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MANUAL FOR OPERATION
and
MAINTENANCE

CONTENTS

CHAPTER I
INTRODUCTION

This manual is intended for safe handling and maintenance of industrial transfer pumps. The internal gear transfer pumps are designed and manufactured in accordance with the Machinery Directive 98/37/EC and are available for use only after the final checks have been carried out by our company.

1.1 PURPOSE OF USE

KUPAR INDUSTRIAL TRANSFER PUMPS are used when transferring fluids from one place to another with a viscosity that is high, that is relatively low compared to fluidity water. The fact that the materials to be transferred are chemically lubricating should be the property of making films that will physically reduce friction.

Pump Selection:

The most important criterion when selecting gear pumps is the viscosity. Viscosity is important when selecting the type and size, also selecting the pump speed and designing clearances.

There are 4 important criterions of pump selection such as:

Pump type: The main principle is to select the helical gear pumps for low viscosities and internal gear pumps for high viscosities. Lobe pumps can transfer liquids including small solid particles.

Size of the ports: Size of the ports and pipes is again related to the viscosity of the fluid. Every size of the port and pipe has a capacity of flow rate of fluid according to the viscosity. When selecting pump size and designing the pipe system, the diameter should be calculated accurately or you must be contented with the maximum flow rate for that viscosity. For example, it is never possible to pump 50 tons of and fuel oil per hour from a system with a 2 " pipe diameter. If the installation is 2" then the amount of material to be passed through here has to be satisfied.

Pump Speed: The maximum speed for gear pumps 1500 rpm speed should be reduced according to increasing viscosity. High speeds should be selected for low viscosities; low speeds should be selected for high viscosities. Direct coupling to electric motor is used for 1000 and 1500 rpm. 500 and lower speeds coupling to electric motor with V-belt and direct drive to reduction unit is used.

Working clearances: Some working clearances are machined during production and some clearances are adjusted during assembly according to the viscosity ranges. Every pump should be used to transfer the fluid, which has the suitable viscosity, for its working clearances. Otherwise the pump can operate with lower pressure than indicated before or the pump can operate very hard or fully stop.

1.2 KUPAR INDUSTRIAL TRANSFER PUMPS

KUPAR INDUSTRIAL TRANSFER PUMPS, are used to transfer viscous and semi-viscous fluids having less fluid properties than water from one place to another.

Applications;

- Chocolate,
- Fuel-oil,
- Asphalt,
- Detergent,
- Industrial and automotive oils,
- Vegetable oils,
- Soap,
- Jam,
- Rubber,
- Pulp and paper,
- Adhesives,
- Sealants,
- Paints,
- Coatings and similar viscous petrol and chemical products.

Notice: To transfer food materials and acidic chemical products, we also manufacture **Stainless steel pumps**

Design Types;

- **Standard Type (KIP: Internal gear pump - KHP: External gear pump - KLP: Lobe Pumps):** If the pumps do not need any accessory, it is manufactured with bare of pump.
- **Type with By-pass:** According to the transfer system, a relief valve is mounted on the head of the pump, this is called by-pass.
- **Jacketed Type:** In some cases, because of the characteristic of the transferred material, it is needed to heat the pump in these cases, pumps with jacket are used.

Coupling Options;

- Coupled to the electrical motor by belt.
- Coupled to the electrical motor by gearbox.
- Directly coupled to the electrical motor.

Notice: If required to make the system moveable, wheels can be mounted on the construction of these three types.

1.3 PUMP MODELS and FEATURES

MODELS			
INTERNAL GEAR PUMPS	**HELICAL GEAR PUMPS**	**STAINLESS PUMPS**	**LOBE PUMPS**
KIPK3/8"	KHP½"	KHP½"-C	KLP1½"
KIP3/8"	KHP3/4"	KHP1"-C	KLP2"
KIPK½"	KHP1"	KHP1"-B	KLP2½"
KIP½"	KHP1½"	KHP 1½" -C	
KIP1"	KHP2"	KHP1½"-B	
KIP1"-D	KHP2½"	KHP2"-C	
KIPK1½"	KÇP2½"	KHP2"-B	
KIPK1½"-D	KHP3"	KHP2½"-C	
KIP1½"	KHP4"	KIP1"-C	
KIP1½"-D	KHP6"	KIP1"-DC	
KIPK2"		KIPK1½"-C	
KIPK2"-D		KIPK1½"-DC	
KIP2"		KIP1½"-C	
KIP2"-D		KIP1½"-DC	
KIP2"-Y		KIPK2"-C	
KIP2"-DY		KIPK2"-DC	
KIPK2½"		KIP2"-C	
KIPK2½"-D		KIP2"-DC	
KIP2½"		KIPK2½"-C	
KIP2½"-D		KIPK2½"-DC	
KIP3"		KIP2½"-C	
KIP3"-D		KIP2½"-DC	
KIP4"		KIP3"-C	
KIP4"-D		KIP3"-DC	
KIP6"		KIP4"-C	
KIP6"-D		KIP4"-DC	

Table 1

INTERNAL GEAR PUMPS

ADVANTAGES	*Smaller body than the external gear pumps that supplies the same values *Positive suction and non-pulsating discharge *Ideal for high-viscosity liquids because they work at low speeds *Adjustable end clearance *Easy to maintain *Long life
PERFORMANCE RANGES	**Temperature range (°C):** 20-180 **Viscosity range(cp):** 28- 50,000 **Pressure range (bar):** 2-14 **Suction &Pressure ports:**3/8", 1/2",1", 1½", 2", 2½",3",4",6"
MATERIALS	**Main body:** Cast Iron **Gears:** Ductile Iron, Steel **Shafts:** Steel, Heat Treated Steel **Bushing:** Bronze, Carbon, Bearing **Sealing options:** Packing, Mechanical Seal, Special Sealing Applications

Table 2

Pump Type	Flow L / revolution	Pressure & Discharge Ports
KIPK3/8"	0,002	3/8" (*Pipe thread*)
KIP3/8"	0,004	3/8" (*Pipe thread*)
KIPK½"	0,010	½" (*Pipe thread*)
KIP½"	0,017	½" (*Pipe thread*)
KIP1"	0,033	1" (*Pipe thread, Flange*)
KIPK1½"	0,067	1½" (*Pipe thread, Flange*)
KIP1½"	0,123	1½" (*Flange*)
KIPK2"	0,263	2" (*Pipe thread, Flange*)
KIP2"	0,491	2" (*Pipe thread, Flange*)
KIP2"-Y	0,491	3" (*Flange*)
KIPK2½"	0,877	2½" (*Flange*)
KIP2½"	1,296	2½" (*Flange*)
KIP3"	2,222	3" (*Flange*)
KIP4"	3,519	4" (*Flange*)
KIP6"	6,190	6" (*Flange*)

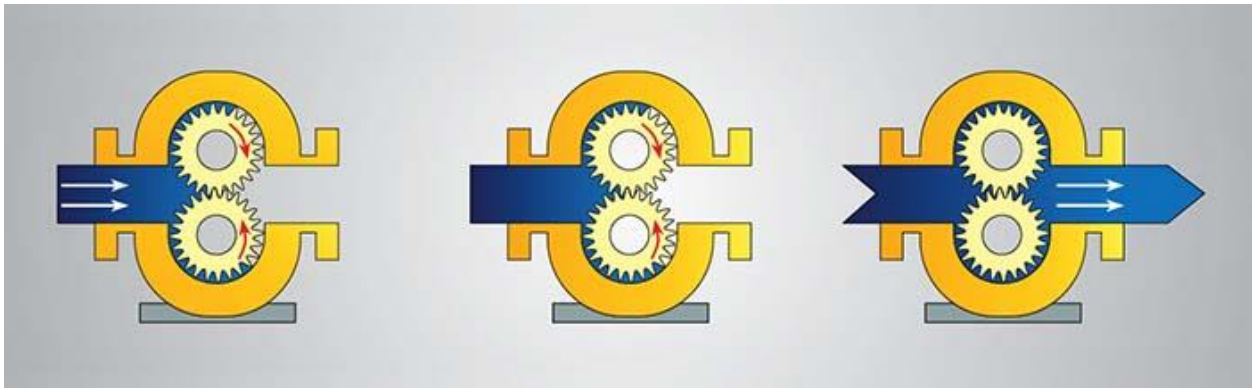
Table 3

TO FIND THE CAPACITY (m³/h);

$$\text{FLOW } (\text{m}^3/\text{h}) = \frac{\textbf{Flow (L / rev.) x Pump Speed (rev / min) x 60 min.}}{\textbf{1000}}$$

Example; KIP2" 450 RPM $Q = \frac{0{,}491 \times 450 \times 60}{1000} = 13{,}25\ \text{m}^3/\text{h}$

HELICAL GEAR PUMPS



ADVANTAGES	* High speed * Good for relatively low viscosity * Relatively quiet operation * Easy maintenance * Operates well in either direction
PERFORMANCE RANGES	**Temperature range (°C):** 20-180 **Viscosity range(cp):** 28- 50,000 **Pressure range (bar):** 2-14 **Suction &Pressure ports:** ½",¾", 1", 1½", 2", 2½",3",4",6"
MATERIALS	**Main Body:** Cast Iron **Gears:** Steel, Cast Iron, Ductile Iron, Stainless Steel, Industrial Plastics **Shafts:** Steel, Heat Treated Steel **Bushings:** Bronze, Carbon, Special Materials Bearing **Sealing:** Packing, Mechanical Seal, Special Sealing Applications

Table 4

Pump Type	Flow	Pressure & Discharge Ports
	L / revolution	
KHP½"	0,006	½" (*Pipe thread*)
KHP3/4"	0,040	3/4" (*Pipe thread*)
KHP1"	0,058	1" (*Pipe thread*)
KHP1½"	0,125	1½" (*Pipe thread*)
KHP2"	0,417	2" (*Pipe thread*)
KHP2½"	0,583	2½" (*Pipe thread*)
KÇP2½"	0,500	2" (*S.Flange*)
KHP3"	0,833	3" (*Pipe thread*)
KHP4"	1,250	4" (*Flange*)
KHP6"	3,958	6" (*Flange*)

Table 5

TO FIND THE CAPACITY (m³/h);

$$\text{FLOW (m³/h)} = \frac{\textbf{Flow (L / rev.) x Pump Speed (rev / min) x 60 min.}}{\textbf{1000}}$$

Example; KHP2" 1000 RPM $Q = \frac{0{,}417 \times 1000 \times 60}{1000} = 25$ m³/h

STAINLESS PUMPS

Our company manufacture all kinds of pumps stainless steel in product range but some stainless-steel pumps are in standard manufacturing program…

ADVANTAGES	*Proper direct use for food, *Using for all acidic chemical material transfer, *Product is stainless steel AISI 316
PERFORMANCE RANGES	**Temperature range (°C):** 20-200 **Viscosity range (Cp):** 28-50.000 **Pressure range (bar):** 2-12 **Suction & Pressure ports:** ½", 1", 1½", 2", 2½", 3"
MATERIALS	**Main body, Gears, Shafts:** AISI 304,AISI 316 Stainless steel, Bronze **Bushings:** Bronze, Carbon,Bearing **Sealing options:** Packing, Mechanical Seal, Special Sealing Applications

Table 6

Pump Type	**Flow**	**Pressure & Discharge Ports**
	L / revolution	
KHP½" – Stainless Steel	0,006	½" (*Pipe thread*)
KHP1" – Stainless Steel	0,058	1" (Pipe thread)
KHP1"- Bronze	0,058	1" (*Pipe thread*)
KHP1½" – Stainless Steel	0,125	1½" (Pipe thread)
KHP1½" – Bronze	0,125	1½" (*Pipe thread*)
KHP2" – Stainless Steel	0,417	2" (Pipe thread)
KHP2" – Bronze	0,417	2" (*Pipe thread*)
KHP2½" – Stainless Steel	0,583	2½" (*Pipe thread*)
KHP3" – Stainless Steel	0,833	3" (*Pipe thread*)

Table 7

LOBE PUMPS

ADVANTAGES	* High efficient * Long Life * Can transfer liquids including small solid particles * Can run dry for an extended period of time. * Low noise and vibration.
PERFORMANCE RANGES	**Temperature range (°C):** **Viscosity range (Cp):** 100 ~ 50,000 Cp **Pressure range(bar):** 1 – 5 **Pressure&Discharge ports:** 1½", 2",2½"
MATERIALS	**Surfaces in contact:** AISI 304 – 316 **Gear Box:** Cast Iron, Stainless steel/option **Bushing:** Bearing **Sealing options:** Mechanical seal, Double Mechanical seal, Lip seals

Table 8

Pump Type	Flow	Pressure & Discharge Ports
	L / revolution	
KLP1½"	0,125	1½" (*Union,Flange*)
KLP2"	0,333	2" (*Union,Flange*)
KLP2½"	0,667	2½" (*Union,Flange*)

Table 9

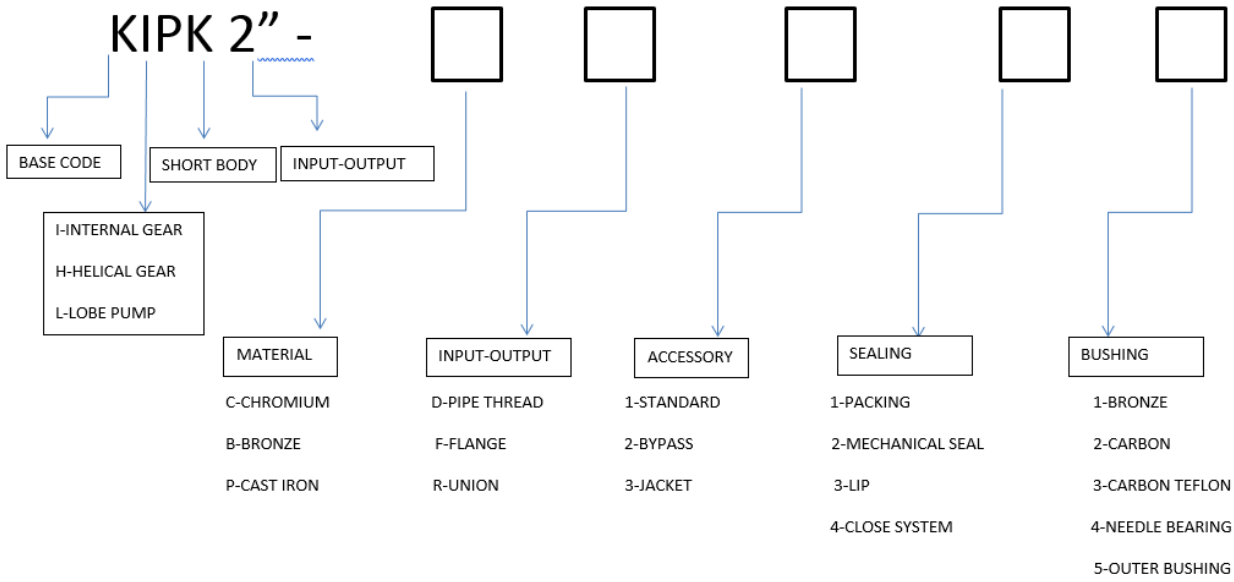
TO FIND THE CAPACITY (m³/h);

$$\text{FLOW } (m^3/h) = \frac{\textbf{Flow (L / rev.) x Pump Speed (rev / min) x 60 min.}}{\textbf{1000}}$$

Example; KlP2" 100 RPM Q = 0,333 x 100 x 60 = 2 m³/h

1.4 GENERAL INFORMATION

CODES



a) Main code in the pumps; **K**upar **I**nternal Gear **P**umps, **K**upar **H**elical Gear **P**umps, **K**upar **L**obe **P**umps. Whose shapes are helical, internal and lobe gear pumps.

b) The sizes in inch system inside the pump codes show the diameter of the suction and pressure ports.For example: the pump with code KHP2½”, has ports of diameter 2½” size.

c) The letter **“K”** just after the main code shows that: all the technical specifications are same as the pump has the main code except for the flow rate. Only flow rate is lower than the pump has only the main code.

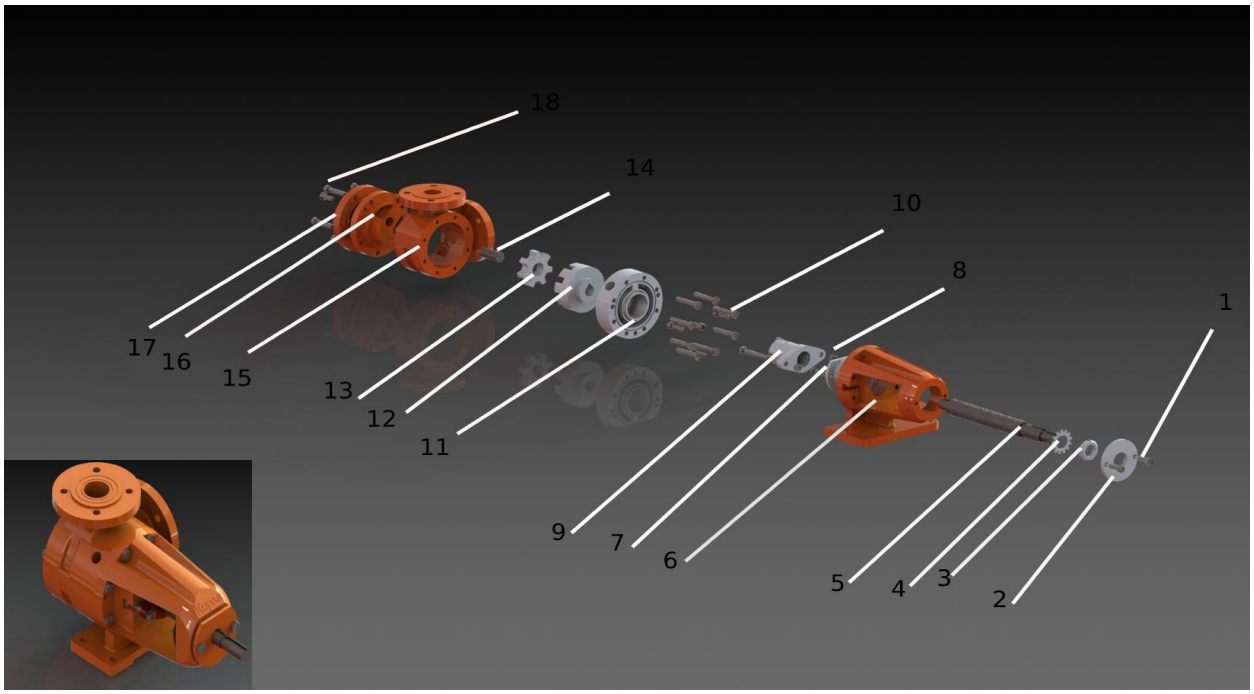
d) The letter **“Y”** in the codes after “-” means: again all the technical specifications are same but the suction and pressure ports are on horizontal (180°) unlike the others. Suction and pressure ports of Internal gear pumps are vertical (90°) to each other

e) At the end of the code are "- **C**" pumps with chrome pumps, which are manufactured from stainless steel **AISI 316** stainless steel and designed for use in the chemical and food industries.

f) KIP2 "-D and **KIP2" -DY** coded pumps are externally mounted and designed to reduce the stresses of material hardening in bed, such as chocolate, and the whole flow, pressure values are the same as KIP2".

CHAPTER II
PUMP PARTS

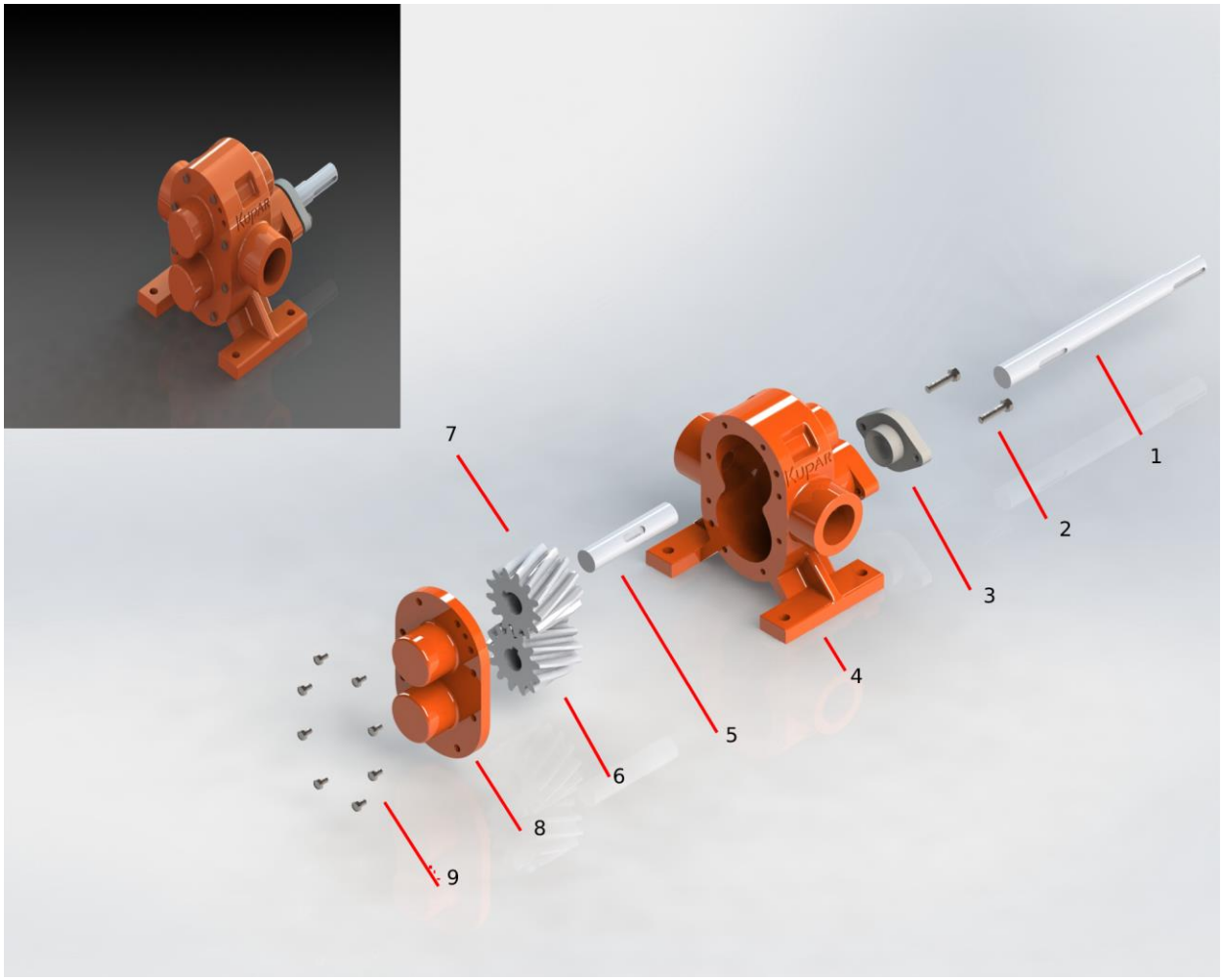
2.1 INTERNAL GEAR PUMPS



1	Hex screw
2	Bearing Cover
3	Lock Nut
4	Lock Washer
5	Shaft
6	Main body
7	Back bearing cover
8	Hex screw M10x1.5x20
9	Packing Press
10	Hex screw M10x1.5x20
11	Mid-Jacket
12	External Gear
13	Internal Gear
14	Pin
15	Flanged Body
16	Cover
17	Jacket
18	Hex screw M10x1.5x30

Table 10

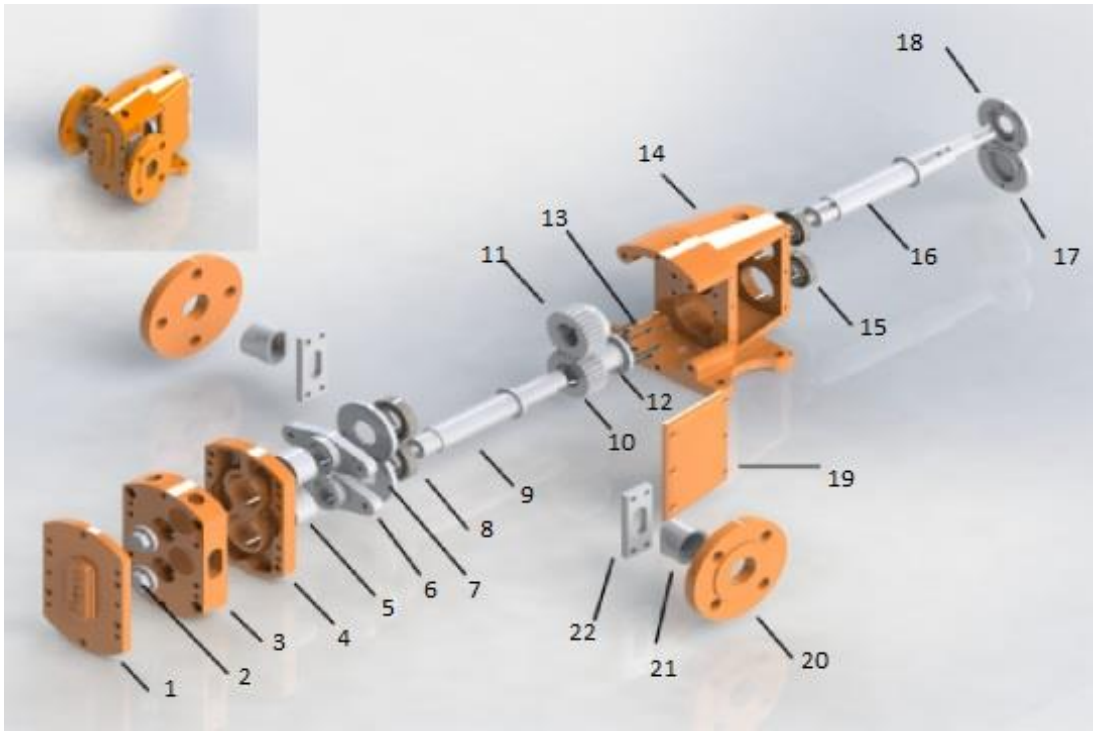
2.2 HELICAL GEAR PUMPS



1	Shaft (long)
2	Hex screw M8x1.25x35
3	Packing press
4	Body
5	Shaft (short)
6	Gear
7	Gear
8	Cover
9	Hex screw M6x1.0x10

Table 11

2.3 LOBE PUMPS



1	Cover
2	Top nut
3	Body
4	Mid - Jacket
5	Packing
6	Packing press
7	Bearing Cover
8	Bearing
9	Shaft (short)
10	Gear
11	Gear
12	Gear conic hub
13	Hex screw M6x1.0x35
14	Gear box
15	Bearing
16	Shaft (long)
17	Front closed bearing cover
18	Front bearing cover
19	Gear box cover
20	Flange
21	Mid-flange back the flanges
22	Inlet-outlet

Table 12

CHAPTER III
OPERATING RULES

3.1. BEFORE THE OPERATION

3.1.1 ASSEMBLY:

3.1.1.1 Mechanical Assembly

* **SIZE OF THE HOLES;** If the pump is coupled directly or with a pulley, the pulley or coupling is used, the coupling or the pulley must not be too tight when mounting to the shaft. Especially when mounting them to the shaft of the pumps having carbon bushing, if you hit the shaft, it can crack the carbon bushings because they are brittle.

* **POWER OF THE MOTOR;** If the pump will be driven by an electrical motor, the power of the motor shouldn't be lower than specified by us.

*The pump must be coupled to the electric motor or gearbox on chassis, **PAY ATTENTION! to the followings when installing the pump:**

a) DIRECT COUPLING; If the pump will be directly coupled to the gearbox or electrical motor, take care to align pump shaft and the motor or gearbox shaft.

b) DRIVE BY BELT; If the motor is to be coupled with the pulley; The pump and the motor should be placed side by side on the chassis, the pulley sizes should be selected to ensure the specified speed of the pump by rating the speed of the motor. Be sure that the pulleys of the pump and the motor are aligned. The electric motor should be installed so that it can move right and left on the chassis. Once the appropriate length of V-belts has been placed on the pulleys, the V-belt tension must be adjusted by moving the motor, then the motor bolts must be tightened.

c) PROTECTION OF TURNING PARTS; After ensuring that the pump is properly coupled with the electric motor or gearbox, the pulleys or couplings must be enclosed with a suitable frame so that it cannot be reached by hand.

***USING OF HOSE;** If hose will be used in the suction and pressure lines, hose should be selected carefully so that the hose shouldn't be deformed because of suction or shouldn't be damaged because of pressure. Especially the hose to be used in the suction line should have spiral steel wire to prevent shrinkage in the suction vacuum.

***USING OF PIPES;** If the installations are made of pipes, the pipes must be good quality, have no cracks or holes, have a thickness which can withstand suction and pressure.

PAY ATTENTION to the followings at the installations of pipelines;

a) INSTALLATION; The entire pipeline should be installed so that it does not apply power to the pump and/or does not suspend the pump. Vibrations that may occur on the pump passes to pipeline, then increases and can damage both pump and pipeline. It is suitable to use compensator to absorb the vibrations.

b) SIZE OF THE PIPE; The diameter of the pipe lines shouldn't be smaller or larger than the nominal diameter of the pump which is indicated at the code of the pump.

c) PLACE OF THE PUMP AND FITTINGS; The pumps should be as close as possible to the top level of the fluid to be sucked, the suction line should be short and the number of elbows etc. should be used as less as possible. Again, the pipe line of the pressure line should be short and fittings should be used as less as possible, it is known that every fitting causes pressure loss.

d) VALVES; If it is not needed don't use valve at the lines, but if you need to use valve PAY ATTENTION to the followings: valve at the suction line can't be used to change the capacity of the pump, in this case the can't work full capacity then it shortens the life of the pump. Second case is the valve at the pressure lines again capacity can't be changed by this way; in the case of closed valve at the pressure line, pipeline or mechanic parts can be damaged when the pumps starts. If it is needed to use valve at the pressure line the pumps should be selected with pressure relief valve or a pressure relief valve must be mounted to the pressure line.

e) ISOLATION; isolation is very important both at the suction and pressure lines, especially at the suction line if there is a hole or gap, pump sucks air, in this case, capacity of the pump reduces also it shortens the life of the pump. You can see the leakage at the pressure line but at the suction line sometimes you can't see very small holes and gaps, you can understand from the air bubbles more than common and low capacity.

3.1.1.2 Electrical Connection

a) ELECTRIC MOTOR; The connection of the electric motor must be done by an experienced and certified electrician.

b) CIRCUIT BREAKER; Route to the motor with a circuit breaker compliant with EN 60947 standards.

c) OVERCURRENT; Overcurrent trailer or motor protection (compact) switches should be used to protect the motor against overloads.

d) NO ELECTRICITY DURING MAINTENANCE; Be sure that electricity is cut during repair, maintenance and manual cleaning of the pump.

e) STANDARD; The electrical components and connections, you will use, must comply with EN 60204-1.

f) PHASE; control the number of phases; 3 phases or 2 phases (380V or 220V) of the motor before connecting to the electricity;

g) MANUAL OF THE MOTOR; Read the manual of the electric motor for electric motor connections, (star-delta connection can be needed for big motors)

3.1.2 IMPORTANT NOTES ABOUT THE PUMP BEFORE OPERATION;

a) GREASE; Before operating the pump, grease should be applied from the glaciers on the body and the bearing.

b) PACKING; for the pumps with packing; packing press is pre-tightened, do not tighten the packing before operation and when pump is not operating.

c) SUCTION LINE; Control the suction line be sure that the suction line is open. If the level of the fluid is higher than the pump be sure that the fluid can come to the pump, if negative suction is needed control the end of the pipe or the hose is inside the fluid to be sucked.

d) PRESSURE LINE; control the pressure line that it is clean and open and is not blocked, if there is valve, it is open.

e) FİLTER; If there is filter at the suction line, control the filter if it is clean and well-isolated for air.

f) BY-PASS RELIEF VALVE; if there is a pressure relief valve on the pump, control the position of the valve, adjustment nut should be close to the pressure line if not, relief valve does not work.

g) SOLID PARTICLES; be sure that there are no free solid particles inside the fluid around the suction line alternatively can enter the pump after start. Also, be careful during the all installations and carrying, a solid mustn't fall into the pump.

h) PLACING; The pumps should be safely fixed to the chassis and also the chassis should be rigidly fixed to floor or construction.

i) TURNING PARTS; turning parts of the pumps and motors should be in a protection frame, check the fame is fixed and it is not possible to reach the turning parts.

3.2. ON OPERATION;

3.2.1. CHANGING CAPACITY; In Gear and lobe Pumps, it is absolutely not recommended to block the flow of material in the suction line, also the pressure line cannot be throttled by a valve or other flow control mechanism, as the working life of the pump is greatly reduced. If you want to change the capacity of the pump you should change the speed of the pump, if you need to change the capacity during operation, you can use frequency converter.

3.2.2. CHANGING DIRECTION; There are mostly 2 ports on the gear and lobe pumps one Inlet and one outlet ports. These ports are generally 90º in Internal gear pumps, in helical gear pumps and lobe pumps ports are 180º to each other. It is not certain which one is inlet or outlet because gear and lobe pumps can turn both directions so the ports changes according to the turning direction. If you buy the pump with electric motor od gearbox, we mark the inlet and outlet ports of the pump according to the common turning direction of the electric motor. We

mark the motor also. If you buy without motor you can use whichever you want. You can see, the direction according to turning direction, at the working principle diagrams of each pump type at the previous pages. If you need to change the direction, you should change the direction of electric motor by swapping any two of the three phase electric inputs).

3.2.3. REASSEMBLING COVER OF INTERNAL GEAR PUMPS; If it is needed to disassemble the pump for maintenance or repair, you should be careful when reassembling the cover of the internal gear pump. For helical gear and lobe pumps the position of the cover is not so important, only the hole for long shaft should be at the bottom in general. For internal gear pumps position of the cover is very important that the pump doesn't operate if the cover is not in right position, for this reason all internal gear pumps have tab on the body and the cover as a mark for right position these two tabs must face each other.

3.3. BY-PASS RELIEF VALVE;

3.3.1 AIM OF BY-PASS RELIEF VALVE; The main purpose of Bypass, is to protect pump and drivers from any kind of damage might be caused due to high pressure, which happens mainly because of blocking of discharge line. Bypass can be placed on pump or it can be placed on pipelines. REMEMBER THAT BY-PASS RELIEF VALVE IS NOT USED TO CHAGE THE CAPACITY OF THE PUMP ONLY THE WAY TO CHANGE THE CAPACITY IS CHANGING THE SPEED OF THE PUMP.

3.3.2 SETTING BY-PASS RELIEF VALVE; if you buy the pump with the by-pass on it, the p-pass relief valve is pre-set to open more than nearly 6 bars. By-pass on setting can be changed according to installation pressure. To set the by-pass, first remove the protection cap on the top of the by-pass by using wrench, there is a stud a nut and a fixing nut under the cap. Loosen the fixing nut, to increase the opening pressure tighten the nut on stud, to decrease the opening pressure loosen the nut of stud. When you finish the adjustment do not forget to tighten the fixing nut to fix the adjustment. Opening pressure should be min. 2 bar higher than the operating pressure of the installation. If it is nearly same pressure of installation; the pump will continuously discharge some of the material to inlet, so the pump runs at a lower flow rate.

3.3.3 POSITION OF BY-PASS RELIEF VALVE; Be careful if your pump has by-pass relief valve, it operates related to outlet port. If you change the direction you should change the direction of by-pass relief valve also. By-pass relief valves are factory-set by-pass from the top to the outlet, if the direction is changed, by-pass should be disassembled and turned so that the adjustment nut faces the outlet port. Silicone, liquid gasket, etc. should be used for isolation during this assemble.

CHAPTER IV
MAINTENANCE

ATTENTION! During the maintenance, the pump must be stopped, the electrical connection must be cut off or the fuses must be closed. The points to be considered in the maintenance of the pump are as follows;

4.1. IMPORTANT NOTES ABOUT MAINTENANCE;

a) In the pumps having roller bearing and outer bushing, grease oil must be pumped from the glaciers on the body until it is leaked through the shaft every 2 months.

b) If you buy a pump with filter mounted on it, according to the amount of solid particles in the liquid, transferred, the filter should be cleaned periodically. The bolts on the filter should be removed and the cover should be opened, the filter sheet inside must be cleaned. The cover should be closed by placing the filter sheet carefully. Then Silicone, liquid seal, etc., should be used between the cover and filter body to isolate.

c) In models driven by V-belt; the belts should be checked by removing the protection frame at least every 6 months.

d) If you buy a pump having packing gland for sealing, after the first start of the pump you can see leakage it is normal. Wait for half an hour, tighten the nuts of the packing press equally but not too much. You will see it stop. Check the leakage every 2 months, then you can tighten the nuts again. It is recommended to change all packing every 1 year.

e) During the maintenance of the pumps, when the cover of the pump is disassembled, it is important not to use screwdriver or thin part to demount the cover from body. There are threaded holes for clamping bolts. Pump bolts can be used to separate the cover from the body.

f) After maintenance; during reassembling of the pump, especially be careful to use liquid sealing between the body and cover to isolate air, and prevent leakage. If you see gasket during disassembling take care to use the same thickness of gaskets used on the pump.

4.2 ACCESSORIES

Filter: Gear pumps cannot transfer fluids with solid particles. The solid parts can get caught between the teeth or between the teeth and the body, causing jamming or even stalling. Therefore, it may be necessary to place a filter in the suction port of the pump when such risks exist. Our filters are bucket type suction filters. Punched sheets, filter the fluid, are selected according to the flow or pump size. Depending on the amount of solids in the fluid, the bolts should be removed and cleaned at certain intervals.

Mechanical Seal: In our pumps Packing gland is used for sealing as standard. If you need complete leak proof you should get the pump with mechanical seal. But Mechanical seal is not suitable for all fluids. Mechanical seal is not suitable to use in freezing and/or adhesive fluids and/or fluids having very high viscosity.

Carbon Bearing: Standard pumps' bushing material is Rg7 bronze. However, in some special cases like high-temperature, low-lubricating fluids, carbon bearing is used for bushings but carbon bearings are very breakable, so be careful when carrying and working pumps having carbon bearing.

By-Pass Relief Valve: Gear Pumps are positive displacement pumps. This means that you can not throttle or close the pressure line. In this case pump can damage itself, lines or drivers. Is there risk of throttle or close of the pressure line By-Pass Relief valve should be used to prevent damages.

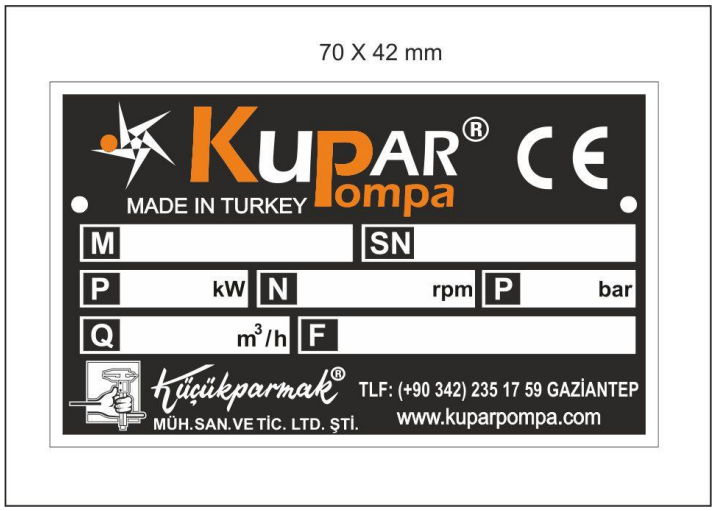
Heating Covers: A part that is mounted on the cover of the pump with the aim of heating the body and cover of the pump to increase or keep the fluidity of the liquid.

Wheeled Chassis: It is a system implemented with the aim of making it easier to move the pump from one place to another

4.3 COUPLING TYPES

4.4 LABEL

ALL THE OPERATING RULES SHOULD BE SUITABLE TO THE VALUES SPECIFIED ON THE LABELS…



CHAPTER V
FREQUENTLY ASKED QUESTIONS and POSSIBLE CAUSES

5.1 The pump is running for the first time, what could be the reason it does not suck?

Cause: In this case, do not put amount of oil into the pump from the pressure line so that the pump will not become dry and will evacuate the air by making the pump vacuum. However, if the fluid transfer still does not start after 3 - 5 minutes, stop the pump immediately.

Check the following items:

1. Make sure that the pump does not suck air from any point on the suction line, because of poor isolation

2. Check that the suction tube is immersed in the fluid,

3. The suction height may be too high.

4. The material may not be able to absorbed because of very high viscosity.

5. Check whether the tab on the cover and the tab on the body is face to face at the internal gear pumps.

5.2 What causes the pump to stop working suddenly?

Reason 1: Power failure can be occurred. Electric installation should be controlled, electrical motor or gearbox should be checked against electrical faults.

Reason 2: Solid particles generally cause the pump to stop. If such a failure occurred; firstly stop the pump immediately, demount the cover (As explained on Chapter 3). Remove the particle and control the inside parts of the pump, if there is burr because of the solid particle clean part by an aid of rasp. Mount the cover (As explained chapte 3). Start the pump again.

Reason 3: Pump working space is set according to the viscosity specified during selection of pump. If the pump is designed for lower viscosity but you try to ues the pump to transfer fluid having high viscosity, it can stop the pump because of jamming.

5.3 Pump works very noisy what should be done?

Reason 1: First reason of the noise is in adequate suction and/or discharge. Control if there is enough liquid flow in suction line and also the pressure line is open and clean.

Reason 2: Gear pumps work very hard when suction and/or discharge. So the suction and / or pressure pipe or hose must be smaller than the diameter of the pump port. Suitable hose and pipe should be selected (As explained at chapter 3.1)

5.4 The pump does not provide the specified flow rate and pressure, working at a lower value of the catalog value what should be done?

Reason 1:The pump suction and / or pressure lines should be checked, smaller diameter pipe from the pump input and output diameter shouldn't be used.
Reason 2: Check if enough fluid can come to the pump. The pump needs to suck amount which will be transferred for exmapled if the capacity is 1000 L/h pump needs to suck 1000 L/h.
Reason 3: Check air isolation at the suction line. If pump sucks air from suction line, the pump can't work with full capacity.
Reason 4: By-pass; if by-pass setting preusre is same or lower than the installation pressure, by-pass can discharge continously so the pump can't transfer full capacity. Check the by-pass relief valve as explained at **chapter 3.3**
Reason 5: Pump working cleareances; is designed according to specified viscosity when selecting the pump. If the pump is designed for higher viscosity and you use the pump to transfer for the liquid having lower viscosity, the pump can't transfer full capacity because of leaking back, and can't provide the pressure.

5.5 What we can do is leaking from packing? (pump models having packing)

Reason: **The gland may be loose,** tighten the nuts of packing press equally as explained at **Chapter 4.1**

APPENDIX

VISCOSITY CONVERTING CHART

A converting table between viscosity units like Centiposes, milliPascal,Centistokes and SSU

Cp (Centipoise) MPas(Milipascal)	P(Poise)	Cst(Centistokes)	S(Stokes)	SSU(Saybolt Seconds)
1	0.01	1	0.01	31
2	0.02	2	0.02	34
4	0.04	4	0.04	38
7	0.07	7	0.07	47
10	0.1	10	0.1	60
15	0.15	15	0.15	80
20	0.2	20	0.2	100
25	0.24	25	0.24	130
30	0.3	30	0.3	160
40	0.4	40	0.4	210
50	0.5	50	0.5	260
60	0.6	60	0.6	320
70	0.7	70	0.7	370
80	0.8	80	0.8	430
90	0.9	90	0.9	480
100	1	100	1	530

Table 13

APPROXIMATE VISCOSITIES & COMMON LIQUIDS

CentiPoise (cP)	**CentiStokes (cSt)**	**Saybolt Secont Universal (SSU)**	**Typical liquid**
3,2	4	40	Milk
12,6	15,7	80	Fuel Oil
16,5	20,6	100	Cream
34,6	43,2	200	Nebati Yağ
176	220	1000	Tomato juice
820	650	5000	Glycerine
1760	2200	10,000	Honey
5000	6250	28,000	Mayonnaise
9,800	10,900	50,000	Chocolate
15,200	19,000	86,000	Minus Cream
19,600	21,800	100,000	Dough

Table 14

Centistokes= centipoises/specific gravity - SSU=Centistokes*4,55