INSTRUCTIONS ON INSTALLATION, OPERATION AND MAINTENANACE FOR SAM TURBO PUMP TYPE "MF"

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SAM TURBO INDUSTRY LIMITED

NEELAMBUR, COIMBATORE-641 014. INDIA

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 LIMITED

CONTENT

PLEASE FURNISH COMPLETE NAMEPLATE DETAILS, NAME OF THE PARTS, PART NOS AND MATERIAL OF CONSTRUCTION WHILE ORDER SPARE PARTS FOR THE PUMPS

GENERAL INSTRUCTIONS FOR INSTALLATION & MAINTENANCE OF MF PUMPS.

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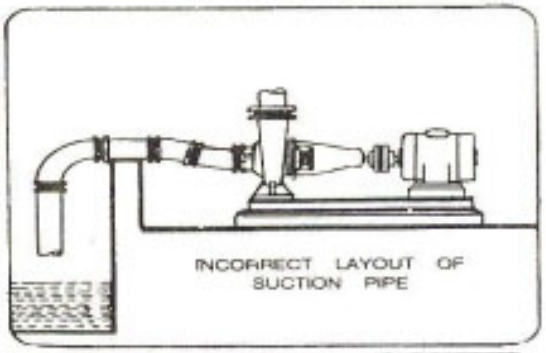

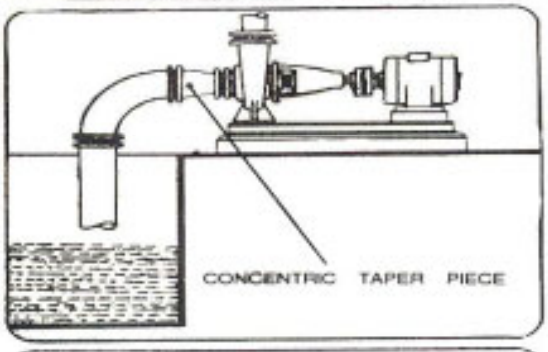

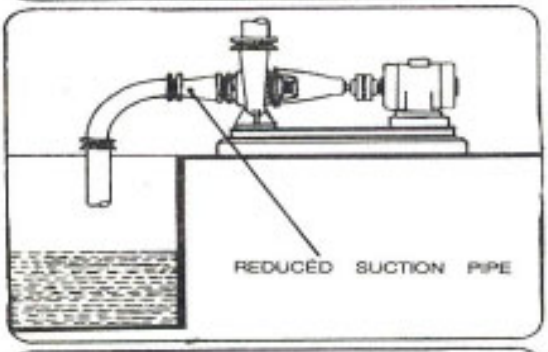

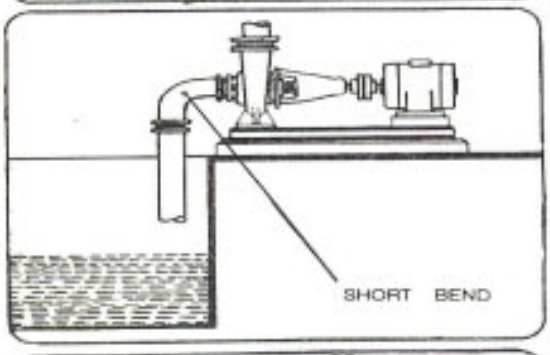

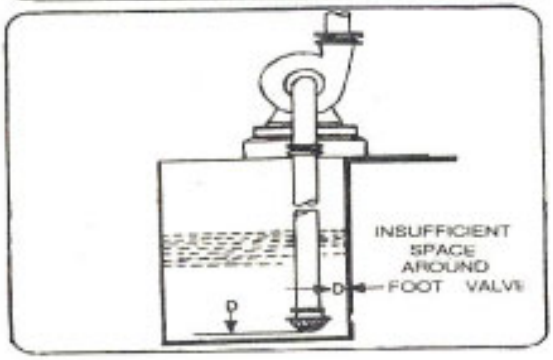

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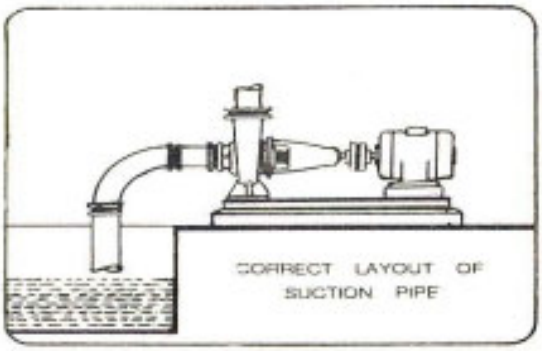

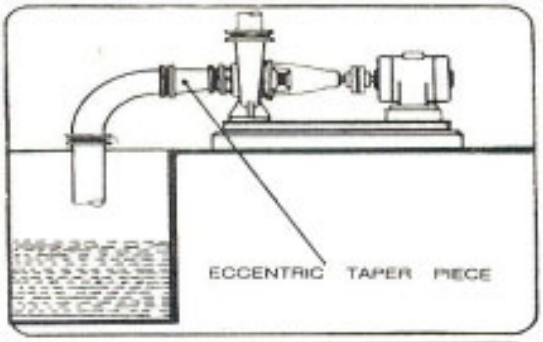

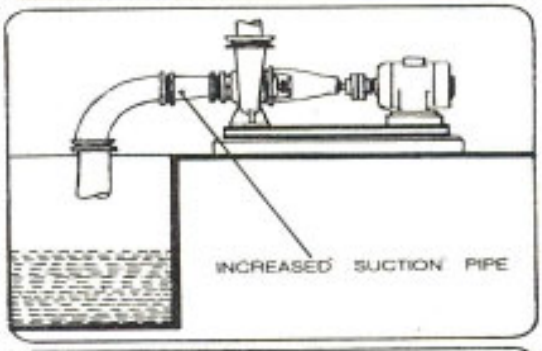

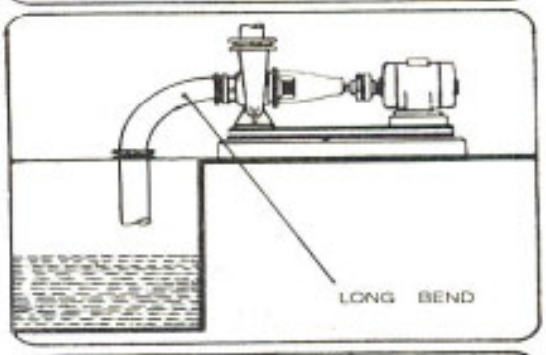

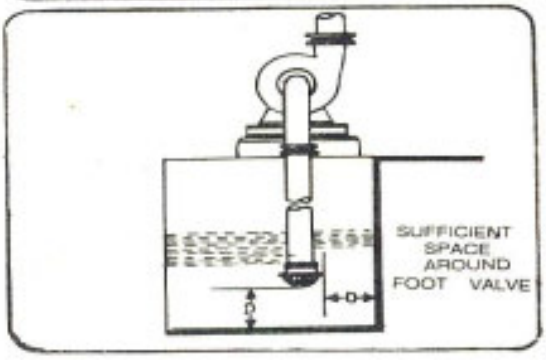

GENERAL INSTRUCTIONS FOR INSTALLATION, OPERATION & MAINTENANCE OF M F PUMPS

WARNING

The equipment supplied is designed for specific capacity, speed, pressure and temperature. Do not use the equipment beyond the capacities for which it is manufactured. The equipment manufactured is also shop tested for the satisfactory performance and if it is operated is excess of the conditions for which it is manufactured the equipment will be subject to excessive stresses and strains.

LOCATION

The pump should be located as near the liquid source as possible. This will minimise the suction lift an d pump will give better performance.
Ample space should be provided on all the sided so that the pump can be inspected while in operation and can be serviced conveniently whenever required.

FOUNDATION

The foundation should be sufficiently substantial to absorb any vibration and to form a permanent rigid support for the base plate. This is important in maintaining the alignment of a direct connected unit. A concrete foundation on a solid base is advisable. Foundation bolts of the proper size should be embedded in the concrete located by a drawing or template. A pipe sleeve about two and one-half diameter larger than the bolt should be used to allow movement for the final position of the foundation bolts.

ALIGNMENT

Pumps and drivers that are supplied by the manufacturers, mounted on a common base plate are accurately aligned before dispatch. However the base plats are flexible to some extent and therefore must not be relied upon to maintain the factory alignment. Re-alignment is necessary after the complete plete unit has been leveled on the foundation and again after the grout has been set and the foundation bolts has been tightened. The alignment must be checked after the unit is piped up and rechecked periodically.

FLEXIBLE COUPLING

A Flexible coupling will not compensate for misalignment of the pump and driver shafts. The purpose of the flexible coupling is to compensate for the temperature changes and to permit the movement of the shafts without interference with each other while transmitting power from the driver to the pump.

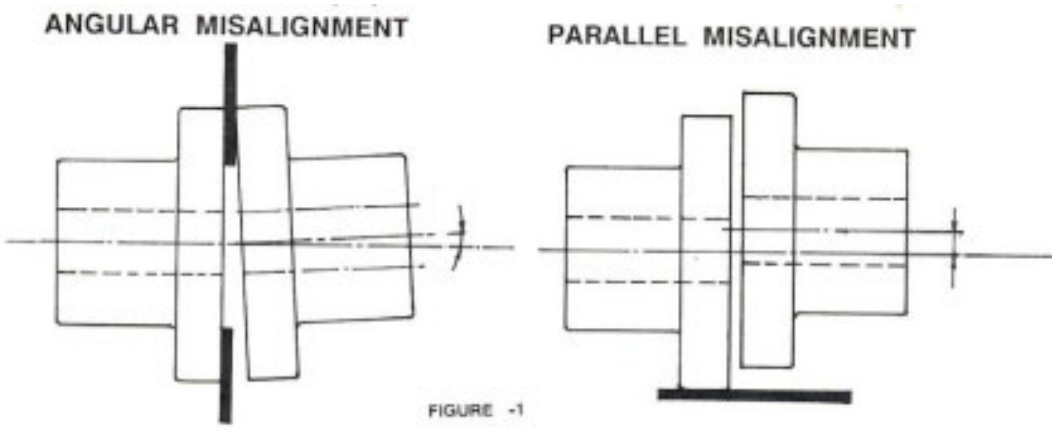

FIGURE -1

TYPE OF MISALIGNMENT (SEE FIGURE 1)

There are two types of misalignment between the pump shaft and the driver shaft.

(a) Angular misalignment : Shafts with axis concentric but not parallel
(b) Parallel misalignment : Shafts with axis parallel but not concentric

LEVELLING THE UNIT

When the unit is received with the pump and the driver mounted on the base plate, it should be placed on the foundation and the coupling halves disconnected. The coupling should not be reconnected until all alignment operations have been completed. The base plate must be supported evenly on wedges inserted under the four corners so that it will not be distorted or sprung by the uneven distribution of the weight. Adjust the wedges until the shaft of the pump and drivers are in level. Check the coupling faces, suction and discharged flanges for the horizontal and the vertical positions by means of spirit level.

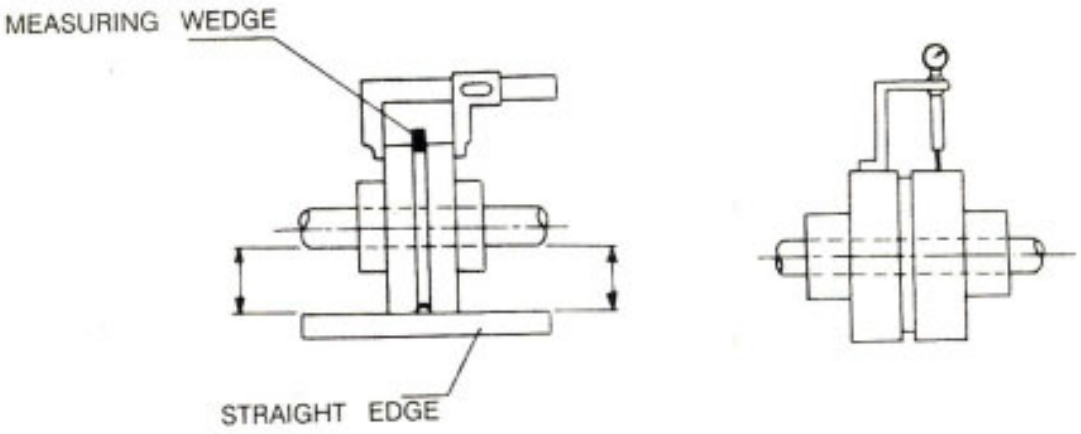

FIGURE 2

FLEXIBLE COUPLING ALIGNMENT (SEE FIGURE 2)

The two halves of the coupling should be atleast 4 mm apart so that they cannot touch each other when the driver shaft is rotated. Necessary tools for approximately checking are straight edge and on an outside caliper. A check for parallel alignment is made by placing a straight-edge across both coupling periphery at the top, bottom and bolt sides. The unit will be in parallel alignment when the straight-edge rests evenly on the coupling periphery at all positions. Care must be taken to have the straight-edge parallel to the axis of the shafts.

A check for angular alignment is made by using an outside caliper across the width of the coupling faces at various points.

Coupling alignment can be checked with dia gauge indicator as shown in figure 2.

GROUTING

When the alignment is correct, the foundation bolts should be tightened evenly but not too firmly. The unit can then be grouted by working soft concrete under the edges Foundation bolts should not be fully tightend until the grout is hardened usually 48 hours after pouring.

FACTORS THAT MAY DISTURB ALIGNMENT

The unit should be periodically checked for alignment. If the unit does not stay in line after being properly installed, the following are possible causes

(a) Setting, seasoning of the foundation.
(b) Pipe strains distorting or shifting the machines.
(c) Wear of the bearings.

PIPING

Both suction and delivery pipes and accessories should be independently supported near the pump so that when the flange bolts are tightend no strain will be transmitted to the pump casing. It is usually advisable to increase the size of both suction and delivery pipes at the pump nozzles in order to decrease the loss of head from friction and for the same reason piping should be arranged with as minimum bends as possible, as these should be made with a long radius wherever possible. The pipe lines should be free from scales, welding residuals etc., and have to be mounted in such a way that they can be connected to suction and delivery flanges without any stress on the pump. Adequate supports should be given to the pipe lines so that the weight of the pipe lines does not fall on the pumps. The use of the minimum number of the bends and other fittings will minimise the frictional losses.

SUCTION PIPE

The suction pipe should be as short as possible. This can be achieved by placing the pump near the liquid to be pumped. The suction pipe must be kept free from air leaks. This is particularly important when the suction lift is high. A horizontal suction line must have a gradual rise to the pump. Any high point in the pipe will be filled with the air and thus prevent proper operation of the pump. A concentric taper piece should not be used in a horizontal suction line as it forms an air pocket in the top of the reducer and the pipe. Use an eccentric piece instead.

The end of the suction pipe must be well submerged to avoid whirlpools and ingress of air but must be kept clear of any deposits of mud, silt grit etc. The pipe must be clear from any side of the wall by atleast 450 mm. The end of the suction pipe should be provided with the strainer of sufficient open area.

DELIVERY PIPE

A check (non-return) valve and a gate of sluice valve (regulating valve) should be installed in the discharge line. The check valve placed between the pump and the gate valve is to protect the pump from excessive pressure and to prevent water running back through the pump in case of failure of the driving machine.

Discharge piping should be provided with the sluice valve adjacent to the delivery flange to control the discharge, if required.

SEALING

Apply sealing liquid (external sealing) to the shaft seal cage to prevent entry of air in the case of pumps with packed stuffing box. It is convenient to tap the sealing liquid from the delivery line above the non- return valve.

FOOT VALVE

It is advisable to install a foot valve to facilitate priming. The foot valve should have sufficient clear passage of water. Care must be taken to prevent foreign matter from being drawn into the pump or choking the foot valve and for this purpose an efficient strainer should be provided.

STUFFING BOXES AND PACKING

Stuffing boxes should be carefully cleaned and the packing placed in them. Be sure that sufficient packing is placed at the back of the water seal cage. If the water to be pumped is dirty or grity, sealing water should be piped to the stuffing boxes from clean outside source of supply in order to prevent damage to the packing and shaft.' In placing the packing, each packing ring should be cut to the proper length so that ends come together but do not overlap. The succeeding rings of packing should not be pressed too tight as it may result in burning the packing and cutting the shaft. If the stuffing box is not properly packed, friction in stiffing box prevents turning the rotor by hand. On starting the pump it is well to have the packing slightly loose without causing an air leak, and if it seems to leak, instead of putting too much pressure on the gland, put some heavy oil in the stuffing box until the pump works properly and then gradually tighten up the gland. The packing should be occasionally changed.

BALL BEARINGS

Correct maintenance of ball bearings essential. The bearing manufacturers give the following as a guide to relubrication periods under normal conditions.

Three monthly when on continous duty.

Six monthly when on eight-hour per day duty.

The bearings and housings should be completely cleaned and recharged with fresh grease after 2500 hours or the nearest pump overhaul time.

PRIMING

No pumping action occurs unless the pump casing is filled with liquid. Pump casing and suction pipe must therefore be completely filled with the liquid and thus all air removed before the pump is started. Several different priming methods can be used depending on the kind of installation and service involved.

(1) Liquid level above pump level.

Pump is set below liquid level of source of supply so that liquid always flows to pump under positive head.

(2) Priming with foot valve.

(a) When pump is installed on suction lift with foot valve at the end of suction line, fill pump with water form some outside source till all air is expelled and water flows through air vent.

(b) When there is liquid under some pressure in the discharge pipe, priming can be effected by bypassing the pressure liquid around the check and gate valve. Of course, the original prime must be effected from some outside source.

NOTE: In this case, the foot valve must be capable of withstanding pump pressure and possible surge.

(3) Priming by ejector: An ejector operated by steam, compressed air or water under pressure and connected to air vent on top of casing can be used to remove air form and prime the pump on suction lift installations.

(4) Priming by dry vacuum pump: A hand or power pump sucks in all the air form the casing and the suction pipe, and thus primes the system.

STARTING

The pump must not be started without being primed. Be sure that the driver rotates in the proper direction as indicated by a direction arrow on the pump casing.

RUNNING

On account of its simple construction, the centrifugal pump requires practically no attention while running. Lubrication of the bearing and manipulation of the glands are the only things that need attention from the operator.

STOPPING

Before stopping the pump, close the gate valve. This will prevent water hammer on check valve.

STUFFING BOXES

Do not tighten the glands excessively. A slight dripping of water from the stuffing boxes when pump is running keeps packing in good condition.

CASING RINGS

Casing rings are fitted in the casing to reduce the quantity of water leaking back from the high pressure side to the suction side. These casing rings are fitted to maintain a small clearance and depend on the water in the pump for lubrication. When they are worn out, the clearance become greater and more water passes back into the suction. They must be replaced form time to time to restore the pump efficiency to its normal value.

SPARE PARTS

A set of ball bearings, a set of casing rings and a set of gland packing rings must always be kept at hand to ensure uninterrupted service from the pump. While ordering for spare parts, always give type, size and serial number of the pump as stamped on the name plate.

Refer ASSY NOS. : MB7-06 & MC7-06

PUMP TROUBLE

When investigating trouble with MF pumps, always remember that pumps have been tested at the factory and are mechanically correct when sent out. Discounting the possibility of damage during transit, most of the trouble in the field is due to faulty installations. Investigations show that the majority of troubles with centrifugal pumps result from faulty conditions on the suction side.

1. GENERAL

1.1 This booklet covers instruction for following type of MF pumps.

MF 300/400 / MF 250/270
MF 350/500
MF 450/550

1.2 These are single stage horizontal single volute type foot mounted end suction pumps fitted with oil lubricated ball bearings and thrust bearing, The pumps provided with semi open type mixed flow impeller. The delivery casing can be offered in following TWO different executions.

(1) VERTICON - (STANDARD) Pointing Vertically upwards.
(2) HORIZON - Pointing Horizontal

1.3 Pumps when properly installed and given due care in operation and maintanence should operate satisfactorily for a long period.

1.4 When the pump is received some time before the actual use of pump. It should be inspected and located in dry place. The coupling should be rotated once in a month to prevent pitting of bearing surfaces.

1.5 The special problems arising at site should be referred to the supplier full name plate details should be furnished while exchanging correspondence in connection with these pumps.

2. INSTALLATION

2.1 For location, preparing foundation, installation, alignment, general maintenance, trouble shooting etc. the instructions given in our publication 'General Instruction Manual on centrifugal pumps' which is printed along with this manual must be followed carefully.

2.2 The external sealing connection to the pump if applicable, must be made after installing and before commissioning of pump.

3. OPERATION

3.1 Before starting the pump check the following.

3.1.1 The pump rotates freely.

3.1.2 Sealing connections if any is properly tightened and adjusted.

3.1.3 Oil level in the bearing housing.

3.1.4 The direction of rotation of motor corresponds to the direction of rotation of the pump.

3.1.5 The pump and suction pipe is fully primed with the liquid.

3.1.6 Stuffing box is packed properly and gland is tightened.

3.1.7 Valve on delivery side is closed.

3.1.8 The cock for pressure gauge connection is closed.

3.2 Starting the pump

3.2.1 Open delivery valve 30% approx. of full open.

3.2.2 Start the motor. Let the prime mover pick up its full speed.

3.2.3 Open the valve on the delivery side fully.

3.2.4 Open the cock for pressure gauge connection.

3.3 During running of pump, check the following and regulate if necessary.

3.3.1 The pump and motor is running smooth.

3.3.2 The flow of sealing liquid is uninterrupted if external sealing is applicable.

3.3.3 Leakage through stuffing box is normal there should be leakage of 60 to 80 drops per minute.

3.3.4 The bearings not getting heated up excessively.

3.3.5 Head and capacity developed by the pump is as specified.

3.3.6 Power consumption is within limit.

3.3.7 Ensure that there is no mechanical friction in the pump.

3.3.8 Stop the pump immediately if any defects are noticed. DO NOT START IT AGAIN UNLESS DEFECTS ARE RECTIFIED. REPORT IMMEDIATELY TO THE SUPPLIER IF IT IS NOT POSSIBLE TO RECTIFY THE DEFECTS.

3.4 During stopping the pump

3.4.1 Close the valve on the delivery side.

3.4.2 Stop the motor.

3.4.3 Close the sealing connection.

3.4.4 If the pump is not required to be operated for long time drain the casing completely. Also drain the lubrication oil completely. The bearing housing should be dried internally with hot air and should be flushed with moisture free protective such as light oil or kerosene.

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4. TECHNICAL DATA

4.1 Direction of rotation

The standard direction of rotation is clockwise when viewed form driving ends. The pump with the reverse direction of rotation is not possible.

4.2 Bearings

The pumps are fitted with antifriction heavy duty single row deep groove ball bearing at driving and non driving end. Also a thrust bearing is provided at DE to take residual axial thrust. The details of bearings are given in Technical chart 1. The designation of bearings is as per SKF catalogue. However, equivalent bearings in type, capacity and dimensions also can be used.

4.3 Lubrication

Bearings are oil lubricated. The oil used should be a highly refined straight mineral product of high emulsibility free from running and acid forming tendencies. Detergent oil may cause foaming and emulsion difficulties and should not be used. The oil should be conform to the following grades of oil available in the market.

Manufacturers	Trade name
INDIAN OIL	SERVOSYSTEM-317
HINDUSTAN PETROLEUM	ENCLO-53
CALTEX	REGAL OIL B (R&O)

4.4 Refilling Period

For a new pump oil is to be changed after 200 hours of working. For subsequent filling, the oil is to be hanged after about 1000 hours of working.

4.5 Bearing Temperature

The maximum allowable bearing temperature is 80° C.

4.6 Stuffing box

The stuffing boxes are extra deep to reduce leakage and minimise the maintenance. Lantern ring is provided for sealing purpose.

4.7 Sealing

Self liquid is only used for sealing in most of the cases. However sealing arrangement with external liquid can be supplied against specific request.

4.8 Stuffing box packing

Teflon Impregnated Graphited Asbestos (TIGA) is used in the standard supply. However packing suitable for liquid handled is also supplied against order.

4.9 Flexible coupling

The pumps are supplied with pin and rubber bush type flexible couplings for the sizes and the quantity of rubber bushes. Please refer to technical data I.

5. MAINTENANCE

Preventive maintenance schedule is the periodical checks and precautions by which possibility of failure and breakdowns are made very remote.

5.1 Daily Checks

5.1.1 Pressure gauge readings

5.1.2 Bearing temperature

5.1.3 Oil level in bearing housing

5.1.4 Leakage through s1. Box

5.1.5 Noise and vibrations

5.1.6 Voltage and current

5.2 Periodical maintenance

5.2.1 Check the alignment of pump set

5.2.2 Calibrate the measuring instruments

5.2.3 Check the sealing connections

6. OVERHAULING

With normal daily operating spell, the pump will be due for overhaul after about 5000 working hours. This work should be done by skilled personnel. Please refer to the cross sectional drawing while dismantling and reassembling the pump.

6 .1 Dismantling (Please refer Assy Drg. No. MC7-06 & MB7-06)

6.1.1 Drain the volute casing (11.4) completely by removing drain pump (91.5).

6.1.2 Disconnect the pump from suction and delivery piping and auxiliary piping if any. Remove coupling nuts and take out coupling pins along with rubber bushes and coupling washer. Unscrew the bolts holding the pump on base plate and take out the pump. Drain oil from bearing bed (36.7) by unscrewing the drain plug (91.38).

6.1.3 Remove oil level indicator (65.23)n and accessories. Remove pump coupling. Take out coupling key (95.2)

6.1.4 Remove the nuts holding down suction adopter (18.01) form volute casing (11.4). Take out suction adopter by tightening release bolts. Take ‘O’ rings (42.4) from suction adopter (18.01)

6.1.5 Unscrew impeller nut (93.4). Take out the lock washer for impeller nut (94.04)

6.1.6 Remove the impeller (24.2) from pump shaft (22.3)

6.1.7 Take out impeller key (95.12)

6.1.8 Remove nuts holding down bearing bed (36.7) to the volute casing (11.4)and take it out carefully.

6.1.9 Unscrew gland nuts and remove gland (46.4). Take out gland packing (47.3) and lantern ring (46.10)

6.1.10 Remove the stuffing box bush (46.41) from volute casing by removing hexagonal bolts. The stuffing box bush is not provided in pumps type MF 300/400 and MF 350/500

6.1.11 Remove Shaft sleeve (53.6) 'O' Ring (42.41) and key for impeller and shaft sleeve (95.12). Take out deflector (51.9).

6.1.12 Remove outer bearing cap (37.2) along with oil seal (43.3) removing bolts and by tightening release bolts. Also remove inner bearing cap (37.3) along with oil seal (43.13) by unscrewing bolts.

6.1.13 Take out pump shaft (22.3) from bearing bed along with bearing lock nut bearing nut (93.3) ball bearing DE (33.3) thrust bearing (33.13) bearing adopter (37.21) and ball bearing NDE (33.3).

6.1.14 Unscrew lock nut and bearing nut (93.3)

6.1.15 Remove whole assembly that is bearing adopter, ball bearing D.E., thrust bearing by using suitable puller or bearing adopter (37.21).

6.1.16 Remove ball bearing NDE (33.3) and take out bearing spacer (33.6) this completes the dismantling of the pump.

Before proceeding of reassembly of rotating unit and pump check the following

- **a)** Ball bearing are rotating freely and smoothly. Renew them if they are not rotating freely or if the races are deteriorated.
- **b)** Check the shaft for possible run out. Remove the same before reassembling.
- **c)** Remove any dust or rust form parts and if necessary apply new paint/coating on the same.
- **d)** Clean all the parts thoroughly with kerosene or petrol.
- **e)** If reassembling is not to be made immediately, apply rust preventive coating on al machined surfaces.
- **f)** Examine all the pars for refitting, worn out etc. Damaged or corroded parts should be replaced by new.
- **g)** Ensure that newly fitted parts are free form damage and from burrs.
- **h)** Examine deflector 'O' Ring for damage or deterioration. If replaced with new make sure that they are of requisite dimensions.

6.2 Reassembly

6.2.1 Wipe light clean oil over shaft (22.3)

6.2.2 Insert bearing spacer (33.6) from NDE and fit ball bearing NDE (33.3).

6.2.3 Put compression springs for thrust bearing (33.13) in the holes provided into bearing adopter (37.21). Fit the cage of thrust bearing (33.13) into bearing adopter. Fit another cage of thrust bearing on thrust bearing adopter (33.5) on the shaft.

6.2.4 Fit ball bearing (33.3) at D.E AND N.D.E. Ensure that bearing spacer (33.6) is fitted at NDE prior to ball bearing. Fit bearing nut and lock it by means of bearing lock nut (93.3). Fit gasket (41.06) on bearing adopter (37.21).

6.2.5 Lift the shaft (22.3) duly fitted with bearings and insert it in bearing bed (36.7).

6.2.6 Fit outer bearing cap (37.2) and inner bearing cap (37.3). Ensure that gasket (41.05) & (41.07) is duly fitted and shaft is rotated freely.

6.2.7 Insert deflector (51.9) and gland (46.4) from shaft.

6.2.8 Fit bearing housing (36.7) to the volute casing (11.4) and tighten the nuts.

6.2.9 Fit shaft sleeve (53.6) along with '0' ring (42.41) and insert key for impeller and shaft sleeve (95.12). Ensure that '0' ring (42.41) is fitted properly. Fit gasket (41.08).

6.2.10 Fit impeller key (95.12) and fit the impeller (24.2)

6.2.11 Insert lock washer for impeller nut (94.04) over the pump shaft (22.3) and tighten impeller nut (93.4). Lock the impeller nut by means of lock washer.

6.2.12 Ensure that impeller rotates freely. Fit suction adopter (18.01) duly fitted with ‘O’ Ring (42.4) to volute casing (11.4) and tighten the nuts. Ensure that the pump shaft rotates freely.

6.2.13 Insert gland packing (47.3) along with lantern ring (46.10) and tighten the gland. Do not Over tighten it.

6.2.14 Fit coupling key (95.2) and fit pump coupling over shaft.

6.2.15 Install the pump on base plate and make suction and delivery as well as auxiliary pipe Connections.

6.2.16 Fill the oil in bearing bed. Align motor coupling with pump coupling and fix coupling pins and nuts along with rubber bushes and coupling washers.

This completes the reassembly of the pump.

TECHNICAL DATA - I

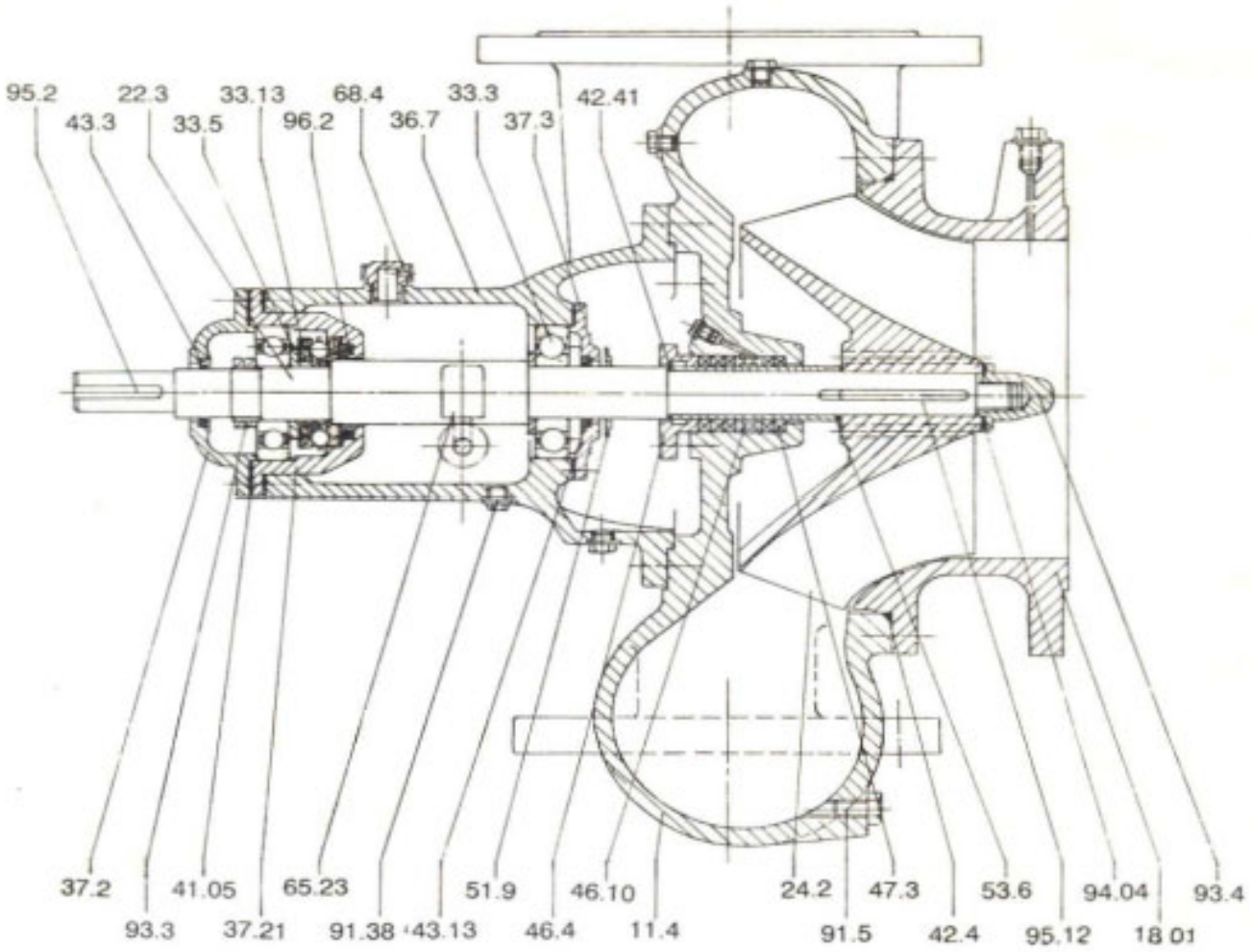
PUMP TYPE	SIZE		BEARING			APPROX. OIL	OIL SEAL SIZE	
	SUC	DEL	DE	NDE	THRUST(DE)	(LITRES)	DE	NDE
MF 300/400	350	300	6412	6412	51314	2.3	80X55X13	85X60X13
MF 350/500	350	350	6412	6412	51314	2.3	80X55X13	85X60X13
MF 450/550	400	450	6415	6415	51320	3.6	105X72X13	105X75X13
MF 250/270	300	250	6408	6408	51310	2.3	50X35X7	62X40X7

TECHNICAL DATA - II

PUMP TYPE	STUFFING BOX PACKING			'O' RING SPECIFICATION (SIZE IN MM)	
	SIZE(SQ) (MM)	LENGTH (MM)	POSITION OF LANTERN RING FROM IMPELLER	PART NO: 42.41 IDXTHICK	PART NO: 42.4 IDXTHICK
MF 300/400	12	1188	2 - L - 3	47X4	-
MF 350/500	12	1188	2 - L - 3	47X3	472X4
MF 450/550	16	1890	2 - L - 4	-	540X6
MF 250/270	8	900	2 - L - 4	40X4	280X4

SECTIONAL DRAWING WITH BILL OF MATERIAL

DRG NO : MC 7-06

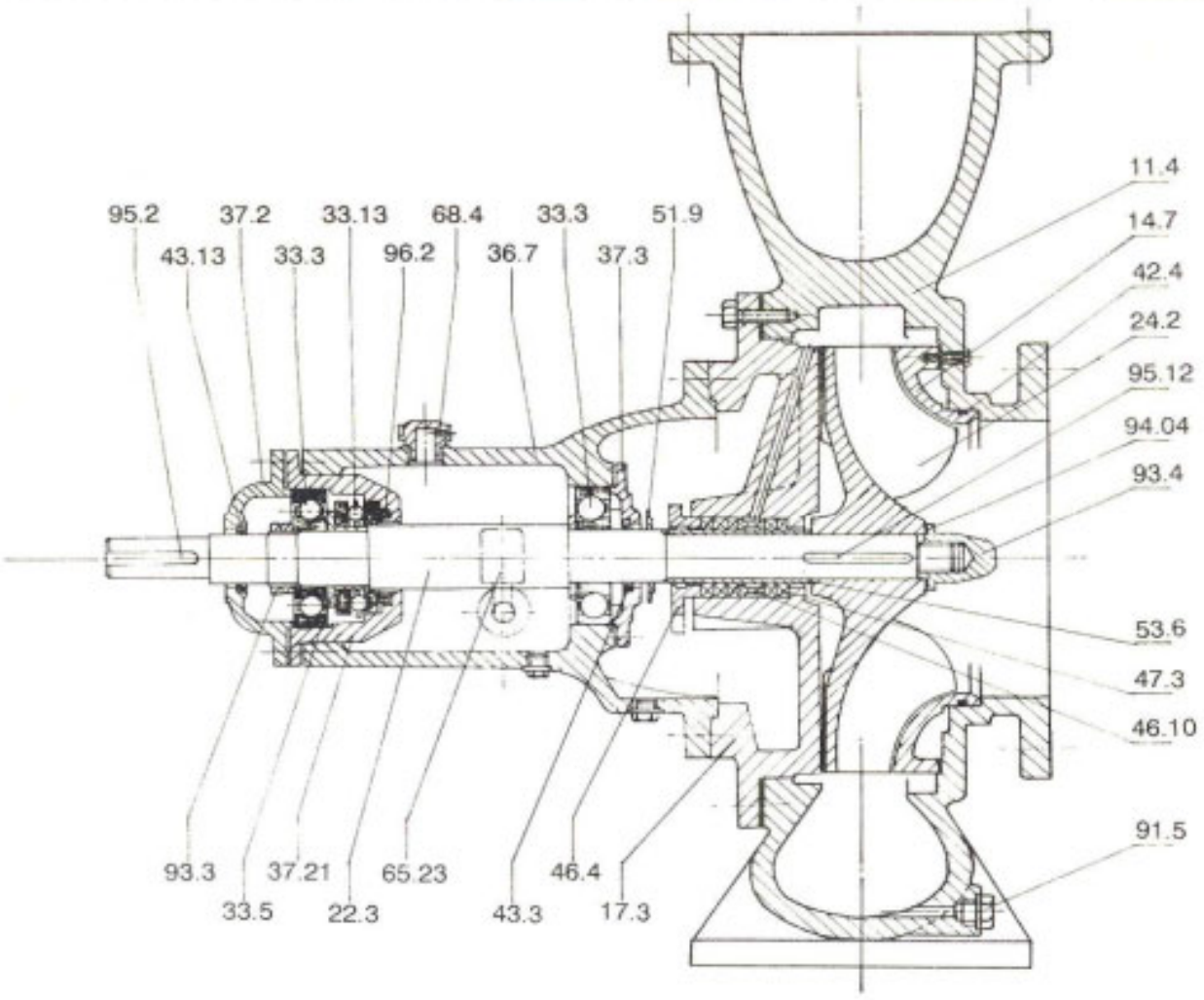


Pump type for 1. MF 300/400 2. MF 350/500 3. MF 450/550 4. MF 250/270

CODE NO.	PART NAME	MATERIAL	QTY.	CODE NO.	PART NAME	MATERIAL	QTY.
11.4	Volute Casing	IS210 FG 200	1	46.10	Lantern Ring	BS 970 En-8	1
18.01	Suction Adopter	IS210 FG 200	1	46.4	Gland	IS 210 FG 200	1
22.3	Pump Shaft	BS 970 En-8	1	47.3	Gland Packing	TIGA	1
24.2	Impeller		1	51.9	Deflector	IS 226 C15	1
33.3	Bearing	Steel	2	53.6	Shaft Sleeve	AISI-410	1
33.13	Bearing	Steel	1	65.23	Constant Level Oiler	Al & Plastic	1
33.5	Thrust Bearing Adopter	IS210 FG 200	1	68.4	Vent (Oil Inlet)	Plastic	1
36.7	Bearing Bed	IS210 FG 200	1	91.5	Plug (Casing Drain)	BS970 En-8	1
37.2	Outer Bearing Cap	IS210 FG 200	1	93.3	Lock Nuts	BS970 En-8	2
37.21	Bearing Adopter	IS210 FG 200	1	93.4	Impeller Nut	IS318 Gr.2	1
37.3	Inner Bearing Cap	IS210 FG 200	1	94.04	Lock Washer(Impeller Nut)	Copper	1
41.05	Gasket (For outer Cap)	Paper(Oil resistant)	1	95.12	Key (Impeller/sleeve)	BS970 En-8	2
42.4	'O' ring (Suction Adopter)	Neoprine Rubber	1	95.2	Key (Coupling)	BS970 En-8	1
42.41	'O' ring (Shaft Sleeve)	Neoprine Rubber	1	96.2	Spring	Steel	1 Set
43.13	Oil Seal	Synthetic Rubber	1				
43.3	Oil Seal	Synthetic Rubber	1				

SECTIONAL DRAWING WITH BILL OF MATERIAL

TYPE	: MF 300/400-S
SIZE	: 350 x 300
DRG NO	: MB7-06



CODE NO.	PART NAME	MATERIAL	QTY.
11.4	Volute Casing	IS 210 FG 200	1
14.7	Wearplate	IS 210 FG 200	1
17.3	Casing Cover	IS 210 FG 200	1
22.3	Pump Shaft		1
24.2	Impeller		1
33.3	Bearing (6412)	Steel	2
33.13	Bearing (51314)	Steel	1
33.5	Thrust bearing adopter	IS210 FG 200	1
36.7	Bearing Bed	IS210 FG 200	1
37.2	Outer Bearing Cap	IS210 FG 200	1
37.21	Bearing Adopter	IS210 FG 200	1
37.3	Inner Bearing Cap	IS210 FG 200	1
42.4	'O' ring (Wearplate)	Neoprine Rubber	1
43.13	Oil seal (60x85x13)	Synthetic Rubber	1
43.3	Oil Seal (55x80x13)	Synthetic Rubber	1

CODE NO.	PART NAME	MATERIAL	QTY.
46.10	Lantern Ring	BS970 En-8	1
46.4	Gland	IS210 FG 200	1
47.3	Gland Packing	TIGA	5Rings
51.9	Deflector	IS226 C 15	1
53.6	Shaft Sleeve	AISI- 410	1
65.23	Constant level oiler	Al & Plastic	1
68.4	Vent (Oil Inlet)	Plastic	1
91.5	Plug (Casing drain)	BS970 En-8	1
93.3	Lock Nuts (KM 12)	BS970 En-8	2
93.4	Impeller Nut	IS318 Gr.2	1
94.04	Lock Washer (Impeller Nut)	Copper	1
95.12	Key (Impeller/Sleeve)	BS970 En-8	2
95.2	Key (Coupling)	BS970 En-8	1
96.2	Spring	Steel	1 Set

BREAKDOWN - CAUSE - CHECK POINTS

In case of breakdown we recommand the location of the fault by using the following table.

BREAKDOWN	CHECK-POINTS								
Pump does not deliver	1	7	8	9	10	11	12	14	15
	17	18	19	23	25	26	56	57	58
Pump delivers at reduced capacity	1	2	3	4	5	6	7	8	9
	10	11	12	13	14	15	16	17	18
	19	20	21	22	56	57	58		
Delivery performance deteriorates	1	3	7	9	10	11	12	13	14
	19	20	21	22	23	24	53	57	62
Pump delivers too much	16	56	57	58					
Delivery is interrupted	1	3	6	7	8	9	10	11	12
	13	14	15	16	19	22	23	25	26
	56	57	58	62					
After stopping pump runs in reverse direction	52								
Very noisy	1	2	5	6	7	8	11	12	13
	15	19	20	22	54	55	56	57	62
Unsteady running of pump	19	20	22	31	32	33	35	36	37
	38	39	40	43	44	47	48	49	50
	51	54	55	58					
Stuffing box leaks excessively	24	27	28	29	30	31	47	48	49
	53								
Fumes from stuffing box	22	23	24	25	26	27	28	29	30
	41	42	43						
Pump rotor locked in Standstill position.	22	45	46	50					
Pump is heating up and seizing	23	24	25	26	27	28	29	30	40
	41	42	45	46	47	48	49	50	54
Bearing temperature increases	19	20	21	22	31	32	33	34	35
	36	37	38	39	40	41	42	43	44
	45	46	47	48	49	51	54	55	58
Motor will not start	14	22	60						
Motor gets hot or burns out	14	22	27	28	40	43	50	55	56
	57	58	59	60	61				
Motor is difficult to start	14	22	27	28	45	46	50	58	59
	60								

CHECK POINTS

1	Suction pipe, foot valve chocked.
2	Nominal diameter of suction line too small.
3	Suction pipe not sufficiently submerged.
4	Too many bends in the suction line.
5	Clearance around suction inlet not sufficient.
6	Shut off valve in the suction line in unfavourable position.
7	Incorrect layout of suction line (formation of air pockets).
8	Valve in the suction line not fully open.
9	Joints in the suction line not leak-proof.
10	Air leaking through the suction line and stuffing box etc.
11	Suction lift too high.
12	Suction head too low (difference between pressure at suction connection and vapour pressure too low).
13	Delivery liquid contains too much gas and / or air.
14	Delivery liquid too viscous.
15	Insufficient venting.
16	Number of revolutions too high.
17	Number of revolutions too low.
18	Incorrect direction of rotation (electric motor incorrectly connected, leads of phases on the terminal block interchanged).
19	Impeller clogged. 20 Impeller damaged.
21	Casing rings worn out.
22	Seperation of crystals from the flow of pumping liquid (falling below the temperature limit / equilibrium temperature).
23	Sealing liquid line obstructed.
24	Sealing liquid contaminated.
25	Lantern ring in the stuffing box is not positioned below the sealing liquid inlet.
26	Sealing liquid omitted.
27	Packing incorrectly fitted.
28	Gland tightened too much / slanted.
29	Packing not suitable for operating conditions.
30	Shaft sleeve worn in the region of the packing.
31	Bearing worn out.
32	Specified oil level not maintained.
33	Insufficient lubrication of bearings.
34	Ball bearings over-lubricated.
35	Oil/Grease quality unsuitable.
36	Ball bearing incorrectly fitted.
37	Axial stress on ball bearings no axial clearance for rotor).

38 Bearings dirty.
39 Bearings rusty (corroded).
40 Axial thrust too great because of worn casing rings, relief holes obstructed.
41 Insufficient cooling water supply to stuffing box cooling.
42 Sediment in the cooling water chamber of stuffing box cooling.
43 Alignment of coupling faulty or coupling loose.
44 Elastic element of coupling worn.
45 Pump casing under stress.
46 Pipe line under stress.
47 Shaft runs untrue.
48 Shaft bend.
49 Rotor parts insufficiently balanced.
50 Rotor parts touching the casing.
51 Vibration of pipe work.
52 Non-return valve gets caught.
53 Contaminated delivery liquid.
54 Obstruction in the delivery line.
55 Delivery flow too great.
56 Pump unsuitable for parallel operation.
57 Type of pump unsuitable.
58 Incorrect choice of pump for existing operating condition.
59 Voltage too low / power supply overloaded.
60 Short circuit in the motor.
61 Setting of starter of motor too high
62 Temperature of delivery liquid too high.