

Assembly and operating instructions Duodos 10 Air-driven double diaphragm pump



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General non-discriminatory approach

In order to make it easier to read, this document uses the male form in grammatical structures but with an implied neutral sense. It is aimed equally at both men and women. We kindly ask female readers for their understanding in this simplification of the text.

Supplementary information

Read the following supplementary information in its entirety!

The following are highlighted separately in the document:

- Enumerated lists
- Instructions
 - \Rightarrow Results of the instructions

Information



This provides important information relating to the correct operation of the system or is intended to make your work easier.

Safety information

Safety information are provided with detailed descriptions of the endangering situation, see \Leftrightarrow *Chapter 2.1 'Explanation of the safety information' on page 6*

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1 Function and identification

1.1 Function

The Duodos is an air-driven double diaphragm pump.

The Duodos is run-dry safe and self-priming.

The pump capacity of the double diaphragm pump can be controlled by changing the pressure in the air supply. The air control is designed for oil-free operation. The Duodos is optimally suited to the transport of liquid chemicals.

The Duodos double diaphragm pump transports liquids to a discharge lift of 70 m. As the pump capacity depends greatly on the back pressure, the performance curve must always be observed. At the same time, the differential pressure between the hydraulic and pneumatic sides must not exceed 2 bar. Higher values reduce the service life of the double diaphragm pump.

When selecting the double diaphragm pump you must check its material compatibility. In addition, the density, viscosity, solids content and temperature of the liquid being transported must be considered.

Permissible values for the medium
 Temperature of the medium
 PP version: 5 ... 65°C
 PVDF version: -13 ... 93 °C
 Viscosity of the medium max. 200 mPas
 Solids content: none

1.2 Identification

Туре	Housing	Diaphragm	Feed rate I/h	Order numbers
Duodos 10	PP	Santoprene®	0 900	1010793
Duodos 10	PVDF	Teflon®	0 900	1010797

2 Safety and responsibility

2.1 Explanation of the safety information

Introduction

These operating instructions provide information on the technical data and functions of the product. These operating instructions provide detailed safety information and are provided as clear step-by-step instructions.

The safety information and notes are categorised according to the following scheme. A number of different symbols are used to denote different situations. The symbols shown here serve only as examples.



DANGER!

Nature and source of the danger

Consequence: Fatal or very serious injuries.

Measure to be taken to avoid this danger

Danger!

 Denotes an immediate threatening danger. If this is disregarded, it will result in fatal or very serious injuries.



WARNING!

Nature and source of the danger

Possible consequence: Fatal or very serious injuries.

Measure to be taken to avoid this danger

Warning!

 Denotes a possibly hazardous situation. If this is disregarded, it could result in fatal or very serious injuries.



CAUTION!

Nature and source of the danger

Possible consequence: Slight or minor injuries, material damage.

Measure to be taken to avoid this danger

Caution!

 Denotes a possibly hazardous situation. If this is disregarded, it could result in slight or minor injuries. May also be used as a warning about material damage.

NOTICE! Nature and source of the danger Damage to the product or its surroundings Measure to be taken to avoid this danger Note! Denotes a possibly damaging situation. If this is _ disregarded, the product or an object in its vicinity could be damaged. Type of information Hints on use and additional information Source of the information, additional measures Information! Denotes hints on use and other useful information. It does not indicate a hazardous or damaging situation.

2.2 Users' qualifications



WARNING!

Danger of injury with inadequately qualified personnel! The operator of the plant / device is responsible for ensuring that the qualifications are fulfilled.

If inadequately qualified personnel work on the unit or loiter in the hazard zone of the unit, this could result in dangers that could cause serious injuries and material damage.

- All work on the unit should therefore only be conducted by qualified personnel.
- Unqualified personnel should be kept away from the hazard zone

Training	Definition
Instructed personnel	An instructed person is deemed to be a person who has been instructed and, if required, trained in the tasks assigned to him/her and possible dangers that could result from improper behaviour, as well as having been instructed in the required protective equipment and protective measures.
Trained user	A trained user is a person who fulfils the requirements made of an instructed person and who has also received additional training specific to the system from ProMinent or another authorised distribution partner.
Trained qualified per- sonnel	A qualified employee is deemed to be a person who is able to assess the tasks assigned to him and recognize possible hazards based on his/her training, knowledge and experience, as well as knowledge of pertinent regulations. The assessment of a person's technical training can also be based on several years of work in the relevant field.

Training	Definition		
Electrician	Electricians are deemed to be people, who are able to complete work on elec- trical systems and recognize and avoid possible hazards independently based on his/her technical training and experience, as well as knowledge of pertinent standards and regulations.		
	Electricians should be specifically trained for the working environment in which the are employed and know the relevant standards and regulations.		
	Electricians must comply with the provisions of the applicable statutory direc- tives on accident prevention.		
Customer Service depart- ment	Customer Service department refers to service technicians, who have received proven training and have been authorised by ProMinent to work on the system.		



Note for the system operator

The pertinent accident prevention regulations, as well as all other generally acknowledged safety regulations, must be adhered to!

2.3 Intended use



CAUTION!

Intended use

Possible consequences if the instructions are not observed: Minor injuries and material damage

- The pump is intended for liquids transport
- The pump is not intended for the transport of gaseous or solid media
- Only use the pump in accordance with the technical data and specifications outlined in the operating instructions.
- The pump is not designed for use in areas at risk from explosion
- Only switch the device on if it has been properly fastened to the ground or its holding fixture.

2.4 Duodos general safety notes



WARNING!

Danger from hazardous substances! Possible consequence: Fatal or very serious injuries.

Please ensure when handling hazardous substances that you have read the latest safety data sheets provided by the manufacture of the hazardous substance. The actions required are described in the safety data sheet. Check the safety data sheet regularly and replace, if necessary, as the hazard potential of a substance can be re-evaluated at any time based on new findings.

The system operator is responsible for ensuring that these safety data sheets are available and that they are kept up to date, as well as for producing an associated hazard assessment for the workstations affected.



WARNING!

Hazardous media / contamination of persons and equipment

Possible consequence: Fatal or very serious injuries. material damage

- Ensure the device is resistant to the media being conveyed
- Always observe the safety data sheets for the media to be conveyed. The system operator must ensure that these safety data sheets are available and that they are kept up-to-date
- The safety data sheets for the media being conveyed are always decisive for initiating counter measures in the event of leakage to the media being conveyed
- Observe the general restrictions in relation to viscosity limits, chemical resistance and density



WARNING!

Service life of the diaphragm

Possible consequence: Fatal or very serious injuries

The service life of the diaphragm cannot be precisely specified. For this reason, the possibility of fracture and subsequent leakage of liquids must be taken into account.

In addition, you must prevent particles from defective diaphragms reaching the media being conveyed. This can be achieved e.g. by filtration, a hose rupture alarm or other means suitable for the respective process.



CAUTION!

Compressed air

Before any work on the double diaphragm pump, close the compressed air lines and vent the double diaphragm pump.

Before any maintenance and repair work, close off the compressed air supply, discharge the compressed air and detach the air supply line from the double diaphragm pump. The line to the discharge side of the double diaphragm pump may be under pressure and must likewise be vented.

CAUTION! Hot surface

When conveying hot liquids, the pump can likewise become hot. Hot surfaces may then be present on the pump. Bear in mind these circumstances and take suitable measures to reduce any hazards.

Maximum pump loudness 91 dB

Depending on the operating conditions, the noise level of the device can reach 88 dB \pm 3 dB. Bear in mind these circumstances and implement suitable measures to reduce the noise load. The type and implementation of suitable measures is depends on the local circumstances and is the responsibility of the system operator.

Check the fastening elements are correctly seated.

Before commissioning the double diaphragm pump, you must check that all fastening elements with sealing rings are correctly seated. The seals may 'creep', so that the fastening elements come loose over time.

\bigcirc

In the event of a diaphragm rupture

In the event of a diaphragm rupture, the pumped medium can get into the air system of the double diaphragm pump and from there into the atmosphere. If the pumped medium is a dangerous, harmful or toxic substance, the air outlet must be routed to a suitable area where safe disposal is possible.

Operation in the open air and outdoors

- Take suitable measures to protect the device from environmental influences when operating outside such as:
 - UV rays
 - Humidity
 - Frost, etc.

3 Transport and storage

User qualification, transport and storage: trained user, see *Chapter 2.2 'Users' qualifications' on page 7*



WARNING!

Danger from hazardous substances!

Possible consequence: Fatal or very serious injuries.

Please ensure when handling hazardous substances that you have read the latest safety data sheets provided by the manufacture of the hazardous substance. The actions required are described in the safety data sheet. Check the safety data sheet regularly and replace, if necessary, as the hazard potential of a substance can be re-evaluated at any time based on new findings.

The system operator is responsible for ensuring that these safety data sheets are available and that they are kept up to date, as well as for producing an associated hazard assessment for the workstations affected.

3.1 Transport

Transport

- The pump is protected by means of cardboard packaging
- The packaging materials can be recycled
- Consider the ambient conditions

3.2 Storage

The device must be completely drained before storage.

Permissible storage conditions:

All versions:	+ 5° C 60° C
All versions:	< 95% relative air humidity (non-condensing)

Permissible operating conditions:

All versions:	- 10° C 40° C
All versions:	< 95% relative air humidity (non-condensing)

4 Assembly

User qualification, installation: trained qualified personnel, see \$ Chapter 2.2 Users' qualifications' on page 7



CAUTION!

Possible consequence: Slight or minor injuries. Material damage.

Observe the permissible ambient conditions.

4.1 Installation surroundings



Upright installation

Install the double diaphragm pump upright and plumb. The valves of the double diaphragm pump operate when loaded by gravity. The valve balls are pressed by gravity into the valve seat and seal it off. Installation outside the vertical axis impairs the function of the valves.



Nominal width of the pipework

The threaded connectors must not reduce the nominal width of the pipework or the double diaphragm pump. The hydraulic connectors have internal and external threads. Do not screw threaded fittings on to the internal thread as this would lead to a reduction of the nominal width.

Keep the suction line short and the number of pipe valves small. Do not reduce the diameter of the suction line. If a rigid pipework system is used, short flexible hose pieces should be inserted between the double diaphragm pump and pipework to protect the double diaphragm pump against vibration and tensile and compressive forces. The installation of a pulsation damper is recommended to reduce pulsations in the pumped medium.

Assembly



Fig. 1: Installation surroundings

- 1. Pulsation damper
- 2. Flexible connection
- 3. Pipe connection
- 4. Manometer
- 5. Shut-off valve
- 6. Discharge side
- Outlet valve
 Flexible conne
- Flexible connection
 Filter/controller module
- 10. Air dryer (option)

- 11. Shut-off valve
- 12. Compressed air connection
- 13. Outlet valve
- 14. Suction side
- 15. Shut-off valve
- 16. Manometer
- 17. Pipe connection
- 18. Flexible connection
- 19. Air outlet

4.1.1 Securing the double diaphragm pump



Correct securing of the device

Only switch the device on if it has been properly fastened to the ground or its holding fixture. The system operator is responsible for ensuring that the ground and the fittings can hold the device safely and under all operating conditions.

4.2 Ambient conditions

NOTICE!

Ambient conditions

Possible consequence: Property damage and increased wear and tear

Assembly is to be carried out in the following order. If the pump has to be installed outdoors, then it is to be equipped with protection against sunlight and weather influences.

When positioning the pump, ensure that sufficient room for access is provided for all types of maintenance work.

4.3 Layout of the suction side

Nominal width of the pipework The threaded connectors must not reduce the nominal width of the pipework or the double diaphragm pump. The hydraulic connectors have internal and external threads. Do not screw threaded fittings on to the internal thread as this would lead to a reduction of the nominal width.

Dimensioning of the suction side

Layout the suction side with generous dimensions. The supply of the double diaphragm pump with the liquid to be pumped must be ensured under all load and operating statutes. Ensure that the inside diameters of the suction lines are generously sized.

To ensure a maximum service life of the diaphragm, the double diaphragm pump should be installed as close as possible to the pumped medium. If there is a positive priming pressure on the suction side of more than 3.0 m water column, the fitting of a back pressure valve in the air outlet of the double diaphragm pump is recommended in order to protect the diaphragm. The minimum air pressure to operate the double diaphragm pump is approximately 1 bar.

4.4 Compressed air supply

		Compressed air supply The double diaphragm pump must be connected to a compressed air supply in accordance with the current state of the art (ISO 8573-1). We require unoiled, residual oil-free (residual oil from the compressors of maximum 0.1 mg/m ³ for HEES-liquids, bio-oils or max. 5mg/m ³ permitted for mineral oils) and appropriately dried compressed air (ISO 8573-1, class 4 with 3°C PDP). Our recommendation is that the pressure dew point must be at least 10 °C below the ambient temperature.
		<i>Suitable compressed air supply</i> The system operator is responsible for the provision of a suitable compressed air supply. In doing so, observe ISO 8573.
	Layout the compress phragm p all operati sumption compress occur in th consumer	e compressed air supply with generous dimensions. Your ed air supply must be able to supply the double dia- ump with sufficient compressed air at any time and under ng statutes. In this respect also consider the air con- of other devices and machinery connected to the same ed air supply. Considerable pressure fluctuations can ne compressed air supply when switching compressed air rs on and off.
	The air pr psi). Conr pressed a capacity in supply pre valve sho pump.	essure of the supplied air must not exceed 7 bar (100 nect the air inlet of the double diaphragm pump to a com- ir supply, which is designed to provide the required pump n terms of air quantity and pressure. To guarantee the essure remains within the specified values, a control uld be connected upstream of the double diaphragm
	In there is between t	a rigid air supply line insert a short piece of flexible hose he double diaphragm pump and the pipework.
	The weigh weigh upo pump, rat the double	nt of the air supply line, control valve, and filters must not on the air connection fitting of the double diaphragm her it must be supported in a suitable manner. Otherwise e diaphragm pump can be damaged.
Lubrication of the air valves	Based on require ar	their design, the air valve and the pilot valve do not ny lubrication and indeed must not be lubricated.
Moisture in the air line	Water in t the double are malfu ommende the comp	he compressed air can lead to the exhaust air freezing or e diaphragm pump icing up. The possible consequences nctions or failure of the double diaphragm pump. It is rec- ed that an air dryer is fitted. This extracts the water from ressed air and protects against icing up.

5 Operation of the double diaphragm pump

User qualification: operation instructed personnel, see
 © Chapter 2.2 'Users' qualifications' on page 7

The double diaphragm pump is fully integrated into the customer provided system and is then controlled from this system. It is not possible to operate the double diaphragm pump directly.

6 Commissioning



Check the fastening elements are correctly seated. Before commissioning the double diaphragm pump, you must check that all fastening elements with sealing rings are correctly seated. The seals may 'creep', so that the fastening elements come loose over time.

6.1 Checks prior to commissioning



WARNING!

Danger from hazardous substances!

Possible consequence: Fatal or very serious injuries.

Please ensure when handling hazardous substances that you have read the latest safety data sheets provided by the manufacture of the hazardous substance. The actions required are described in the safety data sheet. Check the safety data sheet regularly and replace, if necessary, as the hazard potential of a substance can be re-evaluated at any time based on new findings.

The system operator is responsible for ensuring that these safety data sheets are available and that they are kept up to date, as well as for producing an associated hazard assessment for the workstations affected.

The following checks are to be carried out:

- Ensure that the device has not been damaged during transportation or storage. Immediately report any damage to the supplier
- Check that the air pressure is suitable for the device.
- Ensure that the device is suitable for the liquid to be conveyed and that it will not be attacked.
- Make sure that the temperature of the liquid does not exceed the recommended temperature range
- Install a manometer in the discharge line if the back pressure value is unknown
- Under the operating conditions, check the values for flow, pressure, etc.
- Install a pressure relief valve in the discharge line in order to protect the pump in the event that a valve is unintentionally closed off or the line is blocked in another way.

6.2 Priming

1. To start the double diaphragm pump, open the air value by approximately 1/2 to 3/4 of a turn



Cavitation

If opening of the air valve causes the stroke rate of the double diaphragm pump to increase, but not however the flow volume passing through the double diaphragm pump, then cavitation is the cause. Slightly turn back the air valve so that the air consumption and feed rate of the double diaphragm pump are set in an optimum ratio.

Once the double diaphragm pump is filled with water, open the air valve further to set the required air flow.

6.3 Interrupting operation



WARNING!

Danger from hazardous substances!

Possible consequence: Fatal or very serious injuries.

Please ensure when handling hazardous substances that you have read the latest safety data sheets provided by the manufacture of the hazardous substance. The actions required are described in the safety data sheet. Check the safety data sheet regularly and replace, if necessary, as the hazard potential of a substance can be re-evaluated at any time based on new findings.

The system operator is responsible for ensuring that these safety data sheets are available and that they are kept up to date, as well as for producing an associated hazard assessment for the workstations affected.

Rinse through the double diaphragm pump after every use if liquids are used which when stationary have a tendency to form deposits or to solidify. This avoids damage to the double diaphragm pump. Liquid residues remaining in the double diaphragm pump may dry out and form deposits. When restarting the double diaphragm pump, this can lead to problems at the diaphragms and the ball valves. At temperatures below 0 °C the double diaphragm pump must always be completely drained.

7 Maintenance of the double diaphragm pump



WARNING!

Danger from hazardous substances!

Possible consequence: Fatal or very serious injuries.

Please ensure when handling hazardous substances that you have read the latest safety data sheets provided by the manufacture of the hazardous substance. The actions required are described in the safety data sheet. Check the safety data sheet regularly and replace, if necessary, as the hazard potential of a substance can be re-evaluated at any time based on new findings.

The system operator is responsible for ensuring that these safety data sheets are available and that they are kept up to date, as well as for producing an associated hazard assessment for the workstations affected.



Before all work

Before all work on the double diaphragm pump, disconnect the double diaphragm pump from the compressed air supply and the feed and discharge lines, vent and decontaminate. Always observe the safety data sheet for the chemicals to be conveyed.

7.1 Troubleshooting

Possible symptoms

- Double diaphragm pump does not cycle
- Double diaphragm pump cycles, but does not pump
- Double diaphragm pump cycles, but insufficient feed rate
- Double diaphragm pump cycles irregularly
- Double diaphragm pump vibrates strongly

Cause:	Measure:
Suction lift of the system too high	For suction lifts above 6 metres, priming of the pump can in most cases be induced by pre-filling the pump chambers
Too high priming pressure on the suction side of the system	If there is a priming pressure of more than 3 metres water column, pro- vide a back pressure valve in the air outlet of the double diaphragm pump
Back pressure of the medium higher than the air pressure	Increase the air inlet pressure to the double diaphragm pump
Compressed air pressure higher than the back pressure of the medium	Adjust the feed air pressure according to the performance curve of the double diaphragm pump. At high stroke rates, cavitation in the medium may occur
Suction line of too small nominal width	Observe the recommendations of the dimensioned drawing for the cross-section of the suction line

Maintenance of the double diaphragm pump

Cause:	Measure:
Air line of too small nominal width	Observe the recommendations for dimensioning of the air inlet line in the operating instructions of the double diaphragm pump
Air distribution system of the double diaphragm pump	Dismantle and examine the air valve, pilot valve and control pins
Rigid pipe connections at the pump	Use flexible connections and a pulsation damper
Exhaust air silencer blocked	Remove the silencer. Then clean or de-ice and refit.
Pumped medium in the exhaust air silencer	Dismantle pump chambers and determine whether a diaphragm is broken or a diaphragm flange is loose
Ball valve blocked	Dismantle the liquid end of the double diaphragm pump and clear the blockage
Ball valve or valve seat worn or distorted	Check the ball valves and valve seats for wear and correct seating Replace as necessary
Suction line blocked	Clear blockage or check and clean suction line
Discharge line blocked	Check for blockage. Valves in the discharge line may be closed
Pump chamber blocked	Dismantle the liquid end and inspect the diaphragm chambers of the double diaphragm pump

7.2 Air valve maintenance



To carry out maintenance on the air value first disconnect the compressed air supply, vent the double diaphragm pump and remove the air supply line from the double diaphragm pump.



Fig. 2: Air valve maintenance

- 1. Remove the 4 screws (11)
- **2.** Remove the air valve housing (1)
- **3.** Remove the seals (8 and 12).
 - ⇒ Check the seals and replace as necessary.
- **4.** Using pliers, remove the two safety collars (7) of the air valve and the two end stops (6)
 - \Rightarrow Replace the O-rings (3) as necessary.
- **5.** Pull the piston (2) out of the control cylinder. Ensure that the piston is not scratched or damaged
- 6. Clean the piston with a soft cloth
- 7. Check the piston for scratches and signs of wear
 - ⇒ Replace the piston as necessary.
- 8. Check whether the control cylinder (is one part of 2) is dirty on the inside or scratched
 - ⇒ Replace the control cylinder and piston (2) as necessary.
- **9.** Insert an end stop (6) with O-ring (3) and safety collar (7) in the air valve housing (1)
- **10.** Remove the new control cylinder and piston (2) from the plastic bag and pull the piston out of the control cylinder
- **11.** Push the six O-rings (3) on to the control cylinder and press the O-rings into the recesses
- **12.** Coat the O-rings thinly with grease prior to fitting the control cylinder in the air valve housing
- **13.** Align the slots in the control cylinder with the slots in the air valve housing (1)

Dismantle the air valve

Reassemble the air valve

- **14.** Push the piston into the control cylinder up to the already mounted end cover. Ensure this does not cause any scratches.
- 15. Fit the second end stop complete with an O-ring
- 16. Fit the remaining safety collar
- 17. Now you can refit the air valve housing in the pump
- **18.** Place the cover (9), the valve house seal (8), the air valve housing (1), with the five rectangular recesses pointing towards the cover, and the seal (12) with the four hexagon head screws on the double diaphragm pump
- **19.** Push the silencer (14) and the cover (15) on to the screws
- **20.** Fit the washers (10) and the hexagon nuts (16) and tighten the nuts to 3.4 Nm.
- 21. Switch the compressed air supply back on
 - ⇒ The double diaphragm pump is now ready for use.

7.3 Maintenance of the pilot valve



To carry out maintenance on the pilot valve first disconnect the compressed air supply, vent the double diaphragm pump and remove the air supply line from the double diaphragm pump.



Fig. 3: Maintenance of the pilot valve

- **1.** Remove both tensioning straps
- **2.** Screw out the outer diaphragm flange, diaphragms and inner diaphragm flange together in an anti-clockwise direction
- **3.** To be able to remove the piston (23) of the pilot valve, you must remove the O-ring (24) at one end of the piston
- **4.** Press the piston out of the control cylinder and inspect the Orings (24) for damage and wear
 - ⇒ Replace damaged O-rings
- 5. To remove the control cylinder, remove the safety collar (22)
- **6.** Examine the inside of the control cylinder (20) of the pilot valve to determine if it is dirty or scratched or has any other defects
 - ⇒ If necessary replace the control cylinder (20)
- **7.** Lightly grease the six O-rings (21)
- 8. Push the control cylinder from the chamfered end of the hole into the pump housing (13)
- 9. Secure the control cylinder using the safety collar (22).
- 10. Lightly grease the four inner O-rings of the piston (23)
- 11. Insert the piston (23) in the control cylinder

Dismantle the pilot valve

Reassemble the pilot valve

- 12. Pull the remaining O-rings (24) onto the piston
- **13.** Screw the outer diaphragm flange, diaphragms and inner diaphragm flange together in a clockwise direction on to the piston rod
- **14.** Fit both tensioning straps

7.4 Maintenance of the ball valves

An inspection or maintenance is normally indicated if upon starting the double diaphragm pump:

- primes badly
- provides less capacity
- cycles irregularly
- cycles, but does not pump

Before maintenance work

- **1.** First close the suction line of the double diaphragm pump
- **2.** Close the discharge line of the double diaphragm pump
- 3. Shut-off the compressed air supply
- **4.** Vent the double diaphragm pump
- **5.** Remove the air supply line from the double diaphragm pump
- **6.** If necessary remove any liquid which may remain in the double diaphragm pump
 - ⇒ Now the double diaphragm pump can be removed for maintenance.



Fig. 4: Maintenance of the ball valves

- **1.** Unscrew the screws (37) with which the connection fittings are fastened to the pumping housings
- 2. Check the surfaces of the valve balls (34) and valve seats (33) for wear and damage
 - ⇒ Replace worn or damaged parts.
- **3.** Push the two seals (32) into the grooves of the valve seat (33) and insert the valve seat in the pumping housing
- **4.** Place the valve ball (34) on the valve seat and screw the pipe elbows (39) to the pumping housing
- **1.** Attach the air supply line to the double diaphragm pump
- **2.** Open the compressed air supply
- **3.** Open the discharge line of the double diaphragm pump
- **4.** Open the suction line of the double diaphragm pump
 - \Rightarrow Now the double diaphragm pump can pump again

Check all connectors for leak-tightness

7.5 Maintenance of the diaphragms

Before maintenance work

- **1.** \blacktriangleright First close the suction line of the double diaphragm pump
- **2.** Close the discharge line of the double diaphragm pump
- 3. Shut-off the compressed air supply
- **4.** Vent the double diaphragm pump
- 5. Remove the air supply line from the double diaphragm pump

Ball valve assembly

After maintenance work

- 6. If necessary remove any liquid which may remain in the double diaphragm pump
 - ⇒ Now the double diaphragm pump can be removed for maintenance.



Fig. 5: Maintenance of the diaphragms

- **1.** Remove both tensioning straps (28)
- 2. Screw out the outer diaphragm flange (27), diaphragms (26) and inner diaphragm flange (25) together in an anti-clockwise direction

The inherent cur points outwards

3. ⊾

The inherent curvature of the diaphragms (26) points outwards when fitting.

Place the outer diaphragm flange (27) on the outside of the diaphragms. When doing so, ensure that the side of the inner diaphragm flange (25) with the larger radius points towards the diaphragms.

- **4.** Tighten the outer diaphragm flange to approx. 3 Nm. The diaphragm must not turn freely with the diaphragm flange when tightening.
- **1.** Attach the air supply line to the double diaphragm pump
- 2. Den the compressed air supply
- 3. Den the discharge line of the double diaphragm pump
- **4.** Open the suction line of the double diaphragm pump
 - ⇒ Now the double diaphragm pump can pump again

Check all connectors for leak-tightness

Assembly the diaphragms in the reverse sequence

After maintenance work

8 Disposal of used parts

■ Users' qualification: instructed persons, see <a> Chapter 2.2 'Users' qualifications' on page 7



NOTICE!

Regulations governing disposal of used parts

 Note the current national regulations and legal standards which apply in your country

ProMinent Dosiertechnik GmbH, Heidelberg will take back decontaminated used devices providing that they are covered by adequate postage. Technical Drawing – Duodos 10

9 Technical Drawing – Duodos 10



Fig. 6: Technical Drawing – Duodos 10

- I. Suction connector
- II. Discharge connector

- III. Optional
- IV. Compressed air connector

9.1 Exploded drawings and parts lists

Exploded drawing – Duodos 10 PP

Fig. 7: Exploded drawing – Duodos 10

Parts list Duodos	10	PP
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Item	Quan- tity	Part no.	Reference no.	Description	Remark
1	1	1043218	095-077-551	Air valve housing	Polypropylene, glass fibre- reinforced
2	1	1043113	031-106-000	Control cylinder and piston, air valve	Subassembly
3	8	1043183	560-101-360	O-ring	Buna-N
6	2	1043233	165-074-551	End stops	Polypropylene, glass fibre- reinforced
7	2	1043124	675-051-115	Safety collar	Stainless steel 302/304
8	1	1043247	360-085-360	Seal, air valve housing	Buna-N
9	1	1043259	165-072-551	Cover, air inlet	Polypropylene, glass fibre- reinforced
10	8	1043105	901-037-115	Washer 1/4"	Stainless steel 302/304
11	4	1043140	170-103-115	Hexagon head screw 1/4-20 5"	Stainless steel 302/304
12	1	1043241	360-084-360	Seal, pump housing	Buna-N
13	1	1043170	114-019-551	Pump housing	Polypropylene, glass fibre- reinforced
14	1	1043145	530-022-550	Silencer	polyethylene

Technical Drawing – Duodos 10

ltem	Ouan-	Part no	Reference	Description	Remark
nem	tity	r art no.	no.	Description	Kennark
15	1	1043256	165-073-551	Cover, silencer	Polypropylene, glass fibre- reinforced
16	4	1043128	545-003-115	Hexagon head screw 1/4-20 UNC	Stainless steel 302/304
17	2	1043110	449-021-551	Packing gland insert	Polypropylene, glass fibre- reinforced
18	2	1043250	720-031-359	Seal, K-R	Urethane
19	1	1043188	685-046-120	Diaphragm piston rod	Stainless steel 416
20	1	1043222	755-038-000	Cylinder, pilot valve	Subassembly
21	6	1043179	560-066-360	O-ring	Buna-N
22	1	1043125	675-047-115	Safety collar, pilot valve cyl- inder	Stainless steel 302/304
23	1	1043221	775-038-000	Piston, pilot valve	Subassembly
24	6	1043180	560-029-374	O-ring	Nitrile
25	2	1043190	612-147-150	Inner diaphragm flange	Aluminium
26	2	1043213	286-069-354	Diaphragm	Santoprene
27	2	1043208	612-146-552	Outer diaphragm flange	Polypropylene
28	2	1043119	200-057-115	Clip	Stainless steel 302/304
29	2	1043224	100-002-115	Hammer screw	Stainless steel 302/304
30	2	1043127	545-027-337	Hexagon head screw 1/4-28 UNF	Steel, chromed
31	2	1043167	196-145-552	Pumping housing	Polypropylene
32	8	1043240	720-032-600	Valve seal	PTFE
33	4	1043089	722-073-552	Valve seat	Polypropylene
34	4	1043097	050-033-354	Valve ball	Santoprene
35	2	1043148	312-095-552	Elbow, suction side	Polypropylene
37	24	1043126	706-023-115	Hexagon head screw 10-32 UNF x 1"	Stainless steel 302/304
38	24	1043230	544-004-115	Flange nut 10-32 UNF	Stainless steel 302/304
39	2	1043152	312-096-552	Elbow, discharge side	Polypropylene
40	4	1043237	720-033-600	Distributor seal	PTFE
41	1	1043076	518-127-552	Distributor fitting, horizontal	Polypropylene
42	1	1043074	518-128-552	Distributor fitting, vertical	Polypropylene
43	2	1043245	360-086-360	Seal, diaphragm	Buna-N
55	8	1043126	706-023-115	Screw 10-32x1	Stainless steel 302/304

Parts list Duodos 10 PVDF

Item	Quan- tity	Part no.	Reference no.	Description	Remark
1	1	1043218	095-077-551	Air valve housing	Polypropylene, glass fibre- reinforced
2	1	1043113	031-106-000	Control cylinder and piston, air valve	Subassembly
3	8	1043183	560-101-360	O-ring	Buna-N
6	2	1043233	165-074-551	End stops	Polypropylene, glass fibre- reinforced
7	2	1043124	675-051-115	Safety collar	Stainless steel 302/304
8	1	1043247	360-085-360	Seal, air valve housing	Buna-N
9	1	1043259	165-072-551	Cover, air inlet	Polypropylene, glass fibre- reinforced
10	8	1043105	901-037-115	Washer 1/4"	Stainless steel 302/304
11	4	1043140	170-103-115	Hexagon head screw 1/4-20 5"	Stainless steel 302/304
12	1	1043241	360-084-360	Seal, pump housing	Buna-N
13	1	1043170	114-019-551	Pump housing	Polypropylene, glass fibre- reinforced
14	1	1043145	530-022-550	Silencer	polyethylene
15	1	1043256	165-073-551	Cover, silencer	Polypropylene, glass fibre- reinforced
16	4	1043128	545-003-115	Hexagon head screw 1/4-20 UNC	Stainless steel 302/304
17	2	1043110	449-021-551	Packing gland insert	Polypropylene, glass fibre- reinforced
18	2	1043250	720-031-359	Seal, K-R	Urethane
19	1	1043188	685-046-120	Diaphragm piston rod	Stainless steel 416
20	1	1043222	755-038-000	Cylinder, pilot valve	Subassembly
21	6	1043179	560-066-360	O-ring	Buna-N
22	1	1043125	675-047-115	Safety collar, pilot valve cyl- inder	Stainless steel 302/304
23	1	1043221	775-038-000	Piston, pilot valve	Subassembly
24	6	1043180	560-029-374	O-ring	Nitrile
25	2	1043190	612-147-150	Inner diaphragm flange	Aluminium
26	2	1043215	286-070-600	Diaphragm	PTFE
27	2	1043206	612-146-520	Outer diaphragm flange	PVDF
28	2	1043119	200-057-115	Clip	Stainless steel 302/304
29	2	1043224	100-002-115	Hammer screw	Stainless steel 302/304
30	2	1043127	545-027-337	Hexagon head screw 1/4-28 UNF	Steel, chromed
31	2	1043163	196-145-520	Pumping housing	PVDF
32	8	1043240	720-032-600	Valve seal	PTFE

Technical Drawing – Duodos 10

ltem	Quan- tity	Part no.	Reference no.	Description	Remark
33	4	1043085	722-073-520	Valve seat	PVDF
34	4	1043101	050-034-600	Valve ball	PTFE
35	2	1043146	312-095-520	Elbow, suction side	PVDF
37	24	1043126	706-023-115	Hexagon head screw 10-32 UNF x 1"	Stainless steel 302/304
38	24	1043230	544-004-115	Flange nut 10-32 UNF	Stainless steel 302/304
39	2	1043150	312-096-520	Elbow, discharge side	PVDF
40	4	1043237	720-033-600	Distributor seal	PTFE
41	1	1043075	518-127-520	Distributor fitting, horizontal	PVDF
42	1	1043063	518-128-520	Distributor fitting, vertical	PVDF
43	2	1043245	360-086-360	Seal, diaphragm	Buna-N
55	8	1043126	706-023-115	Screw 10-32x1	Stainless steel 302/304

10 Spare Parts kits

Spare parts kit	Part no.
Air drive for Duodos 10	1010810
Liquid end for Duodos 10 PP	1010801
Liquid end for Duodos 10 PVDF	1010806

Parts list spare parts kit - Duodos 10

Spare parts kit air drive - Duodos 10 (order no. 1010810):

lte m	Quan tity	Part no.	Reference no.	Description	Remark
2	1	1043113	031-106-000	Control cylinder and piston	Subassembly
12	1	1043241	360-084-360	Seal, pump housing	Buna-N [®]
8	1	1043247	360-085-360	Seal, air valve housing	Buna-N [®]
3	8	1043183	560-101-360	O-ring	Buna-N [®]
22	1	1043125	675-047-115	Safety collar, pilot valve cylinder	Stainless steel 302/304
7	2	1043124	675-051-115	Safety collar	Stainless steel 302/304
18	2	1043250	720-031-359	Seal, K-R	Polyurethane
23	1	1043222	755-038-000	Piston, pilot valve	Subassembly
20	1	1043221	775-038-000	Cylinder, pilot valve	Subassembly

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

lte m	Qua ntity	Part no.	Reference no.	Description	Remark
34	4	1043101	050-033-354	Valve ball	Santoprene®
26	2	1043213	286-069-354	Diaphragm	Santoprene®
43	2	1043245	360-086-360	Seal, diaphragm	Buna-N [®]
32	8	1043240	720-032-600	Valve seal	PTFE
40	4	1043237	720-033-600	Distributor seal	PTFE

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

lte m	Qua ntity	Part no.	Reference no.	Description	Remark
34	4	1043101	050-034-600	Valve ball	PTFE
26	2	1043215	286-070-600	Diaphragm	PTFE
43	2	1043245	360-086-360	Seal, diaphragm	Buna-N [®]
32	8	1043240	720-032-600	Valve seal	PTFE
40	4	1043237	720-033-600	Distributor seal	PTFE

11 Technical data

Technical data – Duodos PP / PVDF

Part no.	1010793	1010797
Pump type	Duodos 10 PP	Duodos 10 PVDF
Capacity (max.)	900 l/h	900 l/h
Back pressure (max.)	70 m water column	70 m water column
Feed rate/stroke	0.04 I	0.04 l
Temperature of medium	5 65 °C	-13 93 °C
Viscosity of medium	max. 200 mPa·s	max. 200 mPa·s
Suction lift dry	0.5 m	0.5 m
Suction lift moist	5.0 m	5.0 m
Operating noise	Maximum 88 dB ± 3 dB	Maximum 88 dB ± 3 dB
Suction connector	"1/2"" NPT outside	"1/2"" NPT outside
	1/4"" NPT inside"	1/4"" NPT inside"
Discharge connector	"1/2"" NPT outside	"1/2"" NPT outside
	1/4"" NPT inside"	1/4"" NPT inside"
Compressed air connec- tion	1/4" NPT inside	1/4" NPT inside
Air consumption	0.5 11 Nm³/h	0.511 Nm³/h
Max. air pressure	7 bar	7 bar
Minimum air pressure approx.	1 bar	1 bar
Pumping housing	PP	PVDF
Diaphragm	Santoprene®	PTFE
Valve balls	Santoprene®	PTFE
Valve seats	PP	PVDF
Seals	PTFE	PTFE
Pump housing	Polypropylene, glass fibre-rein- forced	Polypropylene, glass fibre-reinforced
Assembly bracket	PP	PVDF
Weight	2 kg	2.5 kg
Dimensions L x W x H	178 x 140 x 198 mm	178 x 140 x 198 mm

Operating temperatures

Material	Min. op. temperature	Max. op. temperature
Santoprene®	-23 °C	100 °C
Thermoplastic elastomers produced in the injection r high durability. Excellent abrasion hardness.	noulding process without a	mesh layer. Flexible with
PTFE	-37 °C	100 °C
Chemically inactive and effectively impermeable. On	ly a very few chemicals are	know to react with Teflon [®] .
PVDF	-13 °C	93 °C
Polypropylene	5 °C	65 °C

Repair tools

Tool	Size	Duodos 10
Spanner 3/8"	9.52 mm	Х
Spanner 7/16"	11.11 mm	Х
Spanner 1/2"	12.7 mm	Х
Screw driver 7 mm	7.00 mm	Х

12 Declaration of Conformity

EC Declaration	- Original - of Conformity for Machinery
We, F	ProMinent Dosiertechnik GmbH m Schuhmachergewann 5 - 11 D - 69123 Heidelberg
hereby declare that the product iden requirements of the EC Directive, by placed on the market by us. This declaration is no longer applicab	tified below conforms to the basic health and safety virtue of its design and construction, and in the configuration le if changes are made to the product without our authorisation.
Product description:	Pneumatic double diaphragm pump
Product type:	Duodos
Serial no.:	see type plate on the unit
Applicable EC Directives:	EC Machinery Directive (2006/42/EC)
Applied harmonised standards, especially:	EN ISO 12100 (2010), EN 809
Technical documentation was compiled by the authorised representative for documentation:	Dr. Johannes Hartfiel Im Schuhmachergewann 5 - 11 D 69123 Heidelberg
Date / Manufacturer signature:	01/03/2012
Name / position of the signatory:	Joachim Schall, Manager Innovation and Technology

Fig. 8: Declaration of Conformity

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