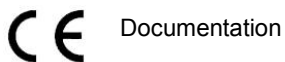




Operating Manual

English translation of original operating instructions



It is imperative to read the operating instructions prior to commissioning!

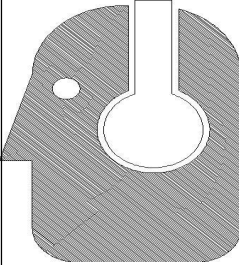
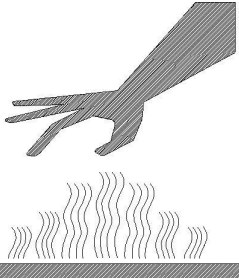
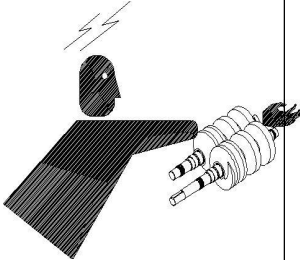
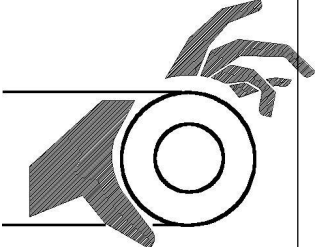
This document as well as all documents included in the appendix is not subject to any update service!

Subject to technical changes.

--- LG Series
Dry Screw Vacuum Pump

Safety Instructions

1. Do not operate machine before reading instruction manual.
2. Use adequate protective measures and protective equipment prevent unnecessary damage when installing and operating.

Warning	Notice	Warning	Warning
			
An audible protection device must be provided	Do not place your hand on the surface of the device	Keep the body and clothing away from running equipment	Do not start the machine without any operating instructions

Notice

Ignore these warning signs will cause serious damage to the device operator or maintainer.

Safety Precautions

1. Do not put too much weight on the pipe connected to the pump casing.
2. Do not start the device without coupling shield. Failure to start the direction of rotation will damage the device.
3. Do not start device when air inlet is directly exposed to air.
4. Please note, vacuum pump power must be disconnected when making any maintenance to pump.

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1. Overview

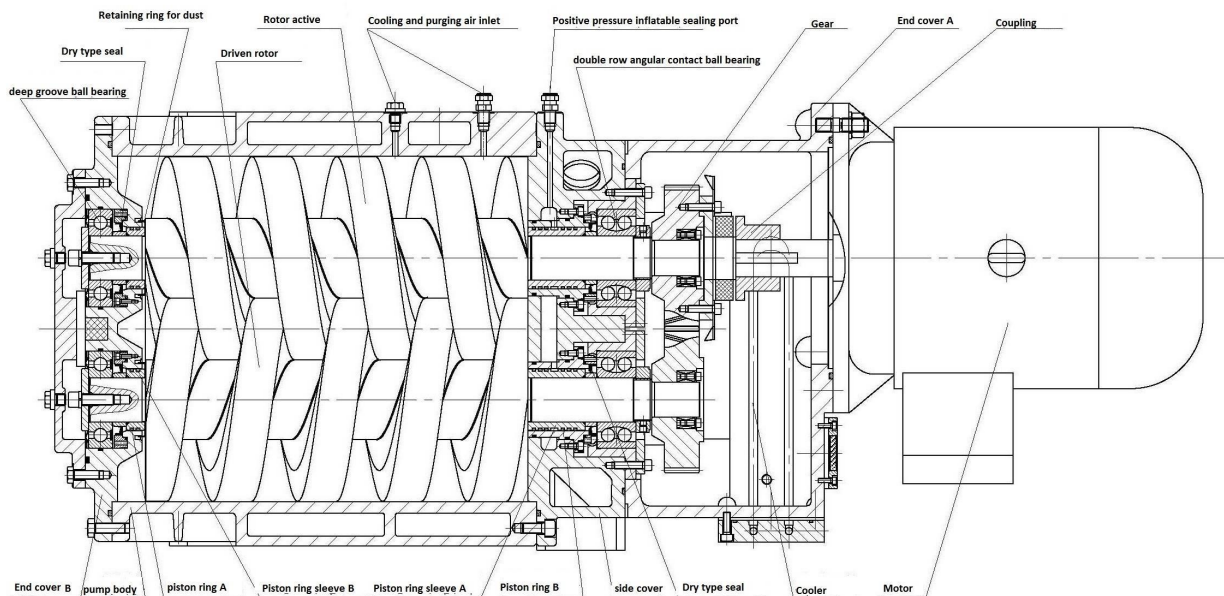
1.1 Overview

LG series dry screw vacuum pumps adopt four level rotors. Rotor A and rotor B use the same profile line, with opposite rotate, uniform meshing gap, closed meshing line, and nice sealing.

LG series dry screw vacuum pumps inhale gas through Rotor A and Rotor B, and this enlarges pumps suction speed. After air is inhaled in pump casing, sealed space will move from inlet end to outlet end under rotating of rotor A and rotor B when the pump continues running. Pressure rises steadily and there is no intermediate exhaust phenomenon. When sealed space is connected to exhaust port, the gas in the exhaust passage is recoiled into the pump chamber, causing the gas pressure in the pump chamber rise, then temperature rises and airflow causes noise. The pump is running, and volume of sealed space begins to become smaller and gas in the pump chamber is continuously discharged.

Since this pump is oil-free without oil, it can create clean vacuum. Anti-corrosion should be done when it is used to suck corrosive gases.

LG series Dry screw vacuum pump structure drawing



1.2 Structure

● Screw rotor

The screw rotor material is made of high-grade ductile iron, precision manufactured by special CNC equipment and it past precise dynamic balance test.

● Wheel gear

Wheel gear is one of the most important parts of screw pump, it can make screw rotor and rotor maintain a fixed gap. This series of screw vacuum pump with high precision helical gear structure, uniformity meshing, good stability and low operating noise.

● Bearing

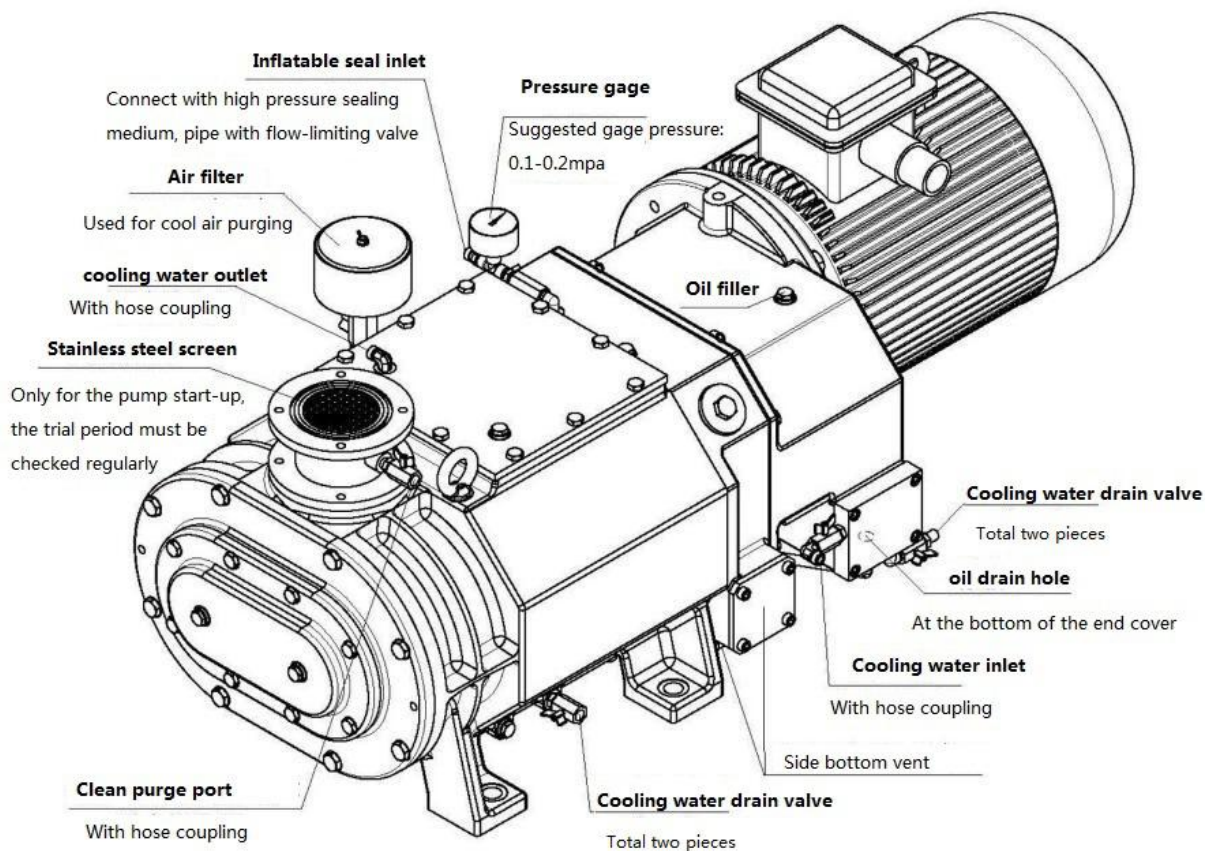
Fixed-end bearings for the heart only thrust ball bearings, extended end bearings for the radial ball bearings. These bearings withstand high-speed and high-load operation, while maintaining accurate gap between gear and rotor.

● Shaft seal

Labyrinth seal is used in our dry screw vacuum pump, this seal can prevent small amount of oil from oil chamber into pump chamber

● Lubricating oil

Vacuum pump gears are lubricated with lubricating oil and amount of lubricating oil should be added above red mark. If oil is too less, the oil into the circulation from oil tank is less, then bearings and gears are not effectively lubricated, and will be damaged due to abnormal friction; Also flow lubricating oil will be less and it cannot effectively cool the gear and bearing shaft, which will affect pump service life or even machine breakdown. Therefore, please regularly check the oil level and see if oil is polluted or not in daily maintenance.



1.3 Basic technical data

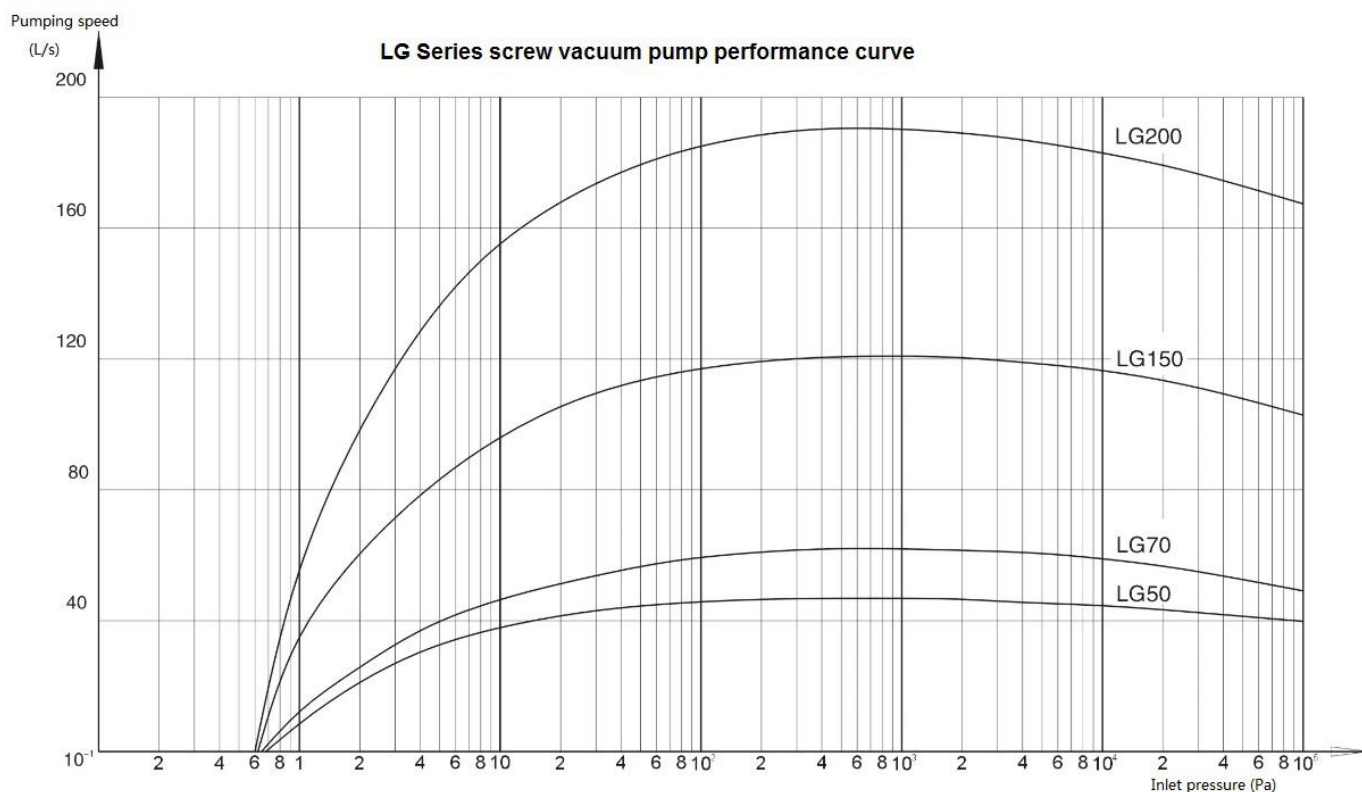
Model		LG-50	LG-70	LG-110	LG150	LG-200
Capacity (50/60Hz)	m ³ /Hr	180/216	250/300	400/480	540/650	720/850
	L/min	3000/3600	4200/5000	6600/7920	9000/10800	12000/14400
	L/S	50/60	70/84	110/132	150/180	200/240
Ultimate Pressure (50/60Hz)	mbar	0.02 / 0.01				
	Torr	0.015 / 0.007				
	Pa	2 / 1				
Power(kW) (50/60Hz)		7.5/7.5	7.5/7.5	11/15	18.5/18.5	22/22
Speed(RPM) (50/60Hz)		2900 / 3550				
Inlet diam (mm)		65	80	100	150	150
Outlet diam (mm)		40	40	65	65	65
Lubricating oil consumption (L)		0.85	0.85	1.4	2	2
Cooling water consumption	L/min	2.5	2.6	2.8	3	4
	gal/min	0.67	0.7	0.75	0.8	1.07
Weight (kg)		295	350	480	520	680

Notice:

(1) The oil amount on above sheet is only for reference. Usually the oil should be fluoride or mineral substance oil. Pump oil and lubricant oil will be matched before delivery.

(2) Above cooling water consumption based on 30℃ ambient temperature, 20℃ cooling water suction temperature. Various working conditions will cause different cooling water consumption and water pressure from 0.15MPa to 0.2MPa.

1.4 Performance curves



1.5 Cleaning

● Cooling purge

Cooling purge is used to cool rotor and pump casing. It is used to cool compressed heat generated by the exhaust gas during the operation of the pump. The gas enters into the pump chamber through the air inlet, then convey to discharge end when rotor is rotated and compressed, and the gas is heated by the heat of compression. The heat will reach to 130 ~ 200 °C at the discharge end, so we need to use cooling purge to reduce temperature. Usually we use dry and clean air as a cooling purge material, which is our standard purge material. When using atmosphere as a purge substance, it is necessary to configure air filter at the inlet end. Cooling purge will occupy pump speed, it will make actual effective pump speed decline. And the greater the amount of blowing, the more obvious impact.

(1) Purge amount

Model	Consumption (m3/min)	Illustration
LG-50	0.55	consumption varies when working vacuum changes
LG-70	0.6	
LG-110	0.75	
LG-150	0.85	
LG-200	1	

(2) Purge material

- ① Standard: atmosphere through air filter
- ② Use heat exchanger: use a heat exchanger to recycle the cooled exhaust gas
- ③ Use N₂ or inert gas as the purge medium

● Inflatable seal and aeration

If the labyrinth seal cannot meet needs of the production process when pump running you can use inflatable way to strengthen the sealing effect of the labyrinth seal to completely isolate oil chamber and pump chamber. Industrial production is usually used with air or N₂ as a sealing medium and inert gas can be used as a sealing medium in special occasions. The pressure of the sealing medium is 0.5 to 1.5 Kg/cm² G. The demand will change with inlet pressure of pump and nature of extracted gas. It can be adjusted according to actual situation. Inflatable port is located in the top of side cap.

Aeration mainly reduce the condensable gas within the pump and concentration of corrosive gas, reduce condensable gas in vacuum pump and partial pressure of corrosive gas through introduction of external gas. To avoid condensation and corrosion of gas and other circumstances. Aeration can also cool purge when pump working and aeration port is located on the side of pump casing.

★ Inflatable seal and aeration generally use the same medium, our dry screw vacuum pump has been connected between inflated seal and aeration inlet pipe of pump, leaving only one input port. connect to dry compressed air, N₂ or inert gas when using; the gas pipe and inflatable sealed tube can be connected separately according to actual needs.

● Cleaning purge (High recommended)

This series of screw vacuum pump with high precision screw rotor and pump casing, small meshing gap of pump. It is necessary to clean inside pump chamber before screw pump stop working. Residual gas will corrode rotor and surface of pump chamber, which will make meshing gap of pump becomes larger when the corrosive / toxic gas is aspirated. It will decrease performance of vacuum pump even render the pump ineffective in severe case; Sticky material will be bonded to the rotor or surface of pump chamber after stopping the pump during suction of viscous substances such as resins, etc. Which will make pump meshing gap becomes smaller and stability of the pump decline, or even make vacuum chamber stuck in severe case seriously. Cleaning purge is particularly important when pumping corrosive / toxic gases or viscous substances such as resins and so on.

Close main valve inlet, and then fill dry air or N₂ into air inlet, purge inside pump chamber before pump stops working. Purge time is generally 10 to 15 minutes. The more inlet air volume of the purge medium, the higher inlet pressure, the better purge effect. And inlet pressure is generally not higher than atmospheric pressure.

If common cleaning and purging cannot effectively remove harmful substances in pump chamber, you can use steam or other cleaning gas as a purge medium for intensive purging. The need for a regular cleaning purge after the completion of the enhanced purge, , remove the pump chamber residual steam or other cleaning gas.

● Steam purge

If there is incarceration or heavy loading when screw vacuum pump is restarted without operation for a long time,

please do not start it. It is necessary to purge pump according to following steps:

****Way of steam purge (after pump stop working)**

(1) steam purge is required after handling the following materials: organic matter, monomer, polymer, resin, etc.;

(2) steam pressure: about 1 Kg / cm² G;

(3) purge process;

- 1) Close suction valve, open discharge valve or valve of silencer/separator;
- 2) Fill steam 1 to 10 minutes through pump suction path or inlet side of valve (specific time is depended on treatment of substances);
- 3) Remove motor back cover, turn the motor fan to see if it is running smoothly (note that the motor cannot be started);
- 4) When the pump is running smoothly, you can stop the steam injection. Then start motor to see if pump is working normally.

(4) If it does not meet satisfactory results, you can repeat above steps 2 to 3 times.

2. Operating Procedures

2.1 Installation

● Location

(1) Vacuum pumps should be installed on a clean, flat, hard foundation. Concrete foundation can be used as well as metal frame for foundation. The foundation must have sufficient strength to fully consider the weight of vacuum pump and base area of the foundation, so as to avoid the vacuum pump to be forced due to foundation deformation. It will cause vacuum pump to be distorted when heavy force damages internal structure of vacuum pump.

(2) Make sure that motor and other parts are suitable for outdoor usage if vacuum pump is used outdoors.

(3) Make sure that there is sufficient equipment maintenance space when design installation location for the vacuum pump for facilitate equipment regular inspection and routine maintenance as well as equipment split and reload.

(4) Vibration isolator such as a vibration isolation groove must be designed if there is a vibration source near location of installation vacuum pump.

(5) 5 to 10 cm groove should be left around the foundation, preventing oil drainage or water drainage from staining workshop.

● Installation

(1) All dust on the pump must be cleared before operation. Working environment of the pump must always be clean and ambient temperature should be in the range of 5 ~ 40 °C.

(2) Level bar must be used to calibrate foundation level when vacuum pump is installed. Level of error should be less than 0.5 mm / m. Sizing block can be calibrated if base error is too large. The base force will be reduced when using horn. So, strength of the foundation should be recalculated.

(3) Bellows can be used to block propagation of vibration if the pipe connected to the vacuum pump is vibrated.

2.2 Pipe connection

● Main pipe

(1) Clean inside of the suction and discharge pipes to remove rust, dust and foreign matter, etc. Filter should be equipped at the suction port and it must be regularly checked when during operation of screw vacuum pump. Make sure sufficient channel area of filter to avoid filter to be sucked into pump chamber, which will cause damage to the vacuum pump. The filter can be removed after confirming that there is no large hard foreign material in pipe when vacuum pump runs a long time.

(2) It is recommended to use soft connections at the suction and discharge ports, such as bellows, rubber tubes, etc., which can reduce unnecessary load to the pump.

(3) Make sure install a check valve at the suction or discharge port so that the pump will not reverse suction. If check valve is unable to find, then a gate valve should be installed at least, and make sure close the valve before stopping pump.

(4) A recovery tank should be placed under the pump if there is a condensing gas in the pump discharge pipe, so that the condensed gas can be collected and discharged through drain valve.

(5) Note that drain valve should be installed on front of condenser when collecting condensed gas.

(6) Intake pipes should be very tight. It will affect vacuum even if tiny leakage. Intake pipe should be as short as possible, with less joints and elbows. Pipe connected pump should not be less than caliber of the pump.

● Cooling water pipe

Cooling system uses direct water cooling to cool end cap A, side cap and pump casing to this series of screw vacuum pump. Internal cooling water pipe line of vacuum pump has been connected, customers only need to connect inlet and outlet pipe line. Please note that cooling water should follow the principle of “low in” and “high out”; Valve should be installed on inlet and outlet pipe of cooling water to adjust the water.

The rotor temperature can up to 200 °C when screw vacuum pump runs. Reduce Cooling water appropriately when pump runs to maintain a high temperature (such as 80 ~ 90 °C) for pump casing, which is conducive to reducing the temperature difference between pump and rotor and increasing gap between pump body and rotor. That will improve the stability of vacuum pump. In addition, it is necessary to appropriately reduce amount of cooling water when sucking condensable gas to keep vacuum pump at a high temperature. Which will effectively reduce condensation of gas in pump chamber.

2.3 Preparation for starting

(1) Clear dusts in the pump. Make sure tube is clean thoroughly, it cannot have residual residue.

(2) Check if all suction, discharge pipes and cooling water pipes are tightened properly and all pipes are installed correctly.

(3) Add oil to oil red spot. Gears and bearings will be collapsed if oil is too little; Temperature will rise quickly if oil is too much, and will cause gear noise or impact other parts. Therefore, please note that oil level is maintained at red

point of the oil sheet for a long time.

(4) Please set amount of cooling water according to table 1.3. Temperature rise speed difference between rotor and pump will be too large when cooling water is connected. It will make a large temperature difference between pump and rotor. That is not conducive to maintaining the gap between the rotor and the pump. It is recommended that customers turn off the cooling water for about 3 to 5 minutes before vacuum pump is started and then turn on the cooling water.

2.4 Operation

- (1) Open suction valve and start vacuum pump under no-load to check rotor steering (observe motor fan steering).
- (2) Run pump for 20-30 minutes without load to check if it is normal for abnormal vibration or heat. If non-normal, please stop device and look for reason. In most cases, incorrect installation or incorrect position is the main reason. Missing lubrication also will cause it sometimes.
- (3) Check temperature and vibration of each part after pump runs for 2 to 3 hours under normal load.
- (4) Please observe the ammeter during operation. Stop pump immediately and look for the reason if any abnormality is happened. The Common causes are the collision between rotors or contact outer ring of rotor and inside of pump casing. All of our pumps have passed the test. Due to re-installed, the state of pump still needs to be closely watched.

***Notices when operating**

- (1) Check temperature of bearing, lubricant and cooling water
- (2) Keep pump work in design range.

2.5 Stop

- (1) Close inlets of main valve.
- (2) Make sure to clean purge before stopping pump when inhale corrosive gas.
- (3) Turn off pump by turning off motor.
- (4) Turn off cooling water system.

Note: open the drain valve to remove the cooling water within the pump if there is a cold icing phenomenon, to avoid vacuum pump to be cracked.

2.6 Lubricant

For lubricants, please use high quality petroleum products including antioxidants, corrosion inhibitors, ultra-high-pressure additives and other ingredients (do not use moisture, sulfuric acid resin or tar composition of the lubricant).

Standard lubricating oil of this series screw vacuum pump is 1 # vacuum oil.

The following brands are recommended lubricants for bearings and gears.

- Lubricants: BP, Energol THHT 46 / THB46
Regal, R & O 46

Shell, Turbo T 46

Mobil, DTE oil medium or, equivalent.

- Special use: Fomblin, 25/6

· Grease: Almasol 1262:G 40M (SHINETSU)

JFE 552 (KLUBER)

Arcanol L74V (FAG)

- Special use: RT-15 (Fomblin)

Barrierta L55/2 (KLUBER)

3. Maintenance and Inspection

3.1 Overview

(1) Temperature will rise according to rise of the compression ratio when operating, if the temperature rise is local and the outer surface is hot, that is abnormal phenomenon. It is possible that there is a problem with supply of cooling water, cooling system is not opened, rotor is rubbed with the pump casing or the foreign matter enters pump. At this point, the pump must be stopped immediately and check reasons. In some cases, it will be corrosive after running for a long time between rotor and pump casing. It will cause a larger gap between these components, vent gas will to the suction port and decline suction ability. In this case, pumping volume will be significantly reduced. It needs to stop running device, measurement error and consider taking corrective measures.

(2) You can immediately find abnormal phenomena through checking pump casing, bearing temperature, vibration and noise of the routine. Therefore, it is strongly recommended to check pump routinely.

(3) The voice of collision between the rotor and connect of rotor outer ring with inner surface of the pump can be heard by placing auscultation device on the outer surface. Therefore, paying attention to the sound of pump is also very important.

(4) Discharge cooling water after stopping pump in cold winter, to avoid freeze water to damage pump and side cover damage.

3.2 Periodical checking

● Daily inspection items

① Check oil table: too much or too little lubricant will damage gear and bearings.

② Check whether cooling water is sufficient.

③ Check temperature of rear cover and front cover. Use a suitable thermometer to measure and it is more convenient to use surface thermometer.

④ Check pressure of suction and discharge. Measure pressure to ensure that pump is operated within permissible range.

⑤ Check the motor load. Note that increase of motor load often indicates an abnormal state.

● Monthly inspection items

① Check color of lubricant (replace lubricant if oil becomes darker).

② Check amount of oil. Please check sealing structure inside pump if oil is greatly reduced.

● Quarterly inspection items

① Check flow and color of cooling water. Please clean cooling water inter layer and water pipe if it is non-normal.

② Check grease on rear cover and increase if necessary

● Half year inspection items

① Check tube connection.

② Replace front cover lubricant.

③ replace rear cover grease.

● Annual inspection items

① Check internal dynamic seal of vacuum pump.

② Check internal rotor and pump casing. Remove suction pipe from the inlet end to see the condition of internal rotor and pump casing.

③ Check gear. Open front cover to check gear condition.

Maintenance Checklist for Dry Screw Vacuum Pump

Item	Detect points	Everyday	Every month	3 - 6 months	Every year
Motor current	Is there any change? Does it meet standard requirements?	☺ ☺			
Screw rotation	Is rotation smooth or correct?	☺			
Pressure of intake and exhaust	Is pressure in the normal range?	☺			
Noise and vibration	Are there any abnormal noise and vibration?	☺			
Temperature	Is pump surface temperature within standard range? Is temperature at bearing within standard range?	☺ ☺			
Front cover oil level	Is oil level at normal level?	☺			
Front cover oil quality	Is front cover oil emulsified or contaminated?	☺			
Oil leak	Is there any oil leak?	☺			
Lubricant replacement	Front and back end cap lubricants should be replaced regularly. The grease on rear cap must be checked regularly.		☺	☺	
Protection of cooling water and pressure	Does cooling water meet standards? Is water pressure within standard range?	☺ ☺			
Pipe of intake and exhaust	Is there any dirt?			☺	
Clean the purge	Clean purge before stopping pump	☺			
Detect pump chamber and screw	Is there a rust or corrosion phenomenon? Is there a crack on the surface?				☺ ☺
Wearable parts of pump	Replace if necessary				

3.3 Disassembly

● Notices of disassembly

- ① Any disassembly must be responsible by professional maintenance technicians. Serviceman must be familiar with vacuum pump related safety code, and disassembling steps of screw vacuum pump.
- ② Do not move, disassemble or operate before vacuum pump is completely stopped and make sure that power is turned off.
- ③ Please use N2 to clean vacuum pump comprehensively before disassembly when removing toxic, corrosive and other harmful gases to human. Be sure residual gas is exhausted.
- ④ Please note, temperature of vacuum pump parts is very high when operating, please disassemble pump after it is thoroughly cooled to avoid to be scalded.
- ⑤ Please do not damage package of connection. Make sure mark all links and anastomosis.
- ⑥ Dust should be treated to removed parts. Protect main seal components A, B, gear and bearings especially.

● Disassembly step

- 1 Remove all appendages on pump.
- 2 Open drain valves below pump to drain cooling water.
- 3 Open drain plug on front cap to drain oil.
- 4 Loosen motor connection nut and remove motor.
- 5 Loosen screw on the coupling, remove oil pan and coupling.
- 6 Loosen nut and remove lower cover.
- 7 Loosen gear expansion screw and remove gears A and B.
- 8 Then remove the components of air intake. Loosen screw and remove cover cap B.
- 9 Loosen bolt and remove bearing plate.
- 10 Loosen the bolts on the end cap B and use M12 mandrel to remove end cap B from pump casing.
- 11 Remove the corrugated spring, deep groove ball bearing, dry seal and piston sleeve B from end cap B.
- 12 Then remove exhaust side of parts. Loosen screws of bearing gland and remove bearing glands.
- 13 Loosen the nut on screw, remove the nuts from slave shaft A and slave shaft B, and pay attention to fixing copper pad in the screw hole.

The next step is to remove parts in side cover, which are used to determine gap of screw fixed end, so that it must be marked when disassembling, so as to be reset when reloading, which will avoid re-adjustment of fixed end clearance.

- 14 Use M6 bolts to remove bearing seat and bearing from side cap, and then remove bearing from bearing seat. Note that if there is an adjustment gasket in bearing seat. Mark bearing seat and gasket during disassembly.
- 15 Use M12 mandrill to remove side cover from pump casing and then remove dry seal from side cap. Note that if there is an adjustment gasket. Mark the oil deflector ring and gasket.
- 16 Remove rotor A and rotor B from piston ring A & shaft sleeve and make it.
- 17 Push rotor A and rotor B gently from pump casing and hang them with nylon rope.
- 18 Remove water bottle from pump casing.

Clean parts with high-quality cleaning agents and update old or damaged parts according to range of factory stated. It is recommended to replace new bearings, seals, gasket and O-rings for each assembly.

3.4 Assembly

● Notice for assembly

- ① Please note that if there are mold or damaged parts when assembling. Especially damage at junction or anastomosis will cause to serious affect after assembly. Therefore, it is very important for careful inspection for

damage of joints or anastomosis. Please replace or repair if founded.

- ② Clean bearings with light oil and then lubricate them. Please use a clean tool and wash your hands when handling bearings at any time.
- ③ Use soft cloth and detergent to remove dust on the anastomotic parts and coat it with oil. It is recommended to use molybdenum disulfide for tight fitting parts because these parts will be difficult to remove once rusted. Assembly will be more difficult than disassembly. (Use soft cloth and detergent before installation to clean thoroughly surface of taper parts of gears,).
- ④ Use new package as thick as old package to pack it.

● Assembly process

1. Fix rear cap A to end cap B with screws and place rear cap on table or appropriate rack.
2. Insert rotor A and rotor B vertically from end cap B, pay attention to make shorter end of rotor A and rotor B down, and then fit O-ring at the end of rotor.
3. Assembly pump gear end first (front and exhaust) and pay attention to paired relationship of original parts.
4. According to the original pairing style, assemble piston ring armor, dry seal and sleeve into the side cover, the installation as far as possible to keep the piston ring and the ring concentric. And then according to the correct pairing relationship, so that the rotor out of the shaft through the corresponding piston ring armor and the sleeve of the hole, the assembly of attention to press the sleeve, to prevent the shaft was shaft out of the dry seal, the side cover Main and driven rotor. At this time, the lower end face of the side cover should be in contact with the upper end surface of the screw rotor.
5. Install adjusting gasket on rotor shaft according to original paired relationship.
6. Install bearing seat on rotor shaft according to original paired relationship. Then fit double row angular contact ball on the bearing seat. Note that bearing a seal ring should be allocated at inside of bearing.
7. Use a round nut to secure bearing to rotor shaft. Note that the end of the round nut with tapered surface is inward. And then tighten the tightening screw on round nut. Place copper pad in front of set screw, otherwise it will damage thread on the rotor shaft.
8. Install bearing gland and secure it to the side cap with screws.
9. Check clearance between rotor face and side cap if it is the same thickness as gauge (= gap gauge).
10. Lift assembled parts and separate them from end cap B to assemble the pump. Put the front part on console and the rear part on the upper part of the assembled part up and down, so that the front part of the console, the rear part of the vertical top. Use arrangement and make side cover the end of the support surface when assembling. Pay attention to protect the side cover of side cap.
11. Install O-ring in the sealing grooves on the end face of the side cap, and then install the pump casing on the side cap to confirm that the lower end of pump casing is in agreement with side cap. And then place dust ring on the shaft.
12. Insert O-ring into end cap B. Install it on pump casing and fix it with bolts.
13. Install the piston ring B, dry seal and shaft sleeve in end cap B.
14. Place O-ring in cap B of bearing and then install the bearing. Note that sealed ring must be with bearing. Confirm that the bearing is already lubricated; Press the plate and fix it with bolts. Note that the spring washer must be fixed.
15. Place the wave spring in the bearing mounting hole and insert the O-ring in the seal groove at the end cap B. Install the rear cover and secure it with bolts.
16. Lift assembled parts and place them horizontally on the console.
17. Install gears B on the shaft, tighten bolt of gear expansion ring, fix gears B, install the dial indicator on the side cap, measure jerk value of gears B. If the jerk value is too big, it can be adjusted by touching high point gear. When

jerk value is less than 0.05mm, tighten bolt to fix gear B. Then install drive gear on the shaft, properly tighten gear ring screws, so that active rotor and gear can be relative rotation, and then through the inlet to the appropriate thickness of the gap gauge into the main, driven Rotate the meshing gap between the rotor and turn the driven gear slightly so that the thickness gauge is fixed and the screw of the drive gear is tightened properly. Take scale and then measure gap between rotors, adjust jerk value of rotor when the gap is uniform. When jerk value is less than 0.05mm, tighten bolt to fix gear B. It is a key step of pump installation.

18. Insert stud on the pump casing, insert the O-ring in the sealing groove on side cap end, install end cap A on side cap and fix it with spring washer and nut.

19. Install shaft coupling and oil pan to gear B and then fix it with bolts.

20. Place gasket on the outer face of end cap A, install motor on the end cap A and fix it with spring washer and nut.

21. Add lubricating oil to oil inlet at the top cap of front cap. The amount of oil should reach to red mark of oil scale.

22. Secure blind plate to pump casing.

23. Install every kind of accessories and Vacuum pump assembly is finished.

3.5 Quality guarantee

(1) Warranty period is one year after shipment, any product defects, workmanship and assembly problems arising from Seller's reasons during this period will be dealt with by the Seller.

(2) The following circumstances will not be included as a free warranty.

① Factors that seller cannot control: such as natural disasters, fire and so on.

② Product problems caused by climate, such as too high temperature, too large salinity and so on.

③ Failure of demolition caused by user without permission.

④ Failure caused by improper operation and maintenance.

⑤ Dry vacuum pump works in poor operating environment conditions, it is very important to manual of daily maintenance. Expect routine checks, a full interval comprehensive inspection, such as three months and six months, is very necessary. Special maintenance is required under special operating conditions, such as semiconductor industry operation or the chemical industry handling corrosive / toxic gases or solids.

4. Possible Problems and Solutions

Possible problems	Possible reasons	Solutions accordingly
Overheat	1. oil of front cover is too much 2. pump intake air temperature is too high 3. differential pressure is too large 4. rotor and pump friction 5. cooling water is insufficient	1. check amount of oil 2. assemble the condenser to cool the inlet air 3. empty and clean exhaust duct 4. find cause of the friction 5. check cooling water pressure and flow control valve to clean the cooling water pipeline
Deficiency of air	6. filter blocked 7. gap is too large 8. filter is blocked in the intake line	6. clean or replace the filter 7. check the gap 8. clean or replace the filter

Motor overload	9. foreign matter into machine 10. pressure loss of the pipe increases 11. exhaust port is blocked 12. friction between rotor 13. friction between rotor and pump casing	9. check pump chamber 10. check pressure of inlet and outlet 11. emptying and cleaning the exhaust duct 12. adjust gear to adjust gap between rotors 13. find the cause of the friction
Knocking	14. rotor gap is not uniform 15. parts assembled incorrectly 16. abnormal pressure increases 17. abnormal gear wear	14. reorient to the right position 15. reassemble 16. look for reasons for increased stress 17. replace gears
Bearing / gear damage, shaft damage	18. improper use of lubricants 19. lack of lubricants 20. the load is too large	18. replace oil 19. add lubricant 20. replace bearings or gears and adjust the load

* If fault is still existed after reading above reminder, it is possible to be caused by pump operation conditions. In this case, please contact us and indicate following information:

1. Model, quantity, series name, application area and so on.
2. Information about the pipe (valves, filters, elbows, etc.).

5. Daily Operation Checklist

	Checklist item	Status
Check before operation	Is water flow normal when open cooling water supply valve?	
	Close valve of pump inlet pipeline.	
	Open valve of pump exhaust pipeline.	
	Check if color and amount of the oil is normal?	
	Open pump before opening suction port.	
Check when operation	Is vacuum degree normal in full vacuum?	
	Check electrical condition (voltage and current)	
	Is there an abnormal sound?	
	Check if pump parts temperature is normal?	
	Check if color and amount of oil is normal?	
Check after stopping	Keep pump running for several minutes after closing valve of suction line,	
	If foreign matter is inhaled, it is necessary to wash using detergent.	
	Stop and discharge cooling water if pump does not run for a long time.	
	Make sure intake and exhaust lines of valve are closed.	
	Make sure power is off.	

6. Wearing Parts List

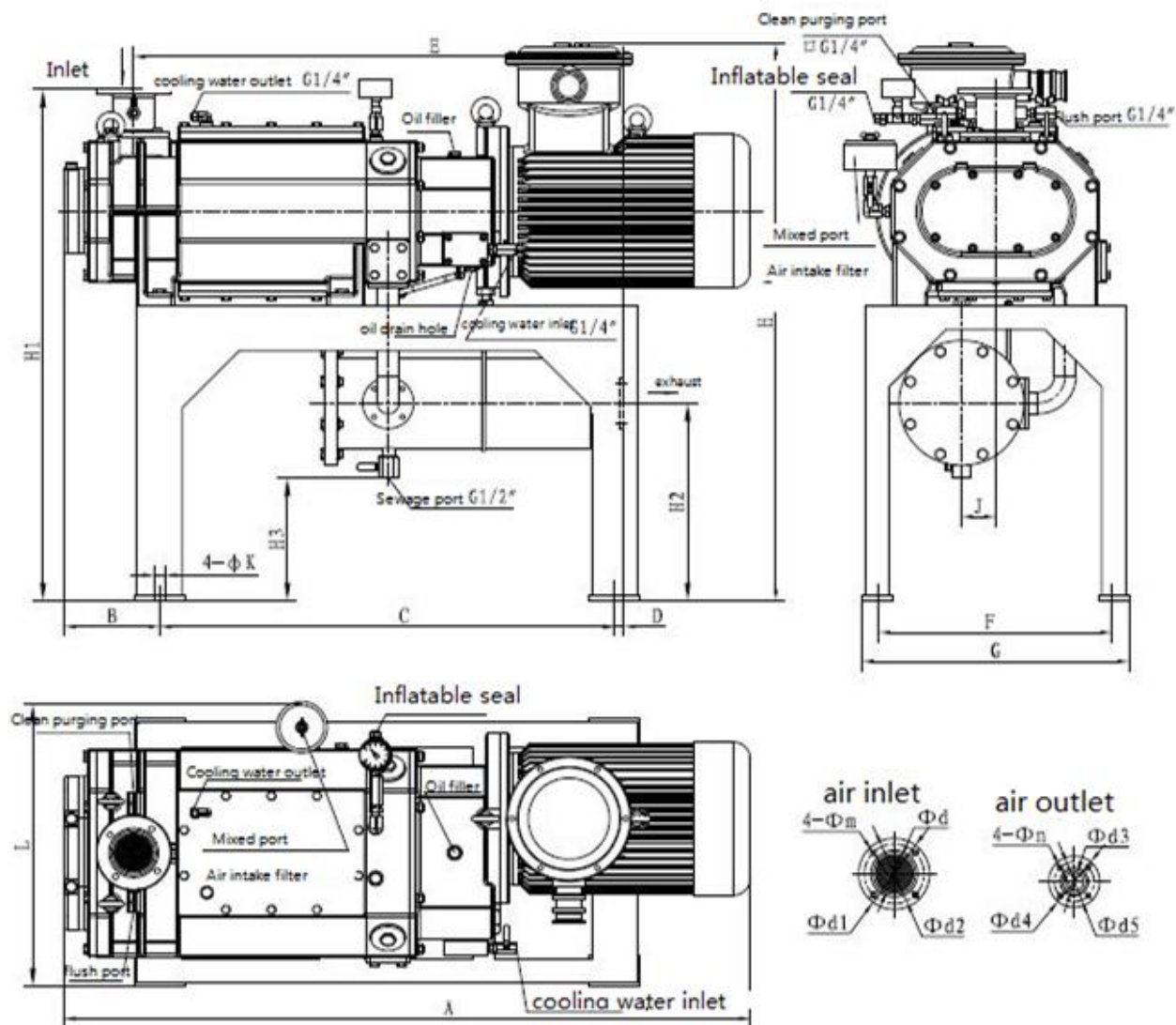
The following is a list of recommended wearing parts for routine inspections, which include all seals, bearings and other parts that are not reused after dismounting. These parts can be ordered by "maintenance kits" or separately.

LG screw vacuum pump wearing parts:

No.	Item.	LG-50	LG-70	LG-100	LG-150	LG-200
1	Piston Ring A	14 pcs	14 pcs	14 pcs	20 pcs	20 pcs
2	Piston Ring B	6 pcs	6 pcs	6 pcs	0	0
3	Deep groove ball bearings	2 pcs	2 pcs	2 pcs	2 pcs	2 pcs
4	Double row angular contact ball bearings	2 pcs	2 pcs	2 pcs	2 pcs	2 pcs
5	O-ring of pump casing	1 set	1 set	1 set	1 set	1 set
6	O-ring of side cap	1 set	1 set	1 set	1 set	1 set
7	O-ring of end cap B	1 set	1 set	1 set	1 set	1 set
8	O-ring of plug	1 set	1 set	1 set	1 set	1 set
9	O-ring of hexagon plug	1 set	1 set	1 set	1 set	1 set
10	Motor gasket	1	1	1	1	1
11	Dry oil seal	4 pcs	4 pcs	4 pcs	4 pcs	4 pcs

7.Dimenison Drawing

Outline drawing of screw vacuum pump with frame and muffler



	A	B	C	D	E	F	G	H	H1	H2	J	K	L	d	d1	d2	m	d3	d4	d5	n
LG50	1081	102	740	17	747	410	470	978	900	348	60	20	500	50	110	90	10	32	90	70	8
LG70	1207	168	800	17	863	410	470	978	900	348	60	20	500	65	125	105	10	32	90	70	8
LG110	1587	172	860	293	1188	500	570	1075	945	292	65	20	590	80	145	125	10	50	110	90	10
LG150	1433	183	685	295	1005	530	600	1085	970	292	80	20	630	90	170	145	12	50	110	90	10
LG200	1751	183	925	295	1245	530	600	1095	970	292	80	20	630	90	170	145	12	50	110	90	10