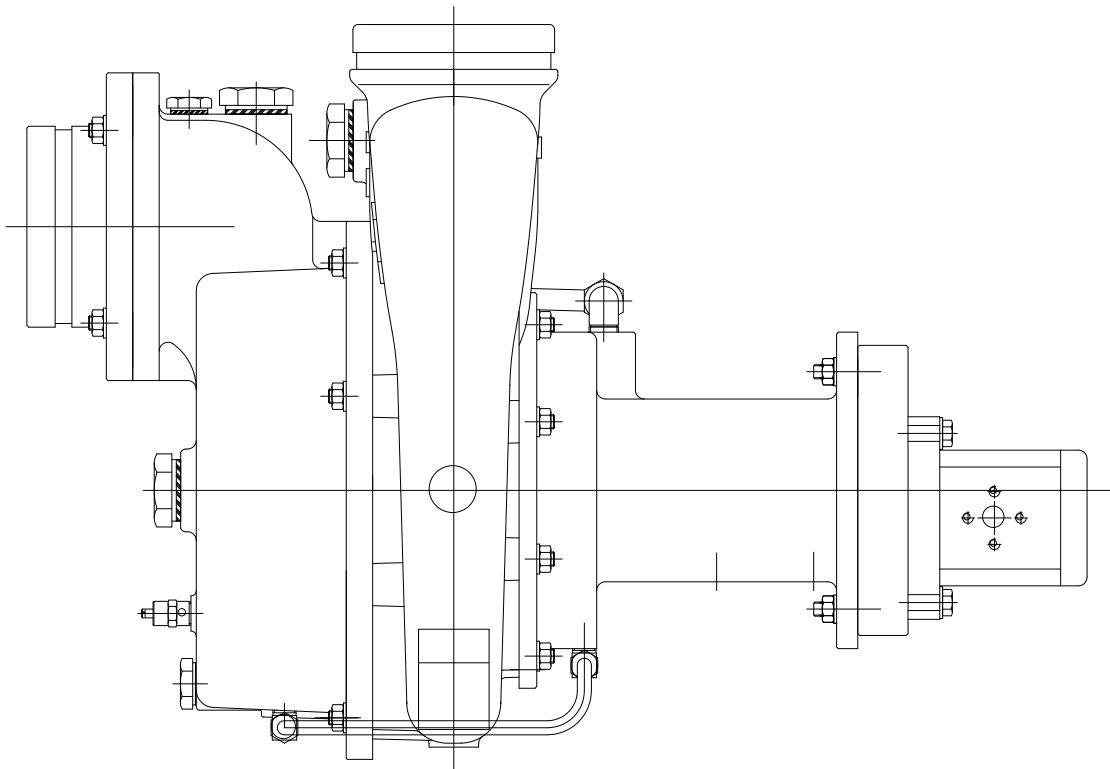


## OPERATION AND MAINTENANCE INSTRUCTION

### DESMI self-priming centrifugal pump

SP-D3/B03



### DESMI PUMPING TECHNOLOGY A/S

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## 1. PRODUCT DESCRIPTION

This operation and maintenance instruction applies to the SP-D3 pump with hydraulic motor.

DESMI SP-D3 is a single-stage self-priming centrifugal pump with stainless steel shaft and mechanical shaft seal. To ensure quick priming a liquid ring pump is placed behind the main impeller in the shaft seal cover. The pump is suitable for pumping liquids with temperatures between 0 and 80°C. Max. number of revolutions: 3600 RPM.

The pump has horizontal inlet and vertical outlet at the top. The back of the impeller is equipped with relief blades to reduce the load on the bearings. Relief holes in the impeller ensure circulation of liquid for the shaft seal and prevent overheating of the shaft seal during normal operation.

### 1.1 DELIVERY

- Check on delivery that the shipment is complete and undamaged.
- Defects and damages, if any, are to be reported to the carrier and the supplier immediately in order that a claim can be advanced.

## 2. TECHNICAL DATA

The pump is manufactured in a material combination appearing from the type number on the nameplate. See below.

### 2.1 EXPLANATION OF THE TYPE NUMBER

All the SP-D3 pumps are provided with a nameplate. The type number indicated on the nameplate is built up as follows:

SP-D3/B03

where

SP = Super Primer  
D = Pressure branch diameter 3"  
3 = Impeller diameter 175 mm  
B = Pump casing, shaft seal cover and impeller in aluminium  
03 = With hydraulic motor

Any use of the pump is to be evaluated on the basis of the materials used in the pump. In case of doubt, contact the supplier.

### 2.2 TECHNICAL DESCRIPTION

The capacity of the pump appears from the nameplate on the pump. If the pump has been delivered without motor, the pump capacity is to be indicated on the plate when mounting the motor.

## 3. INSTALLATION

### 3.1 MOUNTING/FASTENING

The pump should be mounted and fastened on a solid base plate with a flat and horizontal surface to avoid distortions.



For installations pumping hot or very cold liquids, the operator must be aware that it is dangerous to touch the pump surface and, consequently, he must take the necessary safety precautions.

## 4. TRANSPORT/ STORAGE

The weight of the pump (dry) without motor is 25 kg. The pump is to be stored in a dry area.

Before shipment the pump has to be properly secured on pallets or the like.

## 5. DISMANTLING

### 5.1 DISMANTLING THE HYDRAULIC MOTOR

Remove nuts (76) and pull out the mounting flange (84) with hydraulic motor (85) and coupling (82). Check the condition of the rubber bushings (51) and replace if any signs of wear should appear. If the hydraulic motor needs to be removed from the mounting flange remove the pointed screw (83) and pull off the coupling. In case of problems with the hydraulic motor please refer to the service manual for this unit.

### 5.2 ACCESS TO IMPELLER AND SHAFT SEAL

Remove pipes (31) and (38). Remove nuts (63), which hold the shaft seal cover to the pump casing, and pull the pump casing away from the shaft seal cover. Now the impeller and wear ring can be inspected.

### 5.3 DISMANTLING SHAFT SEAL

Remove nut (6). Pull off the impeller and the key (20). Remove Allen screws (40), which hold the cover (10) for the priming impeller and pull off the cover. Remove pointed screw (9) and pull off the priming impeller (9), the washer (52) and the key (21). Remove the pointed screws in the shaft seal and pull off the shaft seal.

### 5.4 DISMANTLING SEAT

Remove lock ring (50) and press out the shaft from the shaft seal cover. Press out the seat and the V-ring (24) from behind the shaft seal cover.

### 5.5 DISMANTLING SHAFT WITH BEARINGS

If the bearings are worn down or noisy, arrange the shaft with bearings in a hydraulic press and press the shaft out of the inner bearing (13). Remove the lock ring (15) and press the shaft out of the outer bearing (14). Once a bearing has been removed it should not be remounted but replaced with a new one. This is due to the fact that the force applied in pressing the shaft out of the bearing will most likely have damaged the bearing.

## 5.6 INSPECTION

When the pump has been dismantled, check the following parts for wear and damage:

- Sealing ring/impeller: Max. clearance 0.4-0.5 mm measured in radius.
- Shaft seal/shaft seal cover: Check the seat for flatness and cracks.  
Check the rubber parts for elasticity.
- Bearings: Replace in case of wear and noise.

## 6. ASSEMBLING

### 6.1 FITTING SEALING RING IN PUMP CASING

When fitted, the sealing ring (8) is to bear against the shoulder of the pump casing.

### 6.2 FITTING SHAFT WITH BEARINGS

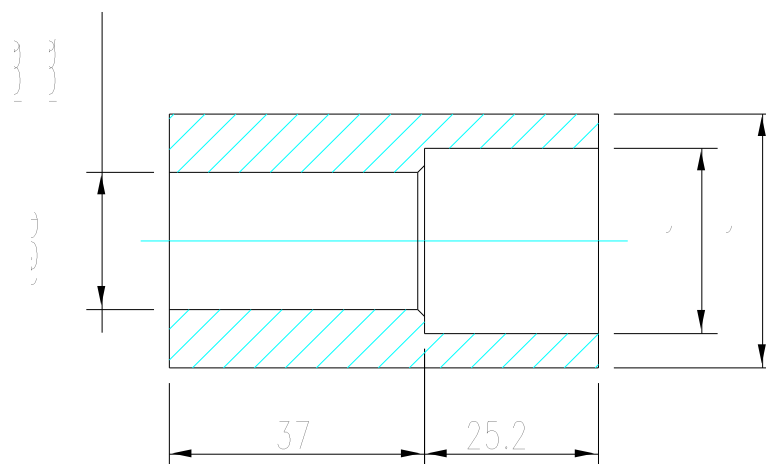
Place the spring washer (45), and O-rings (48) and (49) in the shaft seal cover. Lead shaft with bearings into the shaft seal cover and mount lock ring (50).

### 6.3 FITTING V-RING

Lead the V-ring (24) over the shaft until it touches the shaft seal cover and then further 1-1.5 mm into the shaft seal cover.

### 6.4 FITTING SHAFT SEAL

Before fitting the seat with O-ring, clean the recess in the shaft seal cover. Fit the seat without scratching the lapped surface and check that all parts are correctly imbedded. Clean the lapped surface with alcohol. If it is necessary to use tools for assembling, protect the sliding surface of the seat to prevent it from being scratched or cut. Clean the sliding surface of the rotating part of the shaft seal with alcohol and lead it over the shaft. Secure the pointed screws with Loctite 243 or Omnifit 40M and tighten. The use of a fitting bush like the one shown below is recommended to achieve the correct position of the shaft seal. Using this bush and a M16 nut and washer the shaft seal is secured and correctly aligned before mounting the pointed screws. After start, check by viewing the leak hole that there are no leaks.



## 6.5 FITTING PRIMING UNIT

Mount plate for priming unit (25) with O-ring (32). Notice the correct position of the plate over the pilot pin in the shaft seal cover. Mount the key (21) and the priming impeller (9). Secure the pointed screw (9) with Loctite 243 or Omnifit 40M and tighten it lightly while holding the priming impeller against the plate (25). Mount cover for the priming impeller (8) with Allen screws (40). The Allen screws are to be secured with Loctite 243 or Omnifit 40M and should only be tightened lightly due to the material.

## 6.6 FITTING IMPELLER

Mount washer (52) and key (20) on the shaft. Mount impeller (7), washer (18), lock washer (17) and lock nut (16). Tighten the lock nut with a torque wrench to 50 Nm (=5 kgm).

## 6.7 FITTING BEARING HOUSING AND SHAFT SEAL COVER

Place the O-ring (30) in the shaft seal cover with a little grease. Lead the pump casing (1) into place and fasten. Note that the drain hole for the shaft seal faces downwards. Mount pipes (31) and (38).

## 6.8 SHAFT

When the pump has been assembled, check that the shaft rotates freely.

## 6.9 FITTING THE HYDRAULIC MOTOR

Fit the mounting flange (84) on the hydraulic motor. Mount the coupling (82) against the shoulder of the hydraulic motor shaft. Secure the pointed screw with Loctite 243 or Omnifit 40M and tighten it. Fit the coupling screws (56) with rubber bushings (56) and secure the thread with Loctite 243 or Omnifit 40M and screw them in the coupling (82). Avoid contact between the rubber bushings and the securing fluid. Fit the mounting flange (84) with hydraulic motor (85) and coupling (82) on the shaft seal cover (2).

## 7. FROST PROTECTION

Pumps containing liquids likely to freeze, which are not in operation during frost periods, are to be drained to avoid frost damage. Remove the plug (35) at the bottom to empty the pump. Alternatively, it is possible to use anti-freeze liquids in normal constructions.

## 8. DISMANTLING



Before dismantling the pump make sure that it has stopped. Empty the pump of liquid before it is dismantled from the piping system. If the pump has been pumping dangerous liquids you are to be aware of this and take the necessary safety precautions. If the pump has been pumping hot liquids, take great care that it is drained before it is removed from the piping system.

## 9. START-UP



A self-priming centrifugal pump will not function until the pump casing has been filled with liquid.

The liquid also serves as coolant for the shaft seal. In order to protect the shaft seal the pump must not run dry.

WARNING
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For safety reasons the pump is only allowed to operate against closed discharge valve for a short time (max. 5 minutes and at a max. temperature of 80°C for standard pumps). Otherwise there is a risk of damage to the pump and, at worst, of a steam explosion. If the pump is not monitored, the installation of a safety device is recommended. To protect the pump against unintentional operation it is equipped with a relief valve, which opens at a pre-set pressure.

Be careful: When the valve opens, the escaping liquid will be hot.

The relief valve must in **no** circumstances be removed or re-adjusted !

As regards maintenance of the relief valve - see paragraph 11.

## 9.1 STARTING

Before starting the pump check that

- the shaft rotates freely without jarring sounds
- the pump casing is filled with liquid

Start the pump for a moment to check the direction of rotation. If the direction is correct (i.e. in the direction of the arrow), the pump may be started.

## 10. SYSTEM BALANCING

It is often difficult to calculate a manometric delivery head in advance. It is, however, decisively important to the quantity of liquid delivered.

A considerably smaller delivery head than expected will increase the quantity of liquid delivered, causing increased power consumption and perhaps cavitation in pump and piping. In the pump the impeller may show signs of heavy erosion caused by cavitation (corrosion) which may at times render an impeller unfit for use in a very short time. Not unusually do similar erosions occur in pipe bends and valves elsewhere in the piping system.

Therefore, after start-up, it is necessary to check either the quantity of liquid delivered or the power consumption of the pump e.g. by measuring the current intensity of the connected motor. Together with a reading of the differential pressure the quantity of water delivered can be determined against the characteristics of the pump.

Should the pump not function as intended, please proceed according to the faultfinding list. Bear in mind, though, that the pump was carefully checked and tested at the factory and that the majority of faults stem from the piping system.

FAULT	CAUSE	REMEDY
The pump does not prime	<ol style="list-style-type: none"> <li>1. The pump is not filled with liquid.</li> <li>2. Leaking non-return valve in pump.</li> <li>3. Wrong direction of rotation.</li> <li>4. Air is drawn in because of too little liquid or leaking suction line.</li> <li>5. Liquid lock in outlet line.</li> <li>6. Temperature of liquid too high.</li> <li>7. Air cannot escape on pressure side.</li> </ol>	<p>Fill pump casing with liquid. Remove foreign body in valve/Remove any coating on mating faces. Change direction of rotation. Lower suction pipe/ Tighten suction line</p> <p>Change the pressure line so that the air can pass out freely. Replace liquid in pump casing/Wrong dimensioning/Contact DESMI. Ventilate the system</p>
The pump has no or too low capacity	<ol style="list-style-type: none"> <li>1. Wrong direction of rotation.</li> <li>2. Piping system choked</li> <li>3. The pump is choked</li> <li>4. Suction line leaks. Pump takes air.</li> <li>5. Suction lift too high</li> <li>6. Pump and piping system wrongly dimensioned.</li> </ol>	<p>Change direction of rotation to clockwise when viewed from shaft end (the direction of the arrow). Clean or replace Clean the pump Find the leakage/Repair the fault, non-return valve not submerged. Check data sheet Q/H curve and NPSH or contact DESMI As 5</p>
The pump uses too much power	<ol style="list-style-type: none"> <li>1. Counter-pressure too low.</li> <li>2. The liquid is heavier than water.</li> <li>3. Foreign body in pump</li> <li>4. Electric motor is running on 2 phases.</li> </ol>	<p>Insert orifice plate or check valve/Contact DESMI. Contact DESMI</p> <p>Dismantle the pump, remove the cause. Check fuses, cable connection, and cable.</p>
The pump makes noise	<ol style="list-style-type: none"> <li>1. Cavitation in pump</li> </ol>	<p>Suction lift too high/ Suction line wrongly dimensioned/Liquid temperature too high.</p>



## 11. INSPECTION AND MAINTENANCE

Inspect the shaft seal for leaks at regular intervals.

Activate the relief valve at regular intervals in order to check the function. If the valve is choked, replace or clean it, if possible.

- Before inspection of a pump without guard check that the pump cannot be started unintentionally.
- The system is to be without pressure and drained of liquid.
- The repairman must be familiar with the type of liquid, which has been pumped, as well as the safety measures he has to take when handling the liquid.

### 11.1 DRAINING THE PUMP

When the piping system has been drained, note that there is still liquid in the pump. Remove the liquid by dismantling the pipe plug (35) at the bottom of the pump.

### 11.2 BEARINGS

The pump is equipped with ball bearings with a nominal life of 25,000 working hours. The bearings are lubricated for life and require no attention but are to be replaced in case of noise or bearing wear.

## 12. REPAIRS

### 12.1 ORDERING SPARE PARTS

When ordering spare parts please always state pump type and pump No. (appears on the nameplate of the pump). See also spare parts drawing with item Nos.

## 13. OPERATING DATA

Max. working pressure is 7 bar, this being the sum of the suction pressure and the pump head (differential pressure).

(10.2 mWC = 1 bar)

The above-mentioned max. working pressure is **NOT** valid for pumps approved by a classification society. Pumps approved by classification societies have been pressure tested according to the requirements of these societies, i.e. a test pressure of 1.5 x the permissible working pressure. The test pressure is stated in the test certificate and stamped into the discharge flange of the pump.

## 14. EU DECLARATION OF CONFORMITY

DESMI PUMPING TECHNOLOGY A/S, hereby declare that our pumps of the type SP-D3 are manufactured in conformity with the following essential safety and health requirements in the COUNCIL DIRECTIVE 2006/42/EC on machines, Annex 1.

The following harmonized standards have been used:

EN/ISO 13857:2008	Safety of machinery. Safety distances to prevent danger zones being reached by the upper limbs
EN 809:1998 + A1:2009	Pumps and pump units for liquids – Common safety requirements
EN12162:2001+A1:2009	Liquid pumps – Safety requirements – Procedure for hydrostatic testing
EN 60204-1:2006/A1:2009	Safety of machinery – Electrical equipment of machines (item 4, General requirements)

Pumps delivered by us connected with prime movers are CE-marked and comply with the above requirements.

Pumps delivered by us without prime movers (as partly completed machinery) must only be used when the prime mover and the connection between prime mover and pump comply with the above requirements.

Nørresundby, Marts 05 2019



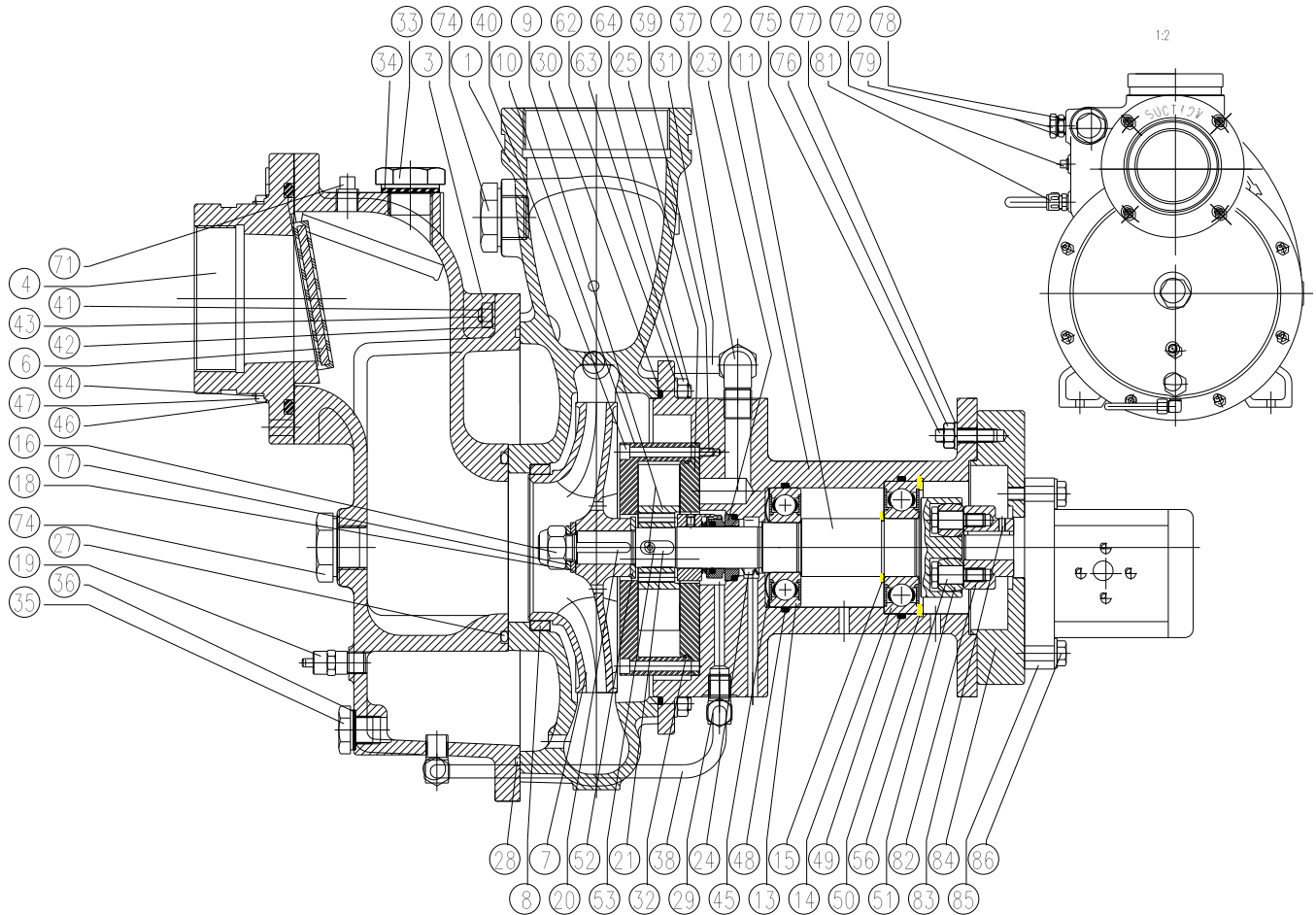
Henrik Mørkholt Sørensen  
Managing Director

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## 15. INFORMATION RELEVANT FOR DISASSEMBLY OR DISPOSAL AT END-OF-LIFE

No damage materials are used in DESMI pumps – please refer to DESMI Green Passport (can be sent on request – contact a DESMI sales office) – i.e. common recycling companies can handle the disposal at end-of-life. Alternatively the pump and motor can be returned to DESMI at end-of-life for safe recycling.

## 16. ASSEMBLY DRAWING



## 17. SPARE PARTS LISTS

1 Pump casing	28 O-ring	51 Coupling rubber bushing
2 Shaft seal cover	29 Male stud elbow	52 Washer
3 Suction nozzle	30 O-ring	53 Thread insert
4 Inlet flange for Victaulic	31 Pipe	56 Coupling screw
6 Check valve	32 O-ring	62 Washer
7 Impeller	33 Plug	63 Nut
8 Wear ring	34 Packing washer	64 Stud
9 Priming impeller/pointed screw	35 Plug	71 Plug
10 Cover for priming impeller	36 Packing washer	72 Plug
11 Shaft	37 Male stud elbow	74 Plug
13 Ball bearing	38 Pipe	75 Stud
14 Ball bearing	39 Pilot pin	76 Nut
15 Lock ring	40 Allen screw	77 Washer
16 Lock nut	41 Stud	78 Nipple
17 Lock washer	42 Washer	79 Plug
18 Washer	43 Nut	81 Nipple
19 Pressure relief valve	44 Stud	82 Coupling
20 Key	45 Spring washer	83 Pointed screw
21 Key	46 Washer	84 Mounting flange
23 Shaft seal	47 Nut	85 Hydraulic motor
24 V-ring	48 O-ring	86 Allen screw
25 Plate for priming impeller	49 O-ring	
27 O-ring	50 Lock ring	

## 18. DIMENSIONAL SKETCH

