DOUBLE SUCTION CENTRIFUGAL PUMP WITH HORIZONTAL SHAFT

INSTALLATION, OPERATION, MAINTENANCE, and REPAIR GUIDE





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DOUBLE SUCTION CENTRIFUGAL PUMP WITH HORIZONTAL SHAFT INSTALLATION, OPERATION, MAINTENANCE, and REPAIR GUIDE

PURPOSE OF USER MANUAL

- To convey the instructions regarding the pump's installation, maintenance, and repair.
- To explain the pump's starting, operating, and stopping methods.

SAFETY SIGNS



Safety measures that can cause lifethreatening if not implemented

Warnings on electric current

Safety instructions, which, if not followed, may damage the machine and its operation.

Notes or instructions make work easier and ensure reliable operation

GENERAL INSTRUCTIONS



▶ Responsible personnel should be experienced and have knowledgeable about safety-related standard

- To prevent misuse of the pump, the instructions given in this manual should be carefully studied and strictly followed at every stage of the pump's assembly and operation.
- ► The user is responsible for the control and assembly to be carried out by authorized and qualified personnel who have thoroughly studied this manual.
- ► The pump should never be operated outside the operating conditions given in the purchase order. Because the operating conditions given in the purchase order were taken into account in the selection of the pump material and the testing of the pump.
- If the pump needs to be operated outside of the conditions specified in the purchase order, please contact with DUYAR PUMP. DUYAR PUMP does not accept any responsibility for the damages that may arise from the operation of the pump outside the specified conditions without written approval.
- If the dispatched pump is not to be installed immediately, it should be stored in a clean, dry place where the ambient temperature does not change much. Extremely low or high temperatures can cause serious damage to the pump if proper precautions are not taken.
- ► DUYAR PUMP does not accept warranty responsibilities for repairs or changes made by the user or other unauthorized persons.
- This manual does not cover the safety rules applicable at the place of use.

SAFETY INSTRUCTIONS



To avoid damage to body and/or material damage, strictly follow the instructions below.

- Operate the pump only under the specified operating conditions
- The tension, contraction and weights in the pipe system should never be transferred to the pump.
- Electrical connections related to the motor and auxiliary elements must be made strictly in accordance with local rules and by authorized
- No work should be done on the pump without stopping the pump group completely.



Before doing any work on the pump, always disconnect the power from the motor and make sure that no accidental connection is made.

- Any work on the pump must always be carried out by at least two personnel.
- The clothes of the personnel who will work on the pump must always be suitable for the work they will do and/or the person must use the necessary safety equipment.
- Never work on the pump when it is hot.

Never touch with pumps and pipes hotter than 80 °C. Do not touch with bare hands. Appropriate precautions should be taken to warn user elements (eg, using warning signs, barricades).

- Always exercise caution when working on pumps that pump hazardous liquids (such as acids or hazardous fluids).
- Never work on the pump while the pump and the pipes connected to the pump are under pressure.
- When works on the pump are completed, put all the previously removed safety guards back in their places.
- ► Never run the pump in reverse direction.
- Do not place hands or fingers into the holes or cavities of the pump.
- Do not walk on the pump and/or pipes connected to the pump.



1. GENERAL DESCRIPTION OF THE PUMP

1.1- Description of the Pump

• DSP series pumps are centrifugal pumps with horizontal shaft, single stage, axially split body and double suction impellers.

1.2 Application Areas

DNP series pumps are suitable for pumping clean or slightly polluted (max . 20 mg/dm³) liquids with low viscosity and fluid with temperature up to $80\,^{\circ}$ C. Among others, the main application areas are:

- Water supply, water treatment and irrigation systems,
- Heating and cooling systems,
- Water supply and circulation systems in industrial facilities,
- Fire extinguishing systems,
- Güç istasyonları,

1.3 Nomenclature of the Pump



1.4 Pump Labeling

• Pump information is indicated.



1.5 Technical Information

Speed	: up to 3600 rpm
Compression Flange	: DN 32 DN 400 mm
Suction Flange	: TS ISO 7005-2 / PN 16
Compression Flanges	: TS ISO 7005-2 / PN 25
Operating Temperature	: from 20°C to + 80°C
Ambient Temperature	: 40°C
Body Pressure (max .)	: 16 bar -25 bar
Pumpable Liquids	: See Section 1.2

The useful life of this product as determined and announced by the Ministry is 10 years.

2. UNPACKING, HANDLING AND STORAGE

2.1 Unpacking

- Check the packaging for damages during transportation.
- Carefully remove the packaged pump and accessories (if any). Check if they are damaged during transportation.
- If there is any damage during transportation, immediately notify DUYAR PUMP SERVICE DEPARTMENT and TRANSPORT COMPANY.
- Check if all materials in the shipping list have been sent. If there is any missing material, notify the DUYAR PUMP SERVICE DEPARTMENT immediately.
- The protective liquids for transportation purposes remaining in the pump should be cleaned properly.

2.2 Transportation

2.2.1 General warnings



- Strictly follow the rules in the workplace in order not to cause accidents.
- Wear gloves, hard-toed shoes and a helmet during transport work.
- Depending on its volume, weight and construction, forklifts, cranes or hoists can be used to lower wooden cases, packages, pallets or boxes.

2.2.2 Uninstallation



- Before lifting and transporting the pump and motor group on the pump or common chassis, determine the following points:
- Total weight and center of gravity,
- Largest external dimensions ,
 - Locations of lifting points.

The load lifting capacity must be suitable for the weight of the pump or pump group.

- The pump or pump assembly should always be lifted and transported in a horizontal position.
- Kesinlikle kaldırılan yükün altında veya yakınında durulmamalıdır.
- The load should not be kept lifted for longer than required.
- Acceleration and braking operations during lifting must be done in a way that does not pose a danger to the working elements.



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In order not to cause deformation of the pump or pump unit, it should be lifted as shown in Figure 2.2.2 A or Figure 2.2.2 B. (The motor mount ring should never be used when lifting the entire group).



2.3 Storage

- If the pump is not to be installed immediately, it should be stored in a clean, dry place where there is no danger of frost and the ambient temperature does not change much.
- If the motor bearings are of the greased type, extra grease must be applied to prevent moisture from entering the bearings around the shaft.
- Necessary precautions should be taken to protect the pump from moisture, dust, dirt and foreign substances.
- The pump shaft should be rotated by hand from time to time (once a week) to avoid pitting on the bearing surfaces and to prevent the pump from jamming.

3. ON-SITE INSTALLATION

CAUTION

On-site assembly should be done in accordance with EN 60204-1 Standard.

- Only qualified personnel should assemble, balance and adjust the pump.
- Incorrect installation may cause malfunctions. These situations are not covered by the warranty.

3.1 Bare Pump

- If the pump is purchased as a bare pump, then a suitable chassis must be made on which the pump and motor group will be attached.
- The chassis must be designed and manufactured with a strength to prevent vibration and deformation as well as coupling must be selected before assembling the group.
- The following points must be taken into account during motor selection:

► The maximum power the pump draws in its entireoperating range,

- Operating speed of the pump,
- A current power source (frequency, voltage, etc.),
- Engine type (TEFC, Ex-proof, etc.),
- ► Motor connection shape (footed, flanged, horizontal vertical, etc.).
- When choosing the coupling, the nominal motor power and speed must be taken into account.

3.2 Preparation for Installation

Before assembling the pump;

- Suction and discharge flanges must be cleaned thoroughly.
- The protective layer on the pump shaft should be removed.
- During the temporarily storing of the pump, the grease must be completely removed from the bearings with grease, the oil in the liquid oil bearings must be completely drained and the bearings must be re-lubricated after a thorough cleaning with a suitable cleaner. (Note: this operation is not required for bearings lubricated for the whole service life).

3.3 Mounting Location

CAUTION

The pump should be installed in a wellventilated area that is free from frost and explosion hazard.

- There must be sufficient space around the installed pump for easy access to and maintenance of the pump, and sufficient space above the pump to lift the pump when necessary.
- The pump suction pipe should be as short as possible.

3.4 Pump Foundation



Care must be taken in the preparation of the pump foundation and the on-site assembly of the pump group. Incorrect and careless assembly causes early wearing of pump parts and pump failures.

 The pump foundation must be heavy enough to absorb vibrations and strong enough to prevent bending and misalignment. Prior to the installation of the pump, the base mass concrete must have completely solidified and gained resistance (completed its setting time). The concrete surface must be completely horizontal and very smooth.

3.5 Assembly

- Place the pump group on the foundation concrete. Check the horizontality of the pump by placing a spirit level on the outlet flange. As seen in Figure 3.5, use steel wedges to ensure that it becomes fully horizontal.
- Slightly tighten the anchor deflections.
- Check the coupling adjustment as described in Section 3.6A.
- Fill the inside of the chassis with concrete. Pay attention that there is no air gap in the concrete and that it integrates with the foundation concrete.
- Wait for the concrete to set (at least three days).
- Tighten the anchor studs. Check the coupling adjustment again, if necessary, adjust it again.



Şekil 3.5 Placing the chassis and wedges on the foundation concrete



3.6 Coupling Adjustment

- CAUTION After the assembly of the chassis and the plumbing connections, the coupling adjustment must be checked for the last time. Because it is the buyer's responsibility to set up the whole system properly.
- CAUTION "Coupling adjustment" is to ensure that the motor and pump rotation axes are on the same line. If DSP type pumps are ordered with motor and chassis, they are shipped with the coupling settings made in our factory. However, this setting can be easily disturbed during transportation, handling, on-site installation and piping. Therefore, it is absolutely necessary to re-adjust the coupling after the

assembly is mounted, regardless of the factory setting.



 The most important factor in the trouble-free operation of the pump group is correct coupling adjustment. The main cause of many problems such as vibration, noise, bearing heating, and overloading is the an unadjusted or poorly adjusted couping. For this reason, the clutch adjustment should be done very well and should be checked frequently.



Figure 3.6 B Correction of the angular error in the horizontal plane

 A flexible coupling should never be considered as an element that corrects a bad adjustment. A flexible coupling cannot correct a poor axial alignment between the pump and the motor and will not correct excessive misalignment.



Correction of the angular error in the vertical plane

 The main reason for using a flexible coupling is to compensate for expansions/dilatations caused by temperature changes and to allow movement of the shaft ends without friction during power transfer from the motor to the pump.

- In order to adjust the coupling, a smooth-edged piece of metal (steel ruler, gauge, etc.) and a precise caliper are required (special devices should be used for very fine and precise adjustment).
- There may be two kinds of misalignment in the coupling;
 - ▶ angular error
 - ▶ Parallel shift error



Figure 3.6 D Correction of the parallel shift sliding error in the horizontal plane

- To check the angular error, the distance between the two parts of the coupling is measured mutually in the horizontal and vertical planes. The intervals measured at these four points should be equal. (Şekil 3.6. B, 3.6. C)
- •To check the parallelism error, a straight-edged gauge is pressed on one part of the coupling parallel to the axis and the condition of the gauge relative to the other part is checked. The jig should contact both parts at the same time with all its edges. This process should be done in two opposite places in the horizontal and vertical planes. (Fig. 3.6. D, 3.6. E)



Figure 3.6 E Correction of the parallel shift error in the vertical plane

 Adjustment errors may occur in the horizontal and/or vertical plane. Errors in the vertical plane are made by placing thin sheet metal pieces under the pump or motor feet, and errors in the horizontal plane are made by shifting the pump or motor in the horizontal plane by making use of the gaps in the connection holes.



After any changes are made, all settings should be checked again. Because the movement during the adjustment made in one direction may disrupt the adjustment in the other direction.

CAUTION

The final coupling adjustment of the pump should be made at operating temperature. For this, the pump group should be operated for a sufficient time until it reaches the operating temperature, then it should be stopped and the coupling setting should be checked. If the parallel shift error is more than 0.1 mm, readjustment must be made again.



3.7 Installation of Piping

CAUTION Never use the pump as a support point or carrier for piping.

• The piping system should be supported close to the pump. (Figure 3.7A. 3.7B) It should be checked that the tension and contractions in the pipe system and the weight of the system do not affect the pump. For this, after the assembly of the piping is completed, the suction and discharge flanges of the pump must be It should be checked whether the pipe system exerts any stress on the pump by losening the bolts.

The piping system should be supported close to the pump. It should be checked that the tension and contractions in the pipe system and the weight of the system do not affect the pump. For this, after the installation of the piping is completed, the suction and discharge flanges of the pump must be It should be checked whether the pipe system exerts any stress on the pump by loosening the bolts.

• The nominal diameters of the suction and discharge flanges of the pump shall not be indicators of the correct size of the suction and pressure pipes. The nominal diameter of the pipes and accessories used must be at least equal to or larger than the pump mouth diameters. Pipes and accessories smaller than the diameter of the pump mouth should never be used. Especially the ones with a large free passage area should be preferred for the elements such as foot flap, strainer, strainer filter and checkvalve. Generally, flow rates should not exceed 2m/s in the suction pipe and 3m/s in the pressure pipe. High speeds cause high-pressure drops, which causes cavitation conditions in the suction pipes and excessive friction losses in the pressure pipes.





- Pipe connections must be made with flanges. Flange gaskets must be of suitable material and must be of the appropriate size. Flange gaskets should be centered between flange bolts in such a way that they do not disrupt the flow section.
- Expansion parts should be used in systems operating with excessive vibrations and hot liquids, which will not transfer additional forces that may arise from thermal expansions to the pump.

Substances such as welding burrs, metal particles, sand, lint that may occur during the manufacture of the pipe hardware may remain in the pipe and damage the pump. In order to prevent such substances from entering the pump during assembly operations, the suction and discharge flanges must be closed with non-perforated gaskets. At the end of the assembly, all pipe parts must be disassembled, cleaned and reassembled after painting. If a strainer is used on the suction side of the pump, the strainer should be cleaned after the first few days of operation. DOUBLE SUCTION CENTRIFUGAL PUMP WITH HORIZONTAL SHAFT INSTALLATION, OPERATION, MAINTENANCE, and REPAIR GUIDE

3.7.1 Suction Pipe

- The suction pipe must be absolutely leakproof and must not be arranged in a way that causes air pockets to form. That is, if the pump is fed from a tank higher than itself (suction height/supply installation), the suction pipe should have a slightly descending slope towards the pump (Figure 37 B), and if the pump is fed from a lower tank (suction depth installation), the suction pipe should have a slightly increasing slope towards the pump.(Fig. 37 A)
- In order to keep pipe friction losses as small as possible, sharp bends should not be used, sudden changes in direction and cross-section should be avoided, and the suction pipe should be made as short as possible. If it is necessary to make a cross-section change in a horizontal suction pipe, an eccentric conical spacer with the straight edge at the top should be used (Figure 3.7.2 A)
- If the pump is supplied from a higher tank, there must be an isolation valve in the suction pipe with its axis in the horizontal position. This valve should always be fully open while the pump is running and should never be used as a flow control valve.

CAUTION valve may cause cavitational operation of the pump.

3.7.2 Discharge Pipe

- In order to adjust the flow and head, a control valve should be connected to the discharge pipe as close as possible to the pump.
- If the pump's head is more than 10 m or the discharge line is quite long, a check valve should be connected on the discharge pipe between the pump and the shutoff valve in order to protect the pump against water hammers during standstill or to prevent reverse flow.



Figure3.7.2 B Emme yükseklikli



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3.7.3 Auxiliary pipe connections and accessories

- Depending on the application, auxiliary piping connections (seal/gasket cooling, seal irrigation, seal washing, drainage, etc. required for pump system operation) and/or connection of measuring devices (pressure gauge, temperature gauge) can be used to control working conditions.
- Pressure gauges or vacuum gauges must be connected and securely fastened to the measuring points on the pump flanges or on pipes in close proximity to spiral pipe flanges with a diameter of approximately 8 mm to prevent pressure fluctuations. In order to ensure the safety of the devices, vent valves should be used to avoid isolation and incorrect measurements. (Figure 3.7.3 A).
- There are connection points on the body of each pump to discharge the pump (Figure 3.7.3 B). If desired, these connections can be piped to a drain tank. The pipe used to drain the pump must be equipped with an isolating valve, and both the valve and the pipe must be suitable for the maximum working pressure of the pump.
- The packing cooling, irrigation and flushing pipes must be connected to the designated places on the pump body (Figure 3.7.3 C).





Figure 3.7.3 B

dl: Air Vent .

- d2: Irrigation/watering line pipe.
- d3: Seal water leakage discharge.
- d4: Greaser.
- d5: Pressure gauge (suction).
- d6: Pressure gauge (discharge).
- d7: Discharge

3.8 Minimum Flow



If the pump is likely to operate with the discharge valve completely (i.e. at zero flow) or almost closed (i.e. at very small flow), a minimum flow valve (by-pass valve) should be used on the outlet flange

of pump or on the delivery pipe immediately after the pump but before the control valve. If such a valve is not used and the pump works with a closed valve for a long time, almost all of the power given by the motor is converted into heat energy and passes into the pumped liquid. This can lead to overheating of the pump and, consequently, to serious malfunctions.



DSP SERIES



4.4 Electrical Connections



• Electric motors must be manufactured in accordance with EN 60034-1.

 The protection class of the casings of the motor bodies and control systems in the pump group must comply with at least EN 60529 IP 22. However, operating and environmental conditions must be taken into account in determining the protection class of the electric motors or control systems in the pump group.

- Electrical connections should only be made by authorized electricians. The applicable national regulations and the engine manufacturer's instructions must be followed.
- The safety precautions given in the "Safety Instructions" section should be followed.
- All power connections must be disconnected before starting any work.
- Energy cables must be laid in such a way that they do not touch the piping, pump and motor bodies.
- Check the voltage, phase and frequency values given on the motor nameplate by comparing them with the network values.
- Electric motors must be protected against overload by circuit breakers and/or fuses. Circuit breakers and fuses should be selected in accordance with the full load current given on the motor nameplate.
- PTC (passive in engine) thermal control-thermistor) is recommended, but its use is up to the customer's discretion.
 If PTC is used, its terminals must be connected to the motor terminal box and these must be connected to the thermistor relay in the control panel.
- Before making the electrical connections of the motor, the pump shaft should be rotated by hand to check whether the pump rotor rotates freely.
- Electrical connections should be made in accordance with local electrical codes and motor grounding connection should never be forgotten.
- The motor wiring diagram is in the motor terminal box or in the manual.
- The electrical connection type of the motor varies according to the motor power, power source and connection type. The required connection shapes of the jumpers in the terminal box are given in the Table 1 and Figure 3.8 A, 3.8 B, 3.8 C.

Val Varma Caldi	Engine Power PN ≤4 kW	Engine Power PN >4 kW		
for verme şekir	Power Supply 3 ~ 400 V	Power Supply 3 ~ 400 V		
Direkt	Y – connection (9b)	△ – onnection (9a)		
Y/∆ - start	Impossible	Remove bridges (9c)		
	Tablo 1			



Şekil 3.8 A ∆-bağlantı



Şekil 3.8 B Y-bağlantı



Şekil 3.8 C Y∕∆-bağlantı

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CAUTION

The transition time from star to delta must be be very short in Star / Delta connection motors.

GLong transit time may cause damage to the pump

(Table 2).

Motor power	Y-Setting Time		
≤30 kW	<3 seconds		
>30 kW >5 seconds			
Tablo 2			

3.10 Final Checks

- After completing all the above-mentioned operations, the clutch adjustment should be checked once again in accordance with section 3.6. If it is wrong, it should be corrected.
- The pump rotor should be rotated by hand several times to ensure that it turns freely.
- All safety guards must be fitted.
- After that, the pump group should be started and waited until it reaches normal operating and heating conditions. At the end of this period, the coupling should be adjusted for the last time by stopping the pump and feeding only the bottom of the motor feet with thin metal sheets. It is highly recommended to make the final coupling adjustment at operating temperature.



The pump should never be started until the safety guards are reinstalled. This is a safety and occupational safety rule that must be strictly followed.

4. START/STOP

4.1 Preparation

4.1.1 Oil Control

- The bearings of the pumps lubricated with grease are shipped from the factory filled with grease enough to last at least one year. Before starting the pump for the first time, it should be checked whether dirt enters the pump bearings during transportation and assembly. If the bearings are dirty, they should be thoroughly cleaned and freshly greased.
- If the pump has been waiting for a long time (more than 6 months) before installation, new grease must be applied to the bearings.
- See Chapter 5 on lubrication.

4.1.2 Checking the Packing (See Section 6.1)

4.1.3 Deflation and Impregnation of Pump

- Make sure the pump and suction pipe are completely filled with water. This issue is not a problem for forced-fed pumps. If so, the suction valve shall be opened, the air plugs shall be loosened, the air shall be discharged and finally the pump is completely filled.
- If there is a foot valve in deep suction pumps, the pump is filled with water from the filling hole at its highest point and its air is taken.
- If the system has a vacuum pump, it is ensured that the water rises in the suction pipe and fills the pump with a vacuum pump. When the water reaches the highest level,

CAUTION shall be started. Never let the pump run dry.



4.1.4 Direction of Rotation Control

 DSP type pumps rotate clockwise when viewed from the motor towards the pump. This direction is indicated by an arrow on the pump and pump label. The pump should be started for a very short time and then stopped immediately to check that it rotates in the direction of the arrow. If the safety guard has been removed while performing this operation, it must be reattached immediately.

4.2 Starting the Pump

- Check that the suction valve is open and the discharge valve is closed.
- Turn on the switch and start the engine.
- Wait for the motor to reach full speed.
- Open the discharge valve slowly by observing the ammeter on the panel (Do not open the valve completely if the pressure pipe is empty at the first start, open it in a controlled manner so that the value in the ammeter is below the nominal current value of the motor).
- After fully opening the valve, check whether the value read on the manometer is the value at the operating point. If the value on the manometer is less than the value at the operating point, turn the valve down to the value at the operating point. If you read a larger value on the manometer, recheck your installation and especially your static height.

CAUTION

If any of the following problems are observed while the pump is running at its rated speed, the pump should be stopped immediately and the problem corrected:

- ▶ The pump does not press any water,
- ▶ The pump is not pumping enough water,
- ► Flow rate is decreasing,
- The discharge pressure is not sufficient,
- ► The motor is overloaded,
- ► There is vibration in the pump,
- ▶ Pump too loud working,
- ▶ The beds are excessive _ it is warming up.

4.3 Stopping the Pump

- Close the discharge valve slowly.
- If there is a water hammer prevention device in the discharge line or if the impact is not dangerous, you can stop the pump without closing the discharge valve.
- Stop the engine. Observe that the pump group is standing smoothly and calmly.
- If the packing is externally supplied, turn it off to relieve the pressure in the gasket box.
- If the pump will be out of service for a long time, close the suction valve and auxiliary circuits, if any. If there is a danger of frost and/or if the pump will not be used for a long time, completely empty the water in the pump by opening the drain plugs or take the necessary precautions against the danger of frost.

4.4 Checks During Operation

- The pump should never be allowed to operate without water.
- The pump should run smoothly, quietly, and without vibration.
- The pump should never be operated for a long time in the closed valve position (zero flow).

- All valves of auxiliary systems must be open while the pump is running.
- Water must flow drop by drop from the glands of pumps with soft packing. If the amount of water leaking from the shaft seal has increased after a long period of operation, lightly tighten the gland nuts mutually and slightly to reduce leakage to a droplet level. Check manually to see if the stuffing box is overheating. If the nuts are fully seated, remove all old O-rings, thoroughly clean the gland, and install new O-rings. Make sure the rings are the correct size and length, and their connections are offset from each other.
- Check the flexible parts of the coupling at regular intervals. Replace any worn parts immediately.
- Check the motor current from time to time. If the amperage is higher than usual, the pump may jam or rub. Immediately stop the pump and make the necessary mechanical and electrical checks.
- Keep the backup pumps ready for operation by running them for a short time at least once a week. Check the auxiliary systems of these pumps, if any.

5. LUBRICATION

- DNP type pumps generally use the 'lifetime grease lubricated' or greased rolling bearings.
- The "Lubricant for life" rolling bearings do not require any maintenance.
- Bearing types and dimensions are given in Table 3, depending on the pump size.

Pump Size Group*	Shaft End Diameter (∅)	Bearing Type
A	35	6308 C3
В	42	6310 C3
С	55	6312 C3
D	65	6314 C3
E	75	6317 C3
F	85	6319 C3
G	100	6322 C3
н	105	6324 C3

Tablo 3 5.1 Grease Change Time

(*) See Section 12 for pump size group.

 The grease should be changed after approximately 1500-2000 operating hours. If this operating period is not reached within a year due to intermittent operation, the oil should be changed approximately every 12-15 months. More frequent grease changes can cause overheating and thus shorten bearing life.



The bearing temperature should never rise more than 50°C above the ambient temperature. But it should never exceed 80°C.





6. DISASSEMBLY, REPAIR and ASSEMBLY



Before starting work on the pump, always disconnect the electrical connections and be sure to take the necessary precautions to prevent accidental start-up.

• Strictly follow the instructions given in the "Safety Instructions" section.

6.1 Disassembly of the Pump (Disassembly)

- Close the shut-off valves in the suction and discharge lines. Drain the water inside the pump by opening the bleeder plug (DSP0060) and the drain plug (DSP0066).
- Remove the packing irrigation line pipes (DSP0021).
- Remove the coupling and other safety guards (See Section 13 for Guards).
- Remove the body coupling nuts and centering pins.
- Lift out the rotor and bearing assembly.
- Unscrew the fastening bolts of the bearing covers (DSP0004, DSP0005).
- Separate the bearing housings (DSP003) from the bearings (DSP0018).
- Remove the bearing nuts and washers (DSPO022, DSPO023).
- Remove the bearings (DSP0018) from the shaft (DSP0007)
- Take the splash pad (DSP0017), the short shaft sleeve (DSP0011), the gland packing (DSP0006), the long shaft sleeve (DSP0010), the wear rings (DSP0009), the impeller (DSP0008) and the impeller key (DSP0027).
- Clean all parts, and replace damaged or worn parts.

6.2 Installation of the Pump

- Assembly is done in reverse order of disassembly given in Section 6.1. Attached montage section picture will help you in this regard. Pay particular attention to the following points:
- Never reuse the removed O-rings. Make sure that the new O-rings are the same size as the ones that were removed. During assembly, make sure that the O-rings are properly seated, not crushed, slipped or jammed.
- Check the surfaces of the long shaft sleeves (DSP0077) before installing them. Replace shaft covers with worn, scratched, or rough surfaces.
- Place the bearings on the shaft by slightly heating them or using a press.
- Impermeability on the contact surfaces of the lower and upper bodies of the pump is provided by the DSP flat gasket. These surfaces should be cleaned very well before assembly and then covered with DSP flat gasket. Never use a liquid gasket between these surfaces.

6. Packings

6.1 Soft Packed Pumps

• Before starting the soft packing change, thoroughly clean the gasket box, gland, and shaft bushings.

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- Cut a sufficient number of pieces of appropriate size from the appropriately sized packing diagonally, wrap it on the shaft bush and see that the ends are fully closed.
- Place the first ring with the joint on top and drive it into the gasket box with the help of a glen.
- Place the second ring with the seam side down this time. Thus, install all the packing rings. If there is a water ring in between, replace it.
- Insert the glen and tighten it completely first. Thus, the seals take the shape of the seal bearing. Then loosen the glen. Slightly tighten the shaft by turning it and stop the tightening as soon as the shaft brakes slightly.
- After starting the pump, water should come from the packings drop by drop. The amount of water should not be less than 10 cm3/ min and not more than 20 cm3/ min. Find the appropriate setting by slightly tightening or loosening the glen nuts from each other.
- Check if the temperature of the packing does not increase excessively during the two hours after making the Glen adjustment. The sealing temperature should not exceed 80°C for a pump that delivers ambient temperature water.



7. SPARE PARTS

- DUYAR PUMP guarantees to supply spare parts of DNP type pumps for TEN YEARS from the date of manufacture. So you can always easily get the spare parts you need.
- When ordering spare parts, inform us of the values below written on your pump's label.

Pump type and size Engine power and speed Year of manufacture and serial No. Flow rate and manometric height : (DNP 80-250)

- : (37 kW 2950 d/dak)
- : (2019-0001519)
- : (300 m³/h 30 m)
- If you want to keep spare parts in your warehouse, we recommend the quantities given in Table 4 for two operating years, depending on the number of pumps of the same type.

	Part name		Nu	mber o	of Pum	ps in th	ne Syst	em
Part No.			3	4	5	6-7	8-9	10+
DSP 0007	Shaft (Including Keys)	1	1	2	2	2	3	30 %
DSP 0008	Wheel	1	1	1	2	2	3	30 %
DSP 0009	Wear Ring	4	4	4	6	6	8	50 %
DSP 0018	Bearings	2	2	4	4	6	8	50 %
DSP 0010	Long Shaft Cover	4	4	4	6	6	8	50 %
DSP 0011	Short Shaft Cover	4	4	4	6	6	8	50 %
DSP 0016	Soft Packing (set)	8	8	12	12	12	16	40 %
DSP 0077	Body O-Rings	4	6	8	8	9	12	150 %

Tablo 4



DOUBLE SUCTION CENTRIFUGAL PUMP WITH HORIZONTAL SHAFT INSTALLATION, OPERATION, MAINTENANCE, and REPAIR GUIDE

8. FAULTS, CAUSES AND CORRECTION

In this section, malfunctions that can be seen in DNP type pumps during operation, possible causes (Table 5) and correction methods are given (Table 6 A - Table 6 B).

CAUTION Before starting the troubleshooting process, check the accuracy of all measuring instruments you to.

Faults	Possible Causes
The pump that is started is not flooding at all	1-5-7-10-11-13
Flow rate decreases or no water is pumped	2-3-8-14
Engine overloading	9-12-17-18-19-27-28
Beds are overheating	19-20-21-22-24
There is vibration in the pump	15-16-19-23-25
The noise level is high	4-6-26

Tablo 5

Po	ssible Causes	Solution Methods
1	There may be air in the pump and/or suction line.	Fill the pump and suction pipe completely with liquid and repeat the starting procedure.
2	Air is sucked from the packing, suction pipe, or connections. The pump sucks liquid mixed with air.	Check all connections on the suction pipe. Check the packing, if necessary, feed the packing with pressurized liquid. Check the immersion depth of the suction pipe or foot valve and increase the immersion depth if necessary.
3	Air pocket in the intake pipe.	Check the slope of the suction line and whether there are parts suitable for the formation of air pockets, and make the necessary corrections if any.
4	There is air in the liquid.	Since the immersion depth of the suction pipe is not sufficient, eddies are formed and therefore air is sucked. Check the liquid level in the suction tank or increase the immersion depth of the suction pipe/foot valve.
5	Suction depth is too large.	If there are no obstructions in the suction, check the friction losses of the suction line, if necessary, use a larger diameter suction pipe. If the static suction depth is too great, either the liquid level in the suction tank must be increased or the pump must be lowered to a lower level.
6	The pump works with cavitation.	The plant's NPSH is too low. Check the liquid level in the suction tank. Check for excessive friction losses in the suction line. Check whether the isolation valve in the suction line is fully open. If necessary, increase the load on the suction of the pump by lowering the pump to a lower level.
7	The head of the pump is insufficient.	The actual head of the plant is higher than given. Check the total static height and friction losses of the pressure pipe. Using a larger diameter pipe may be the solution. Check whether the valves are fully open.
8	Increase in the head.	Check whether the valves are fully open. Check if there is an obstruction causing the pressure pipe to be blocked.
9	The pump operates at a lower head.	The actual head of the plant is less than given. Turn the impeller diameter in accordance with the manufacturer's recommendation.
10	Pump reverses.	Check whether the direction of rotation of the motor corresponds to the direction of rotation given on the pump body or on the label.
11	Speed is low.	Check the voltage and frequency of the mains or whether there is a phase deficiency in the motor.

Tablo 6 A



8. FAULTS, CAUSES AND CORRECTION

In this section, malfunctions that can be seen in DNP type pumps during operation, possible causes (Table 5) and correction methods are given (Table 6 A - Table 6 B).

CAUTION Before starting the troubleshooting process, check the accuracy of all measuring instruments you use.

Faults	Possible Causes
The pump that is started is not flooding at all	1-5-7-10-11-13
Flow rate decreases or no water is pumped	2-3-8-14
Engine overloading	9-12-17-18-19-27-28
Beds are overheating	19-20-21-22-24
There is vibration in the pump	15-16-19-23-25
The noise level is high	4-6-26

Tablo 5

Possible Causes		Solution Methods
12	The speed is too high.	If possible, reduce the pump speed or turn the impeller diameter in accordance with the manufacturer's recommendation.
13	Impeller, check valve or strainer clogged.	Clean the impeller, check valve or strainer.
14	Impeller or strainer partially clogged.	Clean the impeller or strainer.
15	Impeller partially clogged.	Clean the impeller.
16	Worn or defective impeller.	Change the impeller.
17	Mechanical friction in the pump.	Check for any obstructions or bends in the pump rotor.
18	Soft packings are overtightened.	Loosen the packing gland (glen).
19	Coupling misalignment.	Check and readjust the coupling rubber.
20	Bed covers are too tight.	Check the covers and make the necessary corrections.
21	The flow is less than the minimum required flow of the pump.	Increase the flow. Use bypass valve or line if necessary.
22	There is too much grease in the bearing.	Remove excess grease.
23	The shaft is bent.	Check the spindle and replace if necessary.
25	Unbalanced rotating parts.	Check the balance of the rotating parts.
26	The pump is operating outside the operating zone.	Check the values of the operating point.
27	Density or viscosity of the pumped liquid is more than given.	Use a bigger powerful engine.
28	Engine error.	Check the engine. The ventilation of the engine is not suitable due to its location.

Tablo 6 B



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9. TIGHTENING MOMENT

	Maximum Tightening Torque (Nm)			
Screw Diameter	Quality Class			
	8.8	10.9		
M4	3.0	4.4		
M5	5.9	8.7		
M6	10	15		
M8	25	36		
M10	49	72		
M12	85	125		
M14	135	200		
M16	210	310		
M18	300	430		
M20	425	610		
M22	580	820		
M24	730	1050		
M27	1100	1550		
M30	1450	2100		
M33	1970	2770		
M36	2530	3560		

Tablo 7



10. ESTIMATED NOISE LEVELS

	Sound Pressure Level (dBA)* (Pump and Motor)								
Engine Power-P _N (KW)	1450 rpm	2900 rpm							
<0.55	60	64							
0.75	60	66							
1.1	62	66							
1.5	63	68							
2.2	64	69							
3	65	70							
4	66	71							
5.5	67	73							
7.5	69	74							
11	70	76							
15	72	77							
18.5	73	78							
22	74	79							
30	75	81							
37	75	82							
45	76	82							
55	77	84							
75	78	85							
90	79	85							
110	80	86							
132	80	86							
160	80	86							

Tablo 8



- Values were measured at a distance of 1 m from the pump, in the free field above the sound reflecting surface, without a sound barrier.
- ▶ These values are valid if the pump is operating at the ordered operating value and without cavitation.

► If the pump is operating at 60 Hz, the values in the table are 1800 rpm shall be for 1 dB, 3600 rpm. increase by 2 dB.



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11. PERMITTED FORCES AND MOMENTS ON PUMP FLANGES

	Suction Side								Pressing Side									
т	DN	Fx	Fy	Fz	ΣF^{\flat}	Mx	Му	Mz	ΣM ^b	DN	Fx	Fy	Fz	ΣF^{b}	Mx	Му	Mz	ΣM ^ь
65-250	100	1300	1200	1100	2100	530	380	440	780	65	840	740	680	1300	450	330	360	660
80-200					/													
80-250	125	1600	1400	1300	2500	630	450	570	920	80	1000	900	820	1600	480	350	390	710
80-315																		
100-250																		
100-315	150	2000	1800	1600	3100	750	530	620	1100	100	1300	1200	1100	2100	530	380	440	780
100-400																		
125-315																		
125-350	200	2700	2400	2200	4200	980	690	800	1400	125	1600	1400	1300	2500	630	450	570	920
125-450																		
150-315	200	2700	2400 2	2200	1200	980	690	800	1400 1			2000 1800	1600	3100	750	530	620	1100
150-450	200	2700			1200					150 20	2000							
150-600	250	3300	3000	2700	5200	1300	950	1100	2000									
200-315																		
200-400	250	3300	3000	2700	5200	1300	950	1100	2000	200	2700	2400	2200	4200	980	690	800	1400
200-500																		
250-350																		
250-450	300	4000	3600	3200	6300	1800	1300	1500	2700	250	3300	3000	2700	5200	1300	950	1100	2000
250-600																		
300-315	350	4700	4200	3800	7300	2300	1700	1900	3400									
300-400		5300	4800 430						400 4300	300 4	4000	3600	00 3200	6300 1	1800	1300	1500	2700
300-500	400			4300	8300	2900 2	2100	2400										
300-700																		
350-350	400	5300	4800	4300	8300	2900	2100	2400	4300									
350-400	500	6600	6000	5400			3100	3500	6400	350	4700	4200	3800	7300	2300	1700	1900	3400
350-500					10400	4300												
350-700																		
400-800	600	8000	7200	6500	12500	6100	4300	5000	9000	400	5300	4800	4300	8300	2900	2100	2400	4300

Tablo 9

 * Force unit is Newton [N], moment unit is Newton x Meter [Nm].
**Values here are based on Gray Cast Iron (EN-JL-250 / GG25) material. Larger values are permissible for pumps with steel construction.

CAUTION

The forces and moments transferred to the suction and discharge flanges by the installation must be less than the values given in the table.







12. INSTALLATION PICTURES



SECTION PICTURE



DSP 0013

DSP 0029

- DSP 0014

Parts List								
DSP 0001	Snail (LOWER BODY)	DSP 0021	IRRIGATION LINE PIPE					
DSP 0002	Snail (UPPER BODY)	DSP 0022	BEARING SAFETY NUT					
DSP 0003	BEARING HOUSE	DSP 0023	BEARING SAFETY WASHER					
DSP 0004	FRONT BEARING COVER	DSP 0024	IMPELLER WEDGE					
DSP 0005	REAR BEARING COVER	DSP 0026	Scroll BODY BOLT					
DSP 0006	STUFFING BOX	DSP 0027	BEARING HOUSE FRONT BACK COVER BOLT					
DSP 0007	SCROLL PUMP SHAFT	DSP 0029	GLEN NUT					
DSP 0008	WHEEL	DSP 0060	AIR RELIEF COCK					
DSP 0009	WEAR RING	DSP 0065	GREASE NIPPEL					
DSP 0010	LONG PUMP SHAFT COVER	DSP 0066	DRAIN PLUG					
DSP 0011	SHORT PUMP SHAFT COVER	DSP 0070	KLINGRIT GASKET					
DSP 0012	SHAFT BEARING	DSP 0074	SETSKUR BOLT					
DSP 0013	GLEN	DSP 0075	SPLIT PIN					
DSP 0014	GLEN STUD	DSP 0077	O-RING NBR					
DSP 0015	LANTERN RING	DSP 0079	SCROLL BODY WASHER					
DSP 0016	PACKING	DSP 0083	COUPLING KEY					
DSP 0017	WATER SPRAY RUBBER	DSP 0081	BEARING HOUSE WASHER					
DSP 0018	ROLLER	DSP 0096	BEARING HOUSE FRONT REAR BOLT					
DSP 0019	IRRIGATION/WATERING LINE PIPE RECORD	DSP 0097	PULL BOLT					
DSP 0020	CROWN (CROSS)	GREASE OIL DRAIN PLUG						





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13. COUPLING AND SAFETY SHEET



▶ Note: All enclosures comply with EN 294.













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HORIZONTAL SHAFT, DOUBLE SUCTION, DIESEL AND ELECTRIC ENGINE, CENTRIFUGAL PUMPS









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