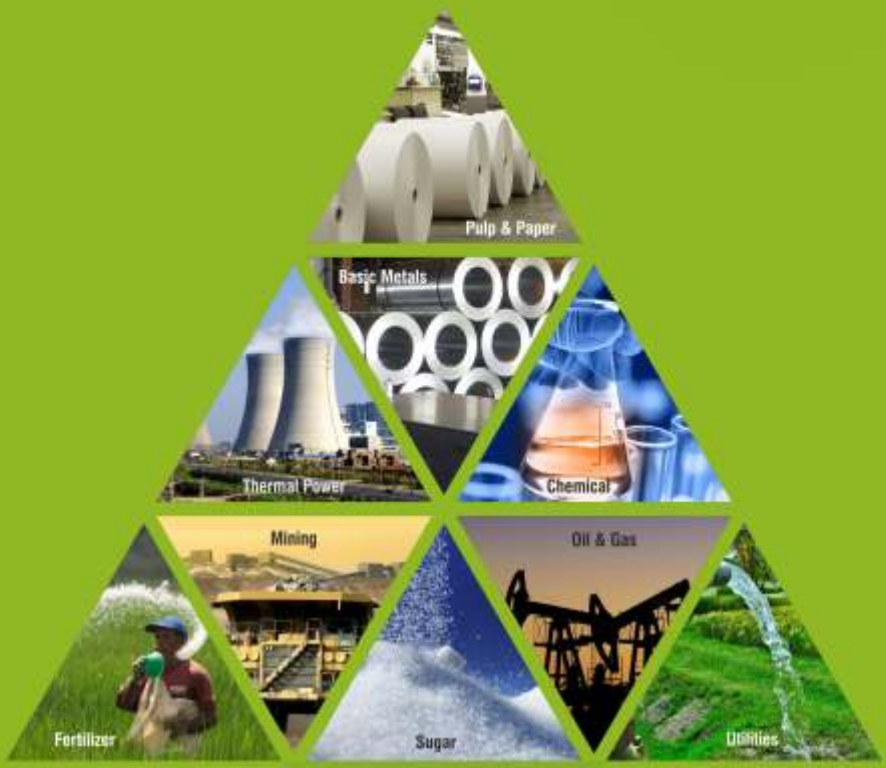


www.sampumps.com

TCH+N

OPERATION & MAINTENANCE MANUAL

SAM

Excellence+Through+Innovation

Upholding excellence in the pump industry...

IMPORTANT NOTES

TYPE : _____

ORDER REF : _____

PUMP TYPE : _____

SL NO : _____

CUSTOMER : _____

PROJECT : _____

SAM TURBO INDUSTRY PVT LTD

NEELAMBUR, COIMBATORE-641 062

WARRANTY

We warrant that the pump supplied by us is free from defective material and faulty workmanship. This warranty holds good for a period of 12 months from the date of commissioning of the equipment or 18 months from the date of despatch from our factory, whichever is earlier.

Our liability in respect of any complaint is limited to replacing part/parts free of charge ex-works or repairs of the defective part/parts only to the extent that such replacement/repairs are attributable to or arise solely from faulty workmanship or defective material.

We warrant the materials for the chemical composition and mechanical properties of the relevant standard only and not for corrosion and erosion.

The warranty holds good only for the products manufactured by us.

SAM TURBO INDUSTRY PVT LTD

CONTENTS

1. GENERAL

"TCH+N" pumps are Back Pull out Design which enables to remove the rotating unit of the pump for inspection and repairs, without disturbing the pipe connections.

(i) The complete range of "TCH+N" pumps are covered by 3 Power Series, thereby, reducing inventory and achieving maximum interchangeability of parts.

(ii) Pumps when properly installed and given proper care-in operation and maintenance should operate satisfactorily for a long period.

FORWARD AND GUARANTEE

Inspect the pump and accessories upon arrival for any damage or loss which may *have* been incurred during shipment. Report on damage or shortage immediately to the Sales Department of our Factory.

We are not liable for damage incurred through failure to observe the instructions for erection and operation. In this connection we refer to our General Terms of delivery for centrifugal pumps.

During the period of guarantee, repair work and modification shall be carried out by our technicians only, or following our approval in writing, it may be done by you. If contrary to our Acknowledgment of Order, you wish to use the pump for a different service please ask for our acceptance. Otherwise the guarantee given for this pump will not be valid.

2. STORAGE & PRESERVATION OF PUMPS

Protect the equipment upto 6 months in an indoor environment. The pump must be protected against damage, dust or any aggressive environment. Pumps stored for period exceeding one year should be serviced every 12 months. They should be disassembled, cleaned and the whole preservation process described below should be repeated.

- All inlet connections in the pump should be closed.
- Suction and discharge flanges should be covered to prevent the entry any kind of foreign material.
- The surfaces to be preserved should be covered with the preservatives suitable for the storing environment.
- Mechanical seals should be cleaned by compressed air. No other liquid of material should be applied to the min order to prevent damage to the secondary sealings and too-ring/gaskets.
- Oil in the bearing bed should be drained.
- Pumps waiting for the installation or startup should be turned manually every 15 days. If it is difficult to move the shaft by hand, use a suitable spanner, by protecting the surface of the shaft at the point of operation.

3. DESCRIPTION OF PUMP

Pump Name plate / Ordering Spare Parts / Spare Parts List:

Every TCH+N Pump has a name plate giving the following details:

- Pump Type
- Serial Number / Year
- Duty Conditions (Head & Capacity)
- Motor Details (KW & RPM)

While you correspond with us for your requirement of spare parts or for any technical information, please always quote the above details in your letter.

CONSTRUCTIONAL FEATURES :

Type TCH+N Centrifugal Pumps are basically, Horizontal, Single Stage, Volute casing with single axial Inlet. Top centre line discharge with semi open impeller construction and hence capable of handling liquids with solid particles of small sizes. Overall dimensions are as per ANSI B73.1 1974.

The Back-Pull-Out design permits dismantling of the complete bearing unit without disturbing the piping connections and drive. The pumps are available for capacity range up to 750 M^3/Hr, for differential head up to 150 Meters.

DIRECTION OF ROTATION :

Clockwise, pump viewed from driven end.

4. ERECTING THE PUMP

Assembling the set on the Base plate

If the assembly of the pump with the motor is done on a common base plate in our works, the whole Set will be carefully mounted and aligned. It is necessary to check once more the alignment of the coupling before putting the pump into operation.

The eye bolts which may be fitted to the motor must never be used to lift the complete set as they are meant to carry the weight of the motor only.

If you furnish the motor yourselves, the clearance between the motor and pump coupling halves as shown on the arrangement drawing must be strictly absorbed.

Difference in level between the shaft centre lines of pump and motor must be equalized by suitable packing (Plane parallel shims) When the pump and motor holding-down bolts are finally secured, care must be taken to avoid distortion.

Leveling the Base plate, aligning the Couplings:

To check whether pump and motor shafts are in perfect alignment proceed as follows:

Level accurately the base plate which carries the complete set with the aid of a spirit level. Place metallic Packing between the base plate and foundation close to the foundation bolt holes. To prevent sagging of the base plate, place metallic packing-if required- also between the foundation bolt holes. After leveling the base plate, fill up the foundation bolt holes with the bolts inserted-with a quick-setting cement compound. After the grout has set, tighten nuts crosswise. Check once again the alignment with a spirit level.

After leveling the pump set, measure the axial clearance between the two coupling halves. Axial clearance between two corresponding points should remain same when both couplings are turned through an angle. Maximum permissible tolerance is 0.05mm.

The radial alignment is achieved by dial gauges, the permissible tolerance being 0.05mm provided that the type of coupling is such as to allow this check (figure 1a). Otherwise a coupling aligner must be used, permissible tolerance 0.05mm (figure 1b).

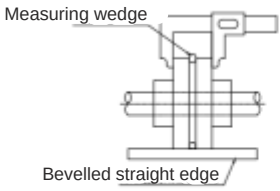


FIG 1(a)

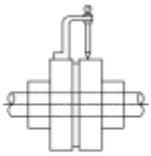


FIG 1(b)

At every check take care that the axial float of the rotor is taken into account, i.e., when measuring the rotor and driver shaft must always be brought to bear in the same direction.

Grouting the Base plates:

Grout base plate fully with concrete through the grouting holes provided for this purpose, leaving no cavities, after the grout has set, recheck the alignment of the coupling.

5. LAYING & CONNECTING PIPES

GENERAL

After grouting the base plate, the pipe work may be connected. The diameters of the piping are not determined by those of the pump and suction branches.

On short delivery pipe runs the diameter should be such that the pipe resistance constitutes, but a small portion of the delivery head. For long pipe runs the most economic pipe diameter must be assessed in each particular case.

The flow velocity in the suction piping should be 1.5 to 2.5 mts/sec., for normal cases but should not exceed 3 meters/sec.

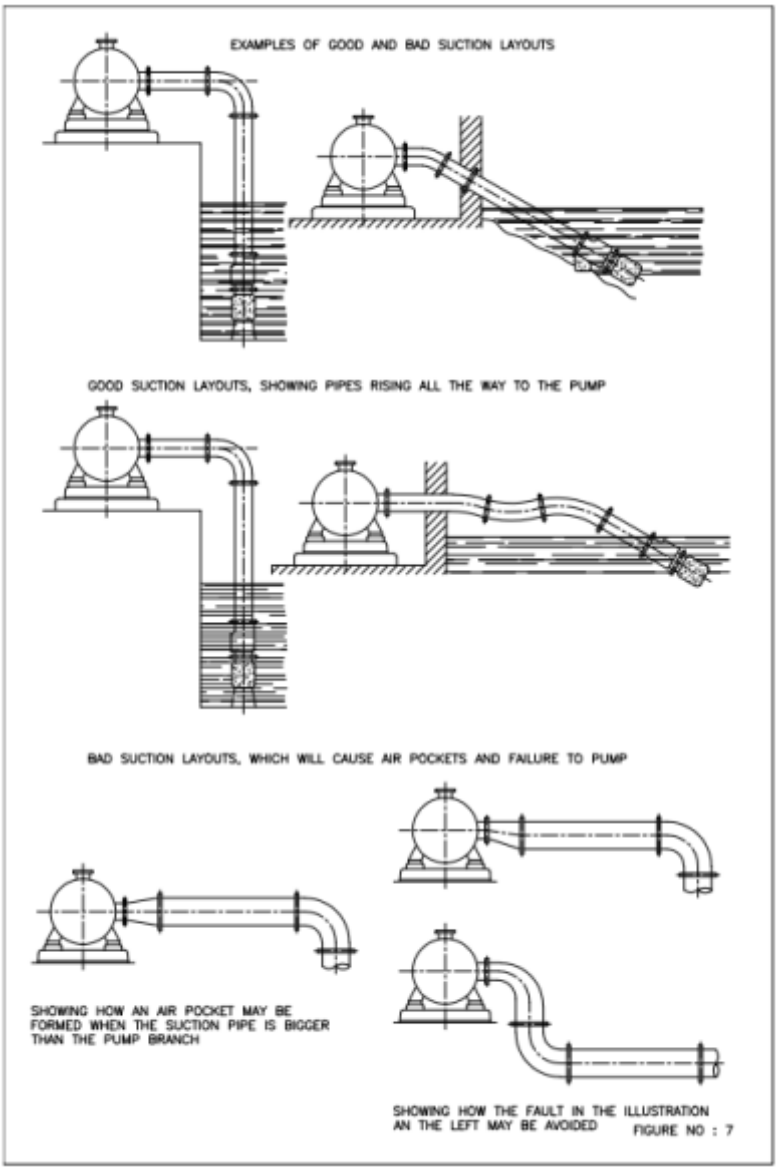
Unfavorably installed pipe runs, especially on the suction side (i.e. bends in various planes immediately before the suction branch) can affect the performance of the pump.

As the pump branches should not absorb pipe forces and moments, The pump must not be used as a locating point of the pipe work.

Once the flange bolts have been loosened, the flanges must not yield more than the amount corresponding to the gasket thickness, nor must they be out of the parallel nor bear against each other under stress. See that the flange gaskets do not extend into the bore of the piping. Clean carefully all pipe parts, valves and fittings and pump branches prior to assembly.

ATTENTION : After connecting up the piping, the coupling alignment must be rechecked. It must be possible to turn the rotor easily by hand. In case of inadequate alignment bearings, coupling and shaft seal may get damaged prematurely. In accordance with safety prescriptions the coupling must be protected with a guard against contact.

Piping


EXAMPLES OF GOOD AND BAD SUCTION LAYOUTS
GOOD SUCTION LAYOUTS, SHOWING PIPES RISING ALL THE WAY TO THE PUMP
BAD SUCTION LAYOUTS, WHICH WILL CAUSE AIR POCKETS AND FAILURE TO PUMP
SHOWING HOW AN AIR POCKET MAY BE FORMED WHEN THE SUCTION PIPE IS BIGGER THAN THE PUMP BRANCH
SHOWING HOW THE FAULT IN THE ILLUSTRATION AN THE LEFT MAY BE AVOIDED
FIGURE NO : 7

Suction and Feed Line:

To prevent collection of gas the suction line must be horizontal or rise continuously all the way to the pump.

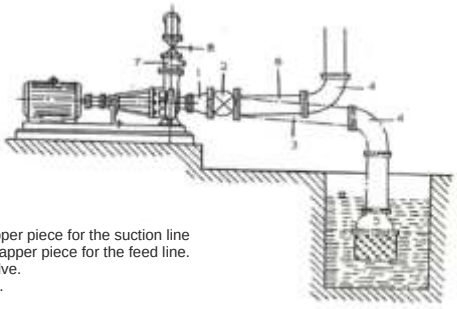
The feed line, however, must be horizontal or shown a gradual slope towards the pump.

The Suction line must be completely airtight and laid so that it can be properly vented (Figure 2). If tapers are required, eccentric ones must be used.

The inlet bore of the suction pipe should be set as deeply as possible below liquid level and be provided with a foot valve fitted with a suction strainer. The foot valve must, however, be far enough away from the bottom to avoid inlet losses becoming too great and thereby lowering the performance.

The isolating valves in the suction or feed line must remain fully open during the operation and must never be used for regulating.

Valve should be mounted with the spindle in the horizontal or in the vertical downward position to avoid air pockets forming in the spindle cap. To avoid ingress of air, it is advisable to use isolating valves with sealing water connection or with a water seal.



1. Ecentric tapper piece for the suction line concentric tapper piece for the feed line.
2. Isolating valve.
3. Suction line.
4. Bend
5. Foot valve with suction strainer.
6. Feed line.
7. Non return valve.
8. Regulating valve.

Delivery Line :

Install gate valve or an output control valve in the delivery line as close to the pump branch as possible. it is recommended to install a non return valve between pump branch and regulating valve (figure 2), thus protecting the pump against reverse rotation and further more the pump and the foot valve against water-hammer which may occur in case of sudden shut-down. Pressure Gauge to be fitted in between volute casing delivery flange and NRV / valve.

Sealing Liquid Lines :

For the sealing liquid line connection(s) please refer to the arrangement drawing. The service data (like pressure, flow rates etc) for external sealing are stated in our General Arrangement Drawing / Mechanical Seal Drawing.

If only a sealing liquid inlet is provided for, a regulating valve should be installed in the inlet line. If an inlet and outlet line (discharges into the open air) is provided for, the regulating valve is to be fitted in the outlet line.

Cooling Water Lines :

For the cooling water line connection please see the arrangement drawing. Connect the cooling water lines so that the inlet is at the lower connection. Thus ensuring that the cooling chamber is vented and completely filled.

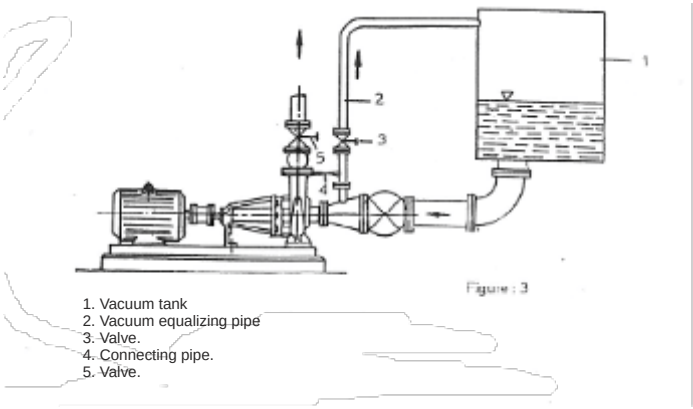


Figure : 3

1. Vacuum tank
2. Vacuum equalizing pipe
3. Valve.
4. Connecting pipe.
5. Valve.

Vacuum Equalizing Pipe (and Sealing Liquid Pipe):

If the pump draws from a system under vacuum, an equalizing pipe must be connected from the highest point of the suction line, however, as close to the suction branch as possible, to the top of the feed tank to keep gas bubbles that might have been entrained in the flow from entering the pump (figure 3).

The line should be fitted with an isolating valve which should be closed only for maintenance work on the pump set.

Apply sealing liquid (external sealing) to the shaft seal to prevent entry of air.

6. LUBRICATION

The pumps are supplied by us without oil charge.

When the pump is put into operation after prolonged shut-down, flush bearings and bearing housing with petrol or benzol in order to remove impurities. During the flushing procedure rotate the shaft slowly.

FIRM	Lubricating oil for temperature up to 80°C	
	Speed up to 1500 rpm	Speed over 1500 rpm
Indian Oil	Servo system 150	Servo system 68
Hindustan Petroleum	ESSTIC 55, TERRESSO 56	ESSTIC 50 TERRESSO 52
Mobil	MOBIL VACTRA Oil Heavy MOBIL D.T.E Oil Heavy Vac HLP 49	MOBIL VICTRA Oil Heavy Medium MOBIL D.T.E Oil Heavy Medium Vac HLP 36
Shell	Shell Vitrea Oil 33, Shell Oil 33	Shell Vitrea Oil 31, Shell Tellus Oil 29

AMOUNT OF OIL / GREASE IN BEARING HOUSING			
FRAME SIZE	**OIL / GREASE QTY**	**GREASE LUBRICATION INTERVAL- Hours**	**SPEED (rpm)**
15	0.4 Ltrs / 15 Gms	1200 500	1500 3000
18 & 18 HS	0.6 Ltrs / 20 Gms		
22	0.8 Ltrs / 20 Gms	1100 400	1500 3000

TO INSTALL A CONSTANT LEVEL OILER AS BELOW:

1. Unscrew upper screw sub assembly from lower sub assembly. (Refer Fig.1)

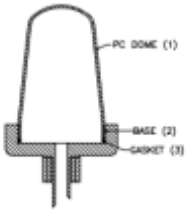


Fig.1

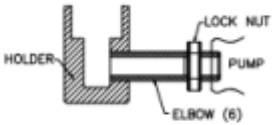


Fig.2

2. Fix lower sub assembly (elbow type) on pump.
Please note Pump has two tappings. One tapping is for CLO and other is a drain, which is at a lower height.

3. Once lower sub assembly is fixed, tighten locknut to ensure that CLO is 90° with respect to ground.

Fig.3

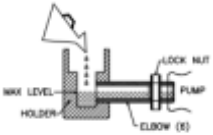


Fig.4

4. Fill oil in pump with a can. Oil should be filled either by opening breather of pump or from the lower sub assembly. (Ref. Fig.4)

5. Once initial oil level is maintained in pump, take upper sub assembly, reverse, it and put it oil in dome through the hole by using a suitable funnel (3/4th full) DO NOT UNSCREW DOME from the sub assembly to fill oil. (Ref.Fig.5)

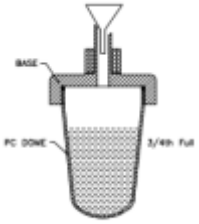
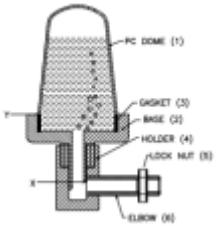


Fig.5

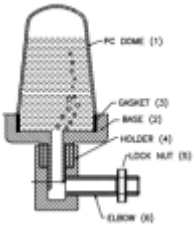


6. Once oil is filled dome, reverse and screw it on the lower sub assembly. DO NOT OVERTIGHTEN. Some bubbling will take place, This is O.K., bubbling will stop once oil has reached its LELEL. I=i.e.X (Ref.Fig.6)

7. Once bubbling has stopped the pump should be started. CLO will automatically maintain oil level in pump. Refill oil whenever oil level in the dome goes below level Y ref.Step-1,5,6.

Note: 1-In case of pump is already full of oil before installing CLO, it is recommended to check oil level in sump as per step 4.

In case there is excess oil, drain it out and bring it to half the elbow overfilling oil will cause oil to overflow from above the holder resulting in oil leakage.



Note-2: keep vent hole of breather in pump clean, if it is chocked it will cause leakage from oil cup.

Grease Lubrication

The grease-lubricated bearings have been lubricated before shipment. For these bearings following roller bearing greases are recommended which are available in the market.

Grease specifications

Name of the firm	Speed 1450 rpm	Speed 2900/3600 rpm
INDIAN OIL	SERVOGEM 3	SERVOGEM 2
CALTEX	STARFAK 3	STARFAK 2
HINDUSTAN PETROLEUM	NATRA 3 or LITHON 3	NATRA 2 or LITHON 2

For lubrication of our machines we recommend the lubricants shown on this lubrication table or equivalent lubricants.

In the case of new bearings, renew the oil after about 200 hours and then about once a year, if the bearing temperature is always below 50°C and there is only small risk of contamination. If the bearing temperature is up to 80°C and if there is danger of contamination, the oil should be renewed about every six months.

7. STARTING AND STOPPING

General

When pumping from a tank, the liquid level must always be well above the inlet opening.

The parameter as indicated on the pump nameplate must not be exceeded while operating.

The stuffing box must always drip slightly to remove friction heat from the sealing faces. If the leakage intensifies and does not decrease when the gland is tightened evenly, the packing must be renewed (see sub section 6.3.1). Also take care that the surface of the shaft sleeve is still perfectly smooth. Otherwise change shaft sleeve.

If a pump shaft is equipped with a mechanical seal, practically no attention is required. During the running-in period occasional slight leakage may occur (See sub-section 6.4).

When handling hot liquids (pump design 'With stuffing box cooling') pay attention to the flow of the cooling water for the shaft seal and the oil bath cooling, if any. The cooling water flow should be adjusted so that the heating of the cooling water does not exceed 15°C.

Sudden changes in temperature of the liquid handled from cold to hot or vice versa should be avoided.

All pumps are equipped with a constant level oiler (see sub-section 6.2), merely check that there is oil in its container and bearing housing.

The shaft must run freely, it must be possible to turn it by hand.

The bearing temperature must not exceed 80°C

Starting - up:

The isolating valve in the feed line (and, if there is any, the valve in the vacuum Equalizing pipe) should be fully open. The regulating valve in the delivery line, however, should be closed, or in the case of automatic operation, the full back pressure should be on the non-return valve.

Make sure that there is a flow in the pipes supplying the external sealing liquid, the cooling water for the shaft seal and, if required, the cooling water for the oil bath. Do not switch on motor until then.

If the delivery pressure does not rise continuously as speed increases, stop the set and prime once more carefully.

Once the pump has run up to working speed, open the regulating valve in the delivery line slowly until the required service data are reached.

Prolonged operating against closed regulating valve in the delivery line may lead to destruction of the internal pump parts and must therefore be avoided.

An alteration of the service data which might become necessary may be effected only with the aid of regulating valve in the delivery line.

When starting up automatically operated plants, all isolating *valves,* hence the delivery gate valve too, must be kept open.

Stopping:

If there is no back flow preventer (non-return flap, non-return valve, etc) close the regulating valve in the delivery line. Do not switch off motor until then.

Close isolating valve in the feed line only if necessary.

Once the pump has completely cooled down, shut off the external sealing and cooling Water supply. If pump draws from a vacuum tank, close vacuum equalizing pipe. However, do not shut off the sealing liquid supply.

If a vacuum gauge without relief valve. is attached to the suction branch of the pump, then it must be isolated before stopping the pump set.

If as a result of prolonged shut-down a change in the concentration of the liquid, crystallization, or solidification etc., can be anticipated, drain pump and, if necessary, flush with a suitable liquid.

If there is danger freezing up during prolonged shut-down periods (e.g. where the pump set is located in the open) the pump including the cooling chamber, heating chamber, etc., must be drained.

Re-Starting:

Before-starting the set, take care that the pump shaft is at rest and does not rotate backwards. Starting with the shaft rotating in opposite direction may lead to shaft damage.

8. SUPERVISION AND MAINTENANCE

Re-packing

When a new pump is being put into service or the stuffing box has just been re-packed, watch the packing performance more closely than normal. For the checking, shut off the cooling water to the gland (if applicable).

During the first hours, the stuffing box is allowed to leak quite a good deal, about 100 drops a minute. If the leakage decreases, slacken the packing gland. If you want to reduce the leakage, tighten the packing stepwise at intervals of about 10 minutes and continue until the packing performance is satisfactory. A small leakage of single drops should be allowed from the stuffing box for ascertainment of lubrication and of the correct packing tightness. A suitable leakage is 100 drops a minute. If the packing cannot be made to seal without intense tightening, it is best to re-pack. When re-packing removes all the old packing rings and clean the stuffing box thoroughly. At the same time check to see that the water channels are clear and the shaft is free of warpage and score marks.

When selecting the packing type, observe the quality and temperature of the liquid being pumped and the shaft sleeve material.

Carefully form the packing into the right ring shape over the shaft sleeve. First insert the cut ends into the stuffing box and then push the whole ring to the bottom of the stuffing box. Put the rings one by one in the stuffing box, with the cut ends spaced 90 degrees apart. Note the location of the lantern ring.

SPECIFICATION OF GASKET, O RING, GLAND PACKING :

PUMP MODEL	GASKET			O RING (ADOPTER) (NEOPRENE RUBBER)	GLAND PACKING (47.3)	SOLID SIZE
	CASING/ST.BOX COVER (41.2)	SLEEVE (41.03) (TEFLON)	IMPELLER NUT (41.04) (TEFLON)			
25/130	133x183x1.5	22x28x1	17x23x1		28.6x44.5x8 SQ	
25/160	159x172x1.5	ID26 x øOD32 x 1	20x28x1	ID78xø3	ID35xOD51x8SQ	5
25/160-I						5
40/160						6
50/160						12
25/160/LF	178x192x1.5					5
25/180						3
25/180-I						6
40/180						10
50/180						12
25/200	210x223x1.5					6
25/200-I						6
40/200						8
25/230 & HS	233x251x1.5	ID34x øOD41 x 1 & ID41 x OD48 x 1	28x38x1 & 32x38x1	ID115 x ø3 & ID130 x ø3	ID45xOD65x10 SQ & ID54 x OD73 x 9.5 SQ	8
40/230 & HS						8
50/230 & HS						8
80/230 & HS						10
100/230 & HS						18
25/260 & HS	273x291x1.5					2
40/260 & HS						3
50/260 & HS						7
80/260 & HS						9
100/260 & HS						17
40/300 & HS	313x331x1.5					8
50/300 & HS						8
80/300 & HS						12
100/300 & HS						19
150/300	313x331x1.5	55x62x1	45x57x1	ID165xø3	ID65xOD90x12.5 SQ	12
80/360	360x378x1.5					12
100/360						10
150/360						12
200/360						16
80/400	403x421x1.5					12
100/400						16
150/400						20
200/400						35
100/450						16
150/400 H				ID170xø3		24

Sealing :

The required sealing liquid pressure in the case of external sealing depends on the pump type and the service conditions since no general stipulations can be made please ask us about the required pressure, unless it is stated in our acknowledgment of order, please quote also the service data, such as capacity, head, nature of liquid etc.,

Sealing of the stuffing box with the liquid handled (self sealing) or with a liquid from an outside source (external sealing) which suits the particular service conditions, and thus the use of a lantern ring is necessary in the following cases.

a) For suction lift duties and suction heads of up to 0.5 Kg/cm^2 or for liquids drawn from vacuum tanks (with self-sealing or external sealing, depending on the service conditions).

b) For liquids with temperatures near boiling point (with external sealing or self sealing, depending on the service conditions).

c) For handling explosive, poisonous or evil smelling liquids (external sealing imperative)

d) For handling abrasive liquids or liquids which tend to crystallize (external sealing imperative)

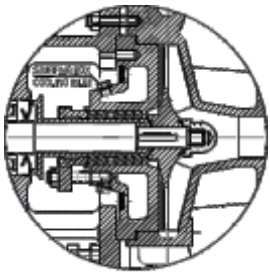
In all other cases the lantern ring is unnecessary. It is then replaced by two packing rings. When packing, see that the lantern ring (46.10) is located underneath the sealing liquid hole (figure 3) When square section packing rings are used, it is essential to install first two packing rings and only then the lantern ring (3-L-2).

By drilling an additional hole into the casing cover, an inside self-sealing system of the stuffing box is achieved. As a rule, this design is used on suction lift duties (the liquid handled must be clean).

FRAME	T15	T18	T22
Capacity M^3/Hr	0.2	0.3	0.4
Pressure Kg/Cm^2	Stuffing Box Pressure (30% of the pump delivery pressure) + 1 Kg/Cm^2		

Stuffing box cooling :

If a liquid being pumped evaporates at the pumping temperature, then the stuffing box should be cooled. This prevents the packing from running dry due to the evaporation of the liquid handled.



TCHHU (JACKETING ARRANGEMENT)

For location of the cooling water connections, see arrangement drg.

The regulation valve, which should be placed in the outlet line, is to beset in such a manner that the heating up of the cooling water does not exceed 15°C.

TEMP	FRAME - CAPACITY IN M^3/Hr		
	T15	T18	T22
110°	0.15	0.22	0.34
150°	0.18	0.25	0.36
200°	0.22	0.28	0.4
250°	0.25	0.3	0.42

Mechanical Seal :

Concerning the pumps fitted with a mechanical seal, we refer the special instructions for installation, provided by seal manufacturers.

The life of a mechanical seal depends on various factors such as cleanliness of the liquid handled, its lubricating properties etc., Due to diversity of operating conditions it is, however, not

mechanical seal, even for a few seconds, must be avoided, never operate the pump without liquid.

When renewing or changing the mechanical seal, check pump shaft for true running and take care that the shaft sleeve surface is in perfect condition in the area of the mechanical seal.

For more particulars please see the instructions for installation and maintenance of mechanical seals given by the concerned seal manufacturers.

If the shaft seal is to be converted from packing to mechanical seal at a later date, this is feasible for a fair number of standard mechanical seals without re-machining the stuffing box chamber.

Shaft sleeve and the gland (suitable to the seal to be installed by you) along are to replaced. These can ordered with us as extra components, giving complete details about the mechanical seal you propose to install.

Flushing of the Mechanical Seal :

Evaporation of the liquid between the rotary seal faces, hence the risk of dry-running must in all cases be avoided. Therefore we recommend flushing of the seal; this is indispensable when the temperature of the liquid handled is in the vicinity of the boiling point.

If abrasive particles can get to the seal faces, flushing must also be provided. The smaller the particles the easier it is for them to get lodged between the contact faces. This will destroy the faces and lead to breakdown of the seal.

The flushing is achieved by means of circulating line (Self-flushing) or through an external flushing system (external flushing). To regulate the flushing liquid a throttling element (e.g. a flow controller) can be installed in the circulating line.

The required pressure of the external flushing liquid depends on the type of pump and service conditions.

BEARING FRAME	PUMP MODELS	BEARING SIZE		OIL SEAL SIZE		CIRCLIP SIZE	LOCK NUT & LOCK WSHER
		DE	NDE	DE	NDE		
	25/130	3305 x 1 No	6305 x 1 No	22x32x5 x 1 No	22x35x5x 1 No	B62/ A25	NA
T 15	25/160 25/160-I 40/160 50/160 25/180 25180-I 40/180 50/180 25/200 25/200-I 40/200	3305 x 1 No	6306 x 1 No	22x32x7 x 1 No	30x72x8 x 1 No	LIGHT B62	KM-5 & MB-5
T 18	25/230 40/230 50/230 80/230 100/230 25/260 40/260 50/260 80/260 100/260 40/300 50/300 80/300 100/300	3309 x 1 No	6309 x 1 No	40x55x7 x 1 No	45x55x7 x 1 No	LIGHT B100	KM-9 & MB-9
T 18 HS	25/230 40/230 50/230 80/230 100/230 25/260 40/260 50/260 80/260 100/260 40/300 50/300 80/300 100/300	3311 x 1 No	6311 x 1 No	50x65x8 x 1No	55x70x8 x 1 No	LIGHT B120	KM-11 & MB-11
T 22	150/300 80/360 100/360 150/360 200/360 80/400 100/400 150/400 200/400 100/450	3313 x 1 No	6313 x 1 No	60x75x8 x 1 No	65x75x10 x 1 No	N/A	KM-13 & MB-13
	150/400 H	3314 x 1 No	6314 x 1 No	60x75x8 x 1 No	70x90x10 x 1 No		KM-14 & MB-14

9. DISMANTLING AND ASSEMBLING

Preparations

Make sure that the motor cannot be started.

Close the suction and discharge valves, open the bottom tap of the casing.

Disconnect the seal water and cooling water pipes.

Detach the coupling guard.

Remove the spacer of the coupling (spacer coupling).

Detaching the Exchange Unit

Loosen the screws fixing the stuffing box cover to the casing.

Support the exchange unit underneath the bearing housing or with hoist.

Remove the screws fixing the support foot from the base plate

Pull the exchange unit out by means of the detaching screws of the stuffing box cover.

DISMANTLING :

The pumps offered are of back pull out type design. Hence while dismantling pump, casing will remain in its place with the suction and delivery piping. The rotating assembly can be pulled back easily, if spacer couplings are used, then the driver also need not to be removed, thus enabling easy re-assembling of the pump without affecting the alignment. We recommend to match-mark the parts before removing the spacer so as to 'ensure the original state of mounting when re-assembling.

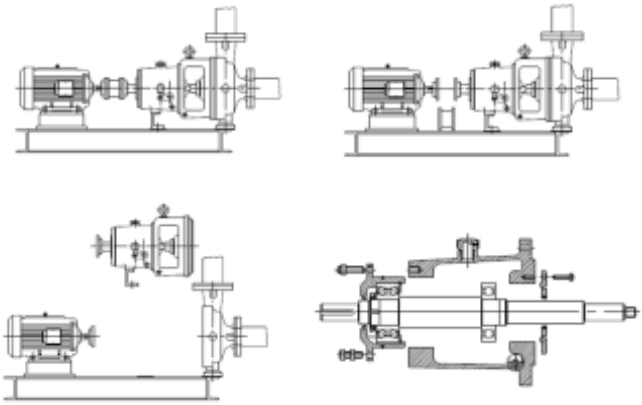
The coupling halves should only be mounted and dismounted by means of suitable extraction devices.

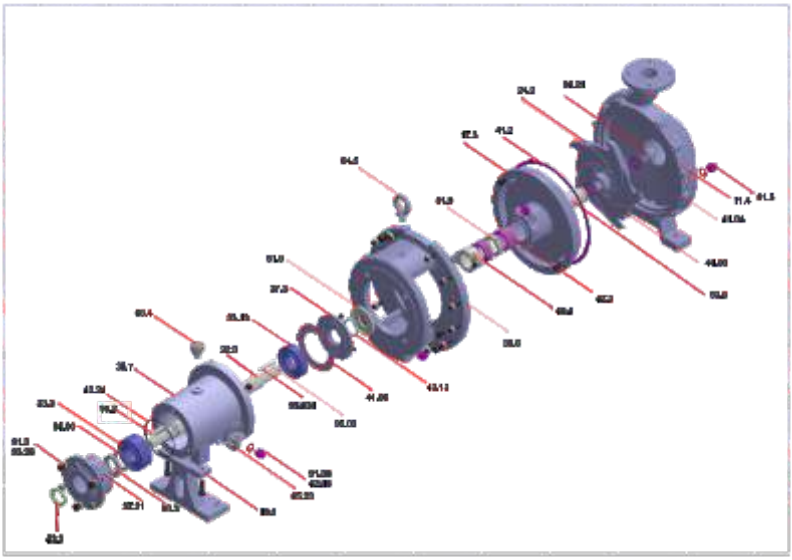
- Drain the volute casing of the liquid handled and bearing housing (36.7) of oil.
- Remove spacer coupling or if there is no such coupling loosen driver and move it aside.

- Loosen sealing liquid and, coolant pipes and undo the fastening screws on the support Foot (91.13)
- Undo stud nuts on volute casing.
- Using the two fixing screws on the S.Box cover withdraw the S.Box cover (17.3) bearing lantern (35.6) and bearing housing (36.7) along with the complete rotor (figure7).
- Remove the Impeller from the shaft.
- Removal of mechanical seal.
- The rotating elements of the mechanical seal can be extracted together with the shaft sleeve (53.6) from the impeller side.
- After undoing the fixing screws, separate Stuffing box cover (17.3) from bearing lantern (35.6)
- Removal of packed stuffing box.
- After undoing the fixing screws, separate stuffing box cover (17.3) together with packing, lantern ring (46.10) and gland (46.4) from bearing lantern (35.6)
- Remove shaft sleeve (53.6), gland (46.4) and deflector (51.9) (The shaft sleeve can be removed by means of an extractor disc, which we supply upon request, using a normal extraction device).
- Remove Outer Bearing Cap, drive side (37.21).
- Drive out carefully pump shaft (22.3) with bearing towards drive side.
- Heat the bearing and extract it see that the heat is not transmitted to the shaft.

If the bearing housing lantern (35.6) or the radial shaft seal (43.13) need not be changed, the bolts connecting the bearing housing lantern (35.6) to the bearing housing (36.7) should not be loosened, as this joint is sealed with a liquid sealant, otherwise these seal faces must be thoroughly cleaned and provided with liquid seal before reassembly: Clean all dismantled parts and check them for wear.

ASSEMBLING : For assembly proceed in reverse sequence.





After mounting the shaft check the axial float of the rotor 0.1 - 0.7mm with grooved ball bearing on the coupling and the pump side.

0.1-0.5mm with a double row angular contact ball-bearings on the coupling side and single row deep groove ball bearing on the pump side (Fig .8).

Should new bearings be mounted on the shaft, they must first be heated up to about 80°C in an oil bath. The bearings must bear against the shaft shoulders.

The bearings installed in our works have normal clearances. However, the use of bearings with c3-play is permissible.

NOTE: After mounting the S.BOX cover (17.3) on to the bearing lantern (35.6), tighten it against the bearing lantern by means of the two Fixing screws and a locking nut.

Pay attention to the O-rings and gaskets. If they are to be changed see that the joint thickness is maintained.

Telescopic arrangement

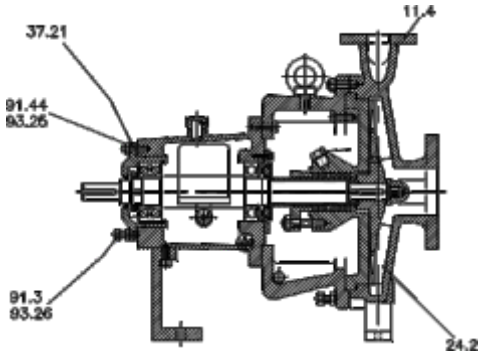
The impeller clearance is an important factor in maintaining optimum pump Performance. The nominal clearance is 0.5mm, actual clearance is depending on the specific operating conditions by taking into account of temperature & solids etc. for maximum service flexibility pumps are shipped from the factory with 0.5 mm clearance.

Procedure of adjusting clearance

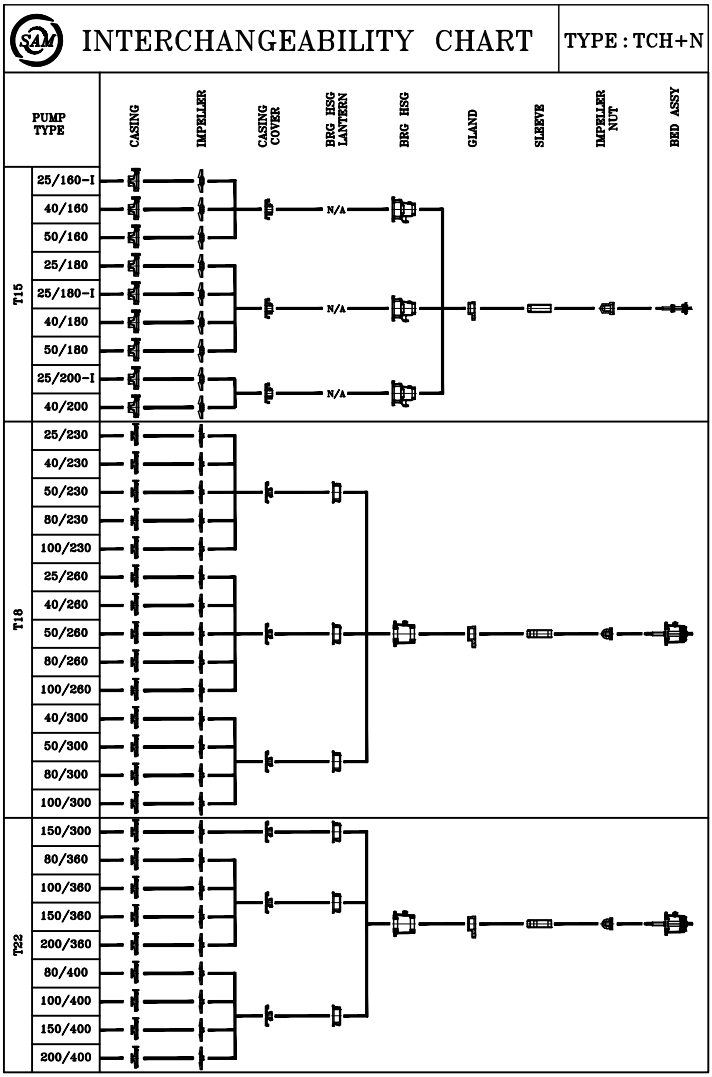
1. To move the impeller (24.2) towards the casing (11.4), impeller adjusting screw (91.3 & 93.26) to be loosened and tightened the nut (91.44 & 93.25) provided at the drive end bearing Adopter (37.21). Continue this exercise by rotating the shaft till impeller touches the casing.

2. In order to maintain desired gap 0.5 mm between impeller and casing , the loosening and tightening of drive end adoptor screws (91.44 & 93.25) and (91.3 & 93.26) to be done.

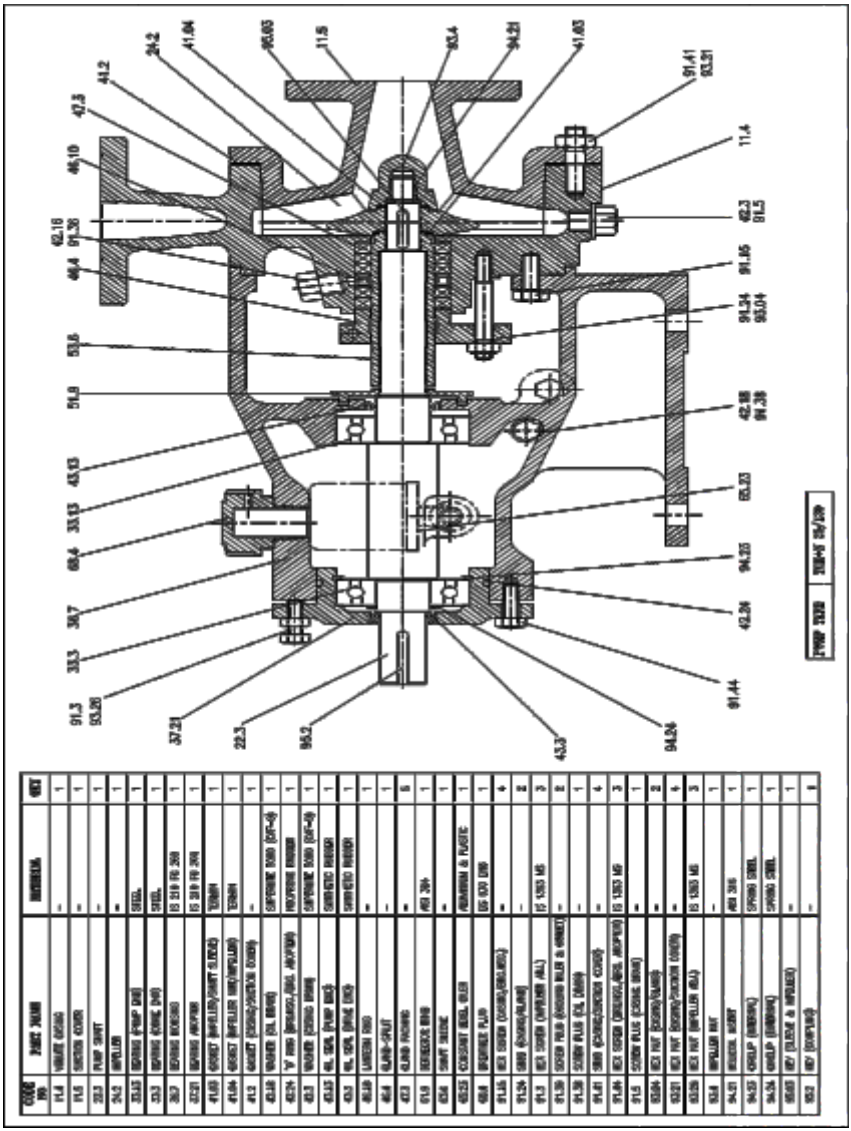
If desired, a dial indicator can be used to check that the bearing assembly has been moved the correct distance

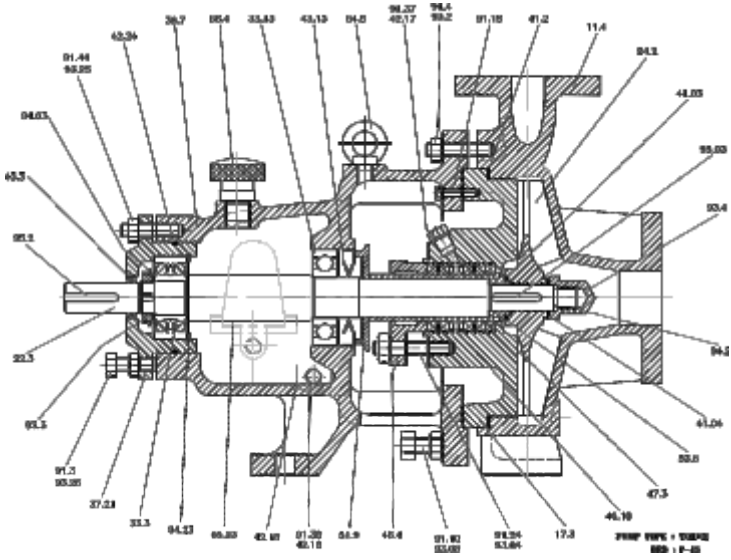


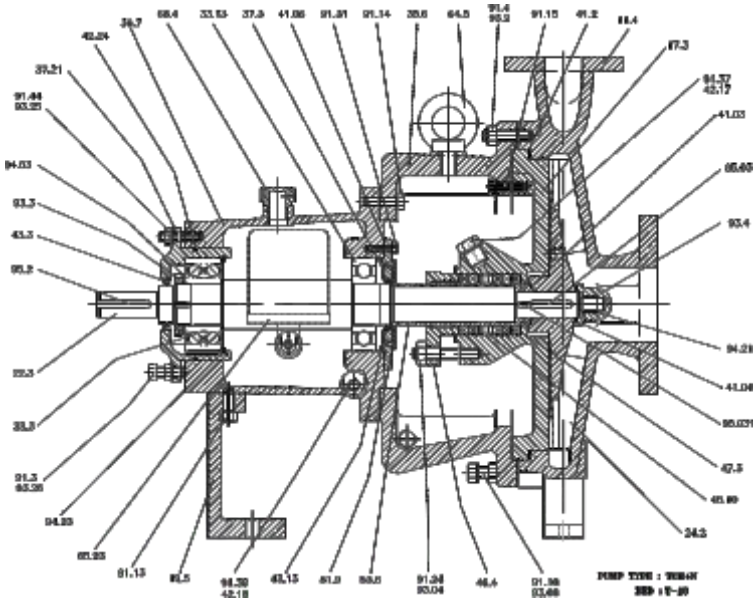
10. INTERCHANGEABILITY CHART

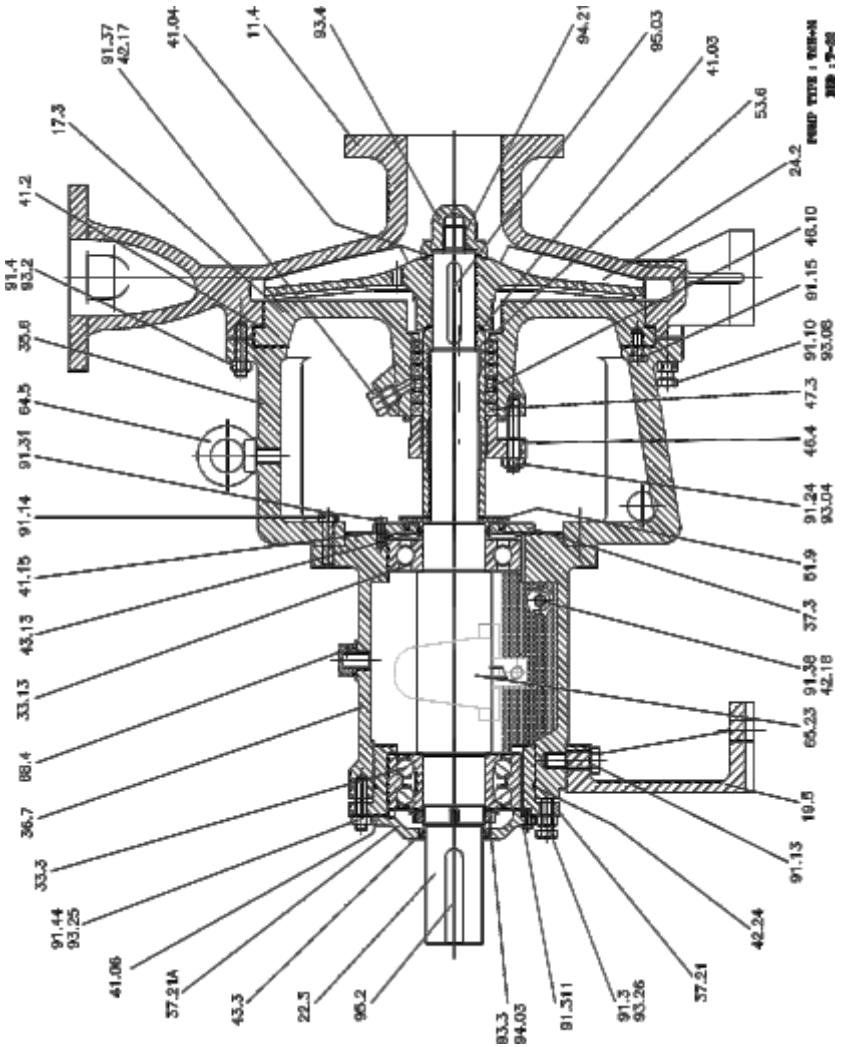


11. SECTIONAL DRAWING








91.37
42.17
41.04
11.4
93.4
94.21
95.03
41.03
53.6
24.2
17.3
41.2
91.4
93.2
35.6
64.5
91.31
91.14
41.15
43.13
33.13
88.4
36.7
33.3
91.44
93.25
41.06
57.21A
43.3
22.5
96.2
83.3
94.03
91.311
91.3
93.26
37.21
42.24
91.13
10.5
65.23
91.38
42.18
37.3
51.9
91.24
93.04
46.4
47.3
91.10
93.05
91.15
46.10

12. BILL OF MATERIAL

	CODE NO		PART NAME
*	11.4	*	Volute Casing
	17.3		Stuffing Box Cover
	19.5		Support Foot
*	22.3	*	Pump Shaft
*	24.2	*	Impeller
	33.3		Bearing (Drive End)
	33.13		Bearing (Pump End)
	35.6		Bearing Housing Lantern
	36.7		Bearing Bed
	37.3		Bearing Cap In Board
	37.21		Bearing Adopter
	37.21A		Bearing Cap Out Board
*	41.03	*	Gasket (Impeller/Shaft Sleeve)
*	41.04	*	Gasket (Impeller Nut/ Impeller)
*	41.06	*	Gasket (Brg.Bed/Brg.Cap.Out Board)
*	41.15	*	Gasket (B.Bed/Brg.Cap In Board)
*	41.2	*	Gasket (Casing/Stuffing Box)
	42.17		Washer (Cooling Inlet & outlet)
	42.18		Washer (Oil Drain)
*	42.24	*	'O' Ring (Brg.Bed/ Brg.Adopter)
*	43.13	*	Oil Seal (Pump End)
*	43.3	*	Oil Seal (Drive End)
	46.4		Gland – Split
	46.10		Lantern Ring
*	47.3	*	Gland Packing

	51.9		Deflector Ring
*	53.6	*	Shaft Sleeve
	64.5		Eye Bolt
	65.23		Constant level oiler
	68.4		Breather Plug
	91.10		Hex Screw (Ejection)
	91.13		Hex Screw (Support Foot/Bed)
	91.14		Hex Screw (Brg.Hsg.Lant/Bed)
	91.15		Hex Screw (Stuffing Box/Brg.Bed)
	91.131		Hex Screw (Casing/Casing Foot)
	91.24		Stud (Stuffing Box/Gland)
	91.3		Hex Screw (Impeller Adj)
	91.31		Hex Screw(Brg.Cover/Brg.Bed)
	91.37		Screw Plug (Cooling Inlet & Outlet)
	91.38		Screw Plug (Oil Drain)
	91.311		Hex Screw (Brg.Cap In Board/Brg.Cap Out Board)
	91.4		Stud (Casing/Brg.Bed)
	91.44		Stud (Brg.Bed/Brg.Adopter)
	93.04		Hex Nut (ST.Box/Gland)
	93.08		Hex Nut (Ejective)
	93.2		Hex Nut (Casing/Brg.Bed)
	93.25		Hex Nut (Brg.Bed/Brg.Adopter)
	93.26		Hex Nut (Impeller Adj)
	93.3		Lock Nut
	93.4		Impeller Nut
	94.03		Lock Washer
	94.21		Helicoil Insert
	94.23		Circlip
	95.03		Key (Impeller)
	95.2		Key (Coupling)

NOTE : * MARKED MANDATORY SPARES

13. TROUBLE – CAUSE - REMEDY

In the event of troubles we recommend to locate the cause using the following chart:

TROUBLE	CAUSE – REMEDY NO.
1. Pump does not deliver	1 7 8 9 10 11 12 15 16 17 18 19 20 24 26 27 31 68 69 70
2. Pumps delivers at reduced Capacity	1 2 3 4 5 6 7 8 9 10 11 12 14 15 16 18 19 20 21 23 68 69 70 74
3. Delivery performance reduced	1 3 7 9 10 11 12 14 15 20 21 23 24 59 65 69 74
4. Pump delivers too much	17 68 69 70
5. Delivery is interrupted	1 3 6 7 8 9 10 11 12 13 14 15 16 17 20 23 24 26 31 68 69 70 74
6. Pumps runs in reverse direction	64
7. Very noisy	1 2 5 6 7 8 11 12 14 16 20 21 23 26 67 68 69 70 74
8. Unsteady running of the pump	20 21 23 33 34 36 38 39 40 41 42 43 47 48 49 52 54 55 56 57 58 63 66 67 70
9. Pumping casing not leak proof	52 54 59 60

10. Excessive leakage from stuffing box	21 25 28 29 30 32 33 55 56 57 65
11. Fumes from stuffing box	23 24 25 26 27 28 29 32 45 46 65
12. Mechanical Seal leaking	21 23 24 31 45 46 55 57 65 75
13. Pump rotor blocked in standstill position	23 49 50 52 54 58
14. Pump is heating up and seizing	23 24 25 26 27 28 30 32 43 45 46 49 50 54 55 56 57 58
15. Bearing temperature increase	20 21 23 33 34 36 39 40 41 42 43 44 45 47 48 49 50 52 54 55 57 63 66 67 70
16. Motor will not start	15 23 72
17. Motor is difficult to start	15 17 23 28 29 49 50 54 58 70 71 72
18. Motor is running hot burning out	15 17 23 28 29 43 58 68 69 70 71 72 73

CAUSE - REMEDY :

1. Suction filter, foot valve clogged.
2. Nominal diameter of suction line too small.
3. Suction does not reach down far enough into the delivery liquid.
4. Ground clearance of suction too narrow
5. Too many bends in the suction line.
6. Shut-off valve in the feed line in un-favorable position
7. Incorrect layout of suction line (Formation of air pockets)
8. Valve (s) in the suction and/or feed line not fully open.
9. Screwed joints or flanges in the suction line not leak – proof
10. Ingress of air via leaking valves and fittings in the suction line (Stuffing box etc).
11. Suction lift too great.
12. Available NPSH too low (difference between pressure at suction branch and vapour pressure too low).
13. Cut-out level for starter too low (In automatic plants.
14. Delivery liquid containing too much gas and/or air.
15. Delivery liquid too viscous
16. Insufficient venting
17. Speed too high (number of revolutions of driver higher than nominal number of revolutions of pump)
18. Speed too low (number or revolutions of driver lower than nominal number of revolutions of pump).
19. Incorrect direction of rotation (electric motor, incorrectly connected, leads on the terminal board interchanged).
20. Impeller Clogged.
21. Impeller damaged.
23. Separation of crystals from the delivery liquid (falling below the temperature limit/equilibrium temperature).
24. Sealing liquid line/circulation line clogged.
25. Sealing liquid line contaminated.
26. Lantern Ring in the stuffing box is not positioned below the sealing liquid inlet.
27. Sealing liquid omitted.
28. Packing incorrectly fitted.
29. Gland tightened too much/slanted.
30. Packing material not suitable for operating conditions.
31. Mechanical Seal blocked; O-ring-rotating seal ring or stationary seal ring damaged.

32. Shaft sleeve/shaft worn in the region of the packing.
33. Bearing worn out.
34. Insufficient lubrication of bearings (also in case of automatic lubrication).
36. Specified oil level not maintained.
38. Oil quality unsuitable.
39. Rolling contact bearings incorrectly fitted.
40. Axial stress on rolling contact bearings (no axial clearance for rotor)
41. Bearings dirty.
42. Bearings rusty (corroded).
43. Axial thrust too great because of worn wear rings, obstructed relief holes.
44. Radial shaft seal ring has not much tension (local heating-up of shaft)
45. Insufficient cooling water chambers.
46. Sediment in the cooling water chambers.
47. Alignment of coupling faulty or coupling loose.
48. Elastic element of coupling worn.
49. Foundation in correctly performed.
50. Base plate not rigid enough in the event of erection without foundation.
52. Pump casing under stress.
54. Pipe line under stress.
55. Shaft runs untrue.
56. Shaft bent.
57. Rotor insufficiently balanced.
58. Rotor parts touching the casing.
59. Unsuitable casing seal.
60. Casing screw not light enough
63. Vibration of pipe work.
64. Non return valve gets stuck.
65. Contaminated delivery liquid.
66. Delivery flow too small.
67. Delivery flow too great.
68. Pump unsuitable for parallel operation.
69. Type of pump unsuitable.
70. Incorrect designing of pump for existing operating conditions.
71. Voltage too low/power supply overloaded.
72. Short circuit-in the motor.
73. Setting of circuit-breaker for motor handled too high.
74. Temperature of the liquid too high.
75. Spring of the mechanical seal damaged.

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INFRASTRUCTURE

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