LACO TECHNOLOGIES

# USER MANUAL


## ATL21G4 ROTARY VANE VACUUM PUMP

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# CONTENTS

# 1. SCOPE

This manual contains installation, operation, maintenance, and troubleshooting information for the ATL21G4 Rotary Vane Vacuum Pump. Please read the manual in its entirety before operating the pump.

LACO rotary vane vacuum pumps are designed to ensure safety when used properly. It is the responsibility of the user to follow safety-related warnings, cautions, notes, and other requirements described in this manual.

Returned equipment will not be accepted by LACO Technologies without prior authorization. Prior to shipping please call for a returned material authorization (RMA) number.

LACO Technologies reserves the right to cancel the warranty if the pump is disassembled without authorization, if pump fluids are used that are not compatible with the design and materials used in the manufacture of the pump, and if unauthorized spare parts are used. The manufacturer has the right to modify the product without notice.

# 2. SAFETY

Death or serious injury can result from improper use or application of this pump. If the pump will be exposed to toxic, explosive, pyrophoric, highly corrosive, or other hazardous process gases including greater than atmospheric concentrations of oxygen, contact LACO Technologies for specific recommendations.

**WARNING** This device is designed for only use in the field of coarse or fine vacuum. It can be used to suck off air or dry gases, which are not poisonous, aggressive or explosive .

**WARNING** Read the instruction manual before operating this device.

**WARNING** Do not modify or repair the rotating parts of this device.

## 2.1 SAFETY REQUIREMENT :

**CAUTION** Transportation, installation, maintenance and troubleshooting must be executed by a responsible, qualified personnel.

**CAUTION** This device must be set up according to this instruction manual.

**CAUTION** Ground the motor properly during installation. Disconnect the power before beginning installation, maintenance or repair work or before interchanging the input leads when correcting the direction of rotation. Disconnecting the power also avoids an unexpected start-up for pumps with automatically resetting thermal overloads.

**CAUTION** Pleases check the direction of rotation before power is turned on

**CAUTION** If the device couldn't accelerate up to its rated speed from the power switch turned on, please turn off the power immediately and check it carefully.

**CAUTION** The power supply must be turned off before moving, maintaining or repairing this device.

**CAUTION** Liquid and solid particles must not enter the pump. If device will be come in contact with moist air device must be equipped with gas ballast valve.

**CAUTION** The end cover is used to prevent contact and direct the cooling air flow, can not be removed; otherwise the motor will get overheating.

# 3. SPECIFICATIONS

## 3.1 ATL21G4 BASIC PARTS

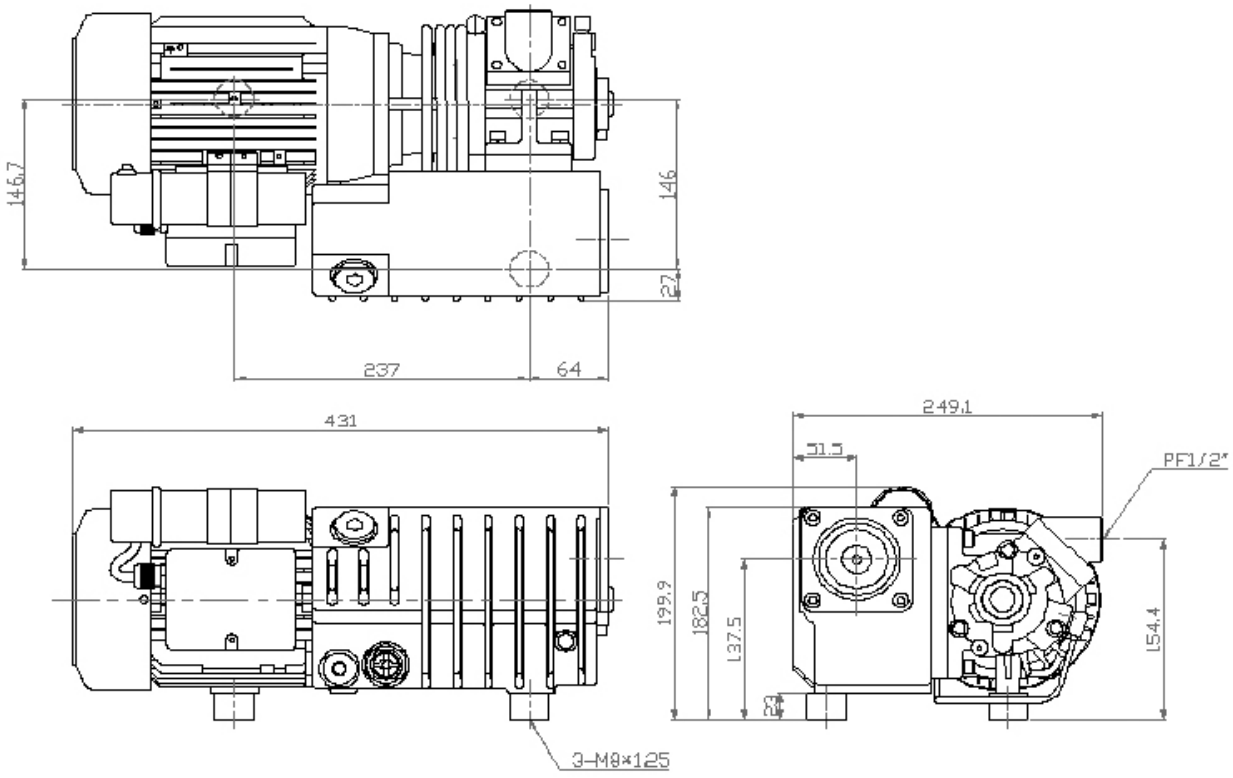
## 3.2 ATL21G4 SPECIFICATIONS

*Table 1: ATL21G4 Specifications*

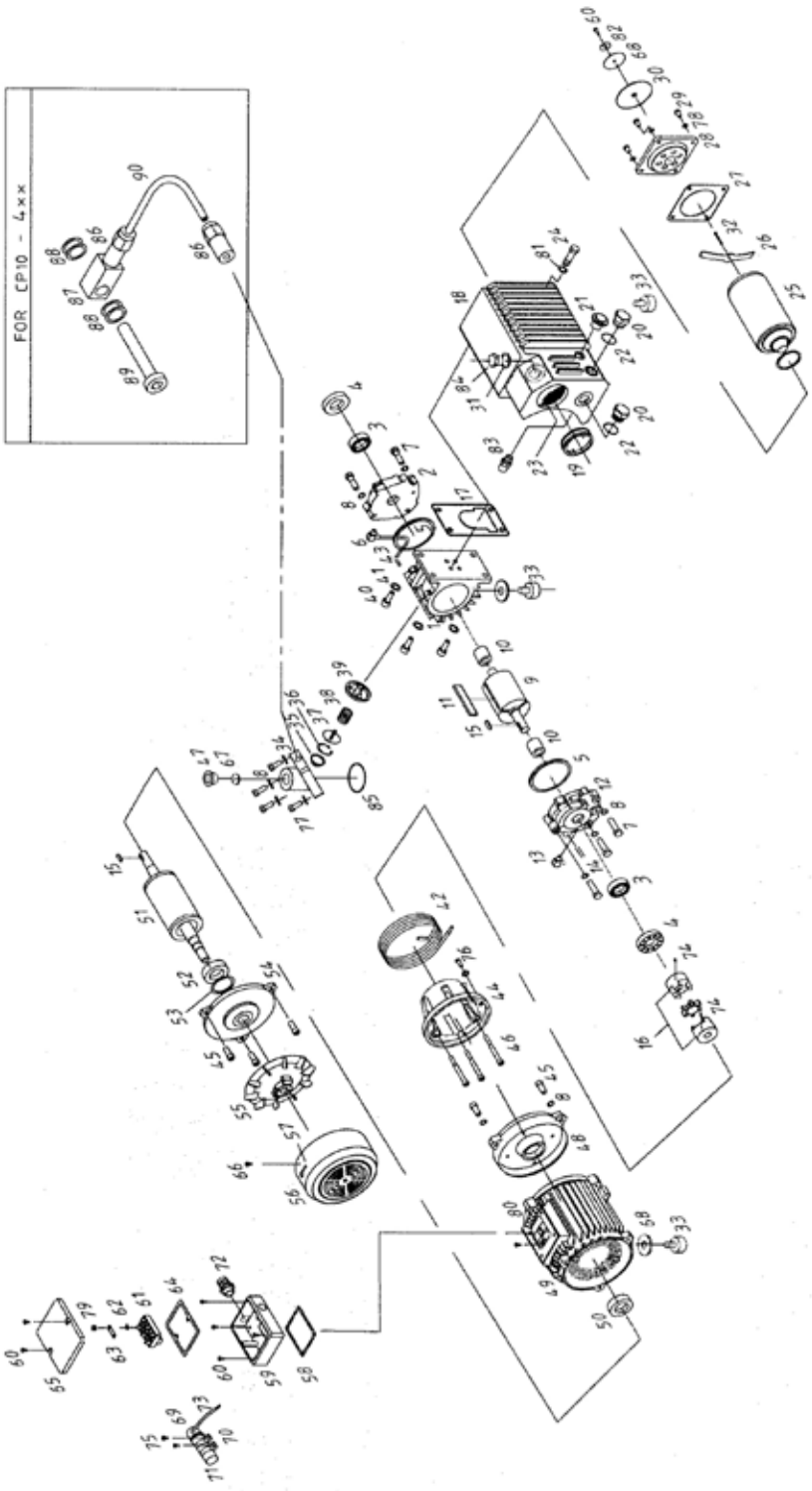
| COMPONENT | DESCRIPTION |
|---|---|
| Pumping Speed @ 60 Hz | 14 cfm, 24 m3/hr |
| Ultimate Pressure | 2 Torr, 29.8 inHG |
| Standard Motor, CE Marked | 120/240 Single Phase |
| Current | 13.07 amps |
| Oil Capacity | 0.53 quart |
| Weight Net | 25.3 kg, 55.78 lbs. |
| Noise Level | 72 dB(A) |
| Inlet Port | 1/2" NPT |
| Ambient Operating Temperature | 70° to 40° C (45° to 104° F) |

### 3.2.1 ATL21G4 DIMENSIONS

(Measurements in mm)



### 3.2.2 ATL21G4 EXPLODED DRAWING



# 4. INSTALLATION

## 4.1 RECEIVING

Each rotary vane vacuum pump is inspected and carefully packed prior to shipment. Inspect it after carefully unpacking it. In case of external damage, retain the shipping container and notify the shipping agency and LACO Technologies immediately. The packing materials are designed specifically for the pump and should always be used when transporting the pump.

Unpack the pump and check for shipping damage as follows:

1. Inspect the outside of the shipping container for shipping damage.
2. Unpack the pump.
3. Thoroughly inspect the pump for damage.
4. If you find any damage, proceed as follows:
    a. Save the shipping container, packing material, and parts for inspection.
    b. Notify the carrier that made the delivery within 7 days of delivery.
    c. File a claim with the carrier.
    d. Contact LACO Technologies to make arrangements for replacing the damaged part(s).

## 4.2 REPORTING SHIPPING SHORTAGE

If you did not receive all the goods that you ordered, do the following:

1. Check the number of items listed on the packing slip. If the number of pieces listed is greater than the number of shipping containers received, contact the carrier concerning the missing piece(s).
2. Check the packing list to see if the missing item is on back order.
3. Carefully check the packing material and container to ensure that the missing item was not overlooked.
4. If you cannot find the item, please notify LACO Technologies immediately

## 4.3 REPORTING INCORRECT SHIPMENT

If the item received is not the item ordered, contact LACO Technologies immediately.

## 4.4 INITIAL FILLING WITH VACUUM PUMP FLUID

All LACO rotary vane vacuum pumps are shipped with a full change of vacuum pump fluid. Always be sure that the oil level is approximately in the middle of the low and high level marks in the oil level window and please note that upon start up of the pump, the oil level in the oil level window will drop slightly.

## 4.5 CONNECTING THE PUMP TO THE SYSTEM

### 4.5.1 PREPARATION

1. Select a well ventilated area, free of dust.
2. The pump should be placed conveniently to monitor the oil level of the pump.
3. We recommend the pump is operated in temperature over 50 °F.

### 4.5.2 ELECTRICAL CONNECTIONS

The pump should be mounted to a secure object so as not to be moved by the vibration of the pump. The pump should be installed and maintained horizontally at all times.

1. The supplied power voltage and frequency must be as the rating stated on the nameplate
2. The drive motor must be protected against overload by a fuse or circuit breaker matching the rating current on the nameplate

**CAUTION** Do not connect power to your pump until the blank off plate is removed from the exhaust port. Operating the pump with the exhaust port blanked off will damage the pump and can injure the operator.

All connections must be vacuum tight for your pump to achieve its ultimate pressure.

### CONNECTING TO SYSTEM

1. It is recommended to mount the pump to a secure object so as not to be moved by vibration. The pump should be installed and maintained horizontally at all times.

2. Install pump to system including intake and exhaust lines.

**CAUTION** Remove the exhaust port cover before starting the pump.

**WARNING** Ensure that your vacuum line is connected to the pump's intake port and not to the exhaust port. If your vacuum line has a closed valve, accidentally connecting it to the pumps exhaust port causes a dangerous overpressure.

**NOTE** Ideally, the inside diameter of the vacuum line should be the same size or larger than the (ID) of the intake port. If the vacuum line is too narrow, it will reduce the pumping speed.

3. It is not required to install an exhaust line because the pump includes an internal oil mist eliminator.

**WARNING** If installing an exhaust line do not install an exhaust line with a smaller ID than the exhaust port. Restrictions reduce the pumping speed and could damage the oil seals or cause dangerous overpressure in the pump.

# 5. BASIC OPERATION

## 5.1 SETUP

Before starting the pump, please complete the following checklist:

**CAUTION** Do not connect power to your pump until the blank off plate is removed from the exhaust port. Operating the pump with the exhaust port blanked off will damage the pump and can injure the operator.

1. Be sure that the pump is filled with the appropriate amount of vacuum fluid.
2. Be sure that all electrical connections have been properly wired and that there are no bare wires that could cause an electrical shock or fire.
3. Be sure that all system connections have been secured with the appropriate seal rings and clamps.

## 5.2 OPERATION

1. First click ON/OFF which is located on the 120V power cord supplied with the pump.
2. These vacuum pumps are not designed for use in corrosive service. When pumping hazardous or corrosive passes, we recommend the use of an inlet vacuum trap.
3. Periodically check the vacuum fluid level in the sight glass to be sure it is between the low and high levels.

4. If the vacuum fluid within the pump becomes discolored or contaminated, change the fluid as soon as possible. Operating the pump with contaminated or dirty oil will greatly reduce the life expectancy of the pump and may lead to the cancellation of the warranty.

### 5.3 ANTISUCKBACK

If the pump stops with the inlet under vacuum the antisuckback system will stop oil leakage into the vacuum chamber. It is recommended to not store the pump for extended periods of time with the inlet port under vacuum.

## 6. MAINTENANCE

### 6.1 INSPECTION

- Check vacuum oil frequently. You need to check whether the oil is brownish, dirty, or contains moisture.
- Always check oil level before you start up the pump.
- If oil level is lowered you can add oil to proper level.
- If the oil has been contaminated by any dust or water, you need to change the oil entirely.

To change the pump oil:

1. Allow the pump to cool for about 5 minutes.
2. Drain the contaminated oil completely through the drain plug (reference Section 3.1 "ATL21G4 BASIC PARTS" for oil drain plug location).
3. Close the drain plug.
4. Fill the new vacuum oil through the oil filling plug and check the oil level.

**NOTE** The pump oil temperature should be typically less than 65°C when operating.

### 6.2 PERIODIC SERVICE ITEMS

#### 6.2.1 VACUUM OIL

Below are guidelines for the rate of oil changes specific to various applications. There is no exact formula for the rate of oil change. Please note the specifics of your system and change the oil at a rate best for your specific application.

| APPLICATION | CHANGE OIL WITHIN (HOURS) |
|---|---|
| High Vacuum in Lab environment, or system seldom exposed to the air | 2,500 |
| High Vacuum in manufacturing environment, often exposed to the air | 1,200 |
| Vacuum furnace, large gas-exhaust diffusion system, system with booster pump. | 600 |
| Vacuum drier, vacuum molding, vacuum packing | 200 |
| Vacuum distillation, low vacuum tank | 120 |

### 6.2.2 PUMP FLUID

Every vacuum pump is designed to work best with a specific pump fluid and the fluid is an active part of the pumping mechanism. For best performance from your pump, care must be used to select fluid with the physical and chemical properties engineered from you pump. For LACO pumps the ideal fluid for general purposes pumping is LVO19. This is a moderately priced fluid that is engineered to give best vacuum and longest life in our pumps. Other fluids may give performance that is good enough for your needs but specification are based on regular use of LVO19.

### 6.2.3 CHECKING THE PUMP FLUID

**WARNING** If the pump has been used on corrosive, toxic or volatile chemicals, observe proper safety precautions before removing the drain plug.

**CAUTION** Hydrocarbon pump fluid should be changed at the following times:

1. After a 100 hour break-in period of pump operation.
2. When the pump fluid becomes contaminated or is discolored.
3. When condensation in the pump fluid is present.
4. Before and after the pump has been stored for a long period of time.
5. Perflouropolyether fluid should be reconditioned when it becomes contaminated.

**NOTE** Always change the pump fluid while the pump is warm to prevent condensables, such as water, from remaining in the pump.

Turn the pump off and change the fluid as follows:

1. Drain the fluid from the pump. Use your fingers to remove the oil fill cap and the oil drain plug from the pump; allow the fluid to drain into a suitable container. If the fluid fill cap or fluid drain cap cannot be

loosened with your fingers, cover them with a cloth and use pliers.

2. After the oil flow diminishes, switch ON the pump, allow it to run for about 10 seconds and then switch if OFF.
3. If the fluid drained from the pump is discolored, contains particulate, has a foul odor or is very dirty, flush out the pump using the procedure below until the drained fluid is clean. If your pump requires more than 2 flushes, a foreline trap or oil filtration unit should be installed on the pump.
    a. Reinstall the fluid-drain plug with flat gasket into the fluid-drain port.
    b. Refill the pump with vacuum pump fluid until the fluid level is visible in the lower rim of the fluid sight glass.
    c. Blank off/on valve off the inlet port.
    d. Turn ON the pump and allow it to run for about 10 minutes.
    e. Turn the pump OFF and refer to step 1 to drain the vacuum fluid.
4. Charge the pump with fluid as follows:
    a. Reinstall the fluid-drain plug with flat gasket into the fluid port.
    b. Remove the fluid-fill cap and fill the pump to capacity with vacuum pump fluid.
    c. Reinstall the fluid-fill cap with flat gasket.

## 6.3 LONG TERM STORAGE (2 WEEKS OR LONGER)

Before placing a pump in long term storage, follow the procedure below:

1. Drain all fluids from the pump as described in the previous section.
2. Refill the pump with clean vacuum fluid as described in the section for changing the pump fluid.
3. Always cover both the intake and exhaust ports with caps to keep any dust or foreign materials from entering the pump. Place pump in original container if available.
4. Be sure that the pump is stored in a horizontal position with the intake and exhaust ports facing up.
5. When putting a pump into storage, put a pin hole in both the intake and exhaust port caps.

### 6.4 AVOIDING OIL LEAKS DURING SHIPPING AND STORAGE

Always drain your vacuum pump of all fluids before shipping. Failure to do so can result in damaged shipping containers and delays by freight carriers due to possibility of the presence of hazardous materials in the event of a spill.

## 7. TROUBLE-SHOOTING

| SYMPTOM | CAUSE | SOLUTION |
|---|---|---|
| Motor will not turn or pump is seized | No Power | Supply power |
| | Power switch or starter defective | Change the power switch or starter |
| | Protector or protector circuit opened | Change the protector or fix the protecting circuit |
| Humming motor, will not turn | One power cord opened | Check the power cord |
| | Power switch or starter defective | Change the power switch or starter |
| | Motor winding open | Change the motor winding |
| | Bearing defective | Change bearing |
| | Capacitor single phase defective | Change capacitor |
| | Working temperature below 15° C | Raise working temperature to 15° C or change lubricant |
| | Wrong lubricant | Change lubricant |
| Weak vacuum | Pump too small | Change to larger pump |
| | Wrong power frequency | Adjust power frequency |
| | Vacuum leakage | Check system and process for leaks |
| | Oil contaminated | Change oil |
| | Exhaust filter blocked | Change or clean filter |
| | Air filter blocked | Change air filter |
| | Vane defective | Change vane |
| | Vacuum meter defective | Change vacuum meter |
| Week pumping speed. | Exhaust filter clogged | Clean or change exhaust filter |
| | Air filter blocked | Change air filter |

| SYMPTOM | CAUSE | SOLUTION |
|---|---|---|
| Overheating | Working temperature exceed 40° C | Reduce working temperature |
| | Cooling air deficient | Change installation place or improve air flow |
| | Dirt in housing of motor or cylinder | Clean out dirt |
| | Less oil | Add oil |
| | Sucking air temperature too high | Reduce temperature of sucking air |
| White mist from exhaust cover | Exhaust filter blocked or damaged | Change exhaust filter |
| | Too much oil | Leak oil |
| Emulsify oil | Moisture | Change oil or open gas ballast valve |

## 8. SPARE PARTS

| NO. | DESCRIPTION | PART NUMBER |
|---|---|---|
| 1 | Cylinder | 2CPCYA001 |
| 2 | A-end plate | 2CPEPA021 |
| 3 | Bearing | 313BR3010 |
| 4 | Shaft seal | 316SL3070 |
| 5 | O-Ring | 316SL3080 |
| 6 | Elbow stud fitting | 337PUM040 |
| 7 | Hex. Head screw | |
| 8 | Spring lock washer | |
| 9 | Rotor | 313PLE020 |
| 10 | Sleeve | 313BR1030 |
| 11 | Vane | 2CPPU3010 |
| 12 | B-end plate | 2CPEPB021 |
| 13 | Elbow stud fitting | 337PUM020 |
| 14 | Tapper pin | 337PUM010 |
| 15 | Shaft key | 338KY2150 |
| 16 | Coupling Rubber | 316RB4080 |
| 17 | Separator gasket | 333PK1030 |
| 18 | Oil separator | 2CPOSA0A1 |
| 19 | Drum plug | 331SN1070 |
| 20 | Plug | 332PU1110 |
| 21 | Oil sight glass | 312PUM130 |
| 22 | O-Ring | 316SL3210 |
| 23 | Demister | 2CPRV4001 |
| 24 | Hollow core screw | 331SH1320 |

| NO. | DESCRIPTION | PART NUMBER |
|---|---|---|
| 25 | Exhaust filter | 31ZPU2010 |
| 26 | Spring | 33BPUM010 |
| 27 | Seal | 33ZPU1010 |
| 28 | Exhaust cover | 315PUM010 |
| 29 | Screw | |
| 30 | Rubber gasket | 316RB1060 |
| 31 | O-Ring | 316SL3210 |
| 32 | Spring screw | 331SH1190 |
| 33 | Rubber foot | 33ZRU1020 |
| 34 | Inlet flange | 2CPIFA001 |
| 35 | Inlet screw | 33ZPU1030 |
| 36 | Retaining ring | 335EP1100 |
| 37 | Valve plate | 315PUM030 |
| 38 | Compression spring | 33BPUM020 |
| 39 | Guide | 315PUM020 |
| 40 | Lock screw | |
| 41 | Spring washer | |
| 42 | Cooling Spiral Tube | 32ZPU1010 |
| 43 | Oil tube | 31ZPU1020 |
| 47 | Inlet oil plug | |
| 74 | Coupling set screw | 2CPCUP012 |
| 76 | Hex. lock screw | |
| 77 | Hex. Lock screw | |
| 78 | Plain washer | |
| 79 | Nut | |
| 82 | Plain washer | |
| 83 | Straight stud fitting | |
| 84 | Oil fill plug | |
| 85 | O-Ring | |