Self Priming Centrifugal Pumps

UKM-S SERIES

OPERATING MANUAL

Mas Grup

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EC DECLARATION OF CONFORMITY

AT UYGUNLUK BEYANI

Manufacturer / *İmalatçı* **: MAS DAF MAKİNA SANAYİ A.Ş.**

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Tuzla - İSTANBUL / TÜRKİYE

The undersigned Company certifies under its sole responsibility that the item of equipment specified below satisfies the requirements of the mainly Machinery Directive 2006/42/EC which is apply to it.
The item of equipment identified below has been subject to internal manufacturing checks with monitoring of the final assessment by **MAS DAF MAKİNA SANAYİ A.Ş.**
Aşağıda tanımlanmış olan ürünler için Makine Emniyeti yönetmeliği 2006 / 42 / AT' nin uygulanabilen gerekliliklerinin yerine getirildiğini ve sorumluluğun alınmış olunduğunu beyan ederiz.
Aşağıda tanımlanan ürünler içüretim kontrollerine bağlı olarak **MAS DAF MAKİNA SANAYİ A.Ş.** *tarafından kontrol edilmiştir.*

Equipment / *Ürün* : Self Priming, Single Stage Centrifugal Pumps
Kendinden Emişli, Tek Kademeli Atıksu Pompaları
Seri / *Model-Tip* : UKM-S Series – *UKM-S Serisi*

For pumps supplied with drivers/ *Elektrikli Pompa Üniteleri*
Related Directives / *Yönetmelikler*
2006/42/EC Machinery Directive **/ 2006/42/AT** *Makine Emniyeti Yönetmeliği*
2014/35/EU Low Voltage Directive **/ 2014/35/AB** *Alçak Gerilim Yönetmeliği*
2014/30/EU Electromagnetic Compatibility Directive **/ 2014/30/AB** *Elektromanyetik Uyumluluk Yönetmeliği*

Regulations applied acc. to harmonize standards / *Uygulanan Uyumlaştırılmış Standartlar*
TS EN ISO 12100:2010, TS EN 809+A1, TS EN 60204-1:2011.

We hereby declare that this equipment is intended to be incorporated into, or assembled with other machinery to constitute relevant machinery to comply with essential health and safety requirements of Directive The machinery covered by this declaration must not be put into service until the relevant machinery into which it is to be incorporated has been declared in conformity with provisions of the directive.
Ekipman, uygun bir makina oluşturmak amacıyla diğer ekipmanlar ile birleştirilirken ya da monte edilirken gerekli sağlık ve güvenlik yönetmeliklerine uyulması gerekmektedir.
Bu bildiri kapsamında yönetmelikte belirtilen bütün hükümler yerine getirilmeden makinanın devreye alınmaması gerekmektedir.

Place and date of issue / Yer ve Tarih **:** İstanbul, 02.06.2014
Name and position of authorized person **:** Vahdettin YIRTMAÇ
Yetkili Kişinin Adı ve Görevi General Manager / Genel Müdür
Signature of authorized person **:**
Yetkili Kişinin İmzası

TABLE OF CONTENTS

INTRODUCTION

- This manual contains instructions for the installation, operation and maintenance of the UKM-S type self-priming waste water pumps of **MAS DAF MAKINA SANAYI A.Ş.**
- Please read carefully this manual and apply all the instructions to operate pumps without problems. Pumps shall be used for their intended duties. In this manual, there are information on operating conditions, installation, starting-up, settings and main controls of pumps.
- These operating and maintenance instructions contain **MAS DAF MAKINA SANAYI A.Ş.** ` s suggestions. The special operating and maintenance information of the plumbing that a pump is fitted to is not considered in these instructions. This information must be given by the plumbing constructors only.
- **Please refer to instructions of plumbing constructors.**
- Please pay attention to the warnings in this manual and ensure that it is read before the installation-start up process. **MAS DAF MAKINA SANAYI A.Ş.** is not responsible for the accidents resulting from negligence.
- If you cannot find an answer to your questions in this manual, it is suggested that you contact **MAS DAF MAKINA SANAYI A.Ş.** Please inform us about the rated value and especially the serial number of the pump when you get in contact for help.
- The safety instructions in this manual cover the current national accident protection regulations. Beside all of these, an operation, work and safety measure imposed by the costumer has to be applied.

The Signs Used in This Operation Manual

Read the instructions carefully in this operating manual and keep it for your future reference.

Warning sign against the electrical risks

Sign for the operator's safety.

1. IMPORTANT SAFETY PRECAUTIONS

In order to minimize the accidents during the mounting and putting into service of the pump, the following rules have to be applied:

1. Do not work without taking safety measures relevant to equipment. Cable, mask and safety band must be used when necessary.
2. Be sure there is adequate amount of oxygen and there is no toxic gaseous around.
3. Before using welding or any electrical equipment make sure that there is no risk of explosion.
4. Check the cleanliness of the area to take care of your help. (Dust, smoke, etc.)
5. Do keep in mind that there is a risk of having accidents related to electricity.
6. Do not lift the pump before you check the transport equipment.
7. Be sure you have a by-pass line.
8. Use helmet, eye glasses and protective shoes for your safety
9. Place a protective barrier around the pump within the necessary safety area.
10. Dust, liquids and gaseous that may cause overheating, short circuit, corrosion and fire must be kept away from the pump unit.
11. By checking the noise level of the pump unit, necessary measures to avoid noisy operation of the pump that can have harmful effects on the personnel and environment.
12. Be careful about the direction of transport and storage.
13. Cover appropriately the moving parts to avoid possible injury of the personnel. Mount the coupling guard and belting before starting-up the pump.
14. All the electrical and electronic applications must be performed by authorized person conforming EN60204-1 and /or domestic instructions.
15. Protect the electrical equipment and motor against overloading.
16. If flammable and explosive liquids are pumped, ground connection of electricity should be carried out properly.
17. Do not expose the pump unit to sudden temperature variations
18. All personnel who work with the waste water system need to be vaccinated in case of contagious diseases.
19. If the pump contains hazardous liquids, one must use protective helmet against the risk of splatter. One also must accumulate the liquid in a proper container against any risk of leakage.

All Other Health and Safety Rules, Laws and Regulations Must Be Applied

2. GENERAL

2.1. Definition of Pump and Usage Areas

UKM-S series pumps are self-priming waste water pumps.
They are used in,

- Domestic and industrial raw sewer systems.
- Sewer purification systems.
- Pumping of muddy fluids and fluids which contain solid particles.
- Factory waste water systems.
- All kinds of drainage and discharge processes.

CAUTION

This pump is designed for handling mild industrial corrosives, mud or slurries containing large entrained solids. Do not attempt to pump volatile, corrosive, or flammable materials which may damage the pump or endanger personnel as a result of pump failure.

Technical specifications of UKM-S type pumps

Suction Flange:	2" - 10"
Discharge Flange:	2" - 10"
Capacity:	50–730 m^3/h
Hm:	4–40 mwc
Speed:	650–2900 rpm

Figure 1: Pump Label

2.2. Performance Information

Actual performance of the pump can be obtained from the order page and/or from the test report. This information is given on the pump label.
The performance curves given in the catalog are valid for water whose density and viscosity are ρ=1 kg/dm^3 and v=1 cst. respectively. For those liquids whose densities and viscosities are different from those of water, please consult with **MAS DAF MAKINA SANAYI A.Ş.** since the performance curves vary with density and viscosity

CAUTION

Do not operate the pump with a motor that has a different power except for the given catalog and label values.

The pump is not to be operated at off-design point given in the order and supplied from the firm.
It is necessary to ensure that the instructions are obeyed for the safe running of the pump.

2.3. Warranty Conditions

The entire products in our selling program are warranted by **MAS DAF MAKINA SANAYİ A.Ş.**

The warranty conditions will only be valid when all the instructions about installation and start-up operations of the pump unit are taken into account.

2.4. Test

All Pumps are dispatched for sale when all the performance and pressure tests are completed. Proper assurance of material and fault-free operation of pumps whose performance tests are made is under the warrantyof **MAS DAF MAKINA SANAYI A.Ş.**

2.5. Pressure Limit

Pressure at the discharge flange must not exceed 10 Bar. A special order is necessary for applications with higher pressures.

3. SAFE OPERATING CONDITIONS

This manual contains main safety instructions for the installation, operation and maintenance. It must be read by the personnel who are responsible for installation and operation. This manual should always be kept near the installation location. It is important to comply with safety precautions stated in page 1 along with the general safety instructions as well as preventive measures repeated in other sections of this manual.

3.1. Training of Personnel

Installation, operation and maintenance personnel must have necessary knowledge in order to accomplish the given job. The responsibility, adequacies and controlling duties of such personnel must be determined by the costumer. It has to be certain that these personnel comprehend totally the content of the operating manual.
If the personnel do not have enough knowledge, required training must be given by the costumer. If training support is needed by the costumer, it will be provided by the manufacturer/seller.

CAUTION

Untrained personnel and unwillingness to comply with safety instructions may be risky for both machine and environment. **MAS DAF MAKINA SANAYI A.Ş.** is not responsible for this kind of damages.

3.2. Hazardous Conditions That May Occur When One does not Comply with the Safety Instructions

Incompliance with safety regulations may put the personnel, the environment and the machine in danger and thus may cause damages. Incompliance with safety regulations may give rise to situations listed below.

Important operational functions of the factory may stop.
Maintenance may get difficult.
One may get injured by electrical, mechanical or chemical hazards.

3.3. Safety Measures for Operator

Dangerous, hot or cold components in the pump area must be covered so that one cannot touch them.
Moving components of the pump must be covered so that one cannot touch them. Those covers must not be dismounted while the pump is running. Dangers that results from electrical connections must be removed. To get more information about this subject, you can refer to domestic electrical instructions.

3.4. Safety Measures for Maintenance and Installation

The costumer must assure that all maintenance, check and installment tasks are performed by qualified personnel. Repair work must only be performed while the machine is not running.
The pump and its auxiliary system must be cleaned thoroughly if it contains hazardous liquids. At the end of the repair work, all safety and protective equipment must be re-installed.

3.5. Spare Parts Replacement

Replacement of spare parts and all modifications must be done after contacting with the manufacturer. Spare parts and accessories certified by the manufacturer are important for the safe operation of the system.

Notice: MAS DAF MAKINA SANAYI A.Ş. is not responsible from the usage of improper spare parts.

4. TECHNICAL INFORMATION

4.1. Design

Since they are self-priming, the UKM-S type pumps are easy to operate. After submerging the suction pipe in water, depending on the suction head they operate approximately in 1 minute.
Due to the cover on the front side of the casing, the maintenance and the cleansing of the pump are quite easy.
Apart from the fact that it can be operated by diesel or electrical motor drives; it can as well be driven by belting at the desired rpm.

4.1.1. Impeller

The impellers are designed such that they have 2 blades, with wide cross-sectional areas and in the form of open impeller which allow the passage of 18-76 mm diameter solid particles.

Pump Type	Diameter of Solid Particles
UKM-S 2”x2”	44,5 mm (1,75”)
UKM-S 3”x3”	63,5 mm (2,5”)
UKM-S 4”x4”	76 mm (3”)
UKM-S 6”x6”	76 mm (3”)
UKM-S 8”x8”	76 mm (3”)
UKM-S 10”x10”	76 mm (3”)
UKM-50	18 mm (0,75”)

Table 1: Solid Particles

4.1.2. Bearing and Lubrication

Single or double ball bearings are used both motor and impeller side bearings. These bearings are lubricated during installation in the factory. Oil indicator must be monitored at regular intervals.

Pump Type	Bearings at the impeller side	Bearings at the motor side
UKM-S 2”x2”	6208 (SRBB)	6208 (SRBB)
UKM-S 3”x3”	6208 (SRBB)	6208 (SRBB)
UKM-S 4”x4”	6308 (SRBB)	3308 (DRBB)
UKM-S 6”x6”	6308 (SRBB)	3308 (DRBB)
UKM-S 8”x8”	3310 (DRBB)	3311 (DRBB)
UKM-S 10”x10”	3310 (DRBB)	3311 (DRBB)

SRBB: Single Row Ball Bearing DRBB: Double Row Ball Bearing
** UKM-50 series use bearings of the driver.*
Table 2: Bearing Types

4.1.3. Seals

In UKM-S type pumps, silicon carbide (SiC) surface mechanical seal (Burgmann MG1) are used. Seal region is filled with liquid oil.

4.2. Construction of Pump Group

4.2.1. Drive

TEFC (Totally Enclosed Fan Cooled) 3 phase, squirrel caged, IM 1001B3 type electrical or diesel motor (along with belting if needed) which complies with DIN EN 60034 IEC is used to drive the pump in proper speed and power.

Specifications of electrical motor;
Isolation class : F
Protection class : IP 54-IP 55
Frequency : 50 Hz
Running type : S1
Start up type : Up to 4 kW, 3x380 V (Y)
More than 4 kW, 3x380V (Δ)+(Y/ Δ)

4.2.2. Coupling and Coupling Guard

In applications where the drive is with electrical motor, an elastic shaft coupling in accordance with DIN 740 and in applications where the drive is with diesel motor, a special coupling is used. A coupling guard is given in accordance with EN 294 in case of the pump group includes the coupling and chassis.

Pump can only be run with a guard in accordance with EN 294 according to safety instructions.
If there is no cover, it is provided by the operator.

4.2.3. Base Plate

It is manufactured from steel plate or U profile steel in accordance with DIN 24259 in direct coupling applications.
In the case of belting drive, U profile is preferred.

5. TRANSPORT AND STORAGE

Suction, discharge and all auxiliary fittings must be closed during transport and storage. Dead-end covers must be removed while the pump unit is being installed.

5.1. Transport

Pump and pump group must be carried safely to the installation location by lifting equipments.

CAUTION

Current general lifting safety instructions must be applied. Please use a suspension system shown in figure while you are carrying and lifting the pump unit. The suspension rings may be broken because of the excessive load and may result in a damage of the pump. Prefer fabric cable for suspension.

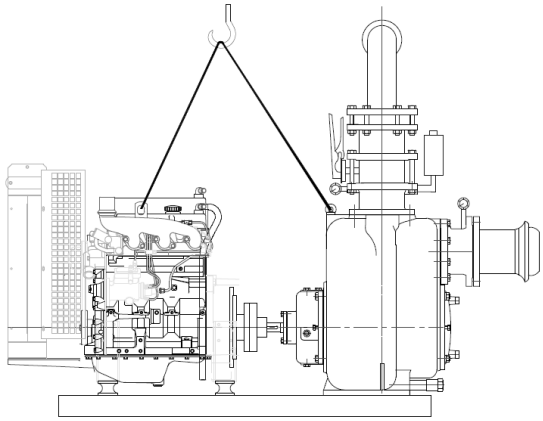


Figure 2-a: Transport of Diesel Motor Coupled Pump Group

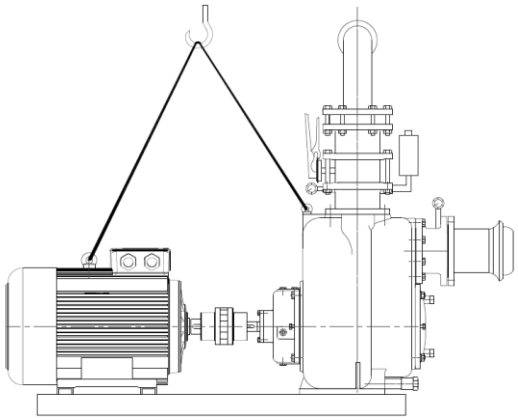


Figure 2-b: Transport of Electrical Motor Coupled Pump Group

Incorrect lifting may damage the pump unit and cause injuries.

Damages caused in transport

Check the pump when it is delivered to you. Please let us know of there is any damage.

5.2. Storage

Please keep the unit clean and dry area during storage.

If the pump is out of use for a long time, please consider the instructions below.

1. If there is water inside the pump, drain it.
2. Clean the pump casing and impeller by jetting clean water for a short time.
3. Empty water inside the pump casing, suction line and discharge line.
4. Add small amount of antifreeze inside the pump casing if it is not possible to empty it completely. Rotate the pump shaft by hand to mix the antifreeze.
5. Add liquid lubricator into the bearing and seal gap up until the level indicator.
6. Close the suction and discharge exits with gasket.
7. Spray an anti-corrosive into the pump casing.
8. Rotate the pump shaft by hand once in every month, in order to protect it from freezing and to lubricate the bearings.

6. ASSEMBLY / INSTALLATION

6.1. Installation

In our standard production, the pump and the motor have been installed in a common base plate.

6.1.1. Location of Installation

Pump will be installed in a location where the control and the maintenance of the pump are easily made. The pump room should be suitable for operation of lifting systems such as freight elevator, forklift, etc.

6.1.2. Location of Installation- Local Ambient Temperature

When the local ambient room temperature exceeds +40ºC in a pumping system, suitable ventilation should be provided in order to remove the heat dissipated to the environment and supply fresh air.

6.2. Type of Connection

Type of connection depends on the design type and the size of the pump and the motor, as well as the local installation conditions. Foot-mounted horizontal pump-motor units have been installed in a common base plate.

6.3. Foundation

6.3.1. General

In applications where a trailor is not used, the pump must be properly fixed to solidified concrete base plate with studs.
Base plate of the pump must be grouted. The foundation shall be of concrete or steel framework.
Note: The foundation shall distribute the weight of the pumping group evenly.

6.3.2. Main Properties of the Steel Framework Bases

Foundations with steel framework shall be designed in such a way that the base plate is bolted or welded contacting to all area.

CAUTION

If base plate is supported from only four points, pump group will stay in the middle, causing misalignment of the coupling and increasing the noise level.

6.3.3. Foundation Properties

The foundation shall be horizontal, flat and clean and shall support all the weight.

Note: Reinforced concrete bases are constructed from standard concrete with at least B 25 resistance class.

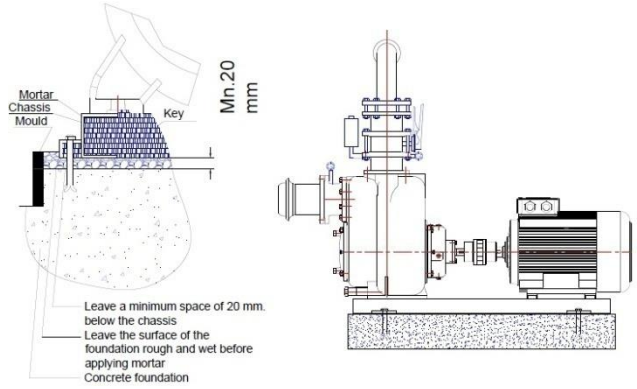


Figure 3: Typical Concrete Foundations

6.4. Coupling Alignment

6.4.1. General

For a proper operation of a pump group, a good alignment of the coupling is necessary. Vibration, noise, overheating of the bearings, overcharge problems can be attributed to the misalignment of coupling or using an improper coupling.
Flexible coupling does not correct the axial misalignments between the pump and the motor axes. However, it allows pinpointing the misalignments.
In order to avoid overheating, vibration, noise and wearing of the rolling bearings, alignment of the coupling has to be made properly and checked often.
Do not use a different coupling other than the original type installed on pumping group.

6.4.2. Method of Coupling Alignment

When the motor moves towards the pump, a gap must be maintained in order that the two faces of the coupling do not touch each other. The recommended distance is 3 mm. To check the coupling alignment, a conical measurement device and a gauge stick are needed.

1. Angular Misalignment (Figure 4)
In order to control the angular misalignment, the distance between the two halves of the coupling is measured in both horizontal and vertical planes. Measurements taken at four points shall be in agreement for the alignment.

2. Parallel Axis Misalignment (Figure 4)
In order to control parallel axis misalignment, a smooth edged
gauge stick is pressed axially over the upper half of the coupling. Then, the gauge stick is checked for the other half of the coupling. For alignment, the gauge stick shall be in contact with both of the halves at the same time. This procedure shall be repeated for four sides of the coupling. (i.e. top, bottom, left and right sides of the coupling). When all four sides give reasonably accepted results, alignment of the coupling has been ensured.

Install the coupling guard only when the alignment of the coupling is checked.

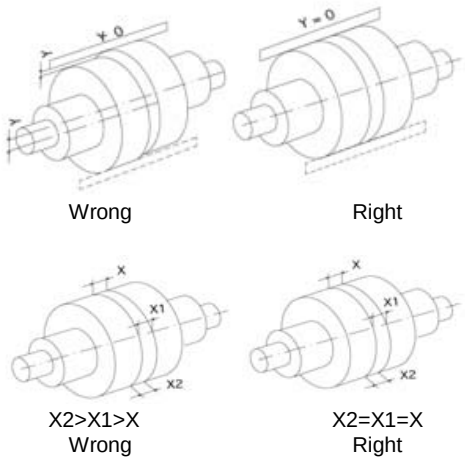


Figure 4: The Control of the Coupling Alignment in Horizontal and Vertical Planes

6.4.3. Belt Alignment for Groups Connected with V-Belts

V-belt alignment:

A proper belting alignment increases the life of the system.
Make sure that the pump and motor shafts are connected to each other.

V-belt tension alignment:

V-belts must be placed properly inside pulley grooves.

1. The tension alignment of belts is made by moving the pulley centers until the correct belt tension is obtained.
2. Belt tension is checked by pushing on it by hand. A belt with normal tension may deflect 1/20 of the distance between the axes. If it deflects more than this amount, the belt is considered loose, otherwise it is too tight.
3. During operation; in a couple of days, the belts are going to be fully placed inside pulley grooves. It may be necessary to align the belt while it is slightly curved on one side.

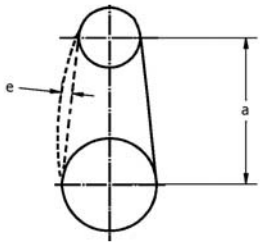


Figure 5: Belt Tension Check

4. Properly tightened belting becomes ready for operation with regular checks of belt tension.

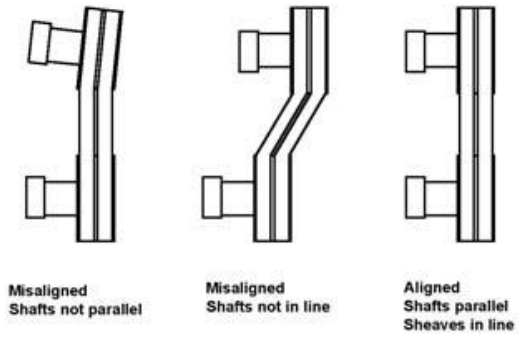


Figure 6: Misaligned and Aligned Belts

6.4.4. Pump and Motor Mounting (Coupling)

If the coupling of the pump group is to be mounted on site, the following procedure should be followed

1. Insert the key.
2. Push the coupling halves with a driving apparatus towards the pump and the motor shafts, until the shaft is fit to snag to the hub of the coupling. If a driving apparatus is not available, heating coupling halves (with coupling rubbers off) to an approximately 100 °C may help the pushing. It is important that axial force is prevented from occurring while mounting the coupling. Support pump shaft from the impeller side, and motor shaft from the fan side while mounting the coupling. If necessary, dismantle the fan cover.
3. Screw the two bolts in coupling hub.
4. Make sure that a suitable spacing is left between the coupling halves while mounting pump and the rotor.
5. Horizontal pump groups mounted on the base plate or directly mounted on the base, alignment of the coupling shall be as described in 6.4.2
6. Put into place the coupling guard.

According to the accident prevention regulations, all preventions and protective devices should be in their intended place and in operational form.

6.5. Piping

6.5.1. Suction snd Discharge Piping

Pump performance is adversely affected by increase suction lift, discharge elevation and friction losses. See the performance curve and operating range to be sure your overall application allows pump to operate within the safe operation range.

6.5.1.1. Material

Either pipe or hose may be used for suction and discharge lines. However, the materials must be compatible with liquid being pumped. If hose is used in suction line, it must be the rigid-wall, reinforced type to prevent collapse under suction.

6.5.1.2. Line Configuration

Keep suction and discharge lines as straight as possible to minimize friction losses. Make minimum use of elbows and fittings, which substantially increase friction losses. If elbows are necessary, use the long radius type to minimize friction losses.

6.5.1.3. Connections of Pump

Before tightening a connection flange, align it exactly with the pump port. Never pull a pipe line into place by tightening the flange bolts and/or couplings.
Lines near the pump must be independently supported to avoid strain on the pump which could cause excessive vibration, decrease bearing life and increase shaft and seal wear. If hose-type lines are used, they should have adequate support to secure them when filled with liquid and under pressure.

6.5.1.4. Gauges

Most pumps are drilled and tapped for installing discharge pressure and vacuum suction gauges. If these gauges are desired for pumps that are not tapped, drill and tape the suction and discharge lines not less than 18” (457.2 mm) from the suction and discharge ports and install the lines. Installation closer to the pump may result in erratic reading.

6.5.2. Suction Lines

To avoid air pockets which could affect pump priming, the suction line must be as short and direct as possible. When operation pumped, if the line slopes down to the pump at any point along the suction run, air involves a suction lift, the line must always slope upward to the pump from the source of the liquid being pockets will be created.

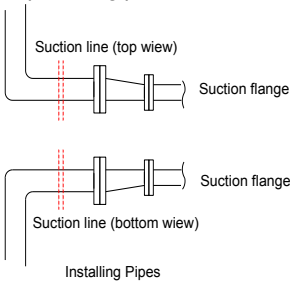


Figure 7: Installing Pipes

6.5.2.1. Fittings

Suction lines should be the same size as the pump inlet. If reducers are used in suction lines, they should be the eccentric type and should be installed with the flat part of the reducers uppermost to avoid creating air pockets. Valves are not normally used in suction lines but if a valve is used, install it with the horizontal to avoid air pocket.

6.5.2.2. Strainer

If a strainer is furnished with the pump, be certain to use it; any spherical solids which pass through a strainer furnished with the pump will also pass through the pump itself.
If a strainer is not furnished with the pump, but is installed by pump user, make certain that the total area of the openings in the strainer is at least three or four times the cross section of the suction line and that openings will not permit passage of solids larger than the solids handling capability of the pump.

6.5.2.3. Sealing

Since even a slight leak will affect priming, head and capacity, especially when operating with a high suction lift, all connection in the suction line should be sealed with pipe dope to ensure an airtight seal. Follow the sealant manufacturer's recommendations when selecting and applying the pipe dope. The pipe dope should be compatible with the liquid being pumped.

6.5.2.4. Suction Lines in Sumps

If a single suction line is installed in a sump, it should be positioned away from the wall of the sump at a distance equal to 1.5 times the diameter of the suction line.
If there is a liquid flow from an open pipe into sump, the flow should be kept away from the suction inlet because the inflow will carry air down into the sump and air entering the suction line will reduce pump efficiency.
It is necessary to position inflow close to the suction inlet, install a baffle between the inflow and the suction lines; it must be the rigid-wall, reinforced type to prevent collapse under suction.
Using piping couplings in the suction lines is not recommended.
Suction inlet at a distance 1.5 times the diameter of the suction pipe. The baffle will allow entrained air to escape from the liquid before it is drawn into the suction inlet.
If two suction lines are installed in a single sump, the flow path may interact, reducing the efficiency of one or both pumps. To avoid this, position the suction inlet so that they are separated by a distance equal to at least 3 times the diameter of the suction pipe.

6.5.2.5. Suction Lines in Positioning

The depth of the submergence of the suction line is critical to efficient pump operation. Figure 7 shows recommended minimum submergence vs. velocity.

Note: The pipe submergence required may be reduced by installing a standard pipe increaser fitting at the end of the suction line. The larger opening size will reduce the inlet velocity. Calculate the required submergence using the following formula based on the increased opening size (area or diameter).

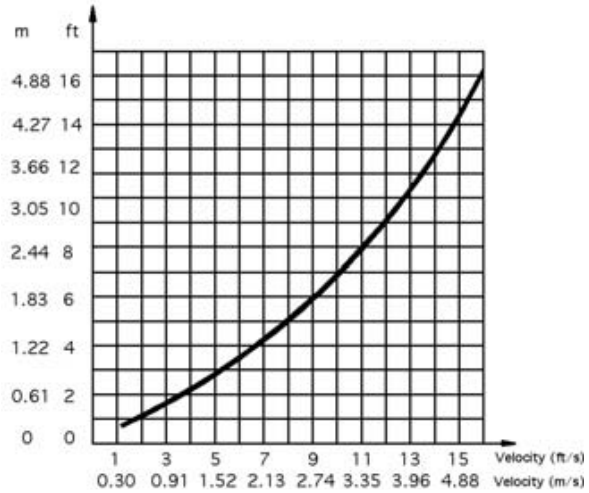


Figure 8: Recommended Minimum Suction Line Submergence vs. Velocity

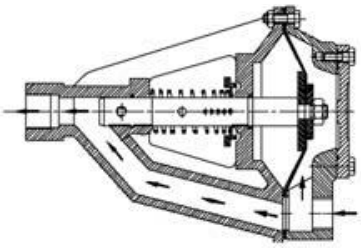
$$VELOCITY\ (ft/s) = \frac{QUANx(GPM)x0.321}{AREA}$$

$$VELOCITY\ (m/s) = \frac{FLOW(m^3/s)}{AREA\ (m^2)}$$

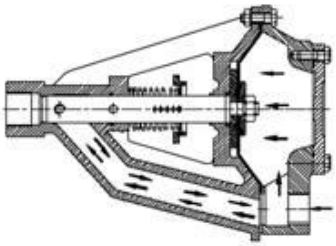
6.5.3. Automatic Air Release Valve

The air release valve is going to permit air to escape through the bypass line and then close automatically when the pump is fully primed and pumping at full capacity.

Theory of Operation



The cross-sectional view of the air release valve is shown in open valve position. During the priming process, air from the pump casing flows through the bypass line and passes through the air release valve to the wet well.



When the pump is fully primed, flow pressure compresses the spring and closes the valve. The valve will remain closed, reducing the bypass of liquid to 3.8 to 19 l/min until the pump losses its prime or stops.

CAUTION

Some leakage from 3.8 to 19 l/min will occur when the valve is fully closed. Be sure the bypass line is directed back to the wet well or tank to prevent hazardous spills.

When the pump shuts down, the spring returns the diaphragm to its original position. Any solids that may have accumulated in the diaphragm chamber settle to the bottom and are flushed out during the next priming cycle.

CAUTION

The valve will remain open if the pump does not reach its designed capacity or head. Valve closing pressure is dependent upon the discharge head of the pump at full capacity. The range of the valve closing pressure is established by the tension rate of the spring. Valve closing pressure can be further adjusted to the exact system requirements by moving the spring retaining pin up or down the plunger rod to increase or decrease tension on the spring.

6.5.3.1. Automatic Air Release Valve Installation

The automatic air release valve must be independently mounted in a horizontal position and connected to the discharge line of the self-priming centrifugal pump.

The valve inlet must be installed between the pump discharge port and the non-pressurized side of the discharge check valve. The valve inlet is at the large end of the valve body and it is provided with standard 1-inch pipe thread.
The valve outlet is located at the opposite end of the valve and is also equipped with standard 1-inch pipe threads. The outlet should be connected to a bleed line which slopes back to the wet well or sump. The bleed line must be the same size as the inlet piping or larger. If piping is used for bleed line, avoid o use of elbows whenever possible.

CAUTION

It is recommended that each air release valve should be fitted with an independent bleeder line directed back to the wet well. However, if multiple air release valves are installed in a system, the bleeder lines may be directed to a common manifold pipe.

6.5.4. Discharge Lines

6.5.4.1. Siphoning

Do not terminate the discharge line at a level lower than of the liquid being pumped unless a siphon breaker is used in the line. Otherwise, a siphoning suction causing damage to the pump could result.

6.5.4.2. Valves

If a throttling is desired in the discharge line, use a valve as large as the largest pipe to minimize friction losses. Never install a throttling valve and system check valve be installed in the discharge line to protect the pump from excessive shock pressure and reverse rotation when it is stopped.

CAUTION

If the application involves a high discharge head, gradually close the discharge throttling valve before stopping the pump.

6.5.4.3. By-pass Lines

Self-priming pumps are not air compressors. During the priming cycle, air from the suction line must be vented to atmosphere on the discharge side. If the discharge line is open, this air check valve has been installed in the discharge line; the discharge side of the pump must be open to the atmospheric pressure through a by-pass line installed between the pump discharge and the check valve. A self-priming centrifugal pump will not prime if there is sufficient static liquid head to hold the discharge check valve closed.

Note: The by-pass line should be sized so that it does not affect pump discharge capacity; however the by-pass line should be at least 1” in diameter to minimize the chance of plugging.

Inflow discharge applications (less than 30 feet or 9 meters), it is recommended that the by-pass line be run back to the wet well and locate 6” below the water level or cut-off point of the level pump. In some installation, this by-pass line may be terminated with 180-240 cm in length 1 1/2" hoses. Smoothbore hose, air and liquid vented during the priming process will then agitate the hose and break up any solids, grease, or other substances likely to cause clogging.

CAUTION

A by-pass line that is returned to a wet well must be secured against being drawn into the pump suction inlet.

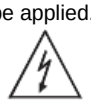
It is also recommended that pipe unions be installed at each 90˚ elbow in a by-pass line to ease disassembly and maintenance.
In high discharge head applications (more than 30 feet or 9 m), an excessive amount of liquid may be by-passed and forced back to the wet well under the full working pressure of the pump.
If the installation involves a flooded suction such as below - ground lift station. A pipe union and manual shut – off valve may be installed in the bleed line to allow service of the valve is installed anywhere in the air release piping, it must be a full – opening ball type valve to prevent plugging by solids.

CAUTION

If a manual shut-off valve is installed in a by-pass line, it must not be left closed during operation. A closed manual shut-off valve may cause a pump which has lost prime to continue to operate without reaching prime, causing dangerous overheating and possible explosive rupture of the pump casing. Personnel could be severely injured. Allow an over-heated pump to cool before servicing. Do not remove plates, covers, gauges, or fittings from an overheated pump. Liquid within the pump can reach boiling temperatures, and vapor pressure within the pump can cause parts being disengaged to be ejected with great force. After the pump cools, drain the liquid from the pump by removing the casing drain plug. Use caution when removing the casing drain plug. Use caution when removing the plug to prevent injury to personnel from hot liquid.

6.6. Motor Connection for Applications with Electric Motor

In electric motor coupled UKM-S type pumps, motor must be connected by an electrical technician according to the connection (switch) diagram. Local electricity policies have to be applied.



- Electrical connections have to be made by authorized electricians.
- In dismantling the pump, make sure the electricity is cut off before taking the motor cover out.
- Use the appropriate electrical connection to the motor.

In environments where there is a risk of explosion, prescribed protective law and regulations shall be applied by competent authorities.

6.6.1. Motor Connection Diagram

- Motors requiring high moments at start up shall not be connected star-delta
- Frequency controlled motors, require high moment at start up and have to be cooled properly at low speeds. Provide the necessary cooling for the motors.

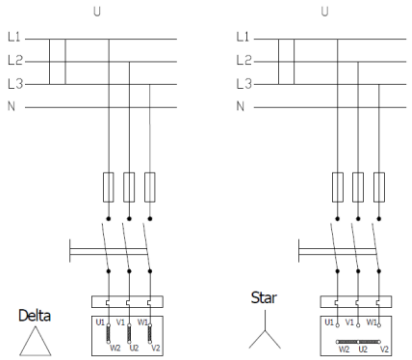


Figure 9: Electric Connection Diagram

Electrical circuit	Motor	
U (Volt)	230/400 V	400 V
3 x 230 V	Delta	
3 x 400 V	Star	Delta

6.6.2. Motor Protection

- Three phased-motor shall be connected to power supply.
- Wait the motor to cool down when thermic protected motor breaks in circuit due to the overheating. Make sure the motor does not start automatically until it cools completely
- In order to protect the motor from overcharging and short circuit use a thermic or thermic-magnetic relay. Adjust this relay to the nominal current of the motor.

Electrical equipments, terminals and the components of the control systems may carry electric current even though they are not operating. They may cause deadly and serious injuries or irreparable material damages.

7. COMMISSIONING, START UP AND OPERATING

7.1. Preparations Before Start Up

Oil Check: For bearings, non-abrasive, high quality oil such as SAE#30 should be used. UKM-S type pumps are transported filled up with fluid oil. Nevertheless one should check before start-up if there is oil in the reservoir.
In normal conditions, every year, the ball bearing must be cleansed from oil and refilled.

UKM-S 2”x2”	≈ 0,7 liter
UKM-S 3”x3”	≈ 0,7 liter
UKM-S 4”x4”	≈ 0,8 liter
UKM-S 6”x6”	≈ 1 liter
UKM-S 8”x8”	≈ 1 liter
UKM-S 10”x10”	≈ 1 liter

Table 3: The Ball Bearing Reservoir Capacity

Mechanical seal is a component which is subject to replacement when it is worn out. If fluid comes from the hole on top of the seal bed plug, it is concluded that the seal is leaking.

UKM-S 2”x2”	≈ 0,6 liter
UKM-S 3”x3”	≈ 0,6 liter
UKM-S 4”x4”	≈ 0,7 liter
UKM-S 6”x6”	≈ 0,7 liter
UKM-S 8”x8”	≈ 2,7 liter
UKM-S 10”x10”	≈ 2,7 liter

Table 4: The Mechanical Seal Reservoir Capacity

Lubrication of Motor Bearing

The lubrication must be performed as it is recommended by the motor manufacturer.

CAUTION

Do not start your pump dry (WITHOUT WATER).

7.2. Checking The Direction of Rotation

CAUTION

- The direction of rotation is in the clockwise sense when looked from the motor side (right). The direction of rotation must always be checked before each operation.
- One should always check the labels which show the direction of rotation and the direction of fluid flow. If you dismount the coupling protection to monitor the direction of rotation, do not restart the engine before remounting the protection.

7.3. Starting the Pump

7.3.1. Priming

This pump is self-priming but the pump should never be operated unless there is liquid in the pump casing.

CAUTION

Never operate this pump unless there is liquid in the pump casing.
The pump will not prime when dry.
Extend operation of dry pump will destroy the seal assembly.

Add liquid to the pump casing when:
1. The pump is being put into service for the first time.
2. The pump has not been used for a considerable length of time.
3. The liquid in the pump casing has evaporated.

Once the pump casing has been filled the pump will prime and reprime as necessary.

CAUTION

After filling the pump casing, reinstall and tighten the fill plug. Do not attempt to operate the pump unless all connecting piping is securely installed. Otherwise, liquid in the pump forced out under pressure could cause injury to the personnel.

To fill the pump, remove the pump casing fill cover or fill plug in the top of the casing and add clean liquid until the casing is filled. Replace the fill cover or fill plug before operating the pump.

UKM-S type pumps are designed self-priming and must be filled in with fluid before being started. The filling up procedure may be performed through the tap over the pump casing.

All the pumps have ball bearings that are lubricated with fluidic oil. The bearings are lubricated at the factory.
The seals are also lubrication. Check the seals, couplings and the belting (if it exists) before start-up.
Finally, check the motor and the cables and commission.

CAUTION

Stop the motor if the pump gets too hot. Wait until it gets cold. Then start the system up again carefully.

8. MAINTENANCE

CAUTION

Maintenance operations must be done by authorized personnel with protective clothing only. The personnel must also beware of high temperatures and harmful and/or caustic liquids. Make sure that the personnel read carefully the manual.

- The instructions in Safety Precautions must be executed during maintenance and repair
- Continuous monitoring and maintenance will increase the engine's and pump' s lives.

The instructions below should be applied.

8.1. The Checks During the Operation

- Pump must never be operated without water.
- Pump must not be operated for a long time with the discharge valve closed (zero capacity).

CAUTION

Do not operate the pump against a closed discharge valve for along time. If operated against a closed discharge valve, pump components will deteriorate and the liquid could come to boil, build pressure and cause the pump casing to rupture or explode.

- Bearing temperature must never exceed 80°C if the ambient temperature is 30°C.
- Precautions must be taken against flare up when the component temperatures are over 60°C. "Hot Surface" warnings must be placed over necessary areas.
- Water leakage from the mechanical sealing indicates the fact that the sealing is worn out and therefore need to be replaced.
- All the auxiliary systems must be in use while the pump is operating.
- Check the elastic components of the coupling. Replace them when necessary.
- If the system consists of a substitute pump, keep it ready by operating it once a week. Check also the auxiliary systems of the substitute pump.

8.2. Pump and Seal Disassembly and Reassembly

This pump requires little service due to its rugged, minimum-maintenance design. However, if it becomes necessary to inspect or replace the wearing parts, follow these instructions.
Many functions may be performed by draining the pump and removing the back cover assembly. If major repair is required, the piping and/or power source must be disconnected. The following instructions assume complete disassembly is required.
Before attempting to service the pump, disconnect or lock out the power source and take precautions to ensure that it will remain inoperative. Close all valves in the suction and discharge lines.

For power source disassembly and repair, consult the literature supplied with the power source or contact your local power source representative.

CAUTION

Before attempting to disassemble or service the pump:
1. Familiarize yourself with this manual.
2. Disconnect or lock out the power source to ensure that the pump will remain inoperative.
3. Allow the pump to cool if overheated.
4. Check the temperature before opening any cover, plates or plugs.
5. Close the suction and discharge valves.
6. Vent the pump slowly and cautiously.
7. Drain the pump.

CAUTION

Use lifting and moving equipment in good repair and with adequate capacity to prevent injuries to personnel or damage to equipment.

8.2.1. Back Cover and Wear Plate Removal

The wear plate (07) is easily accessible and may be serviced by removing the back cover assembly (02).
Before attempting to service the pump, remove the pump casing drain plug (263) and drain the pump. Clean and reinstall the drain plug.
Remove the hand nuts and pull the back cover and assembled wear plate from the pump casing (01).
Inspected the wear plate, and replace it if badly scored or worn. To remove the wear plate, disengage the hardware (301 and 361). Inspect the back cover O-ring (401) and replace it if damaged or worn.

8.2.2. Flap Valve (Suction Check Valve) Removal

If the flap valve (90) is to serviced, remove the cylindiric pin (380), reach through the back cover opening and pull the complete assembly from the suction flange (04). The flap valve (90) can be reached by removing suction cover (02).

Note: Further disassembly of the check valve is not required since it must be replaced as a complete unit.
Individual parts are not sold separately.

8.2.3. Seal Removal

Slide the integral shaft and rotating portion of the seal off the shaft as unit.
Use a pair of stiff wires with hooked ends to remove the stationary element and seat.
An alternate method of removing the stationary seal components is to remove the hardware (375 and 329), and separate the seal plate (03) and gasket (413) from the bearing housing (30). Position the seal plate on a flat surface with the impeller side down.
Use a wooden dowel or other suitable tool to press on the back side of the stationary seat until the seat, O-rings, and stationary element can be removed.
Remove the shaft sleeve O-ring.
If no further disassembly is required, refer to seal installation.

8.2.4. Shaft and Bearing Removal and Disassembly

When the pump is properly operated and maintenance, the bearing housing should not require disassembly.
Disassemble the shaft and bearings only when there is evidence of wear or damage.

CAUTION

Shaft and bearing disassembly in the field is not recommended. These operations should be performed only in a properly equipped shop by qualified personnel.

Remove the bearing housing drain plug and drain the lubricant. Clean and reinstall the drain plug.
Disengage the hardware (370 and 320) and slide the bearing cap (35) and oil seal (220) off the shaft. Remove the bearing cap gasket (411), and press the oil seal from the bearing cap.

Place a block of wood against the impeller end of the shaft and tap the shaft and assembled bearings from the bearing housing.
After removing the shaft and bearings (200 and 201), clean and inspect the bearings in place as follows.

CAUTION

To prevent damage during removal from the shaft, it is recommended that bearings be cleaned and inspected in place. It is strongly recommended that the bearings be replaced any time the shaft and the bearings are removed.

Clean the bearing housing, shaft and all component parts (except the bearings) with a soft cloth soaked in cleaning solvent. Inspect the parts for wear or damage and replace as necessary.

CAUTION

Most cleaning solvents are toxic and flammable. Use them only in a well-ventilated area free from excessive heat, sparks, and a flame. Read and follow all precautions printed on solvent containers.

CAUTION

Clean the bearings thoroughly in fresh cleaning solvent. Dry the bearings with filtered compressed air and coat with light oil.

Bearings must be kept free of all dirt and foreign material.
Failure to do so will greatly shorten bearing life. DO NOT spin dry bearings. This may scratch the bails or races and cause premature bearing failure.
Rotate the bearings by hand to check for roughness or binding and inspect the bearings balls. If rotation is rough or the bearing balls are discolored, replace the bearings.
The bearing tolerances provide a tight press fit onto the shaft and a snug slip fit into the bearing housing. Replace the bearings, shaft, or bearing housing if the proper bearing fit is not achieved.
If bearing replacement is required, remove the outboard bearing retaining ring (390) and use a bearing puller to remove the bearings from the shaft.
Press the inboard oil seals (221 and 222) from the bearing housing.

8.2.5. Shaft and Bearing Reassembly and Installation

Clean the bearing housing, shaft and all component parts (except the bearings) with a soft cloth soaked in cleaning solvent. Inspect the parts for wear or damage and replace as necessary.
Inspect the shaft for distortion, nicks and scratches, or for thread damage on the impeller end. Dress small picks and burrs with a fine file or emery cloth. Replace the shaft if detective.
Position the inboard oil seals (221 and 222) in the bearing housing bore. Press the oil into the housing until the face is just flush with the machined surface on the housing.

CAUTION

To prevent damage during removal from the shaft, it is recommended that bearings be cleaned and inspected in place. It is strongly recommended that the bearings be replaced any time the shaft and the bearings are removed.

Note: Position the inboard bearing (200). Position the outboard bearing (201) until the retaining ring.
The bearing may be heated to ease installation. An introduction heater, hot oil bath, electric oven, or hot plate may be used to heat the bearings. Bearings should never be heated with a direct flame or directly on a hot plane.

Note: Hot oil is used to heat the bearings, hot the oil and the container must be absolutely clean. If the oil has been previously used, it must be thoroughly filtered.

Heat the bearings to a uniform temperature no higher than 120 °C (250 °F), and slide the bearings onto the shaft, one at a time, until they are fully seated. This should be done quickly, in one continuous motion, to prevent the bearings from cooling and sticking on the shaft.

After the bearings have been installed and allowed to cool, check to ensure that they are not moved away from the shaft shoulders in shrinking. If movement has occurred, use a suitable sized sleeve and a pres to reposition the bearings against the shaft shoulders.

If heating the bearings is not practical, use a suitable sized sleeve and an arbor (or hydraulic) press to install the bearings on the shaft.

CAUTION

When installing the bearings onto the shaft, never press or hit against the outer race, ball, or ball cage.
Press only on the inner race.

Secure the outboard bearing on the shaft with the bearing retaining ring (391).
Slide the shaft and assembled bearings into bearing housing until the retaining ring on the outboard bearing seats against the bearing housing.

CAUTION

When installing the shaft and bearings into the bearing bore, push against the outer race. Never hit the balls or ball cage.

Press the outboard oil seal (220) into the bearing cap with the lip. Replace the bearing cap gasket (412), and secure the bearing cap with the hardware (370 and 320). Be careful not to damage the oil seal lip on the shaft keyway.

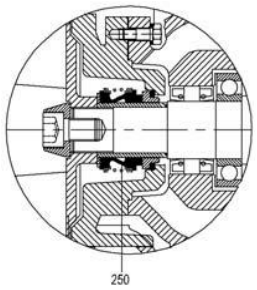


Figure 10: Seal Assembly

8.2.6. Seal and Installation

CAUTION

Most cleaning solvents are toxic and flammable. Use them only in a well-ventilated area free from excessive heat, sparks, and a flame. Read and follow all precautions printed on solvent containers.

Clean the seal cavity and shaft with a cloth soaked in fresh cleaning solvent. Inspect the stationary seat bore in the seal plate for dirt, nicks and burrs, and ant that exist. The stationary seat bore must be completely clean before installing the seal.

CAUTION

A new seal assembly should be installed any time the old seal is removed from the pump. Wear patterns on the finished faces cannot be realigned during reassembly. Reusing an old seal could result in premature failure.

To ease installation of the seal, lubricate the seal sleeve (70) and the external stationary seat O-ring with a very small amount of light lubricating oil.
If the seal plate was removed, install the seal plate gasket (413). Position the seal plate over the shaft and secure it to the bearing housing with the hardware (329 and 375).
To prevent damaging the shaft sleeve O-ring on the shaft threads, stretch the O-ring over a piece of tubing that has a little bigger inside diameter than the pump shaft. Slide the tube over the shaft threads and then slide

the O-ring off the and onto the shaft. Remove the tube, and continue to slide the O-ring down the shaft until it seats against the shaft shoulder.
Install new mechanical seal to its place. Clean and inspect the impeller. Install the full set of impeller shims provided with the seal and screw the impeller onto the shaft until it is seated against the seal.
Continue to screw the impeller onto shaft. This will press the stationary seat into the seal plate bore.
Measure the impeller-to-seal plate clearance and remove impeller adjusting shims to obtain the proper clearance.
If necessary to reuse an old seal in an emergency, carefully separate the rotating and stationary seal faces from the bellows retainer and stationary seat.

CAUTION

A new seal assembly should be installed any time the old seal is removed from the pump. Wear patters on the finished reassembly. Reusing an old seal result in premature failure.

Handle the seal parts with extreme care to prevent damage.
Be careful not to contaminate precision finished faces with a non-oil based solvent and a clean, lint-free tissue.
Wipe lightly in a concentric pattern to avoid scratching the faces.
Carefully wash all metallic parts in fresh cleaning solvent and allow drying thoroughly.

CAUTION

Do not attempt o separate the rotating portion of the seal from the shaft sleeve when reusing an old seal.
The rubber bellows will adhere to the sleeve during use and attempting to separate them could damage the bellows.

Inspect the seal components for wear, scoring, grooves and other damage that might cause leakage. Inspect the integral shaft sleeve for nicks or cuts on either end. If any components are worn or the sleeve is damaged, replace the complete seal; never mix old and new seal parts.
Install the stationary seal element in the stationary seat.
Press this stationary subassembly into the seal plate bore until it seats squarely against the bore shoulder. A push tube made from a piece of plastic pipe would aid this installation.

The ID of the pipe should slightly larger than the OD of the shaft sleeve.
Slide the rotating portion of the seal (consisting of the integral shaft sleeve, spring centering washer, spring, bellows and retainer and rotating element) onto the shaft until the seal faces contact.

8.2.7. Impeller Installation

Inspect the impeller and replace it if cracked or badly worn. Check impeller, shaft and impeller key for any dirt or damage. Clean if necessary.

CAUTION

Shaft and impeller key must be completely clean during reassembly. Even the slightest amount of dirt on the threads can cause the impeller to seize to the shaft, making future removal difficult or impossible without damage to the impeller or shaft.

Note: At the slightest sign of binding, immediately back the impeller off and check the threads fro dirt. Do not try to force the impeller on the shaft.

A clearance of 0,025 to 0,040” (0,64-1,02 mm) between the impeller and the seal plate is recommended for maximum pump efficiency. Measure this clearance and add or remove impeller adjusting shims as required.

Note: If the rotating assembly has been installed in the pump casing, this clearance may be measured by reaching through the priming port with a feeler gauge.

Note: Proceed with Rotating Assembly Installation before installing the impeller capscrew and washer. The rotating assembly must be installed in the pump casing in order to torque the impeller capscrew.

After the rotating assembly is installed in the pump casing, coat the threads of the capscrew with ‘Never Seez’ or equivalent compound and install the impeller washer and capscrew; torque the capscrew to 90 ft.lbs (1080 in.lbs or 12,4 m.kg)

8.2.8. Rotating Assembly Installation

Note: If the pump has been completely disassembled, it is recommended that the suction check valve and the back cover assembly be reinstalled at this point. The back cover assembly must be in place to adjust the impeller face clearance.

Install the bearing housing and seal plate O-rings and lubricate them light grease. Ease the rotating assembly into the pump casing using the installation tool. Be careful not to damage the O-ring. Secure the rotating assembly to the pump casing with the hardware. A clearance of 0.010 to 0.020 inch (0.25 to 0.51 mm) between the impeller and the wear plate is also recommended for maximum pump efficiency.

8.2.9. Suction Check Valve Installation

Inspect the check valve assembly and replace it if badly worn.
Note: The check valve assembly must be replaced as a complete unit. Individual parts are not sold separately. Reach through the back cover opening with the check valve and position the check valve adapter in the mounting slot in the suction flange. Align the adaptor with the flange hole and secure the assembly with the check valve pin.

8.2.10. Back Cover Installation

If the wear plate was removed for replacement, carefully center it on the back cover and secure it with the hard wear. The wear plate must be concentric to prevent binding when the back cover is installed.
Replace the back cover O-ring and lubricate it with a generous amount of No: 2 grease. Clean any scale or debris from the contacting surfaces in the pump casing that might interfere or prevent a good seal with the back cover. Slide the back cover assembly into the pump casing. Be sure the wear plate does not bind against the impeller.

Note: To ease future disassembly, apply a film of grease on the back cover shoulder or any surface which contacts the pump casing. This action will reduce rust and scale build-up.

Secure the back cover assembly by tightening the hand nuts evenly. Do not over-tighten the hand nuts; they should be just tight enough to ensure a good seal at the back cover shoulder. Be sure the wear plate does not bind against the casing.

8.2.11. Final Pump Assembly

Install the shaft key and reconnect the power source. Be sure to install any guards used over the rotating members.

CAUTION

Do not operate the pump without the guards in place over rotating parts. Exposed rotating parts can catch clothing, fingers or tools or causing severe injury to personnel.

Install the suction and discharge lines and open all valves.
Make certain that all piping connections are tight, properly supported and secure.
Be sure the pump and the power source have been properly lubricated.
Remove the fill cover assembly and fill the pump casing with clean liquid. Reinstall the fill cover and tighten it. Refer to Operation, before putting the pump back into service.

8.2.12. Component Check

To make possible the visual control, one must be able to reach the pump from any direction. Especially, to be able to dismount the internal units of the pump and the engine, sufficient free space must be created around them for maintenance and repair. Furthermore, one must make sure that the piping system can easily be dismounted.

8.2.13. Cleansing of the Casing and the Impeller

In order to take away easily the mud and solid particles that accumulate within the casing and the pump, one may unscrew the suction cover as shown in Figure below.

Figure 11: Cleansing of the Casing and the Impeller

8.3. Coupling

As mentioned in Section 6.4, coupling alignment must be checked regularly.

Worn out elastic bands must be replaced.

8.4. Drive

Apply to the operating instructions of the motor manufacturer.

8.5. Auxiliary Components

Check regularly the fittings and the gaskets, replace the worn out pieces.

8.6. Service

Our Customer Service Department offers after-sale service. Manager should employ authorized and trained personnel for mounting/dismounting procedures. Before these procedures, one must make sure that pump interior is clean and empty.

This criterion is also valid for the pumps which are sent to our factory or to our service points.

Maintain the safety of the personnel and the environment in every field procedure.

8.7. Spare Parts

The spare parts of UKM-S type pumps are guaranteed for **10 YEARS** by **MAS DAF MAKINA SANAYI A.Ş.**

In your spare parts requests, please indicate the below listed values that are indicated on your pump's label.

Pump type and size:
Motor power and speed:
Pump serial number:
Capacity and head:

If you wish to keep spare parts in store, depending on the number of same type of pumps, for two operation years, the quantities which are listed in the table below are recommended.

Component Name	The Number of Equivalent Pumps in the Installation						
	1-2	3	4	5	6-7	8-9	10+
Shaft (key included) kit	1	1	2	2	2	3	%30
Impeller (kit)	1	1	1	2	2	3	%30
Wearing Plate	2	3	4	5	5	6	%60
Bearings (kit)	1	1	2	2	3	4	%50
O-Ring for Casing (kit + 1)	1	1	1	2	2	3	%40
O-Ring for Shaft (kit)	1	1	2	2	3	4	%50
Sealing Bushes (kit)	1	1	1	2	2	3	%30
Coupling Rubber Sleeves (kit) **In application where elastic coupling is used.**	1	2	2	3	3	4	%50

Table 5: Spare Part List

9. NOISE LEVEL AND VIBRATION

The reasons which increase the noise level are indicated below:

- Touch of coupling halves due to worn rubber sleeves (incorrectly aligned)
- Noise level increases due to the fact that the pump is not founded properly (Vibration)
- If the installation does not have compensator noise and vibration increases.
- Wearing in ball bearing also increases noise level.

Check if there is any noise increasing elements in your installation.

9.1. Expected Noıse Values

Measurement conditions:

- The distance between the measure point and the pump : 1m
- Operation : Without Cavitation
- Motor : IEC Standard Motor
- Tolerance : ±3 dB

Power of Motor PN [kW]	Sound Pressure Level (dB) *	
	2 Poles	4 Poles
	2900 rpm/min 50 Hz	1450 rpm/min 50 Hz
0,37	<70	<70
0,55	<70	<70
1,1	<70	<70
1,5	<70	<70
2,2	<70	<70
3	<70	<70
4	<70	<70
5,5	<70	<70
7,5	76	<70
11	79	<70
15	78	<70
18,5	80	<70
22	84	<70
30	84	<70
37	82	72
45	85	74
55	87	75
75	87	76
90	86	73
110	86	83
132	85	82
160	87	84
200	87	83

Table 6: Sound Pressure Level

(*) Without protective sound hood, measured at a distance of 1 m directly above the driven pump, in a free space above a sound reflecting surface.

The above values are maximum values. The surface noise pressure level at dB(A) unit is shown as (L_{pA}). This complies withTS EN ISO 20361.

10. POSSIBLE FAILURES, CAUSES, SOLUTIONS

Possible failures and solution strategies are listed in the table below. Please apply to the Customers' Service Department of our company when a generic solution is not found to your problem.

While the failures are repaired the pump must always be dry and un-pressurized.

POSSIBLE FAILURE	CAUSES	SOLUTIONS
Pump fails to prime.	• Not enough liquid in casing. • Flap valve contaminated or damaged. • Air leak in suction hose collapsed. • Leaking or worn seal or pump gasket. • Suction lift or discharge head too high. • Strainer clogged.	• Add liquid to casing. • Clean or replace check valve. • Correct leak. • Replace suction hose. • Check pump vacuum. Replace leaking or worn seal or gasket. • Check piping installation and install by-pass line if needed. • Check strainer and clean if necessary.
Pump stops or fails to deliver rated flow or pressure.	• Air leak in suction line. • Lining of suction hose collapsed. • Leaking or worn seal or pump gasket. • Strainer clogged. • Suction intake not submerged at proper level or sump too small. • Impeller or other wearing parts worn or damaged. • Impeller clogged. • Pump speed too slow. • Discharge head too high. • Suction lift too high.	• Correct leak. • Replace suction hose. • Check pump vacuum. Replace leaking or worn seal or gasket. • Check strainer and clean if necessary. • Check installation and correct submergence as needed. • Replace worn or damaged parts. Check that impeller is properly centered and rotates. • Free impeller of debris. • Check driver output; check belts or couplings for slippage. • Install by-pass line. • Measure lift with vacuum gauge. Reduce lift and/or friction losses in suction line.
Pump requires too much power.	• Pump spped too high. • Discharge head too low. • Liquid solution too thick. • Bearing(s) frozen.	• Chcek driver output; check that sheaves or motor rpm are correctly sized. • Adjust discharge valve. • Dilute is possible. • Disassemble pump and check bearing(s).
Pump clogs frequently.	• Liquid solution too thick. • Discharge flow too slow. • Suction check valve or foot valve cloggged or binding.	• Dilute is possible. • Open discharge valve fully to increase flow rate and power source at maximum governed speed. • Clean valve.
Excessive noise.	• Cavitaions in pump. • Pumping entrained air. • Pump or drive not securely mounted. • Impeller clogged or damaged.	• Reduce suction lift and/or friction losses in suction line. Record vacuum and pressure gauge readings and consult local represantative or factory. • Locate and eliminate source of air bubble. • Secure mounting harware. • Clean out debris; replace damaged parts.
Bearings run too hot.	• Bearing temperature is high but within limits. • Low or incorrect lubricant. • Suction and discharge lines not properly supported. • Drive misaligned.	• Check bearing temperature regularly to montior and increase. • Check for proper type and level of lubricant. • Check piping installation for proper support. • Align drive properly.

Table 7 - Possible Failures, Causes, Solutions

11. UKM-S PUMP DIMENSIONS TABLE AND WEIGHTS

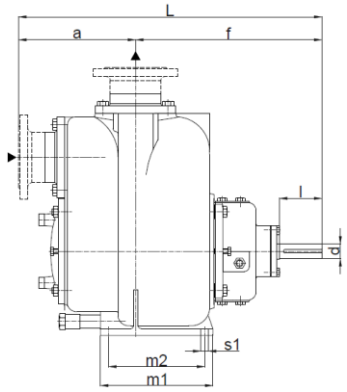


Figure 12-a: UKM-S 2”x2” - 3”x3” - 4”x4” - 6”x6” - 8”x8” Pump Dimensions Figure

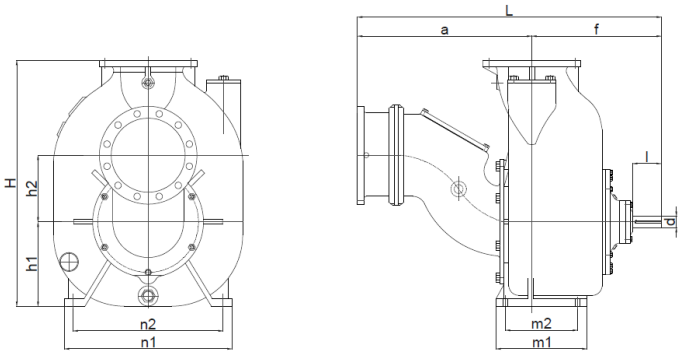


Figure 12-b: UKM-S 10”x10” Pump Dimensions Figure

Pump Type	DNs	DNd	a	f	L	b	h1	h2	H	m1	m2	n1	n2	s1	d	l
UKM-S 2”x2”	DN 65	DN 65	316	306	622	70	151	167	524	200	163	309	281	23	38	104
UKM-S 3”x3”	DN 80	DN 80	300	437	737	60	190	242	663	382	230	439	399	18	38	101
UKM-S 4”x4”	DN 100	DN 100	317	500	817	75	220	245	700	293	250	440	400	20	38	110
UKM-S 6”x6”	DN 150	DN 150	414	490	904	62	258	310	929	447	281	585	525	20	38	127
UKM-S 8”x8”	DN 200	DN 200	406	615	1021	-	336	388	1048	521	305	705	635	22	45	170
UKM-S 10”x10”	DN 250	DN 250	710	523	1233	-	356	280	1038	385	305	710	635	22	45	120

Table 8: UKM-S Pump Dimensions Table and Weights

12. TIGHTENING TORQUES

THREAD DIAMETER	TIGHTENING TORQUE MAX (Nm)	
	Property Classes	
	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

Table 9: Tightening Torques Table

13. UKM-S SECTIONAL DRAWING AND PART LIST (2”x2” - 3”x3” - 4”x4” - 6”x6” - 8”x8”)

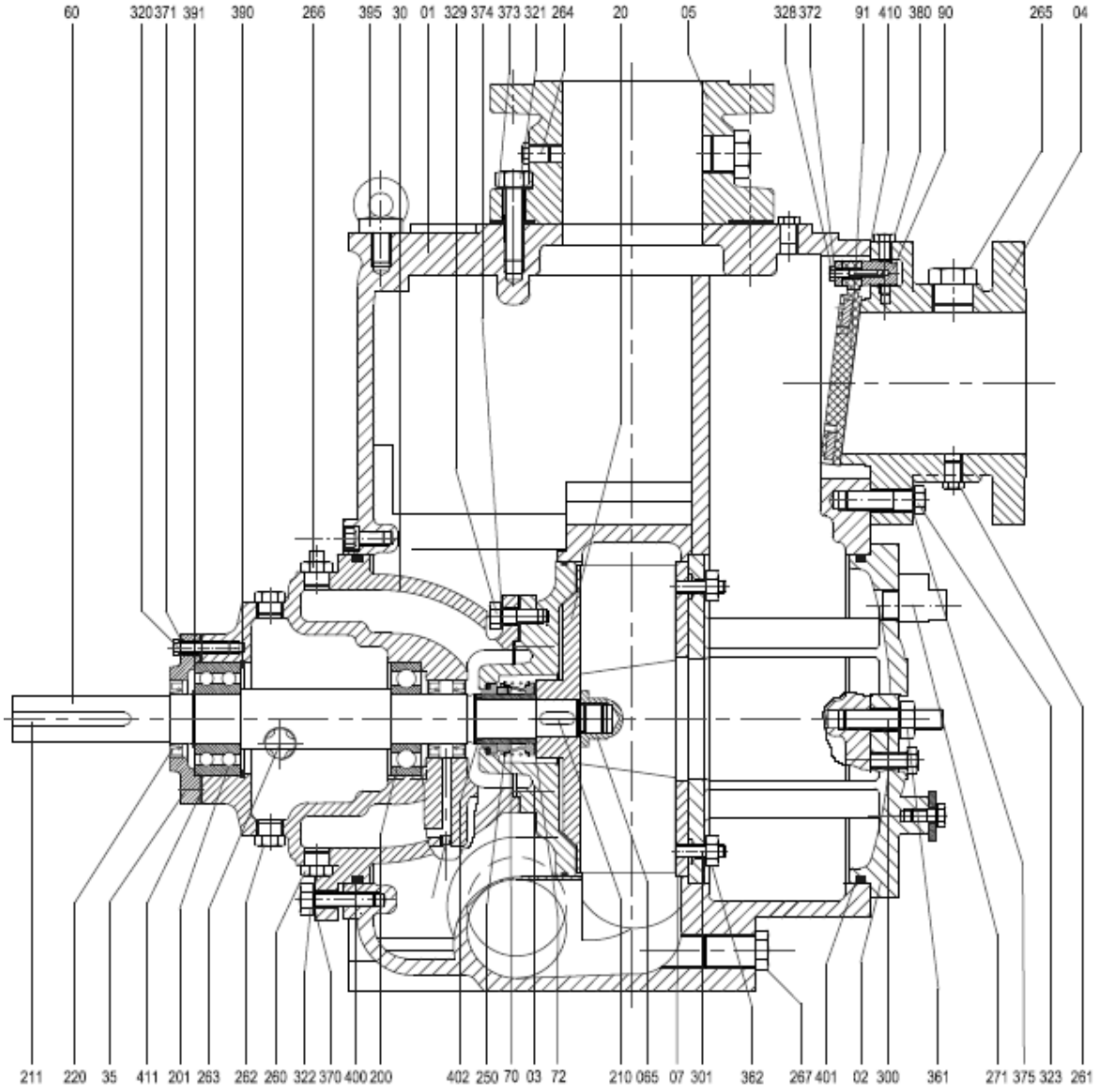


Figure 13: UKM-S Sectional Drawing (2”x2” - 3”x3” - 4”x4” - 6”x6” - 8”x8”)

Part No	Part Name	Part No	Part Name	Part No	Part Name
01	Pump Casing	220	Oil Gasket	340	Impeller Cap Screw
02	Back Cover	250	Mechanical Seal	361	Nut
03	Stuffing Box	260	Pipe Plug	370	Washer
04	Suction Flange	261	Pipe Plug	371	Washer
05	Discharge Flange	262	Pipe Plug	372	Washer
07	Wearing Plate	263	Pipe Plug	373	Washer
20	Impeller	264	Pipe Plug	374	Washer
30	Bearing Housing	265	Pipe Plug	375	Washer
35	Bearing Cover	266	Pipe Plug	377	Washer for Impeller Cap Screw
60	Shaft	267	Pump Casing Drain Plug	380	Flap Valve Pin
65	Cap Nut	271	Pressure Relief Valve	390	Ring
70	Seal Sleeve	300	Stud	391	Ring
72	Mechanical Seal Ring	301	Stud	395	Bolt for Lifting
90	Flap Valve	320	Hex Bolt	400	O-Ring
91	Flap Valve	321	Hex Bolt	401	O-Ring
200	Bearing	322	Hex Bolt	402	O-Ring
201	Bearing	323	Hex Bolt	410	Gasket
210	Key for Impeller	328	Hex Bolt	411	Gasket
211	Key for Pump Shaft	329	Hex Bolt		

Table 10: UKM-S Sectional Part List (2”x2” - 3”x3” - 4”x4” - 6”x6” - 8”x8”)

UKM-S SECTIONAL DRAWING AND PART LIST (10”x10”)

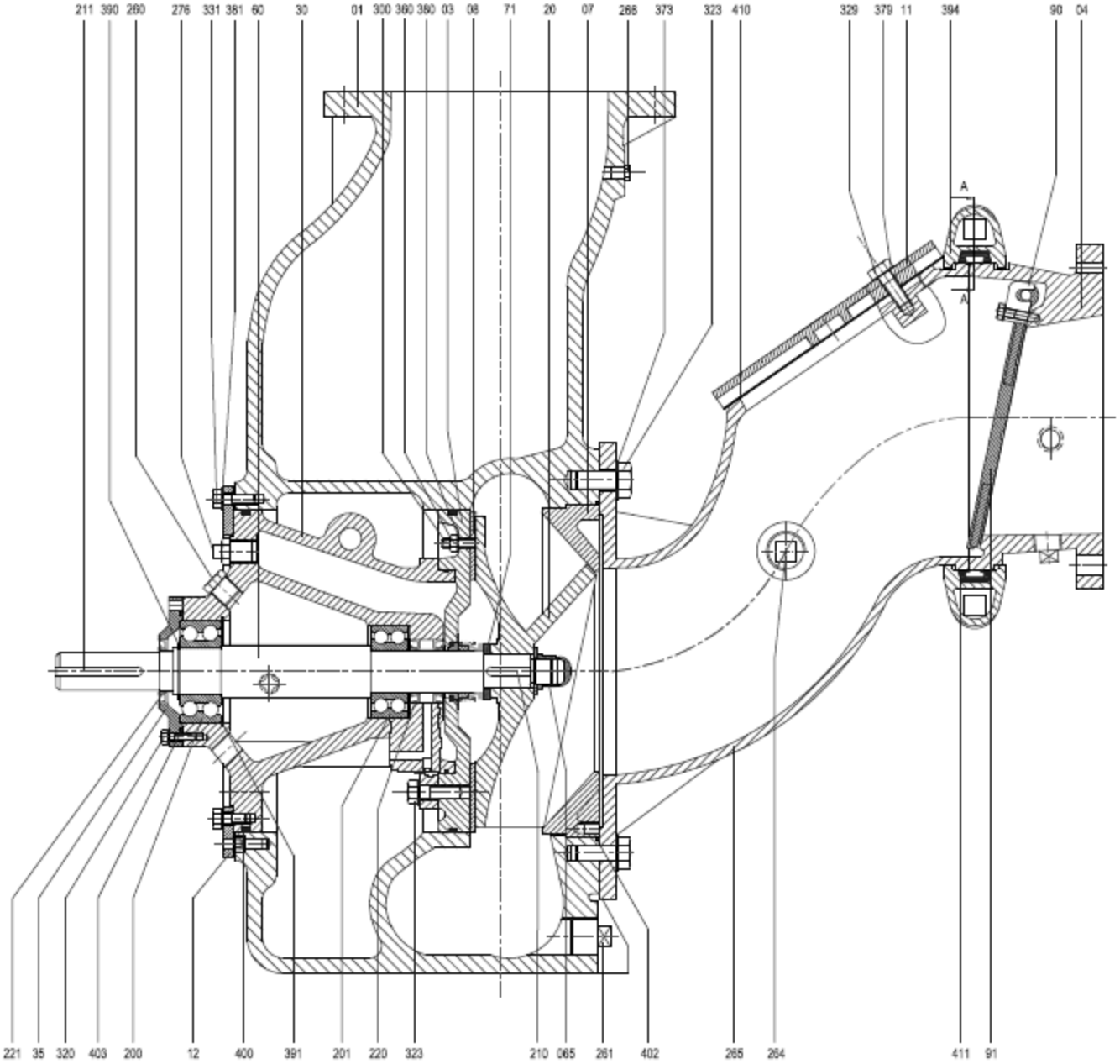


Figure 14: UKM-S Sectional Drawing (10”x10”)

Part No	Part Name	Part No	Part Name	Part No	Part Name
01	Pump Casing	200	Bearing	323	Hex Bolt
03	Stuffing Box	201	Bearing	328	Hex Bolt
04	Suction Flange	210	Key for Impeller	340	Impeller Cap Screw
07	Wearing Plate	211	Key for Pump Shaft	377	Washer for Impeller Cap Screw
08	Impeller Back Plate	220	Oil Gasket	390	Ring
11	Elbow Cover	221	Oil Gasket	391	Ring
12	Bearing Housing Flange	260	Pipe Plug	394	Elbow
20	Impeller	261	Pipe Plug	400	O-Ring
30	Bearing Housing	264	Pipe Plug	401	O-Ring
35	Bearing Cover	266	Pipe Plug	402	O-Ring
60	Shaft	265	Suction Elbow	403	O-Ring
65	Cap Nut	300	Stud	410	Gasket
90	Flap Valve Part	301	Stud	411	Gasket
91	Flap Valve	320	Hex Bolt		

Table 11: UKM-S Sectional Part List (10”x10”)

14. UKM-50 SECTIONAL DRAWING AND PART LIST

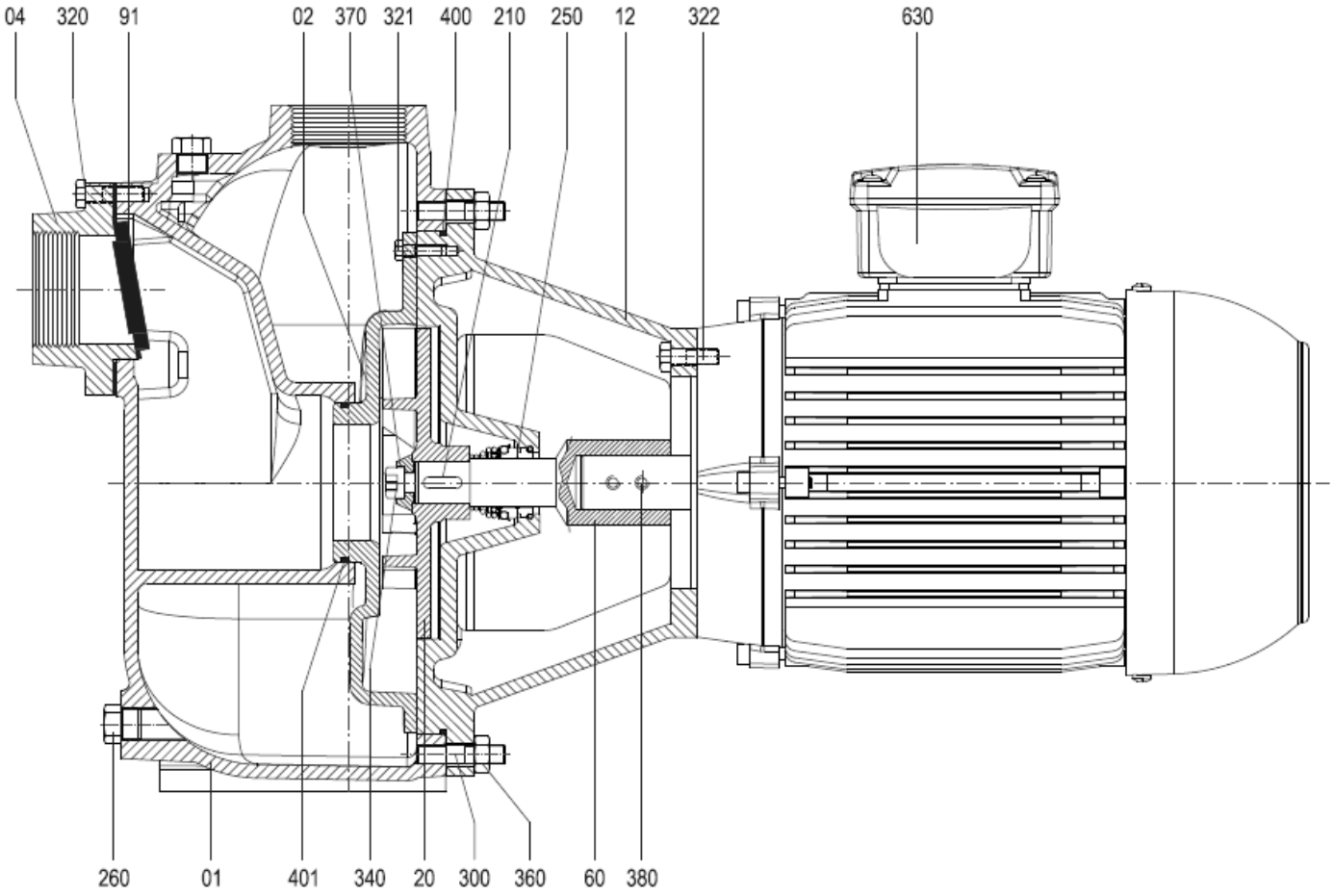


Figure 15: UKM-50 Sectional Drawing

Part No	Part Name	Part No	Part Name
01	Pump Casing	320	Hex Bolt
02	Volute Casing	321	Hex Bolt
04	Flap Valve Casing	322	Hex Bolt
12	Adaptor	340	İmbus Bolt
20	Impeller	360	Casing Nut
60	Shaft	370	Washer for Impeller Cap Screw
91	Suction Flap	380	Setscrew
210	Key for Impeller	400	O-Ring
250	Mechanical Seal	401	O-Ring
260	Plug	630	Electrical Motor
300	Casing Stud		

Table 12: UKM-50 Sectional Part List

15. ROTATING REGION OF UKM-S SELF-PRIMING CENTRIFUGAL PUMP

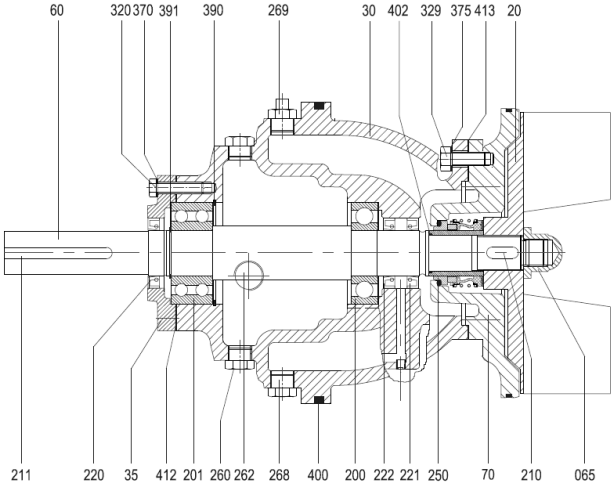


Figure 16: Rotating Region of UKM-S Self-Priming Centrifugal Pump Sectional Drawing

Part No	Part Name	Part No	Part Name
03	Stuffing Box	260	Pipe Plug
20	Impeller	262	Pipe Plug
30	Bearing Housing	264	Pipe Plug
35	Bearing Cover	268	Pipe Plug
60	Shaft	269	Pipe Plug
65	Cap Nut	320	Hex Bolt
70	Seal Sleeve	329	Hex Bolt
200	Bearing	370	Washer
201	Bearing	375	Washer
210	Key for Impeller	390	Ring
211	Key for Pump Shaft	391	Ring
220	Oil Gasket	400	O-Ring
221	Oil Gasket	402	O-Ring
222	Oil Gasket	412	Gasket
250	Mechanical Seal	413	Gasket

Table 13: Rotating Region of UKM-S Self-Priming Centrifugal Pump Sectional Part List

16. AUTOMATIC AIR RELEASE VALVE SECTIONAL DRAWING AND PART LIST

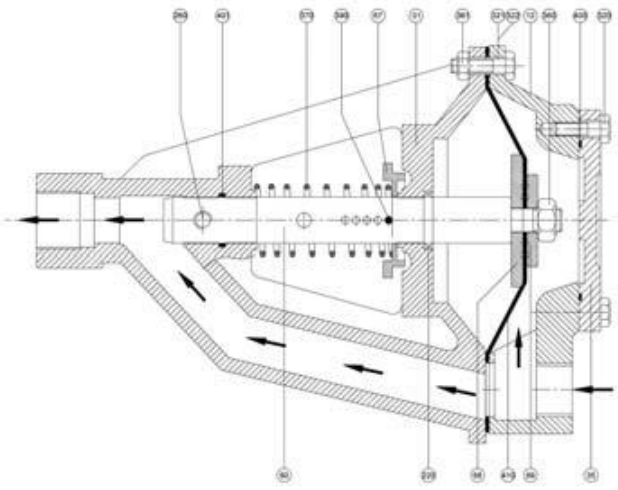


Figure 17: Automatic Air Release Valve Sectional Drawing

Part No	Part Name	Part No	Part Name
01	Casing	321	Hex Bolt
12	Adaptor	322	Hex Bolt
35	Adaptor Cover	360	Nut
60	Shaft	361	Nut
67	Spring Sleeve	370	Spring
68	Sleeve	390	Cylindirical Pin
69	Sleeve	400	O-Ring
220	Oil Seal	401	O-Ring
260	Pipe Plug	410	Gasket
320	Hex Bolt		

Table 14: Automatic Air Release Valve Sectional Part List

17. UKM-S DRAWING FOR DISMANTLING

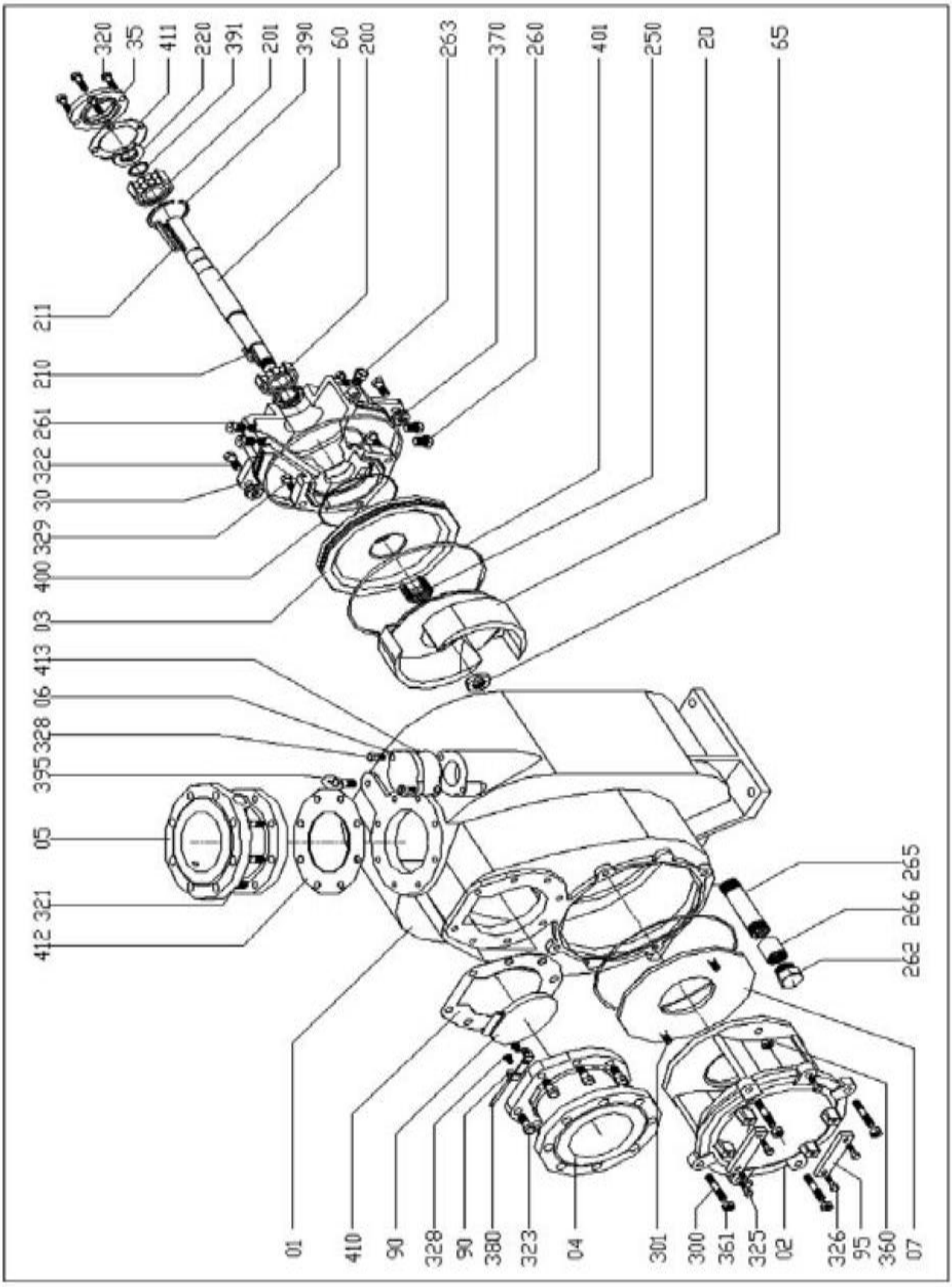


Figure 18: UKM-S Drawing For Dismantling

18. FIGURE LIST

19. TABLE LIST

Mas Grup

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