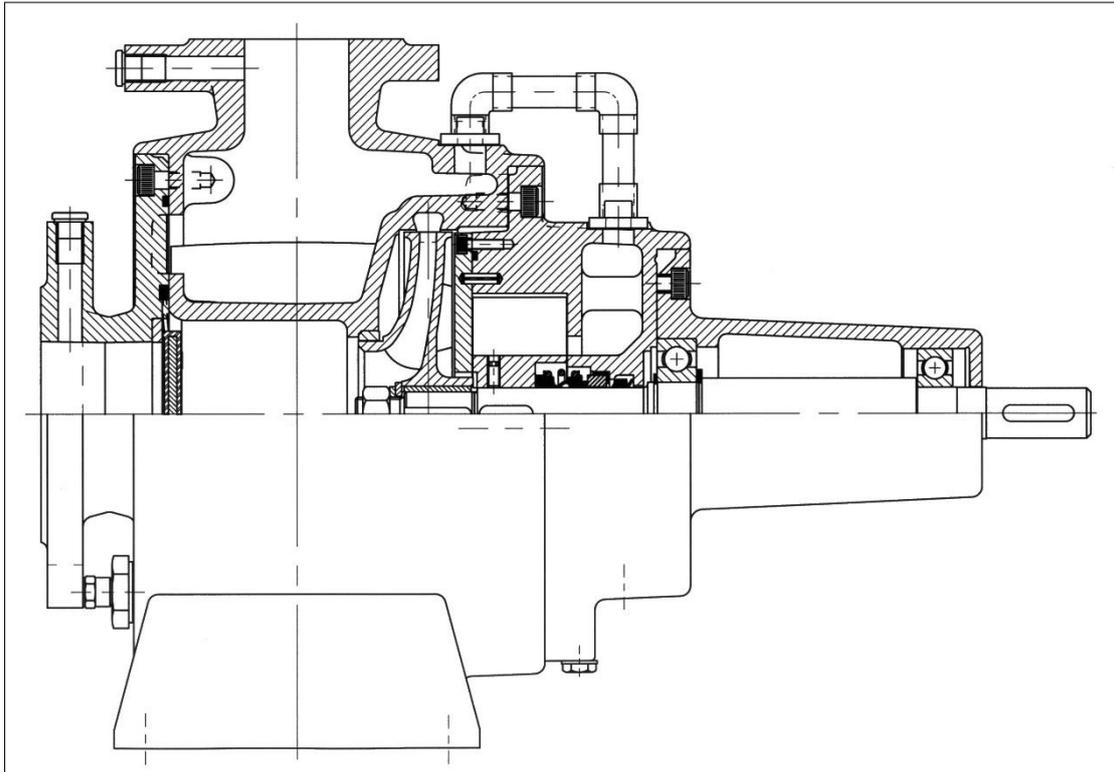


## DESMI self-priming centrifugal pump Modular S-N Super Bilge Pump



**DESMI Pumping Technology A/S**  
Tagholm 1 – DK-9400 Nørresundby – Denmark

Tel.: +45 96 32 81 11  
Fax: +45 98 17 54 99  
E-mail: [desmi@desmi.com](mailto:desmi@desmi.com)  
Internet: [www.desmi.com](http://www.desmi.com)

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## 1. PRODUCT DESCRIPTION

These operation and maintenance instructions apply to the DESMI Modular S-N super bilge pump. The pump is available in three sizes, DN50 DN70 and DN80 on the pressure flange. The suction flange is bigger than the pressure flange.

The Modular S super bilge pump is a single-stage self-priming centrifugal pump with horizontal inlet on the centre line and vertical outlet at the top. The pump is equipped with stainless steel shaft and mechanical shaft seal.

The pump is suitable for the pumping of clean and polluted liquids with temperatures between 0 and 80°C. Max. number of revolutions: 3600 RPM.

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.

The pump is particularly suitable for bilge pumping.

The pump can further be used for the pumping of water in connection with e.g. cooling of diesel engines, as ballast pumps, pumps for irrigation, washing plants, air conditioning, cooling systems, and sanitary systems etc. Furthermore, in the majority of cases where the transport of liquid is required within industry.

The Modular S-N super bilge pump is a quality product manufactured in accordance with ISO 9001.

### 1.1 DELIVERY

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

## 2. TECHNICAL DATA

### 2.1 NAME PLATE

Manufacturer:

DESMI

DK-9400 Nørresundby

Phone +45 96328111

Fax +45 98175499

e-mail: [desmi@desmi.com](mailto:desmi@desmi.com)

<http://www.desmi.com>

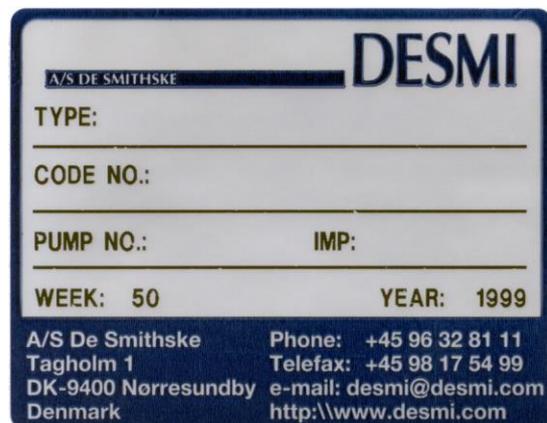
TYPE: Pump type number

CODE NO.: Pump item No.

PUMP NO.: Pump No.

IMP.: Impeller diameter

WEEK/YEAR: Production week and year



The pumps are manufactured in various material combinations which appear from the type number on the name plate.

## 2.2 EXPLANATION OF THE TYPE NUMBER

The super bilge pump is provided with a name plate. The type number indicated on the name plate is built up as follows:

S-XXX-YYY-ZZZN/M11-R

XXX,YYY,ZZZ : Pump size where

XXX=Suction branch diameter, YYY=Pressure branch diameter, ZZZ =Standard impeller diameter.

M : The material combination of the pump.

R : The assembly combination of the pump.

M may be the following:

A : Standard. Casing: GG20. Impeller: NiAlBz.

C : Pump in all cast iron.

D : Casing: Rg5, Impeller: NiAlBz.

E : Casing and shaft seal cover: NiAlBz and bronze alloy. Impeller and sealing rings: NiAlBz.

U : Nonmagnetic

The pumps can be delivered in other material combinations which are agreed with the supplier.

R may be the following:

01 : With electromagnetic clutch.

03 : With hydraulic motor.

04 : V-belt pulley and disengaging clutch.

07 : On base plate with petrol or diesel engine, or with electric motor.

08 : Mounted on trolley with petrol or diesel engine or with electric motor.

09 : With bare shaft end.

10 : Special-tailored according to task.

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.

Pumps in material combinations A and C are primarily used for fresh water.

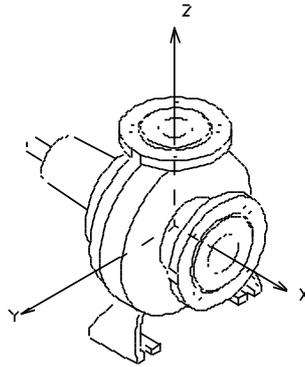
Pumps in material combination D are primarily used for seawater.

## 2.3 TECHNICAL DESCRIPTION

The noise level of the pump depends on the motor type supplied, as the noise from the pump can be calculated as the noise level of the motor + 2dB(A).

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

The permissible loads on the flanges appear from the following table.



Pump	F <sub>v</sub> [N]	F <sub>h</sub> [N]	F [N]	M <sub>t</sub> [Nm]
S70-50-175N/A and D11	1350	1000	1700	200
S80-70-175N/A and D11	1450	1050	1800	270
S100-80-175N/A and D11	1800	1250	2200	470

In connection with the permissible loads on the flanges the following is to be observed:

$$\frac{2}{3} \cdot F_{Zout} + F_{Zin} \leq F_v$$

$$\sqrt{F_{Xin}^2 + F_{Yin}^2} + \sqrt{F_{Xout}^2 + F_{Yout}^2} \leq F_h$$

$$\sqrt{M_{Xin}^2 + M_{Yin}^2 + M_{Zin}^2} + \sqrt{M_{Xout}^2 + M_{Yout}^2 + M_{Zout}^2} \leq M_t$$

$$\left( \frac{\sum F_{calc}}{\sum F} \right)^2 + \left( \frac{\sum M_{calc}}{\sum M_t} \right)^2 < 2$$

where index "in" is suction branch, "out" is pressure branch, and "calc" are the values calculated by the user.

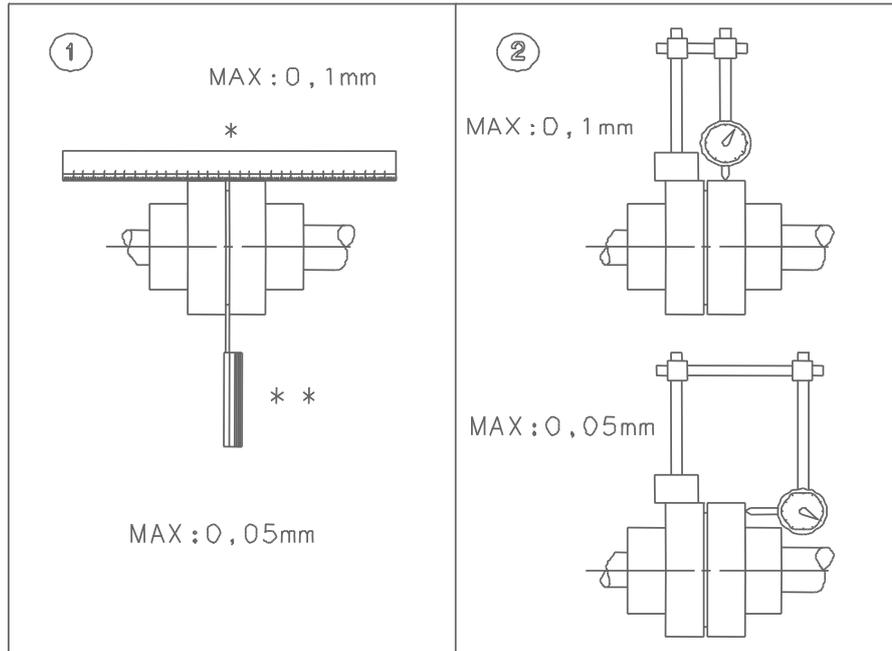
### 3. INSTALLATION

#### 3.1 MOUNTING/FASTENING

The pump should be mounted and fastened on a solid base plate with a flat and horizontal surface to avoid distortion. The pump must be mounted in such a way that the shaft center line is horizontal.

The max. permissible loads on the flanges stated in paragraph 2.3 are to be observed.

When mounting a V-belt pulley on the pump a bore H7 is recommended. To facilitate the mounting the hub in the V-belt pulley may be heated to about 100°C after which the V-belt pulley is easily lead over the shaft towards the shoulder. Alternatively, the V-belt pulley may be mounted with a TAPER LOCK bush.



dimensioning the V-belt pulley it is important to follow the rules of the DESMI nomograms for the pump size in question - contact DESMI.

Be careful when fitting the suction line to the pump so that it is absolutely tight, as even small leakages may impede the priming. When pumping polluted liquids a strainer is necessary. The strainer must be equipped with a sieve, the passage area of which is to be 3 x the area of the suction pipe. The mesh size is to be 1-3 mm smaller than the impeller gap of the pump in question. In order to secure priming of the pump the pressure pipe is to be arranged so that water locks in the pipe are avoided.

If the pump is to be driven by a motor via a flexible coupling, motor and pump are to be placed on a common base plate. The following should be observed:

- Avoid distortion of the base plate.
- Avoid distortion in the piping system.
- Check that pump and motor are aligned correctly.

Two proposals for alignment are indicated above. The deviations mentioned cover a complete revolution of the coupling. The distance between the coupling halves is to be between 2 and 4 mm.



At 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 measures.

When connecting the pump and a prime mover the power transmission is to be equipped with a guard in accordance with the provisions of the COUNCIL DIRECTIVE.

## 3.2 WIRING



Wiring to be carried out by authorised skilled workmen according to the rules and regulations in force.

## 4. TRANSPORT/ STORAGE

The weights of the pumps (in A11-09 combination) are stated in the following table, and the pumps are to be lifted as shown.

Pump	Weight [kg]
S70-50-175N/A11-09	52
S80-70-175N/A11-09	63
S100-80-175N/A11-02	98

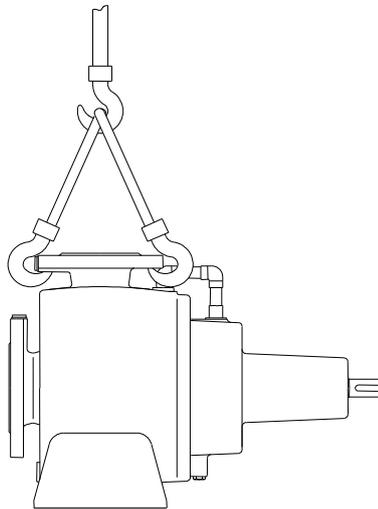
The pump is to be stored in a dry area.

Before shipment the pump is to be fastened securely on pallets or the like.



The pump is to be lifted as

shown here:



The lifting straps must not bear against sharp

edges and corners.

## 5. DISMANTLING

### 5.1 ACCESS TO IMPELLER

Remove Allen screws (44), which hold the U-pipe with flanges (45) to the pump casing and shaft seal cover. Remove Allen screws (22), which hold the shaft seal cover (20) to the pump casing, and pull the bearing housing (18) to remove the complete bearing housing with impeller, bearings, and shaft.

### 5.2 DISMANTLING IMPELLER AND STAR WHEEL

Remove nut (6) and washers (7-8). Pull off the impeller (5). Remove Allen screws (35), which hold the priming plate to the shaft seal cover. Remove the priming plate (33), make sure not to damage the O-ring (34). Unfasten pointed screw (43) and dismantle the star wheel (31).

### 5.3 DISMANTLING SHAFT SEAL

Before dismantling shaft seal (10), remove the sunk key (32). Remove Allen screws (19) which hold the bearing housing to the shaft seal cover. Pull shaft seal cover and bearing housing apart, by which shaft seal and water deflector are pulled off the shaft.

## 5.4 DISMANTLING SEAT

Press out the seat from behind the shaft seal.

## 5.5 DISMANTLING SHAFT WITH BEARINGS

Before dismantling the shaft (17) with bearings (13-15), remove the sunk key (16). The shaft can now be pulled out of the bearing housing allowing inspection of the bearings.

## 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 and scratches.
- Bearing: Replace in case of wear and noise.
- Star wheel: Check the priming plate and shaft seal cover for marks.  
Distance between shaft seal cover, star wheel, and the priming plate:  
approx. 0.25 mm.
- Non-return flap: Check for cracks and hardness

## 6. ASSEMBLING

### 6.1 FITTING SEALING RING IN PUMP CASING

When fitted, the sealing ring (4) is to bear against the shoulder of the pump casing.

### 6.2 FITTING SHAFT WITH BEARINGS

Lead shaft with bearings into the bearing housing. Fit sunk key (16).

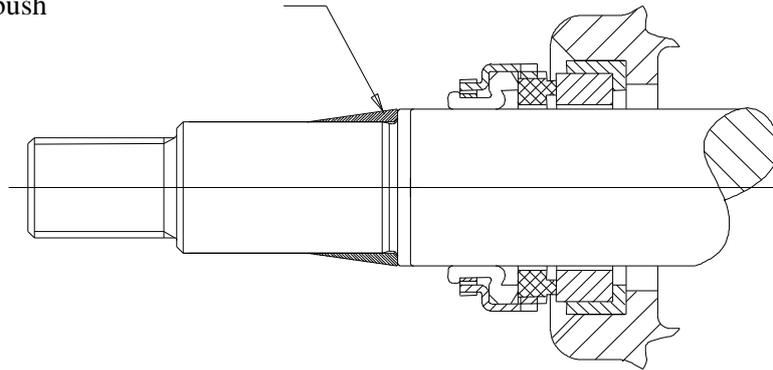
### 6.3 FITTING WATER DEFLECTOR

Assemble the bearing housing and the shaft seal cover. Lead the water deflector 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, clean the recess in the shaft seal cover. When fitting the seat, remove the protective coating, if any, without scratching the lapped surface. Dip the outer rubber ring of the seat into soapy water. Now press the seat into place with the fingers and check that all parts are correctly imbedded. If it is necessary to use tools for assembling, then protect the sliding surface of the seat to prevent it from being scratched or cut. Lubricate the inner diameter of the slide ring rubber bellows with soapy water and push it over the shaft. The use of a fitting bush as shown on the below assembly drawing is recommended to avoid that the rubber bellows is cut. Push the slide ring over the shaft with the hand. If the rubber bellows is tight, use a fitting tool and take care that the slide ring is not damaged.

Fitting bush



If the carbon ring is not fixed, it is important to check that it is fitted correctly, i.e. the chamfered/lapped side is to face the seat. The carbon ring can be held by a little grease. When using oil on the shaft, the bellows will settle and seat in about 15 minutes, and until then tightness should not be expected. After start, check by viewing the leak hole that there are no leaks.

## 6.5 FITTING STAR WHEEL

Fit the sunk key (32). Lead the star wheel over the shaft, check that the distance between star wheel and shaft seal cover is about 0.25 mm. Fasten the star wheel by means of the pointed screw (43) which **must** be secured by Loctite or similar. Fit the priming plate, make sure that the O-ring is placed correctly in the groove and that the guide pin locates in the hole. Check that the distance between star wheel and priming plate is about 0.25 mm.

## 6.6 FITTING IMPELLER

Fit the sunk key (9) in the shaft and lead the impeller towards the shoulder of the shaft. Take care that the ring at the end of the shaft seal spring locates in the recess of the impeller. Secure the impeller with a washer (8) and a nut (7).

## 6.7 FITTING BEARING HOUSING AND SHAFT SEAL COVER

Place the gasket (21) and the O-ring (40) between pump casing and shaft seal cover on the shaft seal cover where it can be held with a little silicone grease. Lead bearing housing with shaft seal cover into place and fasten. Finally fit the U-pipe on pump casing/shaft seal cover.

## 6.8 SHAFT

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

## 7. FROST PROTECTION

Pumps which are not in operation during frost periods are to be drained to avoid frost damage. Remove the plug in the inlet cover 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 measures. If the pump has been pumping hot liquids, take great care that it is drained before it is removed from the piping system. If cold or very hot liquids have been pumped, the operator must be aware that it is dangerous to touch the pump surface and he must, consequently, take the necessary safety measures.

## 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

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 preset 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 fault-finding 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</p> <p>Remove foreign body in valve/Remove any coating on mating faces Change direction of rotation</p> <p>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)</p> <p>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 (leak through the hole in the lower part of the shaft seal cover).

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 is 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 drain plug (75) in the inlet cover of the pump.

### 11.2 BEARINGS

The pump is equipped with ball bearings with a nominal life of 25,000 working hours when direct coupled to electric motor, whereas the nominal life with overhanging V-belt drive is about 10,000 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 name plate of the pump). See also spare parts drawing with item Nos.

## 13. OPERATING DATA

The following working pressures are allowed

PUMP	S70-50-175N/A-D11	S80-70-175N/A-D11	S100-80-175N/A-D11
Pressure [mWC]	70	70	70

(10.2 mWC = 1 bar)

The powers stated in the table below are the highest possible absorbed by the pump, whereas the min./max. values for flow and pressure indicate DESMI's recommended operating range for the pump with the biggest impeller.

Pump	Max. power [kW] 1450/1750/- 2950/3500 RPM	Min. flow [m <sup>3</sup> /h] 1450/1750/- 2950/3500 RPM	Max. flow [m <sup>3</sup> /h] 1450/1750/- 2950/3500 RPM	Min. pressure [mWC] 1450/1750/- 2950/3500 RPM	Max. pressure [mWC] 1450/1750/- 2950/3500 RPM
S70-50-175N/A-D11	1,8/2,2/7,0/11,0	8,0/10,0/17,5/20	20/24/45/53	5,6/8,4/19,0/27	9,2/13,5/38/53
S80-70-175N/A-D11	2,1/2,8/9,3/14,5	16,0/17,5/30/35	39/48/80/95	4,6/6,0/16,5/23	8,7/12,5/36/50
S100-80-175N/A-D11	2,6/3,8/13,5/22	30/35/60/70	70/85/150/170	4,6/6,2/15/24	8,3/12,2/34/48

## 14. EC DECLARATION OF CONFORMITY

DESMI PUMPING TECHNOLOGY A/S, hereby declare that our pumps of the type Modular S-N super bilge pump 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, March 05 2019



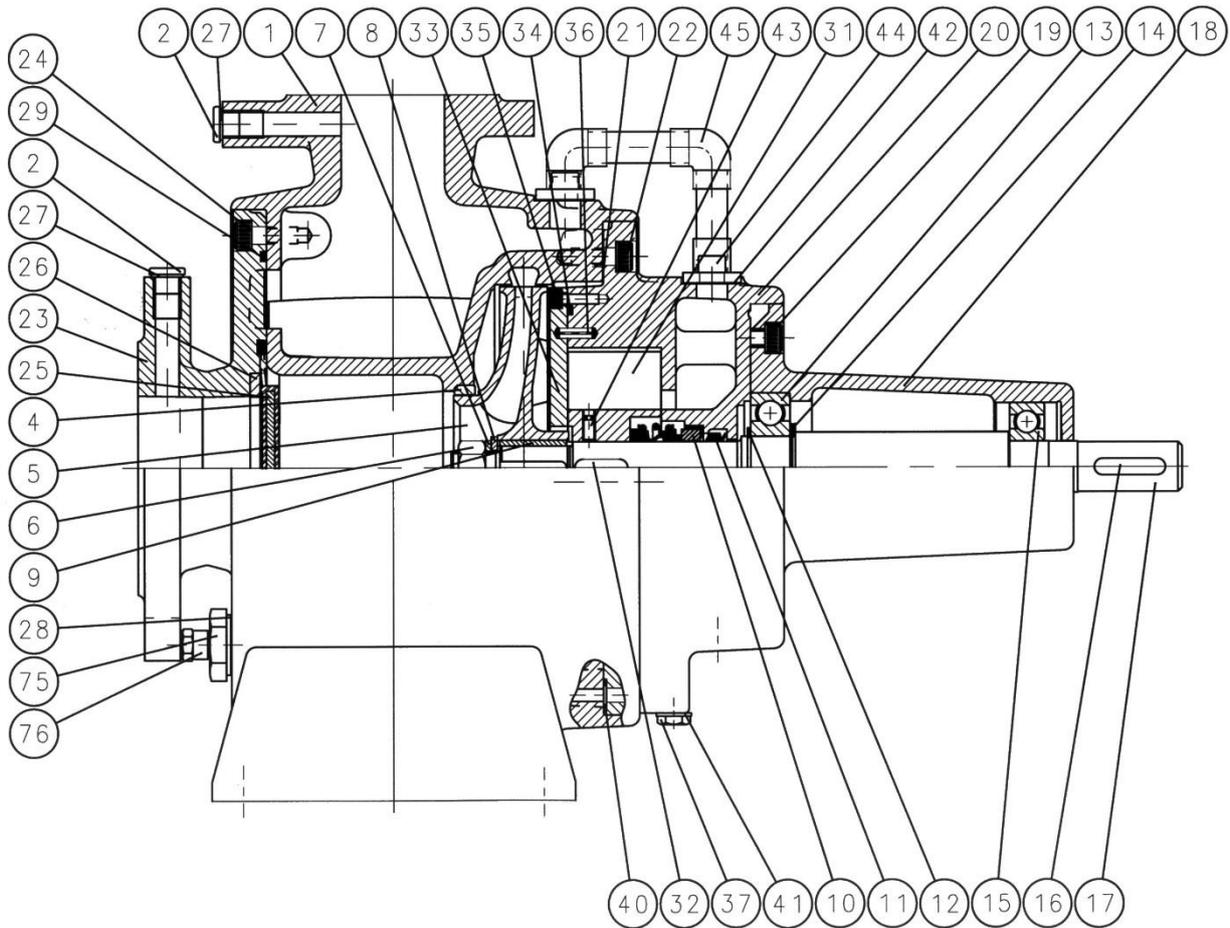
Henrik Mørkholt Sørensen  
Managing Director

DESMI Pumping Technology A/S  
Tagholm 1  
9400 Nørresundby

## 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.

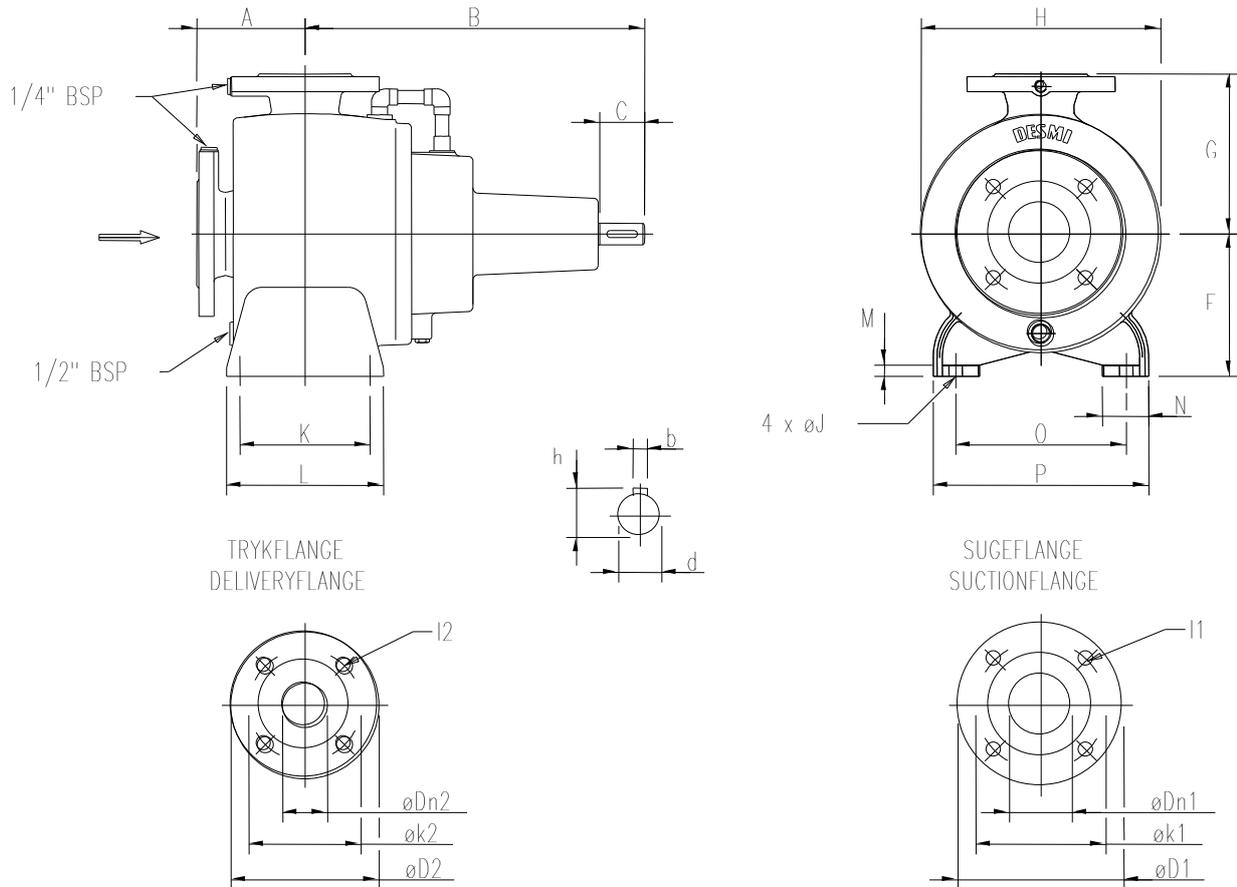
## 16. ASSEMBLY DRAWING



## 17. SPARE PARTS LIST

1 Pump casing	16 Sunk key	31 Star wheel
2 Pipe plug	17 Shaft	32 Sunk key
4 Sealing ring	18 Bearing housing	33 Priming plate
5 Impeller	19 Allen screw	34 O-ring
6 Nut	20 Shaft seal cover	35 Allen screw
7 Spring collar	21 Gasket	36 Tightening pin
8 Washer	22 Allen screw	37 Pipe plug
9 Sunk key	23 Suction piece	40 O-ring
10 Mech. shaft seal	24 Allen screw	41 Gasket
11 Water deflector	25 Non-return flap	42 Gasket
12 Ring lock	26 Contact ring	43 Pointed screw
13 Ball bearing	27 Gasket	44 Allen screw
14 Support disc	28 Gasket	45 U-pipe
15 Ball bearing	29 O-ring	75 Drain plug
		76 Relief valve

## 18. DIMENSIONAL SKETCH



Type	A	B	C	H	F	G	d	h	b	J	K	L	M	N
S70-50-175N/A-D11	125	380	50	270	160	180	24j6	27	8	15	145	175	10	55
S80-70-175N/A-D11	150,5	388	50	295	180	200	24j6	27	8	15	190	220	13	69
S100-80-175N/A-D11	175	412	50	344	200	240	24j6	27	8	15	220	270	18	69

Type	O	P	D1	k1	Dn1	I1	D2	k2	Dn2	I2
S70-50-175N/A-D11	190	250	185	145	70	4x18	165	125	50	4x18
S80-70-175N/A-D11	200	273	200	160	80	8x18	185	145	70	4x18
S100-80-175N/A-D11	230	320	228	180	100	8x18	220	160	80	8x18