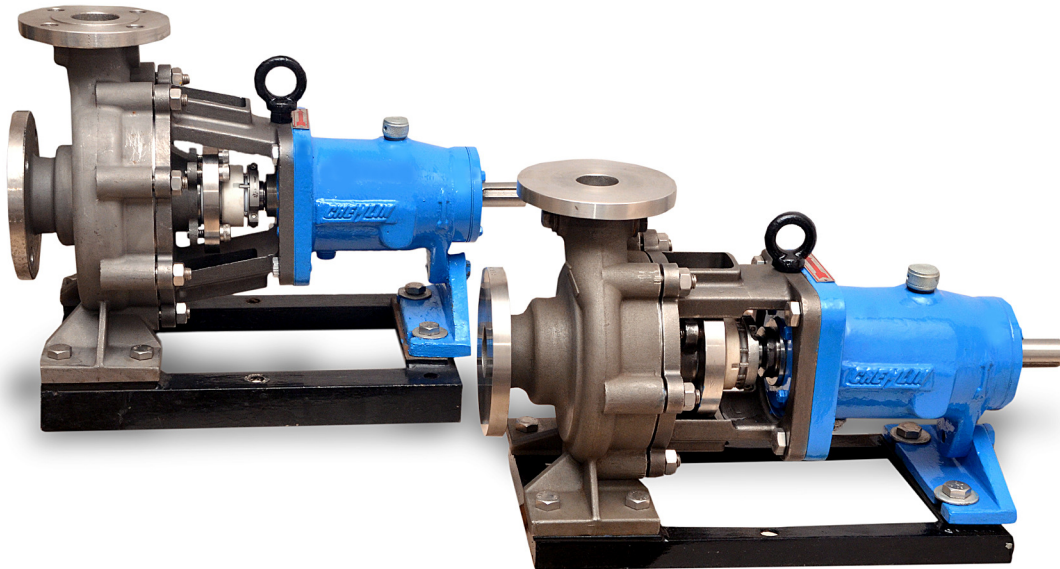


USER MANUAL

- ***INSTALLATION***
- ***OPERATION***
- ***MAINTENANCE***

HORIZONTAL CENTRIFUGAL PUMP SIZE - F25 TO F50



These instructions must be read thoroughly prior to Installing, Operating and Maintaining of this equipment.

Designed to Meet Your Specifications!

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Horizontal Centrifugal Pump

1. Introduction:

Chemlin range of Pumps is developed and manufactured with state-of-the-art manufacturing facility. The products are committed to continuous quality control and improvements using modern quality techniques, inspection procedures and instruments.

Chemlin manufactures products conforming to Indian / International Standards viz. ISO 2858, IS 5120, etc. and has ISO 9001:2008 Certification.

Proper care in Installation and Operation of Chemlin Pump will give trouble free performance over long periods of operation.

The Pump must not be operated beyond the specified parameters. For any of the query regarding the suitability of the Pump for the application intended, contact '**Chemlin**' for solution and proper guidance.

2. Inspection:

On receipt of the consignment, the Pump/Spares must be checked immediately against the necessary Dispatch/Shipping Documents and that there has been no damage in transportation. Any shortage and damage must be informed in writing to '**Chemlin**' immediately within seven Days on receipt of the consignment and the matter to be taken up with the transporter/ Insurance agency.

3. Storage and Handling:

The Boxes or Cartons may be unloaded using Forklifts or suitable handling devices and stored in position with no strains applied on any part of the Pump.

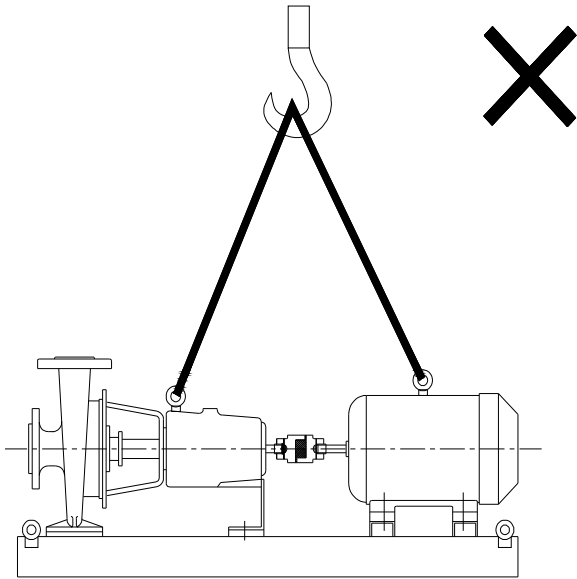
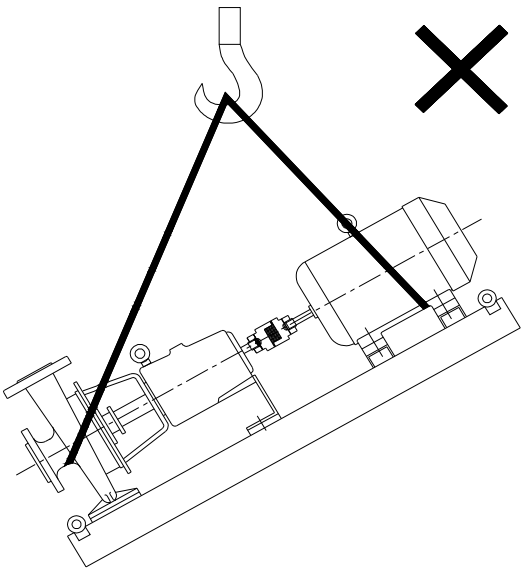
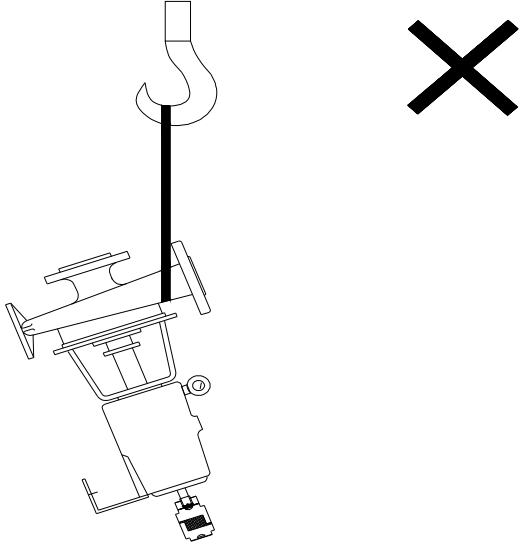
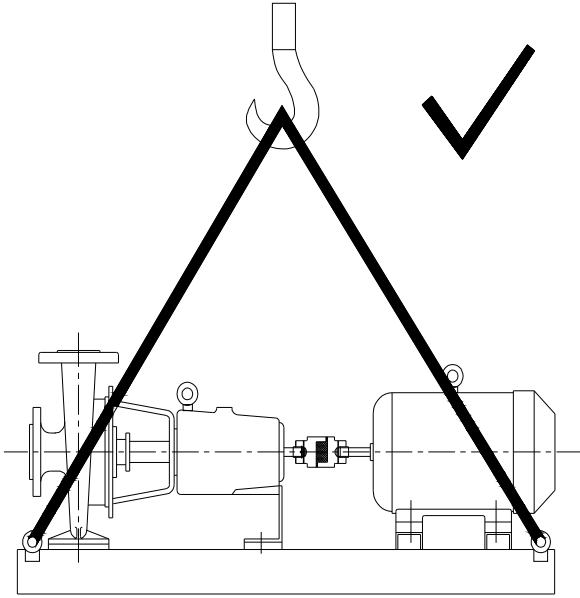
The Pumps and Motors have integral lifting lugs or eyebolts, which are intended for use in only lifting the individual equipment. Take care to lift the components or assembly above the centre of gravity to avoid the flipping. Also there should not be any bend or damage to external flushing or lubrication piping during handling.

1. It is advisable that the pumping unit be stored horizontally on a rigid foundation as shown in the drawing.
2. All loose un-mounted items to be packed in water proof material like plastic bag or box.
3. In case of assemblies ordered with external piping, individual components may be disassembled for easy handling.
4. Store the pump in clean and dry location away from vibration, moisture and dust.
5. Desiccant [Silica Gel] bags are to be placed inside the Pump and Component packages.
6. Generally pump openings are covered at the factory and should be retained to avoid access of dirt, dust particles and foreign matter while being stored.

When a new unit is not to be installed immediately then it should be stored in a Horizontal Position and in clean and dry place, possibly indoors, insuring that all mounting surfaces are clean and coated with grease.

When the service life of the product or the components is over, the same should be recycled or disposed using environmentally acceptable methods. If the product

contains harmful substances, care must be taken for disposing of safely using/wearing protective equipments.



4. Safety Precautions:

- **Always** lock out the power to the pump driver when performing maintenance on the pump
- **Always** lock out the suction and discharge valves when performing maintenance on the pump
- **Never** operate the pump without safety devices installed.
- **Never** operate the pump with suction and/or discharge valves closed
- **Never** operate the pump out of its design specifications
- **Never** start the pump without making sure that the pump is primed
- **Never** use heat to disassemble pump
- **Never** attempt to remove the safety guards while operating.
- **Never** put hands in the openings of the pump while in operation.
- **Never** Step on the Pump/Piping connected to the Pump in case the pump is handling corrosive liquids.
- Inspect the entire system before start-up
- Monitor the system during operation and perform maintenance periodically or as required by the application.
- Before performing maintenance on the pump, check with appropriate personnel to determine if skin, eye or lung protection is required and how best to flush the pump
- When performing maintenance, pay special attention to all cautionary statements given in this manual.

Failure to observe safety precautions can result in personal injury, equipment damage or malfunction.

5. Installation:

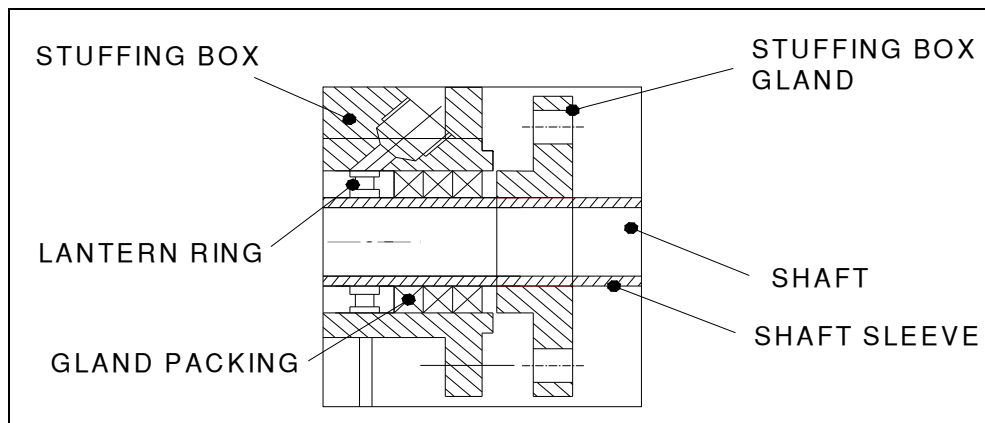
All personnel involved in the operation, installation, inspection and maintenance of the Pumps must be qualified or trained to carry out the respective work. If not, necessary knowledge and skill, appropriate training and instructions must be provided. Customer can call for the training provided by supplier.

All plant safety requirements, health laws and regulations are to be followed.

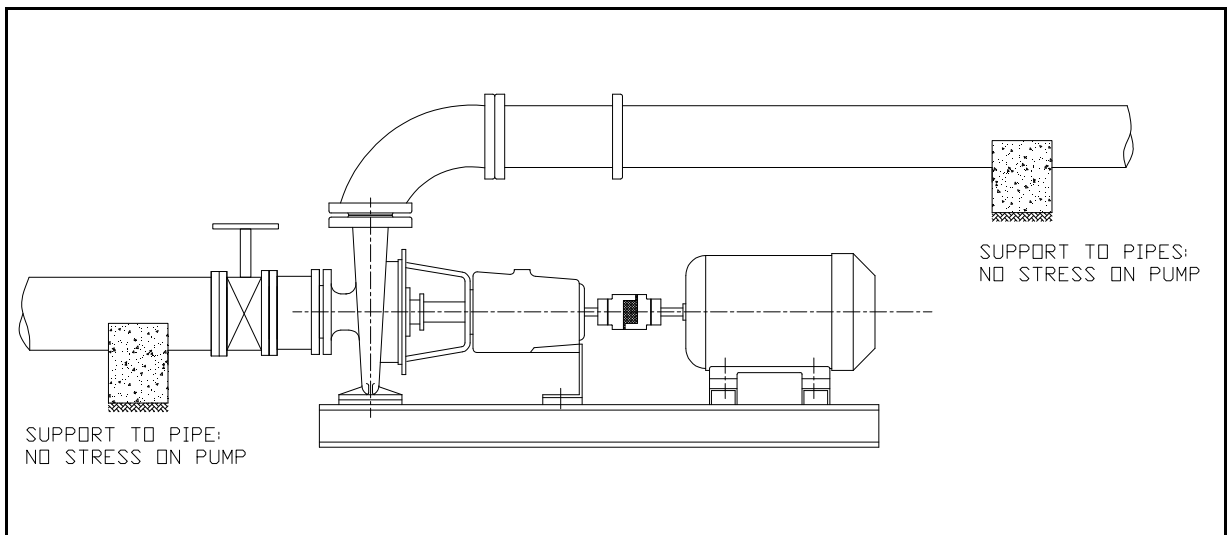
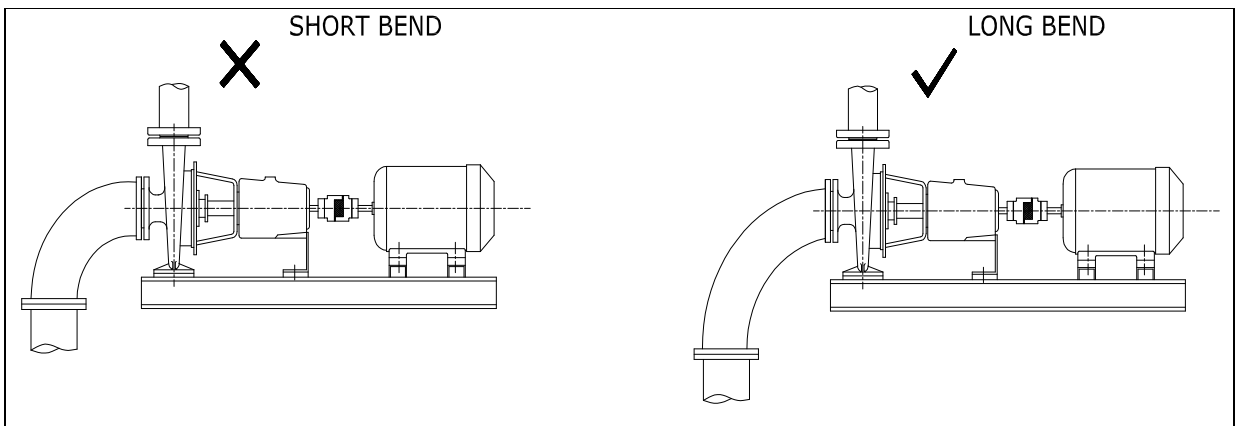
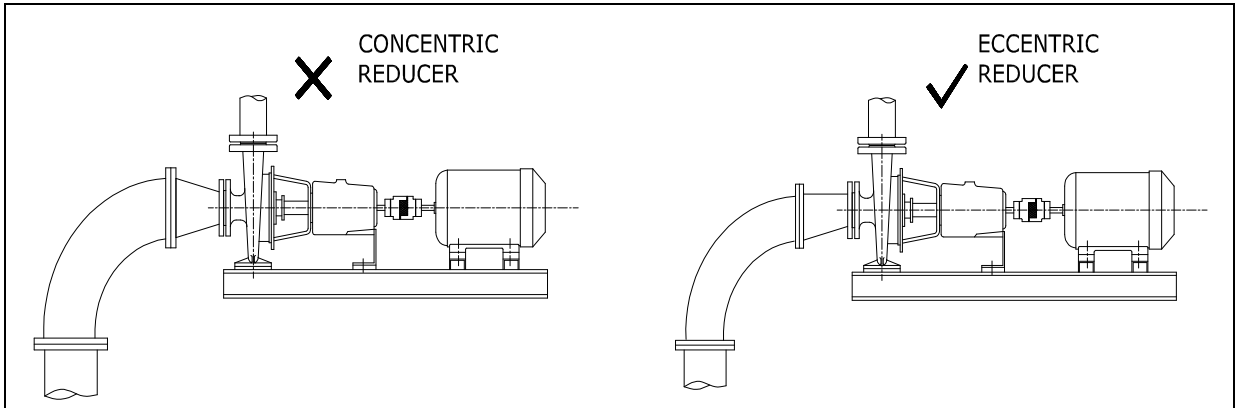
01. Check the Pump location considering dimensions and dismantling procedures of the Pump.
02. Make sure that the Pump is easily accessible for maintenance and inspection and has adequate ventilation.
03. Clean thoroughly all surface of pump. Remove pump Coverings and clean the flange faces.
04. The foundation may consist of a structure heavy enough to afford permanent rigid support to the full area of base plate and absorb any normal strains or shocks. Concrete foundations are preferred and the misalignments are to be corrected by shims. The Base plate should be properly mounted on the foundation.
05. The alignment of the Pump and motor (Prime mover) shaft is very important considering its operation and has to be done precisely. The coupling bolts should be removed and then the Motor leveling and alignment done using metallic shims. The alignment can be checked by using a straight edge on the diameter of coupling along with tapered wedge/filler gauges between the faces of couplings. For more precise alignment a Dial indicator can also be used.
06. The suction piping should be as direct and short as possible. Generally the size of suction piping is larger than the Pump suction nozzle and eccentric reducers should be used. The discharge piping should have adequate controls for throttling and preventing reverse flow in the event of unexpected failure of

- prime mover. The piping should be independently supported and should not impose any stress on the pump flanges.
07. Expansion joints are advised on suction and discharge piping when handling hot liquids.
 08. A full-face asbestos gasket (1.5 mm) or an asbestos rope gasket may be used. Care should be taken that it is perfectly uniform.
 09. Install and align the Pump.
 10. It should be noted that the running clearances in the Wear rings are designed to maintain a flow of liquid for lubrication and any external stress or strain will distort the alignment & cause pump to bend. Operation in this condition will result in reduction of pump life.
 11. Discharge line must be properly supported to avoid any strain and bending moments to the pump unit, which may result in internal misalignments causing failure of bearings & internal parts.
 12. Pump shaft must be checked for freeness without packing stuffing box & before connecting motor coupling. This will help to track high spots in wear rings.
 13. When the Packing is compressed, the Gland must be in line with the Stuffing Box and Shaft. **[Fig. A]**
 14. Check direction of rotation of motor, which is shown on upper part of bearing housing, before connecting the motor coupling to pump couplings.
 15. Connect motor coupling to the pump ensuring proper alignment of coupling.
 16. Check lubrication of motor bearings.
 17. Don't run pump dry as the rotating parts may damage.
 18. The minimum liquid level 'at Pump starting' must be maintained according to the approved drawing.
 19. Before starting the pump, check that no foreign matter such as stones, bricks, welding slag etc. exists in tank. They will be drawn into the Pump and cause premature failure of the Pump Bearings and Wear Rings. Also it is desirable to start, the pump with discharge valve partially open (1/4 to 1/3).
 20. Protection / Detection device should be installed to monitor the liquid temperature does not rise to an unsafe level.
 21. Power monitor/ Liquid Level indicators should be installed to stop the pump against dry run or start up empty.
 22. It is recommended that leakage/ hazardous gas detection system to be installed wherever necessary.
 23. It is recommended that condition monitoring systems to be installed for controlling surface temperatures at Ball bearing and vibrations of the pump system.

Fig. A



➤ **Guidance for Suction and Discharge Piping:**

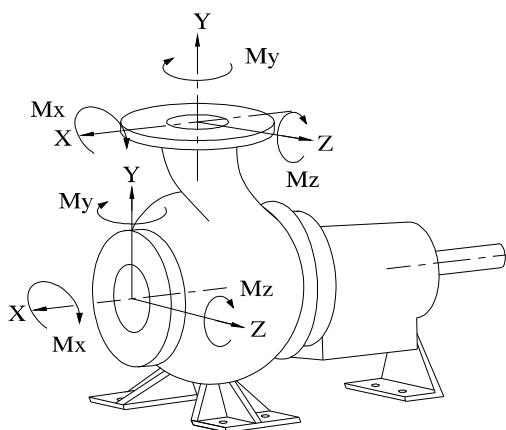


5.1. Nozzle Loading:

Discharge piping should be constructed to fit the discharge piping flange. The pump can accommodate fair amount of loads without affecting the operation of the pump. However, the installation should not impose unnecessary loads to the discharge flange.

The API 610 standard covers nozzle loads for horizontal pumps and vertically suspended pumps for nozzle sizes up to 16 in. (400 mm).

Generally, small pumps not anchored to their foundations can tolerate higher nozzle loads than anchored ones.



Location/Orientation	Nozzle-Loading Force as a Function of Flange Size - SI Units N					
	Nominal Size of flange (DN)					
	≤50	80	100	150	200	250
Each Top Nozzle						
<i>F_x</i>	710	1070	1420	2490	3780	5340
<i>F_y</i>	580	890	1160	2050	3110	4450
<i>F_z</i>	890	1330	1780	3110	4890	6670
<i>FR</i>	1280	1930	2560	4480	6920	9630
Each Side Nozzle						
<i>F_x</i>	710	1070	1420	2490	3780	5340
<i>F_y</i>	890	1330	1780	3110	4890	6670
<i>F_z</i>	580	890	1160	2050	3110	4450
<i>FR</i>	1280	1930	2560	4480	6920	9630
Each End Nozzle						
<i>F_x</i>	890	1330	1780	3110	4890	6670
<i>F_y</i>	710	1070	1420	2490	3780	5340
<i>F_z</i>	580	890	1160	2050	3110	4450
<i>FR</i>	1280	1930	2560	4480	6920	9630
	Moment (N-m)					
Each Nozzle						
<i>M_x</i>	460	950	1330	2300	3530	5020
<i>M_y</i>	230	470	680	1180	1760	2440
<i>M_z</i>	350	720	1000	1760	2580	3800
<i>MR</i>	620	1280	1800	3130	4710	6750

6. Maintenance:

The Maintenance schedules of Pump are to be properly planned and divided into three categories.

- i) Daily observation of Pump operation
- ii) Semi-annual observation and
- iii) Annual Inspection

i) Daily Observation / Inspection

Daily Inspection by the operators should be done and irregularities like change in sound of running pump excessive leakage in stuffing box, heating of Bearings etc. should be reported immediately. The temperature of bearings increases in the beginning, however, after a few hours of operation will stabilize.

ii) Semi-annual Inspection

The gland packing of the pump should be checked semi-annually and replaced if necessary. The pump and driver alignment is to be checked and corrected. The Oil/Grease in bearing housing is to be refilled/ changed. The tightening of fasteners (Bolts, nuts, studs etc.) to be checked.

iii) Annual Inspection

The pump should be carefully dismantled and the running clearances between wearing rings etc. to be checked. The parts in contact with liquid to be checked for correction / abrasion and should be replaced by original spares, if necessary. The bearings to be cleaned and checked thoroughly and should be changed if necessary. The rotating assembly should be changed if necessary.

The corrosion / Abrasion on the parts in contact with liquid like Volute, Impeller, Stuffing box, Wearing box, and necessary parts changed. The Ball Bearings to be removed cleaned and replaced if necessary. The rubber elements in coupling are to be checked and replaced. If the annual shut-down is taken for a longer period the parts like wearing rings, sleeve shaft. Bearings etc. should be coated with rust preventives and the reassembled pump should be stored in a dry location.

6.1. Required Tools/Tackles:

It is required to keep the following essential tools during disassembly/assembly of the pump for maintenance,

- Induction Heater for Bearings
- Files
- Dial Indicators
- Soft Mallet
- V-Blocks
- Set of Spanners
- Hand Wrenches
- Bearing Pullers
- Circlip Plyers

6.2. Diagnosing Operating Difficulties

A. Rise in Bearing Temperature

1. Over greasing of ball bearings
2. Misalignment in pump and motor coupling
3. Improper Installation of Ball Bearing
4. Damaged Ball Bearing
5. Shaft may have bend

B. Increased Power Consumption

1. Higher revolutions of motor
2. Liquid pumped may be of higher specific gravity than that for which the pump was designed
3. Shaft may be bent
4. Excessive tightening of gland
5. Metal binding of rotating elements
6. Larger impeller diameter

C. Noise in Pump

1. Motor Ball Bearing may be worn out
2. Misalignment between Pump & Motor Coupling
3. Tank frame receiving pump coverplate may not be rigid
4. Shaft may be bent
5. Metal binding of rotating elements
6. Pump Ball Bearing may be damaged
7. Unbalanced Impeller due to partial clogging
8. Head may be lower than specified resulting in increase in discharge

D. Insufficient or No Discharge

1. Low Liquid level in tank
2. Wrong direction of rotation
3. Impeller may be clogged, or suction cover may be choked
4. Discharge line is blocked
5. Turbulence, Cavitation in sufficient suction head, air or gas entrapment with liquid
6. Impeller diameter is smaller than required
7. Damaged Impeller
8. Higher discharge head
9. Discharge valve in closed position

7. Servicing of "Chemlin" Horizontal Centrifugal Pump

Owing to its unique "Back Pull-Out" construction "CHEMLIN" Horizontal Chemical Process Pump is extremely easy for maintenance. The down-time in maintenance is also considerably reduced, hence reducing the loss of production in down-time.

7.1. Dismantling

Before starting, the dismantling procedures confirm that the liquid handled has been completely drained of from the lines. It is not necessary to remove the Base-plate from foundation unless until it is damaged or the strength of Base-plate is reduced due to heavy corrosion etc. Dismantling can be done by following the under mentioned procedure:

- i) Remove the spacer element between couplings by unscrewing the bolts by screwdriver and metal covers & remove snap wrap.
- ii) By unscrewing nuts on Adapter (29), Casing (20) and support foot (9) the whole pump assembly can be removed without disturbing the casing (and its pipe lines) and Electric motor position.
- iii) Remove Impeller Nut (19), Impeller (16), Stuffing Box (24-A), Mechanical Seal Assembly (Stationary Part; if present).
- iv) Remove Shaft Sleeve (27) (Along with rotating part of Mechanical Seal and mark position) by puller if available.
- v) Remove Bearing-housing covers (23) and with help of puller etc. remove shaft towards the motor end along with out-board Bearings. Remove inboard bearing.
- vi) Clean all the parts thoroughly along with casing (20).
- vii) When the Mechanical Seal is installed with external flushing/quenching piping, first remove the same and then remove the Adaptor Bolts.

7.2. Cleaning

Clean all parts thoroughly. Ball Bearing should be cleaned & kept carefully, ensuring that no foreign matter gets into it.

7.3. Inspection

Inspect the parts like Wear Ring (18), Shaft Sleeve (27), Impeller Nut (19), Impeller (16), Stuffing Box (24-A) etc. for Corrosion, Abrasion, Wear, Inspect Shaft (12) for dimensional variations or scratches if any, and also for straightness. Inspect the wear faces of Mechanical Seal if fitted. Prepare a checklist and replace the respective parts.

7.4. Assembling

- Fit the out-board Bearing on shaft and the assembly in Bearing housing (07) from the motor end.
- Fit in board bearing from Pump end and complete the assembly of shaft and bearing housing (07). Check rotation of Shaft for freeness.
- Place the adapter (29) in position with Nut-bolts and do assembly of shaft sleeve (27), Stuffing Box (24-A) (Along with Gland (21-B) or Mechanical Seal Assembly).
- Place the Impeller (16) in position and tighten the Impeller Nut (19).
- This sub-assembly is now ready for putting into the Casing (20). While tightening the nut on the studs from Casing (20) care should be taken for putting the right position of Stuffing Box (24-A)
- Position the lantern Ring (14) by placing proper number of Gland-Packing. The Gland packing is to be lubricated for minimizing the starting load on prime mover. (In case of Mechanical Seal the pressure of rotating seal face on stationary Seal face is to be maintained as per manufactures advice. **[Fig A]**)
- Fit the pump coupling and Motor coupling on respective shafts and recheck the alignment. Usually it is not necessary to do the realignment but it is advisable to check the alignment for any distortions.
- Complete the assembly by putting the spacer element between couplings and tight on putting the Snap Rings in position, and then screw on the metallic covers. Check the freeness of Pump Shaft.

8. Recommended Spares:-

Following are the recommended spares, which should be maintained along with the Pump.

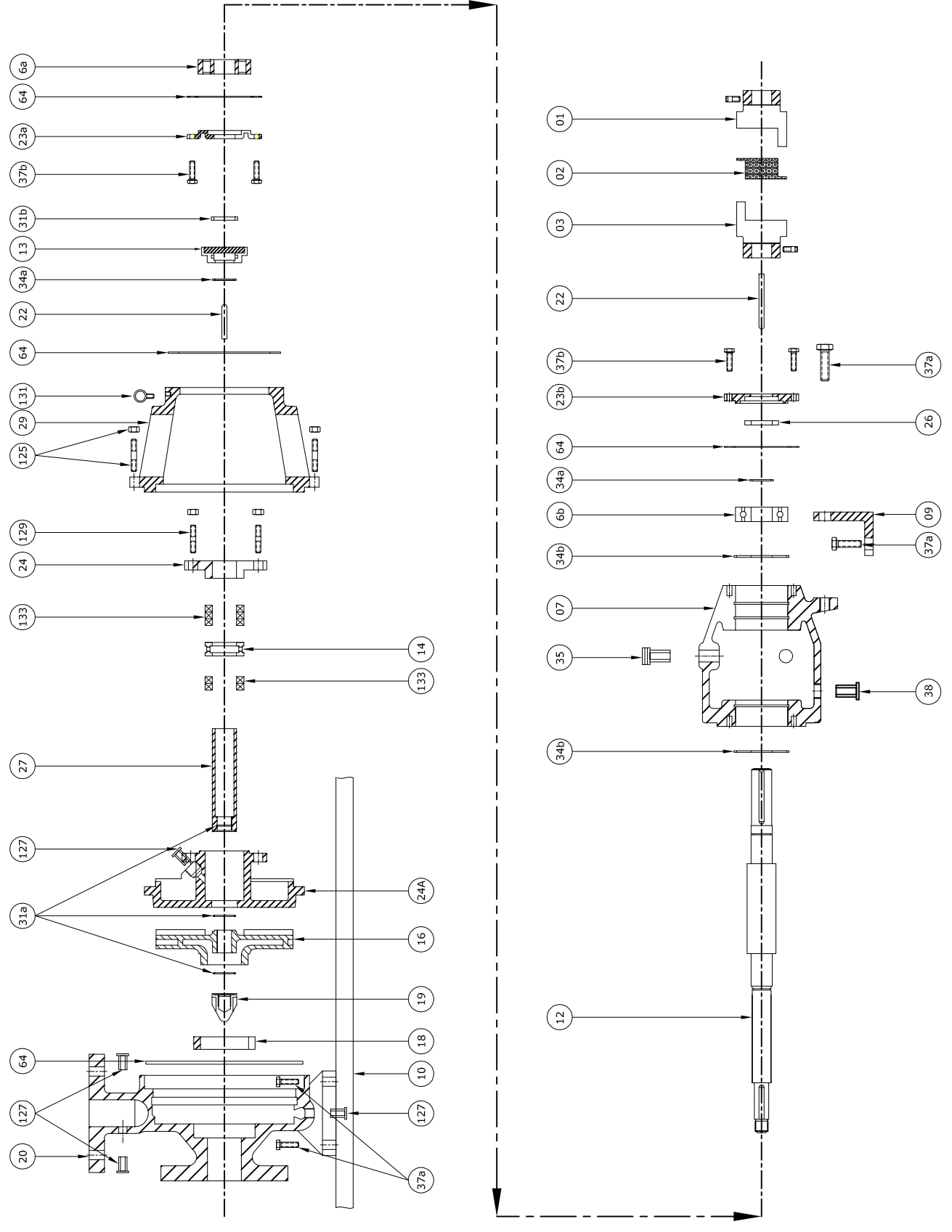
i)	Impeller (16)	1 No.
ii)	Casing Ring (18)	1 No.
iii)	Shaft Sleeve (27)	1 No.
vi)	Shaft (12) complete with Nuts (19, 21), (10) & Keys (22)	1 Set
v)	Ball Bearing (6a, 6b)	1 Set
vi)	Set of Coupling, Spacer, Snap Ring (1,2,3)	1 Set
vii)	Split Gland Follower (24)	1 Set
viii)	Set of Gaskets & 'O' Rings (64, 31a,b)	1 Set
ix)	Gland Packing/Mechanical Seal (133)	1 Set
x)	Set of Nuts & Bolts (37)	1 Set
xi)	Set of Studs with Nuts (125)	1 Set

9. Part List & Exploded Views:-

9.1. Part List of Standard Construction - HCP

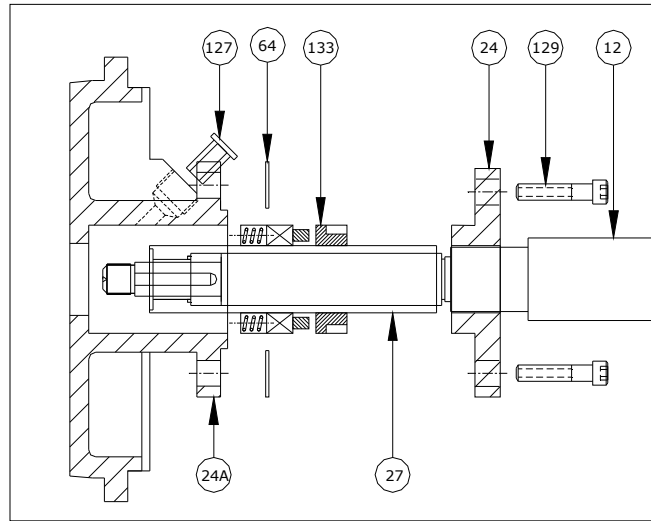
Part Name	Part No.
Motor Half Coupling	01
Spacer, Snap Ring	02
Pump Half Couplings	03
Inboard Ball Bearing	6a
Outboard Ball Bearing	6b
Ball Bearing Housing	07
Support Foot	09
Base Plate	10
Shaft	12
Deflector	13
Lantern Ring	14
Impeller	16
Casing Ring	18
Impeller Nut	19
Volute Casing	20
Impeller Key	22
Stuffing Box Gland/ Gland Plate	24
Inboard Ball Bearing Cover	23a
Inboard Ball Bearing Cover	23b
Gland Plate	24
Stuffing Box	24A
Oil Seal	26
Shaft Sleeve	27
Adaptor	29
Suction Head	45
'O' Ring	31a
'O' Ring	31b
Circlip Internal	34a
Circlip Internal	34b
Circlip External	34c
Breather Plug	35
Oil Level Indicator/Leveler	36
Full Thread Bolts	37a
Full Thread Bolts	37b
Gasket set	64
Studs & Nuts	125
Plugs	127
Allen Bolts	129
Lifting Lugs/Eye Bolts	131
Mechanical Seal/Gland Packing	133

9.2. Exploded view-I: Standard Construction - HCP



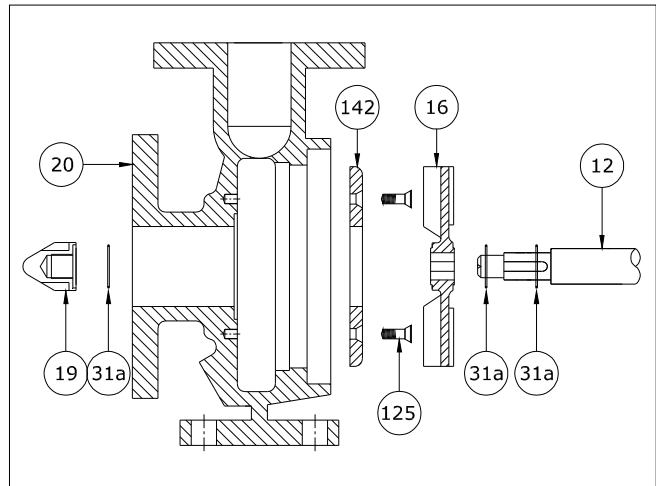
9.3. Exploded view-II: Mechanical Seal assembly

Part Name	Part No.
Shaft	12
Stuffing Box Gland	24
Stuffing Box	24A
Shaft Sleeve	27
Gasket	64
Allen Bolts	129
Plug	127
Mechanical Seal	133



9.4. Exploded view-III: Wear Plate assembly

Part Name	Part No.
Shaft	12
Impeller	16
Impeller Nut	19
Volute Casing	20
'O' Ring	31a
Allen Bolts	125
Wear Plate	142



10. Contact Details:

Difficulties encountered other than mentioned in this manual may please be forwarded with complete details to the following:

Head Office:-

Chemlin Pumps & Valves Pvt. Ltd.,
F-5, "Atharva Estate", 268/2,
"E" Ward Tarabai Park,
Kolhapur : 416 003, (Maharashtra) India
Tel : (0231) 2653123, 2651964.
Fax : (0231) 2655389.

E-Mail : sales@chemlinindia.com, info@chemlinindia.com
Website : www.chemlinindia.com

Works/Factory:-

Chemlin Pumps & Valves Pvt. Ltd.,
235/6, Poona-Bangalore Road
Kagal : 416 216, (Maharashtra) India
Tel : (02325) 244108

E-Mail : works@chemlinindia.com

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