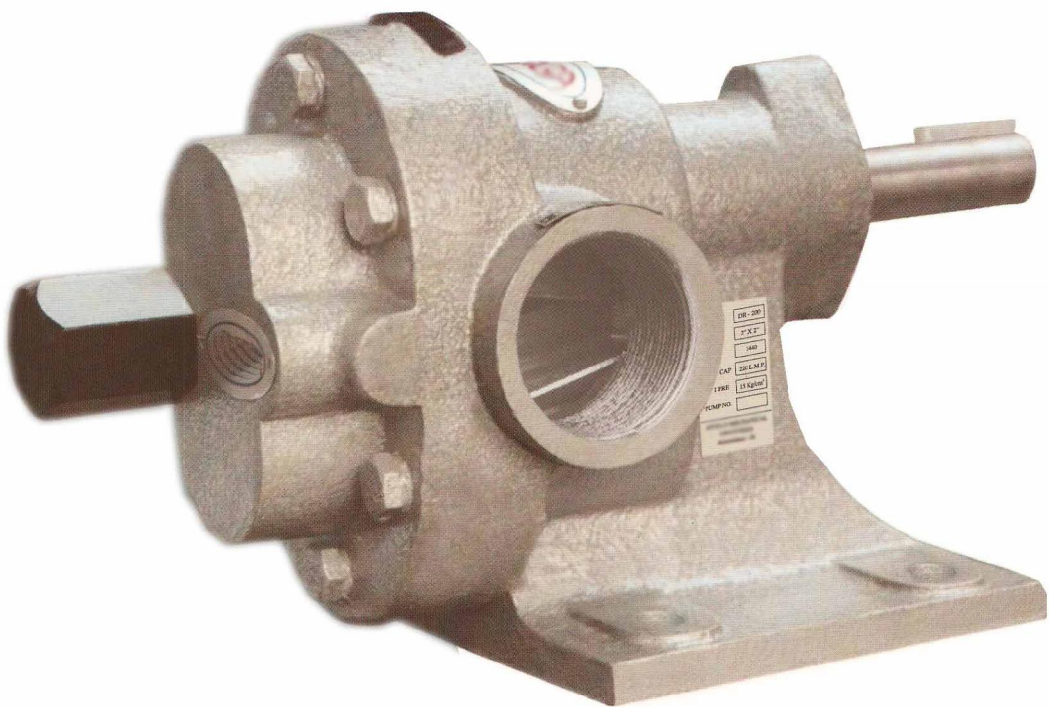




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Instruction Manual for Scintex Gear Pumps



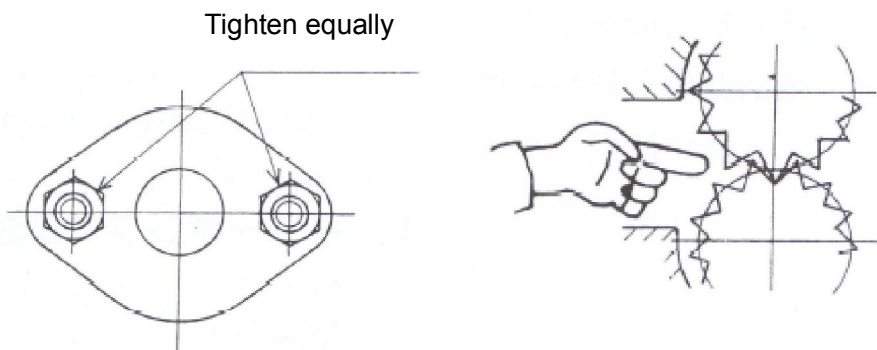
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Safety Precautions

Note the following when handling the pump:

1. Do not remove the safety cover of the rotating object while the pump is in operation.
2. Only tighten the gland packing when the pump is stopped. Ensure both sides are equally tightened and only tighten a little at a time. Observe the operation condition, and tighten further if necessary. Over-tightening shortens the life due to the development of heat in the packing or abrasion of the shaft.
3. If there is leakage from the shaft seal part or other parts, stop the pump before repairing it or taking countermeasures.
4. Be sure to electrically isolate the pump prior to performing any maintenance operations.
5. Never insert your finger into the pump aperture.
6. Do not operate the pump outside of its specifications. This could cause a serious accident such as damage to the piping, pump parts, or equipment such as the motor.



Preface

All pumps are inspected and shipped ready for immediate operation. Upon receiving the pump(s), carefully open the packaging so as not to damage the equipment and check the following:

1. Whether any damage or failure is visible
2. Whether all the ordered items and spare parts and accessories are present
3. Whether the pump rotates smoothly by manually revolving the coupling (If it rotates smoothly when you turn it by hand, it is normal even if it feels a little heavy.)

1. Outline of the Gear Pump

A gear pump is a kind of rotary pump and is defined as a positive displacement pump. Gear pumps are roughly classified into external and internal gear types. The pump which you are now using is of the external gear type. Its operating principle is, as shown in the figure, that the fluid in the space between the valleys of the gears and the casing is forced out to the opposite side when the two gears rotate.

Internal Relief Valve

The gear pump incorporates an internal bypass valve which can be used to relieve pressure from the discharge side of the pump to the suction side. The relief valve works by using a plunger and spring arrangement. When the pressure exceeds the pressure of the spring, the plunger is displaced and liquid is allowed to circulate to the suction side of the pump.

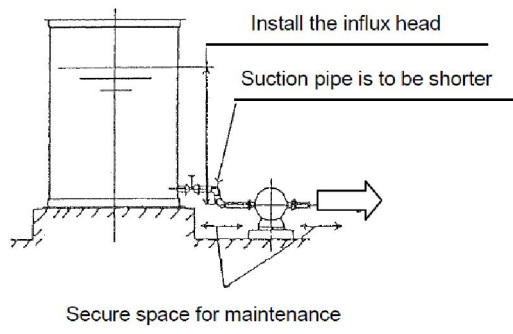
To adjust the internal relief valve, user must first remove the adjustment valve cover. Using an Allen key, turn the bolt head clockwise to increase the spring pressure and increase the pressure required to open the bypass valve. Turning the Allen key anti-clockwise reduces the spring pressure and allows the internal relief valve to open at a lower pressure. The adjustment cover should be refitted after adjustment.

The pump has unique structural characteristics:

1. Simple structure and handling.
2. The discharge rate is almost constant, regardless of variations in supply pressure.
3. The desired discharge pressure can be obtained by changing the rotating speed.
4. Any fluid, from low to high viscosity, can be used.
5. With a strong self-suction power, it can suck fluid from an underground tank or extract from a high vacuum tank. It can be used for the supply of chemical liquids, hazardous liquids, and low- and high-temperature liquids.
6. A high pressure can be obtained regardless of capacity and rotating speed.

Basic Precautions on Using the Gear Pump

1. Be sure to install a suction strainer. If solid material is drawn in to pump body it may become trapped in the gear and prevent rotation.
2. This is a oil pump, do not use fluids which aren't recommended. Pumping water is not recommended for this pump.
3. Do not operate the pump for extended periods with no fluid.
4. Install a safety valve. If the pipe on the discharge side is closed the pump pressure may damage the pump or could raise high enough to overload the motor. Therefore a safety valve, integrated or separately installed, is necessary.
5. The pump is supplied containing a rust-preventive oil. If this could cause a problem with your process, clean the pump interior before use.
6. In principle, the directions of rotation should not be reversed. Contact us if reverse rotation is used.

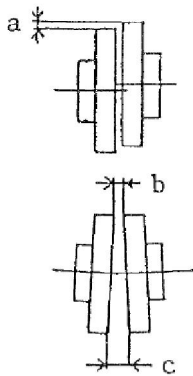


2. Installation

Improper installation could affect the capacity or life of the pump, so note the following:

1. The pump should be installed near the tank on the suction side.
2. Install the pump with a positive suction head where possible. Especially when a high viscosity fluid is to be used, or extraction from a vacuum tank, etc. in which a high negative pressure arises on the suction side, the influx head is necessary.
3. Allow sufficient space around the pump for maintenance.
4. The surface of the foundation concrete should be level. If the pump is installed on a steel plate, resonance could occur, so sufficient rigidity with the frame of the pump is required.

In case of direct coupling, Measuring should be done at the four points.



a = not more than 0.05 mm
c – b = not more than 0.1 mm

3. Piping

Note the following regarding piping.

1. Ensure the pipeline is airtight. If air is sucked into the suction side pipeline from joints or others, it will affect the capacity of the pump.
2. The pipeline should be supported on both sides of the pump, so that the stress and weight of the pipeline do not act on the pump.
3. Install valves and pressure gauges on both sides of the pump for maintenance. If high viscosity fluid is supplied, install a gate valve or other low-resistance valve on the suction side. In case of screw jointing, union joints should be used on both sides of the pump.
4. When the pump sucks fluid from an underground tank or the piping of the suction side is long, install a non-return valve on the piping on the suction side so that the fluid inside the piping will not drop. When the piping on the discharge side is long, install a non-return valve on the pump outlet. For fluids that easily vaporize such as solvent, install a relief valve so that the internal pressure will not act on the pump.
5. Install a strainer on the suction side of the pump. The strainer should be of 40 mesh or higher and large enough to make the pressure loss less than 20 kPa in relation to the viscosity of the fluid and flow rate. During pressure-proof and air tightness tests of the pipeline, take care not to apply pressure to the pump. The oil seals and mechanical seals may be damaged by the pressure during non-operation.
6. Upon completion of the piping works, clean the inside of the pipeline to remove all welding waste, steel scraps and other foreign materials which could damage the pump if drawn in.

4. Operation

Take the following precautions before starting operation.

1. Check that the installation, piping, etc. are complete and all the valves on the suction and discharge sides are fully open.
2. Before starting operation for the first time after installation, check the pump is able to operate by manually rotating it by hand.
3. Check that the supplied fluid will allow the pump to operate. In particular, check the temperature control in case the fluid hardens at ordinary temperature, and remove blind areas for piping works, etc.
4. For a jacketed pump, check that the steam or cooling water is flowing.
5. If the inside of the pump is cleaned and dried, take great care not to run a gear pump having an internal bearing without fluid. Before using for the first time, be sure to draw the fluid into the pump before operating.
6. For all types of pumps instructed by the customer, the shaft seal portion is "vacant" at the time of shipment. Be sure to fill fluid which does not affect the supplied fluid before starting operation.
7. Switch pump motor on and off instantaneously and check the direction of rotation.
8. Switch on and check that the ampere meter, pressure gauge, and compound gauge are normal.
9. If handling a hot fluid, pre-heat the pump or gradually heat up the fluid's temperature. If the pump is subjected to a sudden change of temperature, it may not operate due to thermal expansion.

5. Abnormal Phenomena during Operation

If the pump has been working normally and then starts making a noise or the pressure or capacity decreases, or if it consumes an unusually large amount of power, check the following.

1. If air is sucked from the suction pipe or gland, if a volatile compound in the fluid evaporates and produces vapor, or if the fluid contains air bubbles, the pump will generate an unusual noise, the capacity will decrease, and the needle of the pressure gauge on the discharge side will deflect irregularly.
2. Clogging of the strainer will cause noisy cavitations and reduce the capacity and pressure.
3. If the viscosity of the fluid rises higher than as specified, the power needed for the pump will increase accordingly. Further, if the viscosity rises unexpectedly, the pump will cavitate and develop noise, decreasing its capacity and pressure.
4. If the viscosity of the fluid becomes lower than the specified value, the internal leakage of the pump will increase and the capacity and pressure will decrease.
5. If foreign matter enters the valve seat of the safety valve or the spring is damaged, the capacity and pressure will decrease.
6. If the center of the coupling deviates, the pump will make a noise/vibration and the power consumed will increase greatly, which could eventually break the shaft.
7. If the discharge pipeline becomes clogged, the valve's opening is narrowed, or the fluid's viscosity increases unusually, the discharge pressure will exceed the specified value and the power consumed will increase greatly.
8. If the pump interior becomes severely worn over time (especially when pumping fluid containing a slurry is used), noise will occur and the capacity and pressure will decrease. Also, wear of the bearing causes the gear to contact the casing, resulting in overloading. If this happens, the parts should be replaced.

6. Maintenance

For a pump with gland packing at the shaft seal part, note the following.

- Do not over-tighten the packing which completely stops leakage from the gland. Leakage of a drop every two or three minutes is normal and necessary for lubricating the gland part. Over-tightening the packing causes unusual heat, accelerating abrasion of the shaft.
- If there is no interference at the gland, add another packing. The whole packing should be replaced if you cannot stop the leakage, or when disassembling for checking.
- Insert the gland packing as follows:
 1. Cut it so that there will be no gap when it is set as a ring. Cut with a sharp cutter to an adequate length.
 2. When inserting the gland packing, the packing should be placed such that the cut end of each ring packing is opposite to the next one, with lubricant applied to the friction surface.
- When you stop the pump or if it stops due to a power loss, switch off and close the valves on the suction and discharge sides.
- The strainer in the suction side should be regularly cleaned to prevent harmful clogging.

7. Procedure for long-term storage

When the pump is to be stored for a long time, store it using the procedure below.

1. Rust prevention of uncoated portions
 - a) Fill lubricating oil to the inner side of the gear pump, and apply it to the whole inner surface by hand.
 - b) Apply rust-preventive oil to the gear pump coupling and anchor bolt.
 - c) Seal the aperture flange of the gear pump using an oil-resistant packing.
 - d) Inspect the pump once every six months.
1. Storage until test run
 - a) In principle, store the pump indoors free from moisture. If it is necessary to store the pump outdoors for an unavoidable reason, cover the pump with a sheet etc. to prevent it from being exposed to rainwater directly.

8. TROUBLESHOOTING

Difficulty	Probable Cause	Remedy
No Liquid Delivery	1) Closed valves	1) Open valves
	2) Plugged suction	2) Eliminate restriction
	3) Air leak at suction	3) Locate and repair leak
	4) Suction lift too high	4) Do not exceed vapor pressure of liquid
	5) Motor wired incorrectly	5) Check wiring diagram
	6) Wrong rotation	6) Correct rotation
Low Liquid Delivery	1) Pump shaft speed incorrect	1) Check driver speed, motor wiring, pulley tension
	2) Discharge pressure too high	2) Reduce downstream pressure
	3) Air leak at suction	3) Locate and repair leak
	4) Worn or damaged pump	4) Inspect and repair as required
	5) Low viscosity	5) Verify original application conditions
Gradually Loses Prime	1) Suction lift too high	1) Improve suction pressure
	2) Air or gas in fluid	2) Eliminate air or gas from fluid
	3) Air leak at suction	3) Locate and repair leak
	4) Worn or damaged pump	4) Inspect and repair as required
Noisy	1) Cavitating	1) Improve system suction pressure, provide adequate NPSH
	2) Solid particles in fluid	2) Install suction strainer. Clean suction strainer.
	3) Air or gas in fluid	3) Eliminate air or gas from fluid
	4) Worn or damaged pump	4) Inspect and repair as required
Motor Runs Hot or Overloads	1) Discharge pressure too high	1) Reduce downstream pressure. Check relief valve setting. Be sure discharge pressure gages function correctly.
	2) Shaft speed too fast	2) Reduce speed
	3) Fluid viscosity higher than expected	3) Change to larger horsepower or higher service factor motor. Thin fluid.
	4) Incorrectly wired motor	4) Check wiring diagram
	5) Binding internal pump parts	5) Inspect and correct condition
	6) Motors normally feel hot	6) Verify if actual motor amperage draw is within range
Seal Leaks	1) Dry running	1) Open valves. Prim pump
	2) Solids in fluids	2) Add suction strainer
	3) Damaged during field replacement	3) Inspect and replace damaged components
	4) Seal material incompatible with fluid	4) Verify original application conditions. Consult factory.

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