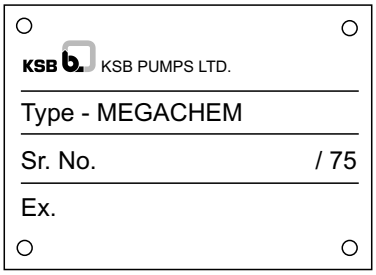
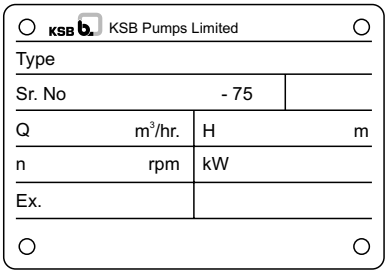
THANK YOU CUSTOMER

You are a proud owner of a **MEGACHEM** pump.





The pump's nameplate shows the type series, pump size, version, works order no. & main operating data. Please quote the above information in all queries, repeat orders and particularly when ordering spares.

CONTENTS

1 General

Your centrifugal pumps will only give you completely trouble free and satisfactory service on condition that it is installed with due care and properly maintained. It is absolutely essential that the instructions contained in this manual be strictly observed and that the pumps are not operated under conditions which differ from those specified under our 'Operating Conditions' This operating instruction manual does not take any account of any safety regulations which may apply to the installation site, and the site engineer & the site operator is responsible for notifying our erection staff of any such regulations and seeing that they are complied with.

The type series, pump sizes, main operating data and the works order number are all stamped on the name plate affixed to the pump. Please make sure to quote this information every time you write to us in respect of queries, repeat orders and more particularly when ordering spare parts.

1.1 Handling

When handling the complete pumpset or bare pump attach ropes to the pump and motor as shown (not through the motor eyebolt).

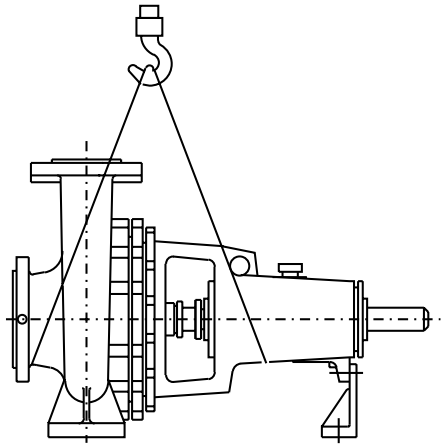


Fig. no.1 : Bare Pump

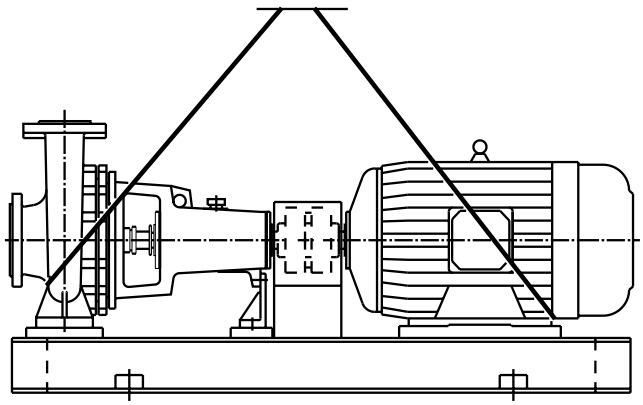


Fig no.2 : Pump & motor on a common baseframe

2 Installation (on site)

2.1 Foundation

Make sure the concrete foundation has set before mounting the pumpset. The surface of the foundation must be completely horizontal and perfectly flat.

2.2 Mounting

Position the pumpset on the foundation and align using a precision spirit level on the discharge nozzle. Ensure that the gap between the two coupling halves is as given on the general arrangement drawing. Always fit shims to the left and right of the anchor bolts, between the baseplate / foundation frame and the foundation. If the shims are more than 800 mm apart, position extra shims equidistant between them. All shims must seat perfectly flush with the baseplate/frame.

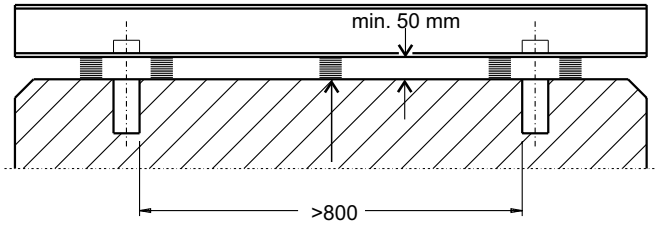


Fig no.3 : Fitting shims

Uniformly tighten up securing means. Baseplate have to be grouted with non-shrinking mortar up to the upper edge of the frame after having been fixed in position.

2.3 Aligning pump / motor

After the baseplate has been fixed in position carefully check the coupling and, if necessary, realign the pumpset (on the motor). Prior to checking the alignment and / or aligning, loosen supporting foot (183) and tighten again without transmitting any strain. The coupling must also be checked and the pumpset realigned even if the pump and motor are supplied ready mounted on a common baseplate.

The pumpset to be aligned radially and axially within 0.04 mm by installing dial indicators and without pipe connection. The gap between the two coupling halves must be the same at all points (minimum 3 points) on the circumference; this can be measured using calipers or a filler gauge.

The alignment should be carried with & without pipe connections and should be within limits. For liquids handling more than 105 ^{0}Ccold alignment & hot alignment should be carried out on pumpset.

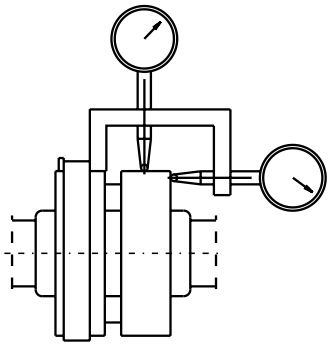


Fig. no. 4 : Aligning a coupling

2.4 Connecting the piping

Never use the pump itself as an anchorage for the piping. Suction lift lines should be laid with a rising slope towards the pump and suction head line with a downward slope towards the pump (fig. 5b, 5c)

The pipelines should be anchored in close proximity to the pump and should be connected to the latter without transmitting any stress or strain, nor should weight of the piping be loaded

on to the pump. The nominal sizes of the pipelines should be at least equal to the nominal sizes of the pump nozzles (fig.5a, 5d).

We recommend the incorporation of check valves or non-return valves and isolating valves in the system, depending on the type of installation and pump.

Any thermal expansion of the type of piping (due to high temperatures) must be compensated by suitable means, so as not to impose any additional load on the pump.

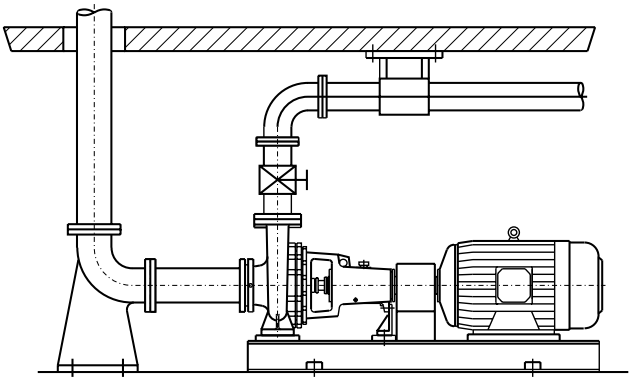


Fig. no. 5a : Piping & supporting of piping

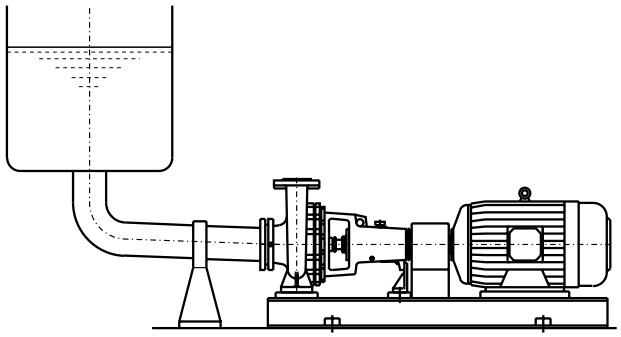


Fig. no. 5b : Suction pit above the pump

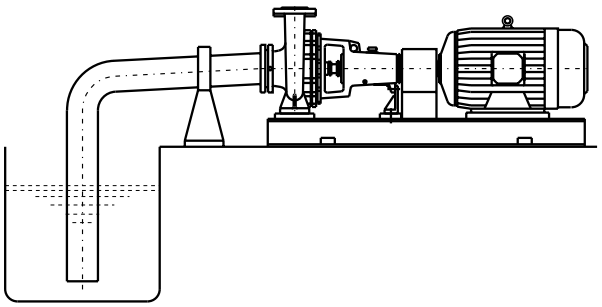


Fig. no. 5c: Suction pit below the pump

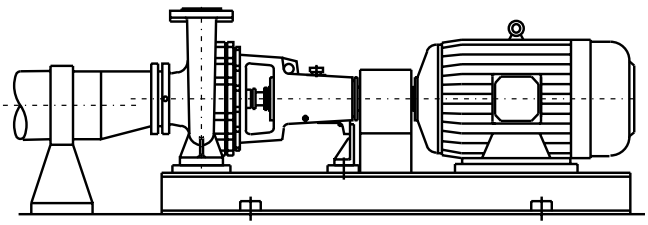
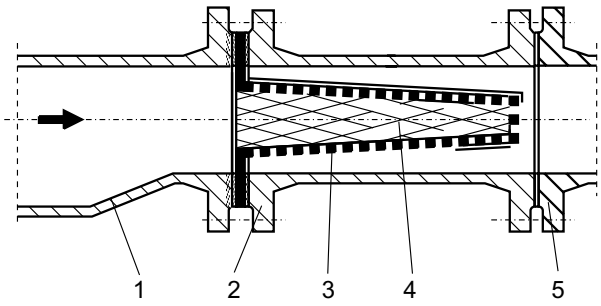


Fig. no. 5d : Suction pipe connections



1 Suction line
2 Strainer holder
3 Fine strainer
4 Coarse strainer
5 Pump nozzle

Fig. no. 6 : Conical strainer for suction line

Before commissioning a new installation, thoroughly clean, flush and blow through all vessels, piping & connections. Welding beads, scale and other impurities frequently only become dislodged after a certain period of time; it is necessary to fit a strainer in the suction line to prevent these entering the pump. The total cross section of the holes in the strainer should be three times the cross section of the piping in order to avoid excessive pressure loss across the strainer due to clogging.

The conical strainer consists of a coarse strainer fronted by a fine strainer with a 2.0 mm mesh and 0.5 mm diameter wire, made of corrosion resistant material, (i.e. Stainless Steel).

Attention : For recommended suction & discharge pipe sizes, refer to performance curves.

2.4.1 Auxiliary connections

The size and location of all auxiliary connections for suction / discharge pressure gauge, cooling and leakage liquid are shown in the fig. No. 7 & table no.1

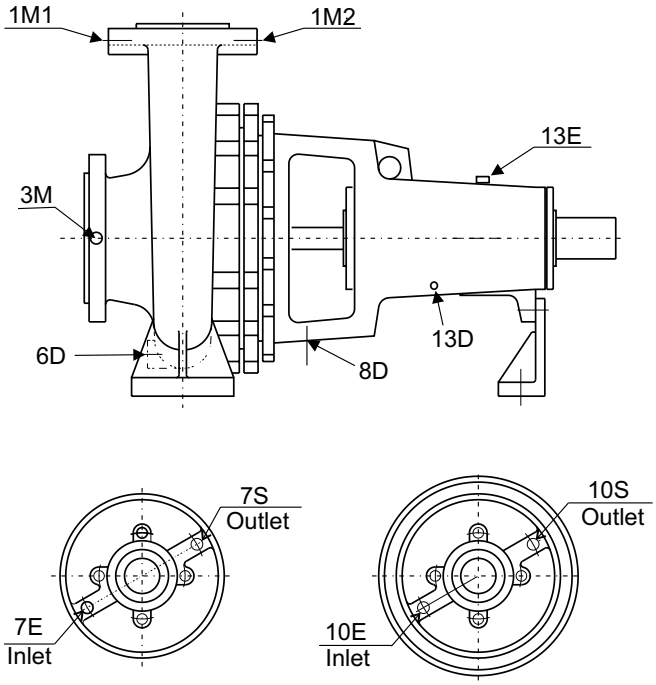


Fig. no.7 : Auxiliary connections of pump

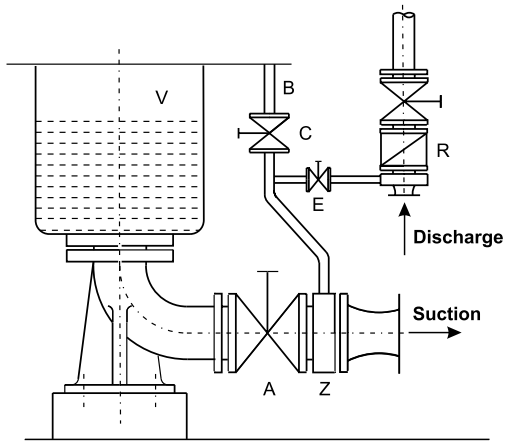
Conn. Code	Description	Conn. type	Bearing Bracket A-30	A-40	A-50	A-60
1M1	Pressure guage	NPT	3/8"	3/8"	1/2"	1/2"
1M2	Pressure guage	NPT	3/8"	3/8"	1/2"	1/2"
3M	Pressure guage	NPT	3/8"	3/8"	1/2"	1/2"
6D	Casing drain	NPT	3/8"	3/8"	1/2"	1/2"
7E	Cooling inlet	NPT	1/2"	1/2"	1/2"	1/2"
7S	Cooling outlet	NPT	1/2"	1/2"	1/2"	1/2"
8D	Drain (leakage)	NPT	3/8"	3/8"	3/4"	3/4"
10E	External sealing in	NPT	1/2"	1/2"	1/2"	1/2"
10S	External sealing out	NPT	1/2"	1/2"	1/2"	1/2"
13E	Vent Plug	Ø 20 mm				
13D	Plug	G	1/4"	1/4"	1/4"	1/4"

Table no. : 1

2.4.2 Vacuum balance line

If the pump has to pump from a vessel under vacuum it is advisable to fit a vacuum balance line. This line should have a minimum DN of 25 mm and be arranged to lead in to the vessel above the maximum admissible liquid level.

An additional pipe line that can be shut off a pump discharge nozzle vacuum balance line facilitates the venting of the pump prior to start-up.



A. Main shut off valve
B. Vacuum balance line
C. Shutofff valve
E. Vacuum tight shut off valve
R. Non- return valve
V. Vacuum vessel
Z. Intermediate flange

Fig. no. 8 : Suction line and vacuum balance line.

Valve	Valve position during		
	Start	Running	Standstill
A	open	open	closed
E	open	closed	closed
C	open	open	closed

Table no. 2

2.5 Coupling guard

In compliance with the accident prevention regulations, the pump may only be operated if it is fitted with a coupling guard. If the customer states specifically that this coupling guard is not to be supplied by us, it must be provided by the customer

2.6 Final check

Recheck alignment as described in 2.3

It must be possible to rotate the coupling easily by hand. Check the integrity of all connections.

3 Commissioning / startup, shutdown

3.1 Preparations

Grease lubricated bearings (standard): Grease lubricated bearings are pre-packed with grease for life time. No greasing is required at site.

Oil lubricated bearings (if applicable) : The bearing bracket should be filled with oil of the types & specifications as mentioned in 4.2.2.

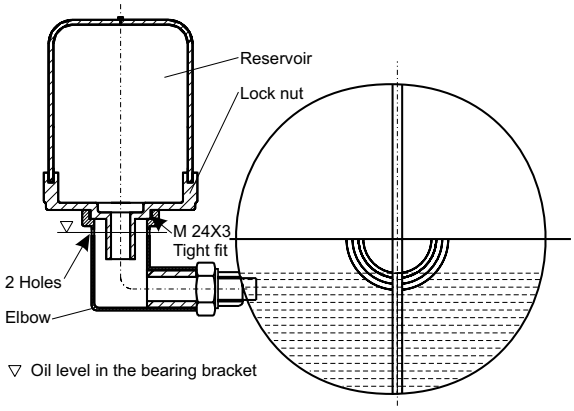


Fig. no. 9 : Oil fill level

3.1.1 Procedure

I Screw the constant level oiler on the bearing bracket.

II Keeping the reservoir of the oiler in upright position, lock the elbow with the help of lock nut.

III Unscrew and remove the reservoir from its position.

IV Unscrew the vent plug on the bearing bracket and fill oil until it appears in vertical portion of the elbow.

V Fill oil in the reservoir of oiler and screw it back in the elbow in upright position.

VI Replace the vent plug on the bearing bracket.

VII Check after some time whether the oil level in the reservoir is dropped or not.

It is important to fill the reservoir properly at all times.

Caution note:- The oil level should always be below the level of vent opening of the elbow. For checking the oil level we recommend to open drain plug and slowly drain the oil untill the constant level oiler starts operating (i.e. untill air bubbles are seen in the reservoir).

3.1.2 Shaft Seal

The shaft is sealed at its exit through the casing by a soft packed stuffing box or a mechanical seal. The the change over from gland packing execution and vice-versa is possible by using conversion kit (refer cl. 6.5). For details refer KSB.

3.1.3 Priming & associated checks.

Vent and prime the pump and suction line before start-up.
The shut off valve in the suction line must be completely open. (Open the shut off valve in the vacuum line; if fitted and close the vacuum tight shut off valve "E"; fig. no. 8)

3.1.4 Checking the direction of rotation

The direction of rotation of the prime mover must match with the arrow on the pump. Check this by switching the motor on and immediately switching it off again.
Mount the coupling guard.

3.2 Start-up

Start the set against a close discharge valve only. Once the pump has reached full speed, slowly open the discharge valve to the duty point.

After the pump has reached its working temperature and/or if leakage occurs, tighten bolts (901.01) with the set disconnected / switched off.

3.3 Shutdown

Close the discharge valve.

The discharge valve can remain open if the discharge line is fitted with a non-return device on condition there is back pressure.

Switch off the motor, making sure the pump set runs down smoothly and evenly to a stand still.

If the pumpset is to remain out of service for long periods, (means more than 6 months) close the isolating valve in the suction line and close all connections.

If there is danger of freezing and / or if the pump is to be out of service for long period, then the pump must be drained or otherwise protect it against freezing.

4 Maintenance and lubrication

4.1 Supervision of operation

The pump must run quietly and evenly at all times.

The pump must never run dry.

The bearing temperature may be allowed 50 ^{0}C above ambient temperature, but must not exceed 80 0C (measured at the bearing housing body).

Do not run the pump for a long period (more than 5 min.) against a closed discharge valve.

Pumps with mechanical seals experience minor or invisible (vapour) leakage. The seal is maintenance free.

Standby pumps should be started up and immediately shut down again once a week to keep them operational.

Flexible parts of coupling which shows signs of wear should be replaced in good time.

4.2 Lubrication and lubricant change

4.2.1 Grease change

The anti-friction bearings are pre-packed for life with grease by the bearing manufacturer; no necessity of re-greasing it during its whole life.

4.2.2 Oil change (if applicable)

The first oil change must be carried out after 300 hours of operation; all subsequent oil changes after 3000 hours. The bearing bracket should be filled with oil of any one of the following types and specifications & for quantity; refer table no. 3.

Indian oil	Servosystem 46
Hindustan Petroleum	Enclo 46
Bharat petroleum	Bharat Hydrol 68

Table no. 3

Procedure : Unscrew oil drain plug beneath the constant level oiler and drain off the old oil. When the bearing bracket is empty replace the oil drain plug and fill in fresh oil in accordance with sec.3.1.1.

5 Dismantling

5.1 General

Before dismantling, make sure the motor is disconnected from the power supply and can not be switched on accidentally. The suction and discharge shut off valves must be closed.

The pump casing must have cooled down to ambient temperature. The pump casing must be empty and not under pressure.

5.2 Dismantling

Procedure:

1. For oil-lubricated pumps drain-off the oil as described in 4.2.2.
2. Disconnect from power supply.
3. Detach all auxiliary supply pipe lines.
4. Remove coupling guard
5. Remove coupling spacer (if applicable)
6. Remove coupling half from the pump shaft. Ref. fig no.10

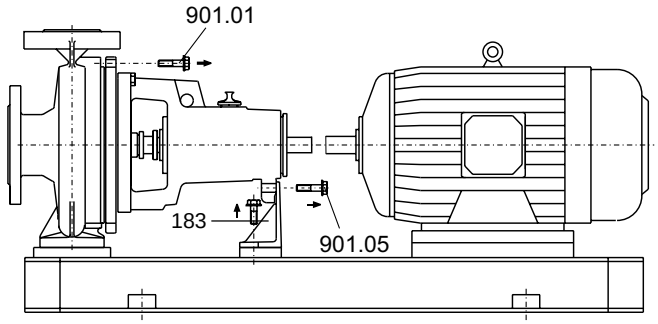


Fig. no. 10 : Dismantling the pumpset

For coupling without spacer / intermediate sleeve :

1. Remove discharge and suction branch from pipe line.
2. Loosen pump from base plate.
3. Uncouple pump and motor.
4. Disconnect motor from power supply.
5. Remove motor from base plate.
6. Remove supporting foot (183) from the baseplate and loosen bolts (901.01) on discharge cover. Refer Fig. no.10.
7. Pull out bearing bracket with discharge cover and complete rotor (assembled unit.)

(With larger pumps, suspend or support bearing bracket to prevent the rotating assembly from falling over.)

For coupling with spacer / intermediate sleeve, during dismantling the volute casing can remain on the base plate and in the pipeline.

1. Remove spacer/intermediate sleeve of the coupling.
2. Remove supporting foot (183) from the base frame and loosen bolts (901.01) on discharge cover. Refer fig No.11.)
3. Pull out bearing bracket with discharge cover and complete rotor (assembled unit).

If the pump has been in operation for a long time, some parts may be difficult to remove. In this case use a brand name penetrating oil e.g. WD-40 / Rustoline or suitable pull-off device.

Under no circumstances use force!

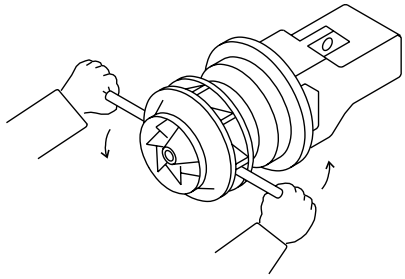


Fig. no.11 : Removal of impeller from pump shaft

5.3 Dismantling the bearing unit

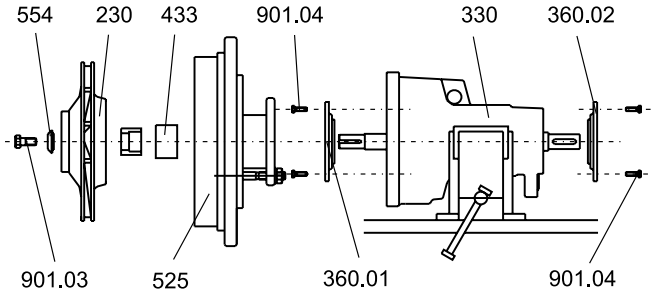


Fig. no. 12a : Dismantling the bearing unit

1. Remove the impeller by unscrewing impeller washer bolt (901.03) & washer (554)
2. Remove seal cover / gland from discharge cover
3. Remove discharge cover by unscrewing its bolts from bearing bracket.
4. Pull shaft protection sleeve off the shaft
5. Remove bearing covers (360.01/02) and gaskets by unscrewing of hex. bolt (901.04). Refer fig. no. 12a.
6. Fasten the bearing unit (330) firmly to the bench vice refer fig No. 12b. Strike the pump shaft end with a soft hammer.
7. Fasten the shaft with its bearings to the bench vice and detach bearings from shaft with an extractor or by means of a hammer and a punch. Fig no. 12c.

Note : Always replace the bearings once they have been removed from the shaft with new ones.

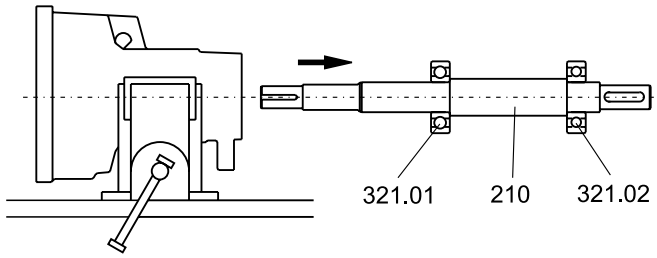


Fig no.12b : Dismantling the pump shaft from bearing bracket.

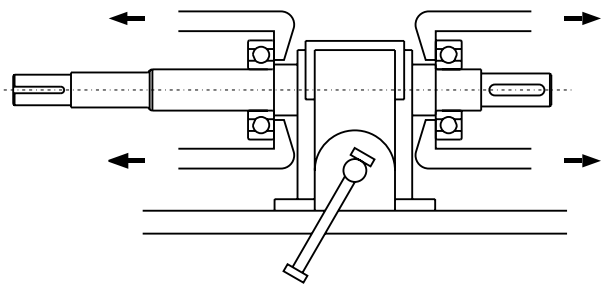


Fig. no.12c : Removal of the bearings from pump shaft.

5.4 Removing of Mechanical seal

To replace the & mechanical seal it is necessary to dismantle the pump.
After removing the discharge cover (525), draw the mchanical seal out from discharge cover by removing seal cover.

6 Reassembly

6.1 Pump

Reassembly in accordance with standard engineering practice. Coat the fits and screw connections with graphite or similar before reassembly.
Check oil seal & o-rings for its damage; replace if necessary. All gaskets must be renewed; make sure the new ones have the same thickness as the old ones.

6.2 Clearance table

	Casing side	Impeller side
Max.	0.6	0.6
Min.	0.5	0.5

Table no. 4

If after some period, these clearances get doubled due to wear; please consult KSB.

6.3 Replacing of bearings

1. Check the shaft (210) with its shaft protection sleeve (524) (as applicable) for eccentricity, between centres, Maximum allowable eccentricity is 0.05mm.
2. Fasten the shaft (210) to the bench vice using soft sheets between the vice clamp jaws to avoid damage. Refer fig no.14.
3. Heat the bearings (321.01/02) in the oven about 80 ^{0}C max. and push it on to the shaft. Fig. no.13. Allow the bearings to cool down. Then tap it lightly against the shoulder using suitable pipe punch.

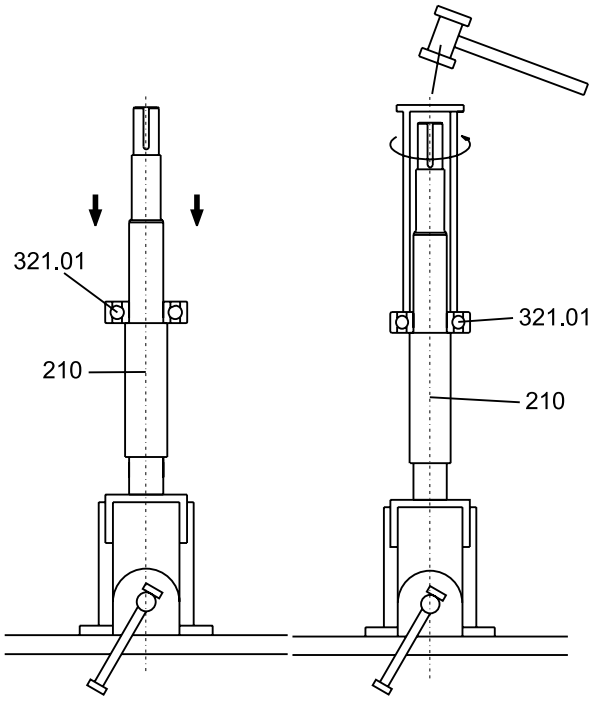


Fig. no. 13 : Fitment of bearings.

6.3.1 Deep groove ball bearings & lubricant fill

Bearing bracket	Grease packed Bearing no.	Oil lubrication Bearing no.	Oil qty.in ltr.
A-30	6306 2Z C3	6306 C3	0.2
A-40	6308 2Z C3	6308 C3	0.35
A-50	6310 2Z C3	6310 C3	0.65

Table no. 5

6.4 Stuffing box compartment

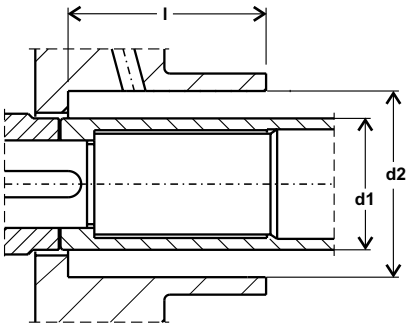


Fig. no.14 : Stuffing box compartment

Bearing bracket #	Dimensions d1	d2	l
A - 30	35	55	73
A - 40	45	65	73
A - 50	60	85	91

Table no. 6
Dimensions of packing compartment in mm.
See interchangeability of components for co-relation of shaft & pump sizes in table no. 8.

6.5 Mechanical seal

Mount the mechanical seal as described in instructions of seal manufacturer. The following points should be observed when mounting mechanical seal :

Extreme care and cleanliness during assembly are the essential prerequisites for the trouble free operation of the mechanical seal.

The guard protecting the sealing faces should only be removed only at the time of its fitment before assembly.

When the stationary seal ring has been inserted, check its plane parallelism in relation to the discharge cover. The surface of the shaft protection sleeve must be absolutely clean and smooth and mounting edge of the sleeve must be chamfered.

Before final mounting in the pump, the rubbing faces of the mechanical seal should be wetted with a drop or two of silicon oil.

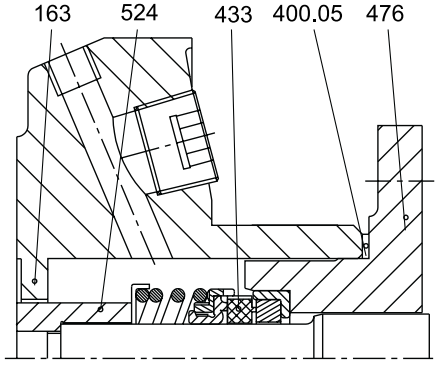


Fig.no.15 : Mechanical seal

6.6 Conversion kit

Parts required for change over from gland packing to mechanical seal

1. Mechanical seal
2. Seal cover
3. Shaft protection sleeve
4. Stud/Nuts
5. Set of gaskets
6. Throttle bush (if required)

Parts required for change over from mechanical seal to gland packing.

1. Shaft protection sleeve
2. Gland packing
3. Lantern ring
4. Stuffing box gland
5. Set of gaskets
6. Stud / Nut.

7 Cooling

For pumping liquid temperature > 105 ^{0}C, stuffing box cooling is required.

Pressure of cooling water	7 bar max.
Temperature of cooling water inlet	20 to 30 ^{0}C
Temperature of cooling water outlet	50 ^{0}C
Test pressure of cooling water	11 kg/cm^2

Clean, clear & non abrasive water is recommended for cooling (pH7)

Bearing bracket	Pumped media temp. in ^{0}C Up to 140	Up to 200
	Cooling water in lpm	
A-30	1.2	1.6
A-40	2.3	2.6
A-50	3	3.4

Table no. : 7

8 Spare parts

8.1 Ordering spare parts

When ordering spare parts please indicate the following information which may be taken from the name plates of the pumps. If the name plate is missing then check on the discharge flange for serial number. e.g.

Type : MEGACHEM C 50-200
Serial no. : 995 1234-1235

8.2 Recommended spare parts of 2 years of continuous operation

Part no.	Description	No.of Pumps			
		3	5	7	10 & above
		Quantity of spare parts			
210	Shaft	1	2	2	30%
230	Impeller	1	2	2	30%
321	Deep groove	2	4	6	100%
	ball bearing				
330	Bearing bracket	-	-	-	2 off
412	O rings	3	5	6	90%
452	Stuffing box gland	2	2	3	30%
458	Lantern ring	2	2	3	30%
461	Packing	2	2	3	30%
	(for set of 5 rings)				
525	S.P.sleeve	2	3	3	50%
-	Set of gaskets	6	8	9	150%

Table no. : 8

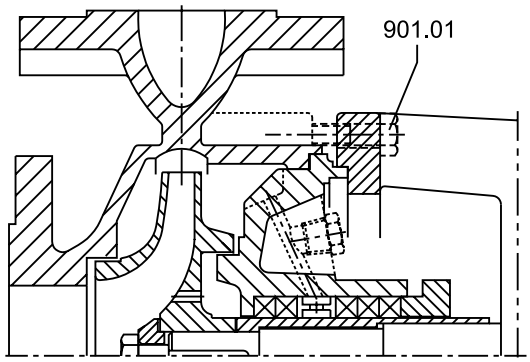
9 Interchangeability of components & recommended stock of spare parts

Pump size	Bearing bracket	Description	Volutecasing	Discharge cover	Cooling cover	Support foot	Shaft	Impeller	Deep groove ball bearing	Bearing bracket	Bearing cover	Gasket	Gasket	Gasket	Gasket	O'ring @	Oil seal	Mechanical seal	Stuffing box gland	Lantern ring	Packing	Seal cover	Splash ring	Shaft protection sleeve	Washer	Hex. bolt	Hex. bolt	Vent plug	Key	Key
		Part No.	102	163	165	183	210	230	321	330	360	400.1	400.2	400.3	400.4	412.1/.2	421	433	452	458	461	471	507	524	554	901.01	901.03	913	940.1	940.2
25- 150	A 30		1	15	1	2	1	1	1	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
25- 200			2	2	1	3	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
32- 125			3	1	1	1	1	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
32- 160			4	1	1	2	1	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
32- 200			5	2	1	3	1	5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
40- 160			6	1	1	2	1	6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
40- 200			7	2	1	3	1	7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
50- 160			8	1	1	3	1	8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
50- 200			9	2	1	3	1	9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
65- 125			10	1	1	3	1	10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
32- 250	A 40		11	3	2	4	2	11	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2
40- 250			12	3	2	4	2	12	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2
40- 315			13	8	2	6	2	13	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2
50- 250			14	3	2	4	2	14	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2
50- 315			15	8	2	7	2	15	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2
65- 160			16	4	2	5	2	16	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2
65- 200			17	5	2	4	2	17	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2
65- 250			18	7	2	6	2	18	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2
80- 160			19	4	2	4	2	19	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2
80- 200			20	6	2	4	2	20	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2
80-250			21	7	2	7	2	21	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2
100-200			22	6	2	6	2	22	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2
100-250	A 50		23	10	3	10	3	23	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	1	3	3
125-250			24	10	3	8	3	24	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	1	3	3
125-400			25	12	3	11	3	25	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	1	3	3

Table no. 9

10 Sectional drawing & list of component

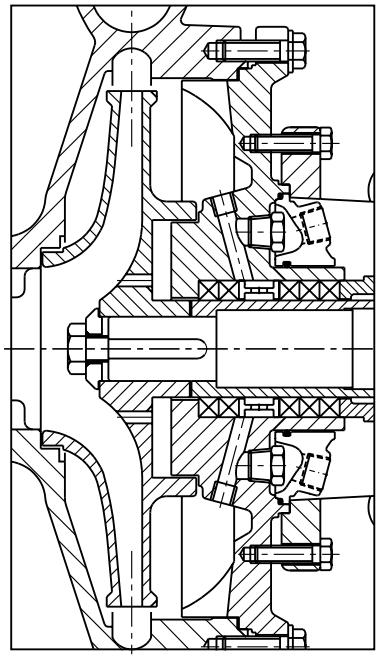
10.1 Sandwiched discharge cover & cooling cover details



Sandwiched dishcage Covers are applicable for sizes

32-125, 160
40-160
50-160
65-125, 160
80-160

Cooling cover details



11 Pump cross sectional drawing

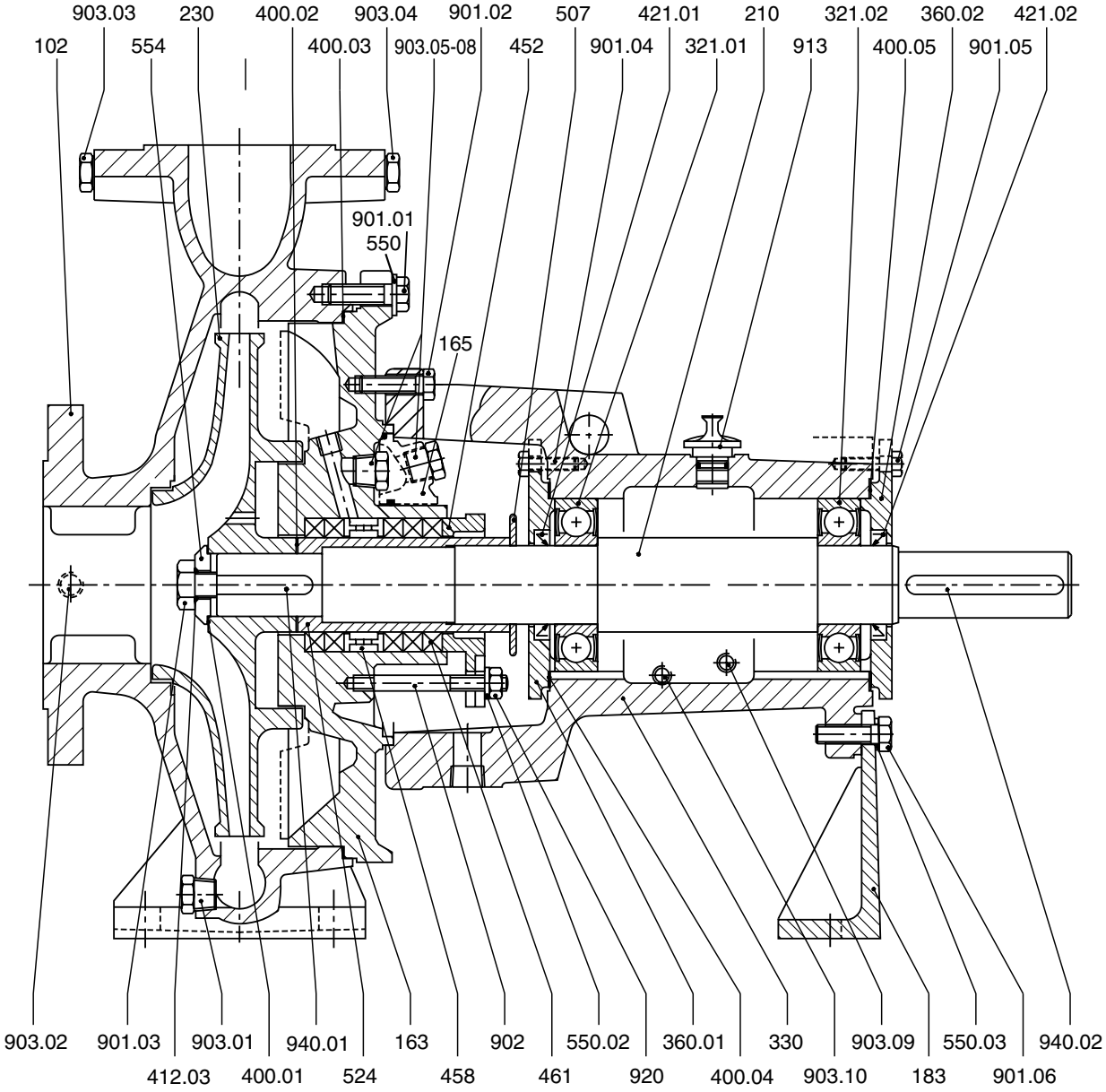


Fig. no.10

11.1 List of components

Part no.	Description	Part no.	Description	Part no.	Description
102	Volute casing	400.01-.05	Flat Gasket	524	Shaft protection sleeve
163	Discharge cover	411.06	Gasket	550.01/.03	Washer
165	Cooling cover (optional)	412.01/.02	O-ring (for cooling cover)	554	Washer
183	Support foot	412.03	O-ring	901.01-.06	Hex. Head bolt
210	Shaft	421.01/.02	Oil seal	902	Stud
230	Impeller	452	Gland	903.01-.10	Hex. Head plug
321.01/.02	Deep groove ball bearing	458	Lantern ring	913	Vent plug
330	Bearing bracket	461	Packing	920	Hex nut
360.01/.02	Bearing cover	507	Splash ring	940.01-.02	Key

12 Faults-cause & remedy

Pump delivers insufficient liquid	Motor overloaded	Excessively high pump discharge pressure	Bearings overheating	Pump leaks	Excessive shaft sealing leakage	Rough pump running	Excessive temperature rise inside the pump	Cause	Remedy 1)
•								The pump generates excessively high differential pressure	Reset duty point
•								Excessively high back pressure	Check the plant for dirt. Fit larger impeller 2)
•						•	•	The pump and \ or piping are incompletely vented or primed.	Vent or prime the pump and piping completely
•								Suction line or impeller clogged	Remove the deposites in the pump and / or piping
•								Formation of air pockets in the piping	Alter piping lyout. If necessary, fit a vent valve
•						•	•	NPSH avaliable is too low (on positive suction head installations)	Check the liquid level. Mount the pump at lower level. Open isolating valve in the suction line fully. Alter suction line, if the losses in the suction line are excessive.
•								Ingress of air on shaft seal	Sealing liquid passage is clogged; clean it out. If necessary, arrange a sealing liquid supply from an outside source, or increase sealing liquid pressure. Fit a new shaft seal \ gland packing.
•								Reverse rotation	Change over two phases of the power supply cable.
•								Rotational speed is too low 2)	Increase the speed
•						•		Excessive wear of the pump internals	Repalce worn components by new ones.
	•					•		Pump back pressure is lower than that specified in the purchase order.	Adjust duty point accurately. In case of persistant overloading, trim the impeller, if necessary.2)
	•							Specifc gravity or viscosity of the fluid pumped is higher than that specified in the purchase order.	2)

Pump delivers insufficient liquid	Motor overloaded	Excessively high pump discharge pressure	Bearings overheating	Pump leaks	Excessive shaft sealing leakage	Rough pump running	Excessive temperature rise inside the pump	Cause	Remedy 1)
					•			Worn shaft seal	Check flushing / sealing liquid pressure. Renew shaft sleeve. Fit new shaft seal.
•					•			Grooving, score marks or roughness on shaft protection sleeve / shaft surface.	Renewshaftsleeve. Fit new shaft seal.
					•			The pump runs noisy.	Correct the suction conditions. Align pump. Rebalance rotor. Increase the suction pressure at the pump suction nozzle.
			•		•	•		Pump set misaligned.	Rectify.
			•		•	•		The pump is warped or resonance vibrations in the piping.	Check the piping connections and pump fixing bolts. Reduce the gap between the pipe supports, if necessary. Support piping using anti-vibration material.
			•					Excessive axial thrust 2).	Clean the balance holes in impeller.
			•			•		Too much or too little, or unsuitable lubricant quality.	Reduce quantity or top up lubricant, or change lubricant quality.
			•					The specified coupling gap has not been maintained.	Restore correct coupling gap in accordance with the data on the installation plan.
•	•							The motor is running on two phases only.	Replace the defective fuse. Check the electrical connections.
						•		The rotor is out of balance.	Clean the rotor. Rebalance the rotor dynamically.
						•		Defective bearings.	Fit new bearings.
						•	•	Insufficient rate of flow.	Insrease the minimum rate of flow.

1) The pump should be made pressureless before attempting to remedy in parts under pressure
2) Please refer KSB