Aspirator
N2400-9000

Instructions for use
EG-Konformitätserklärung für Maschinen
EC Declaration of Conformity of the Machinery
Déclaration CE de conformité des machines

Hersteller / Manufacturer / Fabricant:
STARLAB International GmbH · Neuer Höltingbaum 38 · 22143 Hamburg · Germany

Hiermit erklärt der Hersteller, dass das Gerät konform ist mit den Bestimmungen der Richtlinien:
Hereby the manufacturer declares that the device is in conformity with the directives:
Par la présente, le fabricant déclare, que le dispositif est conforme aux directives:

2006/42/EG
2014/30/EU
2011/65/EU

Membranpumpe / Diaphragm pump / Pompe à membrane:
Typ / Type / Type: Aspirator / Aspirator / Aspirateur
Artikelnummer / Order number / Numéro d’article: N2400-9000
Seriennummer / Serial number / Numéro de série: Siehe Typenschild / See rating plate / Voir plaque signalétique

Angewandte harmonisierte Normen / Harmonized standards applied / Normes harmonisées utilisées:
DIN EN 61326-1:2013, DIN EN 50581:2013

Bevollmächtigter für die Zusammenstellung der technischen Unterlagen / Person authorised to compile
the technical file / Personne autorisée à constituer le dossier technique:
Dr. Christof Behrens · STARLAB International GmbH · Neuer Höltingbaum 38 · 22143 Hamburg · Germany

Hamburg, 14.07.2016
Ort, Datum / place, date / lieu, date

(Johann Peplow)
Geschäftsführer / Managing director / Gérant

(Dr. Christof Behrens)
Produktmanager / Product Manager / Chef de produit

STARLAB International GmbH
Neuer Höltingbaum 38 · 22143 Hamburg
T: +49 (0) 40 675 99 39 0 F: +49 (0) 40 675 99 39 20
info@starlab.de
www.starlabgroup.com
Contents

Safety information! ................................................................. 4
  Important information! .......................................................... 4
  General information ............................................................. 6
  Intended use ........................................................................ 6
  Setting up and installing the system ....................................... 7
  Ambient conditions ................................................................. 8
  Operating conditions .............................................................. 9
  Safety during operation .......................................................... 10
  Maintenance and repair .......................................................... 13

Technical data ........................................................................ 15
  Wetted parts ........................................................................ 17
  System parts ......................................................................... 18
  On/off switch ......................................................................... 19

Use and operation .................................................................... 20
  First steps: Installation ........................................................... 20
  Operation Aspirator ............................................................... 21
  During operation .................................................................... 22
  Filtration ................................................................................ 23
  Filter and collection bottle ...................................................... 25

Cleaning and decontaminating ................................................ 27

Assembling of components .................................................... 30
  Replacing the filter ................................................................. 30
  Assembling a second hand controller connection set .............. 31
  Assembling quick coupling bottle - pump unit ....................... 33
  Quick coupling sets ............................................................... 34

Accessories - spare parts ......................................................... 35

Troubleshooting ..................................................................... 37
  Replacing the fuse ................................................................ 39

Repair - Maintenance - Return ................................................ 40
  Health and safety clearance form .......................................... 42
Safety information!

**Important information!**

- Keep this manual complete and accessible to personnel at all times!
- Read this manual carefully before installing or operating the equipment. Observe the instructions contained in this manual.
- Do not modify the equipment without authorization.

This manual is an integral part of the equipment described therein. It describes the safe and proper use of the vacuum pump. Make operating personnel aware of dangers arising from the pump and the pumped substances. STARLAB cannot accept any liability for inappropriate use of these pumps or for damage from failure to follow instructions contained in this manual.

This manual is only to be used and distributed in its complete and original form. It is strictly the users’ responsibility to check carefully the applicability of the guidance in this manual with respect to his product.

10/26/2016

The following signal word panels and safety symbols are used throughout this manual:

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury and death.
DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE is used to address practices not related to personal injury.

Caution! Hot surface!

Disconnect equipment from AC power.

Formatting used in this manual:
Note: The signal word panels in all sections of this manual always refer to all paragraphs of the same format (► / ➖ / • / plain text) following each signal word panel.

The document ”Safety information for vacuum equipment” is part of this manual! Read the ”Safety information for vacuum equipment” and observe the instructions contained therein!
**General information**

**WARNING**
- Read and comply with this manual before installing or operating the equipment.
- Before operating the equipment read and comply with the section "Cleaning and decontamination"!

**NOTICE**
Remove all packing material, remove the product from its packing-box, remove the protective covers from the inlet and outlet ports and keep. Inspect the equipment.
If the equipment is damaged, notify the supplier within three days; state the item number of the product together with your order number and the supplier's invoice number. Retain all packing material for inspection.
**Do not use the equipment if it is damaged.**
Lift and transport the equipment by the handle.

**Intended use**

**WARNING**
- Prevent any part of the human body from coming in contact with the vacuum.
- Make sure that the individual components are only connected, combined and operated according to their design and as indicated in the instructions for use. Use only original STARLAB accessories.
- Comply with notes on correct vacuum and electrical connections, see section "Use and operation".

**CAUTION**
- The systems are designed for **ambient temperatures** during operation between +10°C and +40°C. Check the maximum temperatures if installing the system in a cabinet or a housing and make sure ventilation is adequate. Install an external automatic ventilation system if necessary.
Ensure that the equipment and all components are suitable for the intended application. Use the system only for aspiration of liquids and filtration.

**Setting up and installing the system**

- Equipment must be connected only to a **suitable electrical supply** and a suitable ground point. **Failure to connect the motor to ground may result in deadly electrical shock.**

  The supply cable may be fitted with a molded European IEC plug or a plug suitable for your local electrical supply. If the plug has been removed or has to be removed, the cable will contain wires color coded as follows: green or green and yellow: earth; blue or white: neutral; brown or black: live. The device has an internal fuse.

- **Do not permit any uncontrolled pressurizing** (e.g., make sure that an exhaust tubing cannot become blocked). **Risk of bursting!**

  - Due to the high compression ratio of the pumps, pressure at the outlet port may be generated that is higher than the maximum permissible pressure compatible with the mechanical stability of the system.

  - Always provide a free and pressureless exhaust line.

- **Comply with maximum permissible pressures and pressure differences; see section "Technical data". Do not operate the pumping unit with overpressure at the inlet or outlet.**

- Check that line voltage and current conform with the equipment. (See rating plate.)

- Avoid overpressure of more than 0.2 bar in instances in which inert gas is connected.
Provide a firm level platform for the equipment. Ensure a stable position of the pump without any mechanical contact except of the pump feet. Comply with all applicable safety regulations.

Check fan regularly for dust/dirt, clean if necessary to avoid reduced ventilation. Avoid high heat supply. If the equipment is brought from cold environment into a room for operation, allow the equipment to warm up. (Watch for water condensation on cold surfaces.)

The diameter of the an outlet tubing should be at the least as large as the diameter of the pump connections.

Comply with all applicable and relevant safety requirements (regulations and guidelines), implement the required actions and adopt suitable safety measures.

**Ambient conditions**

To the best of our knowledge the equipment is in compliance with the requirements of the applicable EC-directives and harmonized standards (see "Declaration of conformity") with regard to design, type and model, especially directive DIN EN 61010-1. This directive gives, in detail, conditions, under which the equipment can be operated safely (see also IP degree of protection).

Adopt suitable measures in case of differences, e. g. using the equipment outdoors, installation in higher altitudes, conductive pollution or bedewing.

Pay attention to the permissible maximum ambient temperatures (see "Technical data").
**Operating conditions**

**DANGER**

- The devices have no approval for operation in or for pumping of potentially explosive atmospheres.
- The devices are **not suitable** to pump:
  - **unstable substances** and substances which react explosively under **impact** (mechanical stress) and/or when being exposed to **elevated temperatures** without air,
  - **self inflammable** substances,
  - substances which are **inflammable without air** and
  - **explosive substance**
- The pumps have **no approval** for operation below ground.

**WARNING**

- The pumps are **not suitable** for pumping dust.

**CAUTION**

- The devices are **not suitable** for pumping substances which may form **deposits** inside the pump. Deposits and condensate in the pump may lead to increased temperatures even to the point of exceeding the maximum permitted temperatures! Increased temperatures may cause ignition of inflammable substances that may have been deposited inside the pump during use.
- If there is a danger of the formation of **deposits** in the pump chamber (check inlet and outlet of the pump), inspect the pump chamber regularly and clean if necessary.
- **Take into consideration interactions and chemical reactions of the pumped media.**
- Ensure that the materials of the wetted parts are compatible with the pumped substances, see section "Technical data".

**NOTICE**

If pumping **different substances**, it is recommended that the pump be purged with air or inert gas prior to changing the pumped media in order to pump out residues and to avoid reactions of the pumped substances with each other and with the pump materials.
Safety during operation

Avoid interactions of media in the collection bottle.
Comply with material safety data sheets and notes on safe use of the manufacturer.
Do not mix incompatible disinfectants and/or incompatible reagents / solvents or any unknown substances.

For example sodium hypochlorite (chlorine bleach)

<table>
<thead>
<tr>
<th>Incompatible chemicals and agents</th>
<th>Possible results of mixing with sodium hypochlorite (chlorine bleach)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acids or acidic compounds (e. g. hydrochloric acid, aluminium chloride)</td>
<td>Release of chlorine gas</td>
</tr>
<tr>
<td>Ammonia containing compounds (e. g. ammonium hydroxide, quarternary ammonium salts)</td>
<td>Formation of explosive compounds, release of chlorine gas and other hazardous gases</td>
</tr>
<tr>
<td>Organic chemicals (e. g. solvents, polymers, amines, oils)</td>
<td>Formation of chlorinated organics, release of chlorine gas and other hazardous gases</td>
</tr>
<tr>
<td>Metals (e. g. copper, iron) Hydrogen peroxide</td>
<td>Release of oxygen, overpressure, rupture of a closed system</td>
</tr>
<tr>
<td>Reducing agents (e. g. sodium thiosulfate)</td>
<td>Production of heat, boiling</td>
</tr>
<tr>
<td>Guanidine salts (e. g. guanidine hydrochloride, guanidine thiocyanate)</td>
<td>Release of toxic gases, e. g. chlorine, chloramine, hydrogen cyanide</td>
</tr>
</tbody>
</table>

Avoid the formation of dangerous reactions / gases in the Aspirator, especially in the collection bottle. If this is impossible dispose of dangerous gases at the outlet of the pump appropriately.
Adopt suitable measures to prevent the release of dangerous, toxic, explosive, corrosive, noxious or polluting fluids, vapors and gases. In such cases, install an appropriate collecting and disposal system and take protective action for pump and environment.

If the equipment is used in combination with hazardous materials (e.g., in medical-microbiological laboratories) check all relevant safety and health requirements and determine the applicability of regulatory limitations prior to use if necessary.

Use appropriate safety work materials and methods if necessary, e.g., steam sterilization, sterilization indicators or germicides. For notes concerning the sterilization of wetted parts, see the "Technical Data" section and "Cleaning and decontaminating". It is the user’s responsibility to ensure effective sterilization.

Never operate a defective or damaged device.

The user must take suitable precautions to prevent any formation of explosive mixtures in the expansion chamber or in the housing. In case of a diaphragm crack, for example, mechanically generated sparks, hot surfaces or static electricity may ignite these mixtures. Use inert gas for venting if necessary.

Potentially explosive mixtures at the outlet of the pump have to be drained appropriately, evacuated, or diluted with inert gas to non-explosive mixtures.

Check the collection bottle regularly for cracks. Never use a collection bottle with cracks nor expose it to vacuum.

Use the system only in combination with the integrated hydrophobic filter (sterilizable) to protect pump and environment (people).
Comply with applicable regulations when disposing of chemicals. Take into consideration that chemicals may be polluted. Take adequate precautions to protect people from the effects of dangerous substances (chemicals, thermal decomposition products of fluorocopolymers), wear appropriate safety-clothing and safety glasses.

Use only OEM spare parts and accessories; otherwise safety and performance of the equipment as well as the electromagnetic compatibility of the equipment might be reduced. The CE mark or the cTUVus mark (see rating plate) may become void if original equipment manufacturer parts are not used.

In case of leaks in the manifold, aspirated substances might be released into the environment. Comply especially with notes on operation and use and maintenance.

Due to the residual leak rate of the equipment, there may be an exchange of gas, albeit extremely slight, between the environment and the vacuum system. Adopt suitable measures to prevent contamination of the pumped substances or the environment.

Maximum liquid level in collection bottle: approx. 80%, depending on the application. (When working with low-boiling liquids, or liquids that tend to foam, the maximum liquid level might be reduced).

Ensure that, in case of failure, the system will always return to a safe status. Provide appropriate protective measures (i.e., precautions which allow for the requirements of the respective application) even for the case of failure and malfunction. When operating the pump, the loss of pumping or venting must not lead to a critically dangerous situation under any circumstances.
Electronic equipment is never 100% fail-safe. This may lead to an indefinite status of the equipment. Failure of the pumping unit (e.g., by power failure) or connected components, or change of parameters must not lead to a critically dangerous situation under any circumstances. In case of diaphragm cracks or leaks in the manifold, pumped substances might be released into the environment or into the pump housing. Comply especially with notes on operation and use and maintenance.

- Pay attention to the safety symbol "hot surfaces" on the equipment. Hot parts may cause burns if touched. Adopt suitable measures to prevent any danger arising from hot surfaces or electric sparks. Ensure that hot surfaces of the pump do not cause burns. Provide a suitable contact guard if necessary.

In case of overload, the motor is shut down by a **self-hold thermal cutout** in the winding. Attention: Manual reset is necessary. Switch off the pump or isolate the equipment from power supply. Identify and eliminate the cause of failure. Wait approx. five minutes before restarting the pump.

**Maintenance and repair**

- **NOTICE** Parts liable to wear have to be replaced regularly. Under typical operating conditions, the projected lifetime of the diaphragms and valves is > 15000 operating hours. Bearings have a typical durability of 40000 h. Motor capacitors have a typical durability in the range of 10000 to 40000 h depending strongly on the operating conditions like ambient temperature, humidity or load.
Never operate the pump if covers or other parts of the pump are disassembled. Ensure that the pump cannot be operated accidentally.

Isolate equipment from power supply before removing the cover!
Before starting maintenance, unplug the equipment and wait 5 seconds to allow the capacitors to discharge.

Attention: The pump might be contaminated with noxious or otherwise dangerous process chemicals that have been pumped during operation. Ensure that the pump is decontaminated before maintenance.

Take adequate precautions to protect people from the effects of dangerous substances if contamination has occurred. Wear appropriate safety-clothing when you come in contact with contaminated components.

Parts liable to wear have to be replaced regularly.
Never operate a defective or damaged pump.
Check every motor capacitor regularly by measuring its capacity and estimating its operation time. Exchange old capacitors early enough to prevent a failure. When motor capacitors fail, they can get hot enough to melt or cause a flame which could be dangerous for persons and equipment in the vicinity. Motor capacitors have to be replaced by an electrician.

Before starting maintenance, vent the system and allow sufficient cooling of the pump. Drain condensate, if applicable. Avoid the release of pollutants.

Ensure that maintenance is carried out by suitably trained technicians. Ensure that the maintenance technician is familiar with the safety procedures which relate to the products processed by the pumping system.
In order to comply with law (occupational, health and safety regulations, safety at work law and regulations for environmental protection) vacuum pumps, components and measuring instruments returned to the manufacturer can be repaired only when certain procedures (see section "Repair - Maintenance - Return") are followed.
## Technical data

<table>
<thead>
<tr>
<th>Type</th>
<th>Aspirator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum pumping speed (ISO 21360) at 50/60 Hz</td>
<td>cfm (m³/h) 0.4/0.5 (0.7 / 0.85)</td>
</tr>
<tr>
<td>Ultimate vacuum (absolute)</td>
<td>Torr (mbar) 112 (150)</td>
</tr>
<tr>
<td>Maximum permissible inlet pressure (absolute)</td>
<td>psi (bar) 16 (1.1)</td>
</tr>
<tr>
<td>Maximum permissible outlet pressure (absolute)</td>
<td>psi (bar) 16 (1.1)</td>
</tr>
<tr>
<td>Rated power</td>
<td>hp (kW) 0.054 (0.04)</td>
</tr>
<tr>
<td>No-load speed 50/60 Hz</td>
<td>rpm 1500 / 1800</td>
</tr>
<tr>
<td>Control range</td>
<td>Torr (mbar) 112 - 637 (150 - 850)</td>
</tr>
<tr>
<td>Permissible ambient temperature</td>
<td>°F (°C) 14 to 140 / 50 to 104 (-10 to +60 / +10 to +40)</td>
</tr>
<tr>
<td>storage / operation</td>
<td>m 2000 above mean sea level</td>
</tr>
<tr>
<td>Permissible relative atmospheric</td>
<td>% 30 to 85</td>
</tr>
<tr>
<td>moisture during operation (no condensation)</td>
<td></td>
</tr>
<tr>
<td>Maximum permissible range of supply</td>
<td>230 V~ ±10% 50/60 Hz</td>
</tr>
<tr>
<td>voltage: **Attention: Observe specifica-</td>
<td></td>
</tr>
<tr>
<td>tions of rating plate!</td>
<td></td>
</tr>
<tr>
<td>Rated current at:</td>
<td>A 0.7 / 0.5</td>
</tr>
<tr>
<td>230 V~ 50/60 Hz</td>
<td></td>
</tr>
<tr>
<td>Fuse</td>
<td>2 x 2.5 AT, 0.19 x 0.78 in (5 x 20 mm)</td>
</tr>
<tr>
<td>Motor protection</td>
<td>thermal cutout</td>
</tr>
<tr>
<td>Degree of protection IEC 529</td>
<td>IP 40</td>
</tr>
<tr>
<td>A-weighted emission sound pressure level* (uncertainty KpA : 3 dB(A))</td>
<td>dB(A) 45</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type</th>
<th>Aspirator</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Volume of collection bottle</strong></td>
<td>gal (l)</td>
</tr>
<tr>
<td></td>
<td>1 (polypropylene)</td>
</tr>
<tr>
<td></td>
<td>(4 (polypropylene))</td>
</tr>
<tr>
<td><strong>Connection at the inlet</strong></td>
<td>hose nozzle DN 3/5mm</td>
</tr>
<tr>
<td><strong>Connection at the outlet</strong></td>
<td>hose nozzle DN 8 mm / silencer</td>
</tr>
<tr>
<td><strong>Hydrophobic filter</strong></td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td>Midisart® 2000</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>Sartorius stedim</td>
</tr>
<tr>
<td>Nominal pore diameter</td>
<td>0.2 µm</td>
</tr>
<tr>
<td><strong>Dimensions L x W x H approx.</strong></td>
<td>in (mm)</td>
</tr>
<tr>
<td>Aspirator</td>
<td>16.1 x 7.6 x 19.7</td>
</tr>
<tr>
<td></td>
<td>(408 x 194 x 500)</td>
</tr>
<tr>
<td><strong>Weight approx.</strong></td>
<td>lbs. (kg)</td>
</tr>
<tr>
<td>Aspirator</td>
<td>16.1</td>
</tr>
<tr>
<td></td>
<td>7.3</td>
</tr>
</tbody>
</table>

We reserve the right to change technical specifications without prior notice!
# Wetted parts

<table>
<thead>
<tr>
<th>Components</th>
<th>Wetted materials</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pump</strong></td>
<td></td>
</tr>
<tr>
<td>Housing cover insert</td>
<td>PTFE, carbon reinforced</td>
</tr>
<tr>
<td>Head cover</td>
<td>ETFE, carbon fibre reinforced</td>
</tr>
<tr>
<td>Diaphragm clamping disc</td>
<td>ETFE, carbon fibre reinforced</td>
</tr>
<tr>
<td>Diaphragm</td>
<td>PTFE</td>
</tr>
<tr>
<td>Valve</td>
<td>PTFE / FFKM</td>
</tr>
<tr>
<td>Inlet</td>
<td>ETFE</td>
</tr>
<tr>
<td>Outlet</td>
<td>ETFE</td>
</tr>
<tr>
<td>Silencer</td>
<td>silicone rubber</td>
</tr>
<tr>
<td><strong>Filter</strong></td>
<td></td>
</tr>
<tr>
<td>Diaphragm</td>
<td>PTFE</td>
</tr>
<tr>
<td>Housing</td>
<td>PP</td>
</tr>
<tr>
<td>Tubing</td>
<td>silicone rubber</td>
</tr>
<tr>
<td><strong>Collection bottle 4l</strong></td>
<td></td>
</tr>
<tr>
<td>Bottle / screw cap</td>
<td>PP</td>
</tr>
<tr>
<td>Hose nozzle at bottle head (connection hand controller)</td>
<td>PP</td>
</tr>
<tr>
<td>Hose in bottle</td>
<td>PTFE</td>
</tr>
<tr>
<td>Hose nozzle (connection filter)</td>
<td>PPS, glass fibre reinforced</td>
</tr>
<tr>
<td>Counter nut</td>
<td>PP</td>
</tr>
<tr>
<td>Closing screw</td>
<td>PPS, glass fibre reinforced</td>
</tr>
<tr>
<td><strong>Collection bottle 2l (accessory)</strong></td>
<td></td>
</tr>
<tr>
<td>Bottle</td>
<td>Borosilicate glass</td>
</tr>
<tr>
<td>Cap insert</td>
<td>PP</td>
</tr>
<tr>
<td>Flat seal</td>
<td>EPDM</td>
</tr>
<tr>
<td>Hose nozzle at bottle head (connection hand controller)</td>
<td>PP</td>
</tr>
<tr>
<td>Hose in bottle</td>
<td>PTFE</td>
</tr>
<tr>
<td>Hose nozzle (connection filter)</td>
<td>PPS, glass fibre reinforced</td>
</tr>
<tr>
<td>Closing screw</td>
<td>PPS, glass fibre reinforced</td>
</tr>
</tbody>
</table>
## System parts

<table>
<thead>
<tr>
<th>Position</th>
<th>Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pump</td>
</tr>
<tr>
<td>2</td>
<td>Mains connection</td>
</tr>
<tr>
<td>3</td>
<td>Fuse holder</td>
</tr>
<tr>
<td>4</td>
<td>On / Off switch</td>
</tr>
<tr>
<td>5</td>
<td>Touch panel</td>
</tr>
<tr>
<td>6</td>
<td>Rating plate</td>
</tr>
<tr>
<td>7</td>
<td>Outlet</td>
</tr>
<tr>
<td>8</td>
<td>Connection tubing</td>
</tr>
<tr>
<td>9</td>
<td>Hydrophobic protection filter</td>
</tr>
<tr>
<td>10</td>
<td>Connection filter</td>
</tr>
<tr>
<td>11</td>
<td>Connection hand controller</td>
</tr>
<tr>
<td>12</td>
<td>Closing screw (optional: connection second hand controller)</td>
</tr>
<tr>
<td>13</td>
<td>Screw cap / bottle cap with insert</td>
</tr>
<tr>
<td>14</td>
<td>Collection bottle</td>
</tr>
<tr>
<td>15</td>
<td>Handle</td>
</tr>
</tbody>
</table>

## Aspirator

![Diagram of the aspirator with numbered parts corresponding to the table above.]
**On/off switch**

System switched off

System switched on

Attention: Operate the on/off switch only by hand.
Use and operation

First steps: Installation

Unpack the equipment.

Read and comply with the document "Safety information for vacuum equipment"!

Assemble connection tubing with filter.

Setting up the Aspirator.

Connect to power supply.

**CAUTION**

Check line voltage and current prior to switching on!

Attach aspiration hose of the hand controller to the hose nozzle of the bottle head.
**Operation Aspirator**

The unit has a touch panel so the keys need only be touched gently. Do not press the keys. The keys “+” and “-“ have to be touched > 0.25 seconds to be actuated.

A successful action is confirmed by a blip and the flashing of LEDs.

Use the keys to set suction power of the system. The suction power can be set linearly in a range from 150 mbar (1 LED flashes) to 850 mbar (8 LEDs flash) underpressure (relative to atmospheric pressure).

A **flashing LED** indicates that the actual available suction power differs from the preset suction power.

Attention: If the collection bottle is under vacuum and the vacuum demand is reduced, the existing underpressure inside the bottle remains until the vacuum is reduced (pressure rises) by further aspiration with the hand controller.

---

**NOTICE**

Depending on ambient atmospheric pressure (depending on altitude or weather conditions) and on the vapor pressure of the media inside the collection bottle, the setting of a high underpressure (e. g., 850 mbar, 8 LEDs flash) may lead to continuous operation of the pump. In this case a reduction of the suction power is recommended.
During operation

⚠️ DANGER

→ Attention: When removing the hand controller, liquid in the tube may leak! Adopt suitable measures to prevent the release of dangerous, toxic, explosive, corrosive, noxious or polluting fluids, vapors and gases. In such cases, use an appropriate collecting and disposal system and take protective action for personnel, equipment and environment.

🌡️ Max. ambient temperature: 40 °C

⚠️ WARNING

• Use the system only with the integrated hydrophobic filter to protect the vacuum supply from aspirated liquids and aerosols, and to protect the environment/user from contamination risk.

Silencer at the outlet

Attention: Dust-laden gases, deposits and condensed solvent vapor can restrict air flow out the silencer. The resultant back pressure can lead to damage of pump bearings, diaphragms, and valves. Under those conditions, a silencer must not be used. Check the silencer regularly and replace if necessary.

In case of harmful / poisonous gases or condensate at the outlet, remove silencer and replace with an exhaust tube.
The hand controller allows the aspiration of excess liquids. See manual "Hand controller".

The aspiration system doesn’t feature an air admittance valve. If the collection bottle is under vacuum and the vacuum demand is reduced, the existing underpressure inside the bottle remains until the vacuum is reduced (pressure rises) by further aspiration with the hand controller.

Attention: Removing the connection tubing from the screw cap leads to immediate venting of the collection bottle. In systems without quick couplings, removal of the tubing at the pump inlet will also vent the system.

**Filtration**

Connect the suction flask to the connection of the hand controller at the bottle head.
The pump achieves its **pumping speed, ultimate vacuum** and vapor pumping rate only at operating temperature (after approx. 15 minutes). Prevent internal condensation, transfer of liquids or dust. The diaphragm and valves will be damaged if liquids are transferred through the pump in significant amounts.

In case of excess temperature the motor is shut down by a **thermal cutout** in the winding. Manual reset is necessary. Switch off or unplug the pump. Identify cause of failure and eliminate. Wait approx. five minutes before restarting the pump. After a power failure, the system will automatically start again.

**Storage following use**

### Short-term:
- Empty bottle.
- Has the pump been exposed to **condensate**?
- Set the hand controller to continuous aspiration and the Aspirator to maximum underpressure and allow the pump to continue to run for a few minutes.
- Has the pump been exposed to media which may damage the pump materials or form **deposits**? Check and clean pump head if necessary.

### Long-term:
- Take measures as described in short-term shutdown section.
- Close inlet and outlet port (e. g., with transport caps).
- Store the pump in dry conditions.
Filter and collection bottle

**NOTICE**
The hydrophobic filter retains water and aqueous solutions also in the form of aerosols. When using solvents, or due to evaporation of water, formation of condensate at the outlet of the Aspirator is possible.

**WARNING**

**Important:** Comply with applicable regulations when disposing of solvents.

**Attention:** Do not remove connections in case of liquid in the tube. Do not touch contaminated parts when removing the screw cap. Risk of infection! Wear appropriate protective clothing, e.g., gloves.

Filter

Change filter if necessary in case of contamination, weak aspiration or no aspiration.

Use only the original spare part (see section “Accessories - Spare parts”) and sterilize and dispose of the filter according to appropriate regulations.

**Note:** After disinfection with alcohol, allow the filter to dry completely because the filter may become clogged by alcohol.
Emptying the collection bottle of the Aspirator

Check liquid level in the collection bottle regularly.

**Maximum admissible liquid level in collection bottle:** approx. 80 %, depending on the application. (In case of low boiling liquids or in case of suction of liquids which tend to foam, the admissible liquid level might be reduced.)

Switch off the Aspirator.

Vent the collection bottle.

Remove the connecting tube at the pump inlet, isolate connections in case.

Remove screw cap from the collection bottle after venting.

Remove bottle from the support.

Sterilize and dispose of collected liquid according to appropriate regulations.
Autoclaving
The collection bottle with bottle head and screw cap, the quick coupling and the filter are designated for steam sterilization at 121°C and 2 bar absolute (1 bar overpressure). Time of exposure according to DIN 58946 \( t_e = 20 \text{ minutes} \).

**NOTICE**

Prior to autoclaving loosen or remove the bottle head from the bottle.

It is the user’s responsibility to ensure effective autoclaving.

**NOTICE**

Autoclaving
Maximum liquid level in collection bottle: 80%. When working with low boiling liquids or liquids that tend to foam, the maximum liquid level may be less.

The number of autoclaving cycles can be marked on the plastic disc (Memory Disc) of the filter (max. 20 autoclaving cycles according to the manufacturer instruction).

**NOTICE**

UV disinfection is permitted but may lead to discoloration of the plastic parts.
Attention: UV disinfection acts only at the surface.
Over time, discoloration and material changes (e.g., resiliency, elasticity/tightness, cracking) due to repeated steam sterilizations may occur.

**Important notes on use of disinfectants, see also “Safety during operation”**

Aggressive disinfectants which release chlorine or oxygen radicals, e.g., sodium hypochlorite (chlorine bleach) or peroxide compounds can corrode the material of the 4l polypropylene collection bottle and other components (e.g., couplings). This may lead to stress cracks and breakage of the 4l polypropylene bottle.

Therefore, prolonged use of these disinfectants in the 4l polypropylene bottle is strongly discouraged. After brief disinfecting operations in the bottle, rinse bottle thoroughly to avoid leaving residues of disinfectant in the bottle.

Alternative: Use the Aspirator with 2l borosilicate glass bottle.

Attention: The quick-coupling accessory sets between the pumping unit and hand controller are not suitable for use with sodium hypochlorite (chlorine bleach).

Using corrosive disinfectants may result in damage, malfunction and/or failure of the equipment.

Chlorine permeates the hydrophobic filter on top of the collection bottle and may damage the materials of the equipment or the vacuum supply.

Leaking of liquid from a damaged collection bottle or suction tube may lead to exposure of personnel and material or to damage/destruction of wetted equipment or laboratory furniture.
The use of the disinfectant Sekusept® Plus (Manufacturer: Ecolab GmbH & Co OHG, Düsseldorf, Germany) in extensive in-house testing did not cause any damage to the collection bottle. Hence the disinfectant Sekusept® Plus - even when used in the collection bottle during suction - is preferred to sodium hypochlorite (chlorine bleach). Comply with use and safety instructions of the manufacturer!

- Even if using disinfecting solutions after termination of the suction it is absolutely necessary to assure the compatibility of disinfectant and the parts to be disinfected.
- For information about the compatibility with the materials of the pumping unit, ask the manufacturer of the disinfectant.
- The wetted materials of the system are listed in the section "Technical data".
Assembling of components

**Replacing the filter**

Vent the collection bottle. Ensure that there is no liquid in the tube to avoid risk of contamination.

Remove connecting tube from the filter. Remove the filter from the piece of tube at the hose nozzle.

Attach new filter.

Observe flow direction. Position filter with the printed side "FACING DOWN" towards the bottle.

Attach the connecting tube.

`atmospheric pressure`

Midisart® 2000

0.20 µm PTFE

insartorius stedim

atmospheric pressure
Assembling a second hand controller connection set (with / without coupling) or conversion to quick coupling hand controller - bottle

Empty bottle.
Decontaminate equipment if necessary.

Remove filter with connection tubing from bottle head.

Remove screw cap from the collection bottle.

Unscrew closing screw.
Only Aspirator with polypropylene bottle: Remove counter nut inside the screw cap.

**Aspirator with polypropylene bottle**

Insert hose connection (1a) with seal ring (2) or coupling (1b) with seal ring (2) in the screw cap. Secure lead through with counter nut (3). Assemble hose (4) under the screw cap to the lead through.
Aspirator with glass bottle (accessory)

Screw hose connection (1a) with seal ring (2) or coupling (1b) with seal ring (2) into the screw cap.
Assemble hose (3) under the screw cap to the lead through.

Screw cap onto bottle.

Assemble filter.

Assemble hand controller.
Assembling quick coupling bottle - pump unit (extension set)

Attention: The extension set "Quick coupling bottle - pump unit" is designated for two different extension versions. Therefore, the set consists of parts which may not be necessary in each individual case. Redundant parts are not credited by STARLAB.

Assembling to pump inlet

Remove tubing. Disassemble hose nozzle. Hold counter piece with open-ended wrench size 19 mm.

Assemble coupling (2) with seals (1, 3) and hose nozzle (4). Hold counter piece with open-ended wrench size 19 mm. Connect tubing.

Assembling to an additional bottle

Assemble coupling part (1) with seal (2) and hose nozzle (3). Connect tubing.
Quick coupling sets

**Quick coupling set: Hand controller to bottle**

Quick coupling made of PVDF, with adapter to connect a hand controller to a collection bottle. When disconnected, the collection bottle closes vacuum tight.

**Quick coupling set: Bottle to pump unit**

Quick coupling made of PVDF, to connect a collection bottle to a Aspirator. When disconnected, the collection bottle closes vacuum tight.

**NOTICE**

Attention: The quick-coupling accessory sets between the pumping unit and hand controller are not suitable for use with sodium hypochlorite (chlorine bleach).
4L PP-bottle with protection filter and inlet pipe ............................................................. N2400-9010

2L glass bottle with protection filter and inlet pipe ............................................................. N2400-9012

Note: Quick couplings must be ordered separately!

4L PP-bottle with screw cap
(w/o filter, connection for hose, blind plug) ............................................................. N2400-9011

Quick coupling hand controller to bottle
N2400-9008

Attention: The quick-coupling accessory sets between the bottle and the pumping unit as well as between the bottle and the hand controller are not suitable for use with sodium hypochlorite (chlorine bleach).

Quick coupling bottle to pump ............ N2400-9009

Attention: The quick coupling accessory sets between the bottle and the pumping unit as well as between the bottle and the hand controller are not suitable for use with sodium hypochlorite (chlorine bleach).

Protection filter with connective tubing ........................................................................... N2400-9007
Hand controller for Aspirator ............ N2400-9001

Tubing for hand controller, 2.5 m ............................................................... N2400-9005

Connection Kit for 2nd hand controller ............................................................. N2400-9006
(to be assembled at a STARLAB Aspirator, does not include hand controller or quick coupling)

For further accessories and spare parts see instructions for use of the hand controller.

Adapter for 2l glass bottle ................. N2400-9013

Mobile underframe ......................... N2400-9014
# Troubleshooting

<table>
<thead>
<tr>
<th>Fault</th>
<th>Possible cause</th>
<th>Remedy</th>
</tr>
</thead>
</table>
| ❑ Pump fails to start, system becomes vented. | ➔ Not plugged in, or failure of electrical supply?  
 ➔ Power switched off?  
 ➔ Motor overloaded?  
 ➔ Internal fuse blown?  
 ➔ Aspiration power setting is off (atmosphere, no vacuum)?  
 ➔ Red LED glows continuously?  
 ➔ Filter clogged? | ✔ Plug in, or check fuse controlling power outlet.  
 ✔ Switch on power.  
 ✔ Switch off, allow motor to cool, identify cause of failure and eliminate before switching on again.  
 ✔ Identify cause of failure, replace fuse (under the cover).  
 ✔ Set aspiration power to "+" (more vacuum).  
 ✔ Eliminate leaks.  
 ✔ Replace filter. |
| ❑ No aspiration at the hand controller, pipette drips (above causes excluded). | ➔ Adapter or aspiration tube defective?  
 ➔ Filter clogged?  
 ➔ Leak at the bottle head?  
 ➔ Pump operating but no pumping speed?  
 ➔ Aspiration power setting is off (atmosphere, no vacuum)? | ✔ Replace adapter with aspiration tube.  
 ✔ Replace filter.  
 ✔ Check seals, coupling and blind cap. Screw in or replace if necessary.  
 ✔ Perform maintenance, replace diaphragm and valves if necessary.  
 ✔ Set aspiration power to "+" (more vacuum). |
| ❑ Pump switches frequently. | ➔ Leak in the system?  
 ➔ Filter clogged?  
 ➔ Diaphragms or valves of the pump defective? | ✔ Check tubing, seals, coupling, and blind cap. Screw in or replace if necessary.  
 ✔ Replace filter.  
 ✔ Perform maintenance, replace diaphragm and valves if necessary. |
<table>
<thead>
<tr>
<th>Fault</th>
<th>Possible cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>❑ Pump is running continuously.</td>
<td>➔ Leak in the system?</td>
<td>✔ Check tubing, seals, coupling, and blind cap. Screw in or replace if necessary.</td>
</tr>
<tr>
<td></td>
<td>➔ Too high underpressure for altitude / weather conditions? Vapor pressure of the media inside the collection bottle too high?</td>
<td>✔ Reduce underpressure / aspiration power.</td>
</tr>
<tr>
<td></td>
<td>➔ Other causes?</td>
<td>✔ Contact your local distributor.</td>
</tr>
<tr>
<td>❑ Pump is running continuously, all LED’s indicating the suction power are flashing.</td>
<td>➔ Pressure sensor defective?</td>
<td>✔ Reduce suction power using key &quot;-&quot;. If the error persists, contact your local distributor.</td>
</tr>
<tr>
<td>❑ Keys do not react.</td>
<td>➔ Keys of the touch panel touched long-lasting?</td>
<td>✔ Wait 20 seconds and try again.</td>
</tr>
</tbody>
</table>
Replacing the fuse

⇒ Switch off the pump.
⇒ Disconnect the electrical power cord before opening the terminal box. After disconnecting from power, wait **5 seconds** to allow the capacitors to discharge.

⇒ Identify and eliminate the cause of failure before switching on the equipment again.

⇒ Keep the snap-fit squeezed and pull the fuse holder out.
⇒ The fuse holder contains two fuses of the same type. Replace the defective fuse with a fuse of the same type (see "Technical data")
⇒ Insert the fuse holder into the housing of the pumping unit until it snaps into place.
Every employer (user) is held responsible for the health and safety of their employees. This also applies to service personnel performing repair, maintenance or return. The health and safety clearance form informs the contractor about any possible contamination of the device and forms the basis for the risk assessment.

In case of devices which have been in contact with biological substances of risk level 2 contact the STARLAB service BEFORE dispatching the device. These devices have to be completely disassembled and decontaminated by the user prior to shipment. Do not return devices which have been in contact with biological substances of risk level 3 or 4. These devices cannot be checked, maintained or repaired and even decontaminated devices must not be returned to STARLAB due to a residual risk. The same conditions apply to on-site work.

No repair, maintenance or return is possible unless a correctly completed health and safety clearance form is returned. Devices sent without a completed form will be rejected. Send a completed copy of the health and safety clearance form to us in advance. The declaration must arrive before the equipment. Enclose a second completed copy with the product.

Remove all components from the device that are not original STARLAB components. STARLAB will not be responsible for lost or damaged components that are not original components. Drain the device completely of fluids and residues. Decontaminate the device. Close all openings airtight especially if using substances hazardous to health.
To expedite repair and to reduce costs, please enclose a detailed description of the problem and the product’s operating conditions with every product returned.

If you do not wish a repair on the basis of our quotation, the device may be returned to you disassembled and at your expense.

In many cases, the components must be cleaned in the factory prior to repair.

For cleaning we use an environmentally friendly water based process. Unfortunately the combination of elevated temperature, cleaning agent, ultrasonic treatment and mechanical stress (from pressurised water) may result in damage to the paint. Please mark on the health and safety clearance form if you would like a repaint (at your expense) in case such damage should occur. We will also replace parts for cosmetic reasons at your request (and at your expense).

**Before returning the device**

Pack the device properly, if necessary, please order original packaging materials at your costs.

Mark the package completely

**Securely attach the completed health and safety clearance form to the outside of the carton.**

Notify the carrier of any possible contamination if required.

**Scrapping and waste disposal**

Dispose of the equipment and any components removed from it safely in accordance with all local and national safety and environmental requirements. Particular care must be taken with components and waste oil which have been contaminated with dangerous substances from your processes. Do not incinerate fluoroelastomer seals and O-rings. You may authorize us to dispose of the equipment **at your expense**. Otherwise we return the device at your expense.
Health and safety clearance form

1. Device (Model): ..................................................................................................................................................

2. Serial no.: ...........................................................................................................................................................

3. Reason for return / malfunction: ........................................................................................................................

4. Has the device been used in a copper process step (e.g., semiconductor production): ☐ yes ☐ no

5. Substances (gases, liquids, solids, biological material, e.g. bacteria, viruses) in contact with the device / which have been pumped:

............................................................................................................................................................................
............................................................................................................................................................................
............................................................................................................................................................................
............................................................................................................................................................................

6. Risk level of the used biological material:
   ☐ none ☐ 1 ☐ 2* ☐ 3** ☐ 4**
   * Contact the STARLAB service BEFORE dispatching the device.
   ** Devices which have been in contact with biological substances of risk level 3 or 4 cannot be checked, main-
   tained or repaired and even decontaminated devices must not be returned to STARLAB due to a residual risk.

7. Radioactive contamination: ☐ yes ☐ no

8. I confirm that the device has been decontaminated:
   ☐ yes ☐ no
   Description of the decontamination method and the test / verification procedure:

............................................................................................................................................................................
............................................................................................................................................................................

9. All parts of the device are free of hazardous, harmful substances: ☐ yes ☐ no

10. Protective measures required for service staff:

11. If the paint is damaged, we wish a repaint or a replacement of parts for reason of appearance
    (repaint and replacement at customer’s expense): ☐ yes ☐ no

12. Legally binding declaration
    We assure for the returned device that all substances, which have been in contact with the device are listed in
    section 5 and that the information is complete and that we have not withheld any information. We declare that
    all measures (where applicable) have been taken as listed in section “Repair - Maintenance - Return”. By our
    signature below, we acknowledge that we accept liability for any damage caused by providing incomplete or
    incorrect information and that we shall indemnify STARLAB from any claims as regards damages from third
    parties. We are aware that as expressed in § 823 BGB (Public Law Code of Germany) we are directly liable for
    injuries or damages suffered by third parties, particularly STARLAB employees occupied with handling/repairing
    the product. Shipping of the device has/will be undertaken according to regulations.

Name: ................................................................. Signature: .................................................................

Job title: ................................................................. Company’s seal:

Date: .................................................................

Release for repair grant by STARLAB (date / signature): .................................................................

Protective measures: ☐ Protective gloves, safety goggles ☐ Hood ☐ External cleaning

STARLAB International GmbH
Neuer Höltigbaum 38
22143 Hamburg - Germany
T: +49 (0)40 675 99 39 0  F: +49 (0)40 675 99 39 20
E-Mail: info@starlab.de
www.starlabgroup.com