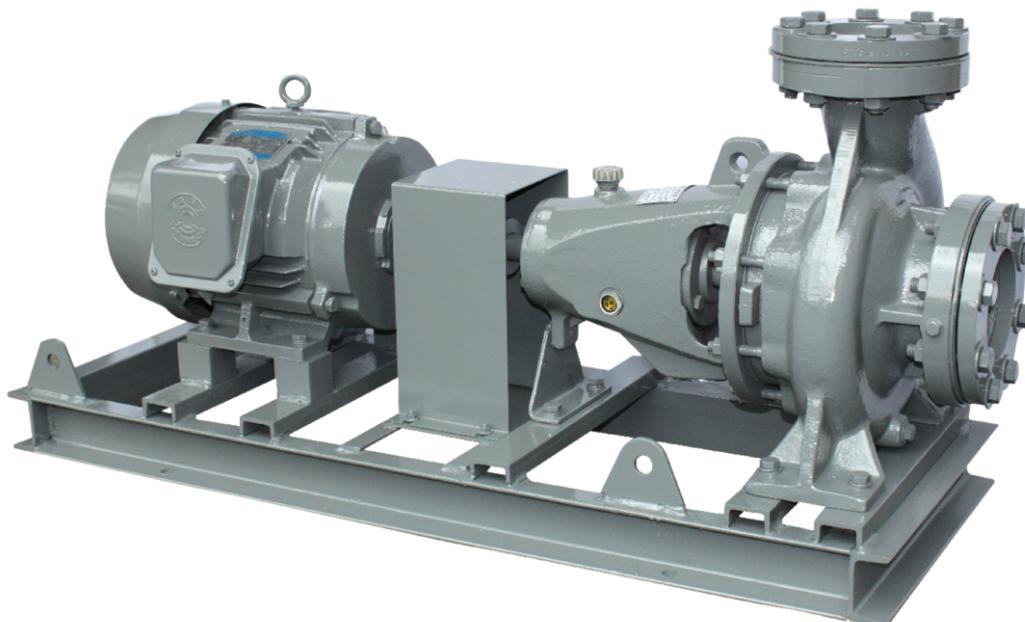




**XA-SERIES**  
**END SUCTION CENTRIFUGAL PUMP**  
**INSTRUCTION MANUAL**



**ASIA AUTOMATIC PUMP CO.,LTD**

<http://www.evergushpump.com.tw>

**Assembly**

Check the parts whether there are defects affecting assembly, or scrub them neatly and then start the process of assembly.

⚠ Caution: The mating face, especially the friction face of the mechanical seal should be cleaned up, and there should not be obvious scratch, flaw and bump with the sealing face; otherwise replace it with new one.

1. Prepare the assembly work by putting the bolts and screws etc. in the places of the corresponding elements.

2. Locate the parts such as the O rings, paper washers, oil seals and put them in the places of the corresponding elements.

⚠ Caution: During mounting the O seal ring, it is easily to fall off and fold, please take care to avoid of water leakage.

3. If mechanical seal is adopted, put the motion seal ring and stationary seal ring on the shaft and in the pump cover respectively.

Next, place the parts such as the packing, packing rings, stuffing box glands and the rear packing ring (if any) in the pump cover in sequence.

⚠ Caution: During mounting, the stationary rubber ring of mechanical seal is easily to slant, which would cause to leakage, so check it carefully.

4. Mount the ball bearings to the shaft before put it in the overhung casing and then close the bearing caps, secure it with bolts. Next, put the lantern ring on the shaft.

5. Put the shaft sleeve on the shaft, fix the pump cover onto the overhung casing. Secure the thrust washer and the nuts of the impeller. Finally, place the whole piece in the pump casing before fixing the casing bolts of pump cover tightly.

6. After assembly, turn the rotor to see whether it rotates freely.

⚠ Caution: Please note that the small parts such as the flat key, lantern disk, lantern ring and the O ring are easily to miss or be mounted in a wrong sequence.

## Disassembly

The disassembly sequences of the pump are carried out in the opposite orders of the assembly. If there is dirty depositing causing the difficulty of disassembling, clean it up firstly.

⚠ Caution: During disassembling the mechanical seal, hit the stationary ring slightly with wood block instead of hitting it directly with hand or iron hammer, and then take it out slowly.

## Erection

Correct assembly can often mean the significant difference between a successful and unsuccessful performance.

### **Mounting and adjusting**

- 1.After cleaning the oil and dirt,place the bedplate in the concrete foundation.
- 2.Use a level to check the bedplate.Use iron wedge or steel shims when necessary.
- 3.Pour concrete into the bedplate and the anchor bolts holes.
- 4.After the concrete has thoroughly set,check both the bedplate and the anchor bolts to see if there are still loose in the concrete.And then tighten and check it again with a level.
- 5.After cleaning the mounting surfaces of the bedplate,pump feet and the driver feet,mount both pump and the driver on the bedplate.
- 6.Keep a certain amount of clearance between the couplings.Check the axial alignment of the pump and driver shafts.If misalignment, adjust it with steel shims and carry out the rim check on the coupling.The clearance should not exceed more than 0.1mm beyond the other one on four points,left,right,upper and lower of their circles.And both the max.and min.clearance between the two mating surfaces of the two couplings should not be more than 0.3mm on any point of the circles.

### **Installation Operation**

- 1.Open the encasement to check the pump and motor.If it is guaranteed that there is no mangle and dropout of the fasten piece,and the inlet and outlet are in good condition with no dust or dirt coming into the pump during disassembly and transportation,the pump could be directed to the building site for use without needing to be dismantled.
- 2.The mounting height,length and diameter of pipes,flow rate should be in conformity with the specified values.During installation,the place near the delivery liquid should be chose to getting the minimum suction head and shortest suction pipeline with the pump.

The mounting height of the pump can be obtained by calculating the air pressure of the altitude in different area and saturated vapor  $P_v$  of delivered liquid under various temperatures.

$$H \leq H_A - H_V - \Delta h_s - NPSHR - 0.3(m)$$

In the formula:H-The mounting height of the pump,which represents the distance from the centerline of pump to the suction liquid level.If the sign of the value is plus,it represents the distance of the centerline of pump overtops the suction liquid level, and the mounting height of the pump must be less than or equal to the calculated value.If the sign of the value is minus,it represents the liquid pouring state that is the distance of the suction liquid level overtopping the centerline of pump.When mounting the

unit, the liquid level height of everse pouring liquid should exceed or be equal to the calculated absolute value.

$H_A$ -Liquid surface pressure of suction liquid(liquid head)

$H_v$ -Saturated vapor under the delivered liquid temperature(liquid head)

$\Delta h_s$ -Total resistance loss in suction pipe(liquid head)

The above values of air pressure and saturated vapor can be inquired from the manual or the supplier.

In normal air pressure, the mounting height can be calculated by the following formula:

$$H \leq 10 - \Delta h_s - NPSHR - 0.5(m)$$

3. For long distance service, the pipeline in larger diameters should be adopted. The piping should be fixed by their independent supporters. Otherwise the pump would be damaged by the piping weights.
4. The rubber joints, which are convenient for pipeline connecting, should be mounted to the inlet and outlet flange.
5. The inlet and outlet pipeline should be mounted with valve, which makes the maintenance and adjust more conveniently.
6. Mount the vacuum gauge in the inlet flange and the manometer in the outlet flange to check and control the operation of the unit. And the span of the pressure gauge should be 2~3 times more than the actual value.
7. If the check valve is mounted to the discharge pipeline, it should be located in the outside of the gate valve.
8. The absorber can be adopted in the place that the vibration is required strictly, and it should be installed following the instruction of the supplier.
9. With the foreign matter in the delivered liquid in the firstly mounting pipeline, the filter net should be installed to the inlet of pump to avoid of the damage to the pump. And the mesh diameter of the filter net is suggested between 3.85 to 6.96 inches. Until the foreign matters are void of the suction liquid, the net can be dismantled.
10. During pumping water from the pool, the straight length of pipeline ahead of inlet should be not 3 times less than the diameter of inlet, and the depth of suction pipe submerged under the water should be 1.5 times more than the diameter of inlet, and the value of which should not be less than 500mm. The distance from inlet to the pool wall and to the bottom of pool should be more than 1.5 times diameter of inlet, and the value should not be less than 500mm. And the filter net should be appended, and the area of which should not be 2~3 times less than the pipe orifice area of inlet.

△Caution:The horizontal section of suction pipeline should be installed downward slightly against the direction of flow to prevent from bubbles.

11.In order to ensure the motor operating reliably,the overload protection device should be equipped to the electric switch.

△Caution:If the overload protection device is omitted,when the discharge valve is fully opened,or the pump works in large flow,or in case the current increases suddenly,which would cause overload while mangling the motor.

## Starting

1.Be sure that the driver is rotating in the correct direction and the rotor of the pump is turning freely before joining the couplings.Add lubricate into the overhung casing up to the centerling level of the oil reservoir glass.

2.Close the gate valve of the discharge piping and the discharge pressure gauge and the suction vacuum gauge.

3.Prime the pump or direct water with a vacuum pump.

4.Rotate the pump(motor)shaft several loops by hand to make sure the mechanical seal have good lubrication,which could keep from dry friction or damaging the stationary and motion ring in sudden startup.

5.Start the motor to check whether its rotating direction is accordance to the arrow.(from the view of the motor,it is clockwise).

△Caution:Don't operate the pump without water inside,or it would damage the mechanical seal.

6.Under the condition of inlet valve are fully opened and the outlet valve are closed,start the pump.When it reach the normal speed,open the pressure gauge of outlet and vacuum gauge of inlet,and then gradually open the outlet valve till the required operating condition is obtained.

△Caution:The operating time should not be more than 3 minutes while the outlet valve being closed.

## Running

1.During running ,check frequently the values indicated in the gauges,the temperature of bearings and stuffing box,water leakage from stuffing box and the vibration and noise levels of the pump.Act immediately when there is anything wrong.

2.The bearings are not allowed to work at the temperature 40°C higher than the ambient temperature with their max working temperature not exceeding 80°C.

3.The amount of water leaking from the stuffing box is 60 drops per minute normally.

- 4.The bearing oil level should be kept in the specified range,being not too low or too high.When below the level,add oil in time.In order to keep the clean and good lubrication of the oil,replace it with new one according to the actual usage condition.In general,for every 1500 working hour,the oil should be replaced with all.
  - 5.The gate valve of inlet is not allowed to regulate the capacity to avoid of cavitation.
  - 6.When the clearance between the impeller and seal ring is worn out too much,replace the seal ring with new one.
  - 7.Check the unit frequently whether is operates smoothly and the abrasion and leakage of mechanica seal,or replace the sealing components in time to prevent water from getting into the motor.
  - 8.Check the pool often whether there are some floating objects and observe the liquid level.Stop the pump when the level is below the minimum to avoid cavitation and mangle to the impeller.If necessary,decrease the discharge capacity by adjusting the gate valve to re-rise the water level.
- △Caution:**The range of capacity and head of pump should be accommodated between the minimum and maximum value showed in the performance table to get the best energy saving.And the pump should not operate for long time under the 30% capacity than normal condition.Otherwise,the specified capacity can be obtained by mounting the bypass pipeline on the discharge pipeline.The capacity under service condition should not exceed the large value showed in the performance table.During operating,the actual head  $H=(P_{out}-P_{in})/0.0098$  should not be less than the relevant value under the large capacity showed in the performance table.(in the equation:  $P_{out}$  indicates the value of pressure gauge in outlet,and  $P_{in}$  indicates the value of vacuum gauge in inlet ;Pressure unt:MP<sub>a</sub>,and Head unit:m).The service condition of high efficiency is the intermediate point showed in the performance table,which could be acquired by regulating the discharge valve according to the value of the inlet and outlet(vacuum)pressure gauge.
- 9.In case the characteristic curve of equipment has been decided,if the operating condition needs to be adjusted,the better way is to change the speed or adjust the diameter of the impeller.Please inquire the supplier for more details.

## Stopping and Maintenance

- 1.Close the gate valve of the discharge piping gradually and switch off the power.
- 2.Close the manometer and vacuum gauge of the inlet and outlet,additionally;the inlet gate valve should be closed under pouring state.
- 3.When it is below 0°C,drain the remaining water inside the pump to prevent it from

being frozen crack.

4. When being left inactive for a long time, turn the pump rotor periodically to ensure the unit starting easily.
5. When stopping the unit for a long time, disassemble it into pieces. After that, put some rust-resistance grease and re-assemble it again and store it in an appropriate place.

## Cautions in Use of Mechanical Seal

When the mechanical seal is adopted to the XA pump, the type of which is single end non-balance mechanical seal. According to the working requirements, different methods and cautions vary with different seals. Some cautions are recommended below:

1. The conventional mechanical seals are just suitable for coming in touch with clean liquids free from particles. To protect the seals against being damaged, clean thoroughly the new pipes and other circulating pipelines and prevent the solid foreign matter from coming in contact with the seals.
2. When delivering crystallized liquids, wash the seals time to time. Wipe out the remaining crystals on the seals before starting the unit after some idle hours.
3. Care should be taken to dismantle the seals. Don't use hammer or other metal weights to hit them; otherwise, the stationary seal surfaces would be damaged.
4. The seals with oil and dirt stuck to are difficult to be dismantled. In the case, take them out after removing all the foreign matter rather than using much force that may cause damage to them.
5. Check if the seals are damaged or out of operation before using them. Repair or replace them with new ones when necessary.
6. Check strictly if there are cracks or damage on the centric friction seal ends of both the stationary and rotating seals. All the components including the pump casing, impeller, seal chamber etc. should be cleaned well before assembling. Provisions are made to clean the two ends of both stationary and rotating seals with cotton cloth carefully and paint some grease or oil on them.
7. Minimize the seal assembling deviation, tighten the relevant nuts and bolts enough to avoid the tilting of seals, otherwise the seals may be out of operation.
8. Adjust the spring compression correctly, not being too less or much, and excessive spring compression will cause fast wearing out to the ends of the seals and more power consumption. Similarly, being not compressive enough will result in the out of operation of the seals and the worse leakage. For this reason, turn the shaft with hand after mounting up them, and it is correct when feeling the seals springs have a certain amount of compression and the shaft turning freely and smoothly without any clamping tension. Adjust the tension when they are too tight and the shaft can no be turned around.

## Troubleshooting

Symptoms	Causes	Solutions
1.Water cannot be sucked and both the hands of vacuum gauge and manometer beat violently.	1.The pouring water is insufficient. 2.Air leakage from the joints between the inlet and meters.	1.Pour water in again; 2.Fix the joints tightly.
2.Water cannot be sucked while high degree vacuum is indicated on the vacuum gauge.	1.The foot valve is lodged or not open. 2.Too high suction resistance. 3.Suction pipe is mounted too high.	1.Check or replace the foot valve; 2.Check up or replace the suction pipe; 3.Reduce the suction lift.
3.No water is delivered in spite of pressure shown on the manometer.	1. Too high outlet resistance. 2.Motor is working in a wrong direction. 3.The impeller is clogged. 4.Motor Speed is insufficient caused by the low voltage.	1.Check or shorten the pipe; 2.Check the motor; 3.Remove the foreign matter in the impeller; 4.Regulate the voltage.
4.The pump is working at the capacity lower than the specified value.	1.The pump is clogged. 2.Seal ring has been worn out. 3.Speed is insufficient. 4.The foot valve or suction pipe is lodged.	1.Clean up the pump and relevant pipes; 2.Replace the seal ring; 3.Increase speed. 4.Clean up or replace the foot valve.
5.Too much power is consumed.	1.The packing is too tight and the stuffing box is too hot,or mechanical friction caused to the rotor. 2.Both the impeller and seal ring are worn out. 3.The pump is working in large flow.	1.Loosen the packing gland appropriately.Calibrate the shaft and the rotor; 2.Replace the impeller and seal ring; 3.Close the gate valve of outlet a little bit to reduce the flow.
6.The pump vibrates of unexpected noise is heard.	1.Foundation is not firm. 2.Air leakage in suction pipeline or the submerse depth of inlet is not enough,which results in air pocket into pumm. 3.Cavitation in the impeller. 4.The pump deviates the operating condition. 5.The bearing is mangled.	1.Tighten the supporter near the flange. 2.Fix the leakage points or increase the submerged depth of the suction pipe. 3.Reduce the mounting height or increase the diameter of inlet or coming pressure,replace the mangled impeller. 4.Adjust to working under the high efficient service condition instead of operating at large flow. 5.Replace the bearing.
7.The bearings are over-heated,the elastic piece of coupling is worn out too fast.	1.The bearings lack lubricant. 2.The motor shaft is not in alignment to that of the pump.The pump shaft is bent.	1.Lubricate the bearings. 2.Align the motor shaft with that of the pump.Calibrate or replace the pump shaft.
8.The elastic piece of coupling is worn out too fast.	1.The motor shaft is not aligned to that of the pump.	1.Align the motor shaft with that of the pump.

## Order Notice:

In order of the customer to use the product safely, please state clearly the service conditions such as the liquid to be delivered, temperature, etc. in ordering. If the specifications are beyond of the instruction, please inquire the supplier for details when placing special orders.

※The products are to be improved according to the requirements of the market.The information of this instruction subject to change without notice.