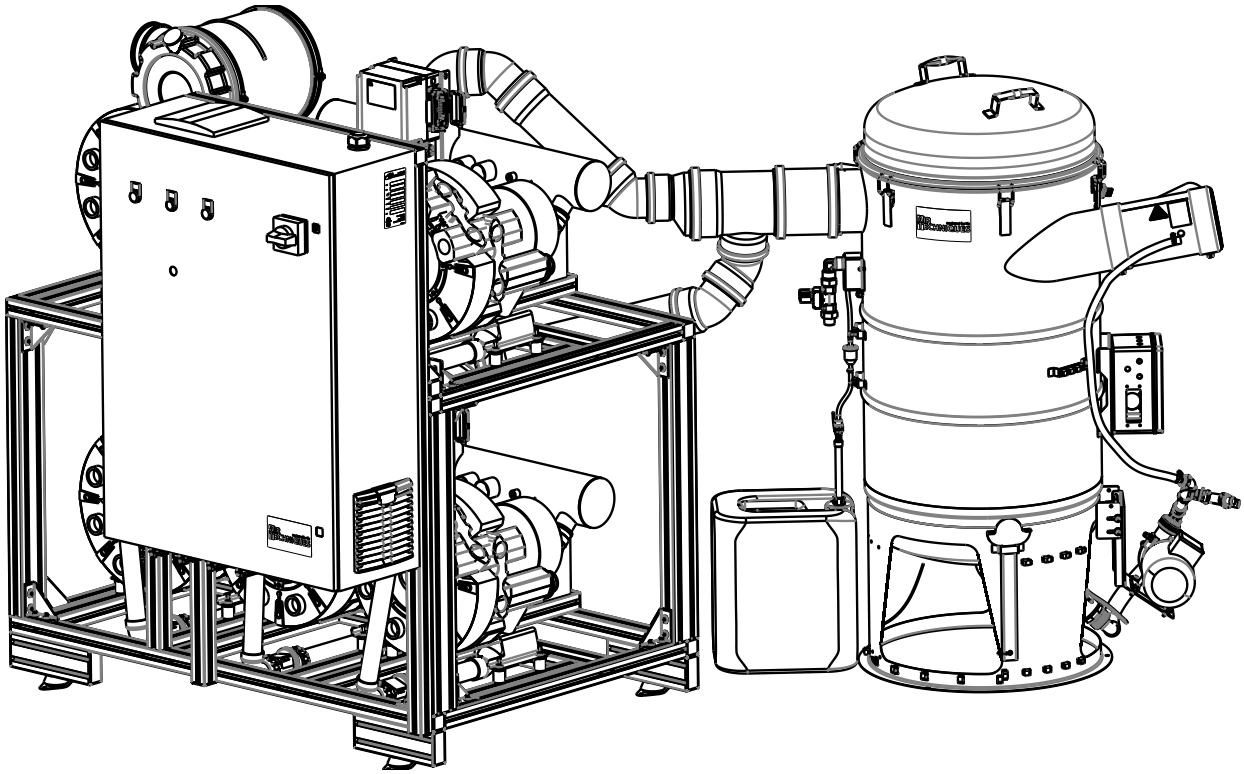
Clinical Dry Vacuum Systems VS60, VS75 & VS90

Operating Instructions



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Important information

1. About this document

These Operating Instructions are a basic component to the unit. They conform to the model type of the device and represent the state of technology at the time of manufacture and initial use.

Air Techniques can accept no responsibility and no liability where the instructions and notes contained within these Operating Instructions are not observed nor guarantee the safe and proper operation of the appliance.

1.1 Warnings and symbols

Warnings

The warnings in this document are intended to draw your attention to possible injury to persons or damage to machinery.
The following warning symbols are used:


General warning symbol


Warning – risk of dangerous electric voltages


Warning - automatic start-up of the unit


Biohazard warning


Warning – hot surfaces

The warnings are structured as follows:


SIGNAL WORD
Description of the type and source of danger
Here you will find the possible consequences of ignoring the warning.
Follow these measures to avoid the danger.

The signal word differentiates between four levels of danger:

– **DANGER**
Immediate danger of severe injury or death

– **WARNING**
Possible danger of severe injury or death

– **CAUTION**
Risk of minor injuries

– **NOTICE**
Risk of extensive material/property damage

Other symbols

These symbols are used in the document and on or in the unit:


Note, e.g. specific instructions regarding efficient and cost-effective use of the unit.


Please read all of the accompanying documents.


Wear protective gloves


Wear ear protectors


Off

On


Manufacturer

Order number/Model type

Serial number

1.2 Copyright information

2. Safety

Air Techniques has designed and constructed this unit so that when used properly and for the intended purpose it does not pose any danger to people or property. Nevertheless, residual risks can remain. You should therefore observe the following notes.

2.1 Intended purpose

The VacStar Clinical (VSC) Dry Vacuum systems are designed to generate a vacuum in order to aspirate saliva, rinsing water and other fluids that are present during dental treatment and need to be transported into the waste water system.

2.2 Proper intended usage

Clinical Dry Vacuum units are to be used in combination with a central separation tank in dental or dental-medical clinics.
They are arranged at the end of the aspiration chain, downstream of the central separation tank.
It is absolutely necessary that separation of secretions and air takes place upstream of the vacuum unit.
The surfaces of the suction units should be cleaned off periodically to avoid buildup of dust and other debris, which may lead to overheating and failure of the units.
In the devices upstream of the suction unit, only use cleaning agents and disinfectants that will not damage the materials, e.g. Monarch or equivalent.
Correct usage of the device also involves following the Planning and Installation Instructions and adhering to the conditions concerning set-up, operation and maintenance.

NOTE
Damage to machine caused by fluids and particles entering the system (e.g. prophylaxis powder, filling residue)

- Fluids and air must be separated upstream of the clinic suction unit.

This unit is technically suitable for the aspiration of nitrous oxide (laughing gas). However, when assembling a system for aspiration of nitrous oxide, it is important to ensure that the other components in the system are also suitable for this purpose. Those responsible for setting up the system must assess this and approve and release the system for the aspiration of nitrous oxide.

Operation with nitrous oxide is only permitted if the exhaust air is transported from the unit to the outside of the building.

2.3 Improper usage

Any other usage or usage beyond this scope is deemed to be improper. The manufacturer accepts no liability for damages resulting from this. In these cases the user/operator will bear the sole risk.

- The unit must not be used to aspirate any other substances, such as dust, sludge, plaster or similar in the practice.
- Do not use non-approved disinfectants or cleaning agents that could damage the materials.
- Never use foaming chemicals like instrument disinfectant baths or agents that contain tensides.
- Do not use chemicals that contain chlorine (such as sodium hypochloride).
- A separation tank (separation of air and water) must always be installed immediately upstream of the aspiration unit.
- Make sure that the water connection for the chemicals adding unit has a pipe interrupter in accordance with local codes.
- Do not install the system in a room that does not have ventilation. The temperature near the motor must not exceed 104°F.
- Not suitable for wet rooms.
- Do not use the unit to aspirate flammable liquids, gases or solvents, e.g. acetone or milking machine cleaner.
- Do not use the unit to aspirate potentially explosive gases – the machine does not have explosion protection. Do not use the unit in a potentially explosive environment.
- Do not operate the unit without a central separation tank, particularly in tropical climates.

2.4 General safety notes

- Always comply with the specifications of all guidelines, laws, and other rules and regulations applicable at the site of operation for the operation of this unit.
- Check the function and condition of the unit prior to every use.
- Do not convert or modify the unit.
- Observe the operating instructions.
- Make the Planning and Installation Instructions (P/N E5210) available to the person operating the device at all times.

2.5 Combining devices safely

Take care when connecting units together or to parts of other systems as there is always an element of risk (e.g. due to leakage currents).

- Only connect units when there can be no question of danger to operator or to patient.
- Only connect units when it is safe to do so and there is no risk of damage or harm to the surroundings.
- If it is not 100% clear from the unit data sheet that such connections can be safely made or if you are in any doubt, always get a suitably qualified person (e.g. the manufacturer) to verify that the setup is safe.

Where applicable, the requirements for medical products have been taken into account in the development and construction of the device. As a result, this device is suitable for installation within medical supply equipment.

2.6 Specialist personnel

Operation

Unit operating personnel must ensure safe and correct handling based on their training and knowledge.

- Instruct or have every user instructed in handling the unit.

Installation and repairs

- Installation, readjustments, alterations, upgrades and repairs must be carried out by Air Techniques or by qualified personnel specifically approved and authorized by Air Techniques.

2.7 Protection from electric shock

- Before connecting the device, always check that the values stated on the device for the supply voltage and mains frequency match those of the mains power supply.
- Comply with all the relevant electrical safety regulations when working on the unit.
- Replace any damaged cables or plugs immediately.

Air Techniques accepts no liability for damages or injury resulting from the use of non-approved accessories or optional accessories, or from the use of non-original wear parts or replacement parts.

2.8 Only use original parts

- Only use Air Techniques parts or accessories and special accessories specifically approved by Air Techniques.
- Only use only original wear parts and replacement parts.

Air Techniques accepts no liability for damages or injury resulting from the use of non-approved accessories or optional accessories, or from the use of non-original wear parts or replacement parts.

2.9 Transport

WARNING
Infection due to contaminated unit

- Disinfect the unit before transport.
- Close all media connections.

The original packaging provides optimum protection for the device during transport.
If required, original packaging for the unit can be ordered from Air Techniques.

Air Techniques will not accept any responsibility or liability for damage occurring during transport due to the use of incorrect packaging, even where the unit is still under guarantee.

Only transport the device in its original packaging.

- Keep the packing materials out of the reach of children.

2.10 Disposal

The unit may be contaminated. Instruct the company disposing of the waste to take the relevant safety precautions in this case.

- Decontaminate potentially contaminated parts before disposing of them.
- Uncontaminated parts (e.g. electronics, plastic and metal parts etc.) should be disposed of in accordance with the local waste disposal regulations.
- If you have any questions concerning correct disposal, please contact Air Techniques or your usual dental supplier.

3. Scope of delivery

The scope of delivery and accessories depends on the particular model type of the unit. Information about this can be found in the planning and installation documents or on the delivery note of the system.

3.1 Consumables

Clinical Evacuation Cleaner Container . . 57630

4. Technical data

4.1 VS60

Nominal Voltage (rated voltage)	480 VAC ± 10%		
Wiring Configuration	3/N/PE		
Rated Current or Rated Power (current or power consumption)	38 A		
Duty Cycle	100%		
Frequency	60 Hz		
Site Circuit Breaker	50 A		
Protection class	1		
IP protection	20		
Sound Pressure Sum Levels	77 dB(A)		
Pump Module	L	W	H
inches	53	58	70
cm	135	147	178
Tank Module	Ø26 x 61 H (in)		
	Ø66 x 155 H (cm)		
Weight			
Pump Module	1,250 lbs		
	566 kg		
Tank Module	180 lbs		
	82 kg		
Environmental Conditions Transport/Storage:			
Temperature range:			
minimum	14°F (-10°C)		
maximum	140°F (+60°C)		
Relative humidity:	95%		
Air Pressure:	N/A		
Environmental Conditions for Operation:			
Temperature range:			
minimum	50°F (+10°C)		
maximum	104°F (+40°C)		
Relative humidity:	70%		
Air Pressure:			
maximum	14.1 psia		
minimum	14.9 psia		

4.2 VS75

Nominal Voltage (rated voltage)	480 VAC ± 10%		
Wiring Configuration	3/N/PE		
Rated Current or Rated Power (current or power consumption)	47.5 A		
Duty Cycle	100%		
Frequency	60 Hz		
Site Circuit Breaker	60 A		
Protection class	1		
IP protection	20		
Sound Pressure Sum Levels	78 dB(A)		
Pump Module	L	W	H
inches	53	58	70
cm	135	147	178
Tank Module	Ø26 x 61 H (in)		
	Ø66 x 155 H (cm)		
Weight			
Pump Module	1,375 lbs		
	624 kg		
Tank Module	180 lbs		
	82 kg		
Environmental Conditions Transport/Storage:			
Temperature range:			
minimum	14°F (-10°C)		
maximum	140°F (+60°C)		
Relative humidity:	95%		
Air Pressure:	N/A		
Environmental Conditions for Operation:			
Temperature range:			
minimum	50°F (+10°C)		
maximum	104°F (+40°C)		
Relative humidity:	70%		
Air Pressure:			
maximum	14.1 psia		
minimum	14.9 psia		

4.3 VS90

Nominal Voltage (rated voltage)	480 VAC ± 10%		
Wiring Configuration	3/N/PE		
Rated Current or Rated Power (current or power consumption)	57 A		
Duty Cycle	100%		
Frequency	60 Hz		
Site Circuit Breaker	80 A		
Protection class	1		
IP protection	20		
Sound Pressure Sum Levels	79 dB(A)		
Pump Module	L	W	H
inches	53	58	70
cm	135	147	178
Tank Module	Ø26 x 61 H (in)		
	Ø66 x 155 H (cm)		
Weight			
Pump Module	1,500 lbs		
	624 (kg)		
Tank Module	180 lbs		
	82 kg		
Environmental Conditions Transport/Storage:			
Temperature range:			
minimum	14°F (-10°C)		
maximum	140°F (+60°C)		
Relative humidity:	95%		
Air Pressure:	N/A		
Environmental Conditions for Operation:			
Temperature range:			
minimum	50°F (+10°C)		
maximum	104°F (+40°C)		
Relative humidity:	70%		
Air Pressure:			
maximum	14.1 psia		
minimum	14.9 psia		

4.4 Ambient conditions

Ambient conditions during storage and transport

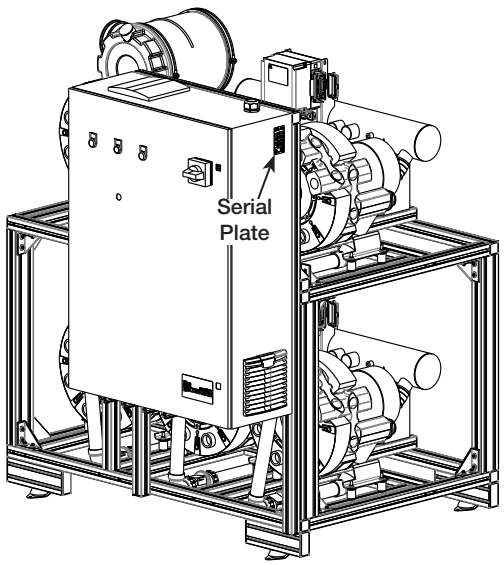
Temperature	°F	+14 to +140
Relative humidity	%	< 95

Ambient conditions during operation

Temperature	°F	+14 to +104
Relative humidity	%	< 70

4.5 Serial plate

The serial plate of the unit is located on the side on the Control Panel.



5. Functional description

VacStar Clinical Dry Vacuums (VSC) (1) are designed for use as dry suction systems. This means that **a separation stage** must be provided **before the air enters** the clinic suction unit. During this separation, the aspirated fluids are separated from the air content.

For **dry suction systems** the separation takes place via a central separation tank, to which multiple treatment units can be connected.

During patient treatment fluids (saliva and blood) or even larger particles (amalgam, dentin, plastic particles) are aspirated and drawn into the cannula. Therefore a fine filter is usually installed in the vicinity of the treatment unit in order to hold back the larger particles.

Clinical Dry Vacuum systems operate on the side channel principle and are driven by robust three-phase current motors.

As the exhaust air from the suction unit contains bacteria and germs, we recommend that the exhaust air pipes are routed to the roof and then to the outside. In addition, a bacteria filter for the exhaust air (2) is also integrated for hygienic reasons. After approx. 3500 operating hours, a message will appear on the display panel (11) of the control unit (4) requesting a change of the filter cartridge in the exhaust air bacteria filter.

The VSC is fitted with a programmable controller (PLC). This is integrated in the control unit and which utilizes a pressure sensor to switch the individual suction units on or off as required to provide smooth and even suction power.

During aspiration of fluids from the patient's mouth with a vacuum rate of approximately 8 inHg, **one vacuum unit** is in operation. Depending on the level of vacuum, mechanical auxiliary air valves (3) open and additional air flows in. This prevents the suction power from rising too high. The auxiliary air also exerts a cooling effect on the VSC.

If the vacuum falls below a certain level due to a rising number of operators using the system then a further pump will switch on and there may be **several vacuum units** operating at the same time. In addition, mechanically regulated auxiliary air valves control the required intake air. A non-return valve on the exhaust air side of each pump prevents air from entering the turbine of an idle pump, which would otherwise lead to a loss of suction performance.

The PLC controller is equipped with an intelligent selector switch function, which continually changes the order in which the suction units are actuated depending on the number of operating hours a unit has been working. This ensures that the different pumps are operated for the same length of time.

Clinic suction units in combination with a central separation tank as a dry suction system.

The central separation tank (6) has up to 2 inlets and a connection to the clinic suction unit. The tangential inlet openings allow a rate of flow of up to 600 SCFM. Up to 90 treatment units can be connected to a central separation tank, while maintaining a useful simultaneous factor of 60%.

Up to **45 treatment units** can be connected to **each inlet** (at 60% SF) of the central separation tank. If there are more than 45 treatment units we recommend distributing them between both inlets in order to provide an even rate of flow.

3 float switches are distributed at different heights in the central separation tank. A float switch will activate the waste water pump (7) if the fluid level reaches approx. 50%. The pump transports the fluid out of the central separation tank to the waste water drain or to the amalgam separator (12).

A safety switch-off is activated at a level of approx. 75% when the 2nd float switch engages, i.e. the suction units remain switched off until the fluid level has fallen. Pressing the yellow button on the control unit cancels the safety switch-off.

The 3rd float switch is used when the control unit is defective and the clinic suction unit needs to be operated in **emergency mode**.

When the level of fluid in the central separation tank reaches 75% in emergency mode, the unit is immediately switched off to prevent the risk of excessive suction of fluids.

The aspirated air and fluid mixture is directed over a coarse filter at the inlet connection of the central separation tank and then tangentially fed to the collector. Solid particles measuring greater than 0.125 inches are held back by the coarse filter. The aspirated air and fluid mixture is separated in the central separation tank. The air (on vacuum side) will pass through the turbine of the suction units and then escape as exhaust air through the exhaust air filter to the outside.

The fluids (blood, saliva, amalgam etc.) are propelled by the waste water pump against the system vacuum through a non-return valve and the flow control valve to the waste water drainage system or to an amalgam separator.

The non-return valve serves to ensure that no vacuum can be built up to the amalgam separators.

The flow reducers restrict the waste water flow to 16 l/min per amalgam separator. This is the maximum amount that the amalgam separator operating at a separation efficiency of ≥ 95% can cope with.

The amalgam separator switches on or off automatically depending on the level of fluids being transported.

A collector rinse (8) using either water or water plus CleanStream cleaner is integrated in the central separation tank. The water inflow valve is opened every 24 hours for a period of 3 minutes by the control unit of the clinic suction unit. After 2 minutes the cleaner valve (9) also opens so that CleanStream cleaner is added to the water for approx. 1 minute. This keeps the central separation tank and the connected amalgam separator as hygienically clean as possible.

When connecting a water rinse the local rules and regulations on water supplies must be observed (e.g. free incline, pipe separation).

The optional Clinical Evacuation Cleaner Container (10) is equipped with a suction tube with a float sensor that sends a signal to the PLC controller when the Cleaner Container is empty and needs to be changed.

If the control unit fails, it is possible to switch to **emergency mode** using the key-operated switch (5). Two positions can be chosen using the key-operated switch:

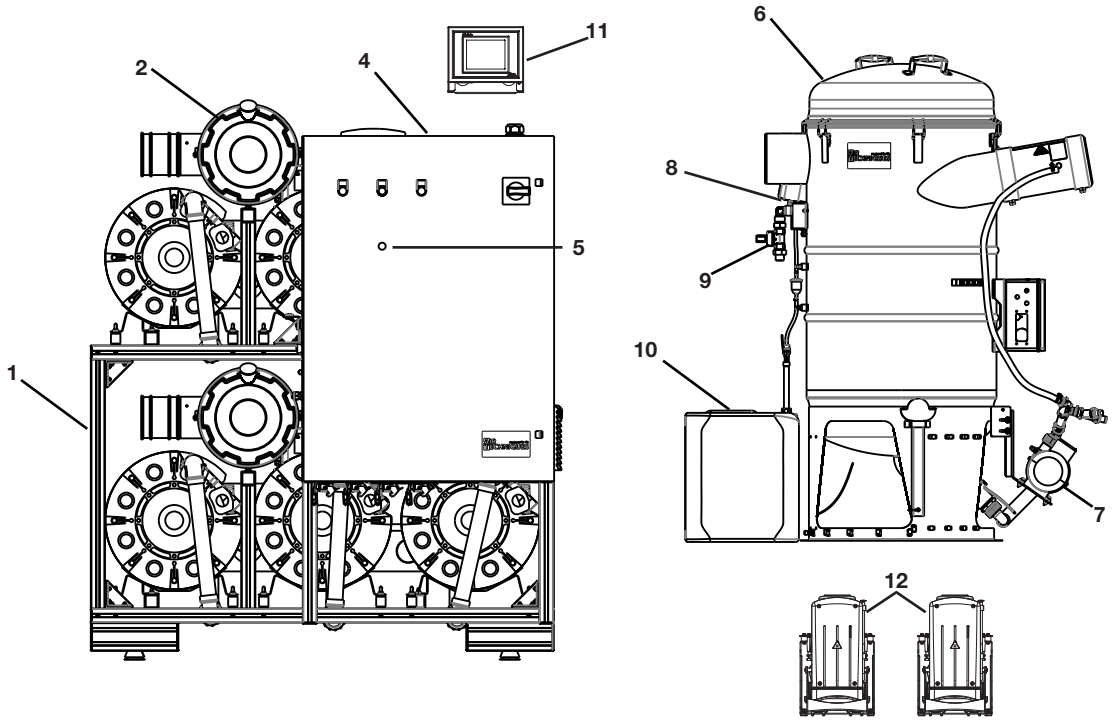
0 - Normal operation

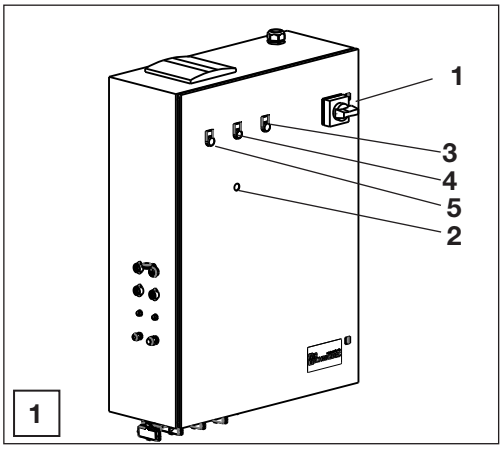
I - Emergency mode

In emergency mode, only one suction unit is activated. This means the number of treatment units that can be used simultaneously is limited. In this operating mode the vacuum is only limited mechanically via the mechanical air valves, which can lead to an excessive build-up of vacuum.

Key:

1	Pump Module
2	Exhaust air filter
3	Auxiliary air valve (Not shown)
4	Control unit
5	Key-operated switch
6	Central separation tank
7	Waste water pump
8	Collector rinse
9	Cleaner valve
10	Cleaner container (optional)
11	Display panel (optional)
12	Amalgam separator (optional)

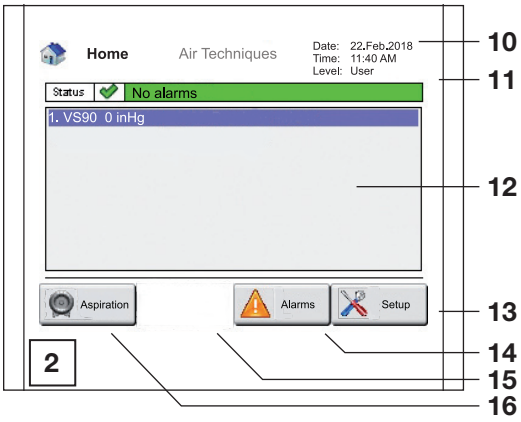




Usage

6. Operation and display on the control unit

1 Main power switch
The main power switch is used to switch the complete system on or off
2 Key-operated switch
The key-operated switch is used to change the unit over to emergency mode in the event of a system fault (refer also to the Functional Description).
3 The green LED lights up when the unit is "Ready for operation".
4 Press the blue key to cancel the fault display on the unit.
5 The red LED lights up if there is a fault with the unit.

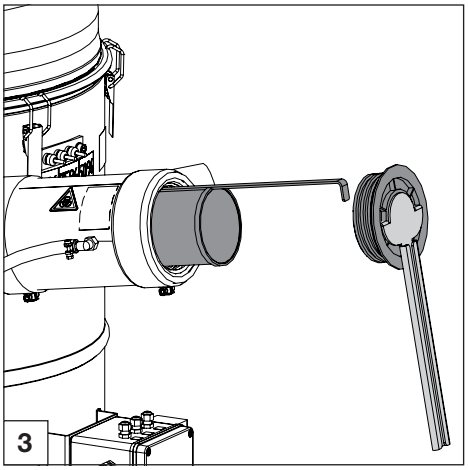


7. Operation and display on the display panel

Once you switch on the display panel – and after a short wait – the **Overview** menu appears. From the various submenus you can return to the main menu via the **Home** button.

10 Display of the date, time and logged-on user status.
11 Status LED for all connected systems.
12 Display window with list of connected systems and display of operating states.
13 **Setup** button for opening the setup menu.
14 **Alarms** button for viewing active alarm messages.
15 **Aspiration** button for querying the status of the connected suction systems.
16 **Compressor** button (if applicable) for querying the status of the connected compressor systems

Further information about admin and operation of the system via the display panel can be found in the instructions enclosed with the display panel.



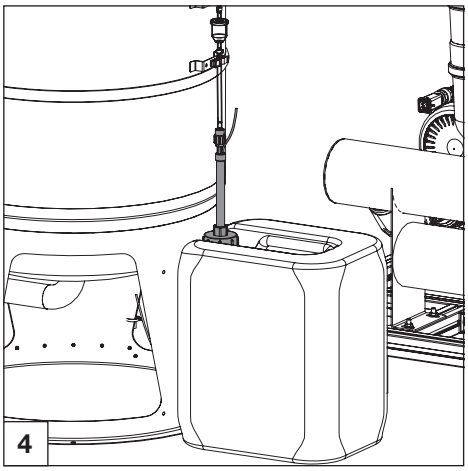
8. Central separation tank

8.1 Cleaning the coarse filter

To prevent any risk of infection, always wear protective equipment (e.g. liquid-tight protective gloves, protective goggles, face mask).

Take out and clean the coarse filter 1x per month. Use the supplied tool to do this.

- Loosen the filter lid with the tool and unscrew.
- Pull out the filter for cleaning.



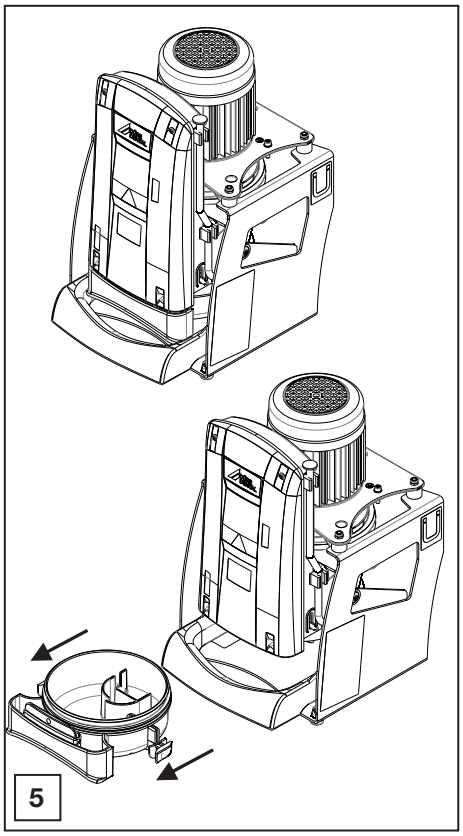
8.2 Changing the clinical evacuation cleaner container

The cleaner container is sufficient for approximately 6 months.

Container empty:
The status LED on the display panel changes colour and the following text appears: "Warning – A fault has occurred". The reason for the warning is displayed in the "Alarm" user level, e.g. "Filling level in cleaner container too low, station 1: V1".

Proceed as follows:

- Unscrew the lid of the empty tank.
- Carefully take out the intake manifold.
- Insert the intake manifold into the full tank and screw it tight.



8.3 Replace the amalgam collecting container

To prevent any risk of infection, always wear protective equipment (e.g. liquid-tight protective gloves, protective goggles, face mask).

Amalgam collecting container full:
The indication on the display panel changes to the alarm level and the following text appears: "Alarm – A fault has occurred". The reason for the alarm is displayed in the user level, e.g. "Fault – amalgam separator, separation tank, station 1: V1".

Proceed as follows:

- Unplug the amalgam separator.
- Change the collecting container.
- Plug in the amalgam separator.
- Acknowledge the fault message.

Further information about changing the amalgam collecting container can be found in the operating instructions that are enclosed with the amalgam separator.

9. Maintenance for Service Technicians

All maintenance work must be performed by a qualified expert or by one of our Service Technicians. Points 10 - 13 depend on the particular type of suction system used and may therefore not always be necessary.

To prevent any risk of infection, always wear protective equipment (e.g. liquid-tight protective gloves, protective goggles, face mask).

To prevent the risk of hearing damage, always wear ear defenders when working on noisy units.

Maintenance work	Maintenance interval	Replacement Part Number
1. Check noise reducer, change if necessary	12 months	E5135
2. Check non-return valves on exhaust air side of the clinic suction units, change if necessary	12 months	E5134
3. Measurement of rate of flow at system air exhaust: 45 SCFM minimum with one pump running	12 months	N/A
4. Change filter cartridge of exhaust air filter (number of hours on control unit display panel)	3,500 hours	E5131
5. Function check of vacuum control activation of units	12 months	N/A
6. Check operating hours on display panel	12 months	N/A
7. Check mechanical operation of auxiliary air valve	12 months	E5138
8. Clean float switch in central separation tank (50%/75%), replace if necessary	12 months	E5142
9. Check water valve on the central separation tank	12 months	E5143
10. Check CleanStream valve on the central separation tank	12 months	E5285
11. Replace sewage check valve.	12 months	E5133

WARNING
Risk of infection due to bacteria present in the exhaust air filter
• Wear protective gloves and a face mask when changing the filter.

WARNING
Risk of infection due to bacteria present in the central separation tank
• Always wear protective gloves and a face mask when working on the unit.

NOTES

For over 50 years, Air Techniques has been a leading innovator and manufacturer of dental products. Our priority is ensuring complete satisfaction by manufacturing reliable products and providing excellent customer and technical support. Whether the need is digital imaging, utility room equipment or merchandise, Air Techniques can provide the solution via our network of authorized professional dealers. Proudly designed, tested and manufactured in the U.S., our products are helping dental professionals take their practices to the next level.

Air Techniques' family of quality products for the dental professional include:

❑ Digital Imaging

- Digital Radiography
- Intraoral Camera
- Caries Detection Aid
- Intraoral X-ray
- Film Processors

❑ Utility Room

- Dry Vacuums
- Wet Vacuums
- Air Compressors
- Amalgam Separator
- Utility Accessories
- Utility Packages

❑ Merchandise

- Surface Disinfectant
- Enzymatic Cleaner
- Hand Sanitizer and Lotion
- Waterline Cleaner
- Evacuation System Cleaner
- Imaging Accessories
- Chemistry
- Processor Accessories

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