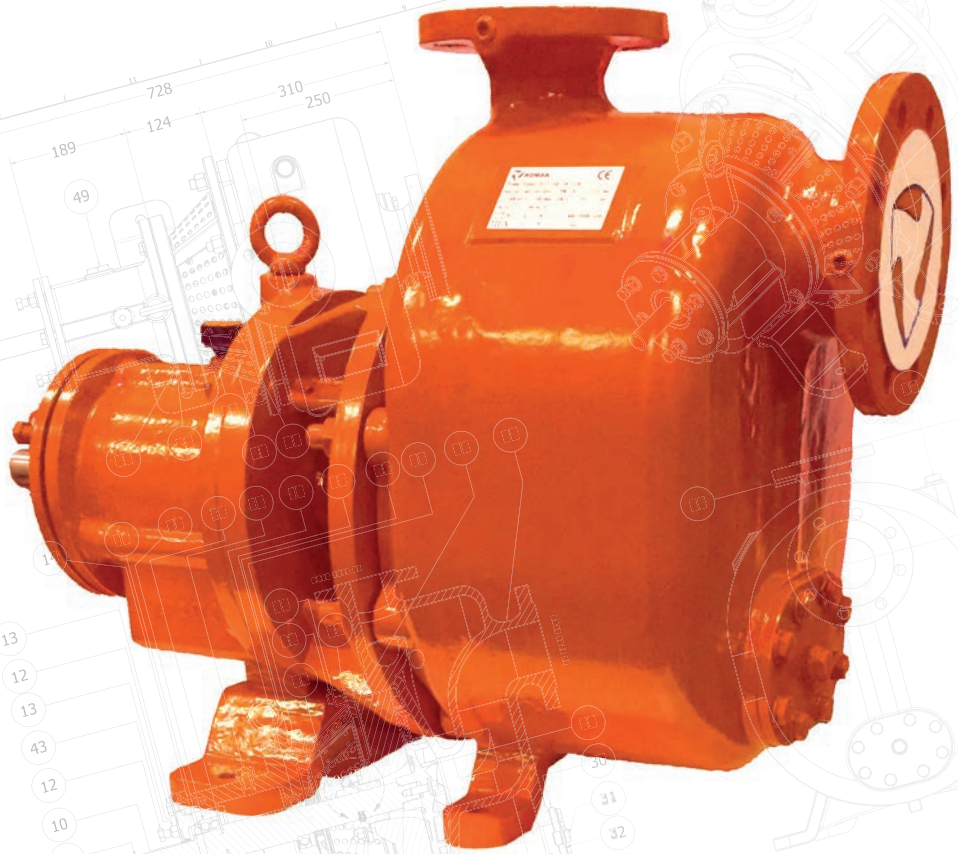
KOMAK Industry bv

Pumps and seals, that's our business

User Manual



KFT ranges
80-50-xxx and 100-80-xxx

Self-priming Centrifugal Pump

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KOMAK

User Manual

KFT 80-50-xxx
and
KFT 100-80-xxx

Table of Contents

KOMAK

1 Introduction

1.1 Inspection before use

The pump is always packed properly but there are always chances that the pump has been damaged though delivery. So before operation and installation please check the pump for any signs of damage. Also check that the pump delivered is the correct pump and all the parts are there.

2 Safety

2.1 Safety markings

The manual contains safety markings where not following the instructions would result in dangerous situation. To prevent major injuries to you or the equipment follow the instructions with a symbol with great care.

List of safety symbols

PREVENT EXCESSIVE EXTERNAL PIPE LOAD
Do not use pump as a support for piping. Do not mount expansion joints, unless allowed by KOMAK in writing, so that their force, due to internal pressure, acts on the pump flange.

NEVER RUN THE PUMP DRY OR WITHOUT PROPER PRIME
(Casing flooded)

NEVER OPERATE THE PUMP WITH THE DISCHARGE VALVE CLOSED
(Unless otherwise instructed at a specific point in the User Instructions.)

NEVER OPERATE THE PUMP WITH THE SUCTION VALVE CLOSED
It should be fully opened when the pump is running.

NEVER OPERATE THE PUMP AT ZERO FLOW OR FOR EXTENDED PERIODS BELOW THE MINIMUM CONTINUOUS FLOW

DO NOT RUN THE PUMP AT ABNORMALLY HIGH OR LOW FLOW RATES
Operating at a flow rate higher than normal or at a flow rate with no back pressure on the pump may overload the motor and cause cavitation. Low flow rates may cause a reduction in pump/bearing life, overheating of the pump, instability and cavitation/vibration and excessive fluid heat.

NEVER EXCEED THE MAXIMUM DESIGN PRESSURE (MDP) AT THE TEMPERATURE SHOWN ON THE PUMP NAMEPLATE

ENSURE CORRECT LUBRICATION
(See section 5, Commissioning, startup, operation and shutdown.)
See section 3 for pressure versus temperature ratings based on the material of construction.

THE PUMP SHAFT MUST TURN CLOCKWISE WHEN VIEWED FROM THE MOTOR END
It is absolutely essential that the rotation of the motor be checked before installation of the coupling spacer and starting the pump.
Incorrect rotation of the pump for even a short period can unscrew the impeller, which can cause significant damage, even if the security bolt is installed.

2.2 Personnel qualification and training

The personnel involved in installation, operation or maintenance need to be qualified to carry out such work. If this is not the case, training must be provided. When repair is carried out coordinate this with operations, health and safety personnel. Furthermore always follow the safety instructions provided in this manual

2.3 ATEX

Gland packing must not be used when pumping hazardous liquids.

If the temperature is greater than 80 ºC (175 ºF) or below -5 ºC (23 ºF) in a restricted zone, or exceeds local regulations, action as above shall be taken.

HAZARDOUS LIQUIDS: When the pump is handling hazardous liquids care must be taken to avoid exposure to the liquid by appropriate siting of the pump, limiting personnel access and by operator training. If the liquid is flammable and/or explosive, strict safety procedures must be applied.

PRODUCTS USED IN POTENTIALLY EXPLOSIVE ATMOSPHERES

Measures are required to:

- Avoid excess temperature
- Prevent build up of explosive mixtures
- Prevent the generation of sparks
- Prevent leakages
- Maintain the pump to avoid hazard

The following instructions for pumps and pump units when installed in potentially explosive atmospheres must be followed to help ensure explosion protection. For ATEX, both electrical and non-electrical equipment must meet the requirements of European Directive 94/9/EC.

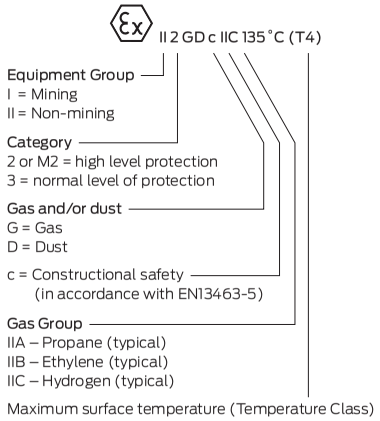
Always observe the regional legal Ex requirements eg Ex electrical items outside the EU may be required certified to other than ATEX.

SCOPE OF COMPLIANCE

Use equipment only in the zone for which it is appropriate. Always check that the driver, drive coupling assembly, seal and pump equipment are suitably rated and/or certified for the classification of the specific atmosphere in which they are to be installed. Where **KOMAK** has supplied only the bare shaft pump, the Ex rating applies only to the pump. The party responsible for assembling the ATEX pump set shall select the coupling, driver and any additional equipment, with the necessary CE Certificate/ Declaration of Conformity establishing it is suitable for the area in which it is to be installed. The output from a variable frequency drive (VFD) can cause additional heating affects in the motor. On pump installations controlled by a VFD, the ATEX Certification for the motor must state that it covers the situation where electrical supply is from the VFD. This particular requirement still applies even if the VFD is in a safe area.

MARKING

An example of ATEX equipment marking is shown below. The actual classification of the pump will be engraved on the nameplate.



AVOIDING EXCESIVE SURFACE TEMPERATURES

Pump liquid temperature Pumps have a temperature class as stated in the ATEX Ex rating on the nameplate. These are based on a maximum ambient temperature of 40 ºC (104 ºF); refer to **KOMAK** for higher ambient temperatures. The surface temperature on the pump is influenced by the temperature of the liquid handled. For self-priming pumps of the KFT range only T1 to T5 may be applicable depending on the service conditions and the material combination supplied. Temperature class is indicated on the type plate of the pump each and every time. The maximum permissible liquid temperature depends on the temperature class and must not exceed the values in the table applicable aside.

Temperature class to EN 13463-1	Maximum surface temperature permitted	Temperatuur limit of liquid handled
T6	85 °C (185 °F)	Consult **KOMAK**
T5	100 °C (185 °F)	Consult **KOMAK**
T4	135 °C (185 °F)	110 °C (230 °F)*
T3	200 °C (185 °F)	175 °C (347 °F)*
T2	300 °C (185 °F)	270 °C (518 °F)*
T1	450 °C (185 °F)	350 °C (662 °F)*

* The tables only takes the ATEX temperature class into consideration. Pump design or material, as well as component design or material, may further limit the maximum working temperature of the liquid.

The temperature rise at the seals and bearings and due to the minimum permitted flow rate is taken into account in the temperatures stated. **KOMAK** will always apply a safety margin of 20% to the vapour pressure of the liquid as a maximum permissible operating temperature.

The operator is responsible to ensure the specified maximum liquid temperature is not exceeded.
Temperature classification “Tx” is used when the liquid temperature varies and when the pump is required to be used in differently classified potentially explosive atmospheres. In this case the user is responsible for ensuring that the pump surface temperature does not exceed that permitted in its actual installed location.. Do not attempt to check the direction of rotation with the coupling element/pins fitted due to the risk of severe contact between rotating and stationary components. Avoid mechanical, hydraulic or electrical overload by using motor overload trips, temperature monitor or a power monitor and perform routine vibration monitoring. In dirty or dusty environments, make regular checks and remove dirt from areas around close clearances, bearing housings and motors. Where there is any risk of the pump being run against a closed valve generating high liquid and casing external surface temperature, fit an external surface temperature protection device.

Where the system operation does not ensure control of priming, as defined in these User Instructions, and the maximum permitted surface temperature of the T Class could be exceeded, install an external surface temperature protection device.

PREVENTING SPARKS
To prevent a potential hazard from mechanical contact, the coupling guard must be non-sparking for Category 2. To avoid the potential hazard from random induced current generating a spark, the baseplate must be properly grounded.

Avoid electrostatic charge. Do not rub non-metallic surfaces with a dry cloth; ensure the cloth is damp. For ATEX the coupling must be selected to comply with 94/9/EC. Correct coupling alignment must be maintained.

Additional requirements for metallic pumps on non-metallic baseplates:
When metallic components are fitted on a non-metallic baseplate they must be individually earthed.

PREVENTING BUILD-UP OF EXPLOSIVE MIXTURES

ENSURE THE PUMP IS PROPERLY FILLED AND VENTED AND DOES NOT RUN DRY
Ensure that the pump and relevant suction and discharge piping system are totally filled with liquid at all times during the pumps operation so as to prevent creating an explosive atmosphere. In addition, it is essential to make sure that seal chambers, auxiliary shaft seal systems and any heating and cooling systems are properly filled. If the operation of the system can not avoid this condition fit an appropriate dry run protection device (for example liquid detection or a power monitor). To avoid potential hazards from fugitive emissions of vapor or gas to atmosphere, the surrounding area must be well ventilated.

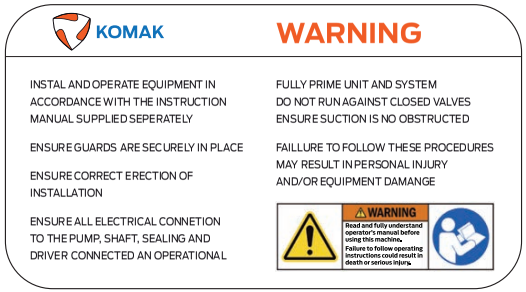
PREVENTION OF LEAKAGE
The pump must only be used to handle liquids for which it has been approved to have the correct corrosion resistance. Avoid entrapment of liquid in the pump and associated piping due to closing of suction and discharge valves, which could cause dangerous excessive pressures to occur if there is heat input to the liquid. This can occur if the pump is stationary or running. Bursting of liquid containing parts due to freezing must be avoided by draining or protecting the pump and auxiliary systems. Where there is the potential hazard of a loss of a seal barrier fluid or external flush, the fluid must be monitored. If leakage of liquid to atmosphere can result in a hazard, install a liquid detection device.

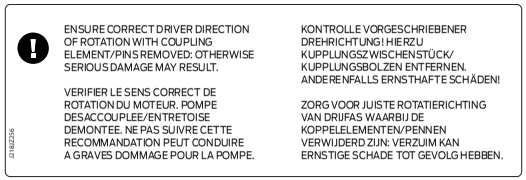
PREVENTIVE MAINTENANCE TO EX EQUIPMENT

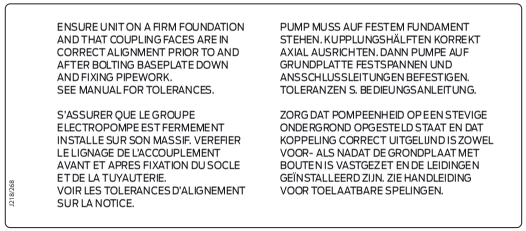
CORRECT MAINTENANCE IS REQUIRED TO AVOID POTENTIAL HAZARDS WHICH GIVE A RISK OF EXPLOSION
The responsibility for compliance with maintenance instructions is with the plant operator. To avoid potential explosion hazards during maintenance, the tools, cleaning and painting materials used must not give rise to sparking or adversely affect the ambient conditions. Where there is a risk from such tools or materials, maintenance must be conducted in a safe area. It is recommended that a maintenance plan and schedule is adopted.

2.4 Nameplate and safety labels

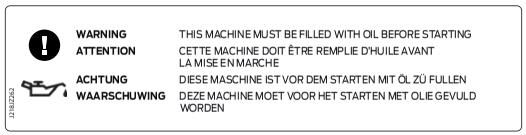
For details of nameplate, see the Declaration of Conformity or separate documentation included with these User Instructions.







Oil lubricated units:



2.5 Specific machine performance

Duty conditions: Where performance data has been supplied separately to the purchaser these should be obtained and retained with these User Instructions.

Deviation of performance and duty (including but not limited to the change of fluid and fluid parameters) is at the full responsibility of the user. KOMAK can not be held liable for damage, direct or consequential. It is further the responsibility of the end-user to ensure the system is performing within reasonable parameters and process failures such as water hammering, pressure surges or impact from natural dangers such as lightning, act of god, earth quakes and terrorist attacks are of no impact to the function of the pump supplied.

2.6. Noise level

Attention must be given to the exposure of personnel to the noise, and local legislation will define when guidance to personnel on noise limitation is required, and when noise exposure reduction is mandatory. This is typically 80 to 85 dBA. The usual approach is to control the exposure time to the noise or to enclose the machine to reduce emitted sound. You may have already specified a limiting noise level when the equipment was ordered, however if no noise requirements were defined, then attention is drawn to the following table to give an indication of equipment noise level so that you can take the appropriate action in your plant. Pump noise level is dependent on a number of operational factors, flow rate, pipework design and acoustic characteristics of the building. It is however the operators responsibility to ensure personnel is not subjected to excessive noise.

3 Transport and storage

The pump is always packed properly but there are always chances that the pump has been damaged through delivery. So before operation and installation the pump must be checked for any signs of damage. Also check if all the parts and documents are there and check the serial numbers to be sure you received the pump and parts ordered. If there is any shortage or damage it must be reported to KOMAK before the pump is put into use. Claims about transport cannot be accepted when the pump has already been put to use.

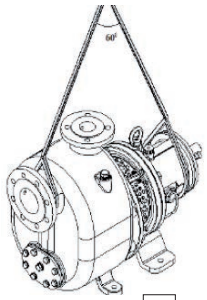
3.1 Lifting

CAUTION

When lifting the pump, motor, complete unit or parts above 25 kg use a crane to do so and in accordance with local regulations.
Lifting gear such as ropes and slings should be positioned where they cannot change positions when lifting. Also an angle of 60° between the ropes must not be exceeded for both lifting the pump and the complete unit.

CAUTION

Never lift the set at the welded supports meant for mounting the baseplate to the ground.



In figure 1 the angle of 60°, which should not be exceeded, is shown for lifting the pump.

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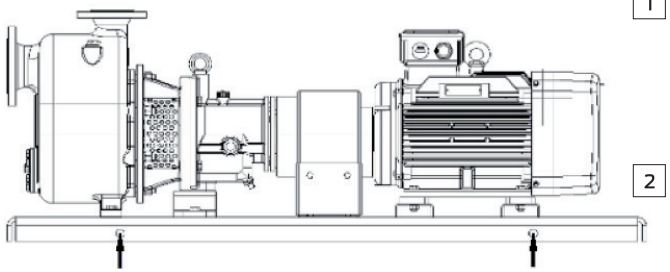

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In figure 2 the lifting holes for lifting the complete set is shown by 2 arrows. The 2 holes are at both sides of the baseplate and also here a angle of 60° must not be exceeded.

CAUTION

3.2 Storage

The pump needs to be stored in a clean and dry location. Avoid any vibration at the location of storage. To keep dirt and other foreign material out of pump casing keep the covers in place. Turn the pump at intervals to prevent the balls of the bearings to damage the inner or outer ring and to prevent the seal faces (if fitted) from sticking.
The pump may be stored as above for up to 6 months. Consult KOMAK for preservative actions when a longer storage period is needed.

4 Description

4.1 Configurations

The pump is a self-priming centrifugal pump that can be built in several configuration and can be used for a variety of chemical applications (See 4.2 and 4.3 below.)

4.2 Name nomenclature

Standard configuration are either 4.2.1 or 4.2.2. For special execution KOMAK will require the serial number to provide the materials data.

4.2.1. Ductile iron version

- Ductile iron body and back-plate
- NiAlBr impeller
- 904 Stainless steel shaft
- Cartridge seal Sic/Sic/Viton

4.2.2. Bronze execution

- NiAlBr body and back-plate
- NiAlBr impeller
- 904 Stainless steel shaft
- Cartridge seal Sic/Sic/Viton

4.3 Design of major parts

All components have been designed by KOMAK and are proprietary design. These parts may not be copied not repaired without express approval of the manufacturer.

4.4 Performance and operating limits

Operating limits are

- System pressure: PN16
- Temperature limit: 90C in standard configurations
- Standard configurations are not approved for hazardous area's.

5 Installation

When the unit operates in hazardous locations the equipment must comply with relevant explosion protection regulations. See section 2.3 Atex.

5.1 Location

The location of the unit should allow access to it for maintenance and inspection.

5.2 Foundation

The pump should be mounted on an appropriate foundation, this can be either into concrete or on a steel framework.

5.3 Grouting

The steel baseplate can be made with a grout hole for grouting into concrete. Grouting the baseplate demps vibrations of the unit and provides a solid contact between the unit and the foundation.
Foundation bolts should only be fully tightened when the grout has cured.

5.4 Initial alignment

5.4.1 Thermal expansion

Because of thermal expansion the unit should be run under operating conditions, shut-down and be checked for the alignment again before final “on-line” duty.

5.4.2 Alignment methods

Before aligning the unit, be sure the unit is disconnected from its power source.

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Check weather the alignment of the motor and pump is still what is should be to prevent any damage to the shafts and coupling.
The unit is already aligned, but it is possible the alignment has been disturbed during transport. Beneath the motor OR pump are 2 flat pieces which can be used to align vertically. Also at the motor OR pump there are bolts which must be used to align horizontally. First align the in the vertical direction and then in the horizontal direction.

Also loosen the bolts at the motor and check for any deflection by use of a dial indicator. Material must be added until the dial indicator shows 0.05 mm or lower. Do this until all feet are within tolerance.
At last check the tightness of bolts for mounting the baseplate, pump, motor and coupling guard.

5.5 Piping

Make sure any protective covers on the piping are removed before connecting these

5.5.1 Suction and discharge pipework

Never use the pump as a support for piping.

Prevent excessive external pipe loads.

Never apply force to pump flange connections by putting piping into place.

Do not mount expansion joints.

Ensure piping are fittings are flushed before use.

When hazardous liquids have been pumped, allow the pump to flush the piping before removal of the pump. Please note that the NPSH available must be higher then the NPSH required.
At the end check the tightness of all the bolts of the piping
Ensuring no obstruction of the suction is possible, or appropriate measure to prevent obstruction is the responsibility of the user.

5.5.1.1 Self-priming casing

The discharge pipework must allow priming air to escape unhindered from the pump during the priming cycle. No back pressure is allowed in the discharge line and the installation must prevent disproportioned run-back of liquid on shutdown to counter syphoning. It is advised to fit a straight pipe section on the discharge of at least 50cm to prevent the pump from emptying itself at priming stage.

Priming air may be vented in one of the following ways:

1) If fitted a discharge regulating valve may be partly opened during the priming cycle to freely vent the air.
2) A automatic air release valve may be fitted to the discharge pipework between the pump and any valves. KOMAK is however not liable for emissions of environmentally unsafe gases or emissions and client should check suitability of actions in the local environment.
3) An air bleed line may be installed from the discharge pipework, between the pump and any valves, back to the suction tank or sump. This configuration has the downside it will require annual/automatic control during operation to prevent continuous re- circulation of the pumped liquid.

5.5.2 Suction piping

5.5.2.1 Self-priming casing suction piping grade

a) The inlet pipe should be as short as possible. If not airtight priming will not be performed easily. Diameter of the suction line should be the smallest as practical for the pump flow rate so as to be able to prime quickly.
   Where suction pipe volume is large a non-return valve is advisable at installation.
b) It is recommended that the suction pipe is not larger than the pump inlet bore or such that the velocity suction is in the range of 3 to 5 m/s. The piping should slope down towards the pump casing suction flange.
c) Take into account the available NPSH, it must be higher than the required NPSH of the pump.
d) Allow a minimum of two pipe diameters of straight section between the elbow and inlet flange.
e) A isolation valve on suction and discharge lines will allow easier maintenance.
f) Never throttle pump on suction side and never place a valve directly on the pump inlet without ensuring it is a full bore type.

5.5.3 Discharge piping

5.5.3.1 Self-priming casing discharge piping

a) To minimize friction losses and hydraulic noise in the pipework it is generally accepted practice to choose pipework that is one or two sizes larger than the pump discharge.
   Typically main pipework velocities should not be above 3 m/s (9 ft/sec) on the discharge. Pipework expanders should have a maximum angle of divergence of 9 degrees.
b) In case a non-return valve is fitted in the discharge line of the pump, a vent/bleed pipe should be fitted from the discharge pipe back to the sump or source tank.
c) It is common practice to fit a regulating valve in the discharge pipework unless pump flow is controlled by the delivery system design. This is to prevent the pump running out of its curve.
d) It is strongly advised to fit a straight pipe section on the discharge of at least 50cm to prevent the pump from emptying itself at priming stage.

5.5.4 Allowable nozzle loads

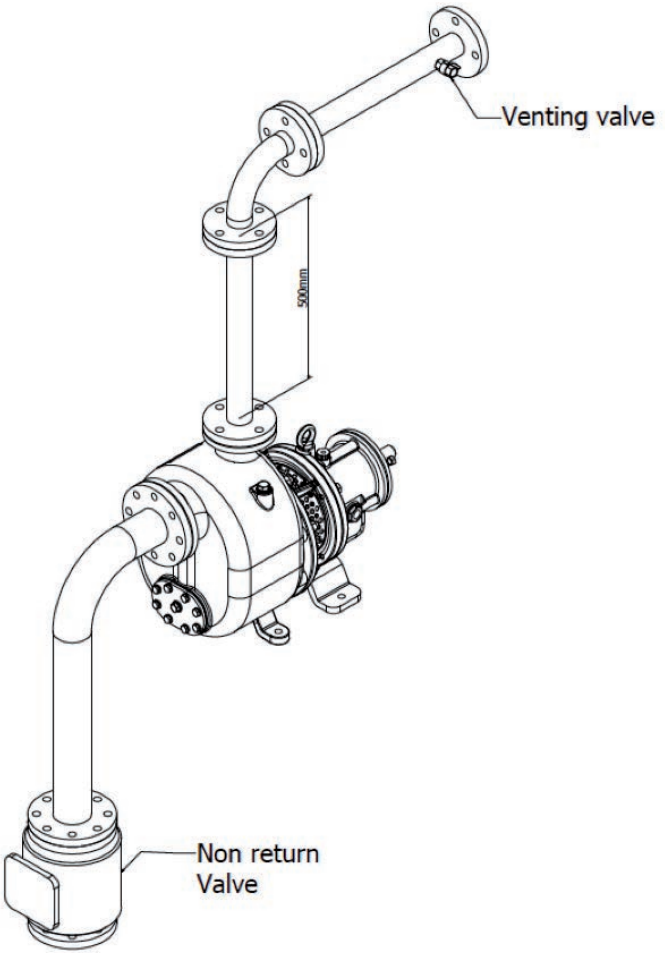
The pump complies with ISO 5199 shaft deflection limits for the following flange loads.

Impellers are balanced to ISO 1940-1 G6.3

The values permitted (50 mm and above) meet ISO 13709/API 610. Individual forces and moments up to twice ISO 13709 (API610) Table 5 values may be permitted but only when applied in accordance with the conditions in ISO 13709 (API610) Annex F.

All individual values which are greater than recommended by the ISO norm must be referred to KOMAK for approval.

Typical installation



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CAUTION

5.5.5 Auxiliary piping

Seal and flange connections for auxiliary piping are fitted with plugs from factory. Removing attaching auxiliary piping is at the responsibility of user only.

5.6 Electrical connections

Danger

Electrical connections must be done by an electrician who is qualified to do so.

Ex

Awareness on electrical connections in areas of explosive atmosphere, where an additional requirement in compliance with IEC60079-14 is needed, is important.

CAUTION

Attention must be paid to ensure techniques being used during the connections of electrical wires and systems do not increase electromagnetic emissions or decrease electromagnetic immunity of the equipment.

Danger

The motor should be connected in accordance to the manufacturer's instructions and nameplate on the motor.

CAUTION

A emergency stop button must be present.

CAUTION

Before connecting the motor to the electrical supply see section 6.4 Direction of rotation.

5.7 Final checks

Ensure all the alignments are correct. This can be checked by rotating the motor shaft manually.

When pumping liquids involving high temperature and thermal expansion can be present run the unit under operating conditions, shut down and check if the alignment is still correct.

5.8 Protection systems

The following protection systems are recommended particularly if the pump is installed in a potentially explosive area or is handling a hazardous liquid:

- A protection device should be installed if there is any possibility of the system allowing the pump to run against a closed valve or below minimum continuous safe flow to ensure the temperature of the liquid does not rise to an unsafe level.
- A power monitor should be installed if there is any circumstance in which the system can run the pump dry or start up without any fluid to stop the pump or prevent it from being started. This is particularly important when pumping a flammable liquid.
- Installing a detection system for leakage is recommended if leakage of the pump or its system can cause a hazard.
- It is recommended that temperature and vibration monitoring is carried out to prevent excessive surface temperatures at bearings.

6 Commissioning, start-up, operation and shutdown

CAUTION

These operations may only be carried out by personnel qualified to do so.

6.1 Pre-commissioning procedure

6.1.1 Lubrication

Determine the mode of lubrication of the pump set (e.g. grease, oil)

CAUTION

For pumps lubricated with oil, fill the bearing housing with the correct oil and with the correct amount of oil. This can be accomplished by use of a sight glass or a constant level oiler bottle.

With low ambient temperatures, special lubricants are necessary. When oil lubricants are used and the ambient is less than -5 °C (23 °F) ensure the oil pour point is at least 15 °C (27 °F) lower than the ambient, or use oil class SAE 5W-50 or API-SJ and ensure the upper operating range of the oil is then not exceeded. ISO VG 46 oil is generally selected for an initial lubrication schedule.

Other drivers and gearboxes (if appropriate) should be lubricated in accordance with their manuals.

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6.2 Pump lubricants

Recommended lubricant for the power frame is: ISO VG32
Model KFT 80-50 and 100-80 will required 1 liter.

6.3 Impeller clearance

The impeller clearance is already set in the factory. It may need some adjustment because of high temperature of pumped media. For setting instructions of impeller clearance see section 7.2 Setting impeller clearance.

6.4 Direction of rotation

CAUTION

Ensure the pump is started in the right direction to prevent serious damage.

The pump is shipped with the coupling disassembled. Before re-assembling the coupling ensure the direction of the motor is correct. The correct direction is the direction corresponding with the direction of the arrow on the pump.

CAUTION

Also re-check the direction when maintenance to the electricity supply of the system has been carried out.

6.5 Guarding

CAUTION

The guarding is supplied with the set but needs to be adjusted to the right height. This can be done by dismounting the 4 bolts on the side of the guard.

CAUTION

Ensure the 4 bolts for the variable high of the guard are in place and also ensure the 4 bolts for mounting the guard to the baseplate are correctly mounted to the baseplate BEFORE connecting the set to the power supply.

6.6 Priming an auxiliary supplies

Not included in standard supply.

6.7 Starting self-priming pump KFT range

a) Ensure flushing and/or cooling/heating liquid supplies are turned ON, before starting pump.
b) Close Outlet valve
c) OPEN all inlet valves.
d) The pump inner chamber should be filled at start-up with a compatible liquid before start-up
e) Damage will occur if the pump is run dry or for prolonged periods with no incoming liquid.
f) Subsequent filling should not be necessary unless the pump has been emptied or drained of fluid.
g) Start the motor and, if no specific provision has been made in the delivery pipework for evacuating the primed air, open the delivery valve by approximately 10 % to allow priming air to escape.
h) When the pump has primed, check outlet pressure is at expected level.
i) If the pressure is satisfactory, SLOWLY open the outlet valve.
j) It is recommended that the priming time is registered. Priming times in excess of 5 minutes will indicate a pump or system malfunction. Any noticeable increases in priming time on subsequent starts will also indicate a fault. Irregular use could lead to the risk of 'evaporation' of the priming fluid – again filling of the priming chamber should be envisioned.
k) Do not run the pump with the outlet valve closed for a period longer than 30 seconds.
l) If the pump has to fill the system it may take a short time before the outlet is pressurized.

6.8 Running the pump

The KFT series has been developed for heavy duty, frequent start-ups should not lead to problems. However it is generally known and understood that continuous running of the pump will lengthen its life-time as apposed to frequent start-stops.

6.9 Stopping and shutdown

a) Close the outlet valve, but ensure that the pump runs in this condition for no more than a few seconds.
b) Stop the pump.
c) Switch off flushing and/or cooling/heating liquid supplies at a time appropriate to the process.
d) For prolonged shut-downs and especially when ambient temperatures are likely to drop below freezing point, the pump and any cooling and flushing arrangements must be drained or otherwise protected.

6.10 Mechanical, electrical and hydraulic duty

The performance of the pump may change with time. To evaluate the implications of these changes please read the following notes.

6.10.1 Specific Gravity (SG)

Pump capacity and total head in meters do not change with specific gravity, non the less the pressure (shown by the pressure gauge) is directly proportional to the specific gravity. And so is the power absorbed.

CAUTION

Check that any change in specific gravity will not overload the pump driver or over-pressurize the pump.

6.10.2 Viscosity

If the viscosity increases, the total head decreases and the power absorbed increases for a given flow rate. If the viscosity decreases, the total head increases and the power absorbed decreases for a given flow rate. If there is an uncertainty about the viscosity of the flow you are planning to pump then contact KOMAK Fluid Technology.

6.10.3 Pump speed

Changing pump speed effects flow, total head, power absorbed, NPSHr, noise and vibration. Flow varies in direct proportion to pump speed, head varies as the square of the speed ratio and the power absorbed varies as speed ratio cubed. The new duty is also depending on the system curve. If increasing the speed, it is important therefore to ensure the maximum pump working pressure is not exceeded, the driver is not overloaded, NPSHa > NPSHr, and that noise and vibration are within

local requirements and regulations.

6.10.4 Net positive suction head (NPSHa)

NPSHa is the head available is a measure of how close the fluid is to cavitating. NPSH required or NPSHr is the head required to keep the fluid from cavitating. So it is important that the NPSHa is higher then the NPSHr. The bigger the difference, the better.

6.10.5 Pumped flow

Rate of flow must not be less or more then the continuous safe flow shown on the performance curve or data sheet of the pump.

6.11. Electrical connections

Electrical connections must be made by a qualified Electrician in accordance with relevant local national and international regulations.
It is important to be aware of the EUROPEAN DIRECTIVE on potentially explosive areas where compliance with IEC60079-14 is an additional requirement for making electrical connections.

It is important to be aware of the EUROPEAN DIRECTIVE on electromagnetic compatibility when wiring up and installing equipment on site.

Attention must be paid to ensure that the techniques used during wiring/ installation do not increase electromagnetic emissions or decrease the electromagnetic immunity of the equipment, wiring or any connected devices. If in any doubt contact KOMAK for advice.

The motor must be wired up in accordance with the motor manufacturer's instructions (normally supplied within the terminal box) including any temperature, earth leakage, current and other protective devices as appropriate. The identification nameplate should be checked to ensure the power supply is appropriate.

A device to provide emergency stopping must be fitted. If not supplied pre-wired to the pump unit, the controller/starter electrical details will also be supplied within the controller/starter. For electrical details on pump sets with controllers see the separate wiring diagram.

Direction of rotation of the driver must be checked prior to fixing the coupling between pump and motor.

7 Maintenance

It is recommended that a maintenance plan and schedule be implemented, in accordance with these User Instructions, to include the following:

a) Any auxiliary systems installed must be monitored, if necessary, to ensure they function correctly.
b) Gland packing must be adjusted correctly to give visible leakage and concentric alignment of the gland follower to prevent excessive temperature of the packing or follower.
c) Check for any leaks from gaskets and seals. The correct functioning of the shaft seal must be checked regularly.
d) Check bearing lubricant level, and the remaining hours before a lubricant change is required.
e) Check that the duty condition is in the safe operating range for the pump.
f) Check vibration, noise level and surface temperature at the bearings to confirm satisfactory operation.
g) Check dirt and dust is removed from areas around close clearances, bearing housings and motors.
h) Check coupling alignment and re-align if necessary

Need for maintenance records:

A procedure for keeping accurate maintenance records is a critical part of any program to improve pump reliability. There are many variables that can contribute to pump failures. Often long term and repetitive problems can only be solved by analyzing these variables through pump maintenance records.

Cleanliness:

One of the major causes of pump failure is the presence of contaminants in the bearing housing. This contamination can be in the form of moisture, dust, dirt and other solid particles such as metal chips. Contamination can also be harmful to the

mechanical seal (especially the seal faces) as well as other parts of the pump. For example, dirt in the impeller threads could cause the impeller to not be seated properly against the shaft. This, in turn, could cause a series of other problems.

For these reasons, it is very important that proper cleanliness be maintained. Some guidelines are listed below:

- After draining the oil from the bearing housing, periodically send it out for analysis. If it is contaminated, determine the cause and correct.
- The work area should be clean and free from dust, dirt, oil, grease etc.
- Hands and gloves should be clean.
- Only clean towels, rags and tools should be used.

Spare parts:
The decision on what spare parts to stock varies greatly depending on many factors such as the criticality of the application, the time required to buy and receive new spares, the erosive/corrosive nature of the application, and the cost of the spare part.

CAUTION

The use of non original components or spares is at users risk, KOMAK cannot be held responsible for any damage, direct or consequential if the pump has not been maintained with original spare parts purchased from a KOMAK official representative and certified by KOMAK as original.

7.1 General

CAUTION

It is the responsibility of the operator to ensure that all maintenance and inspections are carried out by personal qualified to do so and studied this manual (and the video's of the assembly and disassembly) in detail. (Also see section 2.2, Personnel qualification and training)

Ensure the system is disconnected from the power supply before performing any maintenance or inspection. The procedure for shutting down the system is described in section 6.9.

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CAUTION

After maintenance or inspection all the safety devices and guards must be installed BEFORE reconnecting the system to the power supply. Before starting the system, check the instructions in section 6 that are necessary for the restart.

With the pump a USB drive is delivered with instruction video's, alternatively these can be visioned on You-tube. Check those video's carefully before assembling or disassembling the pump. One concerns the assembly and one of the disassembly of the pump.

A separate manual is available for full maintenance of the pump, including bearing house details and assembly procedure.

7.2 Setting Impeller Clearance

CAUTION

This procedure may be required after the pump has been dismantled or a different clearance is required.

For applications in hazardous area's or with hazardous fluids the setting of the impeller must be checked after final installation on site and prior to start-up. This is the responsibility of the user and is intended to warrant proper functioning of the pump.

Before carrying out the procedure ensure the seal set screws have been released (for procedure see 7.3).

a) Disconnect the coupling if it has limited axial flexibility.
b) The impeller adjustment is easily made externally by loosening the bolts at the back side of the bearing bracket and obtain the proper clearance. Proper clearance for clean cold fluid is 2/10mm from the front with a full size impeller. For clearance information please consult the table below.

Procedure: Tighten the 3 single bolts clockwise until the impeller comes into light contact with the front profile of the pump casing. Rotating the shaft at the same time will accurately determine when a detectable rub is obtained.
This is the zero clearance setting.

- Loosen all bolts
- With the 3 pull back bolts (bolts with locking nut) set the shaft assembly with 3,5 to 4/10mm
- For detailed information consult the training video issued by KOMAK.

After obtaining the proper clearance, listed in the table below, tighten the 3 set bolts evenly (single bolts without locking nut) to lock the impeller and shaft assembly. Tightening the set bolts will cause the impeller to move 0.2 mm closer to the front part of the pump because of the internal clearance in the bearing carrier threads. This must be considered when setting the impeller clearance. Tightening the 3 locking bolts should be done at 25Nm. When setting bolts are tight, fix the 3 locking nuts on the back bolts evenly to secure the clearance setting.

e) Check that the shaft can turn freely without binding.

f) Tighten the seal set screws in place to ensure the seal is set correctly on the shaft and remove holding brackets of the seal.

g) Ensure the coupling distance between shaft ends is correct. Reset/re-align if necessary.

Temp °C (°F)	Clearance mm	
	Impellers up to 250 mm	Impellers 250 mm to 320 mm
50 (122)	0.2	0.4
100 (212)	0.4	0.5
150 (302)	0.5	0.6
200 (392)	0.6	0.7
250 (482)	0.7	0.8

7.3 Changing Mechanical seal

In order to change the mechanical seal, the pump body must be removed, as well as the impeller and seal plate (back-plate).
For more detailed procedure please vision the assembly video supplied with the pump.

Assembly procedure:

- Position the seal on the shaft and pull it backwards until it is not hindering assembly of the back-plate.
- Position back-plate and tighten it to the power frame with 2 holding bolts.
- Mount impeller, tighten on shaft and install locking nut. Locking nut should be tightened to 40Nm and fixed with lock-tight.
- Mount pump body and tighten all bolts.
- Secure seal on back-plate by tightening evenly all 4 bolts at 40Nm.
- After setting impeller clearance (see 7.2) fixe the set screws on the shaft with lock-tight to 30Nm. Remover holding / distance holding brackets

7.4 Oil, bearing house maintenance

Normal oil change interval for mineral oil lubricated pumps is:

Lubricant	Under 71°C (160°F)	71-80°C (160-175°F)	80-94°C (175-200°F)
Grease	6 months	3 months	1.5 months
Mineral oil	6 months	3 months	1.5 months
Synthetic oil**	18 months	18 months	18 months

For pumps on hot service or in severely damp or corrosive atmosphere, the oil will require changing more frequently. Lubricant and bearing temperature analysis can be useful in optimizing lubricant change intervals.

The lubricating oil should be a high quality mineral oil having foam inhibitors or synthetic without foam inhibitors for oil mist. Synthetic oils may also be used if checks show that the rubber oil seals will not be adversely affected.

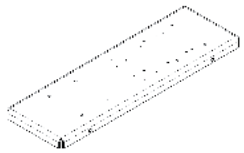
Where the ambient temperature is very low, special lubricants are required. Where oil lubrication is utilized and the ambient is less than -5 ºC (23 ºF) ensure the oil pour point is at least 15 ºC (27 ºF) lower than the ambient, or use oil class SAE 5W-50 or API-SJ and ensure the upper operating range of the oil is then not exceeded. ISO VG 46 oil is generally selected for an initial lubrication schedule.

The bearing temperature may be allowed to rise to 50 ºC (90 ºF) above ambient, but should not exceed 82 ºC (180 ºF) (API 610 limit) at any time. A continuously rising temperature, or an abrupt rise, indicate a fault. Pumps that handle high temperature liquids may require their bearings to be cooled to prevent bearing temperatures exceeding their limits.

For pumps installed in hazardous area the pump bearings must be fitted with temperature sensors ensuring excessive temperate of the bearings is not reached. Connections and proper function of these sensors is the responsibility of the use.

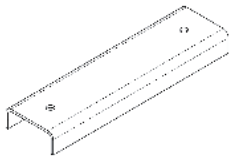
Centrifugal pump lubrication	Oil	Splash/force feed/purge oil mist/pure oil mist lubrication		
	Viscosity cSt @ 40˚C	32	46	68
	Oil temperature range	-5 to 65˚C (23 to 149˚F)	-5 to 78˚C (23 to 172˚F)	-5 to 80˚C (23 to 176˚F)
	Designation to ISO 3448 and DIN51524 part 2	ISO VG 32 32 HLP	ISO VG 46 46 HLP	ISO VG 68 68 HLP
	BP Castrol	Energol HLP-HM 32	Energol HLP-HM 46	Energol HLP-HM 68
	Esso	NUTO HP 32	NUTO HP 46	NUTO HP 68
	Elf/Total	ELFOLNA DS 32 Azolla ZS 32	ELFOLNA DS 46 Azolla ZS 46	ELFOLNA DS 68 Azolla ZS 46
Oil compagnies and lubricants	LSC (For oil mist)	LSO 32 (Synthetic oil)	LSO 46 (Synthetic oil)	LSO 68 (Synthetic oil)
	ExxonMobil	Mobil DTE 24	Mobil DTE 25	Mobil DTE 26
	Q8	Q8 Haydn 32	Q8 Haydn 46	Q8 Haydn 68
	Shell	Shell Tellus 32	Shell Tellus 46	Shell Tellus 68
	Chevron Texaco	Rando HD 32	Rando HD 46	Rando HD 68
	Wintershall (BASF Group)	Wiolan HS32	Wiolan HS46	Wiolan HS68
	Fuchs	Renolin CL 32	Renolin CL 46	Renolin CL 68

8 Selection tables



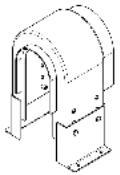
Baseplate

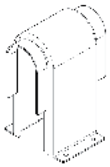
Model	Motor Frame Size								
	132S	132M	160M	160L	180M	200L	225M	250M	280S
12-0225C-96-1									
12-0225C-96-2									
12-0225C-96-3									



Base for height alignment

Model	Motor Frame Size								
	132S	132M	160M	160L	180M	200L	225M	250M	280S
12-0225C-97-1	2x	2x							
12-0225C-97-2			2x	2x					
12-0225C-96-3					2x				
12-0225C-97-4								1x	
12-0225C-97-5								1x	
12-0225C-97-6									1x
12-0225C-97-7									1x





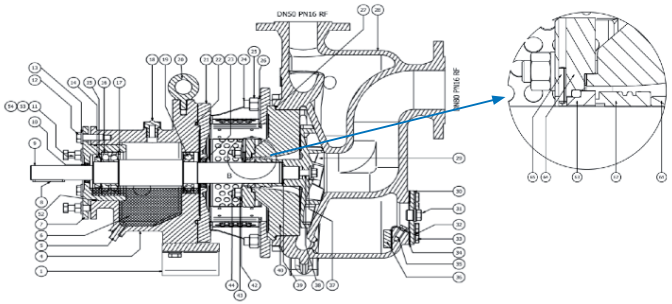
Coupling guard

Model	Coupling Type					
	28-3038	38-3042	38-3048	42-3055	48-3060	55-3065

Model	Motor Frame Size								
	132S	132M	160M	160L	180M	200L	225M	250M	280S
12-0225C-94-1									
12-0225C-94-2									
12-0225C-94-3									
12-0225C-94-4									
12-0225C-94-5									
12-0225C-95									

* Coupling types based on KTR Rotex

9 Spare parts

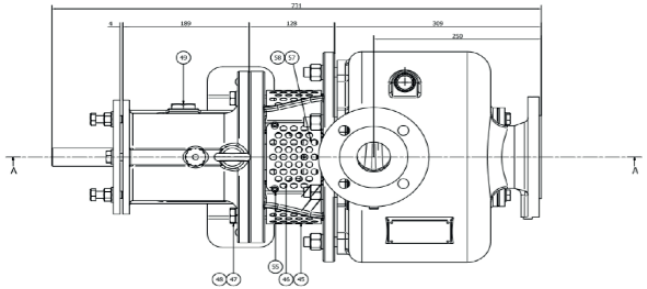


Split view		
ITEM	QTY	DESCRIPTION
1		BEARING FRAME FOUNDATION BRACKET
4		BEARING FRAME
5	1	Magnetic Oil Drain Plug
6	1	Oil
7		BEARING HOUSING
8	1	Parallel Key
9		SHAFT
10	1	Oil Seal
11	3	Hex Head Bolt
12	3	Hex Head Bolt
13	3	Plain Washer
14	1	Locknut
15	1	Locking Washer
16	1	Angular Contact Ball Bearing, Double Row
17	1	Spring Retaining Ring (Internal Circlip)
18	1	Oil Fill & Vent Plug
19	1	Deep Groove Ball Bearing, Single Row
20	1	Lifting Eye Bolt
21		BEARING HOUSE BRACKET
22	1	O-Ring
23	1	Oil Seal
24	8	Stud Metal End 1,25xd
25	8	Hex Head Nut
26	8	Plain Washer
27	1	Casing Packing
28		CASING
29		IMPELLER
30		CASING DRAIN COVER PLATE
31	2	Hex head Plug
32	8	Plain Washer
33	8	Hex Head Bolt
34		CASING DRAIN COVER PLATE GASKET
35	1	Hex Head Bolt

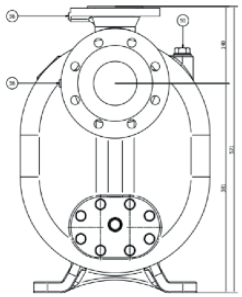
Split view		
ITEM	QTY	DESCRIPTION
36	1	Anode With Metal Lip For M8 Fixation
37	1	Hex Head Flange Bolt
38	1	LOCTITE 268
39	1	O-Ring
40		IMPELLER BACKPLATE
41	4	Spring Lock Washer
42	4	Spring Lock Washer
43	4	Hex Head Nut
44	4	Stud Metal End 1,25xd
52	1	O-Ring
53	3	Plain Washer
54	3	Hex Head Nut

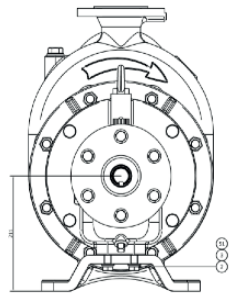
Detail view		
ITEM	QTY	DESCRIPTION
59		
60	1	Gland cover packing
63	1	Stationary Face BP type
64	1	GLAND
65	1	Spring Type Straight Pin

Detail view		
ITEM	QTY	DESCRIPTION
61		BUSHING FOR ELASTOMER BELLOWS SEAL
61		BUSHING FOR METAL BELLOWS SEAL
61		BUSHING FOR ELASTOMER BELLOWS SEAL
62	1	Single O-Ring Cartridge Seal
62	1	Metal Bellows Seal



ITEM	QTY	DESCRIPTION
45		BEARING HOUSE BRACKET COVER
46		BEARING HOUSE BRACKET COVER
47	6	Spring Lock Washer
48	6	Hex Head Bolt
49	1	Oil Sight_Glass & Seal Ring
55	16	Hex Socket Head Screw
57	2	Hex head Bolt
58	2	Plain Washer





ITEM	QTY	DESCRIPTION
2	2	Hex Head Bolt
3	2	Plain Washer
50	1	Hex Head Plug
51	2	Spring Lock Washer
56	2	Hex Socket Pipe Plug

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For more information

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