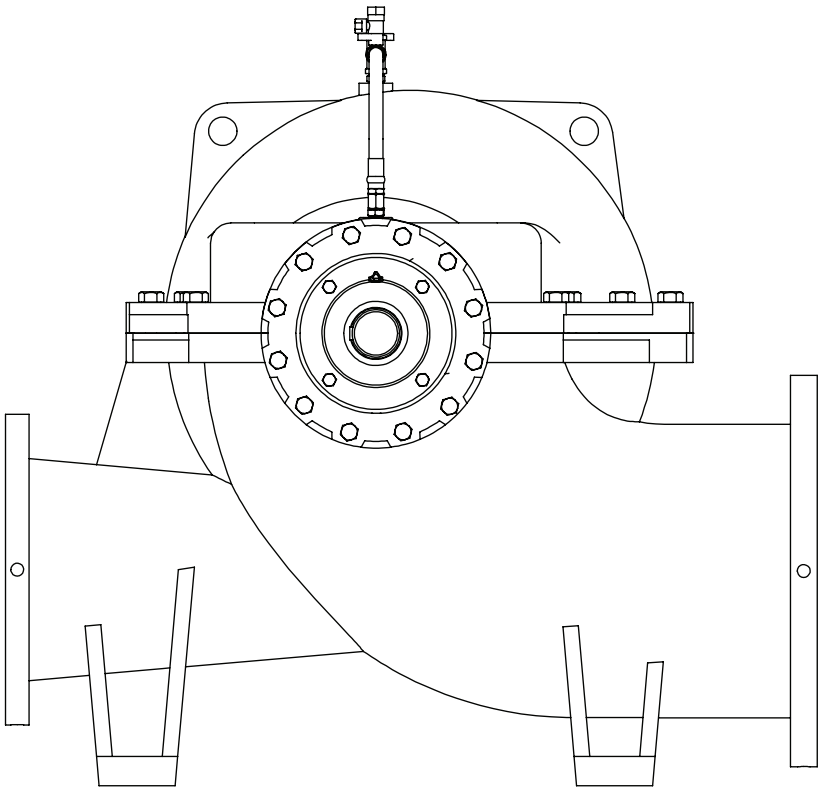
Operating and Maintenance Manual

TK SERIES

DOUBLE SUCTION HORIZONTAL SPLIT CASE PUMP

Ver.2019-02



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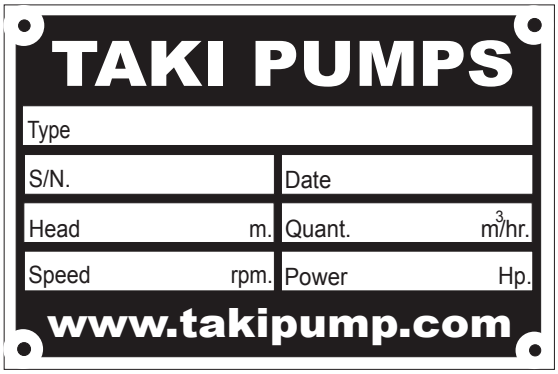
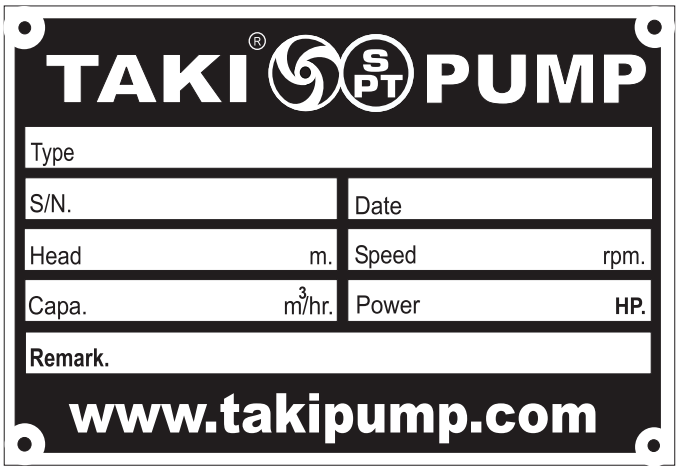
Name Plate





This user manual is valid for any pump which contains the same nameplate information as is displayed above.

The name plate must never be removed from the pump.
If the name plate is removed, it is not possible to identify the pump, and it will not be possible for warnings contained in this manual to relate to the specific pump application

The pump's serial number (S/N.) is displayed on name plate

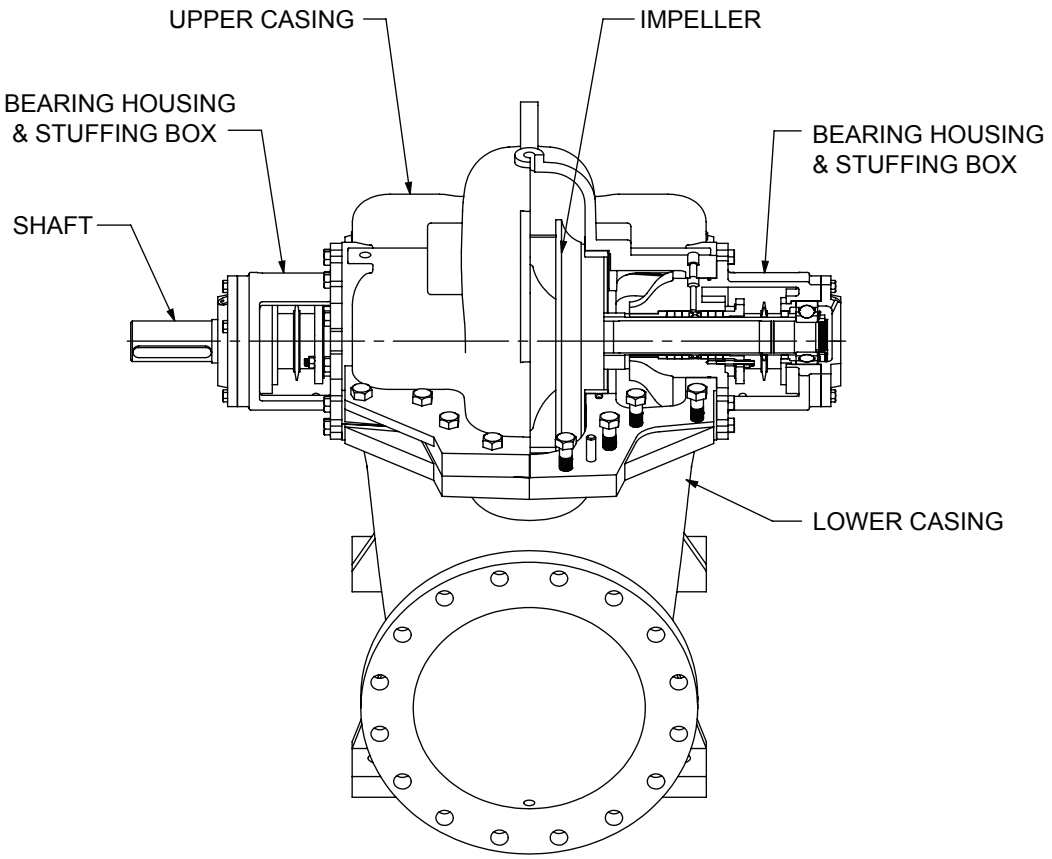
Introduction

TK series are a high performance double suction horizontal split case pump with consists of double suctions and its capable for high level of flow rate, the pump consists of 5 main parts

1. Lower Casing
2. Upper Casing
3. Impeller
4. Shaft
5. Bearing Housing & stuffing

All of these are customable by the customer in term of materials, which in this case the company has provided the customer with cast-iron, stainless steel and bronze. Each material has a unique ability and performance that will affect the efficiently. The pump is designed for a easily for a removal the impeller.

The pump must not be used for other purposes than recommended without consulting your local supplier.



Application :
factories, mines, city water supplies and flood control

Pump sizes:
The TK series is supplied in 3 pump size.

Transporting the pump

The pump must be secured properly on pallets or similar medium before transport and shipment. The pump must be transported with the usual degree of consideration, to avoid exposing it to impact and pressure.

Lifting the pump

If the pump's weight is more than the permitted allowance of kilos/pounds that people may lift according to local regulations, it must be lifted mechanically.
The table below – figure – shows the weight of the various pump sizes.
Pump weight in kg./lbs. (Bare pump)

Model	Kg.	Lbs.
TK 350/300 A	480	1,058
TK 350/300 B	840	1,874
TK 400/300	975	2,149

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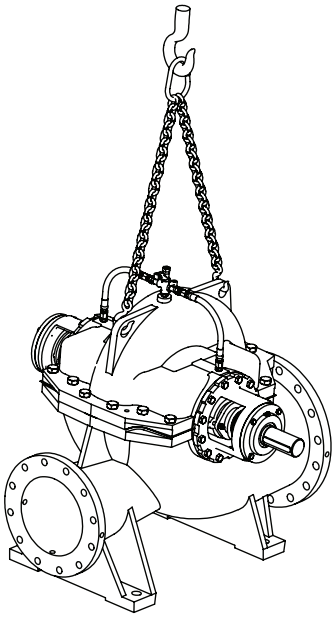
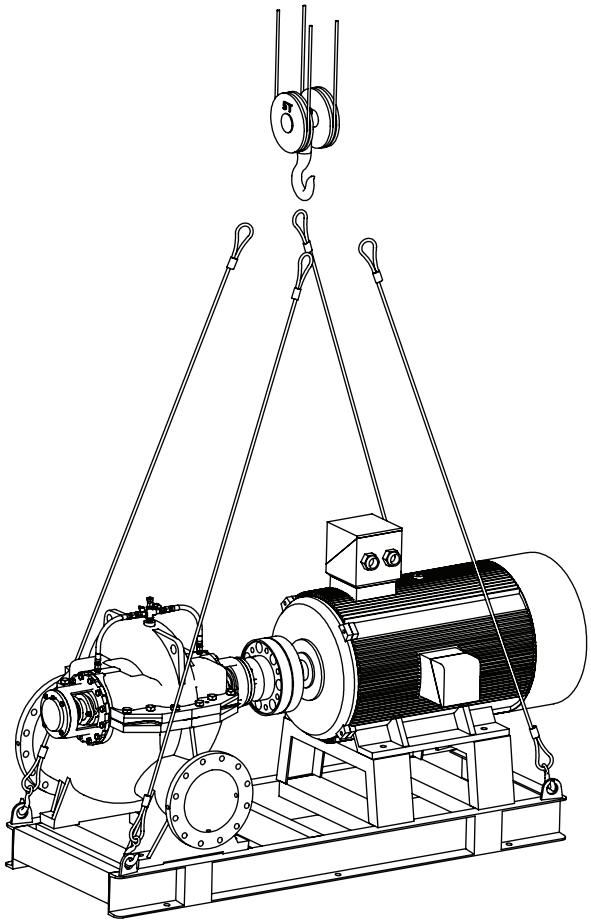




Lift the pump mechanically, if the pump's weight is more than the permitted allowance of kilo/pounds that people may lift.

Do not place fingers in the pump's ports when lifting or handling the pump.

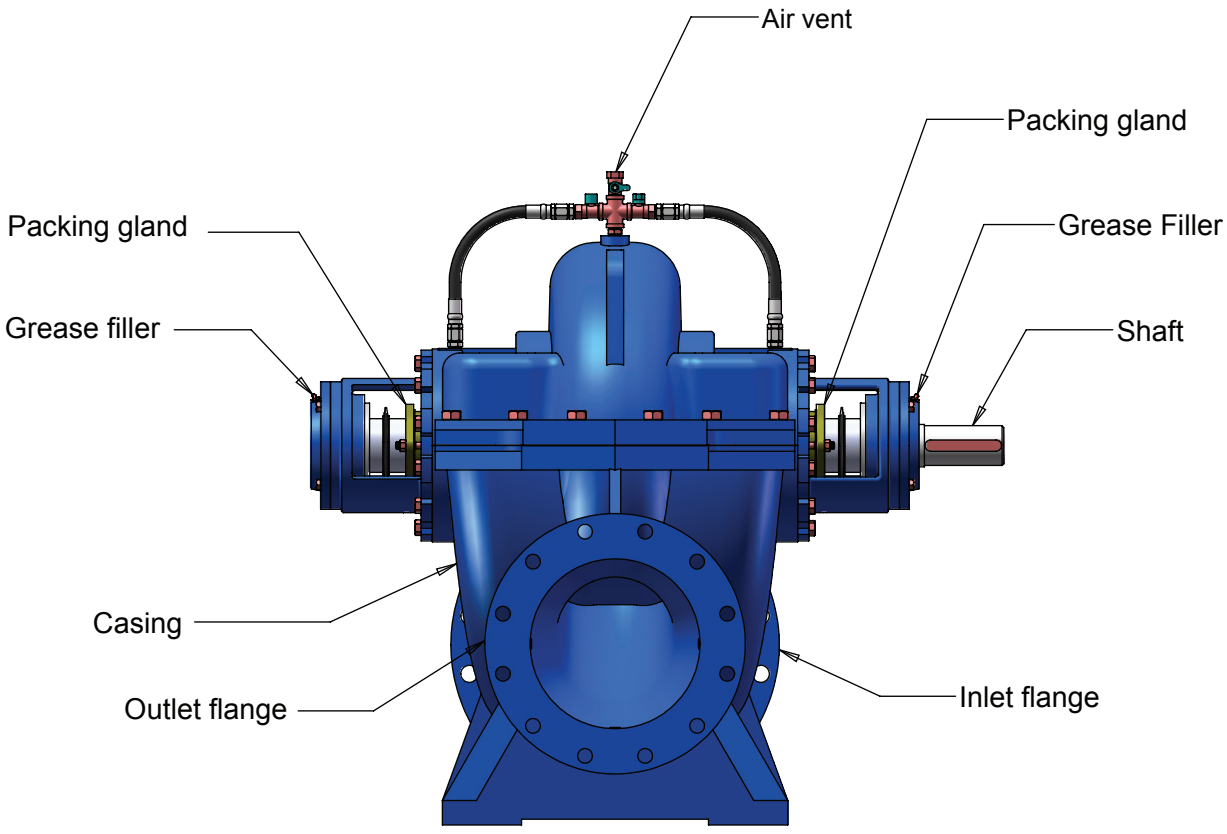
The pump must be lifted using stable suspension points, so that the pump is evenly balances and the lifting straps are not lying over sharp edges.

The pump must be lifted in accordance with the lifting instructions figure.

Motors fitted with lifting eyes must not be used to lift the whole pump, only to lift the motor separately.

Flanges

The Pipe flanges material is must be steel or stainless steel. Gaskets need to be installed between the flanges.



Flange coupling must always be undertaken by skilled professionals.

Achieve parallelism between the flanges and observe the maximum tightening torque to prevent tension in the pump casing.

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Achieve parallelism between the flanges and observe the maximum tightening torque to prevent tension in the pump casing.

Before connecting the flange, check that the flanges are parallel, as any variance in parallelism will create tension in the pump casing. Aligning the pipe system or fitting compensators achieves parallelism.

Drive Specification

TK series needs a drive unit with suitable rotation speed and torque. The design of the drive unit (rotation speed and power) depends on the hydraulic conditions (i.e. capacity, pressure, viscosity) of the application.

Assembly of drive unit

The pump and the drive unit must be assembled carefully and free of distortion. The pump shaft and drive shaft have to be connected with a suitable coupling including guard for protection.

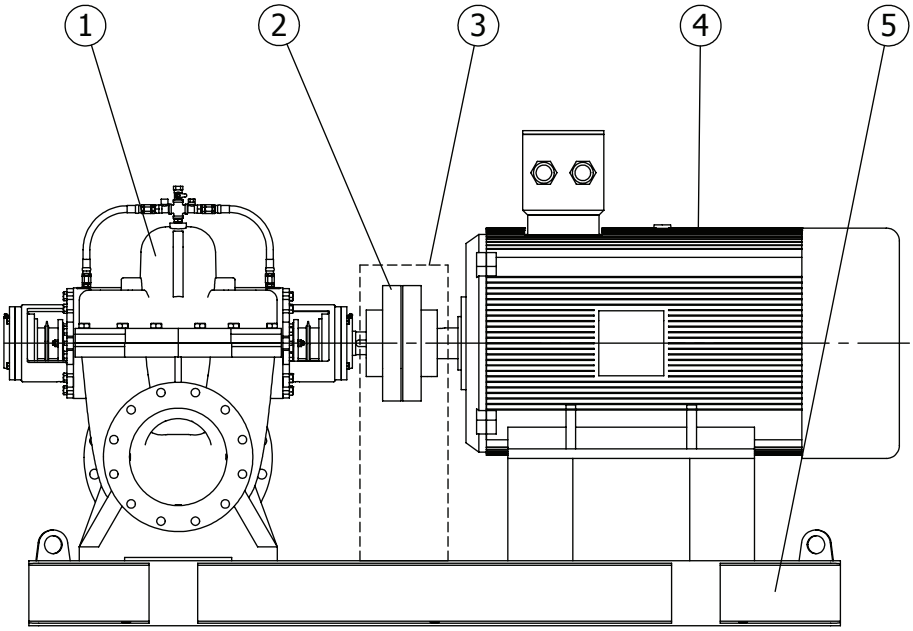
Complete with driving unit

Standard design

The pump and drive are connected to the baseplate, which is made from steel.

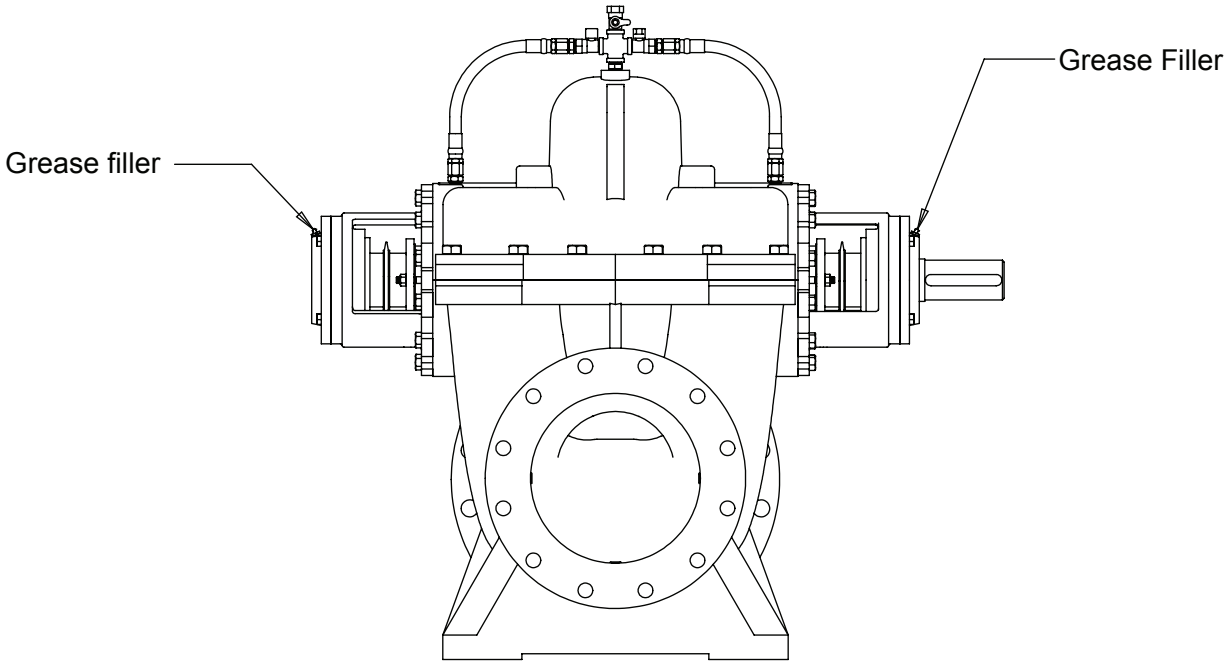
Pump complate Unit

1) Pump
2) Coupling
3) Coupling guard
4) Motor
5) Base plate



Lubricant

The pump must be put in grease as a lubricator at the first time of using.



Installation

Safety

All work on the pump – including adjustments, repairs, pipe couplings, etc. Must be undertaken by professionally qualified staff.

When repair and maintenance work has been completed, any safety equipment provided must be refitted in its original state before the pump is started.

Never shut off the pump's suction and/or pressure side during operation.

If it is possible to block the pump's pressure line, the pump or pressure line must be fitted with a by-pass valve.

Motors fitted with lifting eyes must not be used to lift the whole pump, only to lift the motor separately.

The pump must be lifted in accordance with the instructions contained in this user manual – see section entitled "Lifting the pump".

If the pump's weight is over the permitted allowance of kilos/pounds that people may lift, it must be lifted mechanically – see section entitled "Lifting the pump".

It is forbidden to remain in the pump's working area without cause during operation.

The emergency stop must be positioned in close proximity to the pump.

The pump must be shielded when pumping liquids at high temperatures Warning signs must be displayed!

Foundation

The foundation must be prepared according to the calculation before installation.

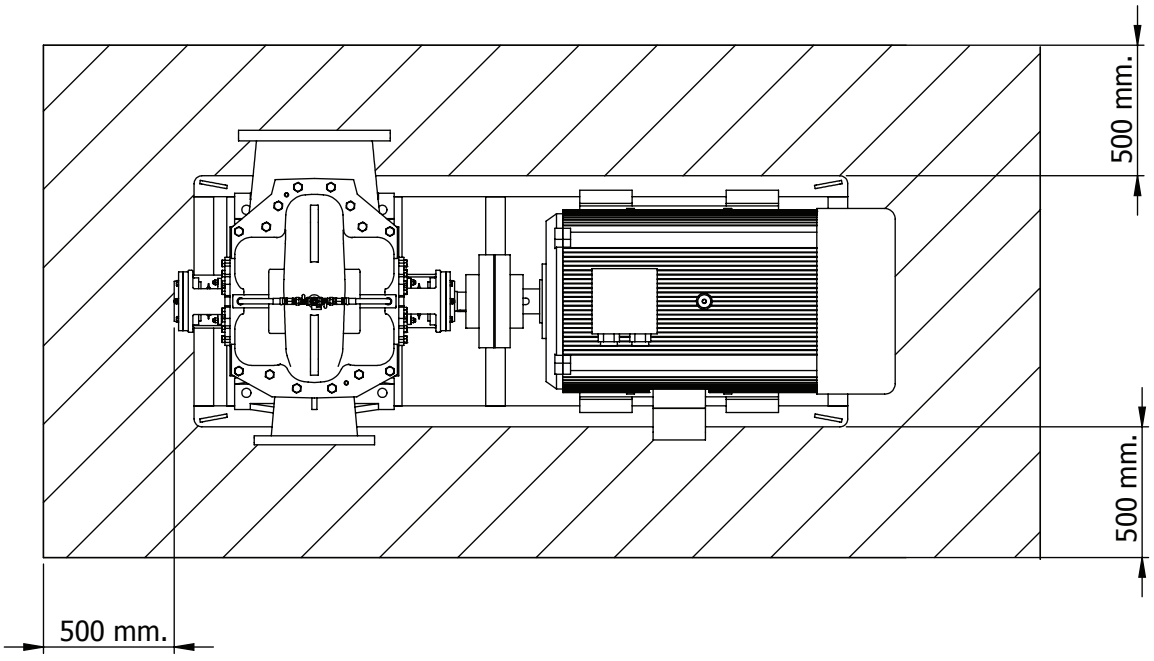
$$\text{Concrete thickness (mm)} = \frac{\text{type of driven} \times \text{total weight of pump unit (kg)}}{\text{base plate length(mm)} \times \text{base plate width(mm)} \times 2.3 \times 0.000001}$$

Type of driven :

Motor	= 3
Gasoline engine	= 4
Diesel engine	= 5

Concrete must be dry, smooth and not inclined

Service Area



Recommend 500 mm around the pump unit (see figure 3.1)

Connecting the motor and the pump.

If you intend to use the pump in a potentially explosive environment, the pump must be connected to an explosion-proof motor.

Carefully shield the coupling between the pump and motor

1. Before connecting the motor and the pump, check that the pump shaft can revolve easily and regularly.

2. When connecting the motor with the pump, you must make sure that the pump shaft and the motor shaft are on precisely the same center line and that there are a few mm (about 0.10 inches) between the shaft end, as otherwise you run the risk of the pump being destroyed during operation.

3. The pump must be connected to the motor by flexible coupling.

4. The pump and the motor are aligned as described in the following section.

Aligning the motor and the pump

The motor and the pump are aligned as follows.
Other couplings are aligned in accordance with the coupling supplier's instructions with regard to the maximum tolerances for eccentricity and non-parallelism.

1. Check the centering between the pump shaft and the motor shaft by means of straightedge. Place the straightedge over the two coupling pieces on the circumference – 90o apart.
Any misalignment will become evident in the form of a gap of light between the straightedge and the coupling hub.

2. Centering may deviate by a maximum of 0.05mm/0.002 inches when both halves of the coupling rotate.

3. Check the parallelism/gap between the halves of the coupling, using an air gap gauge. The gap may be a maximum of 0.5° – or when both halves rotate the gap deviation may not exceed 0.05mm/0.002 inches on the same point.

4. Inserting suitable intermediate layer of material between the pump's or the motor's base and base frame corrects alignment.

Insufficient alignment between pump and motor causes increased wear on the coupling elements.

Before connecting the pipe

The pump should be filled with liquid before it is started. Before the pipes are fitted, the pump is filled with a volume of liquid that enables the liquid to start running out of the pump.

Clean out any impurities from the pipe system before the pump is connected to it.

Remove the protective plugs from the pump port before connecting the pipes.

The pump must be installed so there is no tension between the pipe and the pump casing.

External loads on pump flange

There must be no tension between the pipe and the pump casing when the pump is installed. Tension in the pump casing as a result of preloaded pipes will create a significant in crease in the rate of wear.

Pipe must be supported as close to the pump casing as possible.

Emergency stop

Fit the pump unit with an emergency stop

If the pump is fitted as part of a total system, this must be provided with an emergency stop. The emergency stop is not included in pump unit (option)

When installing the pump, the emergency stop must be:
- Designed, set up and installed, and function in accordance with the prevailing standards and directives
- Positioned within easy reach, so that it is accessible to the operator/engineer during repairs, adjustment and maintenance of the pump
- Be tested regularly to check that it is full working order

Monitoring

Connect any monitoring and safety systems that are necessary for safe operation.

Connect and adjust any monitoring and safety system – manometer, flow meters, etc. – according to the operating condition.
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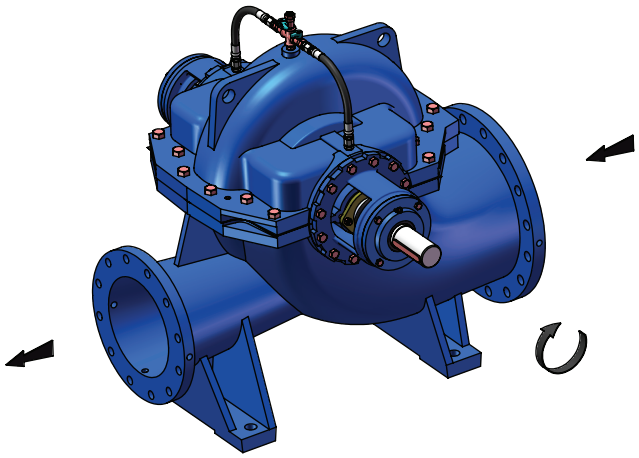
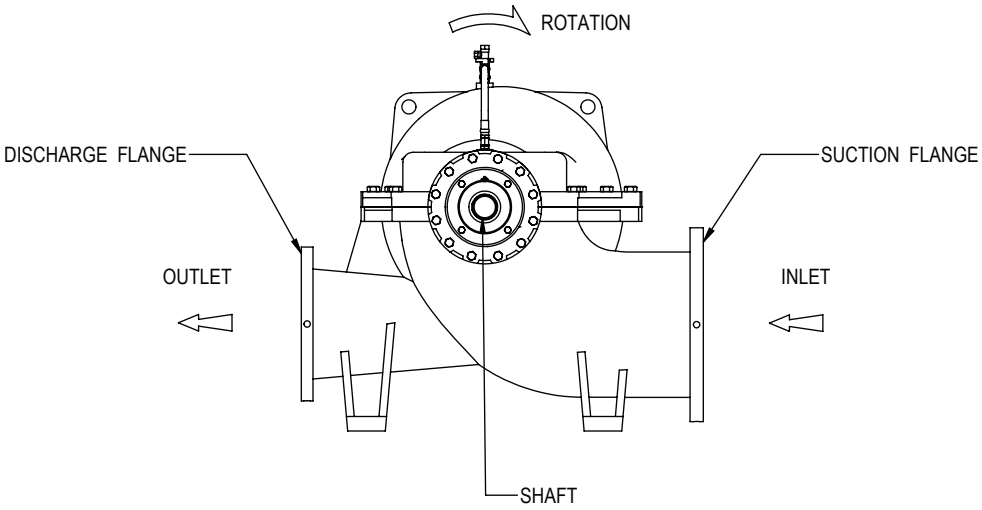
Explosive area

the pump is connected to an explosion-proof motor,if the pump is set up in a potentially explosive atmosphere area.

Before starting the pump

Before starting the pump, check:
- That the pump shaft can be turned around freely.
- That the pump and motor are aligned precisely – see section entitled "Alignment between motor and pump".
- That the bearing are lubricated and maximum service life is observed.
- That suction valve is fully open, to avoid the pump running dry.
- That dischange valve is nearly closen, to avoid the pressure being too low.
- That the pump casing is filled with liquid to ensure the ability to prime.
- That there is no coagulated liquid in the pump or the pipe system – after the last operation – that may cause blockage or breakdown.
- That the necessary monitoring and safety systems are connected and adjusted according to the operating conditions.
- Check the rotation direction of the drive by jocking





Before starting after preservation

Before starting - after preservation – check :
- That the pump is not corroded or dried out
- That slide bearings and the shaft seal's sliding surfaces are not dry.
- This check is performed by turning the pump shaft gently.
- That any preservative or anti-frost liquid is cleaned off before starting the pump – if these are not compatible with the pump liquid.
- That elastomers are replaced if they have been damaged by the anti-frost liquid used.
- That ball bearing and any elastomers are replaced if the pump has been in storage for more than 6 years, as the lubricating grease used for elastomers and ball bearings have a limited service life.

After starting the pump

check :
- That the pump is drawing the liquid.
- That the speed is correct.
- That the direction of rotation is correct.
  Viewed from the motor side, liquid is pumped to the left when the shaft rotates clockwise.
- That the pump is not vibrating or emitting a jarring sound.
- That the stuffing box and bearings are not becoming hot.
  If the pump has fitted with lip seals, these will normally cause the shaft to heat up during the ring's running-in period, which lasts approx. 2 hours.
- That there are no leaks by the pump.
- That the mechanical shaft seal is fully sealed. (if installed)
  Stuffing boxes with packing ring may, however, permitted a low level of leaking 10 -100 drops of leakage per minute
- That the operating pressure is correct.
- That the power consumption is correct.
- That all monitoring equipment is in full working order.
- That any pressurized water pipes, heating/cooling systems and lubricating systems, etc. are operating and in full working order.

Running in the packing seal - when first time starting the pump

when starting a new pump, the packing seal must be run in as described below :

1. Once the pump has started, the packing seal must leak more than 200 drops per minute to saturate the rings.
2. When the packing seal is saturated – after approx. 30 minutes' operation – the packing gland screws must be tightened gradually, so that the leakage is reduced.
3. Check that the staffing box does not become hot.
   If the staffing box become hot, loosen the packing rings slightly, after which you must check that the temperature is falling.
4. When the leakage is between 10-100 drops per minute, do not tighten the screws anymore.
   The number of drops per minute depends on the pump size, pressure and speed.
5. The packing seal must not be tightened so much that there is no leakage.
   The must leak continuously.
6. The leakage rate must be checked at regular intervals.

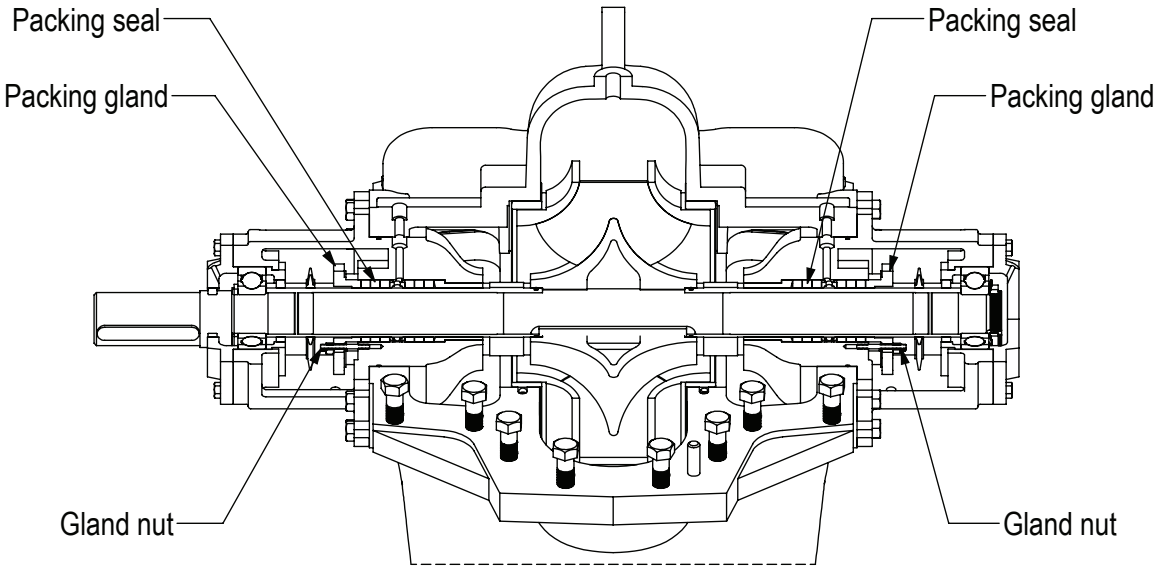
Adjusting the packing seal

The shaft seal must not be adjusted during operation.

It is important that the packing seal leaks during operation, as this provides lubrication and also releases the frictional heat is generated.

The packing seal with packing rings requires continuous adjustment, to make sure that the volume of leakage by the stuffing box is correct.
Depending on the speed, pressure, pump size and viscosity, the stuffing box must leak 10-100 drops per minute to remove the frictional heat that is generated between the shaft and the packing rings. If there is insufficient leakage, the heat generated can cause the gasket rings to harden and create increased wear on the shaft.

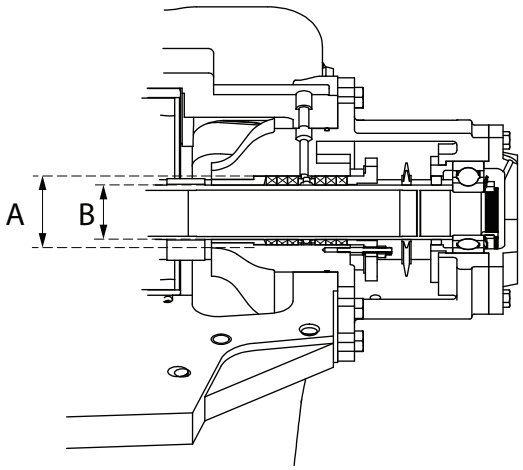
The leakage described above is achieved by tightening the packing rings axially, so that they apply a pressure against the shaft. This pressure restricts the flow of the liquid, as the play between the shaft and the packing ring is in the order of a few thousandths of a millimeter.



The location of the packing seal, the stuffing box and the packing gland on the pump.
The design of the shaft seal housing, does , however, depend on the individual pump application.

Repacking packing seal

1. Pull the packing gland back on the shaft once the screws have been removed.
2. The packing rings can now be pulled out using a packing extractor.
3. Check the shaft and the stuffing box thoroughly for wear, scratches and deposits.
4. Replace worn parts and remove deposits with care.
5. Always conduct a control measurement of the shaft and the stuffing box before specifying the packing dimension.
   !! Never use old packing rings when measuring
   The packing dimension is defined on basis of the following:



The A and B dimensions on the shaft and the stuffing box

The A and B dimensions obtained are inserted in the following formula to determine the packing dimension.

(A - B) / 2 = packing dimension

6. New packing rings are bought as spare part or produced as described in step 7.
7. Trim the new packing ring on the shaft or a mandrel of the same diameter as the shaft.
   Wrap the packing around the shaft/mandrel the number of times that packing ring are to be used, and cut through with a sharp knife.
8. If the packing rings are difficult to move into position, they can be rolled with a pipe or similar item.
   Never strike a gasket, as the fibers in the material will be destroyed and the sealing property will be significantly worsened.
9. Lubricate the individual rings with a little oil to facilitate installation.
10. Turn the ring openings so that the two rings lying alongside one another are diametrically offset.
11. Finally, tighten the packing gland gently by hand, and restart the pump.

Maintenance

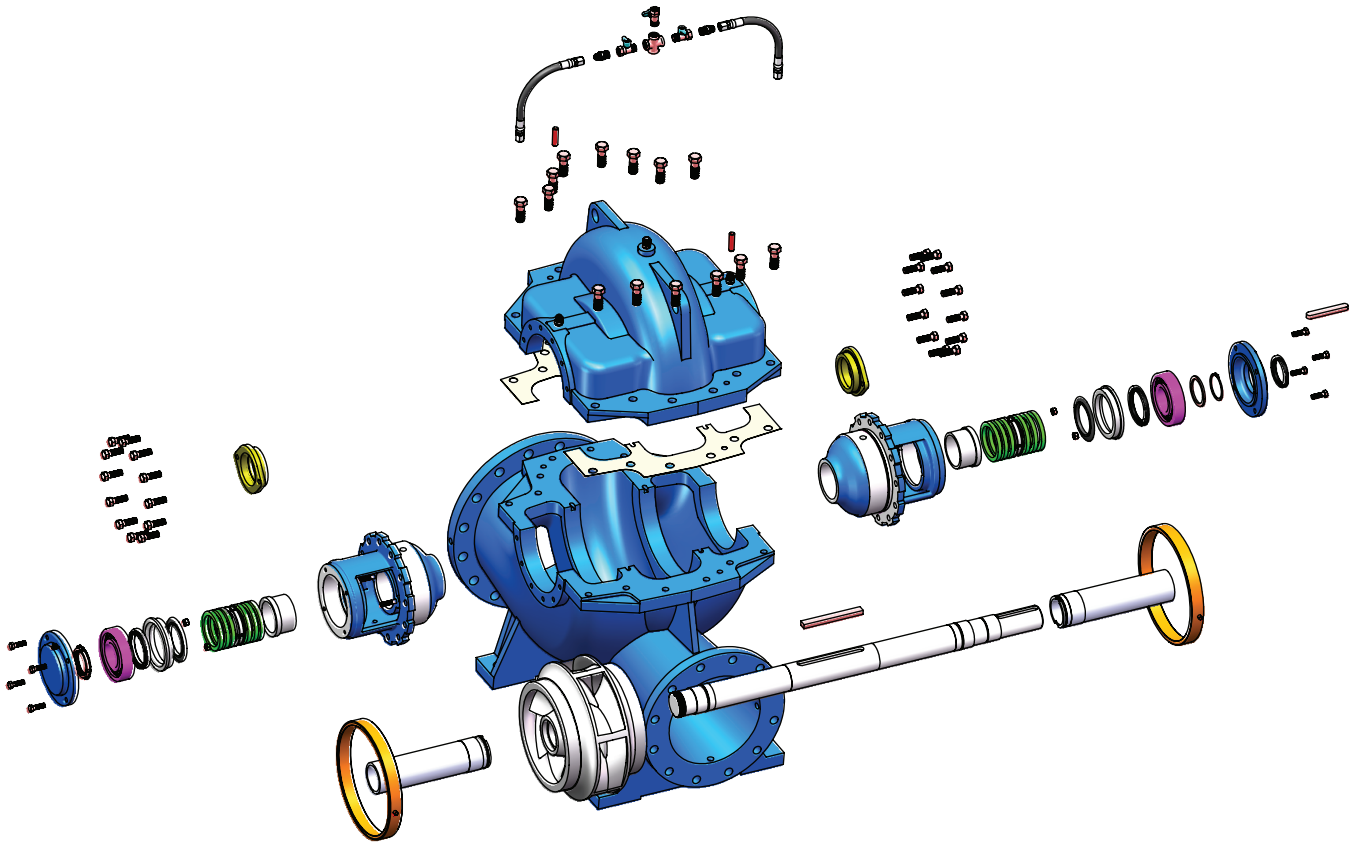
The pump must be inspected and maintained on an ongoing basis in accordance with the schedule below

Maintenance
During daily inspection, check :
That the pump does not vibrate or emit jarring sounds
That lubricated slide bearing are lubricated
That open ball bearing are lubricated
That any lubricating devices are in working order
That any circulation pipes – cooling, heating or pressurized water pipes are in working order
That power output and power consumption are correct
That the operating pressure is correct
During weekly inspection, check :
That any filters and drainage holes are clean
That the areas around the stuffing box and the bearing are free of dust
That the soft stuffing box is leaking 10-100 drops per minute
Whether flexible connecting elements are worn
That mechanical shaft seals are not leaking
During inspection every 2 months, check :
That the bearing do not have too much play

Troubleshooting

Problem:	1. Lack of co-ordination between pressure and flow rate	2. The pump can not prime	3. The pump loses liquid	4. The flow rate is too low	5. The pump is making a noise	6. Motor is overloaded	7. The pump has jammed	8. The pump wears quickly
Cause:								
1. Too great a vacuum				x	x	x	x	
2. Cavitations				x	x	x		
3.								
4.								
5. The pump is drawing air				x	x	x	x	x
6. Pressure too high	x	x			x			
7. Defective valve			x	x	x			
8. The pump is corroded	x				x		x	
9. The pump is worn					x		x	
10. Impurities in the pump	x	x	x					
11. The stuffing box is over-tightened	x		x					
12. Fault in the motor			x					
13. Pipe too constricted or blocked					x		x	
14. Wrong speed							x	
15. The pump runs without liquid	x	x					x	
16. Liquid temp. too high – lack of lubricant	x	x						
17. Speed too low					x			
18. Speed too high				x				x
19. Suction too high							x	
20. Liquid being fed above liquid level				x				
21. Valve incorrectly adjusted					x			
22. The pump's shaft end is bent	x			x				
23. Coupling incorrectly aligned	x			x				
24. Pump twisted in relation to pipe system	x	x	x	x				
25. Leaking pipe/assemblies							x	

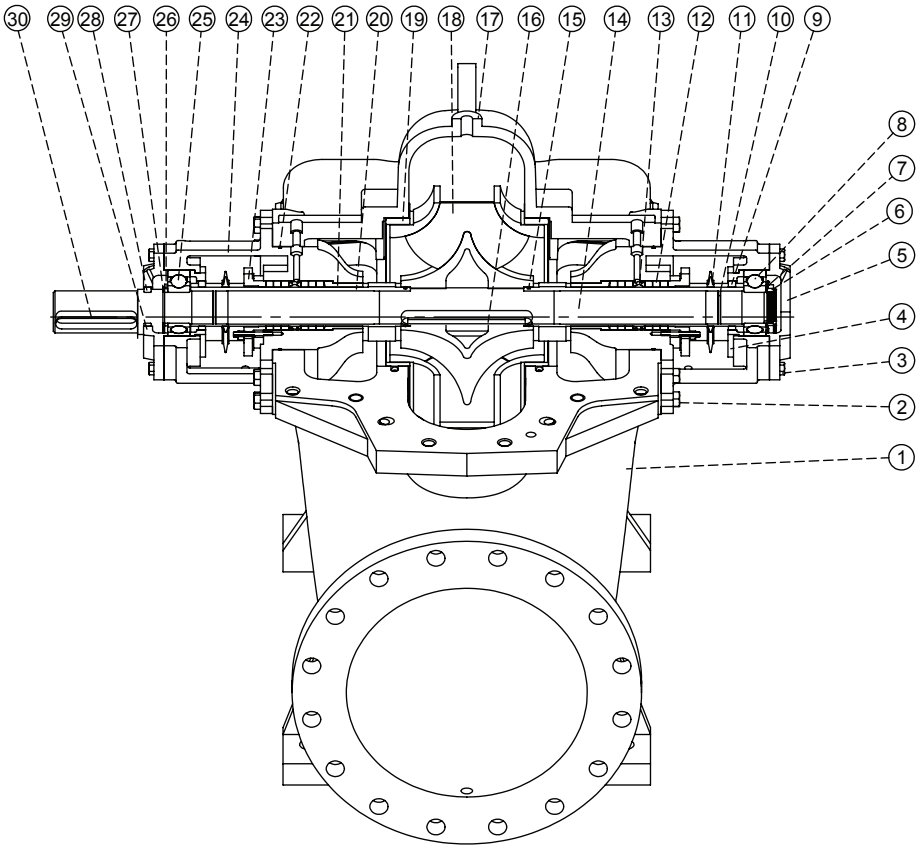
Disassembly the pump



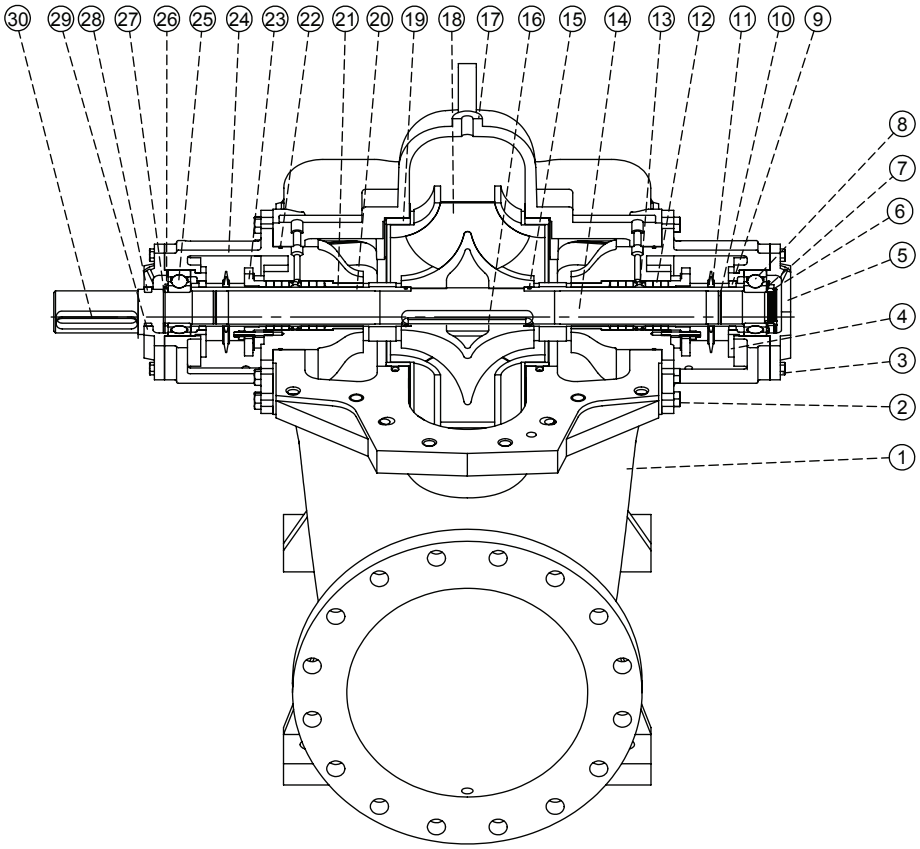
https://takipump.com/video/tk-as.mp4

The following QR code will link to the video on. The video will clearly guide you how to disassembly and assembly TK series (Please follow the steps) In case you have question or problem please contact sale@takipump.com

Spare Parts List

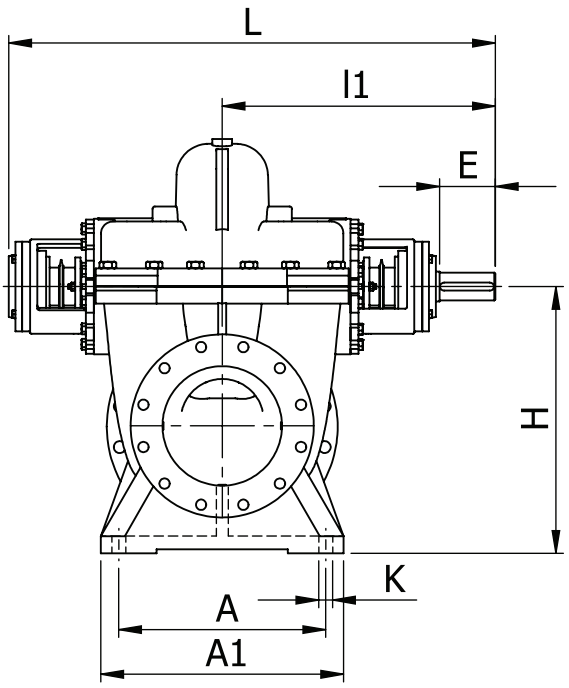


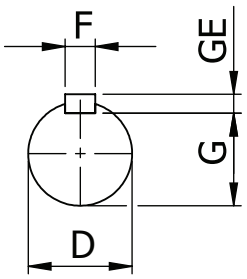
Part No	Part Description	TK 350/300 A	TK 350/300 B	TK 400/300
1	Lower casing	1	1	1
2	Bearing housing bolts	M16x45 @10	M16x45 @24	M16x50@24
3	Bearing cover bolts	-	M12x35 @4 M12x100 @4	M12x30 @8
4	Inner bearing Cover	2	2	2
5	Bearing Cover (NDE)	1	1	1
6	Bearing nut	1	1	1
7	Lock washer	60mm @2	-	-
8	Bearing (NDE)	21312E @1	6313 @1	6315 @1
9	Inner bearing cover seal	-	-	120-95-12 @1
10	Shaft sleeve O-ring	-	-	4x70 @2
11	Deflector	RKB125 @2	-	RKB125 @2
12	Packing seal	5/8" @10	5/8" @12	5/8" @12
13	Lantern ring	-	-	2
14	Shaft	1	1	1
15	Shaft sleeve O-ring	3x60 @2	-	4x85 @2

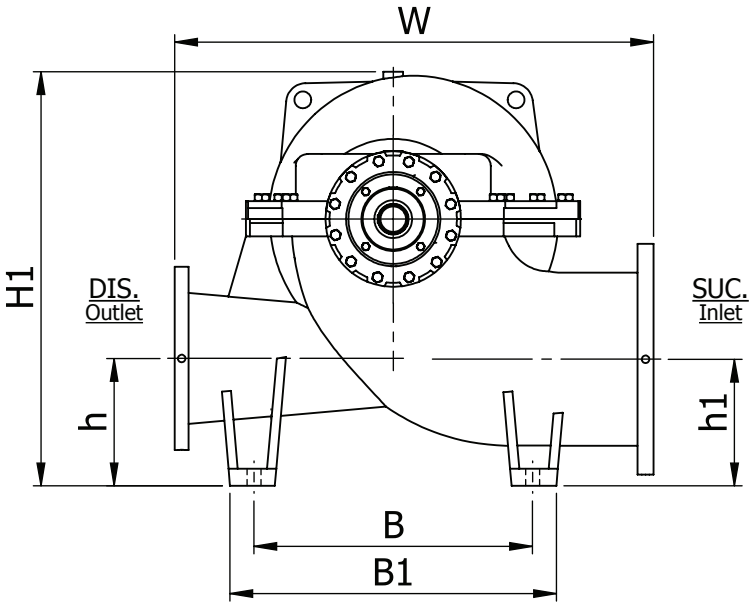


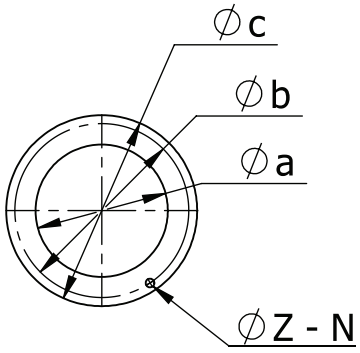
Part No	Part Description	TK 350/300 A	TK 350/300 B	TK 400/300
16	Impeller key	18x11x36 @1	-	22x14x195 @1
17	Upper casing	1	1	1
18	Impeller	1	1	1
19	Wearing ring	2	2	2
20	Shaft sleeve	4	2	2
21	Packing bush	2	2	2
22	Casing cover O-ring	2	4x225 @2	3x240 @2
23	packing gland	2	2	2
24	Bearing housing and Stuffing Box	2	2	2
25	Bearing (DE)	NU312ECP @1	6313 @1	6315 @1
26	Bearing washer	2	2	2
27	Bearing lock ring	2	2	2
28	Bearing cover seal (DE)	-	-	120-95-12 @1 95-75-13 @1
29	Bearing cover (DE)	-	-	120-95-12 @1 75-95-13 @1
30	Drive key	16x9.5x70 @1	-	20x12x135
31	Casing bolts	M16x45 @18	M20x60 @16	M22x75 @14
32	Casing pins	14 @2	16 @2	16 @2

Dimensions









PN 10 Flange

Dimensions

Model	A	A1	B	B1	H	H1	h	h1	D	E	F	G	GE	K	W	L	l1
TK 350/300 A	400	510	550	710	503	800	223	220	55	80	16	49	10	35	933	1106	595
TK 350/300 B	500	585	500	690	620	1060	315	315	60	110	18	53	11	35	1085	1215	676
TK 400/300	520	610	700	820	670	1040	320	310	70	140	20	60	12	35	1203	1195	682

Suc. Flange			ø Z-N	Dis. Flange			ø Z-N
ø a	ø b	ø c		ø a	ø b	ø c	
350	460	505	23-16	300	400	445	23-12
350	460	505	23-16	300	400	445	23-13
400	515	565	26-16	300	400	445	23-14