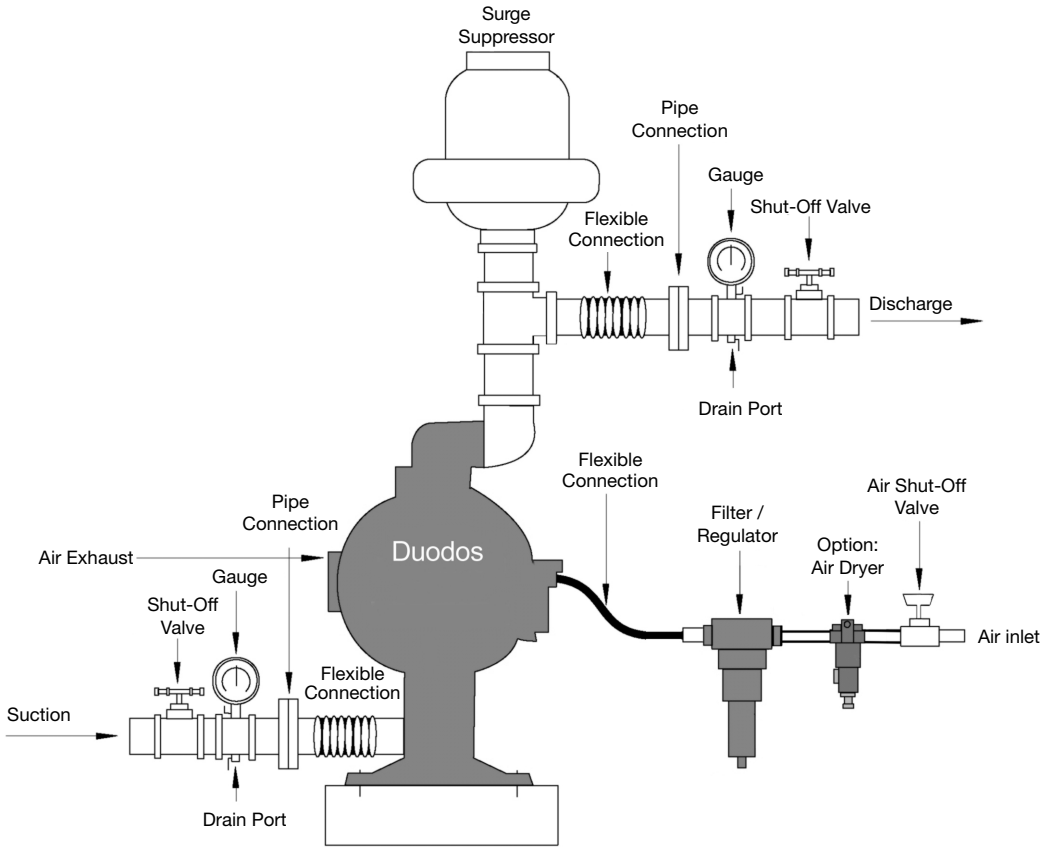
3.4 Priming

To start the pump, open the air valve slightly by a half or three-quarter turn. Once the pump is filled with the medium, you can open the air valve wider, in order to produce the flow of air required. If the stroke frequency of the pump increases on opening, but the flow rate stays the same, cavitation has occurred. Gently turn the valve in the opposite direction in order to provide the optimum ratio of air consumption to feed quantity.

3.5 Operational breakdown

Rinse the pump thoroughly each time it is used, in case media are used that are liable to form deposits or solidify when equipment is idle. This avoids damage to the pump. Any chemical residue left in the pump can dry out and deposits can form. When the pump is started again, this can lead to problems with the diaphragms and ball valves. In temperatures below freezing, the pump should always be completely emptied after use.

4 Installation Guide



5 Important Safety Information

NOTE

Read these safety warnings and instructions in this manual completely, before installation and start-up of the pump. It is the responsibility of the purchaser to retain this manual for reference. Failure to comply with the recommendations stated in this manual will damage the pump, and void factory warranty.

CAUTION

Before pump operation, inspect all gasketed fasteners for looseness caused by gasket creep. Retorque loose fasteners to prevent leakage. Follow recommended torques stated in this manual.

WARNING

- **Before maintenance or repair, shut off the compressed air line, bleed the pressure, and disconnect the air line from the pump. The discharge line may be pressurized and must be bled of its pressure.**
- **In the event of diaphragm rupture, pumped material may enter the air end of the pump, and be discharged into the atmosphere. If pumping a product which is hazardous or toxic, the air exhaust must be piped to an appropriate area for safe disposition.**
- **Take action to prevent static sparking. Fire or explosion can result, especially when handling flammable liquids. The pump, piping, valves, containers or other miscellaneous equipment must be grounded.**
- **This pump is pressurized internally with air pressure during operation. Always make certain that all bolting is in good condition and that all of the correct bolting is reinstalled during assembly.**
- **When used for toxic or aggressive fluids, the pump should always be flushed clean prior to disassembly.**
- **Before doing any maintenance on the pump, be certain all pressure is completely vented from the pump, suction, discharge, piping, and all other openings and connections. Be certain the air supply is locked out or made non-operational, so that it cannot be started while work is being done on the pump. Be certain that approved eye protection and protective clothing are worn all times in the vicinity of the pump. Failure to follow these recommendations may result in serious injury or death.**
- **Airborne particles and loud noise hazards. Wear ear and eye protection.**

6 Troubleshooting

Possible Symptoms:

- Pump will not cycle
- Pump cycles, but produces no flow
- Pump cycles, but flow rate is unsatisfactory
- Pump cycle seems unbalanced
- Pump cycle seems to produce excessive vibration

Inspection: Excessive suction lift in system.

Action: With suction lifts exceeding 6 metres the pump can be prepared for priming in most cases by prefilling the pump compartments.

Inspection: Priming pressure on the suction side of the system is too strong.

Action: Where there is a priming pressure greater than 3 metres WG, a back pressure valve should be provided on the air exit side of the pump.

Inspection: Back pressure of the medium is greater than the air pressure.

Action: Increase the air pressure entering the pump.

Inspection: Compressed air pressure is greater than the back pressure of the medium.

Action: Adjust the pressure of the air supply to correspond with the output curve for the pump. A high stroke rate can cause the medium to cavitate.

Inspection: Nominal width of suction line is too small.

Action: Follow the recommendations given on the scale drawing with regard to the cross-section of the suction line.

Inspection: Nominal width of air pipe is too small.

Action: Refer to the recommendations on dimensions for the air-intake pipe in the operating instructions manual for the pump

Inspection: Pump air distribution system.

Action: Disassemble air valve, pilot valve and control pins as detailed in the operating instructions manual and examine.

Inspection: Stiff tube connections on the pump.

Action: Use flexible connections and a pulsation dampener.

Inspection: Expelled air filter clogged.

Action: Dismantle filter. Then clean or de-ice and re-assemble.

Inspection: Pumped medium in expelled air muffler.

Action: Disassemble pump compartments and check to see if a diaphragm is broken or if a diaphragm flange is loose.

Inspection: Ball valve clogged.

Action: Disassemble the liquid end of the pump and rectify the blockage.

Inspection: Ball valve or valve seat worn or misshapen.

Action: Check ball valves and valve seats for wear and tear and correct positioning. Replace, if necessary.

Inspection: Suction line clogged.

Action: Remove blockage or check and clean suction line.

Inspection: Discharge line clogged.

Action: Check for blockage. It is possible that valves in the discharge line may be closed.

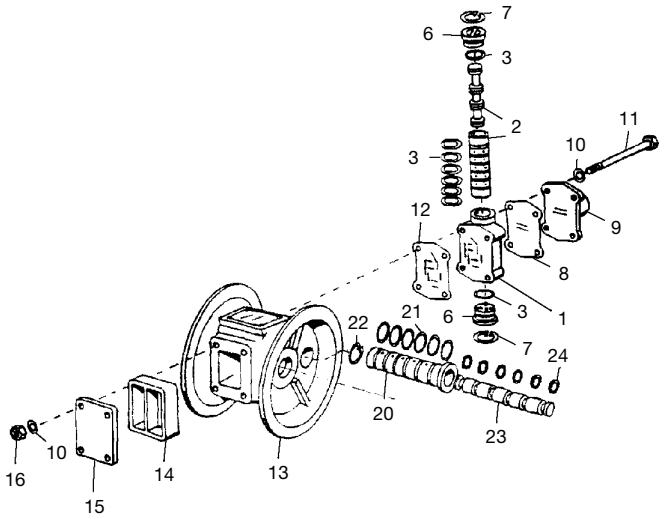
Inspection: Pump compartment clogged.

Action: Disassemble liquid end and examine the pump diaphragm compartments.

7 Maintenance of the air valve

To maintain the air valve, first disconnect the supply of compressed air, deventilate the pump and detach the air supply tube from the pump.

7.1 Maintenance of the air valve – Duodos 10



Step 1: Remove the four hexagon bolts (item 11) using a 7/16" (11.11 mm) spanner. Completely detach the air valve housing (item 1) from the pump. Remove the seals (items 8, 12), examine for cracks and damage and replace, if necessary.

Step 2: Disassemble air valve.

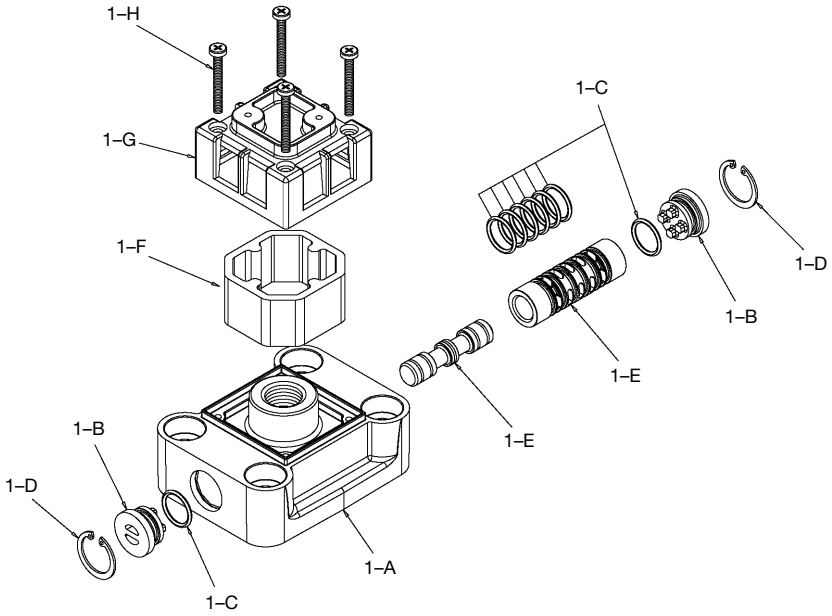
Use pliers to remove both circlips (item 7) and both stoppers (item 6) from the air valve. Examine the O-rings (item 3) for cracks and wear and replace, if necessary. Remove the plunger (part of item 2) from the master cylinder. Take care not to scratch or damage the plunger. Wipe the plunger with a soft cloth and examine for scratches and signs of wear. Check to see if the master cylinder (part of item 2) is dirty or scratched inside. If necessary, replace the master cylinder and plunger (item 2).

Step 3: Re-assemble air valve.

Fit one stopper (item 6) with O-ring (item 3) and circlip (item 7) in the air valve housing (item 1). Take the new master cylinder and plunger (item 2) out of the plastic bag and remove the plunger from the master cylinder. Put the six O-rings (item 3) back onto the master cylinder and push into the grooves. Before installing the master cylinder into the air valve housing, coat the O-rings with a thin layer of grease. Ensure the grooves in the master cylinder are in line with the grooves in the valve housing (item 1). Push the plunger into the master cylinder as far as the end cap fitted previously. Take care to avoid scratching. Fit the second end cap with an O-ring and install the remaining circlip.

Now the air valve housing can be re-installed in the pump. Fit the cap (item 9), the valve housing seal (item 8), the valve housing (item 1) (the five square grooves facing towards the cap) and the seal (item 12) to the pump with the four hexagon bolts. Push the muffler (item 14) and the cap (item 15) onto the bolts. Place the plain washers (item 10) and the hexagon nuts (item 16) in position and tighten using 3.4 Nm. Reconnect the air supply, the pump is now ready for commissioning.

7.2 Maintenance of the air valve – Duodos 15



Step 1: Remove the four Allen screws (item 13) using a 3/16" (4.76 mm) Allan key. Completely detach the air valve housing (item 1) from the pump. Remove the seal (item 23), examine for cracks and damage and replace, if necessary.

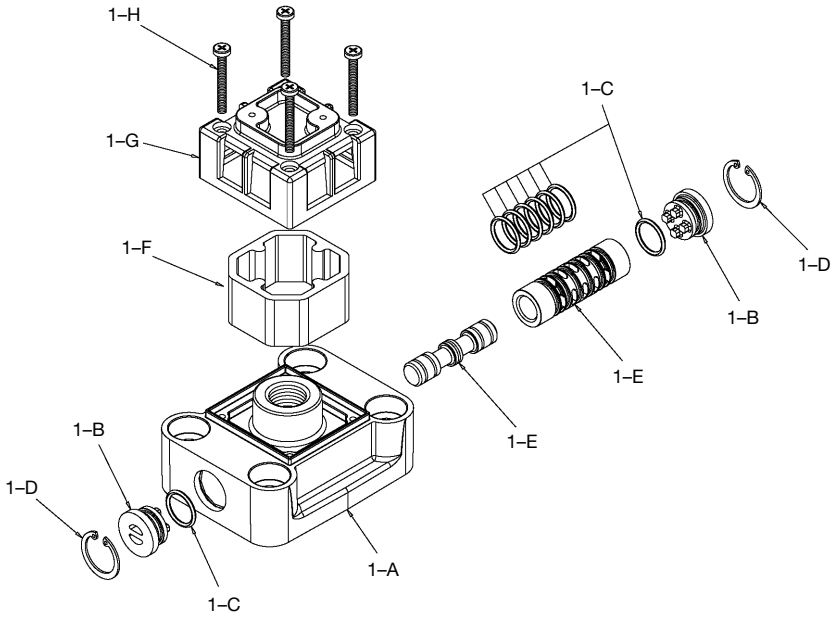
Step 2: Disassemble air valve.

Use pliers to remove both circlips (item 1-D) and both stoppers (item 1-B) from the air valve. Examine the O-rings (item 1-C) for cracks and wear and replace, if necessary. Remove the plunger (part of item 1-E) from the master cylinder. Take care not to scratch or damage the plunger. Wipe the plunger with a soft cloth and examine for scratches and signs of wear. Check to see if the master cylinder (part of item 1-E) is dirty or scratched inside. If necessary, replace the plunger and master cylinder.

Step 3: Re-assemble air valve.

Fit one stopper (item 1-B) with O-ring (item 1-C) and circlip (item 1-D) in the air valve housing (item 1-A). Take the new master cylinder and plunger (item 1-E) out of the plastic bag and remove the plunger from the master cylinder. Put the six O-rings (item 1-C) back onto the master cylinder and push into the grooves. Before installing the cylinder into the air valve housing, coat the O-rings with a thin layer of grease. Push the plunger into the master cylinder as far as the end cap fitted previously. Take care to avoid scratching. Fit the second end cap with an O-ring and install the remaining circlip. Screw the air valve housing (item 1) and the seal (item 23) onto the pump. Reconnect the air supply; the pump is now ready for commissioning.

7.3 Maintenance of the air valve – Duodos 20



Step 1: Remove the four Allen screws (item 13) using a 3/16" (4.76 mm) Allan key. Completely detach the air valve housing (item 1) from the pump. Remove the seal (item 21), examine for cracks and damage and replace, if necessary.

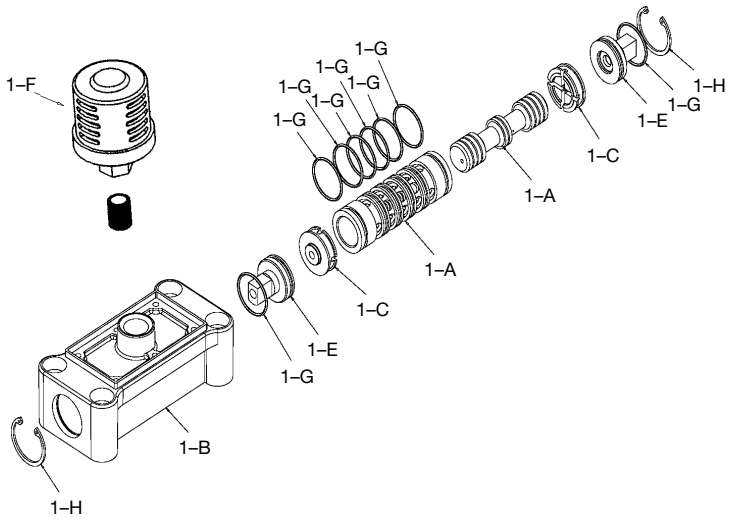
Step 2: Disassemble air valve.

Use pliers to remove both air valve retaining circlips (item 1-D) and both stoppers (item 1-B). Examine the O-rings (item 1-C) for cracks and wear and replace, if necessary. Remove the plunger (part of item 1-E) from the master cylinder. Take care not to scratch or damage the plunger. Wipe the plunger with a soft cloth and examine for scratches and signs of wear. Check to see if the master cylinder (part of item 1-E) is dirty or scratched inside. If necessary, replace the plunger and master cylinder.

Step 3: Re-assemble air valve.

Fit one stopper (item 1-B) with O-ring (item 1-C) and circlip (item 1-D) in the air valve housing (item 1-A). Take the new master cylinder and plunger (item 1-E) out of the plastic bag and remove the plunger from the master cylinder. Put the six O-rings (item 1-C) back onto the master cylinder and push into the grooves. Before installing the cylinder into the air valve housing, coat the O-rings with a thin layer of grease. Push the plunger into the master cylinder as far as the end cap fitted previously. Take care to avoid scratching. Fit the second end cap with an O-ring and install the remaining circlip. Screw the air valve housing (item 1) and the seal (item 21) onto the pump. Reconnect the air supply; the pump is now ready for commissioning.

7.4 Maintenance of the air valve – Duodos 25



Step 1: Remove the four Allen screws (item 13) together with the plain washers and nuts using a 1/4" (6.35 mm) Allan key. Completely detach the air valve housing (item 1) from the pump. Remove the seal (item 21), examine for cracks and damage and replace, if necessary.

Step 2: Disassemble air valve.

Use pliers to remove both circlips (item 1-H) and both stoppers (item 1-E) from the air valve. Examine the O-rings (item 1-G) for cracks and wear and replace, if necessary. Remove both shock absorbers (item 1-C) and examine for cracks, wear and abrasion. Replace if necessary. Remove the plunger (part of item 1-A) from the master cylinder. Take care not to scratch or damage the plunger. Wipe the plunger with a soft cloth and examine for scratches and signs of wear. Check to see if the master cylinder (part of item 1-A) is dirty or scratched inside. If necessary, replace the plunger and master cylinder.

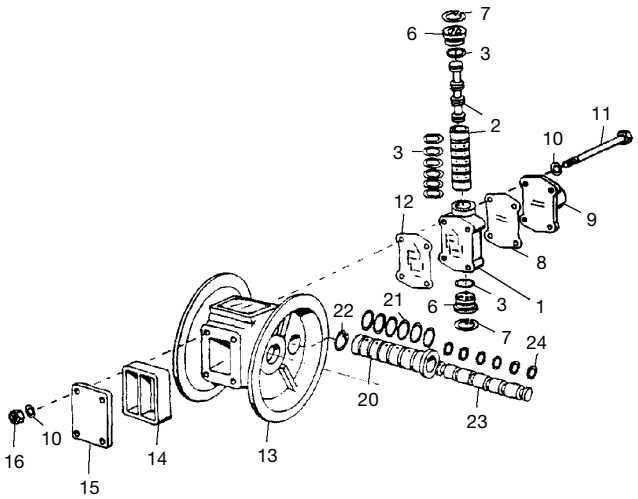
Step 3: Re-assemble air valve.

Fit one stopper (item 1-E) with O-ring (item 1-G) and shock absorber (item 1-C) in the air valve housing (item 1-B) and secure with a circlip (item 1-H). Take the new master cylinder and plunger (item 1-A) out of the plastic bag and remove the plunger from the master cylinder. Put the six O-rings (item 1-G) back onto the master cylinder and push into the grooves. Before installing the cylinder into the air valve housing, coat the O-rings with a thin layer of grease. Push the plunger into the master cylinder as far as the end cap fitted previously. Take care to avoid scratching. Fit the second end cap with an O-ring and shock absorber and install the remaining circlip. Screw the air valve housing (item 1-B) and the seal (item 21) onto the pump. Reconnect the air supply; the pump is now ready for commissioning.

8 Maintenance of the pilot valve

To maintain the pilot valve, first disconnect the supply of compressed air, deventilate the pump and detach the air supply tube from the pump.

8.1 Maintenance of the pilot valve – Duodos 10



Step 1: Remove both strap retainers (item 28). Unscrew the external diaphragm flange (item 27), diaphragm (item 26) and internal diaphragm flange (item 25), turning anti-clockwise all together. Use a 1/2" (12.7 mm) spanner for this.

Step 2: Disassemble pilot valve.

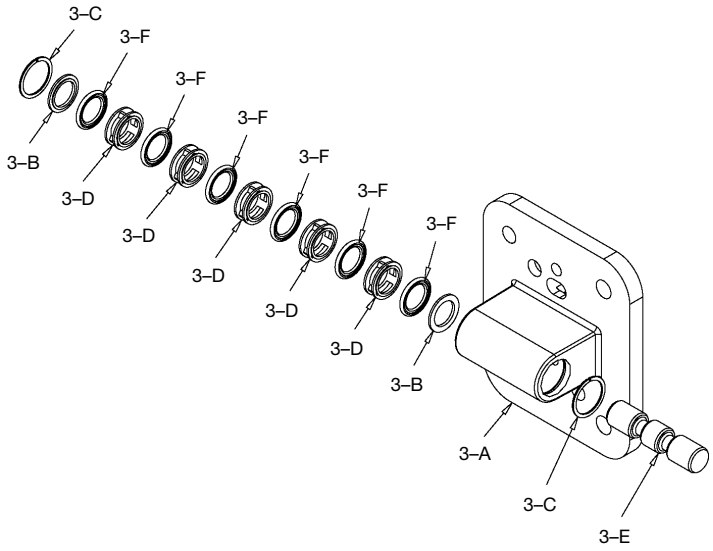
To be able to remove the pilot valve plunger (item 23), you must remove the O-ring (item 24) from one end of the plunger. Then push the plunger out of the master cylinder and examine the O-rings (item 24) for damage and wear. Damaged O-rings must be replaced. Check to see if the pilot valve master cylinder (item 20) is dirty or scratched inside or if anything else is noticeable. Replace, if necessary. Remove the circlip (item 22) to disassemble the master cylinder.

Step 3: Re-assemble pilot valve.

To install the master cylinder, lightly grease the six O-rings (item 21) and push the master cylinder from the chamfered end of the bore into the pump housing (item 13) and secure with the circlip (item 22). Lightly grease the four O-rings inside the plunger and place the plunger in the master cylinder. Next, mount the remaining O-rings (item 24) on the plunger.

Step 4: Screw the external diaphragm flange (item 27), diaphragm (item 26) and internal diaphragm flange (item 25) onto the pump rod, turning clockwise all together. Use a 1/2" (12.7 mm) spanner for this. Use a second spanner to fix the external diaphragm flange to the opposite site so that it does not turn with everything else. This does not apply if the opposite compartment is installed.

8.2 Maintenance of the pilot valve – Duodos 15



Step 1: Remove the four hexagon bolts (item 12) using a 3/8" (9.52 mm) spanner. Detach the cap (item 8) and the seal (item 21) from the air input. You can then remove the pilot valve housing (item 3) for inspection.

Step 2: Disassemble pilot valve.

Remove the pilot valve plunger (item 3-E), wipe with a cloth and examine for scratches and signs of wear. Replace, if necessary. Remove both spiral sealing rings (item 3-C) from the ends of the pilot valve housing. To do this, place a small, straight-edged screwdriver in the groove of the sealing ring, lift the ring and push back in a clockwise direction. Carefully push out both moulded washers (item 3-B), the five spacer supports (item 3-D) and the six moulded seals (item 3-F) from one end of the pilot valve housing. Examine moulded seals and spacer supports for cracks and wear and replace, if necessary.

Step 3: Re-assemble pilot valve.

Fit the spiral sealing ring on one end of the pilot valve housing. Expand the ring, so as to fit a ring end into the groove in the valve housing and allow the ring to snap into place in the groove in a clockwise direction. Assemble one moulded washer with the graduated sides to the moulded seal. Coat the external area of all moulded seals with a thin layer of grease. Insert the moulded seals and spacer supports pushing gently against the sealing ring already installed and fit the remaining moulded washer with the graduated sides pointing towards the moulded seal. Fit the second sealing ring as described above. Coat the inside diameter of all moulded seals with a thin layer of grease. Also lightly grease the outside of the pilot valve plunger and push through the moulded seals.

Step 4: Inspect control pins.

After the pilot valve has been disassembled, both control pins (item 30) can be accessed via the grooves in the pump housing. Remove the control pins from the guide bushes (item 7). Coat the control pins with a thin layer of grease and place back in the guide bushes (insert as far as the buffer).

Step 5: Fit the pilot valve in the pump housing.

First lay the seal (item 22) on the pilot valve housing. Carefully fit the pilot valve into the grooves on the pump housing. The control pins must be aligned with the pilot valve control plunger. Assemble the seal (item 21), the air input cover (item 8) and the hexagon bolts (item 12). Reconnect the air supply. The pump is now ready for commissioning.

8.3 Maintenance of the pilot valve – Duodos 20

Step 1: Remove the four hexagon bolts (item 12) using a 3/8" (9.52 mm) spanner. Detach the cap (item 8) and the circlip (item 19) from the air input. You can then remove the pilot valve housing (item 3) for inspection.

Step 2: Disassemble pilot valve.

Remove the pilot valve plunger (item 3-E), wipe with a cloth and examine for scratches and signs of wear. Replace, if necessary. Remove both spiral sealing rings (item 3-C) from the ends of the pilot valve housing. To do this, place a small, straight-edged screwdriver in the groove of the sealing ring, lift the ring and push back in a clockwise direction. Carefully push out both moulded washers (item 3-B), the five spacer supports (item 3-D) and the six moulded seals (item 3-F) from one end of the pilot valve housing. Examine the moulded seals and spacer supports for cracks and wear and replace, if necessary.

Step 3: Re-assemble pilot valve.

Fit the spiral sealing ring to one end of the pilot valve housing. Expand the ring, so as to fit a ring end into the groove in the valve housing and allow the ring to snap into place in the groove in a clockwise direction. Assemble one moulded washer with the graduated sides to the moulded seal. Coat the external area of all moulded seals with a thin layer of grease. Insert the moulded seals and spacer supports pushing gently against the sealing ring already installed and fit the remaining moulded washer with the graduated sides pointing towards the moulded seal. Fit the second sealing ring as described above. Coat the inside diameter of all moulded seals with a thin layer of grease. Also lightly grease the outside of the pilot valve plunger and push through the moulded seals.

Step 4: Inspect control pins.

After the pilot valve has been disassembled, both control pins (item 28) can be accessed via the grooves in the pump housing. Remove the control pins from the guide bushes (item 7). Coat the control pins with a thin layer of grease and place back in the guide bushes (insert as far as the buffer).

Step 5: Fit the pilot valve in the pump housing.

First lay the seal (item 20) on the pilot valve housing. Carefully fit the pilot valve into the grooves on the pump housing. The control pins must be aligned with the pilot valve control plunger. Assemble the seal (item 19), the air input cover (item 8) and the hexagon bolts (item 12). Reconnect the air supply. The pump is now ready for commissioning.

8.4 Maintenance of the pilot valve – Duodos 25

Step 1: Remove the four hexagon bolts (item 11) and the four plain washers (item 43) using a 1/2" (12.70 mm) spanner. Detach the cap (item 8) and the seal (item 19) from the air input. You can then remove the pilot valve housing (item 3) for inspection.

Step 2: Disassemble pilot valve.

Remove the pilot valve plunger (item 3-E), wipe with a cloth and examine for scratches and signs of wear. Replace, if necessary. Remove both spiral sealing rings (item 3-C) from the ends of the pilot valve housing. To do this, place a small, straight-edged screwdriver in the groove of the sealing ring, lift the ring and push back in a clockwise direction. Carefully push out both moulded washers (item 3-B), the five spacer supports (item 3-D) and the six moulded seals (item 3-F) from one end of the pilot valve housing. Examine the moulded seals and spacer supports for cracks and wear and replace, if necessary.

Step 3: Re-assemble pilot valve.

Fit the spiral sealing ring (item 3-C) to one end of the pilot valve housing. Expand the ring, so as to fit a ring end into the groove in the valve housing and allow the ring to snap into place in the

groove in a clockwise direction. Assemble one moulded washer with the graduated sides to the moulded seal. Coat the external area of all moulded seals with a thin layer of grease. Insert the moulded seals and spacer supports pushing gently against the sealing ring already installed and fit the remaining moulded washer with the graduated sides pointing towards the moulded seal. Fit the second sealing ring as described above. Coat the inside diameter of all moulded seals with a thin layer of grease. Also lightly grease the outside of the pilot valve plunger and push through the moulded seals.

Step 4: Inspect control pins.

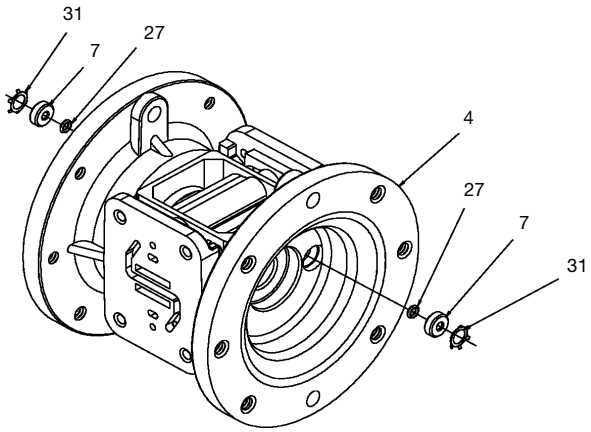
After the pilot valve has been disassembled, both control pins (item 32) can be accessed via the grooves in the pump housing. Remove the control pins from the guide bushes (item 7). Coat the control pins with a thin layer of grease and place back in the guide bushes (insert as far as the buffer).

Step 5: Fit the pilot valve in the pump housing.

First lay the seal (item 20) on the pilot valve housing. Carefully fit the pilot valve into the grooves on the pump housing. The control pins must be aligned with the pilot valve control plunger. Assemble the seal (item 19), the air input cover (item 8), the hexagon bolts (item 11) with the plain washers (item 43) and nuts (item 26). Reconnect the air supply. The pump is now ready for commissioning.

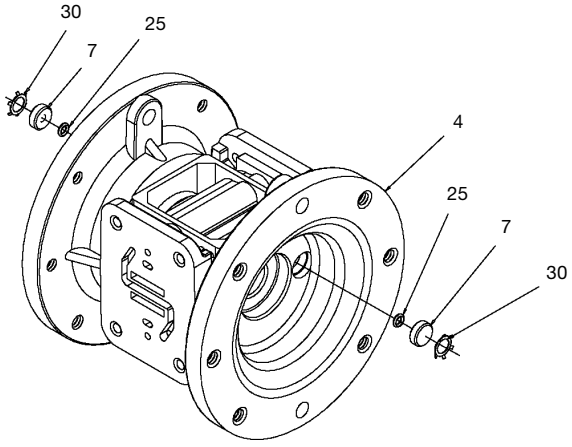
9 Maintenance of the control pins

9.1 Maintenance of the control pins – Duodos 15



To maintain the control pin components, first remove both circlips (item 31) using a small straight-edged screwdriver. It is recommended that you use new circlips when re-assembling components. Next, take out both guide bushes (item 7). Examine the guide bushes for scratches and wear and replace, if necessary. Examine both O-rings (item 27) for cracks and wear.

9.2 Maintenance of the control pins – Duodos 20



To maintain the control pin components, first remove both circlips (item 30) using a small straight-edged screwdriver. It is recommended that you use new circlips when re-assembling components. Next, take out both guide bushes (item 7). Examine the guide bushes for scratches and wear and replace, if necessary. Examine both O-rings (item 25) for cracks and wear.

9.3 Maintenance of the control pins – Duodos 25

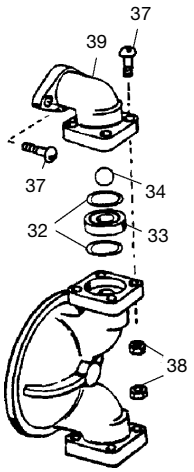
To maintain the control pin components, first remove both circlips (item 34) using a small straight-edged screwdriver. It is recommended that you use new circlips when re-assembling components. Next, take out both guide bushes (item 7). Examine the guide bushes for scratches and wear and replace, if necessary. Examine both O-rings (item 29) for cracks and wear.

10 Maintenance of the ball valves

If priming is poor when starting the pump, or if it has an irregular rhythm, performs poorly or ticks over without pumping, this is usually an indication that inspection or maintenance is required.

Before conducting maintenance work on the ball valves, you should first shut off the suction line and then the discharge line. Next, disconnect the supply of compressed air, deventilate the pump and detach the air supply tube from the pump. Drain off any medium remaining in the pump. You can now dismantle the pump for maintenance.

10.1 Maintenance of the ball valves – Duodos 10

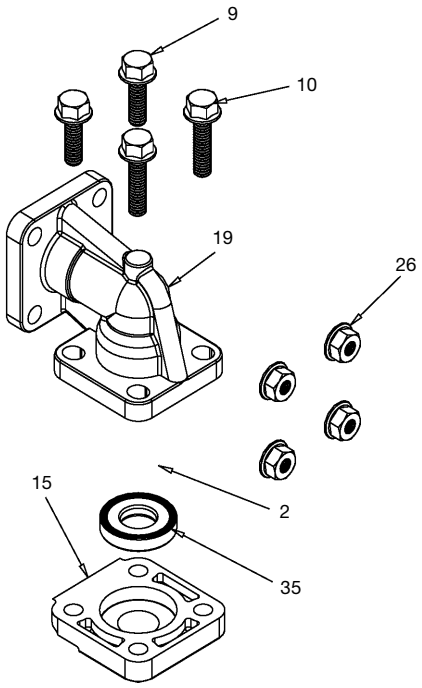


Step 1: To gain access to the ball valves, unscrew the bolts (item 37) which fasten the connection fittings to the feed housing. Examine the surfaces of the ball valves (item 34) and valve seats (item 33) for wear and damage. For the pump to prime properly on starting up, the valves must be airtight when closed. Replace worn or damaged parts.

Step 2: Re-assemble ball valve.

Press both sealing rings (item 32) into the grooves of the valve seat (item 33) and place the valve seat in the feed housing. Place one ball valve (item 34) on the valve seat and screw down the tube elbow (item 39) with the conveyor housing.

10.2 Maintenance of the ball valves – Duodos 15

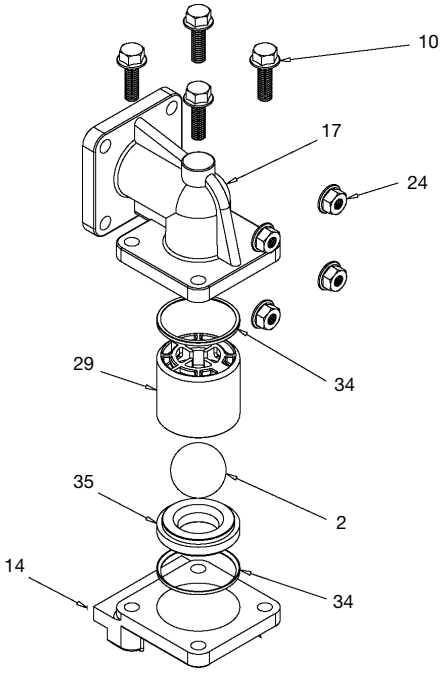


Step 1: To gain access to the ball valves, dismantle the tube elbows (item 19) using a 1/2" (11.7 mm) spanner. Examine the ball valves (item 2) all over for wear, abrasion and cracks. Examine the internal and external bevelling of the valve seat (item 35) of the ball valve for cracks, abrasion and any material that may have corroded the surfaces. For the seat to be completely leakproof, it is important that the curvature of the ball is precisely in line with the profile of the bevelling. Replace worn or damaged parts.

Step 2: Re-assemble ball valve.

Press the valve seat (item 35) into the feed housing. Place one ball valve (item 2) on the valve seat and screw down the tube elbow (item 19) with the feed housing.

10.3 Maintenance of the ball valves – Duodos 20



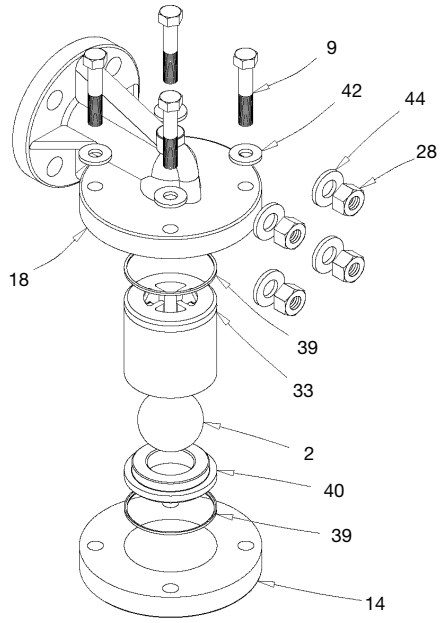
Step 1: To gain access to the ball valves, unfasten the in-line elbow fitting (item 17) using a 1/2 " (12.70 mm) spanner. Then remove and disassemble the seal (item 34) and the entire ball valve.

Examine the ball valve retainer (item 29), the ball valve (item 2), the valve seat (item 35) and the seals (item 34) for cracks, abrasion and any material that may have corroded the surfaces. For the seat to be completely leakproof, it is important that the curvature of the ball is precisely in line with the profile of the bevelling. Replace worn or damaged parts.

Step 2: Re-assemble ball valve.

Place the valve seal (item 34) and the valve seat (item 35) with the chamfered sides face up in the hollow of the external compartment (item 14). Place the ball valve (item 2) on the valve seat and reverse draw the ball valve retainer (item 29) with the open side face down over the ball and the valve seat. Place another valve seal (item 34) so that the chamfered side of the seal faces the ball valve retainer. You can now re-assemble the pump and connect it to the compressed air supply, at which point it is ready for commissioning.

10.4 Maintenance of the ball valves – Duodos 25



Step 1: To gain access to the ball valves, unfasten the in-line elbow fitting (item 18) using a 3/16" (14.28 mm) spanner. Then remove and disassemble the seal (item 39) and the entire ball valve. Examine the ball valve retainer (item 33), the ball valve (item 2), the valve seat (item 40) and the seals (item 39) for cracks, abrasion and any material that may have corroded the surfaces. For the seat to be completely leakproof, it is important that the curvature of the ball is precisely in line with the profile of the bevelling. Replace worn or damaged parts.

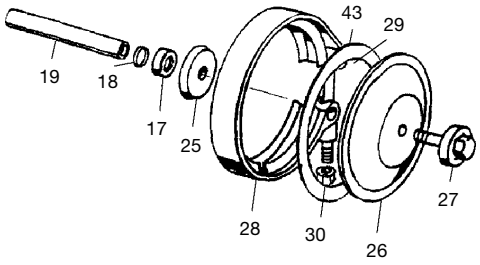
Step 2: Re-assemble ball valve.

Place the valve seal (item 39) and the valve seat (item 40) with the chamfered sides face up in the hollow of the external compartment (item 14). Place the ball valve (item 2) on the valve seat and reverse draw the ball valve retainer (item 33) with the open side face down over the ball and the valve seat. Place another valve seal (item 39) so that the chamfered side of the seal faces the ball valve retainer. You can now re-assemble the pump and connect it to the compressed air supply, at which point it is ready for commissioning.

11 Maintenance of the diaphragms

To conduct maintenance work on the diaphragms, you should first shut off the suction line and then the discharge line. Next, disconnect the supply of compressed air, deventilate the pump and detach the air supply tube from the pump. Drain off any medium remaining in the pump.

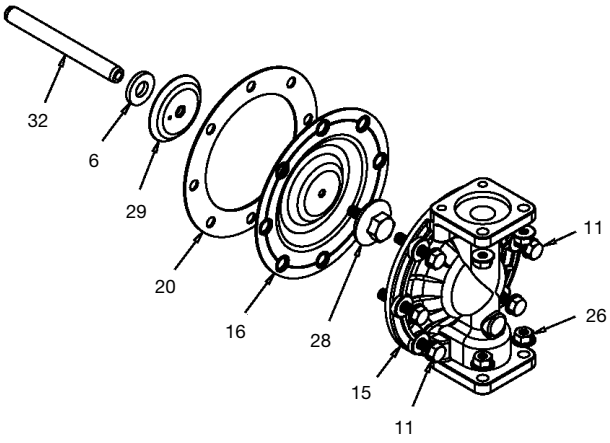
11.1 Maintenance of the diaphragms – Duodos 10

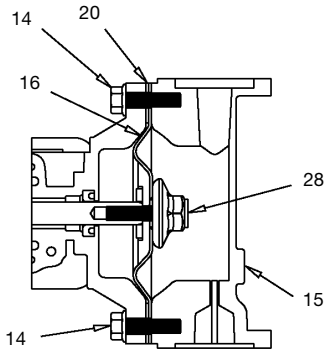


Step 1: Remove both retaining straps (item 28). Unscrew the external diaphragm flange (item 27), diaphragm (item 26) and internal diaphragm flange (item 25), turning anti-clockwise all together. Use a 1/2" (12.7 mm) spanner for this.

Step 2: Assemble the diaphragms in reverse order. The natural curvature of the diaphragm (item 26) will face outwards when installed. Fit the external diaphragm flanges (item 27) to the outside of the diaphragms. Ensure that the side of the inner diaphragm flange (item 25) with the larger radius faces the diaphragm. Tighten the external diaphragm flange to approx 3.39 Nm. When tightened, the diaphragm can turn freely with the diaphragm flange. Use a second spanner to fix the external diaphragm flange to the opposite site so that it does not turn with everything else. This does not apply if the opposite compartment is installed.

11.2 Maintenance of the diaphragms – Duodos 15 PP





Step 1: Use a 1/2" (12.70 mm) spanner to remove the 16 bolts (items 9 and 10) which fasten the tube elbows (items 18 and 19) to the feed housing (item 15). Detach the elbow, including the appropriate in-line distributor fitting.

Step 2: Dismantle liquid ends.

Use a 1/2" spanner to remove the 16 bolts (items 11 and 14) which hold the feed housing, diaphragm and the pump housing (item 4) together.

Step 3: Disassemble and dismantle the diaphragm components.

Use a 3/4" (19 mm) spanner to unscrew the diaphragm components (consisting of the outer diaphragm flange, the diaphragm and the inner diaphragm flange) from the plunger rod, turning in an anti-clockwise direction. Screw a 6/32" locking screw into the threaded hole in the inner diaphragm flange (item 29). Loosely clamp the aforementioned bolts and the locking screw in a vice. Use a 3/4" spanner to unscrew the outer diaphragm flange (item 28), turning anti-clockwise. Examine the diaphragms (item 16) for cracks, tiny holes, abrasion and signs of corrosion from the liquid medium. Use new diaphragms, if necessary.

Step 4: Reassemble diaphragm components.

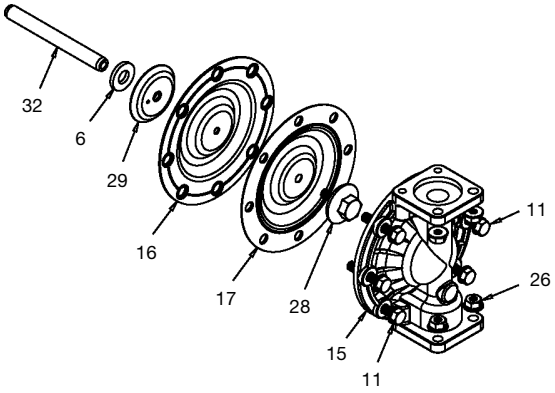
Push the threaded bolt onto the outer membrane flange through the hole in the middle of the diaphragm. Screw the inner diaphragm flange clockwise onto the threaded bolt. Clamp the loosely reassembled components with the above locking screw in a vice and use a torque wrench to tighten to 10.17 Nm. Wait for at least 15 minutes until the components are in place and the tightness is consistent with the indicated torque.

Step 5: Assemble liquid ends.

Check that the shock absorber (item 6) is attached to the plunger rod. Screw the threaded bolt of one of ≤ÿe diaphragm components clockwise into the threaded hole at the end of the plunger rod (item 31), until the end of the plunger rod is flush with the inner diaphragm flange. Place the plunger rod in the pump. Line up the screw holes in the diaphragm with those in the pump housing (item 4). Use the nuts and bolts (items 11 and 14) to screw the feed housing (item 15) onto the pump housing. On the opposite side of the pump, pull out the plunger rod as far as possible. Check that the shock absorber (item 6) is fixed to the plunger rod. Screw the threaded bolts on the second membrane components clockwise into the threaded hole at the end of the plunger rod (item 32) just far enough so that it is still possible to line up the screw holes in the diaphragm to the holes in the pump housing. Assemble the diaphragms with the convolutions pointing towards the centre of the pump, as shown in the sectional drawing. Use the nuts and bolts (items 11 and 14) to screw the second external compartment (item 15) onto the pump housing.

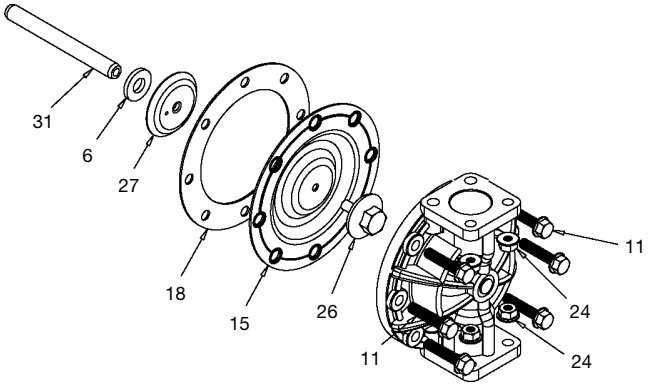
Step 6: Use the nuts and bolts (items 9 and 10) to screw on the in-line elbow fitting, including the distributor. You can now re-install the pump, connect it to the compressed air supply, at which point it is ready for commissioning.

11.3 Maintenance of the overlay diaphragm – Duodos 15 PVDF



The PTFE overlay diaphragm (item 17) sits comfortably on the outside of the normal Santoprene diaphragm (item 16). Assemble and disassemble in the same way as described for the standard diaphragm.

11.4 Maintenance of the diaphragms – Duodos 20 PP



Step 1: Use a 1/2" (12.70 mm) spanner to remove the 16 bolts (items 9 and 10) which fasten the tube elbows (items 17) to the feed housing (item 14). Detach the elbow, including the appropriate in-line distributor fitting and spacers.

Step 2: Dismantle liquid end.

Use a 1/2" spanner to remove the 16 bolts (items 9 and 11) which hold the feed housing, diaphragm and the pump housing (item 4) together.

Step 3: Disassemble and dismantle the diaphragm components.

Use a 3/4" (19 mm) spanner to unscrew the diaphragm components (consisting of the outer diaphragm flange, the diaphragm and the inner diaphragm flange) from the plunger rod (item 31), turning in an anti-clockwise direction. Screw a 6/32” locking screw into the threaded hole in the inner diaphragm flange (item 27). Loosely clamp the aforementioned bolts and the locking screw in a vice. Use a 3/4" spanner to unscrew the outer diaphragm flange (item 26) anti-clockwise. Examine the diaphragm (item 15) for cracks, tiny holes, abrasion and signs of corrosion from the liquid medium. Use new diaphragms, if necessary.

Step 4: Reassemble diaphragm components.

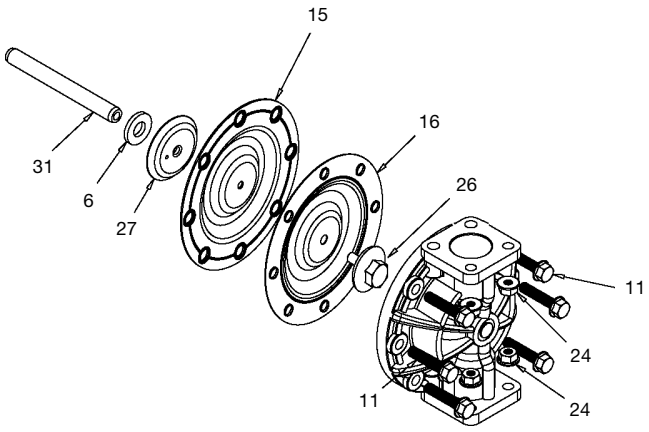
Push the threaded bolt on the outer membrane flange through the hole in the middle of the diaphragm. Screw the inner diaphragm flange clockwise onto the threaded bolt. Clamp the loosely reassembled components with the above locking screw in a vice and use a torque wrench to tighten to 10.17 Nm. Wait for at least 15 minutes until the components are in place and the tightness is consistent with the indicated torque.

Step 5: Assemble liquid ends.

Check that the shock absorber (item 6) is attached to the plunger rod. Screw the threaded bolt of one of the diaphragm components clockwise into the threaded hole at the end of the plunger rod (item 31), until the end of the plunger rod is flush with the inner diaphragm flange. Place the plunger rod in the pump. Line up the screw holes in the diaphragm with those in the pump housing (item 4). The directional arrows moulded onto the diaphragm must point upwards. Use the nuts and bolts (items 9 and 11) to screw the feed housing (item 14) onto the pump housing. On the opposite side of the pump, pull out the plunger rod as far as possible. Check that the shock absorber (item 6) is attached to the plunger rod. Screw the threaded bolts on the second membrane component clockwise into the threaded hole at the end of the plunger rod (item 31) just far enough so that it is still possible to line up the screw holes in the diaphragm to the holes in the pump housing. Assemble the diaphragms with the convolutions pointing towards the centre of the pump, as shown in the sectional drawing. Use the nuts and bolts (items 9 and 11) to screw the second feed housing (item 14) onto the pump housing.

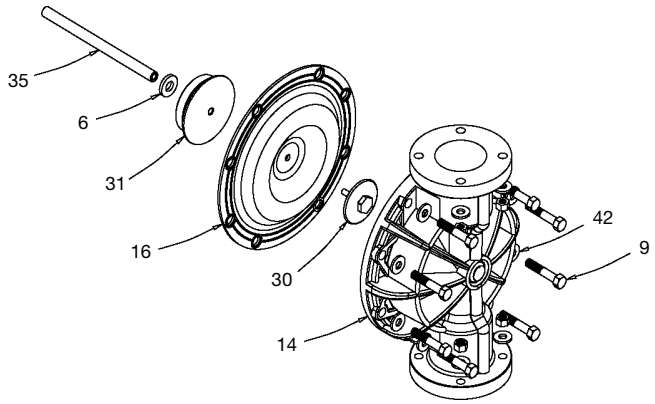
Step 6: Use the nuts and bolts (items 9 and 10) to screw on the in-line elbow fitting, including the distributor. You can now re-install the pump, connect it to the compressed air supply, at which point it is ready for commissioning.

11.5 Maintenance of the overlay diaphragm – Duodos 20 PVDF



The PTFE overlay diaphragm (item 16) sits comfortably on the outside of the normal Santoprene diaphragm (item 15). Assemble and disassemble in the same way as described for the standard diaphragm.

11.6 Maintenance of the diaphragms – Duodos 25 PP



Step 1: Use a 9/16" (14.3 mm) spanner to remove the 16 bolts (item 9), the nuts and the plain washers, which fasten the tube elbows (items 18) to the feed housing (item 14). Detach the elbows, including the appropriate in-line distributor fittings and spacers.

Step 2: Dismantle liquid end.

Use a 9/16" spanner to remove the 16 bolts (item 9), nuts and plain washers, which hold the feed housing, diaphragm and the pump housing (item 15) together.

Step 3: Disassemble and dismantle the diaphragm components.

Use a 1 3/8" (35 mm) spanner to unscrew the diaphragm components (consisting of outer diaphragm flange, diaphragm and inner diaphragm flange) from the plunger rod (item 35), turning in an anti-clockwise direction. Loosely clamp the inner membrane flange in a vice. Use a 1 3/8" spanner to turn the outer diaphragm flange (item 30) anti-clockwise. Examine the diaphragm (item 16) for cracks, tiny holes, abrasion and signs of corrosion from the liquid medium. Use new diaphragms, if necessary.

Step 4: Reassemble diaphragm components.

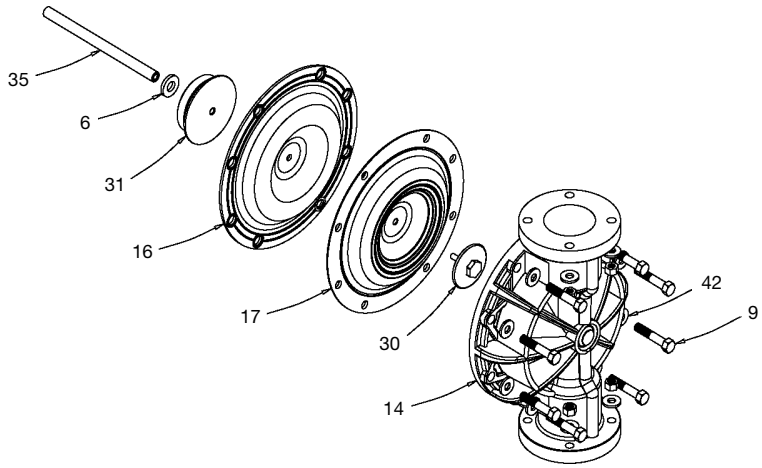
Push the threaded bolt on the outer membrane flange through the hole in the middle of the diaphragm. Screw the inner diaphragm flange clockwise onto the bolt. Clamp the loosely reassembled components with the inner diaphragm flange in a vice and use a torque wrench to tighten to 27.11 Nm. Wait for at least 15 minutes until the components are in place and the tightness is consistent with the indicated torque.

Step 5: Fit diaphragm components.

Check that the shock absorber (item 6) is attached to the plunger rod. Screw the threaded bolt of one of the diaphragm components clockwise into the threaded hole at the end of the plunger rod (item 35), until the end of the plunger rod is flush with the inner diaphragm flange. Place the plunger rod in the pump. Line up the screw holes in the diaphragm with the holes in the pump housing (item 15). The directional arrows moulded onto the diaphragm must point upwards. Use the nuts (item 9) and bolts to screw the feed housing (item 14) onto the pump housing. On the opposite side of the pump, pull out the plunger rod as far as possible. Check that the shock absorber (item 6) is attached to the plunger rod. Screw the threaded bolts on the second membrane component clockwise into the threaded hole at the end of the plunger rod (item 35) just far enough so that it is still possible to line up the screw holes in the diaphragm to the holes in the pump housing. The directional arrows moulded onto the diaphragm must point upwards. Fit the diaphragms with the convolutions pointing towards the centre of the pump, as shown in the sectional drawing. Use the nuts (item 9), bolts and plain washers to fix the feed housing (item 14) onto the pump housing.

Step 6: Use the nuts (item 9), bolts and plain washers to screw down the in-line elbow fitting including spacer. You can now re-install the pump, connect it to the compressed air supply, at which point it is ready for commissioning.

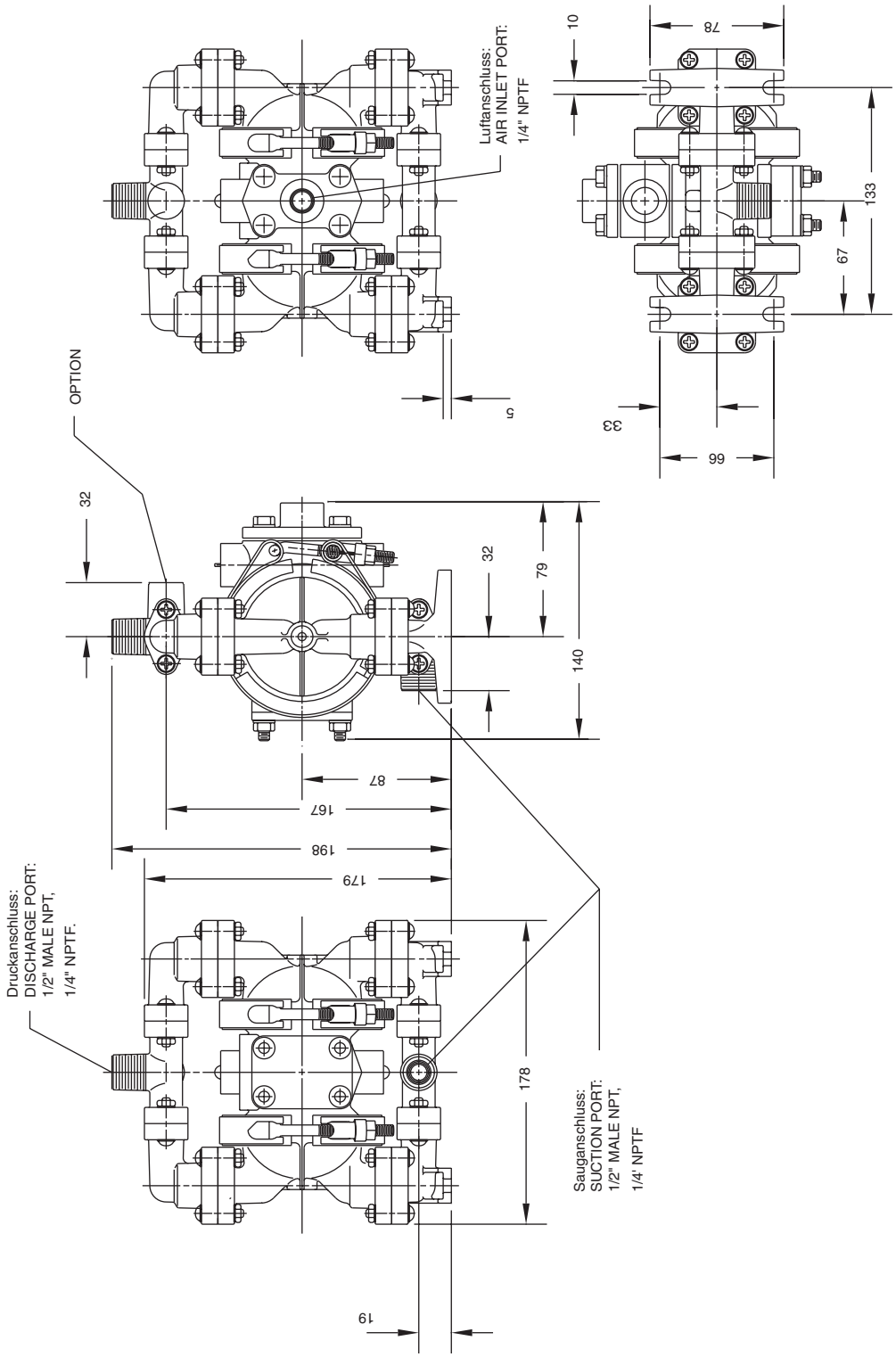
11.7 Maintenance of the overlay diaphragm – Duodos 25 PVDF



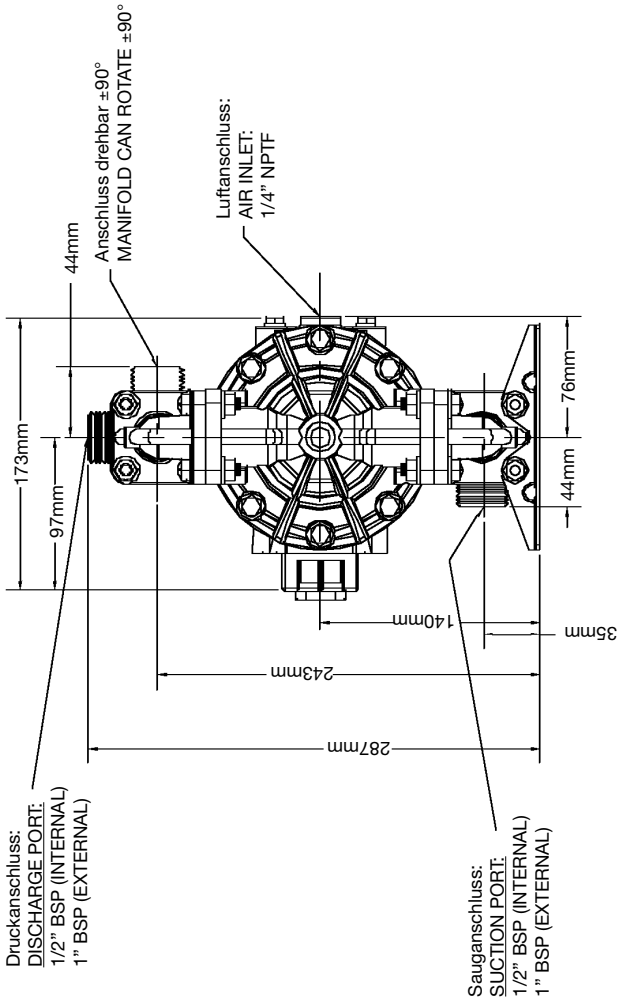
The PTFE overlay diaphragm (item 17) sits comfortably on the outside of the normal Santoprene diaphragm (item 16). Dismantle and install in the same way as described for standard diaphragms.

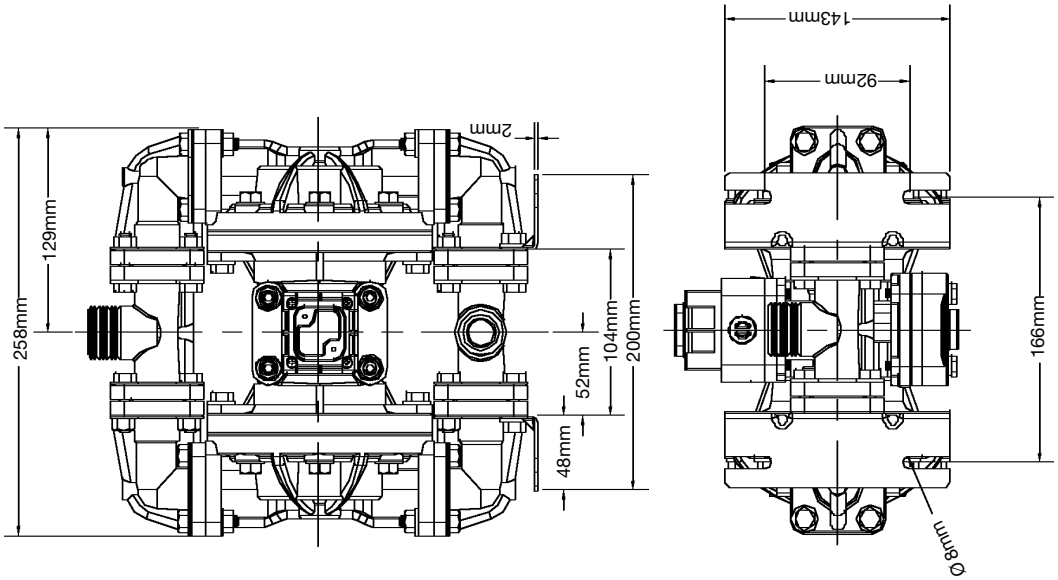
12 Drawing

12.1 Duodos 10, Drawing

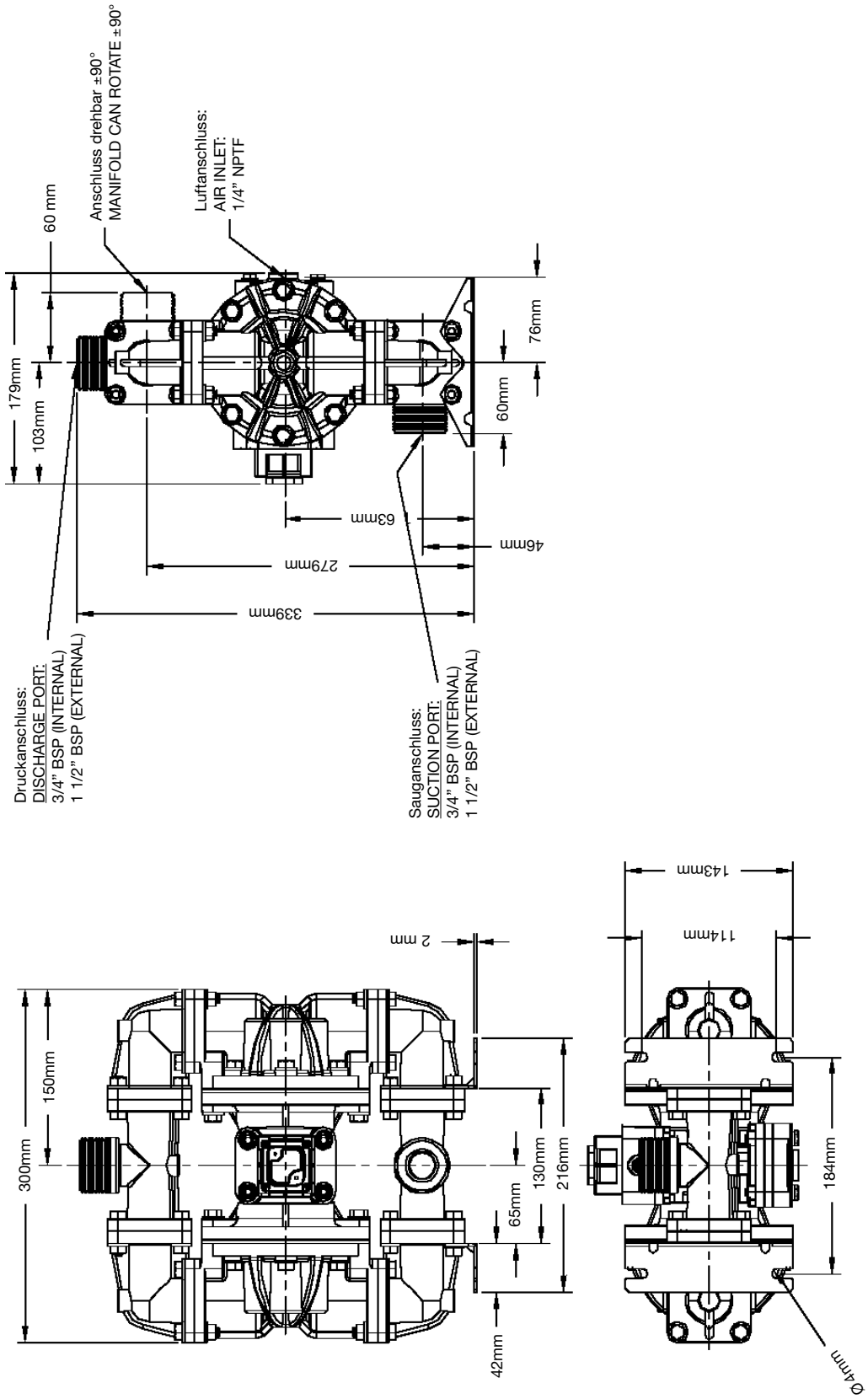


12.2 Duodos 15, Drawing

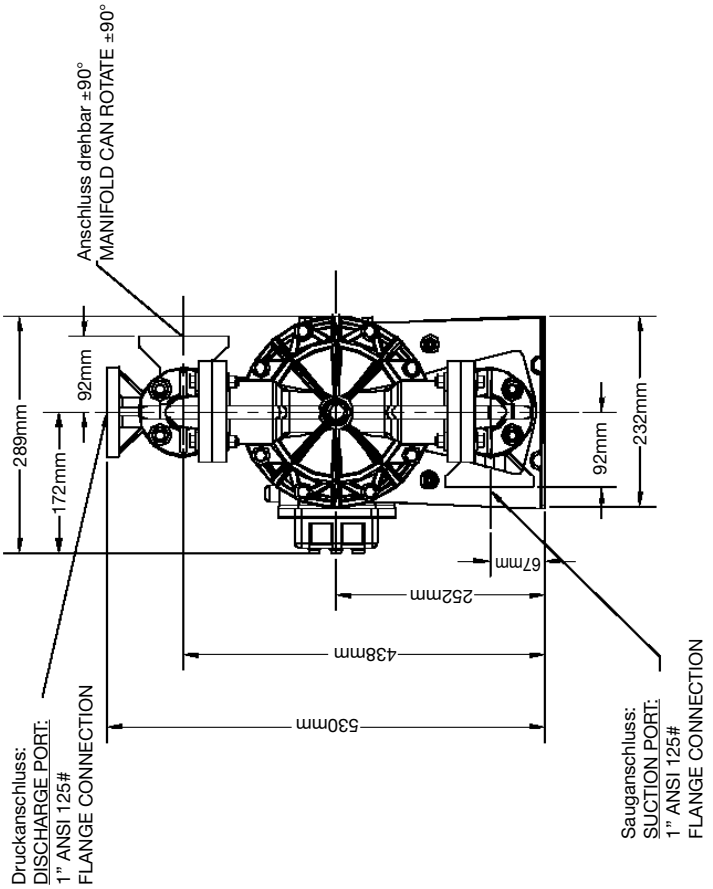


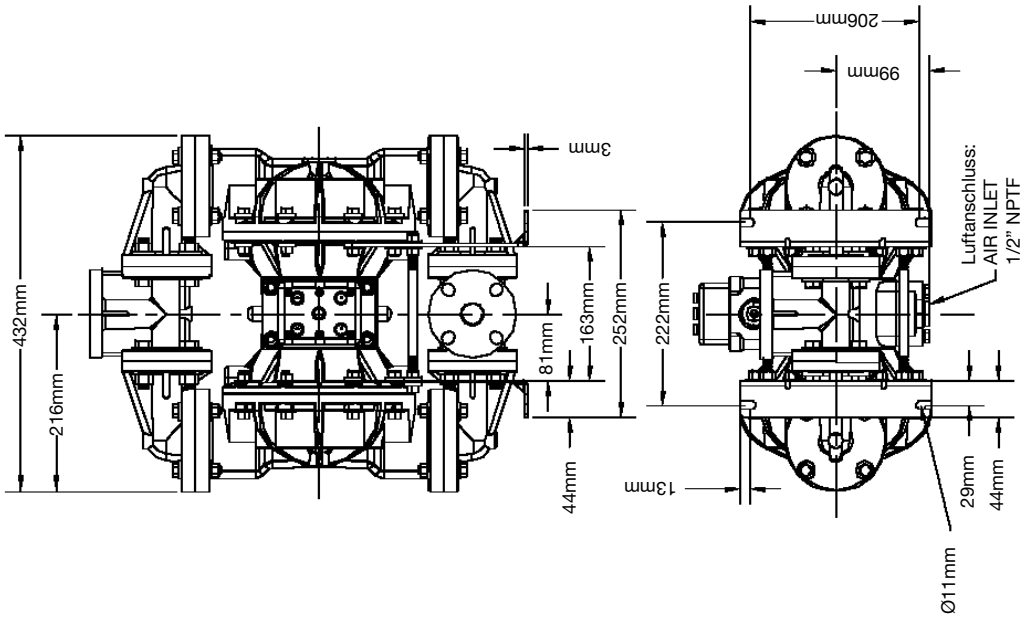


12.3 Duodos 20, Drawing



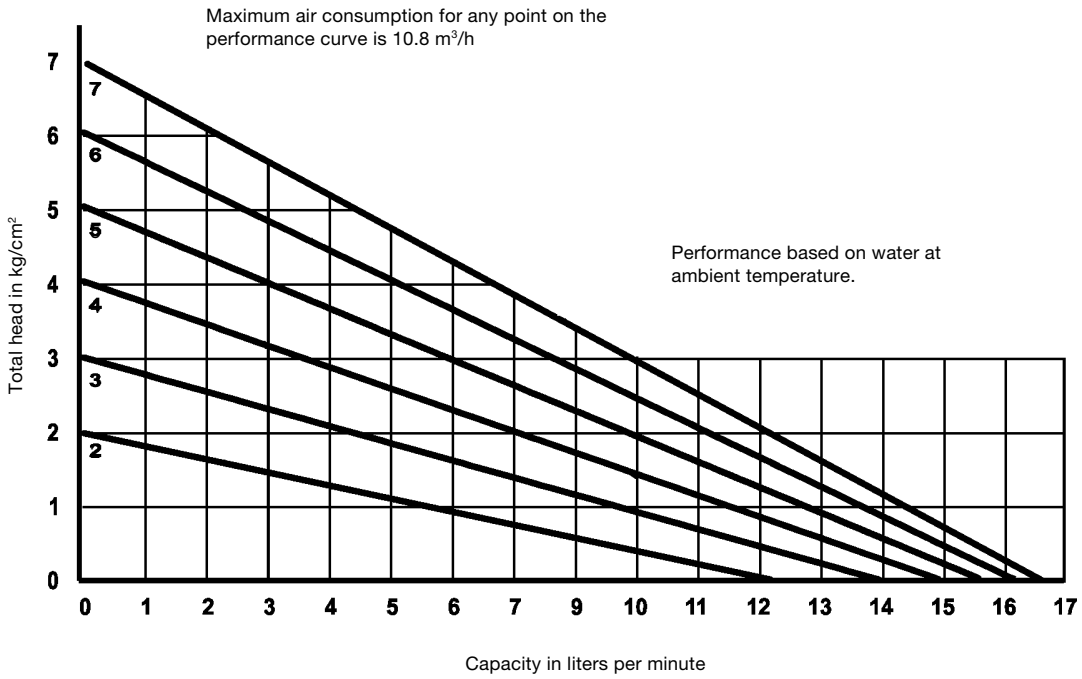
12.4 Duodos 25, Drawing



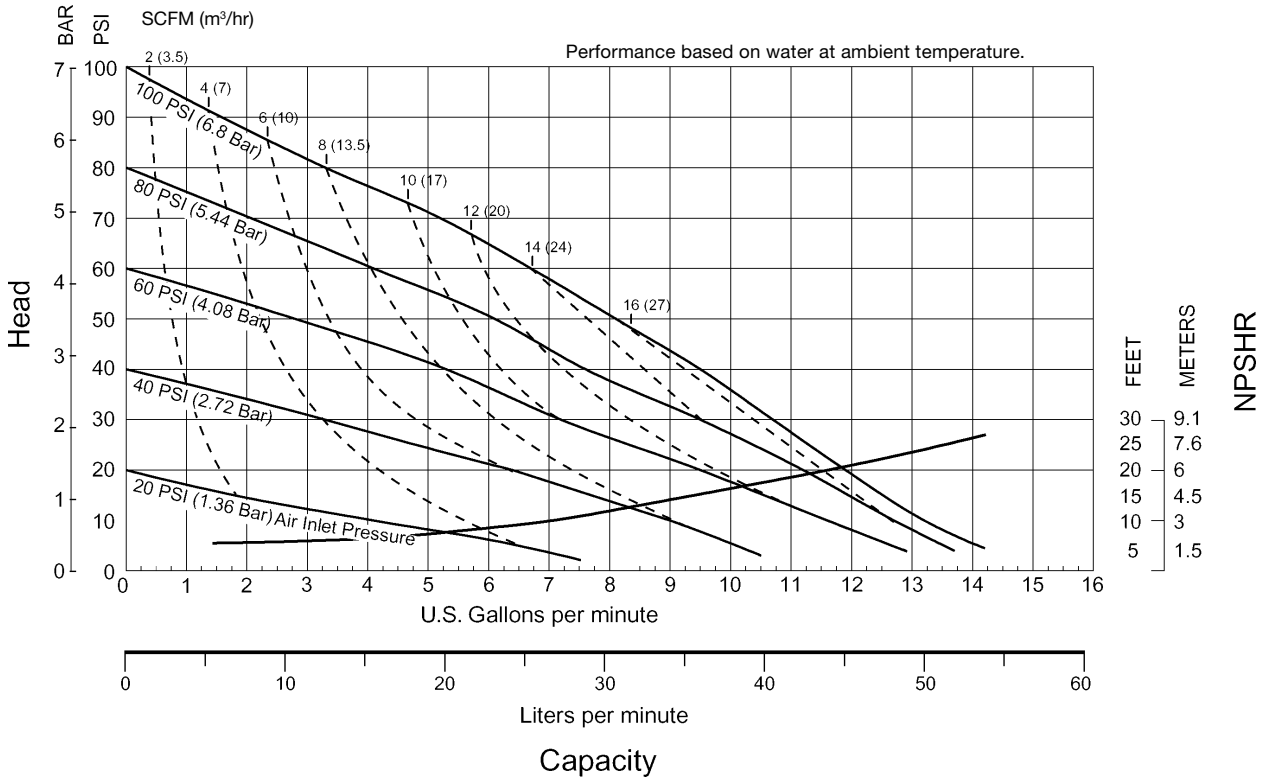


13 Performance Curves

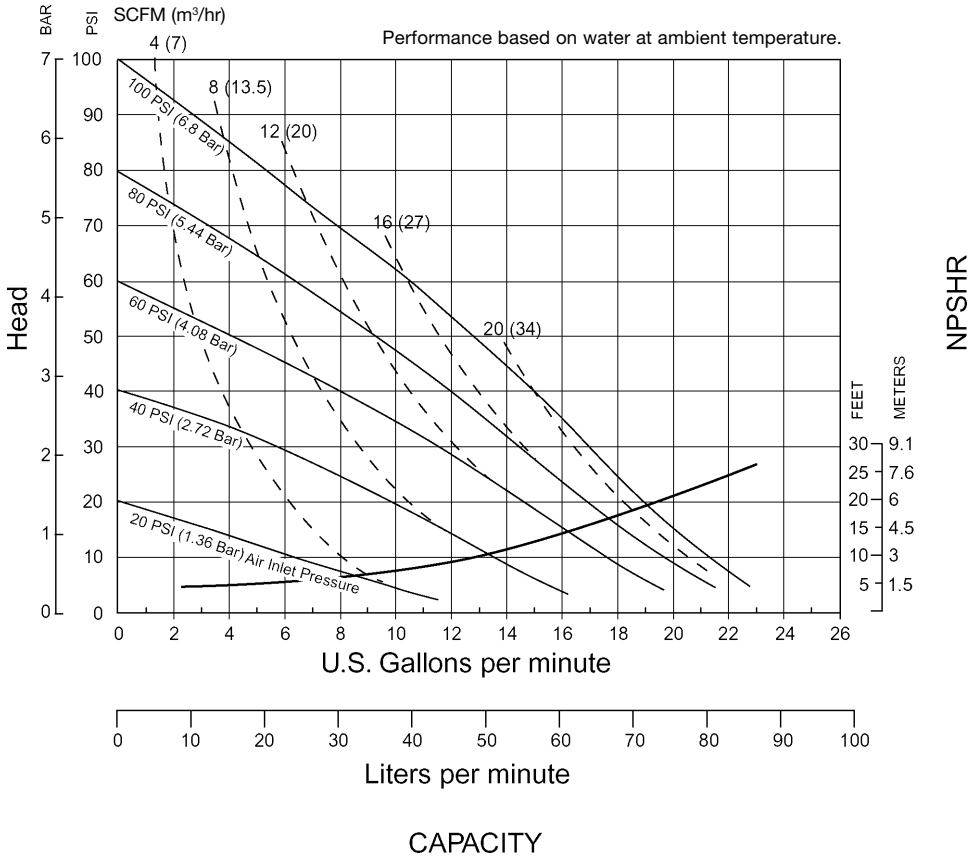
13.1 Performance Curves Duodos 10



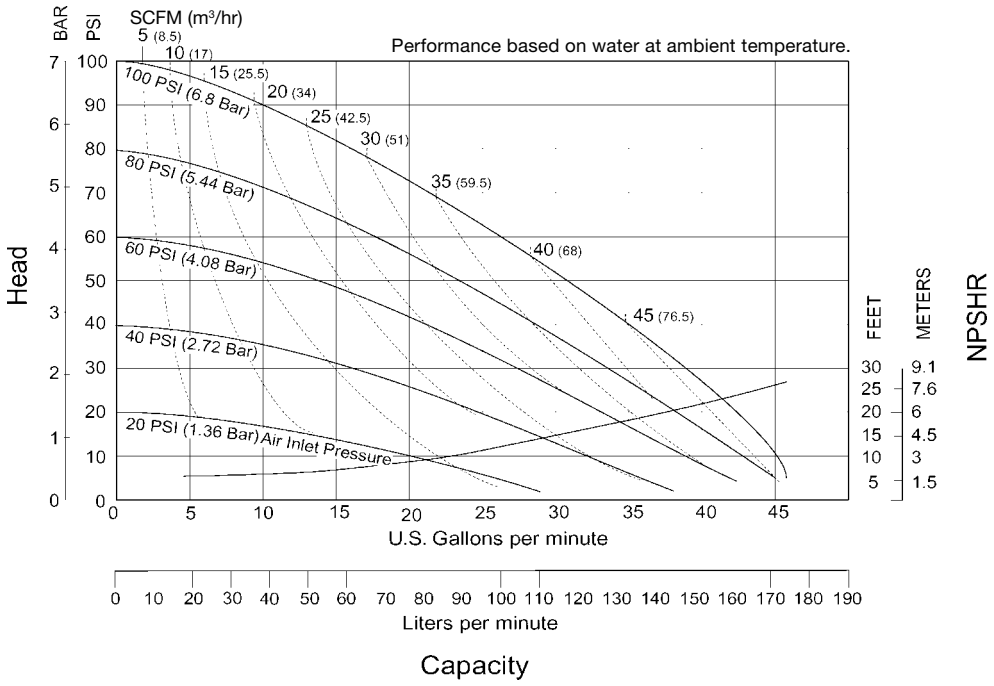
13.2 Performance Curves Duodos 15



13.3 Performance Curves Duodos 20

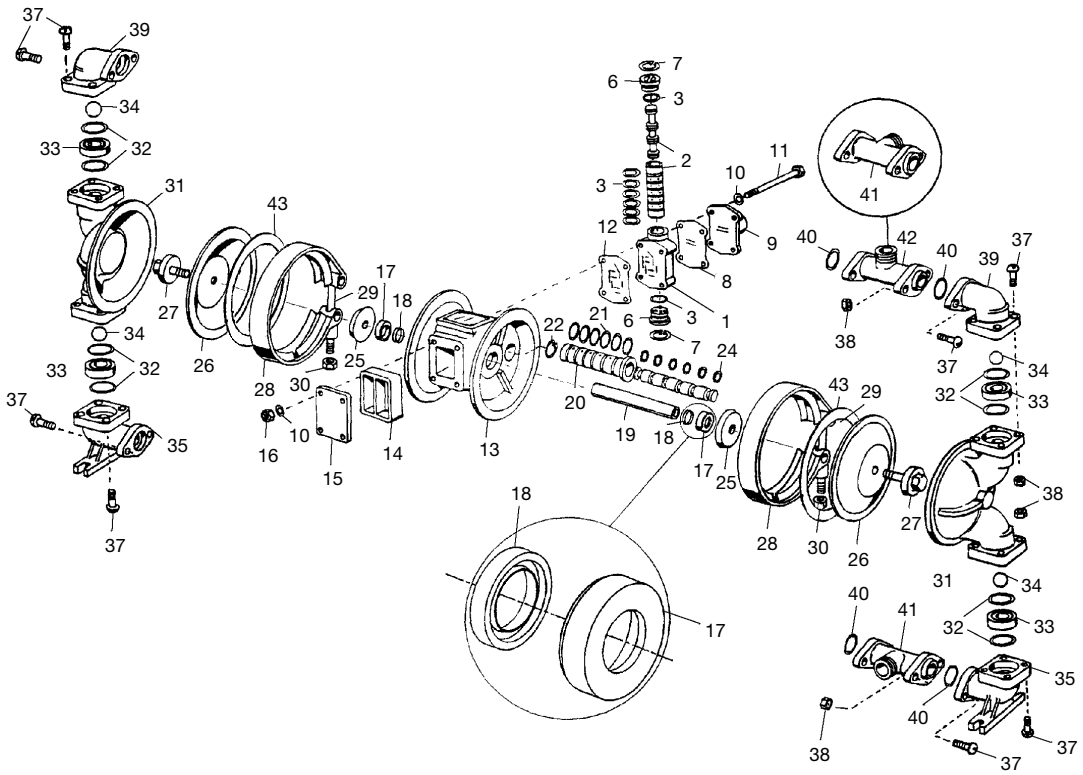


13.4 Performance Curves Duodos 25



14 Composite Repair Parts Drawing and Part List

14.1 Composite Repair Parts Drawing Duodos 10



14.2 Part List Duodos 10 PP

Item	Quantity	Part Number	Description	Materials
1	1	095-077-551	Body, Main Air Valve	Glass Filled Polypropylene
2	1	031-106-000	Sleeve & Spool Set	Assembly, sub-assembly
3	8	560-101-360	O-Rings	Buna-N Rubber
6	2	165-074-551	Cap, End with O-Ring	Glass Filled Polypropylene
7	2	675-051-115	Ring, Retaining	302/304 Stainless Steel
8	1	360-085-360	Gasket, Valve Body	Buna-N Rubber
9	1	165-072-551	Cap, Air Inlet	Glass Filled Polypropylene
10	8	901-037-115	Washer, Flat 1/4"	302/304 Stainless Steel
11	4	170-103-115	Capscrew, Hex Head 1/4-20 5" Long	302/304 Stainless Steel
12	1	360-084-360	Gasket, Intermediate Bracket	Buna-N Rubber
13	1	114-019-551	Intermediate, Bracket	Glass Filled Polypropylene
14	1	530-022-550	Muffler	Polyethylene
15	1	165-073-551	Cap, Air Exhaust	Glass Filled Polypropylene
16	4	545-003-115	Nut, Hex 1/4-20UNC	302/304 Stainless Steel
17	2	449-021-551	Insert, Gland	Glass Filled Polypropylene
18	2	720-031-359	Seal, K-R	Urethane Rubber
19	1	685-046-120	Rod, Diaphragm	416 Stainless Steel
20	1	755-038-000	Sleeve, Pilot Valve with O-rings	Assembly, sub-assembly
21	6	560-066-360	O-rings	Buna-N Rubber
22	1	675-047-115	Ring, Retaining - Pilot Valve Sleeve	302/304 Stainless Steel
23	1	775-038-000	Spool, Pilot Valve with O-rings	Assembly, sub-assembly
24	6	560-029-374	O-rings	Carboxylated Nytrile
25	2	612-147-150	Plate, Inner Diaphragm	6061-T6 Aluminum

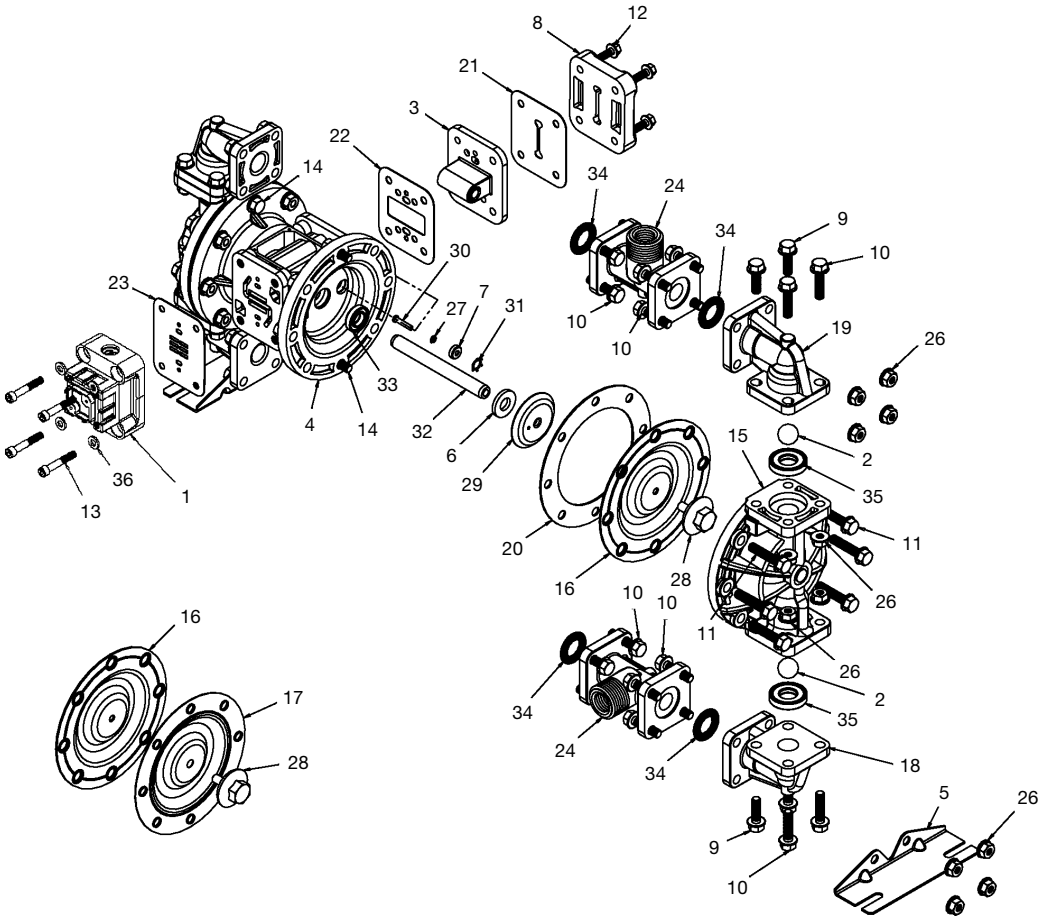
Item	Quantity	Part Number	Description	Materials
26	2	286-069-354	Diaphragm	Santoprene
27	2	612-146-552	Plate, Outer Diaphragm	Unfilled Polypropylene
28	2	200-057-115	Clamp, V-Band	302/304 Stainless Steel
29	2	100-002-115	T-Bolt	302/304 Stainless Steel
30	2	545-027-337	Nut, Hex 1/4-28UNF	Silver Plated Steel
31	2	196-145-552	Chamber, Outer	Unfilled Polypropylene
32	8	720-032-600	Seal, Check Valve	Virgin PTFE
33	4	722-073-552	Seat, Check Valve	Unfilled Polypropylene
34	4	050-033-354	Ball, Check	Santoprene
35	2	312-095-552	Elbow, Suction	Unfilled Polypropylene
37	24	706-023-115	Screw, Machine 10-32UNF x 1" Long	302/304 Stainless Steel
38	24	544-004-115	Nut, Hex Flange 10-32UNF	302/304 Stainless Steel
39	2	312-096-552	Elbow, Discharge	Unfilled Polypropylene
40	4	720-033-600	Seal, Manifold	Virgin PTFE
41	1	518-127-552	Manifold, Horizontal	Unfilled Polypropylene
42	1	518-128-552	Manifold, Vertical	Unfilled Polypropylene
43	2	360-086-360	Gasket, Sealing	Buna-N Rubber

14.3 Part List Duodos 10 PVDF

Item	Quantity	Part Number	Description	Materials
1	1	095-077-551	Body, Main Air Valve	Glass Filled Polypropylene
2	1	031-106-000	Sleeve & Spool Set	Assembly, sub-assembly
3	8	560-101-360	O-Rings	Buna-N Rubber
6	2	165-074-551	Cap, End with O-Ring	Glass Filled Polypropylene
7	2	675-051-115	Ring, Retaining	302/304 Stainless Steel
8	1	360-085-360	Gasket, Valve Body	Buna-N Rubber
9	1	165-072-551	Cap, Air Inlet	Glass Filled Polypropylene
10	8	901-037-115	Washer, Flat 1/4"	302/304 Stainless Steel
11	4	170-103-115	Capscrew, Hex Head 1/4-20 5" Long	302/304 Stainless Steel
12	1	360-084-360	Gasket, Intermediate Bracket	Buna-N Rubber
13	1	114-019-551	Intermediate, Bracket	Glass Filled Polypropylene
14	1	530-022-550	Muffler	Polyethylene
15	1	165-073-551	Cap, Air Exhaust	Glass Filled Polypropylene
16	4	545-003-115	Nut, Hex 1/4-20UNC	302/304 Stainless Steel
17	2	449-021-551	Insert, Gland	Glass Filled Polypropylene
18	2	720-031-359	Seal, K-R	Urethane Rubber
19	1	685-046-120	Rod, Diaphragm	416 Stainless Steel
20	1	755-038-000	Sleeve, Pilot Valve with O-rings	Assembly, sub-assembly
21	6	560-066-360	O-rings	Buna-N Rubber
22	1	675-047-115	Ring, Retaining - Pilot Valve Sleeve	302/304 Stainless Steel
23	1	775-038-000	Spool, Pilot Valve with O-rings	Assembly, sub-assembly
24	6	560-029-374	O-rings	Carboxylated Nytrile
25	2	612-147-150	Plate, Inner Diaphragm	6061-T6 Aluminum
26	2	286-070-600	Diaphragm	Virgin PTFE
27	2	612-146-520	Plate, Outer Diaphragm	PVDF
28	2	200-057-115	Clamp, V-Band	302/304 Stainless Steel
29	2	100-002-115	T-Bolt	302/304 Stainless Steel
30	2	545-027-337	Nut, Hex 1/4-28UNF	Silver Plated Steel
31	2	196-145-520	Chamber, Outer	PVDF

Item	Quantity	Part Number	Description	Materials
32	8	720-032-600	Seal, Check Valve	Virgin PTFE
33	4	722-073-520	Seat, Check Valve	PVDF
34	4	050-034-600	Ball, Check	Virgin PTFE
35	2	312-095-520	Elbow, Suction	PVDF
37	24	706-023-115	Screw, Machine 10-32UNF x 1" Long	302/304 Stainless Steel
38	24	544-004-115	Nut, Hex Flange 10-32UNF	302/304 Stainless Steel
39	2	312-096-520	Elbow, Discharge	PVDF
40	4	720-033-600	Seal, Manifold	Virgin PTFE
41	1	518-127-520	Manifold, Horizontal	PVDF
42	1	518-128-520	Manifold, Vertical	PVDF
43	2	360-086-360	Gasket, Sealing	Buna-N Rubber

14.4 Composite Repair Parts Drawing Duodos 15



14.5 Part List Duodos 15 PP

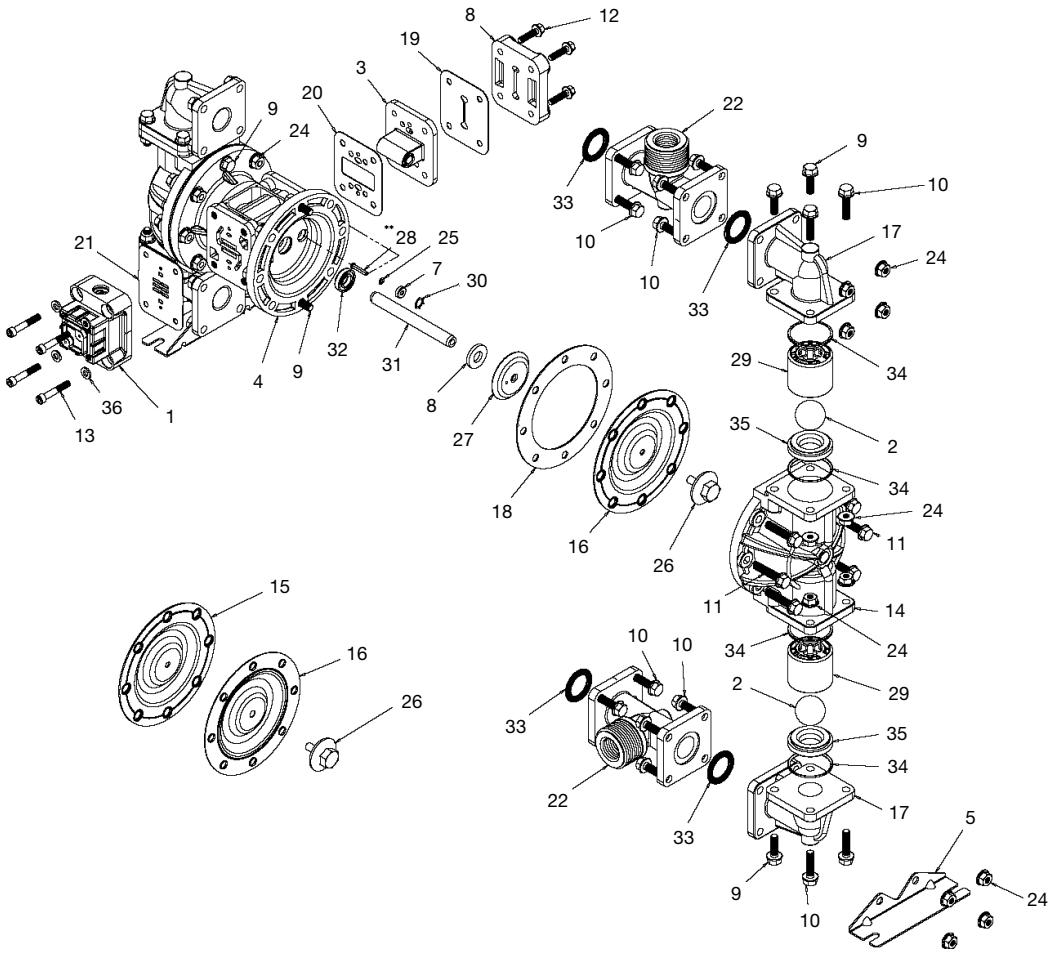
Item	Quantity	Part Number	Description	Materials
1	1	031-115-000	Air Valve Assembly	Assembly, sub-assembly
2	4	050-027-354	Ball, Check	Santoprene
3	1	095-091-000	Pilot Valve Assembly	Assembly, sub-assembly
4	1	114-023-551	Bracket, Intermediate	Glass Filled Polypropylene
5	2	115-140-115	Bracket, Mounting	302/304 Stainless Steel
6	2	132-034-360	Bumper, Diaphragm	Buna-N Rubber
7	2	135-036-506	Bushing, Plunger	Delrin 150
8	1	165-110-551	Cap, Air Inlet	Glass Filled Polypropylene
9	12	171-062-115	Capscrew, Flanged 5/16-18 X 1.00	302/304 Stainless Steel
10	24	171-063-115	Capscrew, Flanged 5/16-18 X 1.25	302/304 Stainless Steel
11	12	171-064-115	Capscrew, Flanged 5/16-18 X 1.50	302/304 Stainless Steel
12	4	171-066-115	Capscrew, Flanged 1/4-20 X 1.25	302/304 Stainless Steel
13	4	171-067-115	Capscrew soc HD 1/4-20 X 1.12	302/304 Stainless Steel
14	4	171-075-115	Capscrew, Flanged 5/16-18 X .88	302/304 Stainless Steel
15	2	196-178-552	Chamber, Outer	Unfilled Polypropylene
16	2	286-095-354	Diaphragm	Santoprene
18	2	312-106-552	Elbow, Suction	Unfilled Polypropylene
19	2	312-112-552	Elbow, Discharge	Unfilled Polypropylene
20	2	360-099-360	Gasket, Spacer	Buna-N Rubber
21	1	360-100-360	Gasket, Air Inlet	Buna-N Rubber
22	1	360-101-360	Gasket, Pilot Valve	Buna-N Rubber
23	1	360-102-360	Gasket, Air Valve	Buna-N Rubber
24	2	518-138-552E	Manifold, BSPT (Tapered)	Unfilled Polypropylene
26	36	544-005-115	Nut, Flanged 5/16-18	302/304 Stainless Steel
27	2	560-001-360	O-ring	Buna-N Rubber
28	2	612-091-552	Plate, Outer Diaphragm	Unfilled Polypropylene
29	2	612-177-330	Plate, Inner Diaphragm	Zinc Plated Steel
30	2	620-019-115	Plunger, Actuator	302/304 Stainless Steel
31	2	675-042-115	Ring, Retaining	302/304 Stainless Steel
32	1	685-056-120	Rod, Diaphragm	416 Stainless Steel
33	2	720-012-360	Seal, Diaphragm Rod	Buna-N Rubber
34	4	720-045-600	Seal, Manifold	Virgin PTFE
35	4	722-099-600	Seat, Check Valve	Virgin PTFE
36	4	901-037-115	Washer, Flat 1/4"	302/304 Stainless Steel

14.6 Part List Duodos 15 PVDF

Item	Quantity	Part Number	Description	Materials
1	1	031-115-000	Air Valve Assembly	Assembly, sub-assembly
2	4	050-022-600	Ball, Check	Virgin PTFE
3	1	095-091-000	Pilot Valve Assembly	Assembly, sub-assembly
4	1	114-023-551	Bracket, Intermediate	Glass Filled Polypropylene
5	2	115-140-115	Bracket, Mounting	302/304 Stainless Steel
6	2	132-034-360	Bumper, Diaphragm	Buna-N Rubber
7	2	135-036-506	Bushing, Plunger	Delrin 150
8	1	165-110-551	Cap, Air Inlet	Glass Filled Polypropylene
9	12	171-062-115	Capscrew, Flanged 5/16-18 X 1.00	302/304 Stainless Steel
10	24	171-063-115	Capscrew, Flanged 5/16-18 X 1.25	302/304 Stainless Steel
11	12	171-064-115	Capscrew, Flanged 5/16-18 X 1.50	302/304 Stainless Steel

Item	Quantity	Part Number	Description	Materials
12	4	171-066-115	Capscrew, Flanged 1/4-20 X 1.25	302/304 Stainless Steel
13	4	171-067-115	Capscrew soc HD 1/4-20 X 1.12	302/304 Stainless Steel
14	4	171-075-115	Capscrew, Flanged 5/16-18 X .88	302/304 Stainless Steel
15	2	196-178-520	Chamber, Outer	PVDF
16	2	286-095-354	Diaphragm	Santoprene
17	2	286-096-600	Diaphragm, Overlay	Virgin PTFE
18	2	312-106-520	Elbow, Suction	PVDF
19	2	312-112-520	Elbow, Discharge	PVDF
21	1	360-100-360	Gasket, Air Inlet	Buna-N Rubber
22	1	360-101-360	Gasket, Pilot Valve	Buna-N Rubber
23	1	360-102-360	Gasket, Air Valve	Buna-N Rubber
24	2	518-138-520E	Manifold, BSPT (Tapered)	PVDF
26	36	544-005-115	Nut, Flanged 5/16-18	302/304 Stainless Steel
27	2	560-001-360	O-ring	Buna-N Rubber
28	2	612-091-520	Plate, Outer Diaphragm	PVDF
29	2	612-177-330	Plate, Inner Diaphragm	Zinc Plated Steel
30	2	620-019-115	Plunger, Actuator	302/304 Stainless Steel
31	2	675-042-115	Ring, Retaining	302/304 Stainless Steel
32	1	685-056-120	Rod, Diaphragm	416 Stainless Steel
33	2	720-012-360	Seal, Diaphragm Rod	Buna-N Rubber
34	4	720-045-600	Seal, Manifold	Virgin PTFE
35	4	722-099-600	Seat, Check Valve	Virgin PTFE
36	4	901-037-115	Washer, Flat 1/4"	302/304 Stainless Steel

14.7 Composite Repair Parts Drawing Duodos 20



14.8 Part List Duodos 20 PP

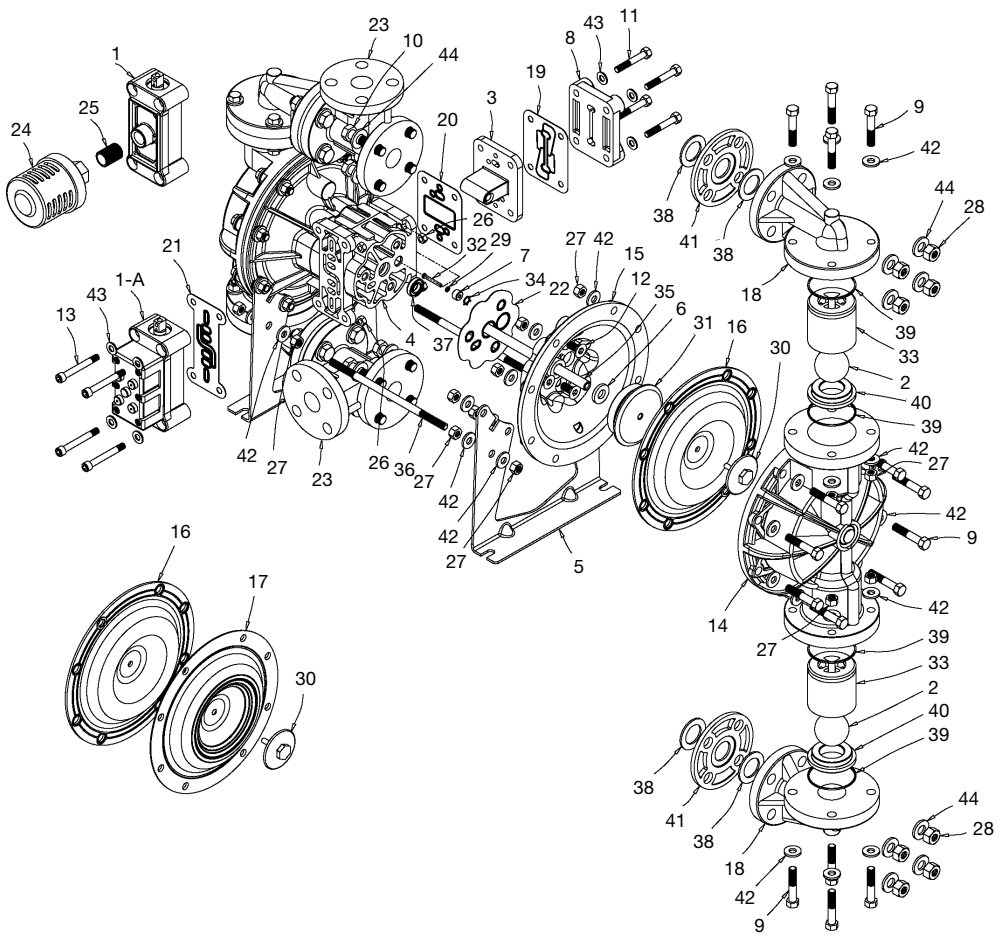
Item	Quantity	Part Number	Description	Materials
1	1	031-115-000	Air Valve Assembly	Assembly, sub-assembly
2	4	050-028-354	Ball, Check Valve	Santoprene
3	1	095-091-000	Pilot Valve Assembly	Assembly, sub-assembly
4	1	114-023-551	Bracket, Intermediate	Glass Filled Polypropylene
5	2	115-141-115	Bracket, Mounting (S07)	302/304 Stainless Steel
6	2	132-034-360	Bumper, Diaphragm	Buna-N Rubber
7	2	135-036-506	Bushing, Plunger	Delrin 150
8	1	165-110-551	Cap, Air Inlet	Glass Filled Polypropylene
9	12	171-062-115	Capscrew, Flanged 5/16-18 x 1.00	302/304 Stainless Steel
10	24	171-063-115	Capscrew, Flanged 5/16-18 x 1.25	302/304 Stainless Steel
11	12	171-064-115	Capscrew, Flanged 5/16-18 x 1.50	302/304 Stainless Steel
12	4	171-066-115	Capscrew, Flanged 1/4-20 x 1.25	302/304 Stainless Steel
13	4	171-067-115	Capscrew, Soc HD 1/4-20 x 1.12	302/304 Stainless Steel
14	2	196-162-552	Chamber, Outer	Unfilled Polypropylene
15	2	286-095-354	Diaphragm	Santoprene
17	4	312-107-552	Elbow	Unfilled Polypropylene
18	2	360-099-360	Gasket, Spacer	Buna-N Rubber
19	1	360-100-360	Gasket, Air Inlet	Buna-N Rubber
20	1	360-101-360	Gasket, Pilot Valve	Buna-N Rubber
21	1	360-102-360	Gasket, Air Valve	Buna-N Rubber
22	2	518-139-552E	Manifold (BSPT), tapered (S07)	Unfilled Polypropylene
24	36	544-005-115	Nut, Flanged 5/16-18	302/304 Stainless Steel
25	2	560-001-360	O-ring	Buna-N Rubber
26	2	612-091-552	Plate, Outer Diaphragm	Unfilled Polypropylene
27	2	612-177-330	Plate, Inner Diaphragm	Zinc Plated Steel
28	2	620-019-115	Plunger, Actuator	302/304 Stainless Steel
29	4	670-050-552	Retainer, Ball	Unfilled Polypropylene
30	2	675-042-115	Ring, Retaining	302/304 Stainless Steel
31	1	685-056-120	Rod, Diaphragm	416 Stainless Steel
32	2	720-012-360	Seal, Diaphragm Rod	Buna-N Rubber
33	4	720-046-600	Seal, Manifold	Virgin PTFE
34	8	720-051-600	Seal, Check Valve Retainer	Virgin PTFE
35	4	722-081-552	Seat, Check Valve	Unfilled Polypropylene
36	4	901-037-115	Washer, Flat 1/4"	302/304 Stainless Steel

14.9 Part List Duodos 20 PVDF

Item	Quantity	Part Number	Description	Materials
1	1	031-115-000	Air Valve Assembly	Assembly, sub-assembly
2	4	050-028-600	Ball, Check Valve	Virgin PTFE
3	1	095-091-000	Pilot Valve Assembly	Assembly, sub-assembly
4	1	114-023-551	Bracket, Intermediate	Glass Filled Polypropylene
5	2	115-141-115	Bracket, Mounting (S07)	302/304 Stainless Steel
6	2	132-034-360	Bumper, Diaphragm	Buna-N Rubber
7	2	135-036-506	Bushing, Plunger	Delrin 150
8	1	165-110-551	Cap, Air Inlet	Glass Filled Polypropylene
9	12	171-062-115	Capscrew, Flanged 5/16-18 x 1.00	302/304 Stainless Steel
10	24	171-063-115	Capscrew, Flanged 5/16-18 x 1.25	302/304 Stainless Steel
11	12	171-064-115	Capscrew, Flanged 5/16-18 x 1.50	302/304 Stainless Steel

Item	Quantity	Part Number	Description	Materials
12	4	171-066-115	Capscrew, Flanged 1/4-20 x 1.25	302/304 Stainless Steel
13	4	171-067-115	Capscrew, Soc HD 1/4-20 x 1.12	302/304 Stainless Steel
14	2	196-162-520	Chamber, Outer	PVDF
15	2	286-095-354	Diaphragm	Santoprene
16	2	286-096-600	Diaphragm, Overlay	Virgin PTFE
17	4	312-107-520	Elbow	PVDF
19	1	360-100-360	Gasket, Air Inlet	Buna-N Rubber
20	1	360-101-360	Gasket, Pilot Valve	Buna-N Rubber
21	1	360-102-360	Gasket, Air Valve	Buna-N Rubber
22	2	518-139-520E	Manifold (BSPT), tapered (S07)	PVDF
24	36	544-005-115	Nut, Flanged 5/16-18	302/304 Stainless Steel
25	2	560-001-360	O-ring	Buna-N Rubber
26	2	612-091-520	Plate, Outer Diaphragm	PVDF
27	2	612-177-150	Plate, Inner Diaphragm	6061-T6 Aluminum
28	2	620-019-115	Plunger, Actuator	302/304 Stainless Steel
29	4	670-050-520	Retainer, Ball	PVDF
30	2	675-042-115	Ring, Retaining	302/304 Stainless Steel
31	1	685-056-120	Rod, Diaphragm	416 Stainless Steel
32	2	720-012-360	Seal, Diaphragm Rod	Buna-N Rubber
33	4	720-046-600	Seal, Manifold	Virgin PTFE
34	8	720-051-600	Seal, Check Valve Retainer	Virgin PTFE
35	4	722-081-520	Seat, Check Valve	PVDF
36	4	901-037-115	Washer, Flat 1/4"	302/304 Stainless Steel

14.10 Composite Repair Parts Drawing Duodos 25



14.11 Composite Repair Parts List Duodos 25 PP

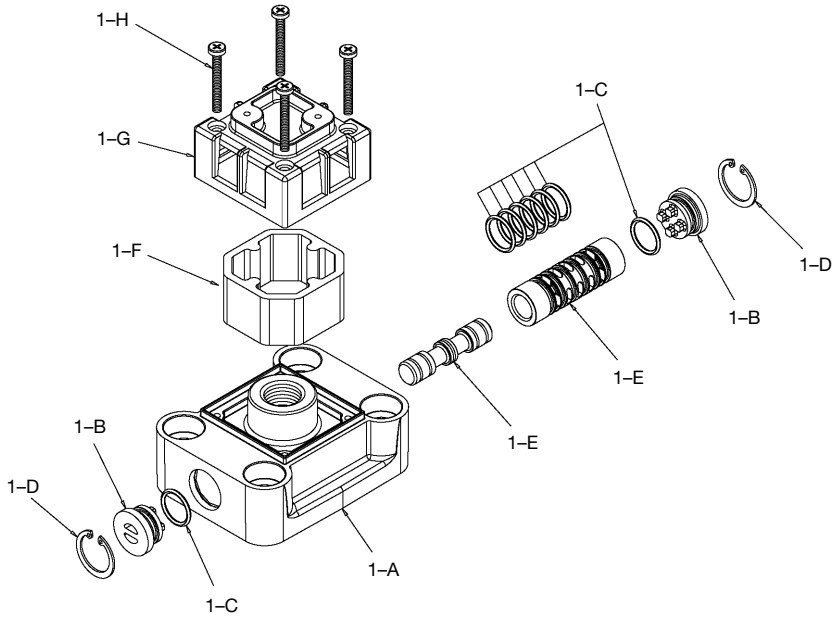
Item	Quantity	Part Number	Description	Materials
1	1	031-156-000	Air Valve Assembly	Assembly, sub-assembly
2	4	050-042-354	Ball, Check	Santoprene
3	1	095-090-000	Pilot Valve Assembly	Assembly, sub-assembly
4	1	114-022-307	Intermediate Assembly	Aluminum, Gray Epoxy Coated
5	2	115-139-305	Bracket, Mounting	Carbon Steel, Gray Epoxy Coated
6	2	132-032-360	Bumper, Diaphragm	Buna-N Rubber
7	2	135-034-506	Bushing, Plunger	Delrin 150
8	1	165-107-307	Cap, Air Inlet	Aluminum, Gray Epoxy Coated
9	32	170-020-115	Capscrew, Hex HD 3/8-16 x 2.00	302/304 Stainless Steel
10	16	170-066-115	Capscrew, Hex HD 1/2-13 x 2.25	302/304 Stainless Steel
11	4	170-085-115	Capscrew, Hex HD 5/16-18 x 2.00	302/304 Stainless Steel
12	6	171-015-115	Capscrew, Soc HD 3/8-16 x 0.88	302/304 Stainless Steel
13	4	171-057-115	Capscrew, Soc HD 5/16-18 x 2.25	302/304 Stainless Steel
14	2	196-157-552	Chamber, Outer	Unfilled Polypropylene
15	2	196-160-307	Chamber, Inner	Aluminum, Gray Epoxy Coated
16	2	286-091-354	Diaphragm	Santoprene
18	4	312-104-552	Elbow	Unfilled Polypropylene
19	1	360-094-360	Gasket, Air Inlet	Buna-N Rubber
20	1	360-095-360	Gasket, Pilot Valve	Buna-N Rubber
21	1	360-096-360	Gasket, Air Vale	Buna-N Rubber
22	2	360-097-360	Gasket, Inner Chamber	Buna-N Rubber
23	2	518-136-552	Manifold, 25 mm DIN	Unfilled Polypropylene
24	1	530-025-000	Muffler-Sound Dampening _ NPT	Assembly, sub-assembly
25	1	538-011-555	Nipple, Pipe	Polyvinyl Chloride
26	8	545-004-115	Nut, Hex 5/16-18	302/304 Stainless Steel
27	40	545-005-115	Nut, Hex 3/8-16	302/304 Stainless Steel
28	16	545-008-110	Nut, Hex 1/2-13	316 Stainless Steel
29	2	560-001-360	O-ring	Buna-N Rubber
30	2	612-170-552	Assembly, Outer Diaphragm Plate	Unfilled Polypropylene
31	2	612-171-157	Plate, Inner Diaphragm	Cast Aluminum Alloy #380
32	2	620-018-115	Plunger, Actuator	302/304 Stainless Steel
33	4	670-048-552	Retainer, Ball	Unfilled Polypropylene
34	2	675-055-115	Ring, Retainer	302/304 Stainless Steel
35	1	685-054-120	Rod, Diaphragm	416 Stainless Steel
36	2	685-055-115	Rod, Support	302/304 Stainless Steel
37	2	720-012-360	Seal, Diaphragm Rod	Buna-N Rubber
38	8	720-044-600	Seal, Manifold Spacer	Virgin PTFE
39	8	720-047-600	Seal, Check Valve	Virgin PTFE
40	4	722-079-552	Seat, Check Valve	Unfilled Polypropylene
41	4	770-062-552	Spacer, Manifold	Unfilled Polypropylene
42	72	901-009-115	Washer, Flat 5/16"	302/304 Stainless Steel
43	8	901-038-115	Washer, Flat 5/16"	302/304 Stainless Steel
44	32	901-046-115	Washer, Flat 1/2"	302/304 Stainless Steel

14.12 Composite Repair Parts List Duodos 25 PVDF

Item	Quantity	Part Number	Description	Materials
1	1	031-156-000	Air Valve Assembly	Assembly, sub-assembly
2	4	050-042-600	Ball, Check	Virgin PTFE
3	1	095-090-000	Pilot Valve Assembly	Assembly, sub-assembly
4	1	114-022-307	Intermediate Assembly	Aluminum, Gray Epoxy Coated
5	2	115-139-305	Bracket, Mounting	Carbon Steel, Gray Epoxy Coated
6	2	132-032-360	Bumper, Diaphragm	Buna-N Rubber
7	2	135-034-506	Bushing, Plunger	Delrin 150
8	1	165-107-307	Cap, Air Inlet	Aluminum, Gray Epoxy Coated
9	32	170-020-115	Capscrew, Hex HD 3/8-16 x 2.00	302/304 Stainless Steel
10	16	170-066-115	Capscrew, Hex HD 1/2-13 x 2.25	302/304 Stainless Steel
11	4	170-085-115	Capscrew, Hex HD 5/16-18 x 2.00	302/304 Stainless Steel
12	6	171-015-115	Capscrew, Soc HD 3/8-16 x 0.88	302/304 Stainless Steel
13	4	171-057-115	Capscrew, Soc HD 5/16-18 x 2.25	302/304 Stainless Steel
14	2	196-157-520	Chamber, Outer	PVDF
15	2	196-160-157	Chamber, Inner	Aluminum
16	2	286-091-354	Diaphragm	Santoprene
17	2	286-093-600	Diaphragm, Overlay	Virgin PTFE
18	4	312-104-520	Elbow	PVDF
19	1	360-094-360	Gasket, Air Inlet	Buna-N Rubber
20	1	360-095-360	Gasket, Pilot Valve	Buna-N Rubber
21	1	360-096-360	Gasket, Air Vale	Buna-N Rubber
22	2	360-097-360	Gasket, Inner Chamber	Buna-N Rubber
23	2	518-136-520	Manifold	PVDF
24	1	530-025-000	Muffler-Sound Dampening _ NPT	Assembly, sub-assembly
25	1	538-011-555	Nipple, Pipe	Polyvinyl Chloride
26	8	545-004-115	Nut, Hex 5/16-18	302/304 Stainless Steel
27	40	545-005-115	Nut, Hex 3/8-16	302/304 Stainless Steel
28	16	545-008-110	Nut, Hex 1/2-13	316 Stainless Steel
29	2	560-001-360	O-ring	Buna-N Rubber
30	2	612-170-520	Assembly, Outer Diaphragm Plate	PVDF
31	2	612-171-157	Plate, Inner Diaphragm	Cast Aluminum Alloy #380
32	2	620-018-115	Plunger, Actuator	302/304 Stainless Steel
33	4	670-048-520	Retainer, Ball	PVDF
34	2	675-055-115	Ring, Retainer	302/304 Stainless Steel
35	1	685-054-120	Rod, Diaphragm	416 Stainless Steel
36	2	685-055-115	Rod, Support	302/304 Stainless Steel
37	2	720-012-360	Seal, Diaphragm Rod	Buna-N Rubber
38	8	720-044-600	Seal, Manifold Spacer	Virgin PTFE
39	8	720-047-600	Seal, Check Valve	Virgin PTFE
40	4	722-079-520	Seat, Check Valve	PVDF
41	4	770-062-520	Spacer, Manifold	PVDF
42	72	901-009-115	Washer, Flat 5/16"	302/304 Stainless Steel
43	8	901-038-115	Washer, Flat 5/16"	302/304 Stainless Steel
44	32	901-046-115	Washer, Flat 1/2"	302/304 Stainless Steel

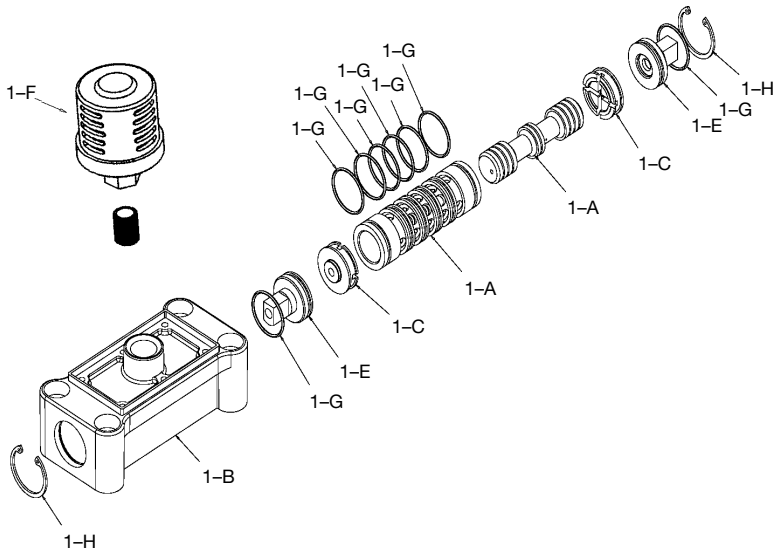
15 Detailed drawings and lists of parts for components

15.1 Components for air valve (No.: 031-115-000) - Duodos 15/20



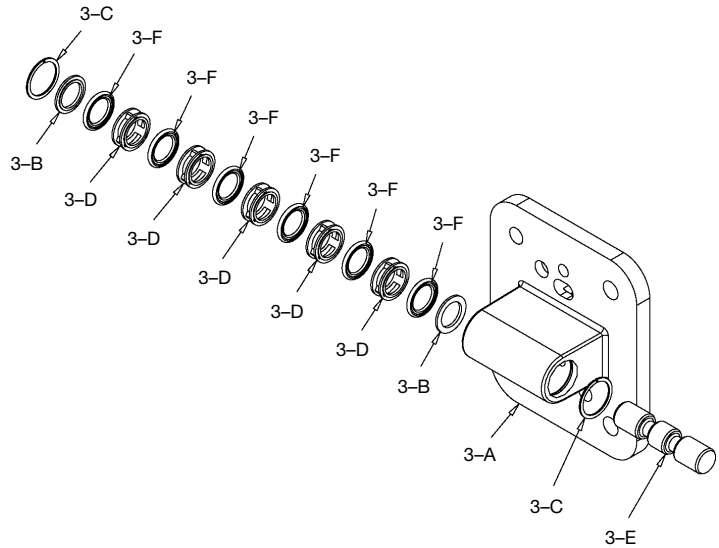
Item	Quantity	Part no.	Description	Material
1-A	1	095-086-551	Air valve housing	Polypropylene, glass fibre reinforced
1-B	2	165-074-551	Stoppers	Polypropylene, glass fibre reinforced
1-C	8	560-101-360	O-ring	Buna-N
1-D	2	675-051-115	Circlip	Stainless steel 302/304
1-E	1	031-132-000	Master cylinder and plunger	Subassembly
1-F	1	530-031-550	Filter	Polyethylene
1-G	1	165-109-551	Filter cap	Polypropylene, glass fibre reinforced
1-H	4	710-011-115	Thread-cutting screws	Stainless steel 302/304

15.2 Components for air valve (No.: 031-156-000) - Duodos 25



Item	Quantity	Part no.	Description	Material
1-A	1	031-151-000	Master cylinder and plunger	Subassembly
1-B	1	095-085-551	Air valve housing	Polypropylene, glass fibre reinforced
1-C	2	132-031-552	Shock absorber	Polypropylene
1-E	2	165-117-552	Stopper	Polypropylene
1-F	1	530-025-000	Filter	Subassembly
1-G	8	560-103-360	O-ring	Buna-N
1-H	2	675-055-115	Circlip	Stainless steel 302/304

15.3 Components for pilot valve (No.: 095-091-000) - Duodos 15/20/25



Item	Quantity	Part no.	Description	Material
3-A	1	095-087-551	Pilot valve housing	Polypropylene, glass fibre reinforced
3-B	2	135-035-506	Moulded washer	Delrin
3-C	2	675-057-115	Spiral sealing ring	Stainless steel 302/304
3-D	5	770-065-175	Spacer support	
3-E	1	775-041-506	Pilot valve plunger	Delrin
3-F	6	917-003-374	Moulded seal	Nitrile

16 Spare parts kits

Spare parts kit	Order no.
Spare parts kit air system for Duodos 10	1010810
Spare parts kit air system for Duodos 15/20	1010811
Spare parts kit air system for Duodos 25	1010813
Spare parts kit liquid end for Duodos 10 PP	1010801
Spare parts kit liquid end for Duodos 15 PP	1010802
Spare parts kit liquid end for Duodos 20 PP	1010803
Spare parts kit liquid end for Duodos 25 PP	1010804
Spare parts kit liquid end for Duodos 10 PVDF	1010806
Spare parts kit liquid end for Duodos 15 PVDF	1010807
Spare parts kit liquid end for Duodos 20 PVDF	1010808
Spare parts kit liquid end for Duodos 25 PVDF	1010809

16.1 List of parts spare parts kits - Duodos 10

Spare parts kit air system - Duodos 10 (Order no. 1010810):

Item	Quantity	Part no.	Description	Material
2	1	031-106-000	Master cylinder and plunger	Subassembly
12	1	360-084-360	Seal, pump housing	Buna-N
8	1	360-085-360	Seal, air valve housing	Buna-N
3	8	560-101-360	O-ring	Buna-N
22	1	675-047-115	Sealing ring, pilot valve cylinder	Stainless steel 302/304
7	2	675-051-115	Circlip	Stainless steel 302/304
18	2	720-031-359	Seal, K-R	Urethane
23	1	755-038-000	Plunger, pilot valve	Subassembly
20	1	775-038-000	Cylinder, pilot valve	Subassembly

Spare parts kit liquid end for Duodos 10 PP (Order no. 1010801):

Item	Quantity	Part no.	Description	Material
34	4	050-033-354	Ball valve	Santoprene
26	2	286-069-354	Diaphragm	Santoprene
43	2	360-086-360	Seal, diaphragm	Buna-N
32	8	720-032-600	Valve seal	PTFE
40	4	720-033-600	Distributor seal	PTFE

Spare parts kit liquid end for Duodos 10 PVDF (Order no. 1010806):

Item	Quantity	Part no.	Description	Material
34	4	050-034-600	Ball valve	PTFE
26	2	286-070-600	Diaphragm	PTFE
43	2	360-086-360	Seal, diaphragm	Buna-N
32	8	720-032-600	Valve seal	PTFE
40	4	720-033-600	Distributor seal	PTFE

16.2 List of parts spare parts kits – Duodos 15

Spare parts kit air system for Duodos 15 (Order no. 1010811):

Item	Quantity	Part no.	Description	Material
1-E	1	031-132-000	Master cylinder and plunger	Subassembly
3	1	095-091-000	Pilot valve, complete	Subassembly
6	2	132-034-360	Shock absorber, plunger rod	Buna-N
7	2	135-036-506	Guide bush	Delrin
1-B	2	165-074-551	Stoppers	Polypropylene, glass fibre reinforced
21	1	360-100-360	Seal, air input	Buna-N
22	1	360-101-360	Seal, pilot valve	Buna-N
23	1	360-102-360	Seal, air valve	Buna-N
27	2	560-001-360	O-ring	Buna-N
30	2	620-019-115	Control pin	Stainless steel 302/304
31	2	675-042-115	Circlip	Stainless steel 302/304
1-D	2	675-051-115	Circlip	Stainless steel 302/304
33	2	720-012-360	Seal, plunger rod	Buna-N

Spare parts kit liquid end for Duodos 15 PP (Order no. 1010802):

Item	Quantity	Part no.	Description	Material
2	4	050-027-354	Ball valve	Santoprene
16	2	286-095-354	Diaphragm	Santoprene
20	2	360-099-360	Seal, diaphragm	Buna-N
34	4	720-045-600	Seal, in-line distributor fitting	PTFE
35	4	722-099-600	Valve seat	PTFE

Spare parts kit liquid end for Duodos 15 PVDF (Order no. 1010807):

Item	Quantity	Part no.	Description	Material
2	4	050-022-600	Ball valve	PTFE
16	2	286-095-354	Diaphragm	Santoprene
17	2	286-096-600	Overlay diaphragm	PTFE
34	4	720-045-600	Seal, in-line distributor housing	PTFE
35	4	722-099-600	Valve seat	PTFE

16.3 List of parts spare parts kits – Duodos 20

Spare parts kit air system for Duodos 20 (Order no. 1010811):

Item	Quantity	Part no.	Description	Material
1-E	1	031-132-000	Master cylinder and plunger	Subassembly
3	1	095-091-000	Pilot valve, complete	Subassembly
6	2	132-034-360	Shock absorber, plunger rod	Buna-N
7	2	135-036-506	Guide bush	Delrin
1-B	2	165-074-551	Stoppers	Polypropylene glass fibre reinforced
19	1	360-100-360	Seal, air input	Buna-N
20	1	360-101-360	Seal, pilot valve	Buna-N
21	1	360-102-360	Seal, air valve	Buna-N•••
25	2	560-001-360	O-ring	Buna-N

Item	Quantity	Part Number	Description	Material
28	2	620-019-115	Control pin	St. steel 302/304
30	2	675-042-115	Circlip	St. steel 302/304
1-D	2	675-051-115	Circlip	St. steel 302/304
32	2	720-012-360	Sealing ring seal, Plunger rod	Buna-N

Spare parts kit liquid end for Duodos 20 PP (Order no. 1010803):

Item	Quantity	Part no.	Description	Material
2	4	050-028-354	Ball valve	Santoprene
15	2	286-095-354	Diaphragm	Santoprene
18	2	360-099-360	seal, Diaphragm seal,	Buna-N
33	4	720-046-600	In-line distributor fitting	PTFE
34	8	720-051-600	valve seal	PTFE

Spare parts kit liquid end for Duodos 20 PVDF (Order no. 1010808):

Item	Quantity	Part no.	Description	Material
2	4	050-028-600	Ball valve	PTFE
15	2	286-095-354	Diaphragm	Santoprene
16	2	286-096-600	Overlay-diaphragm	PTFE
33	4	720-046-600	Seal, In-line distributor housing	PTFE
34	8	720-051-600	valve seal	PTFE

16.4 List of parts spare parts kits - Duodos 25

Spare parts kit air system for Duodos 25 (Order no. 1010813):

Item	Quantity	Part no.	Description	Material
1-A	1	031-151-000	Master cylinder and plunger	Subassembly
3	1	095-090-000	Pilot valve, complete	Subassembly
1-C	2	132-031-552	Shock absorber	Polypropylene
6	2	132-032-360	Shock absorber, plunger rod	Buna-N
7	2	135-034-506	Guide bush	Delrin
1-E	2	165-117-552	Stoppers	Polypropylene
19	1	360-094-360	Seal, air input	Buna-N
20	1	360-095-360	Seal, pilot valve	Buna-N
21	1	360-096-360	Seal, air valve	Buna-N
22	2	360-097-360	Seal, pump housing	Buna-N
29	2	560-001-360	O-ring	Buna-N
1-G	8	560-103-360	O-ring	Buna-N
32	2	620-018-115	Control pin	Stainless steel 302/304
34	2	675-055-115	Circlip	Stainless steel 302/304
1-H	2	675-055-115	Circlip	Stainless steel 302/304
37	2	720-012-360	Seal, plunger rod	Buna-N

Spare parts kit liquid end for Duodos 25 PP (Order no. 1010804):

Item	Quantity	Part no.	Description	Material
2	4	050-042-354	Ball valve	Santoprene
16	2	286-091-354	Diaphragm	Santoprene
38	8	720-044-600	Seal, in-line distributor fitting	PTFE
39	8	720-047-600	Valve seal	PTFE

Spare parts kit liquid end for Duodos 25 PVDF (Order no. 1010809):

Item	Quantity	Part no.	Description	Material
2	4	050-042-600	Ball valve	PTFE
16	2	286-091-354	Diaphragm	Santoprene
17	2	286-093-600	Overlay diaphragm	PTFE
38	8	720-044-600	Seal, in-line distributor fitting	PTFE
39	8	720-047-600	Valve seal	PTFE

17 Technical data

17.1 Technical data – Duodos PP

Order no.	1010793	1010794	1010795	1010796
Type of pump	Duodos 10 PP	Duodos 15 PP	Duodos 20 PP	Duodos 25 PP
Capacity (max.)	900 l/h	3 120 l/h	5 220 l/h	10 200 l/h
Back pressure (max.)	70 m Ws	70 m Ws	70 m Ws	70 m Ws
Feed quantity/stroke	0.04 l	0.098 l	0.098 l	0.64 l
Temperature medium	5 – 65 °C	5 – 65 °C	5 – 65 °C	5 – 65 °C
Solids max. Ø	1 mm	3 mm	4 mm	6 mm
Suction lift dry	1.7 m	3.6 m	1.8 m	5.1 m
Suction lift wet	7.7 m	8.2 m	8.2 m	8.2 m
Suction connection	1/2" NPT external 1/4" NPT internal	1" BSP external 1/2" BSP internal	1 1/2" BSP external 3/4" BSP internal	1" ANSI flange
Pressure connection	1/2" NPT external 1/4" NPT internal	1" BSP external 1/2" BSP internal	1 1/2" BSP external 3/4" BSP internal	1" ANSI flange
Compressed air connection	1/4" NPT internal	1/4" NPT internal	1/4" NPT internal	1/2" NPT internal
Air consumption	0.5 – 11 Nm^3/h	3.5 – 27 Nm^3/h	7 – 34 Nm^3/h	8.5 – 77 Nm^3/h
Max. air pressure	7 bar	7 bar	7 bar	7 bar
Min. air pressure ca.	1 bar	1 bar	1 bar	1 bar
Feed housing	PP	PP	PP	PP
Diaphragm	Santoprene	Santoprene	Santoprene	Santoprene
Overlay diaphragm	none	none	none	none
Ball valves	Santoprene	Santoprene	Santoprene	Santoprene
Valve seats	PP	PTFE	PP	PP
Seals	PTFE	PTFE	PTFE	PTFE
Pump housing	Polypropylene, glass fibre reinforced	Polypropylene, glass fibre reinforced	Polypropylene, glass fibre reinforced	Aluminium, epoxy coated
Installation support	PP	Stainless steel 302/304	Stainless steel 302/304	Steel, epoxy epoxy coated
Weight	2 kg	8 kg	9 kg	24 kg
Dimensions L x B x H	178 x 140 x 198 mm	258 x 179 x 287 mm	300 x 179 x 339 mm	446 x 260 x 530 mm

17.2 Technical data – Duodos PVDF

Order no.	1010797	1010798	1010799	1010800
Type of pump	Duodos 10 PVDF	Duodos 15 PVDF	Duodos 20 PVDF	Duodos 25 PVDF
Capacity (max.)	900 l/h	3 120 l/h	5 220 l/h	10 200 l/h
Back pressure (max.)	70 m Ws	70 m Ws	70 m Ws	70 m Ws
Feed quantity/stroke	0.04 l	0.098 l	0.098 l	0.64 l
Temperature medium	-13 - 93 °C	-13 - 93 °C	-13 - 93 °C	-13 - 93 °C
Solids max. Ø	1 mm	3 mm	4 mm	6 mm
Suction lift dry	1.7 m	3.6 m	1.8 m	5.1 m
Suction lift wet	7.7 m	8.2 m	8.2 m	8.2 m
Suction connection	1/2" NPT external 1/4" NPT internal	1" BSP external 1/2" BSP internal	1 1/2" BSP external 3/4" BSP internal	1" ANSI flange
Pressure connection	1/2" NPT external 1/4" NPT internal	1" BSP external 1/2" BSP internal	1 1/2" BSP external 3/4" BSP internal	1" ANSI flange
Compressed air connection	1/4" NPT internal	1/4" NPT internal	1/4" NPT internal	1/2" NPT internal
Air consumption	0.5 – 11 Nm³/h	3.5 – 27 Nm³/h	7 – 34 Nm³/h	8.5 – 77 Nm³/h
Max. air pressure	7 bar	7 bar	7 bar	7bar
Min. air pressure ca.	1 bar	1 bar	1 bar	1 bar
Feed housing	PVDF	PVDF	PVDF	PVDF
Diaphragm	PTFE	Santoprene	Santoprene	Santoprene
Overlay diaphragm	keine	PTFE	PTFE	PTFE
Ball valves	PTFE	PTFE	PTFE	PTFE
Valve seats	PVDF	PTFE	PVDF	PVDF
Seals	PTFE	PTFE	PTFE	PTFE
Pump housing	Polypropylene, glass fibre reinforced	Polypropylene, glass fibre reinforced	Polypropylene, glass fibre reinforced	Aluminium, epoxy coated
Installation support	PVDF	Stainless steel 302/304	Stainless steel 302/304	Steel, epoxy coated
Weight	2.5 kg	9 kg	9.5 kg	29 kg
Dimensions L x T x H	178 x 140 x 198 mm	258 x 179 x 287 mm	300 x 179 x 339 mm	446 x 260 x 530 mm

17.3 Operating temperatures

Material	Operating temperature min.	Operating temperature max.
Santoprene Thermoplast elastomer manufactured in conical casting procedure with no fabric layer. Flexible with high mechanical durability. Excellent abrasion resistance.	-23 °C	100 °C
PTFE Chemically inactive and practically impervious. There are only a few chemicals known to react with Teflon.	-37 °C	100 °C
PVDF	-13 °C	93 °C
Polypropylene	5 °C	65 °C

17.4 Repair tools

Tool	Size (mm)	Duodos 10	Duodos 15	Duodos 20	Duodos 25
Allan key 3/16"	4.76 mm		x		
Allan key 1/4"	6.35 mm				x
Spanner 3/8"	9.52 mm	x	x	x	
Spanner 7/16"	11.11 mm	x			
Spanner 1/2"	12.7 mm	x	x	x	x
Spanner 9/16"	14.28 mm				x
Spanner 3/4"	19.05 mm		x	x	x
Spanner 1 3/8"	34.92 mm				x
Screwdriver 7 mm	7.00 mm	x			

EC Declaration of Conformity

We,

ProMinent Dosiertechnik GmbH
Im Schuhmachergewann 5 - 11
D - 69123 Heidelberg

hereby declare that, on the basis of its functional concept and design and in the version brought into circulation by us, the product specified in the following complies with the relevant, fundamental safety and health stipulations laid down by EC regulations.
Any modification to the product not approved by us will invalidate this declaration.

Product description :	***Air-driven dual diaphragm pump***
Product type :	***Duodos***
Serial number :	***see type identification plate on device***
Relevant EC directives :	***EC - machine directive (98/37/EC)***
Harmonised standards used, in particular :	***DIN EN 809***
National standards and other technical specifications used, in particular :	
Date/manufacturer´s signature :	***10. Jul 02***
The undersigned :	*Dr. Rainer V. Dulger, Executive Vice President R&D and Production*

Adresses and delivery information from the manufacturer:

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