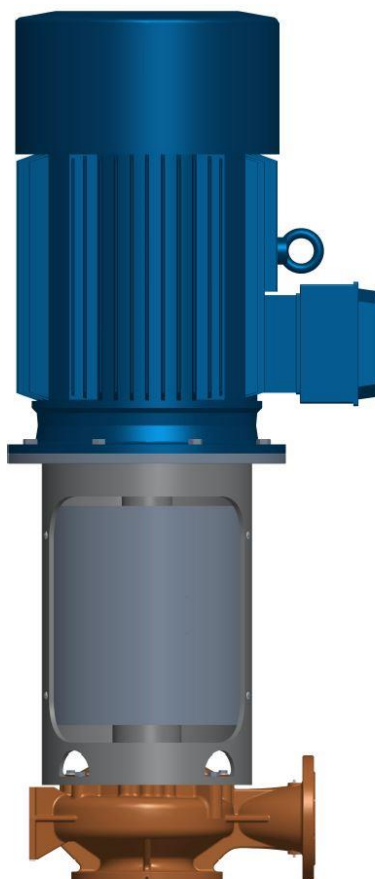


OPERATION AND MAINTENANCE INSTRUCTIONS

DESMI end suction centrifugal pump

NSLH and NSLV Spacer



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Special pump No.



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1. PRODUCT DESCRIPTION

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

The pump is a single-stage vertical end suction centrifugal pump 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 **ø330/415/465/525**, 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.

ø330/415/465/525: Pumps with ø330, ø415, ø465 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.

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

NSLHXXX-YYY-MR-Z or NSLVXXX-YYY-MR-Z

XXX: Pressure branch diameter, YYY: Nominal impeller diameter

M: The material combination of the pump.

R: The assembly combination of the pump.

Z: Other variants

M may be the following:

- A: Casing and shaft seal cover: Cast iron + cast iron alloy. Impeller and sealing rings: NiAlBz
- 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 or NiAlBz. Impeller and sealing rings: NiAlBz or stainless steel
- E: Casing and shaft seal cover: NiAlBz and bronze alloy. Impeller and sealing rings: NiAlBz
- S: Casing, shaft seal cover, impeller and sealing rings: SAF2507 and stainless steel alloy.
- 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 shaft seal
- m : BS flanges
- n : ANSI flanges
- o : Shockproof design
- p : Other design
- q : JIS flanges
- r : With inducer

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:

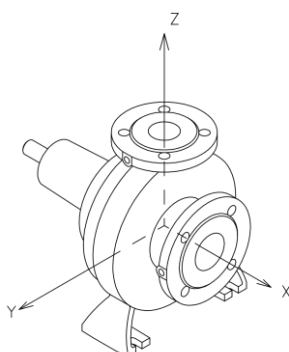
- Pump No. :
- Pump type :
- Application :
- Comment :

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), NiAlBz or stainless steel the values are to be increased by factor 1.5.



Pump size	F _y N	F _z N	F _x N	ΣF	M _y Nm	M _z Nm	M _x Nm	Σ Mt
65-215 65-265	650	840	750	1340	510	310	380	700
80-215 80-265 80-330	800	950	850	1500	550	350	400	750
100-215 100-265 100-330 100-415 100-465	1000	1250	1150	2000	650	400	500	900
125-215 125-265 125-330 125-415	1250	1600	1430	2500	830	520	650	1160
150-265 150-330 150-415 150-465	1500	1900	1700	2950	1000	650	800	1400
200-265 200-330 200-415 200-525	2000	2520	2260	3920	1330	860	1060	1860
250-330 250-415 250-525	2500	3150	2820	4900	1770	1140	1400	2470
300-415 300-418 300-525	3000	3750	3350	5860	2750	1900	2200	4000
350-525	3500	4370	3920	6840	3630	2500	2930	5300

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.

3. INSTALLATION

See also: DESMI Guidelines for pump installations at:
www.desmi.com/media/sd5ltlox/guidelines_uk.pdf

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

See also: DESMI Pump Storage and Preservation at: www.desmi.com/media/vqkjqh54/t1534uk.pdf

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 size	Weight in kg A / D-combination	Pump size	Weight in kg A / D-combination
65-215	150 / 155	150-415	420 / 455
65-265	195 / 200	150-465	-/498
80-330	295 / 310	150-265	256 / 277
80-215	160 / 170	200-330	432 / 473
80-265	212 / 224	200-415	548 / 592
100-330	317 / 335	200-525	885 / 950
100-415	354 / 366	200-265	323 / 327
100-465	367 / 374	250-330	490 / 537
100-215	165 / 175	250-415	602 / 657
100-265	223 / 238	250-525	930 / 1004
125-330	320 / 345	300-415	690 / 758
125-415	370 / 400	300-418	784 / 713
125-215	165 / 180	300-525	1112/1214
125-265	258 / 281	350-525	1279/-
150-330	365 / 395		

The weights of the pumps in E and S (without motor) are equivalent to pumps in A code.

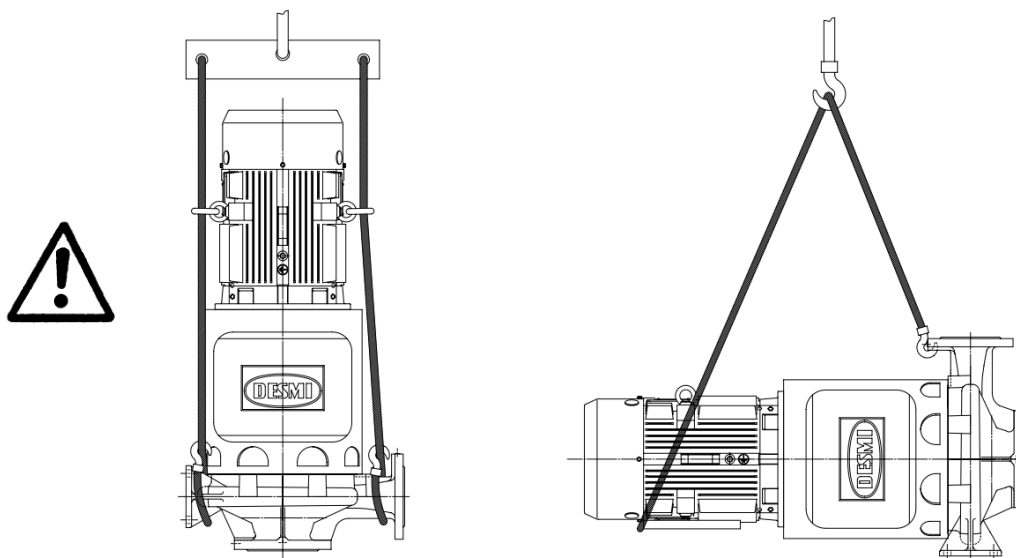
The weight of the motor is given in motor operation manual. It can be found in

- Shipping documents together with the cargo
- Shipping mark on cargo box
- Other documents for the shipment, contracts or orders, etc.

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.

ø330/415/465/525

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.

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.

ø330/415/465/525

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:

Impeller material	Max. clearance measured in radius/mm
NiAlBz/CC333G	0.4-0.5
Stainless steel	0.6-0.7

- 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 TIGHTENING TORQUES

Part. No.	Thread Size (mm)	Tightening Torque (Nm)	
		Pump Casing/Rear Cover in GG20/Rg5 material	Pump Casing/Rear Cover in GGG40/NiAlBz/SS material
64	M8	8	16
	M12	27	54
	M16	65	130
22	M8	8	16
	M12	27	54
	M16	65	130
19	M12	27	54
	M16	65	130
6	M16	65	
	M20	130	
	M24	220	
60	M12	54	
	M16	130	
	M20	240	
	M24	400	

6.2 FITTING SEALING RINGS

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

ø330/415/465/525

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

6.3 FITTING SHAFT WITH BEARINGS

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

Note: Fill open and semi-open bearings with grease before assembly with bearing housing (ref. Section 11).

ø330/415/465/525

Fit cover under bearing (26). For pumps with Lip seal in cover under bearing please read appendix A.

If shim(s) are mounted between cover under bearing (26) and bearing then also mount shim(s) when bearings are replaced.

DESMI spare part numbers for 0.1 mm thick shims:

705057 (SHIM Ø110/140), 707214 (SHIM Ø130/160), 722876 (SHIM Ø160/190)

6.4 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.

ø330/415/465/525

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.

6.5 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 and lubricate the outer rubber L-ring of the seat with a thin layer of silicone grease. Use a brush and ensure that no silicone grease ends up at the slide surface. 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 a thin layer of silicone grease (ensure that no silicone grease ends up at the slide surfaces) 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 silicone grease 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.

6.6 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 (ø330/415/465/525).

6.7 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).

6.8 SHAFT

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

6.9 FITTING COUPLING

When the motor and pump is bolted fully together (via the pump Spacer motor bracket) then there are no further requirements for checking the coupling alignment. But please ensure that suitable shims are used (where required) below pump and motor feet in order to avoid deformations in pump and/or motor when tightened down on the foundation / base frame.

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

ø330/415/465/525

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).

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 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.

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 is choked	Clean or replace the piping system
	3. The pump is choked	Clean the pump
	4. Suction line leaks	Find the leakage, repair the fault, non-return valve not submerged
	5. Pump takes air	
	6. Suction lift is too high	Check data sheet Q/H curve and NPSH or contact DESMI
	7. Pump and piping system wrongly dimensioned	As 5
The pump uses too much power	1. Counter-pressure is 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 connections, and cables
The pump makes noise	1. Cavitation in pump	Suction lift is too high / Suction line wrongly dimensioned / Liquid temperature is too high

10.1 MECHANICAL SEAL FAILURE ANALYSIS

Description of possible failure	Impacts on the pump/system	Indications of failure	How to avoid
Pump settled (due to seizing sliding rings in mechanical shaft seal) due to standstill after storage	Mechanical seal failure/leaking after short time	1. Initial leaking after first start up that does not stop after short time	1. Ensure correct storage of pumps 2. Preventive maintenance to be followed for long term storage 3. Rotate pump carefully by hand prior to first start up, to ensure integrity of mech. shaft seal
Pump settled (due to seizing sliding rings in mechanical shaft seal) due to standstill in system / stored with water inside for longer duration of time	Medium could change properties when standstill in pump based on the environment and type of medium	1. Higher power consumption than calculated short time after startup 2. Leakage from mech. shaft seal after start up	1. Rotate the pump regularly, to avoid seizing 2. If not possible, pumps should be drained
Lack of NPSH available vs. NPSH required	Cavitation duty, creating vibration and mechanical damage	1. Vibration and noise from the pump 2. Wear on impeller/seal ring, and possible leaking mec. seal	1. Make sure to have sufficient NPSHa at all times
Bad piping and fitting arrangement	Turbulent flow and vibrations in the system	1. Vibration, and noises from the piping system. 2. Possible premature leakage from mec. seal	1. Check piping and fitting arrangement is in accordance with CEN standards. 2. Should be reviewed and approved in design phase

Description of possible failure	Impacts on the pump/system	Indications of failure	How to avoid
Starvation / lack of inlet flow	Pump not receiving enough liquid to give a stable operation, pump not giving sufficient flow. Could cause insufficient liquid film in seal and cause dry running	1. Vibrations in the pump and unstable operational readings 2. Flow not increasing at higher pump speed. 3. Possible leaking mechanical seal	1. Make sure all valves are open, and no filters are clogged etc. 2. Check piping and fittings 3. Other consumers on the same suction line might cause problems
High liquid velocities	Vibrations and turbulent flow in the system	1. Noise, vibration and lack of pump performance. 2. Possible leaking mech. shaft seal	1. Make sure to have piping dimensioned for specified flow rating 2. In general liquid velocity should increase from piping inlet through the pump to the outlet
External excited vibrations from the vessel or piping system	If above recommended levels (7mm/s) it can lead to premature mechanical failures	1. Visual and measured vibration levels. 2. Leaking mech. shaft seal	1. Install vibration reducing components such as flexible bellows at inlet/outlet, vibration pads on base plate, horizontal lateral support on motor

Description of possible failure	Impacts on the pump/system	Indications of failure	How to avoid
Dry running of the pump – closed inlet/discharge valve	Pump should never be run dry, this will damage the mechanical seal in very short time, and will cause bearing failure and total pump breakdown	1. Valves closed, quickly generating heat in the pump, high noises, increased power consumption before total breakdown	1. Always make sure pump is never operated dry (check regularly that any priming systems are working) and/or with closed suction valves. 2. Can operate for a short time towards shut discharge valve, refer to the chapter 9
Operating outside recommended QH area (70-120% of BEP)	Can lead to premature mechanical failure and further damage	1. Readings of operational/log data. 2. At least diff. pressure, power and pump speed. Compare with design specification	1. Continuously monitoring the operation. 2. Use limitations and alarms in the control system – min/max rpm, flow, pressure
Medium and/or pressure and/or liquid temperature not according to specification	Depends on specification and actual difference in this	1. Abnormal wear and corrosion in the pump. 2. Leaking mechanical seal	1. Mechanical seal material and properties are specified based on medium and conditions. 2. Difference in spec. might require a different mechanical seal / pump material

Description of possible failure	Impacts on the pump/system	Indications of failure	How to avoid
Water hammer / hydraulic shocks	Cause a tremendous pressure shock to the pump and system that could cause serious damage	1. Shutting down and closing valves creates noise and give hydraulic shocks to the whole system 2. Will cause mechanical damage, not only to mechanical seals	1. Have sufficient ramp down time and avoid closing valves too fast. 2. Correct usage of non-return valves
Pump parts (e.g. vent/flush piping) in pump clogged up	Missing supply of liquid for cooling/lubrication of mechanical shaft seal and/or missing automatic air venting of shaft seal chamber	1. Seal leakage after short time	1. Ensure proper filters / mesh size on suction side of pump. 2. If solids sediment inside pump parts (e.g. piping) they must be disassembled and cleaned inside regularly
Production faults from maker	Normally discovered during testing at the factory	1. Seal leakage after short time	1. Hydrostatic (leakage) and performance test 3.1 or 3.2. 2. Specific classification requirement testing to exclude possibility of production faults

Troubleshooting:

For the maker to begin troubleshooting we need at least the supporting documents “letter of investigation of pump failure” and possibly “commissioning check list” to be properly filled in. We recommend retrieving information in the following order (to optimize the time usage):

1. Description of the failure and pictures of the damage together with operational readings/log data.
This can eliminate or verify many of the possible failures and is the easiest and best way to begin troubleshooting.

2. If nothing can be concluded after point no. 1. pictures and description of the piping system (especially suction piping) should be provided. Also verify if there has been any observation of excessive vibrations or noise coming from the vessel/pump/system.
3. If we cannot conclude possible root cause from information received under point 1. or 2. it might be necessary to send a service engineer to investigation and further troubleshooting.

Other considerations:

- The mechanical seal is normally not covered under warranty/guarantee, as this is considered a “wear and tear” part.
- A mechanical seal might have some initial leakage like drops or a small trickle during first start-up as it has not yet fully settled and become tight. Observe the mechanical seal to see if leakage stops, if not it could be enough to dismantle the mechanical seal and clean it properly to stop the leakage.
- Mechanical seal is the single most exposed/vulnerable part in a 1-stage centrifugal pump; hence a mechanical seal failure is often the first indication of problems. Failure can occur in only a few minutes running in the wrong conditions, so it is often difficult to find root cause of damage if we do not have complete set of information from the vessel.
- In order to avoid serious damage to pumps make sure to follow the maintenance recommendations given by the maker. Inspect the pumps regularly for initial leakage. If leakage is observed, it is important to take action to replace seal as quickly as possible.
- Check regularly that the shaft seal leak drain hole in the rear cover (or in bearing cover/bracket on some pump designs) is not clogged up. A clogged shaft seal leak hole can lead to premature bearing failure due to water rising up into the pump ball bearings when the shaft seal is worn out and/or damaged.

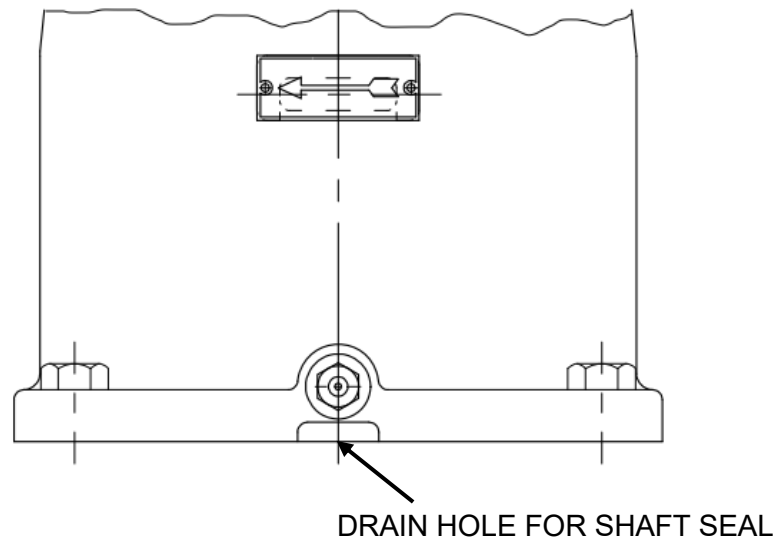
We always recommend having spare mechanical seal (spare part kit) onboard the vessel at all time to avoid standstill of pumps in case of seal failure.

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.

The drain hole at the mechanical shaft seal must be inspected regularly (see drawing example below). Clean the drain hole as needed. If the drain hole clogs up, leaking liquid and/or vapors from the shaft seal can be forced up into the bearing unit, which can result in a much shorter bearing life than normal.



Recommended inspection and maintenance intervals for normal applications:

(half intervals are recommended for a new application – until required intervals can be determined for actual application)

(if daily inspection is not done remote monitoring of pump is recommended – e.g. via temperature sensors on pump bearings)

Inspect (I) or Maintain (M) at the indicated calendar time or run time interval – whichever comes first	Daily	Weekly	Monthly	8000 running hours or 12 months	25000 running hours or 60 months
Shaft seal leakage (normally less than 0.5 mL/hour (~10 drops/hour) – if more than 5 mL/hour shaft seal replacement is recommended)	I				
Motor ampere and/or power consumption within normal range	I				
Unusual noise	I				
Unusual vibration (normally less than 2.8 mm/s from pump itself – and less than 7 mm/s incl. external excited vibrations)	I				
Pressure gauge readings to be within normal range (i.e. keep flow within 70 to 120% of BEP flow if allowed by NPSHa <> NPSHr – see note below)	I				
Unusual bearing temperatures (normally less than 85°C)		I			
Check (clean if required) drain hole for shaft seal			I (M)		
Pumps not running: Rotate pump shaft 2 to 3 revolutions or start shortly (if pump is filled with liquid)			M		
Regrease pump and/or motor bearings	Refer to section 11.2 and motor manual (if motor bearings are re-greaseable)				
Spacer coupling elastomer(s)				I	
Replace mechanical shaft seal and V-ring					M
Replace pump bearings					M
Replace Spacer coupling elastomer(s)					M

Note: Operation outside 70 to 120% of BEP flow reduce the pump life (incl. shaft seal and pump bearings) significantly.

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 (i.e. only obtainable for ideal greasing and operating conditions) 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.

ø330/415/465/525

The bearings are dimensioned for a nominal (i.e. only obtainable for ideal greasing and operating conditions) 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.

Pump size	Assembly	Interval (running hours)	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
80-330 100-330 125-330 100-415 125-415 100-465	Light bearing housing	4500 hours	30 g	15 g
150-330 200-330 250-330 150-415 150-465	Heavy bearing housing	4500 hours	40 g	20 g
200-415 250-415 300-415 300-418	Heavy bearing housing	4500 hours	50 g	25 g
200-525 250-525 300-525 350-525	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 LS EP 2
Shell	Gadus S5 V100 2
Mobil	Mobil lux grease EP 2
Castrol	Spheerol AP 2 or AP 3
Texaco	Multifak EP 2
Q8	Rembrandt EP 2 or Rubens
Statoil	UniWay Li 62
GULF	GulfSea HYPERBAR LC3

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

DESMI use SKF LGHP2 as standard.

Vibration levels higher than 7 mm/s at pump bearing are considered damaging and will normally result in significantly shorter grease and/or bearing life – especially for pumps not running. Hence shorter re-greasing intervals might be required for pumps installed where external excited vibration levels can be higher than 7 mm/s.

Note that relubrication can cause a (usually temporary) bearing temperature rise of up to approx. 20 ° C - especially by mixing different types of grease and / or by overlubricating the bearing.

Grease used for relubrication must be compatible with the grease in the bearing unit.

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.

Spare parts or Spare Parts Kit (SPK) can be ordered via spareparts@desmi.com

Recommended spare parts stock for 2 years' operation to DIN 24296.

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.

Pump size	Max. working pressure [bar] Bronze / Cast iron	Max. working pressure [bar] SG-iron	Max. RPM Light/heavy bearing housing	Pump size	Max. working pressure [bar] Bronze / Cast iron	Max. working pressure [bar] SG-iron	Max. RPM
65-215	16	25	1800/3600	150-415	9 / 13	25	1800
65-265	14.5	25	1800/3600	150-465	9	-	1800
80-330	15	25	3600/---	150-265	10	25	1800
80-215	13	25	1800/3600	200-525	14	25	1800
80-265	14.5	25	1800/3600	200-330	7 / 13	25	1800
100-330	11 / 14	25	3000/3600	200-415	9 / 13	25	1800
100-415	10 / 12.5	25	1800/---	200-265	10 / 12.5	25	1800
100-465	8	25	1800	250-330	7 / 12	25	1800
100-215	12.5	25	1800/3600	250-415	9 / 12	25	1800
100-265	14.5	25	1800/3600	250-525	14	25	1800
125-330	11 / 12	25	1800	300-415	9 / 12	25	1800
125-415	9 / 13	25	1800	300-418	6/16	25	1600
125-215	8	25	1800	300-525	11/14	25	1800
125-265	7	25	1800	350-525	-/16	25	1600
150-330	7 / 13	25	1800				

Notice: Some pump combinations allow higher speeds than stated in the table—see actual pump name plate.

The max. working pressure for NiAlBz and stainless steel pumps is 1.5 times max. working pressure for bronze (RG5).

The above-mentioned max. working pressure is a design value – delivered pumps are pressure tested according to actual application requirements and actual flange standards.

For instance 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 & UK DECLARATION OF CONFORMITY

DESMI PUMPING TECHNOLOGY A/S, hereby declare that our pumps of the NSLH and NSLV 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/ISO 13857:2019	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 60204-1:2018	Safety of machinery – Electrical equipment of machines (item 4, General requirements)
Ecodesign Directive (2009/125/EC)	Water pumps: Commission Regulation No 547/2012. Applies only to water pumps marked with the minimum efficiency index MEI. See pump nameplate.
Directive 2014/34/EU	Equipment and protective systems intended for use in potentially explosive atmospheres. Applies only to pumps marked with Ex. See pump nameplate

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, September 20 2024



Henrik Mørkholt Sørensen
Managing Director

DESMI Pumping Technology A/S
Tagholm 1
9400 Nørresundby

15. ATEX DECLARATION OF CONFORMITY

15.1 PRODUCT DESCRIPTION

The precautions to be taken using the pumps in areas where the ATEX rules for “Ex II 2G Ex h IIb T4 Gb X” marked equipment apply. Only pumps mounted with EX-marked nameplate from DESMI are approved for / allowed to be used in EX areas.

The pumps have been examined according to EN80079-36:2016 and EN80079-37:2016. Constructional safety “c” and an Ignition Hazard Assessment has been made. As a result of this assessment the following precautions are to be taken.

15.2 PRECAUTIONS



Dry run is not allowed. Fill pump with liquid before start up. A $\cos \varphi$ measuring device can be fitted to the power circuit and set to trip the drive power in case of the power consumption being too low. The liquid in the pump also serves as coolant for the shaft seal. Dry run will result in frictional heat being developed causing critical high temperatures at seal faces.



Pumping against closed outlet valve is not allowed for more than 2 minutes. A pressure switch can be fitted to trip the drive power in case of the outlet pressure being too high.



Choking or clogging of the pump can result in either too low load or overload of the motor - or bending of the shaft. Use a strainer / filter in the suction pipe. A $\cos \varphi$ measuring device can be fitted to the power circuit and set to trip the drive power in case of power consumption being too low or too high. The thermistors (if any) in the electric motor can only be used to trip the drive power at overload.



User must replenish grease according to instruction manuals and replace bearings after 90% of rated life i.e. 22.500 hours. The bearing housing is fitted with a temperature sensor (or two in Spacer pumps) to be connected to the electrical control system on site. Set the system to trip the drive power 10°C above normal operating temperature.



Max. allowed liquid temperature is 80°C for fresh water and most likely less for other liquids. The pump housing can be fitted with a temperature sensor to be connected to the electrical control system on site and then set this to trip the drive power 10°C above normal operating temperature. Contact DESMI in case of doubt about max. allowed liquid temperature.

Nørresundby, September 20 2024

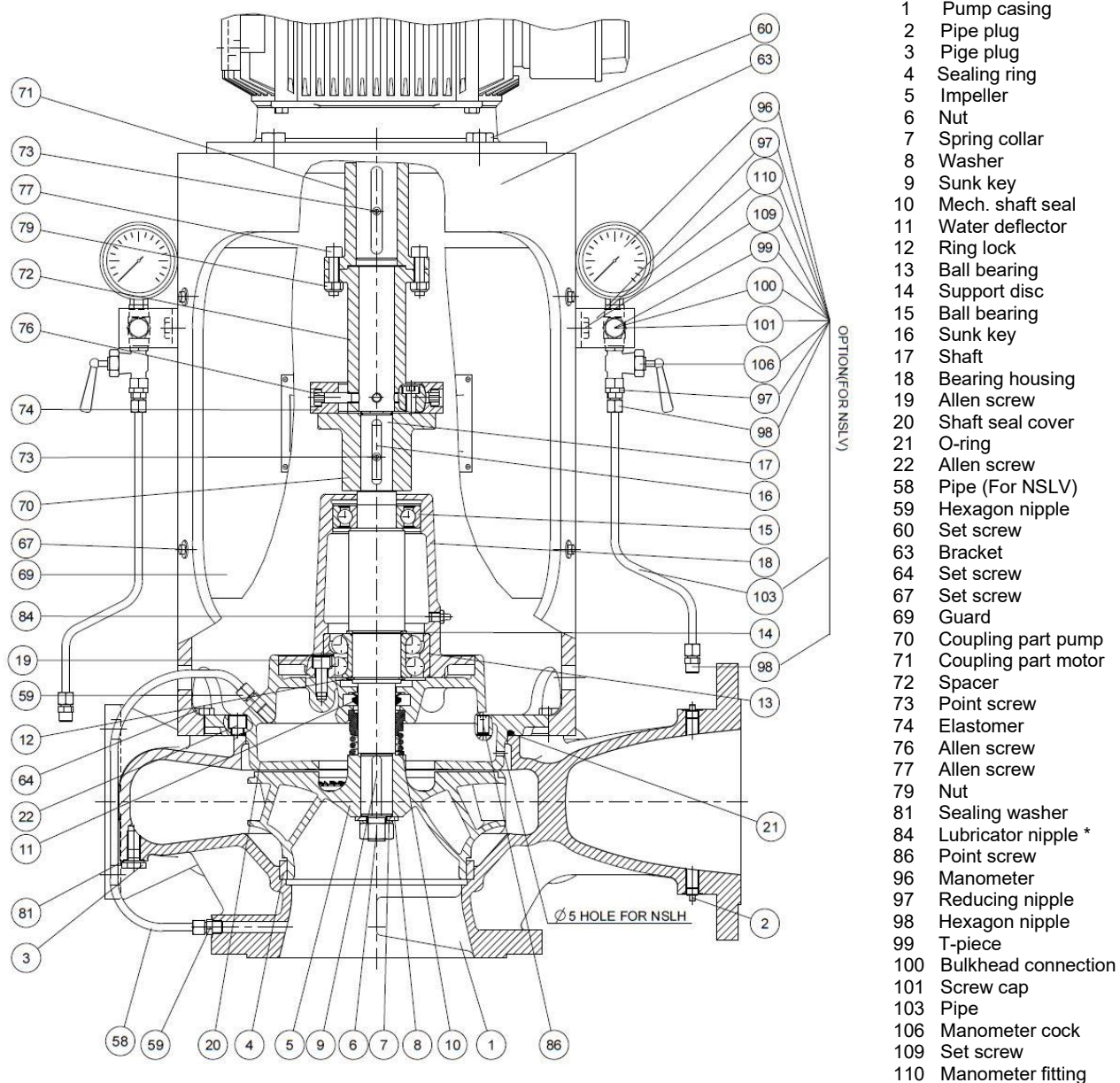
Henrik Mørkholt Sørensen
Managing Director

DESMI Pumping Technology A/S
Tagholm 1, 9400 Nørresundby

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

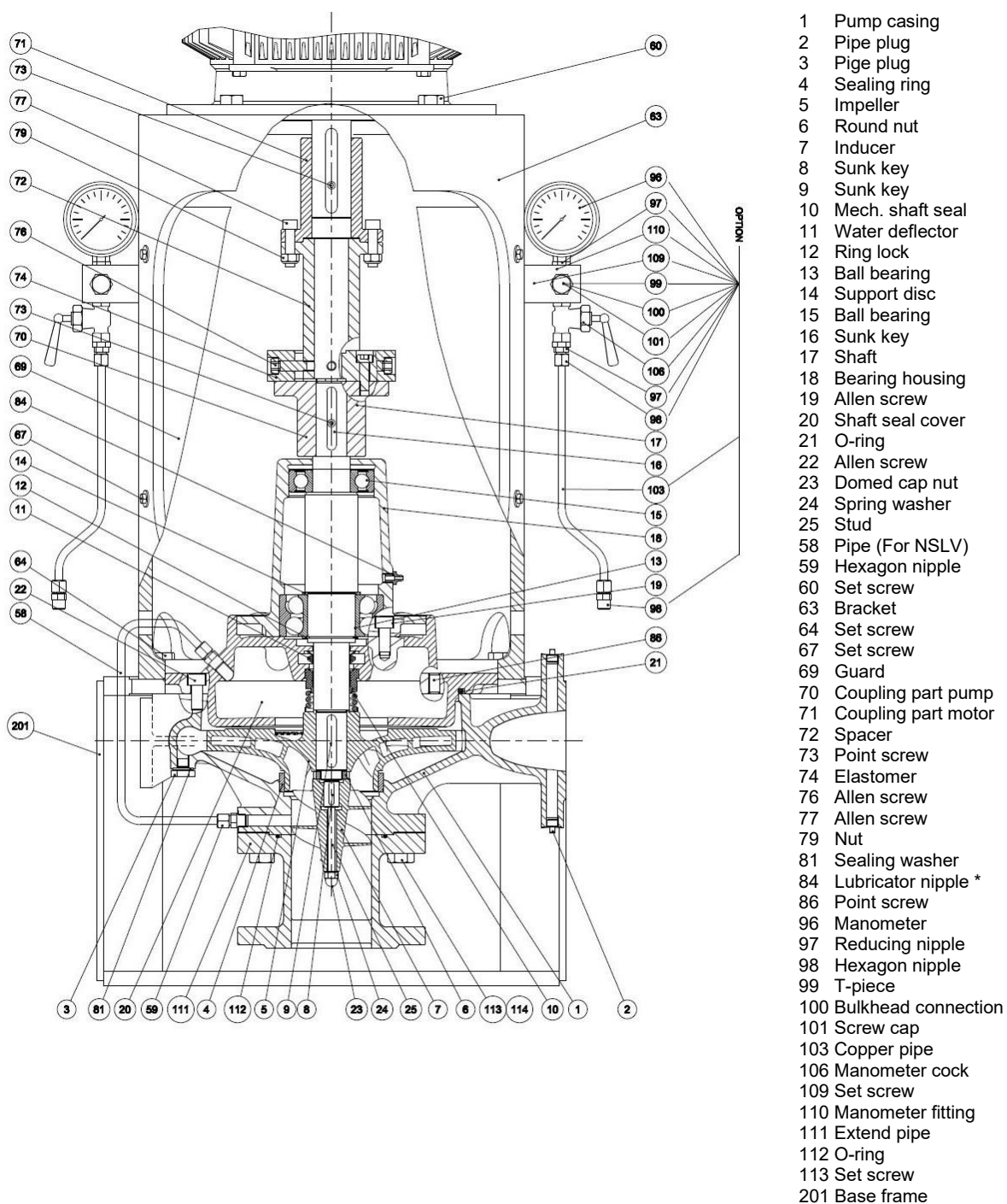
No damage materials are used in DESMI pumps – please refer to DESMI Green Passport (can be sent on request – contact a DESMI sales office) – i.e. common recycling companies can handle the disposal at end-of-life. Alternatively the pump and motor can be returned to DESMI at end-of-life for safe recycling.

17. ASSEMBLY DRAWING AND SPARE PARTS LIST Ø215/265



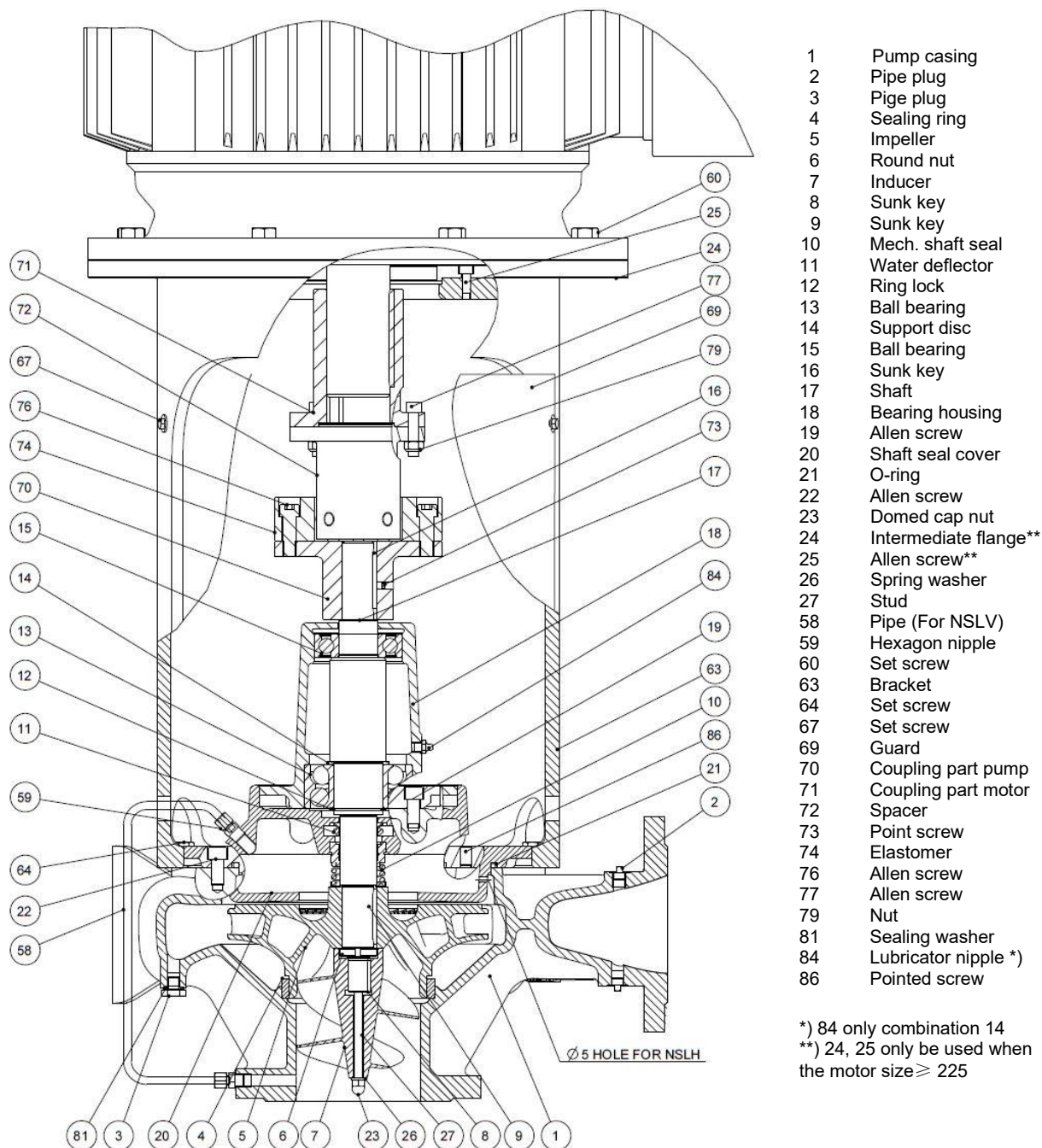
*) 84 only combination 14

18. ASSEMBLY DRAWING AND SPARE PARTS LIST 65-265 WITH INDUCER

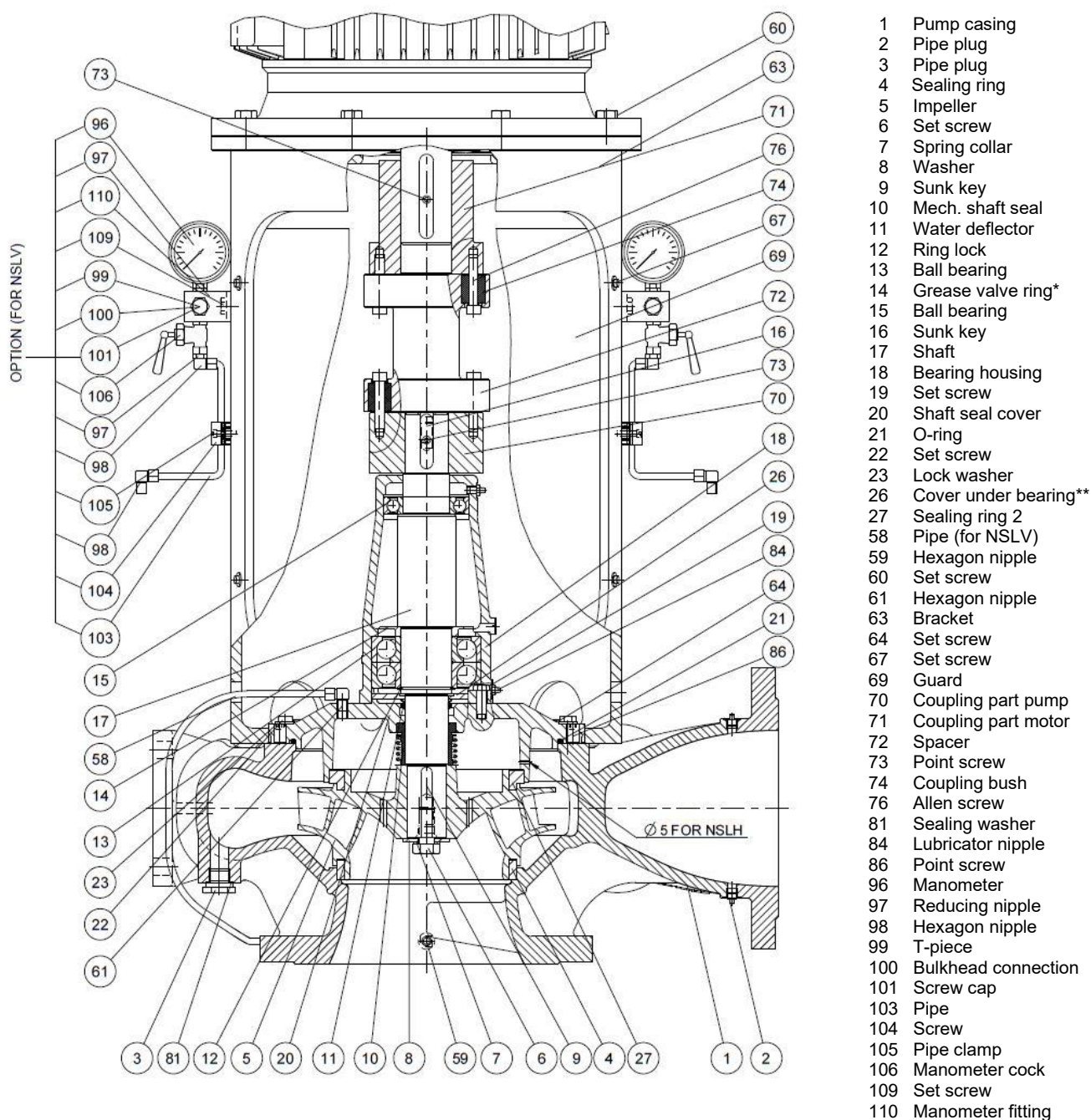


*) 84 only combination 14

19. ASSEMBLY DRAWING AND SPARE PARTS LIST 100-265 WITH INDUCER



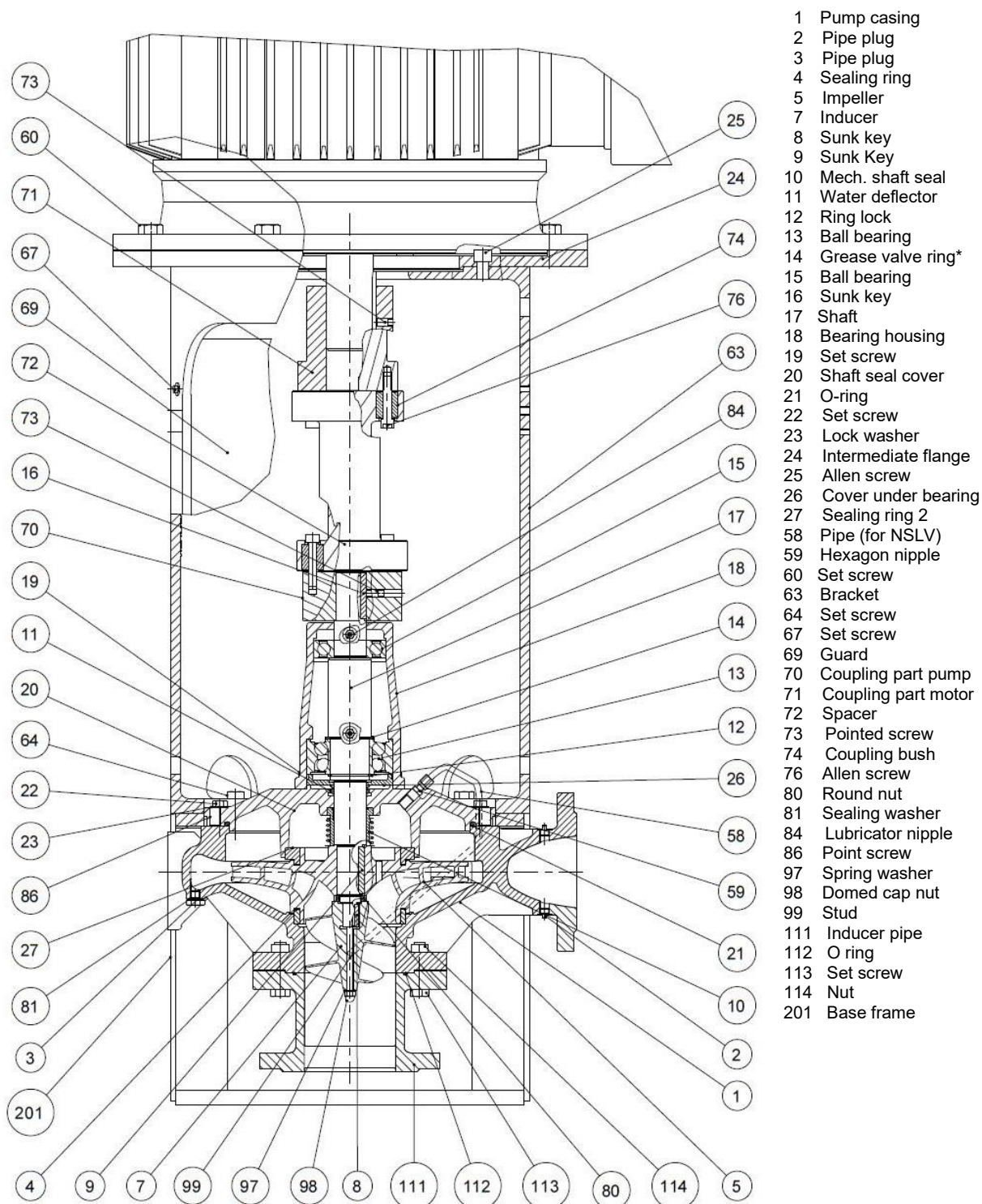
20. ASSEMBLY DRAWING AND SPARE PARTS LIST Ø330/415/465



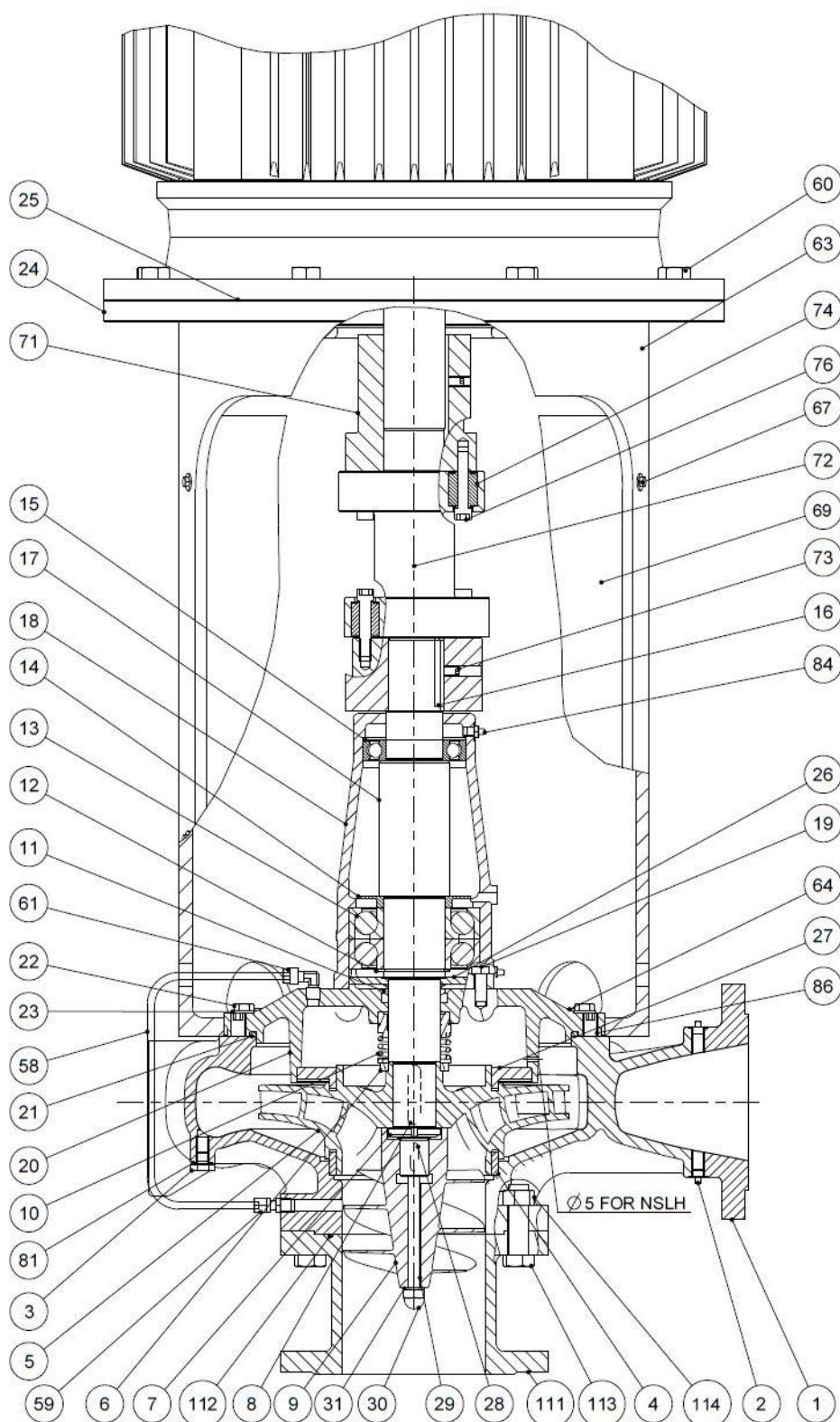
*) Support disc in comb. 13.

**) Option -See Appendix A

21. ASSEMBLY DRAWING AND SPARE PARTS LIST 100-330, 100-415 AND 100-465 WITH INDUCER



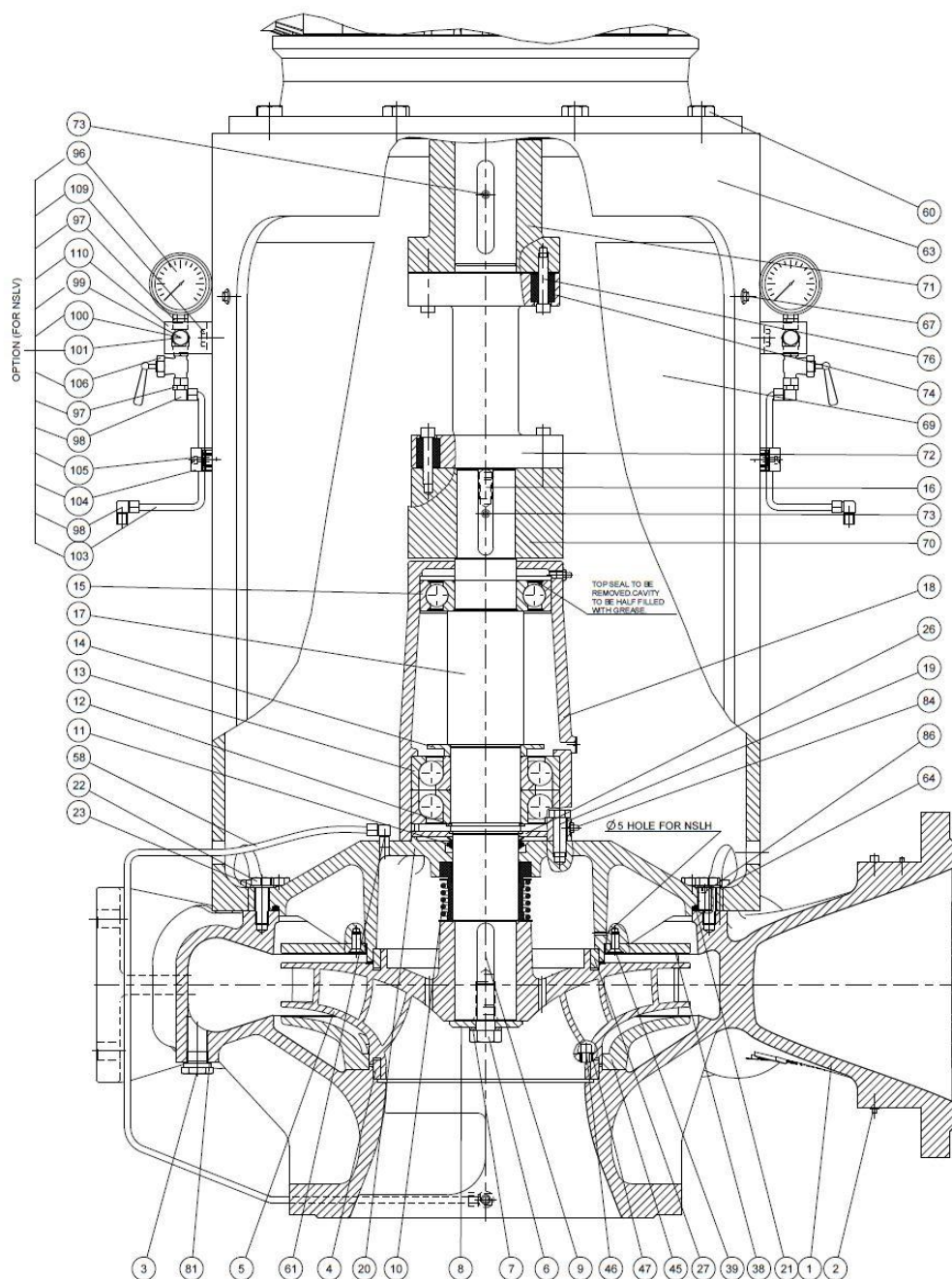
22. ASSEMBLY DRAWING AND SPARE PARTS LIST 125-330 WITH INDUCER



- 1 Pump casing
- 2 Pipe plug
- 3 Pipe plug
- 4 Sealing ring
- 5 Impeller
- 6 Stop ring
- 7 Round nut
- 8 Sunk key
- 9 Inducer
- 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
- 28 Sunk key
- 29 Stud
- 30 Domed cap nut
- 31 Spring washer
- 58 Pipe (for NSLV)
- 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 Point screw
- 74 Coupling bush
- 76 Allen screw
- 81 Sealing washer
- 84 Lubricator nipple
- 86 Point screw
- 111 Inducer pipe
- 112 O ring
- 113 Set screw
- 114 Nut

*) Support disc in comb. 13.

23. ASSEMBLY DRAWING AND SPARE PARTS LIST Ø525

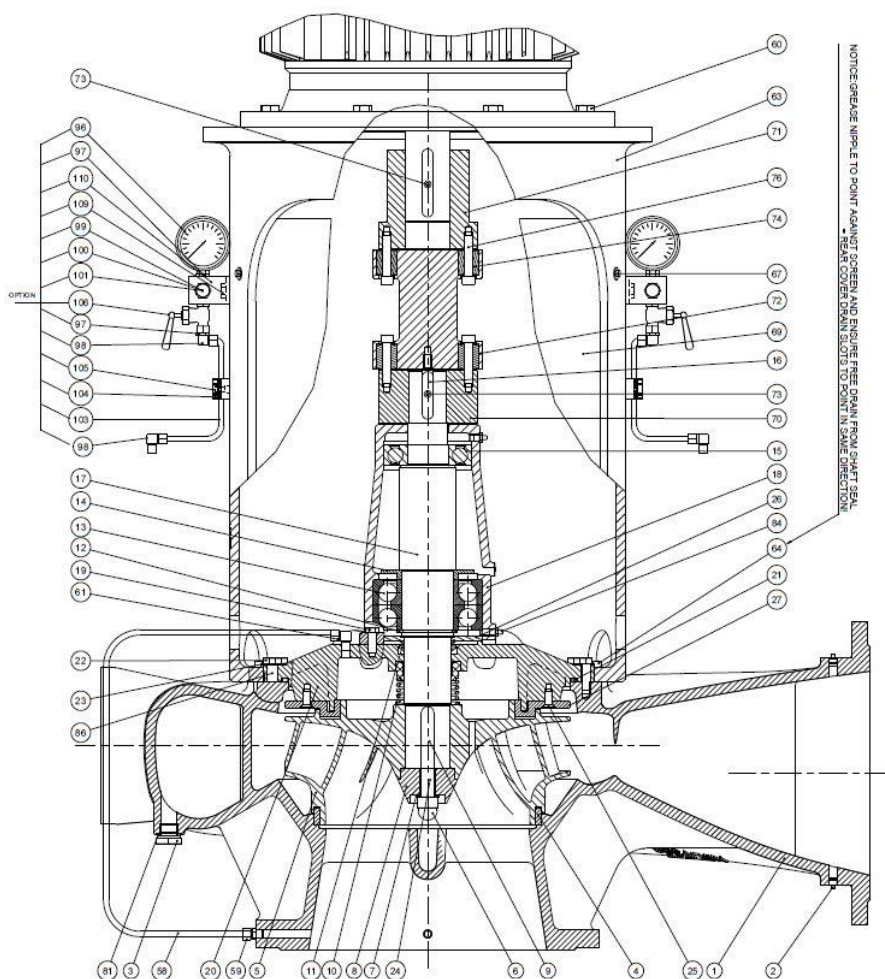


- 1 Pump casing
- 2 Pipe plug
- 3 Pipe plug
- 4 Sealing ring
- 5 Impeller
- 6 Set screw
- 7 Spring collar
- 8 Washer
- 9 Sunk key
- 10 Mech. shaft seal
- 11 Water deflector
- 12 Ring lock
- 13 Ball bearing
- 14 Grease valve ring*
- 15 Ball bearing
- 16 Sunk key
- 17 Shaft
- 18 Bearing housing
- 19 Set screw
- 20 Shaft seal cover
- 21 O-ring
- 22 Set screw
- 23 Lock washer
- 26 Cover under bearing
- 27 Sealing ring 2
- 38 Guide plate
- 39 Sunk screw
- 45 Guide plate**
- 46 Allan screw**
- 47 Washer**
- 58 Pipe (for NSLV)
- 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 Point screw
- 74 Coupling bush
- 76 Allen screw
- 81 Sealing washer
- 84 Lubricator nipple
- 86 Point screw
- 96 Manometer
- 97 Reducing nipple
- 98 Hexagon nipple
- 99 T-piece
- 100 Bulkhead connection
- 101 Screw cap
- 103 Copper pipe
- 104 Screw
- 105 Pipe clamp
- 106 Manometer cock
- 109 Set screw
- 110 Manometer fitting

*) 14 Support disc in comb. 13.

**) 45, 46 and 47 only in NSLV and NSLV300-525

24. ASSEMBLY DRAWING AND SPARE PARTS LIST 300-418

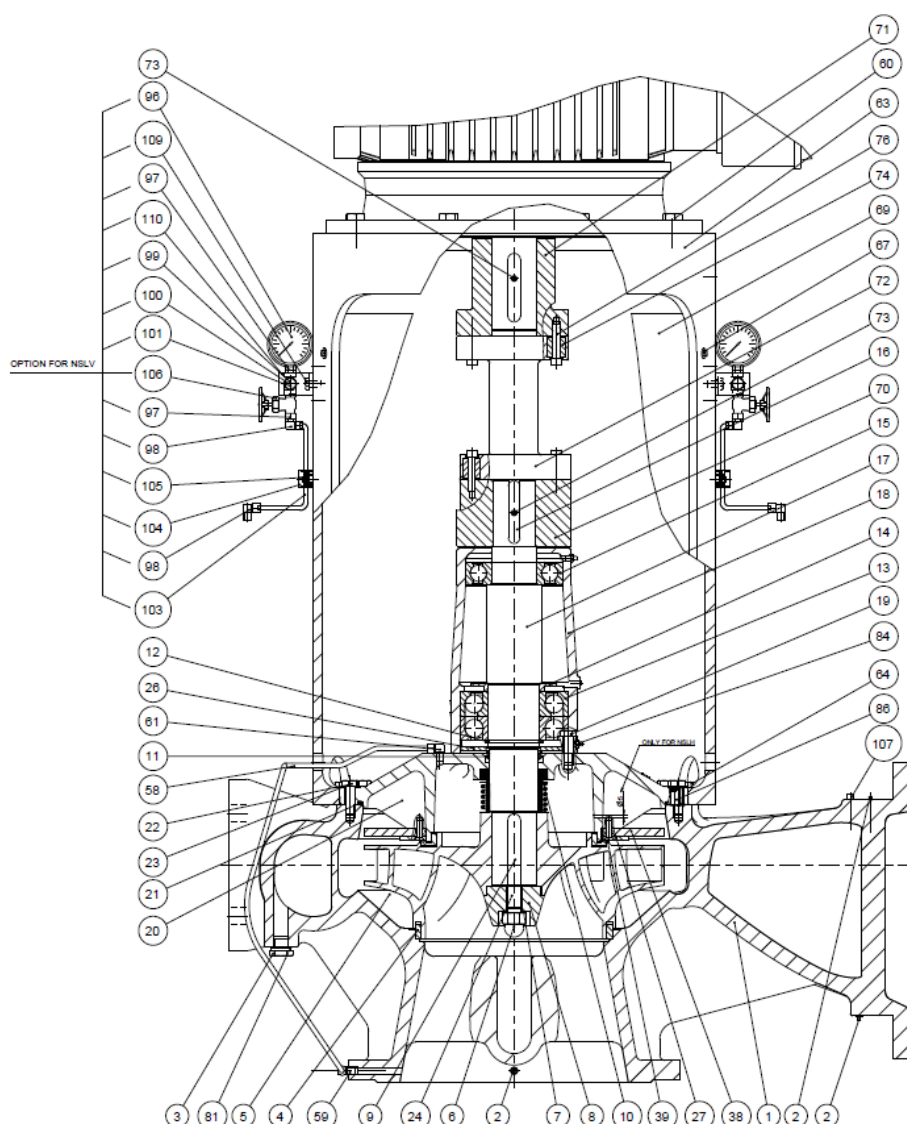


- 1 Pump casing
- 2 Pipe plug
- 3 Pipe plug
- 4 Sealing ring
- 5 Impeller
- 6 Set screw
- 7 Spring collar
- 8 Washer
- 9 Sunk key
- 10 Mech. shaft seal
- 11 Water deflector
- 12 Ring lock
- 13 Ball bearing
- 14 Grease valve ring*
- 15 Ball bearing
- 16 Sunk key
- 17 Shaft
- 18 Bearing housing
- 19 Set screw
- 20 Shaft seal cover
- 21 O-ring
- 22 Set screw
- 23 Lock washer
- 24 Stud
- 25 Sunk screw
- 26 Cover under bearing**
- 27 Sealing ring 2
- 58 Pipe (for NSLV)
- 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 Point screw
- 74 Coupling bush
- 76 Allen screw
- 81 Sealing washer
- 84 Lubricator nipple
- 86 Point screw

*) 14 Support disc in comb. 13.

**) Option -See Appendix A

25. ASSEMBLY DRAWING AND SPARE PARTS LIST 350-525

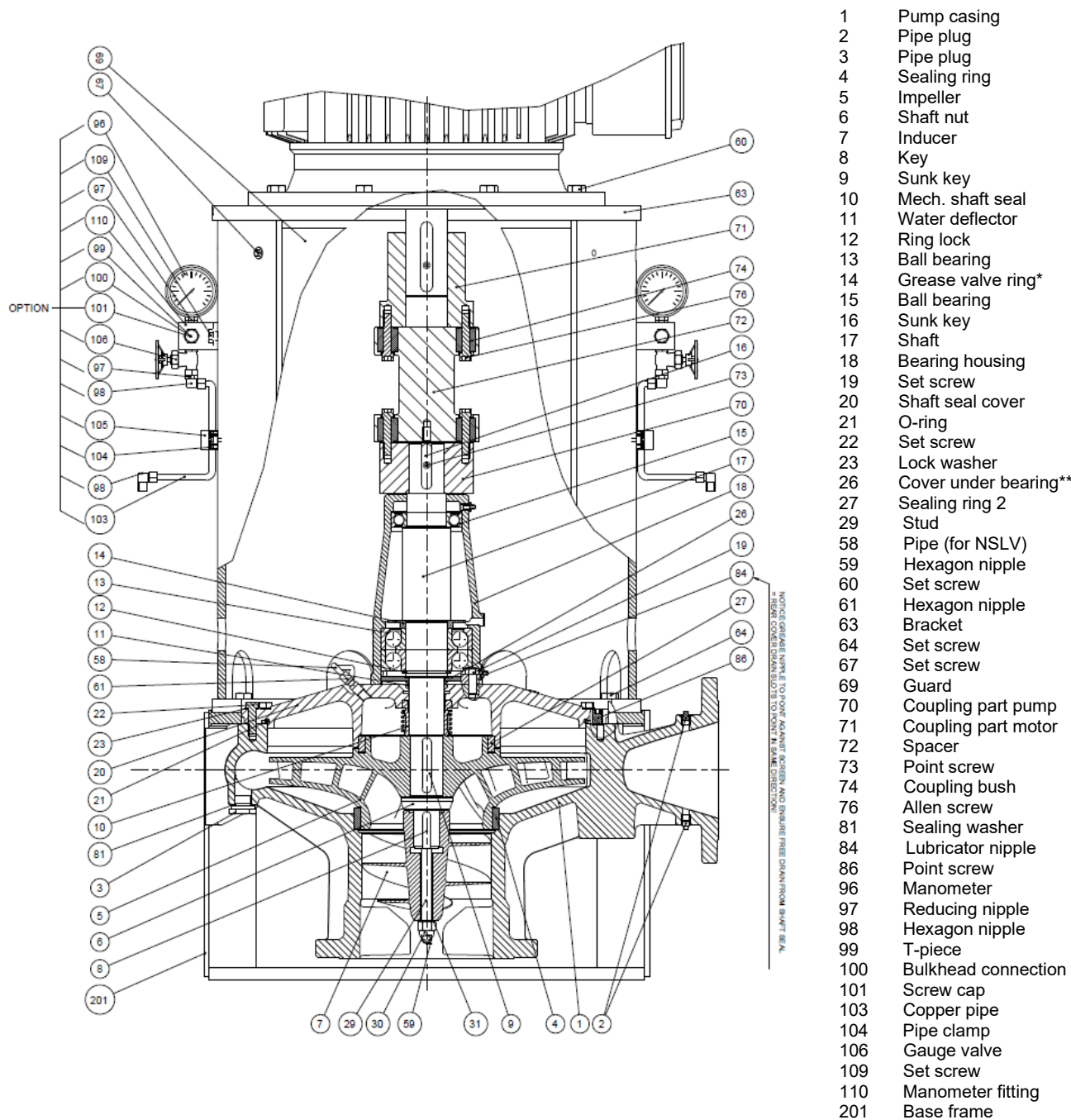


- 1 Pump casing
- 2 Pipe plug
- 3 Pipe plug
- 4 Sealing ring
- 5 Impeller
- 6 Domed cap nut
- 7 Spring collar
- 8 Washer
- 9 Sunk key
- 10 Mech. shaft seal
- 11 Water deflector
- 12 Ring lock
- 13 Ball bearing
- 14 Grease valve ring*
- 15 Ball bearing
- 16 Sunk key
- 17 Shaft
- 18 Bearing housing
- 19 Set screw
- 20 Shaft seal cover
- 21 O-ring
- 22 Set screw
- 23 Lock washer
- 24 Stud
- 26 Cover under bearing**
- 27 Sealing ring 2
- 38 Guide plate
- 39 Sunk screw
- 58 Pipe (for NSLV)
- 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 Point screw
- 74 Coupling bush
- 76 Allen screw
- 81 Sealing washer
- 84 Lubricator nipple
- 86 Point screw
- 96 Manometer
- 97 Reducing nipple
- 98 Hexagon nipple
- 99 T-piece
- 100 Bulkhead connection
- 101 Screw cap
- 103 Copper pipe
- 104 Pipe clamp
- 105 Allen screw
- 106 Gauge valve
- 109 Set screw
- 110 Manometer fitting

*) 14 Support disc in comb. 13.

**) Option -See Appendix A

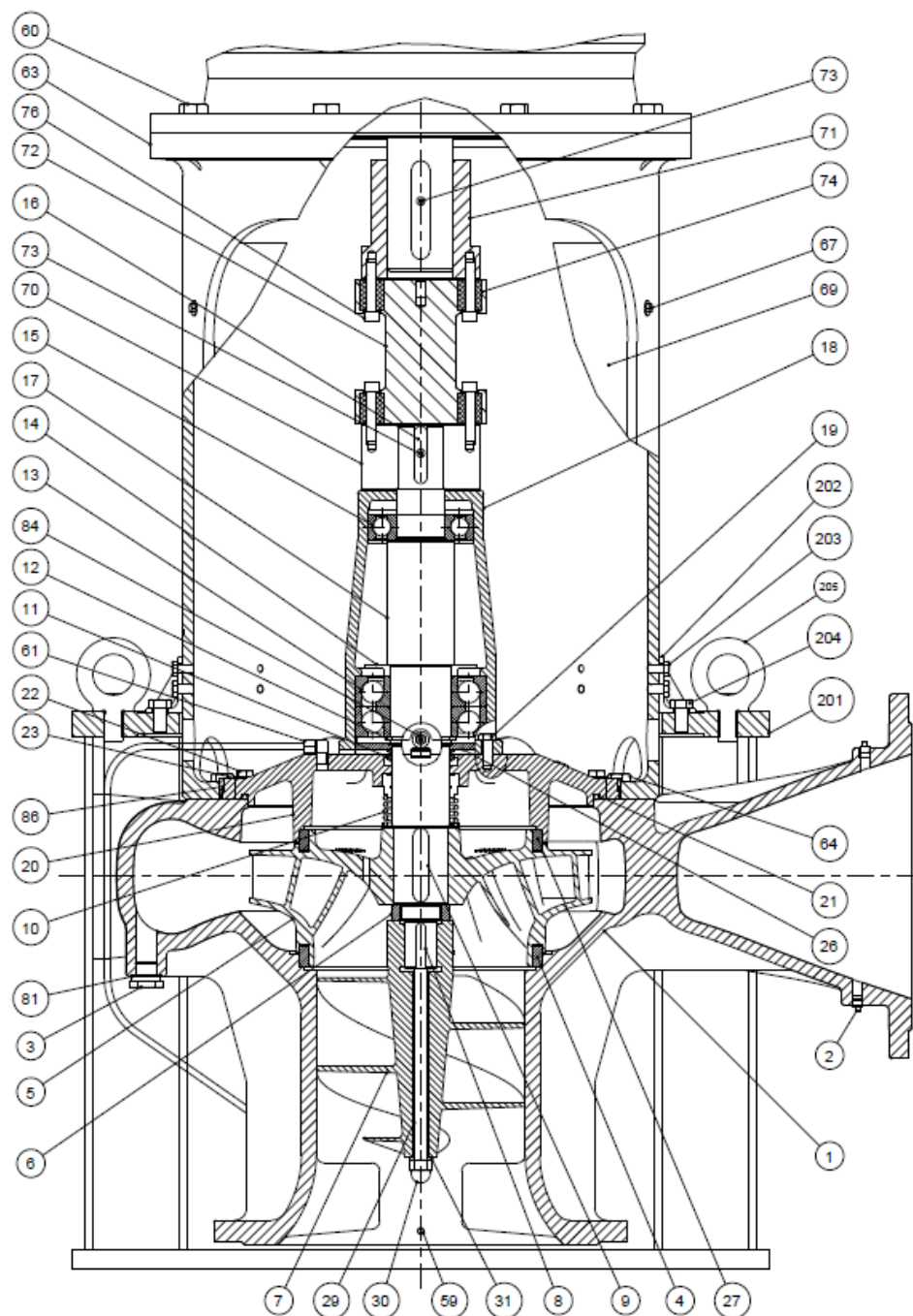
26. ASSEMBLY DRAWING AND SPARE PARTS LIST 150-465 WITH INDUCER



*) Support disc in comb. 13.

**) Option -See Appendix A

27. ASSEMBLY DRAWING AND SPARE PARTS LIST 300-415 WITH INDUCER

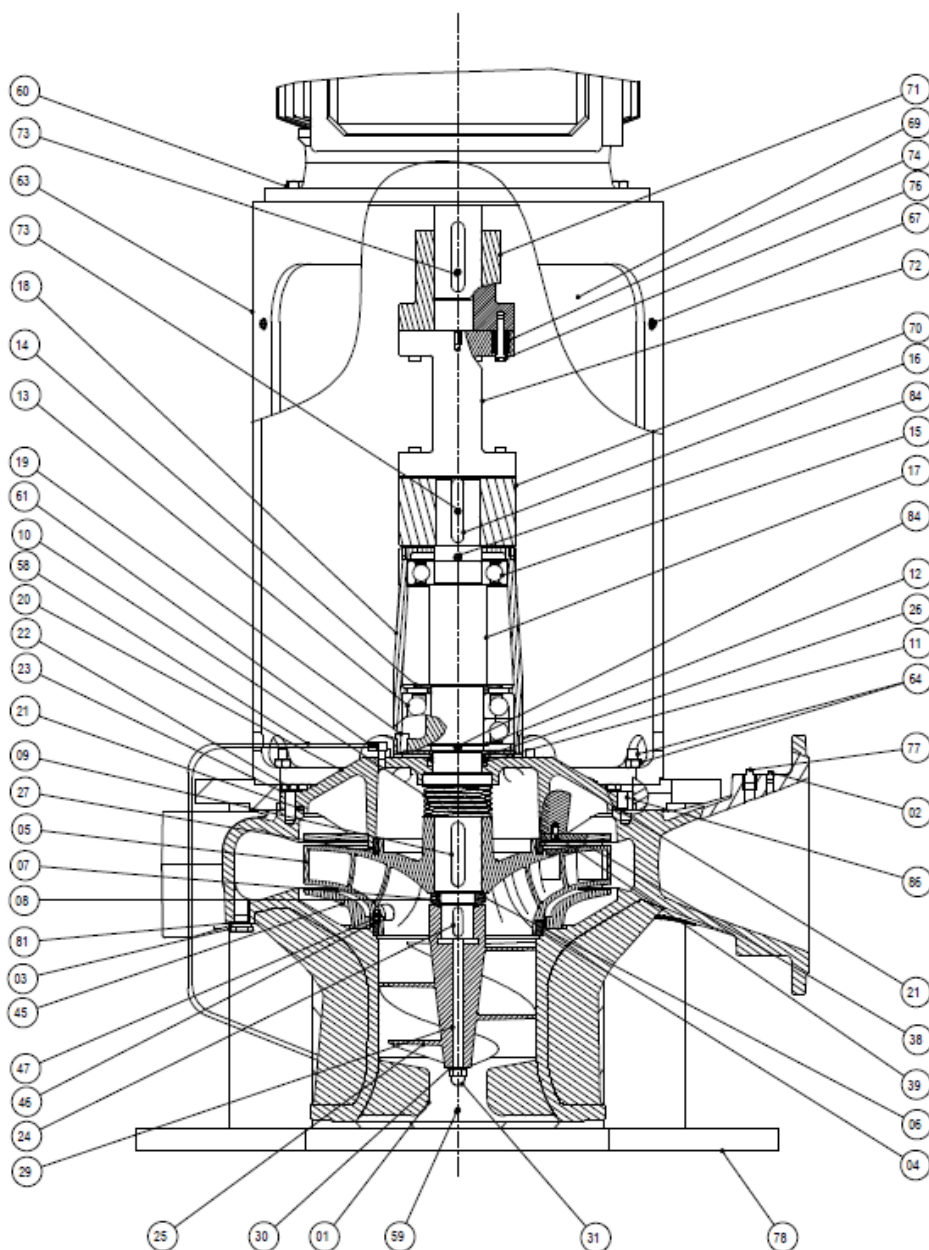


- 1 Pump casing
- 2 Pipe plug
- 3 Pipe plug
- 4 Sealing ring
- 5 Impeller
- 6 Shaft nut
- 7 Inducer
- 8 Sunk key
- 9 Sunk key
- 10 Mech. shaft seal
- 11 Water deflector
- 12 Ring lock
- 13 Ball bearing
- 14 Grease valve ring*
- 15 Ball bearing
- 16 Sunk key
- 17 Shaft
- 18 Bearing housing
- 19 Set screw
- 20 Shaft seal cover
- 21 O-ring
- 22 Set screw
- 21 Lock washer
- 22 Cover under bearing**
- 23 Sealing ring 2
- 29 Stud
- 30 Nut
- 31 Washer
- 58 Pipe (for NSLV)
- 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 Point screw
- 74 Coupling bush
- 76 Allen screw
- 81 Sealing washer
- 84 Lubricator nipple
- 86 Point screw
- 201 Base frame
- 202 L support
- 203 Set screw
- 204 Set screw
- 205 Eye bolt

*) 14 Support disc in comb. 13.

**) Option -See Appendix A

28. ASSEMBLY DRAWING AND SPARE PARTS LIST NSLV200-525C&300-525B WITH INDUCER



- 1 Pump casing
- 2 Pipe plug
- 3 Pipe plug
- 4 Sealing ring
- 5 Impeller
- 6 Shaft nut
- 7 Plastic ball
- 8 Point screw
- 9 Sunk key
- 10 Mech. shaft seal
- 11 V-ring
- 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 Rear cover
- 21 O-ring
- 22 Set screw
- 23 Washer
- 24 Sunk key
- 25 Inducer
- 26 Cover under bearing
- 27 Sealing ring 2
- 29 Stud
- 30 Washer
- 31 Nut
- 38 Guide plate
- 39 Allen screw
- 45 Guide plate
- 46 Allen screw
- 47 Washer
- 58 Pipe (for NSLV)
- 59 Hexagon nipple
- 60 Set screw
- 61 Hexagon nipple
- 63 Bracket
- 64 Stud&Nut
- 67 Set screw
- 69 Guard
- 70 Coupling part pump
- 71 Coupling part motor
- 72 Spacer
- 73 Point screw
- 74 Coupling bush
- 76 Allen screw
- 78 Base frame
- 81 Sealing washer
- 84 Lubricator nipple
- 86 Point screw

**) Option -See Appendix A

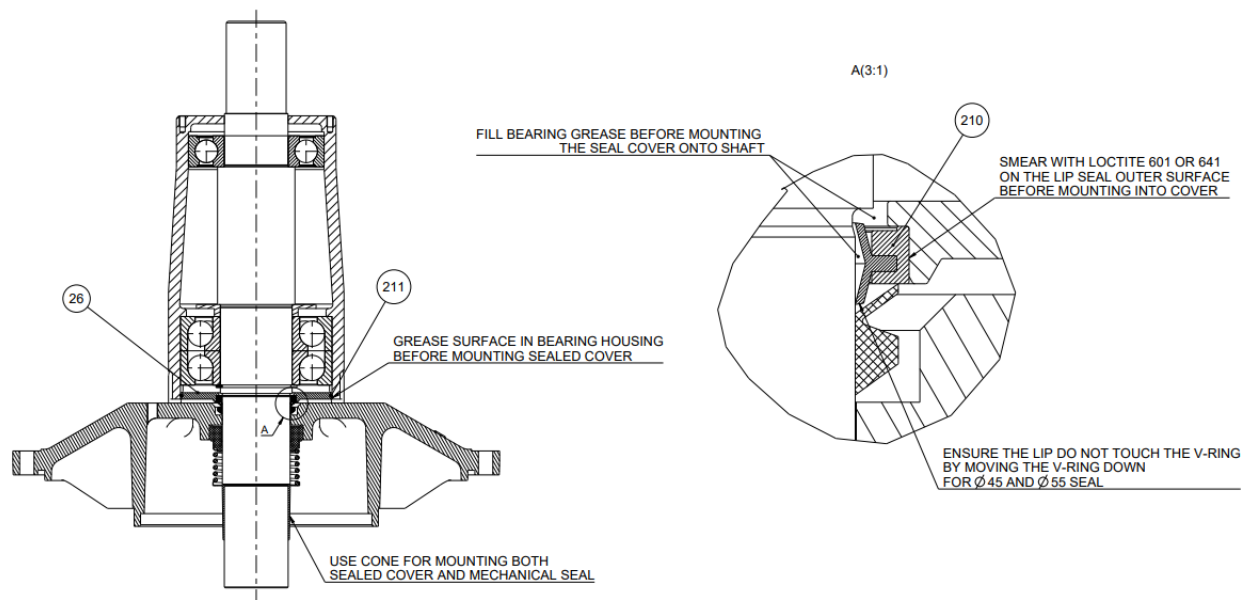
29 DIMENSIONAL SKETCH.

Please require a dimensional sketch of the actual pump from DESMI

APPENDIX A

Assembly drawing of Lip seal kit in cover under bearing.

- The lip seal kit is optional.



SPARE PARTS LIST

- 26 Cover under bearing
- 210 Lip Seal
- 211 O-ring