

OPERATION MANUAL

AeroSilento – Air compressor and Vacuum Pump



LAMBDA AeroSilento Air Compressor & Vacuum Pump

To supply vacuum or compressed air, e.g. for the aeration of fermenters and bioreactors in biotechnological laboratories not equipped by central air and vacuum lines, LAMBDA has developed an innovative, microprocessor controlled, compact and virtually noiseless air compressor and vacuum pump – the LAMBDA AeroSilento.

LAMBDA AeroSilento uses the scroll pump principle based on an almost unknown mechanism using two spirals. One spiral is stationary while the other rotates around the first one. This movement generates a series of closed compartments with gradually decreasing volume and increasing pressure. The transport of gas or liquid is smooth and progressive. Additionally, the multiple mechanical closures through the contact of both spirals results in a very good pressure stability. This means that the final pressure does not decrease with the flow rate, as it is usual in other pump types. The scroll principle was invented about one hundred years ago. However, it could not be produced without the use of modern, numerically controlled machines.

The scroll-pump system has been selected because of its inherent high-quality features:



- operates without oil
- low pulsation
- extremely low noise level
- long lifetime
- excellent flow and pressure stability
- can be used as compressor as well as vacuum pump
- very small dimensions

LAMBDA Laboratory Instruments

is developer and producer of special laboratory instruments mainly for biotechnology, microbiology, food and agricultural, chemical and pharmaceutical research and development as well as for general laboratory and research applications.

LAMBDA MINIFOR – highly innovative and compact fermenter/bioreactor system for laboratory scale fermentation and cell cultures

LAMBDA OMNICOLL – fraction collector-sampler for unlimited number of fractions

LAMBDA PRECIFLOW, MULTIFLOW, HIFLOW and MAXIFLOW peristaltic pumps – reliable, precise and extremely compact

LAMBDA SAFETY POWDER DOSER – allows automatic feeding of powders without spoon. Safe operation with hazardous material (GLP)

LAMBDA VIT-FIT polyvalent syringe pump with extremely robust mechanics – programmable infusion and filling from micro syringes to large volume syringes of 150 ml without adapter

LAMBDA MASSFLOW – precise gas flow measurement and control with data acquisition option

LAMBDA PUMP-FLOW INTEGRATOR – with LAMBDA pumps and doser allows the visualization and recording of the pumped volume

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1 SETTING UP THE AEROSILENTO

1.1 Use of the LAMBDA AeroSilento for pressure-regulated, oil-free air supply

Setting up LAMBDA AeroSilento is simple and easy, a short video could be found at <http://lambda-instruments.com/?pages=video-pressure-regulated-oil-free-air-compressor-aerosilento>.



Figure 1-1 Connect the tubing to the air output hose barb on the rear of the AeroSilento and to the tubing barb of the instrument or recipient to be supplied with the compressed air (e.g. to the air input hose barb on the back of the LAMBDA MINIFOR laboratory fermentor-bioreactor).



Figure 1-2 Switch the power on with mains switch at the rear of the air compressor. The display indicates the actual pressure.



Figure 1-3 Press the ▼ or ▲ button once, to see the preset pressure value. A point is displayed on the last digit.



Figure 1-4 Press the ▼ and ▲ buttons once again to set the desired pressure in kPa. The speed of the compressor motor will automatically be adjusted to the required flow rate until the pre-set pressure is attained.



Figure 1-5 When both buttons ▼ and ▲ are pressed simultaneously, the compressor is reset to 0 kPa.



Both, the air compressor motor and electronics are over-charge protected.



Do not exceed the maximum pressure of 200 kPa (or 2 atm)!



LAMBDA AeroSilento air compressor is not constructed for work with corrosive, explosive or flammable vapours.

1.2 Use of the LAMBDA AeroSilento as a vacuum pump

The LAMBDA AeroSilento can also be used as a low noise vacuum pump.

In this case, connect the tubing to the air input hose barb at the front of the instrument. Disconnect the tubing from the air output hose barb at the rear of the AeroSilento low noise vacuum pump.

The air stream should pass through a low temperature condenser or similar device, thus eliminating the vapours in the gas stream. This will prevent the formation of condensate in the pump and a possible corrosion inside the pump.

2 VAPOUR CONDENSATION

Under certain operating conditions, the vapours can condensate into the liquid phase inside or outside the compressor. Therefore, it is advisable to let the output air stream pass through a low temperature condenser or similar device. This will prevent the formation of condensate in the air supply line and possible damages to the connected devices, e.g. the mass flow measurement device of the MINIFOR laboratory fermenter/bioreactor.

An optional electronic Peltier cooling trap for the AeroSilento air compressor is available (art. no. 8091). It can be simply connected to the “Peltier cooling trap” socket on the rear side of the pressure-regulated air compressor.

3 ELIMINATION OF CONDENSATE

Because of the compression-expansion process, liquid water regularly forms in compressors and must be removed periodically.

The incorporated gas tank in the AeroSilento is heated and therefore the formation of condensates inside is unlikely. Should this still happen, the pump is so light that it is possible to remove the condensate easily:

1. Remove the tubing from the air output hose barb at the rear of the AeroSilento.
2. Set a low pressure (e.g. 10-20 kPa) using the pressure setting buttons ▼ and ▲.
3. Place the output hose above any convenient bucket.
4. Switch on the AeroSilento and tilt it with the front side up. If any condensate is present, it will now flow out. When no more condensate is coming out, place the air compressor back to the horizontal position, switch it off and restore the previous tubing connections.

4 PELTIER AIR DRYING SYSTEM (PELTIER COOLING)

The Peltier humidity condensing system protects the LAMBDA MINIFOR laboratory fermenter-bioreactor against water condensation in the air flow-rate measuring and control system, particularly in the MASSFLOW cell and needle valve. Such a protection is even more important in hot and humid environments.

The air drying system (cooling trap) consists of:



Figure 4-1 Peltier electro-thermal cell, which generates cold (no water cooling system is therefore necessary). The temperature of the cool side is electronically controlled to about +4°C. This prevents freezing of condensed water and blocking of the air way. A small LED on the front of Peltier unit shows when the current is switched on and off. The cable of Peltier cell is connected to the corresponding socket on the rear of the AeroSilento air compressor.

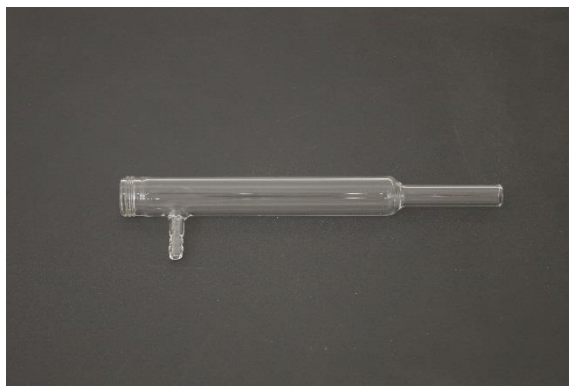


Figure 4-2 Condenser tube, where the input air passes along metal cooling finger on which the water vapour condenses and drops into the condensate bottle



Figure 4-3 Condensate bottle, which is made of pressure resistant chemical glass. The stopper carrying air input and lower part of condenser input tube is screwed to the condensate bottle. The condensate bottle must be protected from shocks and must be kept in the protective stand.

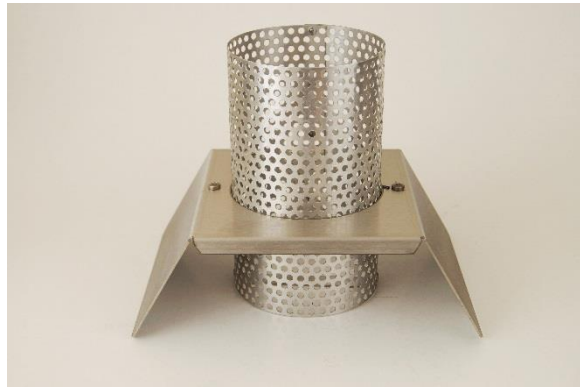


Figure 4-4 Protection stand safely holds the condensate bottle in vertical position and protects against flying pieces of glass in case of an accidental breakage of glass. The openings in the shield allow seeing how much water has accumulated. Empty the bottle when necessary.



The condensate bottle functions also as a pulsation damping device, which stabilizes the air pressure downstream before entry into the MINIFOR fermenter. When the pressure fluctuation should be critical, additional pressure resistant vessels can be added into air stream.



Always remove the pressure before manipulation with condensate bottle!

4.1 Setting up the Peltier cooling for air drying system



Figure 4-5 Apply the heat-conductive paste on the white surface of the Peltier cooling element with control electronics and fan, before attaching the condensing finger with the unit. Spread out the heat-conductive paste on the surface evenly and thinly ensuring that there are no trapped air bubbles.



Figure 4-6 Attach the Peltier cooling element with control electronics and fan with the condensing finger, by placing the white surface with the thermal paste onto the respective trap in the condensing finger attachment as shown.



Figure 4-7 The attached peltier cell with the condensing finger should be made kept together with the help of the locking clamp.



Figure 4-8 Locking clamp has to be pulled firmly through the Peltier cooling element with control electronics and fan and fixed into the hole on both sides of the cell, to make the Peltier cooling finger intact.



Figure 4-9 Insert the condenser cylinder with the tubing connection over the condensing finger and tighten it securely by the black screw cap.

4.2 Fix the Peltier set up to the condensate bottle and protection stand



Figure 4-10 Fix the condenser cylinder with the Peltier cooling finger to the condensate bottle.

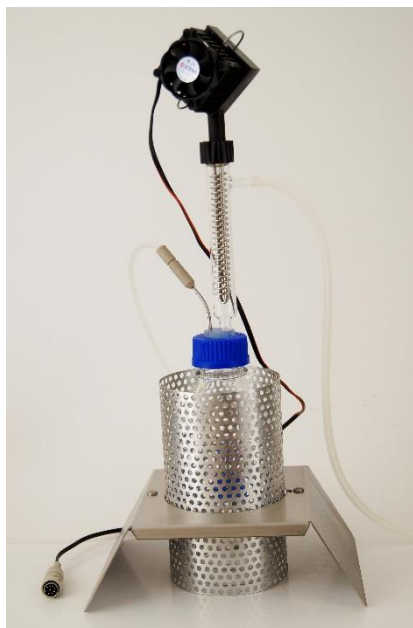


Figure 4-11 Place the condensate bottle with the Peltier cooling finger and glass condenser into the protection stand.

4.3 Connecting the air drying system to AeroSilento



Figure 4-12 Connect the input of the condensate bottle to the air output at the rear of the AeroSilento compressor and secure it in place.

Similarly, connect the output of condenser tube to the MINIFOR air input by tubing. (Using the supplied silicone tubing 5 mm OD with wall of 1 mm you protect your instrument from overpressure and also increase pressure-damping capability).

Connect the Peltier cooling trap to the corresponding socket on the rear of the AeroSilento air compressor.

Switch the power switch of the AeroSilento on.

5 TECHNICAL SPECIFICATIONS

| | |
|------------------------------------|---|
| <i>Type:</i> | LAMBDA AeroSilento – air compressor and vacuum pump |
| <i>Maximum air flow rate:</i> | 5 L/min |
| <i>Maximum pressure:</i> | 0.2 MPa |
| <i>Output pressure regulation:</i> | fully automatic pressure regulation from 0 to 200 kPa (2 atm or 2 bars) |
| <i>Vacuum:</i> | 4 kPa (0.04 atm or about 40 mbar) |
| <i>Power supply:</i> | 100 to 240 VAC/50-60 Hz, 150 W |
| <i>Noise level:</i> | 29 dB |
| <i>Dimensions:</i> | 5 (W) × 16 (H) × 30 (D) cm |
| <i>Weight:</i> | 4.5 kg |
| <i>Safety:</i> | Conform CE |
| <i>Warranty:</i> | 2 years |

6 GUARANTEE

LAMBDA provides a two-year guarantee on material and manufacturing defects, if the instrument was used according to the operation manual.

Conditions of guarantee:

- The instrument must be returned with a complete description of the defect or problem. In order to send back the equipment for repair, you will need a returns authorization number from LAMBDA.
- The customer will send the instrument to our service office.
- Damage or loss of items during transport will not be compensated for by LAMBDA.
- Failure to fulfil these requirements will disqualify the customer from compensation.

Serial Number: _____

Guarantee from: _____