Using the BVC Pro Aspiration System

1. Purpose:

To provide step by step guidance on how to use the BVC Pro Aspiration System.

2. Scope:

All DB440 lab personnel.

3. Prerequisites:

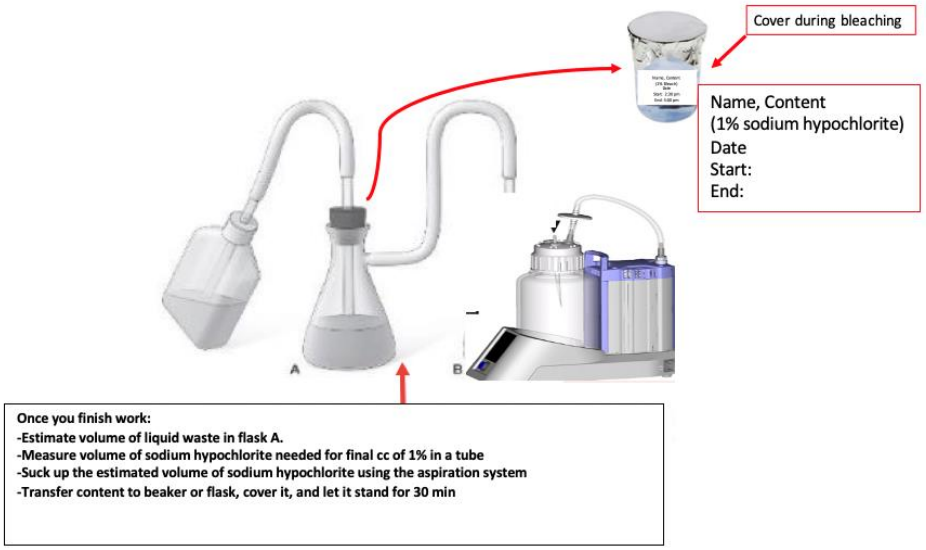
You are an authorized user of DB440 and are either included in your PI's or you possess a CL2 permit for DB440.

4. Responsibilities:

It is the responsibility of all lab personnel who use the aspiration system to follow this SOP.

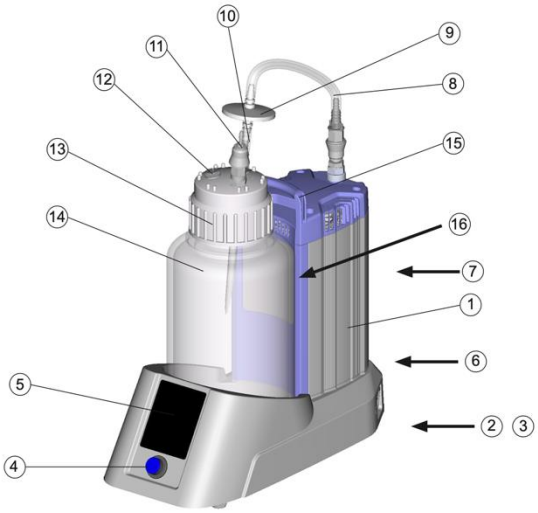
5. Personal Protection Equipment (PPE):

6. Procedure:



Using the BVC Pro Aspiration System:

BVC professional



Position	Designation
1	Pump ME 1C
2	Mains connection
3	Fuse holder
4	On / Off switch
5	Touch panel
6	Rating plate
7	Outlet
8	Connection tubing
9	Hydrophobic protection filter
10	Connection filter
11	Connection VacuuHandControl VHC^{pro}
12	Closing screw (optional: connection second VHC^{pro})
13	Screw cap / bottle cap with insert
14	Collection bottle
15	Handle
16	Level sensor

Safety during operation

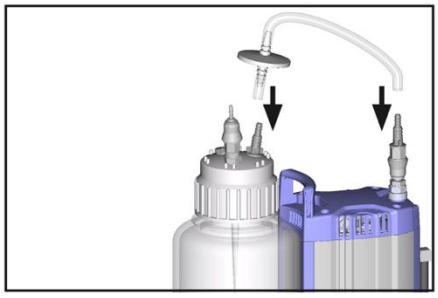
- Avoid interactions of media in the collection bottle. Comply with material safety data sheets and notes on safe use from the manufacturer. **Do not mix incompatible disinfectants and/or unknown substances.**
- For example, sodium hypochlorite (chlorine bleach) (see below):

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

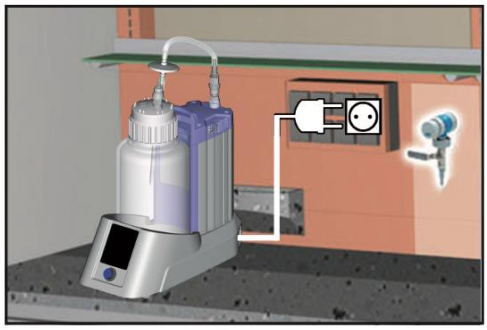
Avoid the formation of dangerous reactions/gases in the BVC, especially in the collection bottle. If this is not possible, dispose of dangerous gases at the outlet of the pump appropriately.

Procedure:

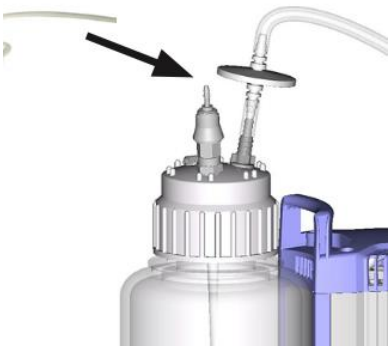
1. Assemble tubing with filter



2. Connect to power supply. Check line voltage and current prior to switching on.



3. Attach tubing to the hose nozzle of the bottle head



Operation

- The unit has a touch panel, so the keys should be touched gently. The “+” and “-“ keys have to be touched > 0.25 seconds to be activated. The other keys have to be touched > 0.5 seconds. Touch the LED keys **below** the LED. A successful action is confirmed by a blip and the flashing of LEDs.

Position	Designation
1	Key to select bottle size and level sensor
2	Key to reduce suction power
3	Key “bottle change”
4	Display suction power
5	Key to increase suction power

- 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 flash) to 850 mbar (8 LEDs flashes) underpressure (relative to atmospheric pressure).
- A flashing LED indicates that the actual available suction power differs from the pre-set suction power.

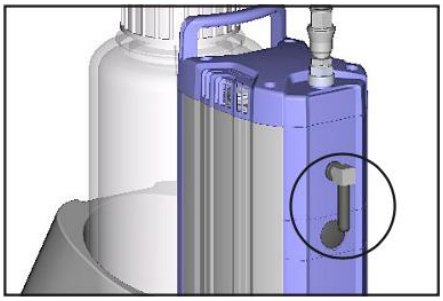
- NOTE: If the collection bottle is under vacuum and the vacuum demand is reduced, the existing underpressure inside the bottle remains until the vacuum is reduced (pressure rises) by further aspiration or venting with the VHCpro. See procedure for venting in "Disinfection routine".
- Use the keys to select the bottle size (4L PP bottle), and with it, the activation of the corresponding level sensor. To operate the key "4l PP" touch the key > 1 second. The LED of the selected bottle flashes blue. Use the key to turn off the level sensor alarm and to start or stop the pump during bottle change. To operate the "bottle change" key, touch the key below the LED for > 0.5 seconds.

Level sensor

- The sensor foil is located on the bottle support. The level sensor gives an alarm and switches off the pump to avoid overfilling the collection bottle if the liquid level in the collection bottle reaches the height of the level sensor- approximately 80% of the maximum bottle capacity (grey marked range with bottle symbols on the sensor foil, for both bottle types).
- Do not fix adhesive foil or anything near the bottle side next to the sensor foil.

During operation

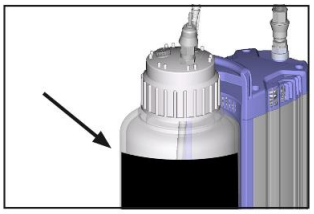
- Use the system only with the integrated hydrophobic filter to protect the vacuum supply from aspirated liquids and aerosols, and to protect the environment/user from contamination risk.
- Silencer at the outlet: Dust-laden gases, deposits and condensed solvent vapor can restrict air flow out of the silencer. The resultant back pressure can lead to damage of the pump bearing, diaphragms, and valves. Under those conditions, a silencer must not be used. Check the silencer regularly and replace if necessary. In case of harmful gases or condensate at the outlet, remove silencer and replace with exhaust tube.

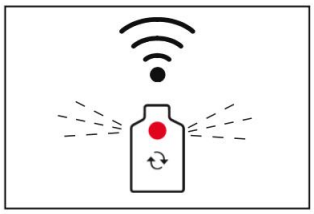


- Removing the connection tubing from the screw cap leads to immediate venting of the collection bottle. In systems without quick couplings, removal of the tubing at the pump inlet will also vent the system. Do not remove connections in case of liquid in the tube.

Emptying the collection bottle

- Check the liquid level in the collection bottle regularly. Maximum admissible liquid level in collection bottle is approx. 80% depending on application, and if correct bottle size is selected and if correctly adjusted.
- Once at 80% capacity, the level sensor will switch off the pump. This is indicated by “blips” and by a red LED inside of the bottle symbol on the bottle change key. Proceed with disinfection routine prior to emptying collection bottle. See below.



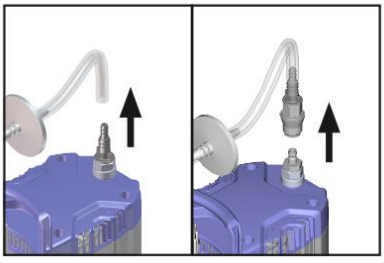


Disinfection routine

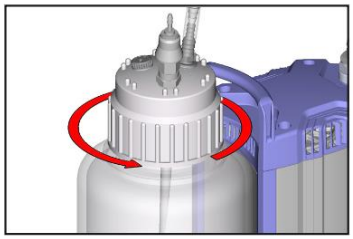
- Switch off the BVC to avoid running of the pump while no bottle is connected.

- Vent the collection bottle. Venting the BVC: Press the lever of the VHCpro or set the VHCpro to continuous aspiration.

- Remove the tubing at the inlet of the pump or disconnect coupling.

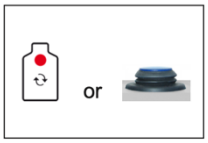


- Remove screw cap from the collection bottle after venting.



- Remove bottle from the support. Determine the volume of bleach needed for your liquid waste to get a final concentration of 1% sodium hypochlorite.

i) C1: Commercial sodium hypochlorite is usually 10%, but always check the concentration of your sodium hypochlorite stock and modify C1 if required.
ii) C1V1 = C2V2: (0.10) × (Volume of sodium hypochlorite stock to add to liquid waste) = (0.01) × (Total volume of liquid waste)
iii) Ex. If the volume is at 80% capacity, volume will be 3.2L, in which case 320 ml of sodium hypochlorite is needed.
iv) Add sodium hypochlorite to the liquid waste. Contact time is 30 minutes.
v) After 30 minutes, pour the liquid waste down the sink and run tap water.
vi) Wash the bottle with soap and water and leave it to dry.
vii) Remove and throw away your gloves in the Bio waste pail. Wash your hands with soap and water.

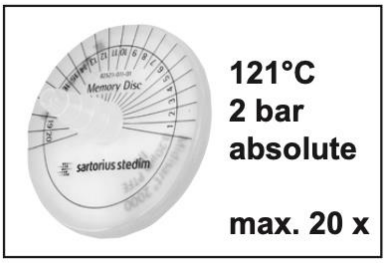


- NOTE: After changing the bottle, touch the key to restart the pump or switch on the pump.
- NOTE: The use of sodium hypochlorite (chlorine bleach) can corrode the materials of the 4l polypropylene bottle and other components (e.g. quick-coupling accessory sets between the pumping unit and VHCpro). Therefore, **after disinfection, rinse bottle thoroughly to avoid leaving residues of disinfectant in the bottle.** If there is residue on the bottle, make sure you scrub it and remove it properly to avoid build-up that could interfere with the level sensor of the system.

Autoclaving

- Autoclaving should be done each time the collection bottle reaches maximum capacity (80%) and disinfection is required.
- 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 minutes.
- Prior to autoclaving, **loosen or remove the bottle head from the bottle.**

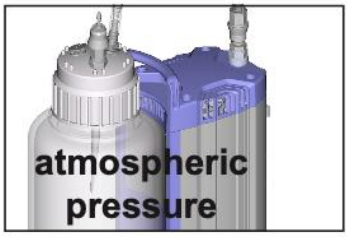
- The number of autoclaving cycles can be marked on the plastic disc (memory disc) of the filter (max. 20 autoclaving cycles).



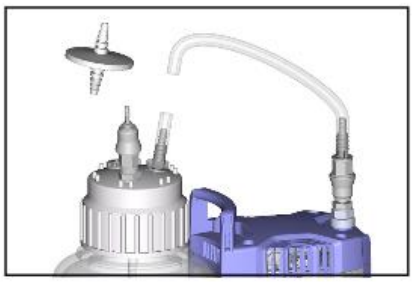
- Over time, discoloration and material changes (e.g. resiliency, elasticity, cracking) due to repeated steam sterilizations/autoclaving and/or chemical disinfection, may occur. Check all parts regularly and replace defective parts.

Replacing 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 “IN” towards the bottle. Attach the connecting tube.