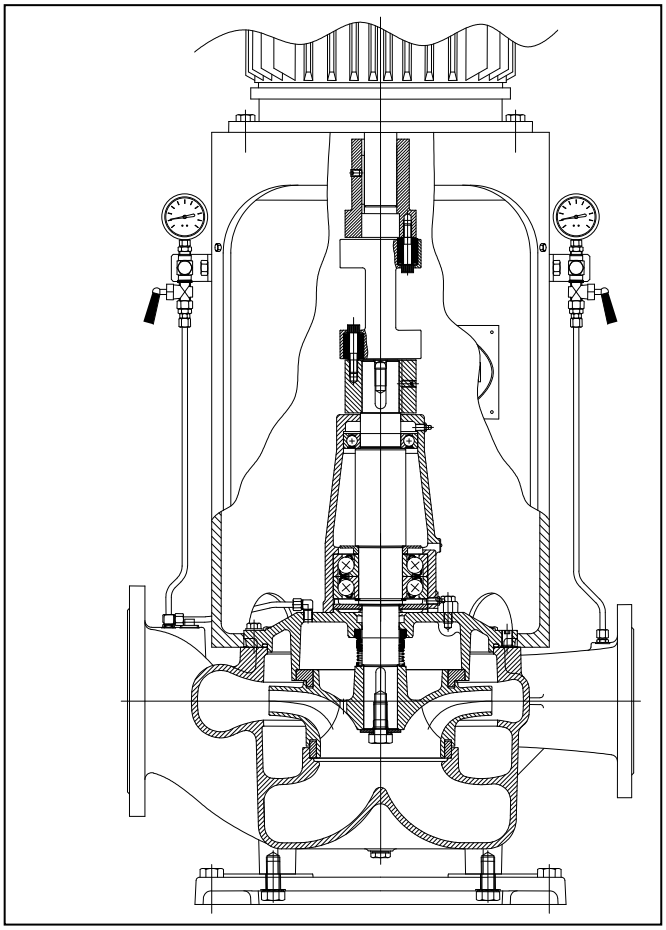
THE DESMI GROUP

DESMI

OPERATION AND MAINTENANCE INSTRUCTIONS

DESMI vertical "in-line" centrifugal pump

NSL Spacer



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Special pump No. ……

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1. PRODUCT DESCRIPTION

These operation and maintenance instructions apply to the DESMI NSL Spacer pump.

The pump is a single-stage vertical "in-line" centrifugal pump (i.e. horizontal inlet and outlet on the same line) equipped with stainless steel shaft, mechanical shaft seal, and closed impeller.

The pump is suitable for the pumping of liquids with temperatures up to 80°C. With special shaft seal up to 120°C. Max. working pressure and number of revolutions are indicated under Operating Data.

The pump is particularly suitable for the pumping of water in connection with cooling systems, cooling of diesel engines, as bilge pumps, ballast pumps, fire pumps, brine pumps, pumps for irrigation, fish farms, water works, district heating, salvage corps, army and navy, etc.

The descriptions in the operation and maintenance instructions are divided into two parts covering the groups **ø215/265** and **ø330/415/525**, as the designs of these two groups are different. The numbers refer to the standard impeller diameter of the pump. E.g.:

ø215/265: Pumps with ø215 or ø265 impellers:
The back of the impeller is equipped with relief blades to reduce the load on the bearings. The line through inlet and outlet is flush with the centre line of the shaft.

ø330/415/525: Pumps with ø330, ø415 or ø525 impellers:
The back and the front of the impeller are equipped with sealing rings and relief holes to reduce the load on the bearings. The pump inlet and outlet are tangential i.e. the line through inlet and outlet is offset in relation to the centre line of the shaft.

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

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

2.1 EXPLANATION OF THE TYPE NUMBER

All the NSL pumps are provided with a name plate. The type number indicated on the name plate is built up as follows:

NSLXXX-YYY-MR-Z

XXX: Pressure branch diameter, YYY: Standard impeller diameter
M: The material combination of the pump.
R: The assembly combination of the pump.
Z: Other variants

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M may be the following:
A: Casing and shaft seal cover : Cast iron + cast iron alloy. Impeller and sealing rings: Bronze
B: Casing and shaft seal cover : Cast iron + cast iron alloy. Impeller and sealing rings: Stainless.
C: All cast iron
D: Casing and shaft seal cover: Bronze. Impeller and sealing rings: NiAlBz
E: Special materials
U: Nonmagnetic material

The pumps can be delivered in other material combinations according to agreement with the supplier.

R may be the following:
02: Monobloc, with bearing in the pump
12: Monobloc, without bearing in the pump
13: Spacer, light bearing housing
14: Spacer, heavy bearing housing
15: Spacer, heavy bearing housing and heavy motor bracket (special motor bracket)
16: Compact spacer

Z may be the following:
i : PN16 flanges
j : PN25 flanges
k : Special flange
l : Other stuffing box
m : BS flanges
n : ANSI flanges
o : Shockproof design
p : Other design
q : JIS flanges

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.

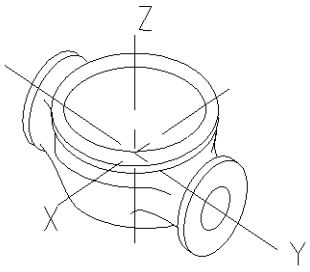
If the pumps are designed for special purposes the following is to be indicated:

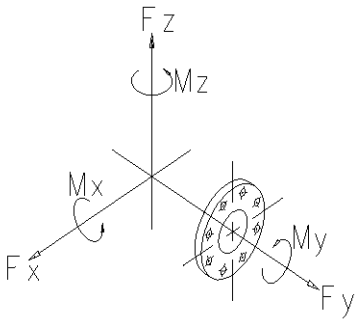
Pump No. :
Pump type :
Application :
Comment :

2.2 TECHNICAL DESCRIPTION

The noise level indicated is the airborne noise including the motor. The noise 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 noise level is for pumps with electric motors.

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 plate when mounting the motor.
The permissible loads on the flanges appear from the following table. The values apply to standard pumps in bronze (Rg5) and cast iron (GG20). As to pumps in SG iron (GGG40) the values are to be increased by factor 1.5.





Pump	Fy N	Fz N	Fx N	□F	My Nm	Mz Nm	Mx Nm	□ Mt
NSL80-215 NSL80-265 NSL80-330	800	950	850	1500	550	350	400	750
NSL100-215 NSL100-265 NSL100-330 NSL100-415	1000	1250	1150	2000	650	400	500	900
NSL125-215 NSL125-265 NSL125-330 NSL125-415	1250	1600	1430	2500	830	520	650	1160
NSL150-215 NSL150-265 NSL150-330 NSL150-415	1500	1900	1700	2950	1000	650	800	1400
NSL200-265 NSL200-330 NSL200-415 NSL200-525	2000	2520	2260	3920	1330	860	1060	1860
NSL250-265 NSL250-330 NSL250-415 NSL250-525	2500	3150	2820	4900	1770	1140	1400	2470
NSL300-415 NSL300-525	3000	3750	3350	5860	2750	1900	2200	4000

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

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

where index "calc" are the values calculated by the user.
At the same time none of the forces or moments may exceed the indicated figure multiplied by 1.4.

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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 max. permissible loads on the flanges stated in paragraph 2.2 are to be observed.

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.

3.2 WIRING

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

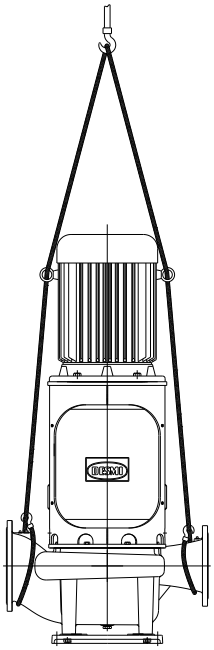
4. TRANSPORT/STORAGE

The weights of the pumps in A and D combination (without motor) are stated in the following table, and the pumps are to be lifted as shown below.

Pump	Weight in kg A / D-combination incl. base plate	Pump	Weight in kg A / D-combination incl. base plate
NSL80-215	186 / 201	NSL150-330	389 / 379
NSL80-265	195 / 212	NSL150-415	479 / 499
NSL80-330	301 / 306	NSL200-265	267 / 300
NSL100-215	197 / 214	NSL200-330	459 / 444
NSL100-265	196 / 213	NSL200-415	579 / 599
NSL100-330	311 / 317	NSL200-525	829 / 919
NSL100-415	404 / 424	NSL250-265	346 / 386
NSL125-215	208 / 223	NSL250-330	539 / 529
NSL125-265	214 / 235	NSL250-415	659 / 664
NSL125-330	326 / 332	NSL250-525	939 / 1054
NSL125-415	439 / 459	NSL300-415	759 / 759
NSL150-215	227 / 251	NSL300-525	1000 / 1135
NSL150-265	232 / 257		

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 in the following way:

The lifting straps must not bear against sharp edges and corners.

5. DISMANTLING

5.1 ACCESS TO IMPELLER

The numbers in brackets refer to the position numbers on the assembly drawing.

Dismantle guard (69).

ø215/265

Remove Allen screws (77) between coupling part motor (71) and spacer (72) and the screws (76), which hold the flexible coupling (74) to the coupling part pump (70). It is not necessary to remove the screws (also 76) which hold the flexible coupling to the spacer. After a vertical pull downwards take out the spacer (72). Loosen the pointed screw (73) and pull the coupling part pump (70) off the shaft. Dismantle the copper pipe (58). Remove Allen screws (22) which hold the shaft seal cover (20) to the pump casing. Remove the shaft seal cover from the pump casing by means of the pointed screws (86). The bearing housing with shaft and impeller can now be lifted up from the pump as a unit, and the impeller can be inspected.

ø330/415/525

Remove Allen screws (76) at each end of the coupling, and remove the spacer (72). Loosen the pointed screw (73) and pull the coupling part pump (70) off the shaft. Dismantle the copper pipe (58). Remove set screws (22) with washers (23) which hold the shaft seal cover to the pump casing. Remove the shaft seal cover from the pump casing by means of the pointed screws (86) The shaft seal cover and the bearing housing with shaft and impeller can now be lifted up from the pump as a unit, and the impeller can be inspected.

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5.2 DISMANTLING SHAFT SEAL

ø215/265
Remove nut (6). Pull off the impeller, and remove sunk key (9). Remove Allen screws (19), which hold the bearing housing to the shaft seal cover, pull shaft seal cover and bearing housing apart, by which the shaft seal (10) and water deflector (11) are pulled off the shaft.

ø330/415/525
Remove set screw (6). Pull off the impeller, and remove sunk key (9). Remove set screws (19), which hold the bearing housing to the shaft seal cover, pull shaft seal cover and bearing housing apart, by which the shaft seal (10) is pulled off the shaft.

5.3 DISMANTLING SEAT

Press out the seat from behind the shaft seal cover.

5.4 DISMANTLING SHAFT WITH BEARINGS

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

5.5 INSPECTION

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

- Sealing rings/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 RINGS

When fitted, the sealing ring (4) in the pump casing (1) is to bear against the shoulder of the pump casing.

ø330/415/525
When fitted, the sealing ring (27) in the shaft seal cover (20) is to bear against the shoulder of the shaft seal cover.

6.2 FITTING SHAFT WITH BEARINGS

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

ø330/415/525
Fit cover under bearing (26).

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6.3 FITTING WATER DEFLECTOR

ø215/265
Assemble the bearing housing and the shaft seal cover. Lead the water deflector (11) over the shaft until it touches the shaft seal cover and then further 1-1.5 mm into the shaft seal cover.

ø330/415/525
Lead the water deflector (11) over the shaft until it touches the cover under bearing (26) and then further 1-1.5 mm towards the cover under bearing. Assemble the bearing housing and 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 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 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. 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 soapy water 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 at the bottom of the bearing housing that there are no leaks.

6.5 FITTING IMPELLER

Fit the sunk key 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 washers (7 and 8) and a nut (ø215/265) or a set screw (ø330/415/525).

6.6 FITTING BEARING HOUSING AND SHAFT SEAL COVER

Place the O-ring (21) between pump casing and shaft seal cover on the shaft seal cover where it can be held with a little grease. However, check the material of the O-ring first. As standard the material is nitrile, but it might be EPDM which will be damaged by mineral grease. Use soft soap or silicone grease for EPDM. Fit and fasten bearing housing and shaft seal cover. Screw the pointed screw (86) back into the shaft seal cover before tightening. Insert the copper pipe (58).

6.7 SHAFT

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

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6.8 FITTING COUPLING

ø215/265

Fit the flexible coupling (74) to the spacer (72) by means of the Allen screws (76) which are tightened up with torque according to the table below. Check that the aluminum insert in the rubber part does not rotate during tightening as it may damage the coupling. To prevent this, apply a little grease to the bolts under the bolt head. The Allen screws (76) can be used again and up to 3 times before they are to be replaced by new original bolts to secure the locking function. Do not use Loctite as it will damage the rubber element.

Fix the spacer with the flexible coupling to the coupling part motor (71) by means of the Allen screws (77) and lock nuts (79), also with torque according to the table below. In order to secure the bolt connection fit a new lock nut or secure with a locking means.

Check that the distance, cf. the table below, between spacer and coupling part pump corresponds to the actual coupling size which appears from the coupling element itself. Fit the flexible coupling to the coupling part pump by means of the Allen screws (76) which are to be greased a little under the bolt head and tightened with the torque stated.

Thread	Torque	Coupling element	Distance
M8	25 Nm	V1700-0832	4 mm
M10	50 Nm	V1700-1042	4 mm
M12	90 Nm	V1700-1242	6 mm
M14	140 Nm	V1700-1442	6 mm

ø330/415/525

Check Allen screws (76) and coupling bushes (74) for damage and clean these with a cloth. Replace them in case of damage.

Remove grease from the screw threads by means of benzene, and clean the threaded holes in the coupling halves for pump and motor by means of pressure air. If new coupling halves are mounted, also remove grease from the threaded holes by means of benzene.

Place coupling bushes (74) in the top holes of the spacer (72), the chamfering on the bushes is to face downwards. Place the coupling bush in the bottom holes of the spacer, the chamfering on the bushes is to face upwards. Hold the hand under the spacer and the bottom coupling bushes and carefully push the spacer into place.

Apply Loctite type 242 on the Allen screws (Loctite 242 is recommended as it will allow dismantling) and tighten all screws with the hand. It might be necessary to push the spacer a little until the screws have located in the thread and you feel that the spacer has found the right position.

Tighten the screws with a torque wrench at 55 Nm. As motor/pump shaft will rotate during this operation it is necessary to hold the spacer by wedging a pin bolt, a piece of flat bar or the like between the two following screw heads in order to lock the system while the screws are tightened.

Fit guard (69).

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7. FROST PROTECTION

Pumps that are not in operation during frost periods are to be drained to avoid frost damage. Remove the plug (3) 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 measures.

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 centrifugal pump will not function until it has been filled with liquid between the foot valve and somewhat above the impeller of the pump.

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

ATTENTION

For safety reasons the pump is only allowed to operate against closed suction and discharge valves for a short time (max. 5-10 minutes and at a max. temperature of 130°C). Otherwise there is a risk of damage to the pump and, at worst, of a steam explosion. If the pump is not manually observed, the installation of a safety device is recommended.

9.1 STARTING

Before starting the pump check that:

- the shaft rotates freely without jarring sounds.
- the pump casing and the suction line are 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 has no or too low capacity	1. Wrong direction of rotation	Change direction of rotation to clockwise when viewed from shaft end (the direction of the arrow)
	2. Piping system choked	Clean or replace
	3. The pump is choked	Clean the pump
	4. Suction line leaks Pump takes air	Find the leakage, repair the fault, non-return valve not submerged
	5. Suction lift too high	Check data sheet Q/H curve and NPSH or contact DESMI
	6. Pump and piping system wrongly dimensioned	As 5
The pump uses too much power	1. Counter-pressure too low	Insert orifice plate or check valve/Contact DESMI
	2. The liquid is heavier than water	Contact DESMI
	3. Foreign body in pump	Dismantle the pump, remove the cause
	4. Electric motor is running on 2 phases	Check fuses, cable connection, and cable
The pump makes noise	1. Cavitation in pump	Suction lift too high/ Suction line wrongly dimensioned/Liquid temperature too high

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11. INSPECTION AND MAINTENANCE

Inspect the shaft seal for leaks at regular intervals.

- 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 pipe plug (3) at the bottom of the pump.

11.2 BEARINGS

ø215/265
The bearings are dimensioned for a nominal life of 25,000 working hours and are to be relubricated according to the below table.

Light bearing housing (combination 13):
The bearings are lubricated for life and require no attention but are to be replaced in case of noise or bearing wear. In connection with replacement, the lower bearing is to be mounted with an RS - sealing facing downwards, fill the bearing itself with grease and place a grease bead on the bearing towards the shaft in a quantity corresponding to the table below.

Heavy bearing housing (combination 14):
Only the upper bearing (15) is lubricated for life, whereas the lower is to be relubricated through the lubricator nipple (84) in accordance with the table below. The replacement of bearings to be made under the same conditions and according to the same procedure as for combination 13, however, the RS - sealing is not to be considered.

ø330/415/525
The bearings are dimensioned for a nominal life of 100,000 working hours and are to be relubricated according to the below table.

Light bearing housing (combination 13):
The bearings are relubricated through the lubricator nipples (84) at top and bottom of the bearing housing (18). In connection with replacement, the bearings are to be mounted with the RS - sealing facing downwards, fill the bearing itself with grease and place a grease bead on the bearing towards the shaft in a quantity corresponding to the table below.

Heavy bearing housing (combination 14):
Both bearings are relubricated through lubricator nipples (84) at top and bottom of the bearing housing (18). See instructions for ø215/265. The top bearing (15) is to be mounted with the RS - sealing facing downwards, fill the bearing itself with grease and place a grease bead on the bearing towards the shaft in a quantity corresponding to the table below.

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Pump	Assembly	Interval	Quantity Bottom bearing (13)	Quantity Top bearing (15)
ø215/265	Light bearing housing	Lubricated for life	40 g	Lubricated for life
ø215/265	Heavy bearing housing	8000 hours	65 g	Lubricated for life
NSL80-330 NSL100-330 NSL125-330 NSL100-415 NSL125-415	Light bearing housing	4500 hours	30 g	15 g
NSL150-330 NSL200-330 NSL250-330 NSL150-415	Heavy bearing housing	4500 hours	40 g	20 g
NSL200-415 NSL250-415 NSL300-415	Heavy bearing housing	4500 hours	50 g	25 g
NSL200-525 NSL250-525 NSL300-525	Heavy bearing housing	4500 hours	80 g	35 g

If the pump liquid temperature is below 80□C the following types of grease are recommended::

ESSO	Beacon 2
BP	Energrease EP grease 2
Shell	Alvania grease 2
Mobil	Mobil lux grease EP 2 eller Mobil plex 47
Castrol	Spherol AP 2
Texaco	Multifak EP 2
Q8	Rembrandt EP 2 eller Rubens
Statoil	Statoil Uniway u2

If the pump liquid temperature is above 80□C, high-temperature grease is recommended, e.g. SKF LGHP2.

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12. REPAIRS

12.1 ORDERING SPARE PARTS

When ordering spare parts please always state pump type, serial No. (appears on the name plate of the pump), position No. on the assembly drawing and designation on the spare parts list.

13. OPERATING DATA

The following working pressures (pressure in piping incl. the pressure increase caused by the pump) and number of revolutions are allowed in standard pumps. ø215 pumps with frame size 280 motors and ø265 pumps with frame size 315 motor are only available in combination 15 (fire bracket).

Pump	Max. working pressure [bar] Bronze / Cast iron	Max. working pressure [bar] SG-iron	Max. RPM Light / heavy bearing housing	Pump	Max. working pressure [bar] Bronze / Cast iron	Max. working pressure [bar] SG-iron	Max. RPM
NSL80-215	16	32	1800 / 3600	NSL150-330	7 / 13	27	1800
NSL80-265	14.5	29	1800 / 3600	NSL150-415	9 / 13	26	1800
NSL80-330	15 / 15	30	3600 / -----	NSL200-265	9	18	1800
NSL100-215	13	26	1800 / 3600	NSL200-330	7 / 13	26	1800
NSL100-265	14,5	29	1800 / 3600	NSL200-415	9 / 13	26	1800
NSL100-330	8 / 14	29	1800 / -----	NSL200-525	14	25	1800
NSL100-415	10 / 12.5	25	1800 / -----	NSL250-265	10 / 10	20	1800
NSL125-215	10	20	1800 / 3600	NSL250-330	7 / 12	25	1800
NSL125-265	14,5	29	1800 / 3600	NSL250-415	9 / 12	25	1800
NSL125-330	7 / 12	25	1800 / -----	NSL250-525	14	25	1800
NSL125-415	9 / 13	26	1800 / -----	NSL300-415	9 / 12	25	1800
NSL150-215	8	16	1800	NSL300-525	14	25	1800
NSL150-265	7	14	1800				

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.

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14. EU DECLARATION OF CONFORMITY

DESMI A/S, hereby declare that our pumps of the NSL Spacer type 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 294:1994	Safety of machinery. Safety distances to prevent danger zones being reached by the upper limbs
EN 809 + A1	Pumps and pump units for liquids – Common safety requirements
EN 12162:2001	Liquid pumps – Safety requirements – Procedure for hydrostatic testing
EN 60204-1:2006	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, June 1, 2010

Kurt Bech Christensen
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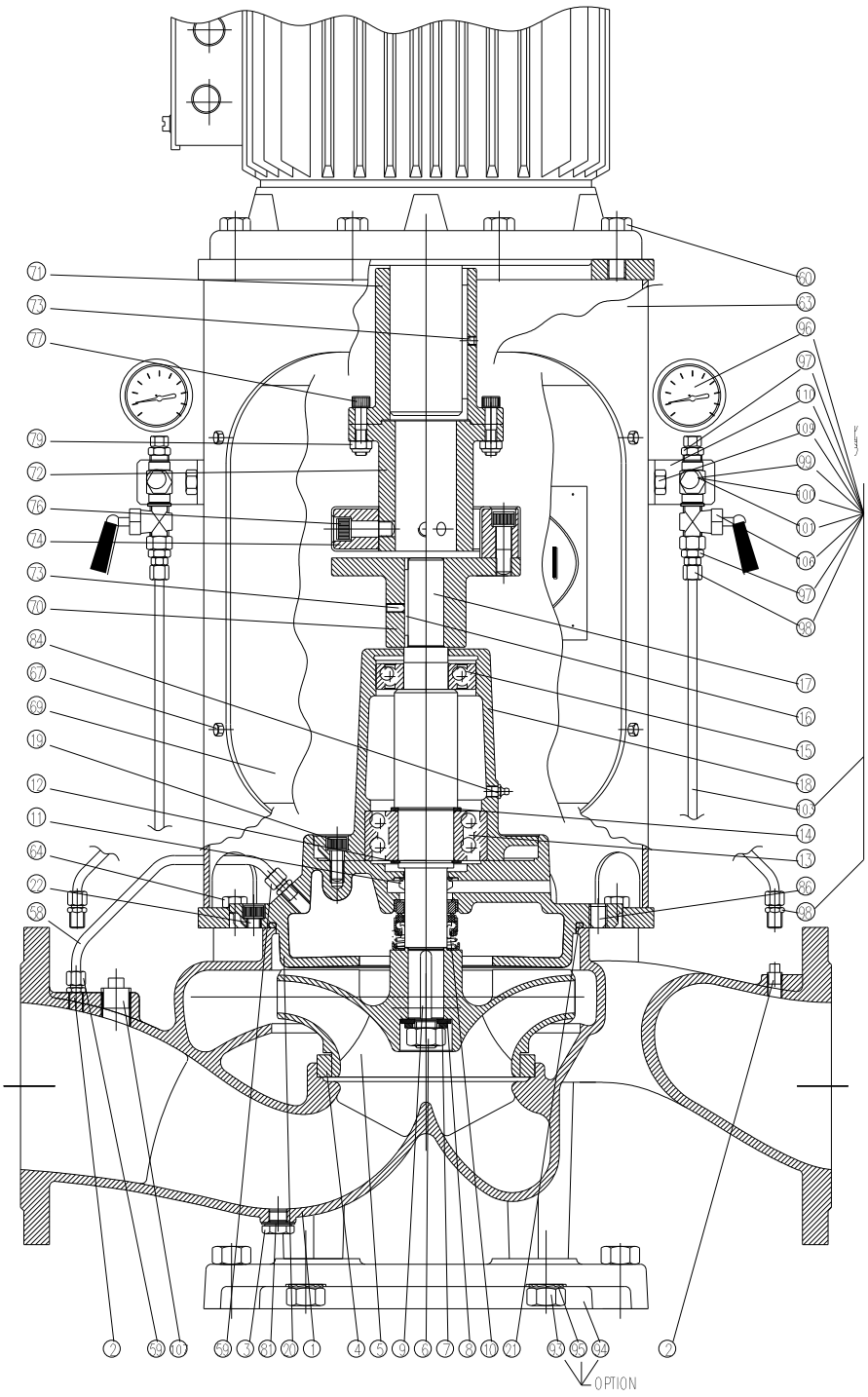

15. ASSEMBLY DRAWING AND SPARE PARTS LIST ø215/265

See ø330/415/525 pumps on the next page

1 Pump casing
2 Pipe plug
3 Pige plug
4 Sealing ring
5 Impeller
6 Nut
7 Spring collar
8 Washer
9 Sunk key
10 Mech. shaft seal
11 Water deflector
12 Ring lock
13 Ball bearing
14 Support disc
15 Ball bearing
16 Sunk key
17 Shaft
18 Bearing housing
19 Allen screw
20 Shaft seal cover
21 O-ring
22 Allen screw
58 Copper pipe
59 Hexagon nipple
60 Set screw
63 Bracket
64 Set screw
67 Set screw
69 Guard
70 Coupling part pump
71 Coupling part motor
72 Spacer
73 Pointed screw
74 Elastomer
76 Allen screw
77 Allen screw
79 Nut
81 Sealing washer
84 Lubricator nipple *)
86 Pointed screw
93 Set screw
94 Base plate
95 Lock washer
96 Manometer
97 Reducing nipple
98 Haxagon nipple
99 T-piece
100 Bulkhead connection
101 Screw cap
103 Copper pipe
106 Manometer cock
107 Pipe plug
109 Set screw
110 Manometer fitting

*) 84 only combination 14

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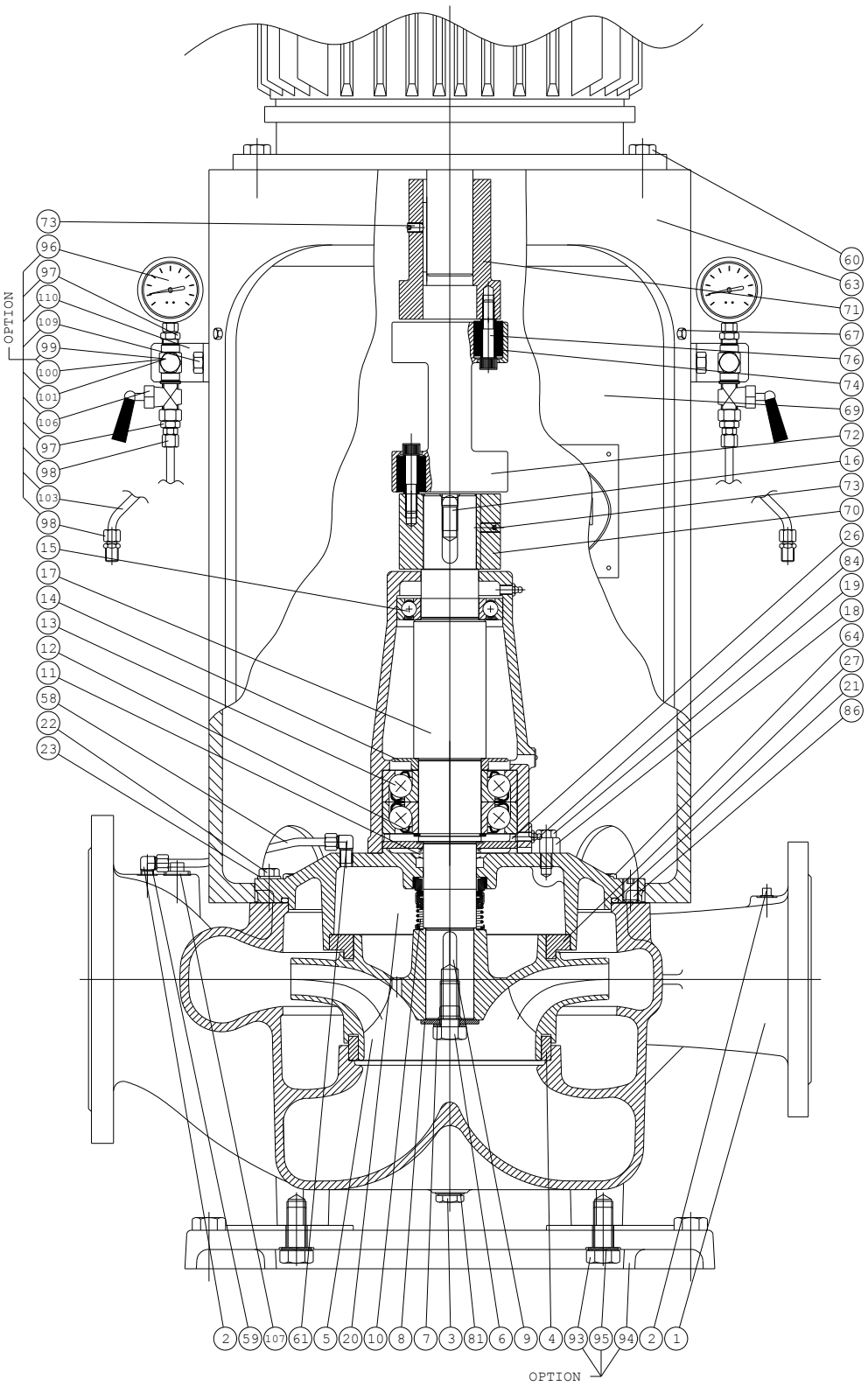

16. ASSEMBLY DRAWING AND SPARE PARTS LIST ø330/415/525

1	Pump casing
2	Pipe plug
3	Pipe plug
4	Sealing ring
5	Impeller
6	Set screw
7	Spring collar
8	Washer
9	Sunk key
10	Mech. shaft seal
11	Water deflector
12	Ring lock
13	Ball bearing
14	Grease valve ring*
15	Ball bearing
16	Sunk key
17	Shaft
18	Bearing housing
19	Set screw
20	Shaft seal cover
21	O-ring
22	Set screw
23	Lock washer
26	Cover under bearing
27	Sealing ring 2
58	Copper pipe
59	Hexagon nipple
60	Set screw
61	Hexagon nipple
63	Bracket
64	Set screw
67	Set screw
69	Guard
70	Coupling part pump
71	Coupling part motor
72	Spacer
73	Pointed screw
74	Coupling bush
76	Allen screw
81	Sealing washer
84	Lubricator nipple
86	Pointed screw
93	Set screw
94	Base plate
95	Lock washer
96	Manometer
97	Reducing nipple
98	Hexagon nipple
99	T-piece
100	Bulkhead connection
101	Screw cap
103	Copper pipe
106	Manometer cock
107	Pipe plug
109	Set screw
110	Manometer fitting

*) Support disc in comb. 13.

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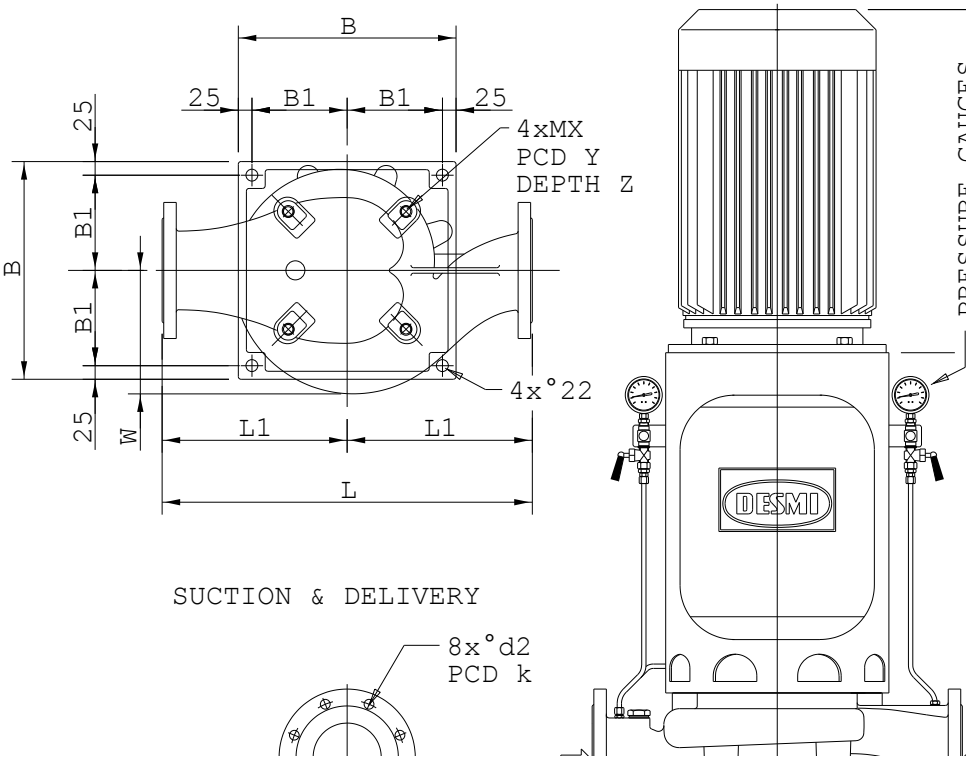
17. DIMENSIONAL SKETCH ø215/265

See ø330/415/525 pumps on the next page



Manometer: 1/4" BSP. Drain: 3/8" BSP. Priming: 1/2" BSP

Type	H	h1	h2	L	L1	W	DN	D	d2	k	X	Y	Z	B	B1
NSL80-215	868	200	155	530	265	163	80	200	18	160	20	306	25	350	175
NSL80-265	900	200	155	580	290	193	80	200	18	160	20	306	25	350	175
NSL100-215	889	200	155	580	290	181	100	220	18	180	20	306	25	350	175
NSL100-265	920	200	155	630	315	193	100	220	18	180	20	306	25	350	175
NSL125-215	902	200	155	630	315	203	125	250	18	210	20	306	25	350	175
NSL125-265	943	200	155	680	340	227	125	250	18	210	20	306	25	350	175
NSL150-215	938	230	185	680	340	239	150	285	22	240	20	306	25	350	175
NSL150-265	967	200	155	730	365	250	150	285	22	240	20	306	25	350	175
NSL200-265	1008	260	215	780	390	290	200	340	23	295	20	306	25	350	175
NSL250-265	1035	260	215	800	400	324	250	405	22	350	20	306	25	350	175

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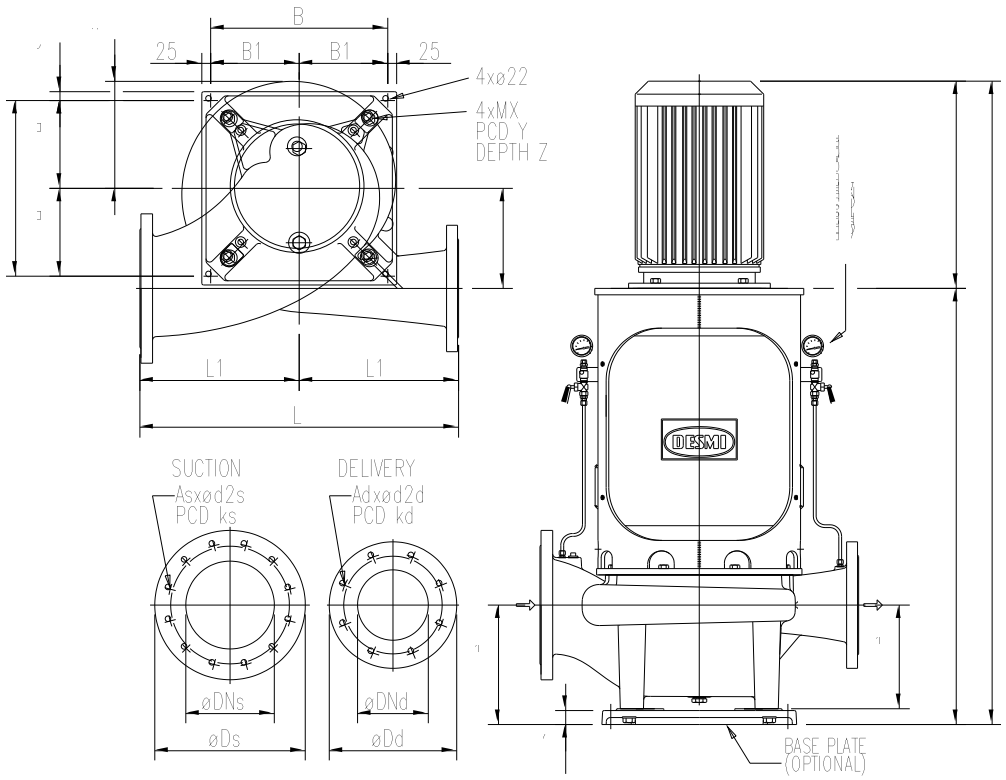
18. DIMENSIONAL SKETCH ø330/415/525



Manometer: 1/4" BSP. Drain: 3/4" BSP. Priming: 1/2" BSP

Type	H	h1	h2	L	L1	W	Ds A-	Dd A-	Ds D-	Dd D-	DNs	DNd	ks	kd
NSL80-330	1079	260	215	600	300	250	235	200	220	200	100	80	180	160
NSL100-330	1084	260	215	650	325	250	270	235	250	220	125	100	210	180
NSL100-415	1107	260	215	700	350	275	270	235	250	220	125	100	210	180
NSL125-330	1130	300	255	700	350	250	300	270	285	250	150	125	240	210
NSL125-415	1145	300	255	750	375	278	300	270	285	250	150	125	240	210
NSL150-330	1140	300	255	750	350	275	360	300	340	285	200	150	295	240
NSL150-415	1191	340	295	800	400	293	360	300	340	285	200	150	295	240
NSL200-330	1183	340	295	900	450	301	425	360	395	340	250	200	350	295
NSL200-415	1241	340	295	900	450	308	425	360	395	340	250	200	350	295
NSL200-525	1515	380	335	900	450	395	425	36+	425	360	250	200	350	295
NSL250-330	1230	380	335	1000	500	327	485	425	445	395	300	250	400	350

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NSL250-415	1283	380	335	1000	500	355	485	425	445	395	300	250	400	350
NSL250-525	1525	390	345	1100	550	390	485	425	445	395	300	250	400	350
NSL300-415	1329	420	375	1200	600	377	555	485	505	445	350	300	460	400
NSL300-525	1570	435	390	1200	600	419	555	485	555	485	350	300	460	400

Type	d2s	d2d	As	Ad	X	Y	Z	B	B1	O
NSL80-330	18	18	8	8	20	306	25	350	175	200
NSL100-330	18	18	8	8	20	306	25	350	175	210
NSL100-415	18	18	8	8	20	450	25	500	250	250
NSL125-330	22	18	8	8	20	306	25	350	175	225
NSL125-415	22	18	8	8	20	450	25	500	250	260
NSL150-330	22	22	8	8	20	450	25	500	250	235
NSL150-415	22	22	8	8	20	450	25	500	250	275
NSL200-330	22	22	12	8	20	450	25	500	250	260
NSL200-415	22	22	12	8	24	560	28	500	250	285
NSL200-525	22	22	12	8	24	560	28	500	250	330
NSL250-330	22	22	12	12	24	560	28	500	250	275
NSL250-415	22	22	12	12	24	560	28	500	250	305
NSL250-525	22	22	12	12	24	560	28	500	250	340
NSL300-415	22	22	16	12	24	560	28	500	250	320
NSL300-525	22	22	16	12	24	560	28	500	250	365

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