Clean Air Techniek B.V.

User manual

English Version 7.2
(valid for software V3.3 and higher)

Series EuroFlow, Type EF/S
Manual sliding window (optional: electrically operated window)

Biological Safety Cabinet Class II

Types:

EF/S 4

EF/S 5

EF/S 6

Offers protection for both personnel and product.

Before using the safety cabinet, please read this manual carefully. The required instructions have to be carried out first.

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Preface

Congratulations with your new Biological Safety Cabinet from Clean Air Techniek B.V.

This is the user manual of the EF/S, the Biological Safety Cabinet Class II. The EF/S cabinet meets all the latest requirements and the European standard that is necessary for Microbiological Safety Cabinets, the EN 12469:2000.

While developing the EF/S cabinet, we took the wishes and demands of our users into account. The primary function is safety for personnel, product and environment, but also ergonomics, design and ease of use are supplementary criteria. To comply with all these wishes and demands the EF/S has been designed and built. The EF/S is the most progressive safety cabinet currently available.

The EN 12469:2000 describes only the minimum requirements, which creates a base for the high demands Clean Air Techniek B.V. pursuits for its products. The EF/S is a high-quality product constructed with high-grade components and materials, with new techniques, such as:

- Microprocessor control with a LCD display for the interface with the user;
- Automatic up speeding fan; when there is increasing resistance in the filter the necessary airspeeds are maintained;
- Window construction that can be operated electrically (optional);
- Slope window construction for improved ergonomics;
- User-friendly window construction with a hinge mechanism easy to operate.

Furthermore the EF/S is a service friendly installation, produced in the Netherlands.

We thank you for buying this cabinet and wish you good times working with our EF/S Biological Safety Cabinet Class II.
Clean Air Techniek B.V.

Version table

Ver. 7.2	**05-08-09**		**MPE**		**New format specifications, update E010001-1F**
Version:	Date:	From serial number:	By:	Check:	Change:

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Clean Air Techniek B.V. is entitled to change parts on each desired moment, without preceding or direct notification of the customer. The content of this user manual can be changed without preceding warning as well. For information concerning maintenance activities or repairs which are not mentioned in the user manual, please contact the service organization.

This user manual has been put together with all possible care, but Clean Air Techniek B.V. cannot take the responsibility for possible mistakes in this user manual or for the consequences of it.

TOC

1 Introduction

The EF/S is a class II Biological Safety Cabinet. It gives the user the possibility to work safely and sterile with bioagentia without complete physical barrier between person and experiment (through work opening (C)).

- Working surface (A) is kept clear of particles by means of a clean downflow of air.
- Because of the downflow air passed through a HEPA-filter (High Efficiency Particulate Air), the working surface is free of particles.
- This airflow is laminar, the airflow has got no turbulence and has got a constant air speed.
- Through the work opening (C) air is drawn into the workspace (inflow), towards the front slots of the worktop. This protects the personnel against pathogenic aerosols that might be released.
- De downflow and inflow air is then drawn through a pre-filter (B) by a fan (E). This fan blows the air in the correct proportion to the downflow HEPA-filter (D) and the exhaust HEPA-filter (F).
- The extracted air can recirculate into the laboratory or can be blown into an exhaust channel.

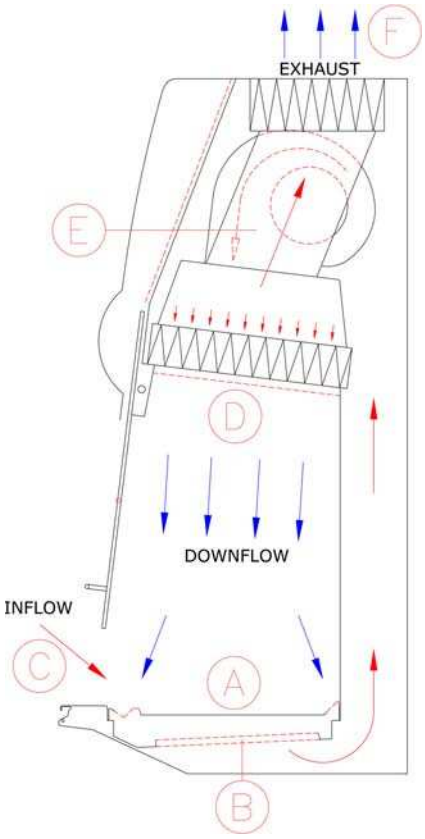


Figure1 Sectional view EF/S

2 Safety

2.1 Use in conformity with regulations

Personnel that is not properly informed about the safety regulation and/or does not meet the requirements mentioned in *§2.3 Authorized persons*, is not allowed to use the cabinet.

Improper use of the cabinet is not allowed.

2.2 Modifications and changes to the installation

In order to operate the installation safely changes and/or alterations shall only be made by Clean Air Techniek B.V., or shall be made after consultation with and permission in writing from Clean Air Techniek. If modifications and changes are made on own initiative, without permission from Clean Air Techniek B.V., the parts of the installation concerned are no longer covered by the warranty. Clean Air Techniek B.V. cannot be held liable for the consequences of the modifications and the dangers, which might possibly occur as a result. The modifications mentioned here include the connection of the installation to an exhaust system.

2.3 Authorized persons

Operating the installation

The cabinet shall only be used by personnel which:
- is familiar with the content, regulations and warnings which are mentioned in this operating manual;
- is familiar with how to operate the cabinet;
- is familiar with the start up procedure, the stop procedure and Knows how to react in case of emergency;
- is familiar with the regulations to keep the safety in all circumstances;
- is capable to end a disturbance.

Maintenance and repair general

Maintenance shall only be performed by professional service engineers, who are sufficiently trained to:
- Estimate and avoid the dangers of the installation;
- Estimate the consequences of their actions.

Maintenance and repair of the electrical installation

Professional, electro-technical service engineers, who are sufficiently trained, shall only perform maintenance when:
- They can estimate and avoid the dangers of the installation;
- They can estimate the consequences of their actions;
- They are sufficiently informed about the operation of the installation and the operation of the sub-systems.

2.4 General safety aspects

The installation shall never be used for any (micro-) biological or any other potentially dangerous work, unless the fan is switched into working position, the sliding window is in working position and there is no alarm.

It is strongly advised not to slide the window out of the working position, during working with the installation. When it is necessary to increase the work opening, this interruption needs to be as short as possible.

When the installation is not used, the window shall always be closed, with the fan off, or switched onto power-save mode, to prevent that dust particles etc. from the room can get into the installation (or worse: material from the installation can get into the room).

Always try to limit the amount of equipment in the workspace. Each object in the workspace will disturb the pattern of the airflow and a large number of equipment may lead to serious disruptions.

Materials such as Petri dishes or tissues should, during activities, never cover the slots of the worktop, since no protection of the personnel can be guaranteed.

Do not use a centrifuge in the workspace. Even a small centrifuge is large in comparison with the work surface and its presence may seriously disrupt the airflow. In addition, all centrifuges themselves create an airflow, which may fling particles out of the casing.

When homogenizers are used in the installation, all reservoirs have to be secured by screw connections, so that a sudden emission of fluids or aerosols will be avoided. To protect the personnel, glass reservoirs are suitable for protection. High-speed homogenizers may cause air turbulence, as do centrifuges.

Even with the best technology, there may still be a risk that the hands and arms of the personnel get contaminated during the work. Movements shall be kept to a minimum. Protective clothing shall have tightly fitting cuffs. The use of hand gloves and over sleeves is recommended.

Always use a chair with the correct height. This enables the personnel to have a good view through the sliding window. User should sit in such a position, that looking under the edge of the sliding window during the work is not possible.

It is important to keep the biological safety cabinet clean. Minor contaminations are not always immediately visible and could easily be forgotten. This increases the possibility that potentially infective material is left behind and may cause serious contamination of the interior of the installation or worse. Regularly clean the worktop, the bottom side, as well as the space under the worktop, in particular. In case of doubt consider disinfection or contact Clean Air Techniek B.V. about the possibilities.

Transport and installation of the cabinet is only allowed for authorized staff. Please contact the manufacturer or the seller of the products.

This unit (with electrical window) has a lead acid battery inside. If this unit or battery needs service, dispose this battery according to chemical waste regulations only.

2.5 Explanation user safety symbols

	**GENERAL DANGER** You can harm yourself and others seriously if you do not follow the procedures carefully.
	**DANGER FOR ELECTROCUTION**
	**BIOLOGICAL DANGER**
	**DANGER OF EXPLOSION**
	**DANGER BY INDUSTRIAL VEHICLE**

3 Installation

	**GENERAL DANGER** Be careful: high centre of gravity, crossover point. Never hinge the window, as long as the cabinet is not placed on the support frame

The cabinet must be installed in a safe way. Clean Air Techniek B.V. supplies an optional support frame, which is designed for this purpose.
When the cabinet is purchased without a support frame, it is advised to discuss the installation with the supplier.

3.1 Assembly-instruction

The cabinet has to be placed on the support frame recommended by the supplier. The assembly needs to be done as specified in instruction underneath.

Assembly support frame

Build the support frame (see also *Appendix I: Support frame* EF/S *on page 64* for an explaining drawing):
- Mount the support yoke (Pos 1 & 2) to the reinforcement plate (Pos 8);
- Mount (optional) feet support (Pos 4).
- Item no. 12 is used to position the cabinet to the support frame (see *§3.1 Placing the cabinet on page 10*).

Placing the cabinet

- Place the cabinet right on the forks of a forklift truck or lifting platform;

	**DANGER BY INDUSTRIAL VEHICLE** Be careful: Make sure the cabinet cannot slide from the forks.

- Move the cabinet to the correct height and position, perform this action as precise as possible above the support frame;
- The weight must be equally divided between the both forks and the cabinet must be horizontal levelled;
- The cabinet should be aligned with the covers of the support frame.
  The two cones on top of the yokes will help aligning;
- Mount the cabinet to the support frame by means of the four inner hexagonal cylinder screws M8x12 (Pos 12). See also *Appendix I: Support frame EF/S on page 64*;
- Connect the wire to a grounded socket that is easy accessible.

3.2 Dismantling & Disposal

For dismantling and disposal follow the next instructions:

- *See § 8.1 Cleaning the installation on page 51;*
- See *§ 9.2 Replacement of the pre-filter on page 54*;
- *See Appendix II: Disinfection on page 65;*
- *See Appendix III: Replacement of the HEPA-filters on page 66;*
- Remove the batteries and dispose them as chemical waste;
- Break the unit down into its component parts. You can re-cycle these components parts, dispose of them in accordance with local requirements.

For advice or information about dismantling or disposal please contact Clean Air Techniek B.V.

4 Product description

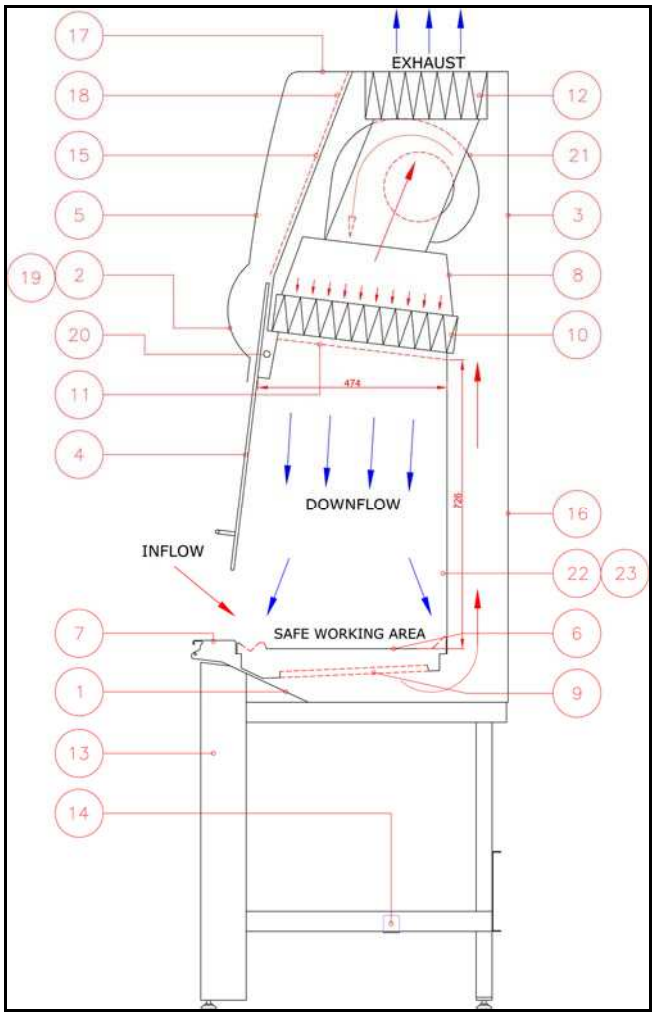


Figure 2 Sectional view EF/S

Part list:

1 Type plate
2 Short user manual
3 Body of the cabinet
4 Hinge/slide window
5 Top hood
6 Worktop
7 Aerofoil
8 Plenum-construction
9 Drip tray/pre-filter
10 Downflow filter
11 Spreading grid
12 Exhaust filter
13 Support frame (optional)
14 Feet support
15 Front panel
16 Back panel
17 Mains connection
18 Electronics
19 Operating panel
20 Lightning
21 Fan
22 Sockets
23 Optional fittings

4.1 Type plate

The type plate (*Figure* 2, Pos 1) mentions instructions that are important for the connection of the biological safety cabinet. See *Appendix VIII: Stickers on page 74*.

4.2 Short user manual (sticker)

The short user manual (*Figure* 2, Pos 2) gives a brief overview of the primary functions, and is included with the cabinet. See also *Appendix XII: Short user manual on page 81*.

4.3 Body of the cabinet

The body of the installation (*Figure* 2, Pos 3) is made of epoxy-coated steel. The interior of the body is made of stainless steel (304). The body is leak tight as per LI-C (table 1 and 4 of the EN

12469:2000-standard). The body has been tested according to the method described in annex 2 of the EN 12469:2000-standard.

4.4 Hinge-slide window

The hinge-slide window (*Figure* 2*,* Pos 4) is a tightly closing, manually operated (optional: electrically operated) glass window. It can be slid up or down, and opened and closed it means of handgrips. The window consists of guiding construction with a working position (this working position is also indicated by means of two blue indication stickers).
The window can be hinged, but only in the hinge/disinfection position; the aerofoil has to be hinged to the outside.

Optional: electrically operated window
The electrically operated window can be slid up or down supported by an electrical motor, only with the top hood (*Figure* 2*,* Pos 5) closed. The window consists of guiding construction with a working position (this working position is also indicated by means of two blue indication stickers). The window can be hinged, but only in the hinge/disinfection position; the aerofoil is hinged to the outside. If anything blocks the window while sliding down, the window will automatically slide up a few centimetres. This means safety for fingers and hand.

4.5 Top hood

In and behind the top hood (*Figure* 2*,* Pos 5) a number of electrical components are assembled.
- FL lighting
- Operating panel / operating board
- Interface board, including engine control
- Electrical motor (option, only with electrically operated window)
- Batteries (option, only with electrically operated window)
- Safety switch (option, only with electrically operated window)
- Additional Option print.

If you wish to check one of these components, you need to hinge the top hood.
To check the interface board, the safety-cover has to be taken away (authorized service personnel only).

4.6 Worktop

The workroom contains a stainless steel (type 304) worktop (*Figure* 2*,* Pos 6) with a deepened work surface. This deepened work surface is called the safe working area (for information about the dimensions see *§10.2 General specifications on page 59)*. At the front and the back there are air slits, which are essential to the functioning of the installation.

4.7 Aerofoil

The aerofoil (*Figure* 2*,* Pos 7) is used for a better air conduction and to support the elbow. During work with the cabinet the aerofoil needs to be hinged down.

4.8 Plenum-construction

The plenum-construction (*Figure* 2*,* Pos 8) divides the air, which is let in by the fan, between the downflow HEPA-filter and the exhaust HEPA-filter.

4.9 Drip tray/pre-filter

The pre-filter with drip tray (*Figure* 2*,* Pos 9) is assembled under the worktop. The installation is equipped with this to protect the interior of the installation against pollution by coarse materials and to collect spilled fluids. Furthermore the pre-filter will enhance the life span of the HEPA-filter significantly.

4.10 Downflow HEPA-filter

The downflow HEPA-filter (*Figure* 2*,* Pos 10) has a very high efficiency: Class H14 in accordance with EN1822. After assembling, each filter will be tested separately according to EN12469:2000, Annex D. Through the service panel the downflow filter can be reached.

4.11 Protection grid

The protection grid (*Figure* 2*,* Pos 11) influences the protective downflow air and must always be mounted.

4.12 Exhaust HEPA-filter

The exhaust HEPA-filter (*Figure* 2*,* Pos 12) has a very high efficiency: Class H14 in accordance with EN1822. After assembling, each filter will be tested separately according to EN 12469:2000, Annex D. Through the topside of the cabinet the exhaust filter can be reached.

4.13 Support frame (optional)

For a stable positioning of the EF/S cabinet, we strongly recommend the use of the especially designed support frame from the supplier (*Figure* 2*,* Pos 13).
This support frame includes an in steps adjustable feet support for a good ergonomically work position (*Figure* 2*,* Pos 14). As well, the feet support will increase the stability of the cabinet. In addition, it is recommended to use an in height adjustable, well disinfectable, chair to optimize the work position.

4.14 Feet Support (assembled on 4.13)

The support frame includes an in steps adjustable feet support for a good ergonomic work position (*Figure* 2*,* Pos 14). As well, the feet support will increase the stability of the cabinet. In addition, it is recommended to use an in height adjustable, well disinfectable, chair to optimize the work position.

4.15 Front panel

The service panel (*Figure* 2*,* Pos 15) can be dismantled to get access to:
- the downflow filter;
- the fan.

		**GENERAL DANGER / BIOLOGICAL DANGER** Cabinet must be disinfected before removing the front panel

4.16 Back panel

The back panel (*Figure* 2*,* Pos 16) can be dismantled to get access to:
- Optional fittings;
- Sockets.

		**GENERAL DANGER / BIOLOGICAL DANGER** Cabinet must be disinfected before removing the back panel

4.17 Main power connection

The main power connection (*Figure* 2*,* Pos 17) is positioned on the top of the cabinet. The cord length is maximum 3 meters and should always be accessible. See *§10.2 General specifications on page 59* for details*.*

4.18 Electronics

The electronics (*Figure* 2*,* Pos 18) consist of:
- Operational print; positioned in the top hood behind the operating panel;
- Control print, positioned under the top hood, behind the safety-cover, including:
    - Fuse holders (see *§10.2 General specifications on page 59* for fuse-numbers).
    - Fan control. The control is free adjustable in the range between 0% and 100%
    - An Air velocity compensating microprocessor regulates the fan speed to compensate for main power fluctuations and filter pollution.
    - Independent potential free output contact (interface board connector J6). See *Interface board on page 71.*
    - Mains filter
    - VSA + starter for UV (Option)
    - VSA for FL-light
    - Option board (see *Appendix VI: Lay-out boards on page 71*)

4.19 Operating panel

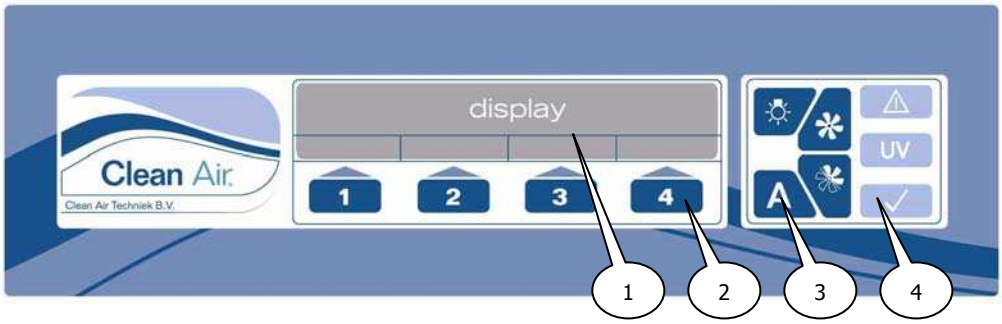


Figure 3 Operating panel

The operating panel (*Figure* 2*,* Pos 19 and Figure 3) consists of:

1. Display;
2. Function keys (4x);
3. Fixed keys (4x);
4. Signals.

4.20 FL-lighting

The Fluorescent-lighting (*Figure* 2*,* Pos 20) is assembled behind the top hood.

4.21 Fan

The fans with the motor (*Figure* 2*,* Pos 21) are maintenance-free, double suction fans.

4.22 Optional Fittings

(*Figure* 2*,* Pos 22)

Gas connection

The gas connection is assembled on the back part of the biological safety cabinet. This connection is assembled together with a gas valve. Normally, the gas connection is a hose connection, long nech type, for 10 mm connection.
Connection on the gas supply has to be done with a certified gas hose.
After connection on the gas supply, the gas connections have to be tested on leakage by a certified installer.

The gas valve has to be assembled on the gas connection (see Annex A.9 of the EN 12469:2000-standard) as an extra safety precaution. A coupling via the electrical system of the installation makes sure that the valve can only be operated in work mode and will be switched off automatically by leaving this mode.
The gas valve switch-function is only visible when the fan in work mode is and there are no air speeds alarms.

Bunsen burner lead-through set

The burner can be plugged into the outlet, which is assembled in the back panel, with a short cable. The plug of the pedal can be inserted into an outlet assembled in the bottom of the installation.

The Bunsen burner can only operate when the cabinet is in safe work mode and button 4 (Gas) is activated.
Recommended to apply is the Fuego Bunsen burner, available at Clean Air Techniek B.V.

Vacuum connection

This connection is always assembled in combination with a vacuum tap, at the back of the work area.

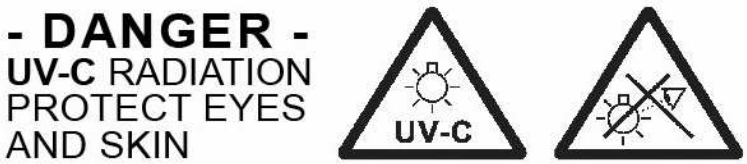
UV light

The UV light is meant for disinfection of the working surface of the safety cabinet.

When the UV light switches on, the FL lighting switches off. The UV light can only be switched on when the window is closed (window on aerofoil) or when the cabinet is in disinfection mode (aerofoil lifted up and window at its lowest point), this makes sure the user will not get in contact with UV-C radiation.

The UV switch-function 4 is only visible when the window is closed.

<table>
<tr><td>  </td><td>DANGER FOR BURNING

Avoid direct contact with UV-C radiation. This causes burns to the skin and eyes.</td></tr>
<tr><td colspan="2"> 
</td></tr>
</table>

The UV light can be switched on and off on the display (see *§6.4 Control UV (optional) on page 27*). It is also possible to adjust the UV disinfection, for each day a certain disinfection period can be defined (see *§6.7 Set up 7 days clock UV on page 29)*.

UV **Watch Out!**	Do not touch the UV-lamp with the hand en keep the lamp fat free; otherwise the lifetime will decrease. The UV-light must be regularly cleaned with alcohol (70%) regularly (switch off the installation). *See §8.2 Cleaning the UV-light (optional) on page 53.*

When the UV is switched on, the UV hour counter counts the lighting period. UV-lamps have, depending on fabricate and type, a limit in effective running hours. Replace the lamp frequently.

Alternative Options

Please contact Clean Air Techniek B.V. for information about alternative options.

4.23 Sockets

The sockets are assembled on the back wall of the working area.
They can be operated at the control panel. See *§10.2 General specifications on page 59* for electrical details.

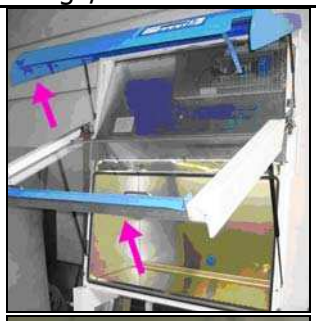
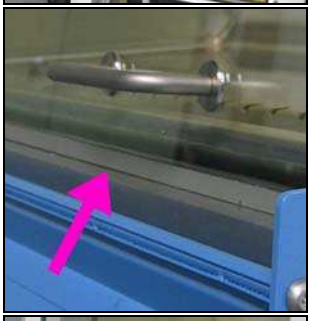
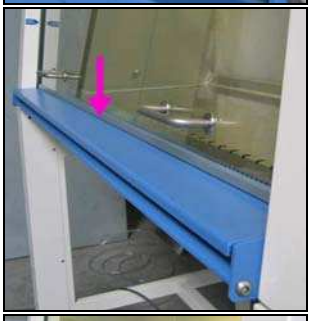
5 Control

5.1 Using the cabinet

Check if the information on the type plate is corresponding to the main power connection. Connect the cabinet to the main connection by putting the plug into a grounded socket that is easy accessible.

5.2 Top hood/sliding window

The hinge/slide window can be in several positions, see Figure 4 Window positions.

1		Hinged: Top hood is also open.
2		Disinfection/hinge position: Aerofoil is folded outside, window in lowest position.
3		Savings/UV-position: Window is closed on the aerofoil.
4		Working position: Safe work opening. 

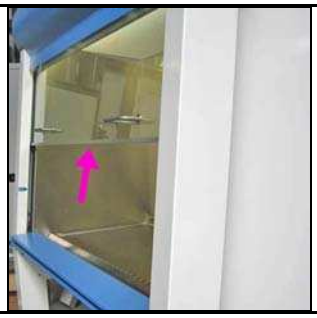
5		Top position: Maximum opening, to place objects in cabinet.

Figure 4 Window positions

Slide the window

To slide the window, both handles need to be used.
Note 1: When the window is not in the working position, the safety of the cabinet cannot be granted. This status will cause an alarm.

Optional: electrically operated window
To slide the window, use the operating switch (see Figure 5 and Figure 6), the window will go up or down supported by an electrical motor.

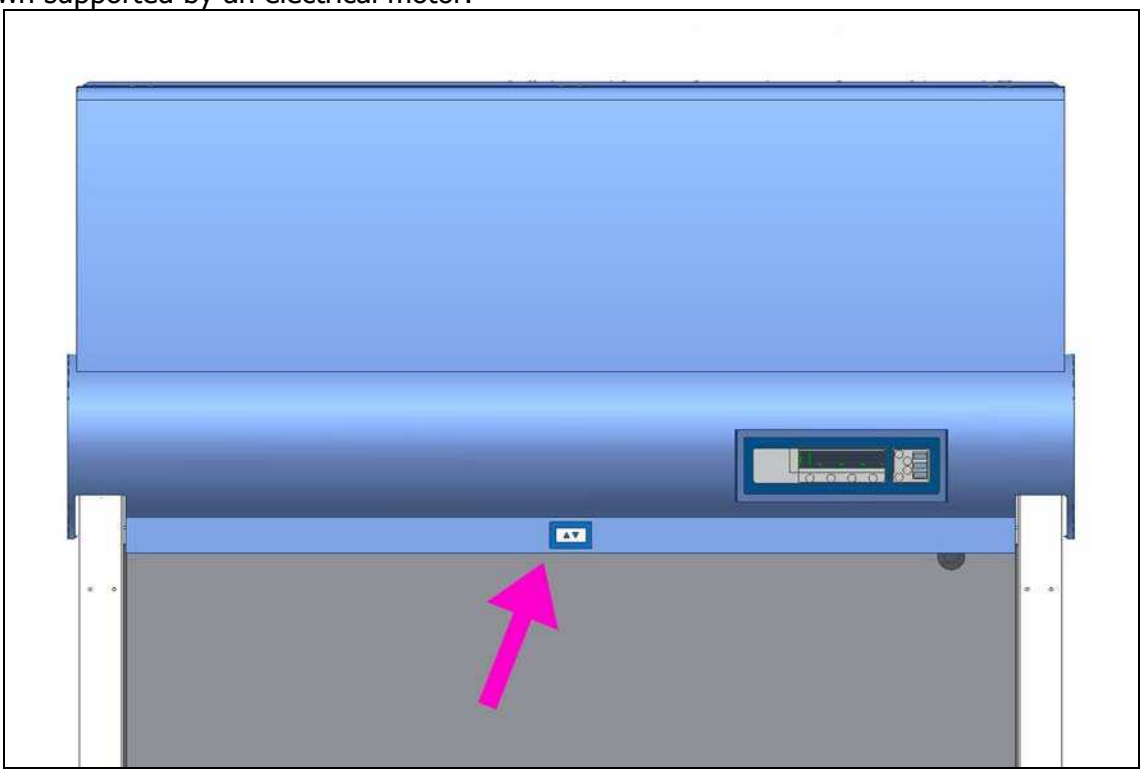


Figure 5 Switch to operate the window up/down

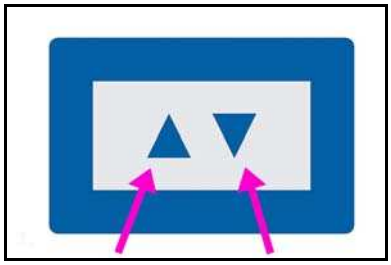


Figure 6 Switch

Switch to operate the window: up and down.

Batteries are feeding the electrical sliding window. In case of power failure it is still possible to operate the window. If such a situation occurs, the window needs to be closed so that the installation is left behind in a safe condition.

It takes 24 hours to charge the batteries for the first time. With charged batteries the window can be used 30 minutes full ongoing. Hereafter the batteries are empty and must be charged for at least 10 minutes before the window can be operated again.

Hinge the window

The window construction can be hinged manually, for example when the working area and window need to be cleaned, but also for placing large objects in the working area.
The window can only be hinged when the window is slit. When the window is not slit down, there will be an acoustic alarm and operation of the (electrical) window is blocked.

- Pull the armrest (aerofoil) towards you.
- Slide the (electrical) window all the way down, until it is closed completely.
- Open the top hood above.
- you may open the window construction upwards.

6 Starting up the cabinet

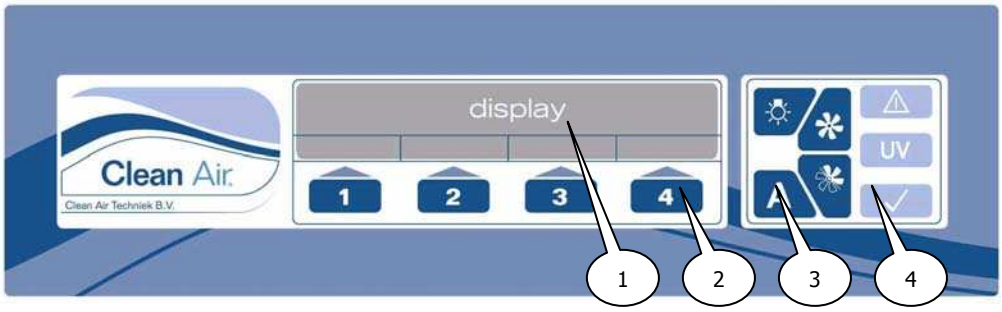


Figure 7 Display Interface

The operating panel (*Figure* 2*,* Pos 19 and *Figure 14*) consists of:

1. Display;
2. Function keys (4x);
3. Fixed keys (4x);
4. Signals.

Display:

The display has 4 lines, the lowest line gives the description of the function key underneath.

I	Cabinet switched off - not safe
II	Monday 11:06:33
III	
IV	MENU | Socket=Off | |

Fixed keys:

	Lighting ON/OFF
	Work mode fan ON/OFF
	Power save mode fan ON/OFF
A	Acknowledge / Enter

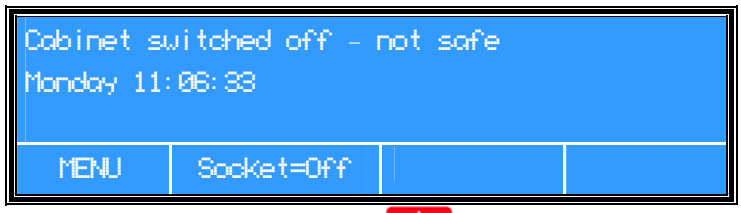
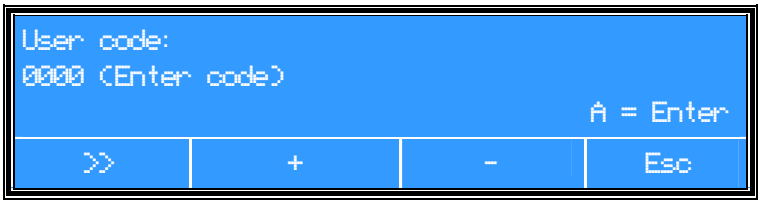
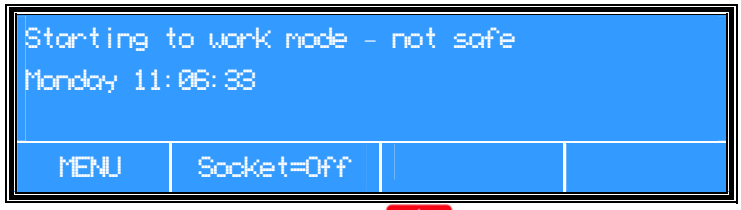
Function keys:

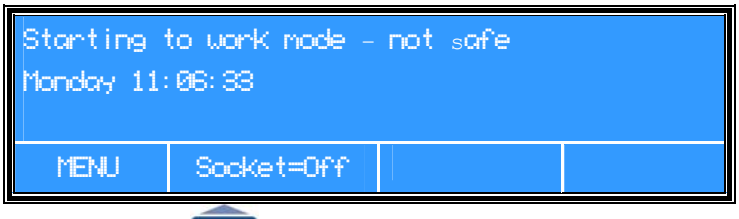
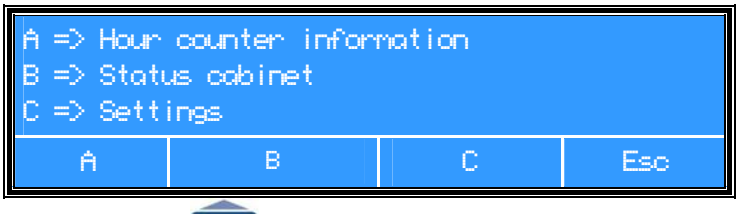
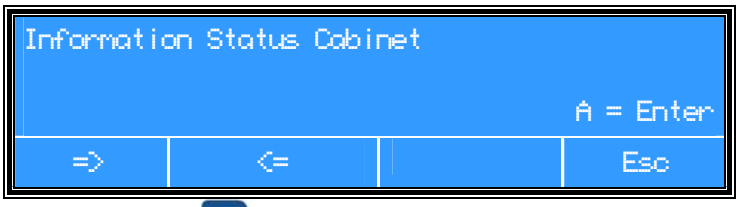
The function of keys 1, 2, 3 and 4 is variable. In the last line of the display the function is shown.

Signals:

⚠	Alarm: Confirmed alarm state Alarm, flashing (along with acoustic signal): Actual alarm
UV	UV: Indication UV-light switched on
✓	OK: Safe user mode

All equipment and, if possible, all materials required for working with a safety cabinet need to be placed into the installation before starting up the cabinet. Equipment or objects with a height up to 350 mm can be placed in the working space by sliding the window upwards. In case of larger objects the window can be hinged. Be careful: keep the safety regulations in consideration.

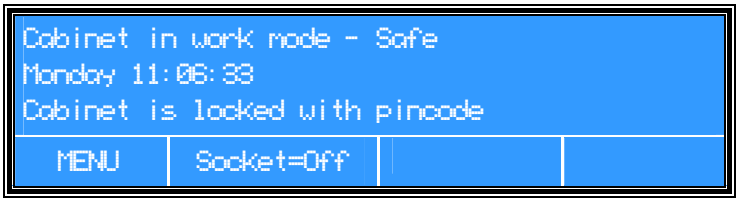
1	Connect the power cable. The lighting of the display will light up. Use both handgrips when hinging or sliding the window.	 The alarm indicator light is red ⚠.
2	Put the window in the working position (see marks on the installation Workposition calibrated).	If the cabinet has an electrically operated window (optional), this can be done automatically.
3	If the cabinet is secured with a user code, this code has to be entered first. Confirm the code with button A. The default code is 0001.	• Enter actual user code.  The user code can be changed by the user, see *§ 6.9 Change the user code on page 44.*
4	Push button ✱. To acknowledge this alarm, push button A.	The fan starts. Cabinet is in start up mode.  The alarm indicator light is red ⚠. There is an acoustic alarm.
5	Push button ☼.	The light will switch on.
6	When the fan has reached the right airspeed, the alarm indicator will disappear. The following display will be shown.	 However, the cabinet must operate for minimally 5 minutes more, before the cabinet is ready to work in.

7	If, after 10 minutes, the air speeds still are not right, the alarm will sound again. To see what is wrong: See § 6.8 on page 38 for more info about this menu.	 • Push button 1 (Menu).  • Push button 2 (B).  • Push button A.  *1 • Back to starting menu: button 4 (Esc).

*1 The average inflow velocity at the top of the front aperture is measured and displayed in the display. The average inflow velocity measured at the top of the front aperture should be at least 0,28 m/s. Measuring these most critical measured values directly under the window ensures that the overall average inflow velocity, measured over the whole inflowarea, is according to the guidelines of the EN12469:2000 (Annex H table H1 Mean inflow velocity to achieve operator protection > 0,4 m/s).

6.1 Locking functions cabinet

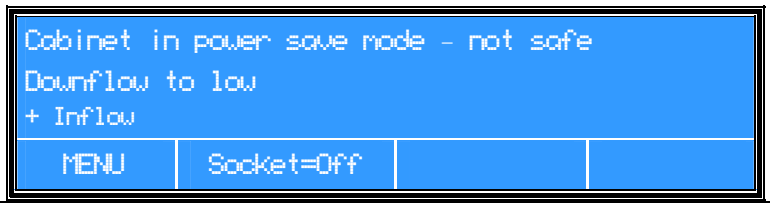
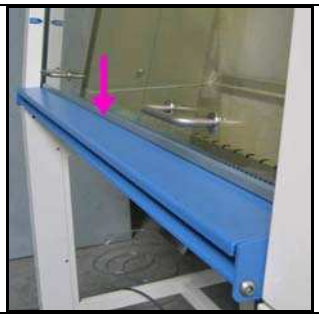
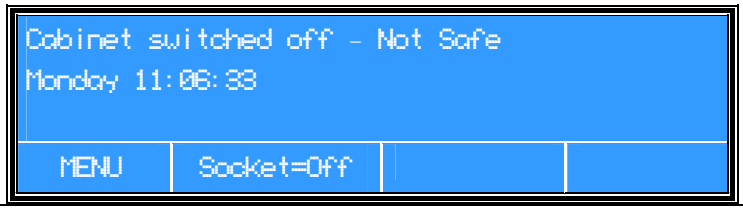
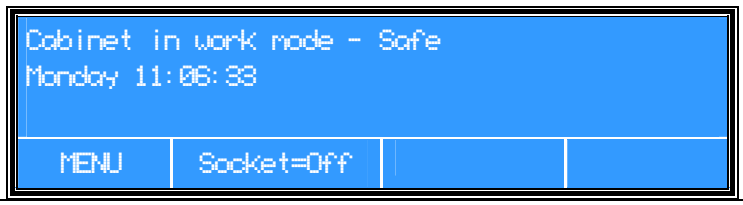
(Only when the locking function is activated)

1	The cabinet will lock its functions after being 5 minutes in work position. In the status of being locked, only a window alarm can be acknowledged.	When, within these 5 minutes, an arbitrary button is pushed (e.g. lighting) the timer starts counting again.
2	From this moment the fan-buttons are not available anymore. The user code has to be entered to make the functions available again.	 See *§6.9 Change the user code on page 44*

3	If the cabinet has to be locked immediately after entering the code; push button A for 5 seconds.	After 3 seconds, two short beeps will be heard as an acknowledgement the cabinet has been locked.
4	To unlock the cabinet, the user code has to be entered again.	See *6.9 Change the user code on page 44.*

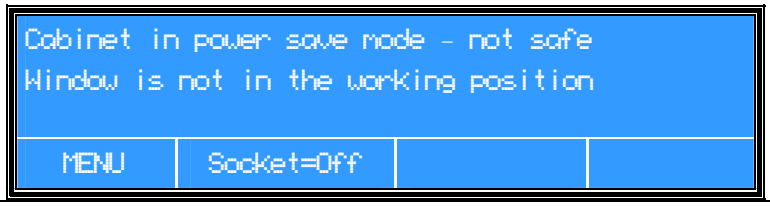
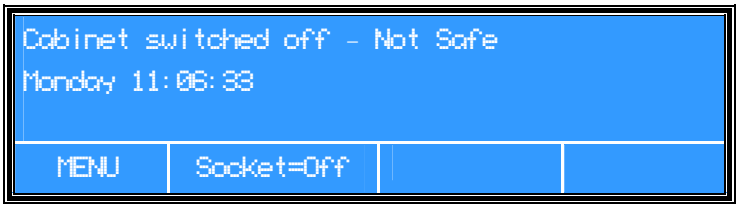
6.2 Power save mode

When not using the cabinet for a short period of time, put it in the power save mode. The fan will run at half speed to save energy (synonyms for power save mode are standby mode or night mode).

1	Push button . When the cabinet is locked, enter the user code.	The fan runs at half speed. There is an acoustic alarm. 
2	To acknowledge this alarm, push button A.	The alarm will return each 7 minutes, only in the working mode.
3	Slide down the window onto the aerofoil, to cease the alarm.	
4	With the next push on the power save button the cabinet enters the switch off procedure.	
5	To go back to the work position, push button and slide the window back in working position.	

6.3 Turn off

Remove all materials en accessories from the working area. Remove all spilled liquids and other parts in a responsible manner, according to the regulations.

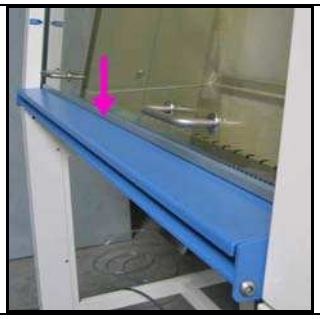
1	Slide the sliding window on to the aerofoil.	 The alarm indicator becomes red ⚠ and there is an acoustic alarm. 
2	Push button ✱ to turn off the cabinet.	The display will ask for the user code (only when the user code is activated).
3	Enter the user code and push button A.	 The fan will be switched off.

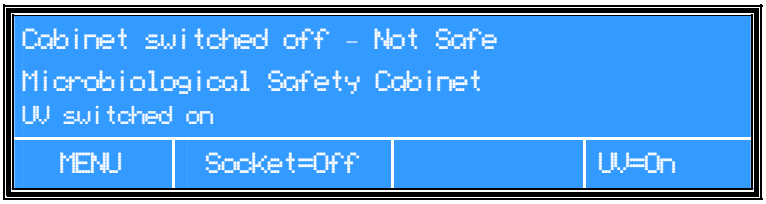
6.4 Control UV (optional)

The UV-function is only visible if this option is installed, and with a closed window. In all other cases, the UV will be switched off and the function at the display is invisible.

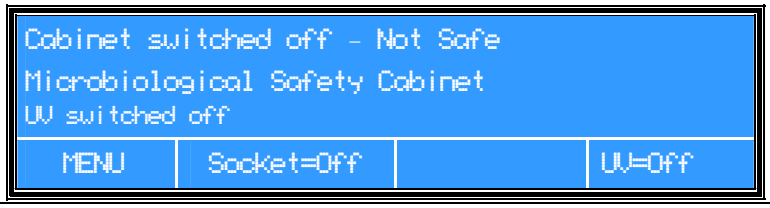
UV can only be switched on with a closed window!
This prevents direct contact on the skin or eyes of the personnel.

Switching UV on:

1	The window must be closed on the aerofoil or in disinfection mode. Cabinet must be switched off.	

2	The display shows "UV=Off". Push button 4 (UV=Off). The UV will switch on.	

Switching UV off:

3	The display shows "UV=On". Push button 4 (UV=On). The UV will switch off.	

If the window is opened during a working UV, the UV will stop, until the window is closed again. FL (Fluoresced lamp)-Lighting and UV cannot be switched on both at the same time. As a safety precaution, one of them will automatically switch off.

6.5 Control Gas supply (optional)

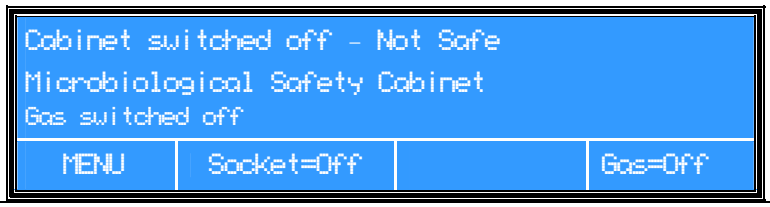
The gas-function is only visible if this option is installed and the cabinet is in work mode with no air alarms. In all other cases, the gas valve will automatically be switched off and the gas-function is invisible.

The gas valve, which controls the gas supply, can only be switched on in the work mode and when there are no airflow alarms (this is not possible in the start-mode).

Switching Gas supply on:

1	Cabinet in work mode. See *§6 Starting up the cabinet on page 23*. Push button 4 (Gas=Off).	
2	The display shows "Gas=On". The gas valve will be switched on.	
3	Turn the gas tap: open/close	

Switching Gas supply off:

4	Push button 4 (Gas=On). The display shows "Gas=Off". The gas valve will be switched on.	

6.6 Control sockets

The sockets can always be switched on and off. If the cabinet is switched off, the sockets are automatically switched off. Also if the cabinet is switched from work mode into power save mode, the sockets are automatically switched off.
See technical specification (see *§10.2* General specifications *on page 59*) for maximum voltage and current (fuses).

Switching Socket on:

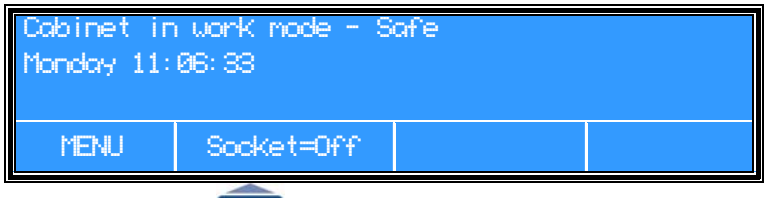
1	Cabinet is in work mode.	
2	Push button 2 (Socket=Off). The display shows: Socket=On. Power of socket is switched on.	

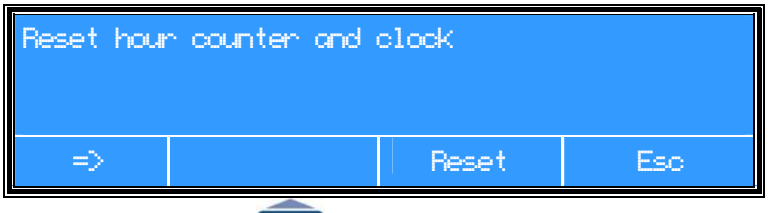
Switching Socket off:

3	Push button 2 (Socket=On). The display shows: Socket=Off. Power of socket is switched off.	

6.7 Menu functions

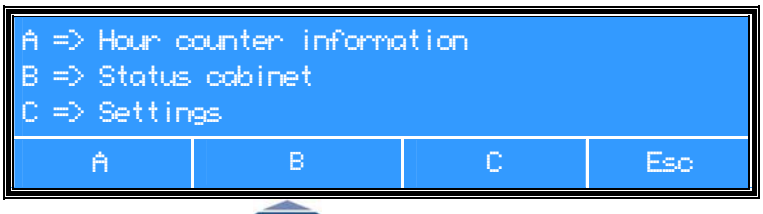
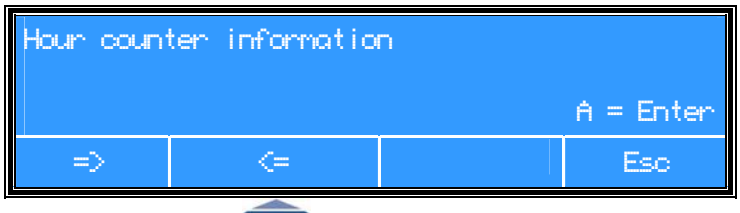
Hour counter information and reset (FL, UV, Timer):

1	Cabinet in work mode.	 • Push button 1 (Menu).
2		 • Push button 1 (A).

3	Hour counter display shows.	
4	Push button A. Hour counter information shows.	 *FL= Fluoresced lamp
There are three different possibilities, see 5a, 5b and 5c.		
5a	Reset <u>all</u> timer and clock adjustments?	• Push button 1 (=>).  • Push button 3 (Reset). • Push 2x button 4 (Esc) for starting menu.
5b	Reset FL counter?	• Push button 2 (reset A). • Push button 1 (Reset). • Push 2x button 4 (Esc) for starting menu.
5c	Reset UV counter?	• Push button 3 (reset B). • Push button 1 (Reset). • Push 2x button 4 (Esc) for starting menu.

Set up 7 days clock UV

1	Cabinet in work mode. Push button 1 (Menu).	

	Set up for 7 days clock UV shows.	 • Push button 1 (A).  • Push button 1 (=>).  • Push button A. 

There are three ways to set the UV:

- 2a. Timer
- 2b. 7 days clock
- 2c. Disable

Timer

2a	The timer sets a period until the UV turns off.	• Push button 1 (Timer), to set up the timer. • Push button 3 (Change), to change the time. • The value can be changed by pushing button 1 (>>), 2 (+) or 3 (-). • Acknowledge the setting with button A. • Push 2x button 4 (Esc) for starting menu.

Clock (7 days clock)

2b	With the clock function, for each day of the week, you can set a variable period for the UV to be switched on. Keep in mind, you have to set the starting hour and starting minute for each day separately! For detailed information regarding programming this menu, *see*	• Push button 2 (Clock), to set up the 7 days clock. • Push button 3 (Change), to change starting time en ending time. • The value can be changed by pushing button 1 (>>), 2 (+) or 3 (-). • Acknowledge the setting with button A.

	§6.7 Set up 7 days clock UV on page 30 .	• Push 2x button 4 (Esc) for starting menu. See also the Example on page 33.

Disable

2c	By pushing on "Disable" the UV can only be turned on and off manually. By pushing on button UV.	• Push button 3 (Disable), to set the UV manually. • Push 2x button 4 (Esc) for starting menu.

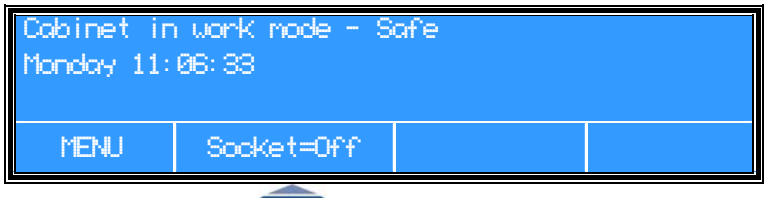
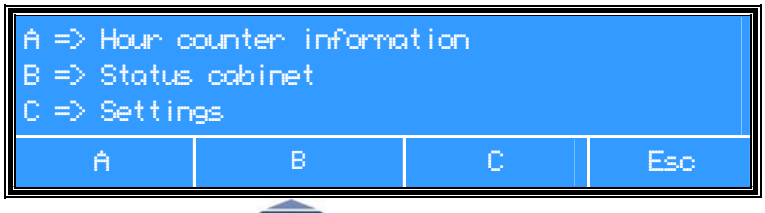
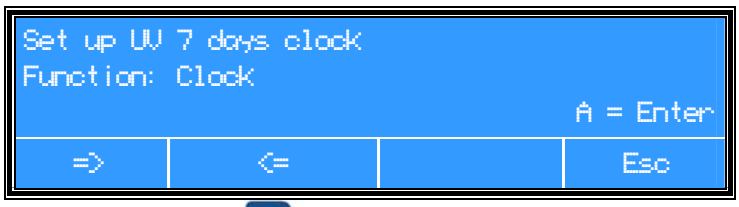
Please select not only a starting time, but also an ending time. Otherwise the UV will stay on until 0:00 h and only then turn off. See also the *Example on page 33.*

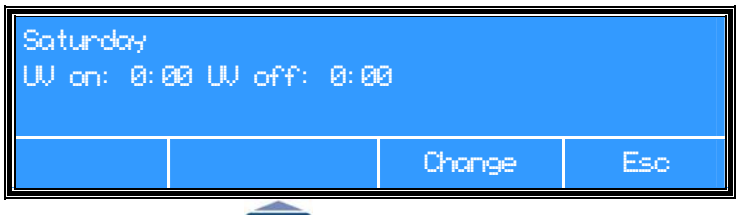
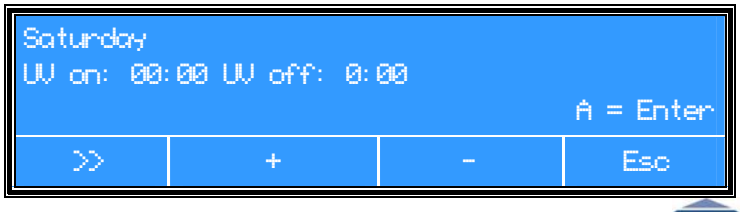
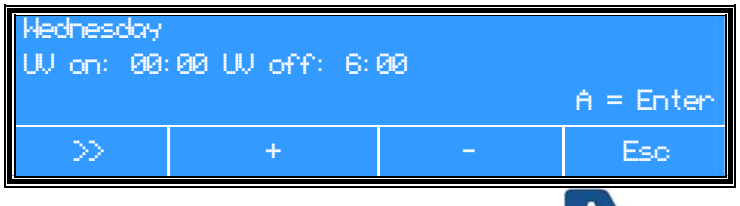
Example

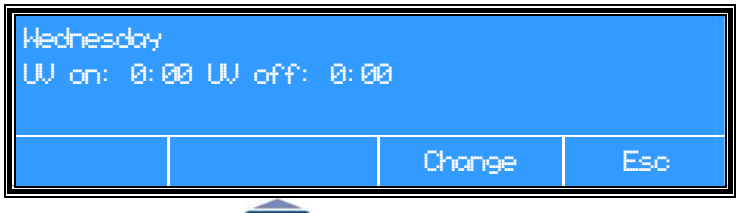
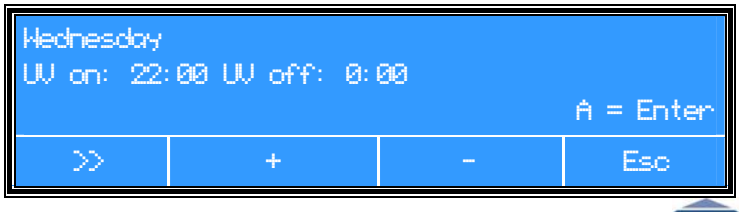
Programming the 7 days clock UV will be given as an example.

Switch on the UV Tuesday evening 10 pm and switch off the UV Wednesday morning 6 am.

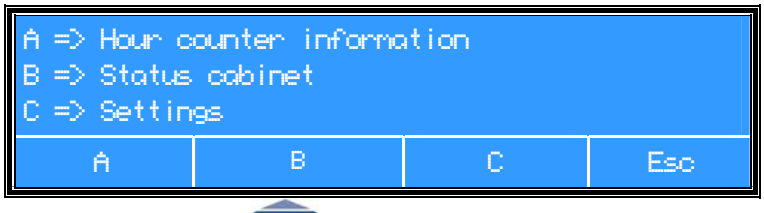
(See *§6.7 Hour counter information and reset (FL, UV,* Timer): *point 5a on page 29,* for deleting all Hour counter programmed information).

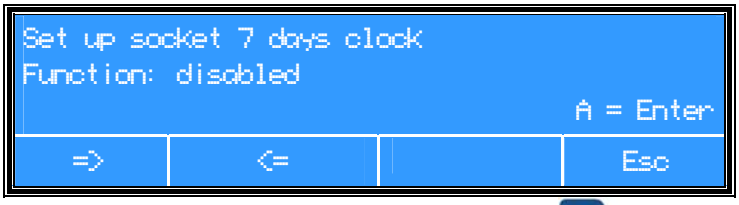
1	Cabinet in work mode. See*: Starting up the cabinet on page 23.*	 • Push button 1 (Menu).
	Set up for 7 days clock UV shows.	 • Push button 1 (A).  • Push button 1 (=>).  • Push button A. 

2	Set up the UV 7 days clock	• Push button 2 (Clock) for setting up the UV 7 days clock.  • Push button 3 (Change) for changing the start and end time.  • The value can be changed by pushing button 1 (>>), 2 (+) or 3 (-).
3	Set up UV **starting time Tuesday evening 10 pm**. Set up UV switching of on **Wednesday morning 6 am**.	• Saturday has to be changed into Tuesday, UV starting time at 10 pm and UV off at midnight. The display shows:  • Acknowledge the setting with button A.  • Push button 1 (=>), then button A, then button 2 (Clock) and then button 3 (Change). • Tuesday has to be changed into Wednesday, UV starting time at midnight and UV off at 6 am. The display shows:  • Acknowledge the setting with button A.

		 • Push 2x button 4 (Esc) for starting menu.
4	Control of programmed UV Clock	• Push 3x button 1 (Menu). • Push button A. • Push button 2 (Clock), for checking the UV clock (day by day).  • Push button 3 (Change), to see what has been programmed.  • The value can be changed by pushing button 1 (>>), 2 (+) or 3 (-). • Important! **Don't touch** A, only use 2x button 4 (Esc) to go back to the main menu.

Set up socket 7 days clock:

1	Cabinet in work mode. See*: Starting up the cabinet on page 23.*	 • Push button 1 (Menu).  • Push button 1 (A).

	Set up display for socket 7 days clock shows.	 • Push 2x button 1 (=>).  • Acknowledge the setting with button A. 

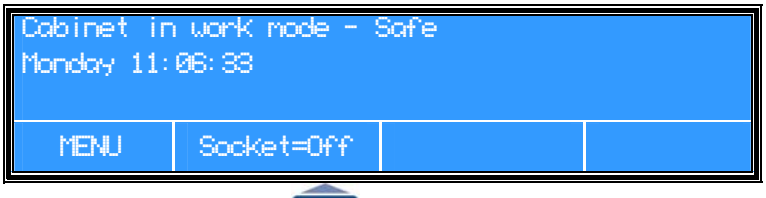
There are three ways to set the sockets:

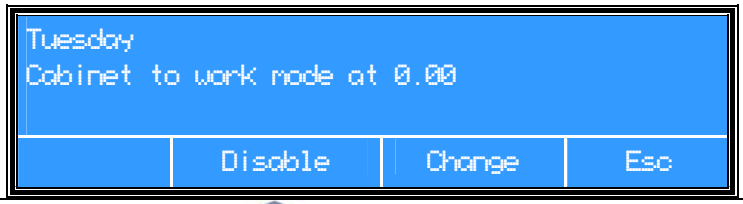
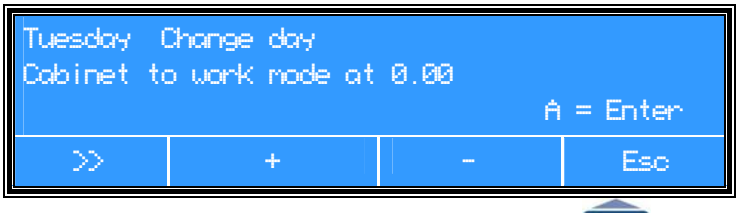
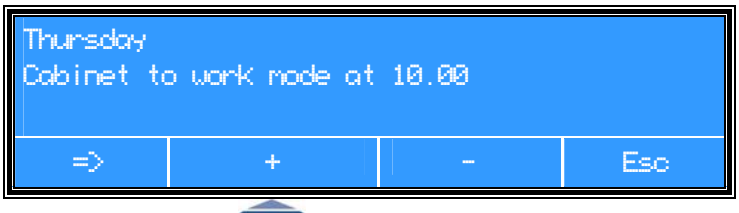
- Timer
- 7 days clock
- Disable

2	See *§6.7 Set up 7 days clock UV on page 30 and further.* See also the *Example for programming the UV-lamp on page 33.*	The timer function needs to be activated first, otherwise the sockets will not switch on.

Set up cabinet 7 days clock

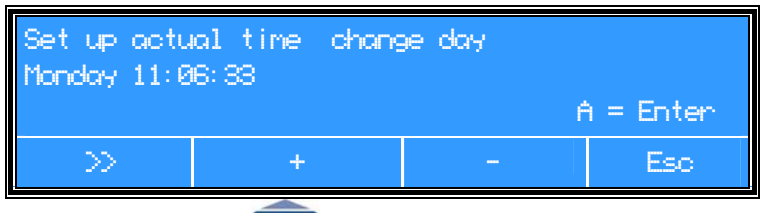
With this menu it is possible to program an automatic switch action on of the cabinet. It is however not possible to switch off the cabinet itself automatically!

1	Cabinet in work mode. See*: Starting up the cabinet on page 23.*	 • Push 5x button 1 (1x Menu, 1 x A and 3x =>),  • Acknowledge the setting with button A,

		
2	Disable	• Push button 2 (Disable), to reset all previous settings.
3	Change days:	• Push button 3 (Change), to change the day.  • The value can be changed by pushing, 2 (+) or 3 (-).
4	Change hours:	• Push button 1 (>>) to change the time.  • The value can be changed by pushing button 2 (+) or 3 (-).
5	Change minutes:	 • Push button 1 (=>) again, to change the minutes.  • The value can be changed by pushing button 2 (+) or 3 (-).
6	Acknowledge the setting.	Acknowledge the setting with button A. Push 2x button 4 (Esc) for starting menu.

For more days / hours / minutes, walk again through the menu and confirm each time.

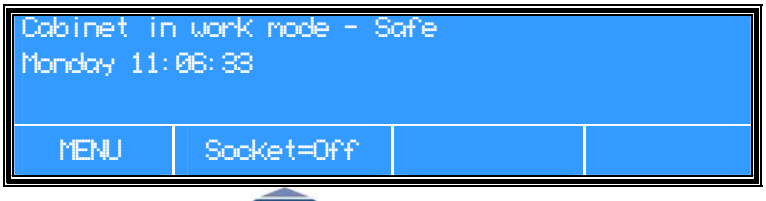
Set up actual time:

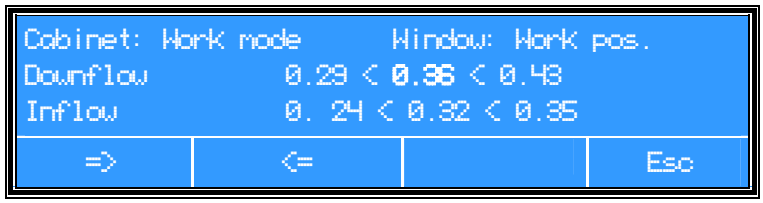
1	Cabinet in work mode. See*: Starting up the cabinet on page 23.*	
2	Set up actual time: Set up display the actual day shows.	• Push 6x button 1 (1x Menu, 1 x A and 4x =>).  • Acknowledge the setting with button A.  • Push button 1 (=>). • The day can be changed by pushing button 2 (+) or 3 (-).
3	Change hours/min/sec: Set up display set up the actual time shows.	• Push button 1 (>>) again. • The hours/min/sec can be changed by pushing button 2 (+) or 3 (-).
4	Acknowledge the settings	• Acknowledge the setting with button A. • Push 2x button 4 (Esc) for starting menu.

Actual time appears when there are no more alarms.
In case of power failure, actual time is kept in memory for one month.

6.8 Information status cabinet

In this menu the settings of the cabinet can be checked to inform service personnel.

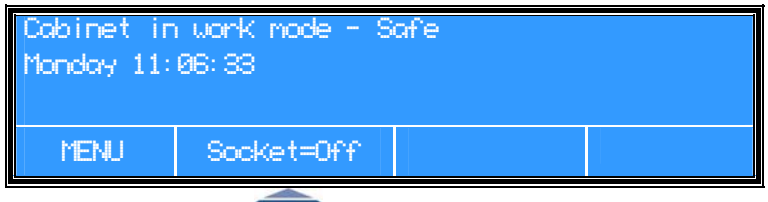
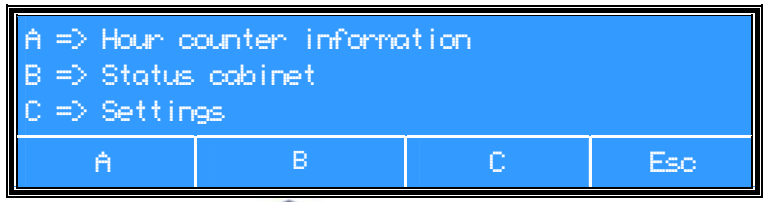
1	Cabinet in work mode. See*: Starting up the cabinet on page 23.*	 • Push button 1 (Menu). 

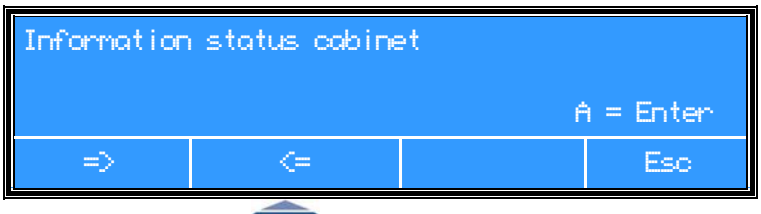
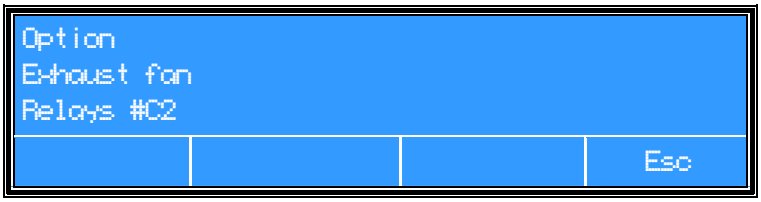
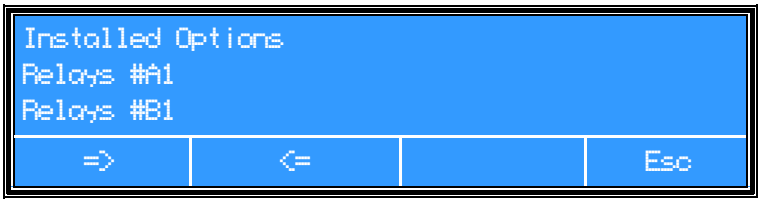
		Push button 2 (B).
2	Status Display:	 Status display shows
3	Status Information *[1]:  (Example with colours)	• Push button A.  Status information cabinet shows (see example). • Middle numbers are the actual air speeds (yellow); • Left and right numbers are the set up alarm borders (red).
4	Information fan shows	• Push button 1 (=>).  The seven-digit number in the upper right corner is only meant for service aims. • Push button 4 (Esc) for starting menu.

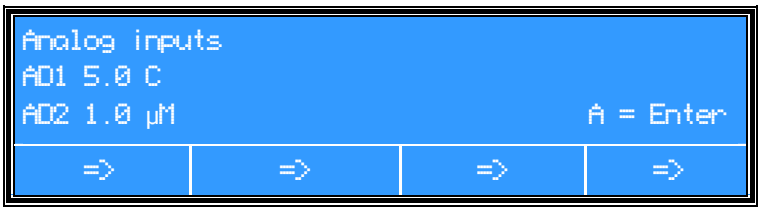
*[1] The average inflow velocity at the top of the front aperture is measured and can be read in display. The average inflow velocity measured at the top of the front aperture should be at least 0,28 m/s. Measuring these most critical measured values directly under the window ensures that the overall average inflow velocity is according to the guidelines of the EN12469:2000 (Annex H table H1 Mean inflow velocity to achieve operator protection > 0,4 m/s).

Information about the installed options

(The display only shows when the options are installed)

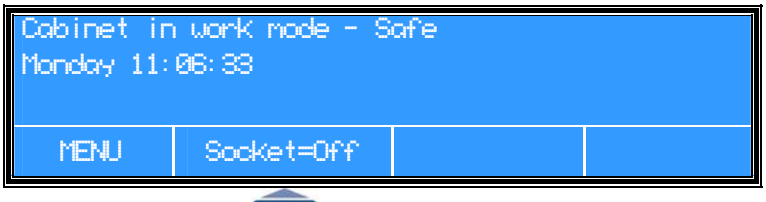
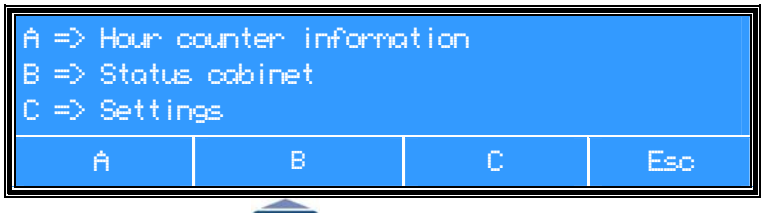
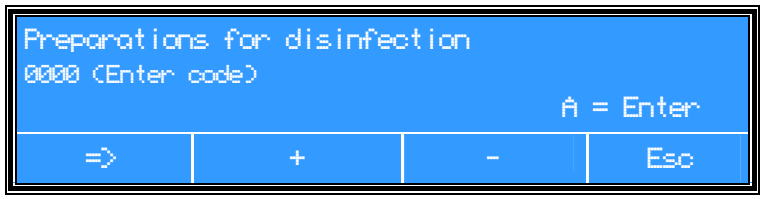
1	Cabinet in work mode. See*: Starting up the cabinet on page 23.*	 • Push button 1 (Menu).  • Push button 2 (B).

2	Information about the installed options is given (example):	 • Push button 1 (=>). 
	From here there are 3 possibilities (examples): - 3a. Screen I - 3b. Screen II - 3c. Screen III	
3A	Options **Screen I** Starting up from Step 2	 Installed options display shows. • Push button 3 (Option).  For explanation codes see *Appendix IX: Information installed options on page 76*. • Push 2x button 4 (Esc) for starting menu.
3B	Options **Screen II** Starting up from Step 2	 Installed options display shows. • Push button 1 (=>).  For explanation codes see *Appendix IX: Information installed options on page 76*. • Push button 4 (Esc) for starting menu.

3C	Options **Screen III** (Display only appears when analogue options are installed) Starting up from Step 2	• Push 2x button 1 (=>).  For explanation codes see *Appendix IX: Information installed options on page 76.* • Push button 4 (Esc) for starting menu.

6.9 Settings

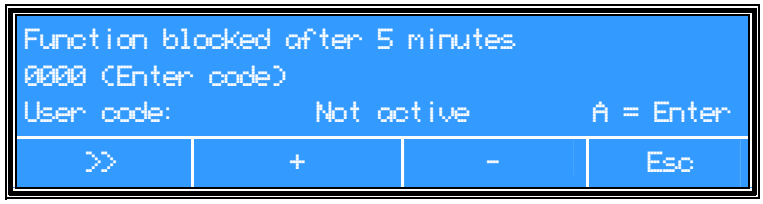
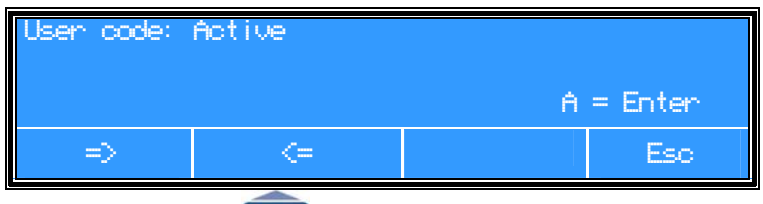
Disinfection

1	Cabinet in work mode. See*: Starting up the cabinet on page 23.*	 • Push button 1 (Menu).  • Push button 3 (C). • Push button A.
2	Preparations for disinfection:	 Preparation for disinfection display shows. • After entering the user code (pre settings 0001) push button A. • Push button 2 (check OK) The aerofoil ("valve") has to be lifted up and the window has to be closed completely. • Push button 1 (Start). • Re-enter the user code. • Push button A. The preparation for the disinfection starts.

3	Abort the disinfection:	• Push button 4 (Stop) to stop the disinfection.
	For more information about disinfection see *Appendix II: Disinfection on page 65* and website www.cleanairbv.com *Products/downloads*.	**The disinfection software itself is no disinfection!**

Activating the user code

The function "User code Active/not active" makes it possible to block the control of the installation. To change this state the valid user code has to be entered. The new state (active or not active) is valid after a period of 5 minutes (after touching the last button). The pre installed valid user code is 0001. In case of emergency there is a special code to break the unknown or forgotten user code. In that case enter code 2882 and the original pre installed code, 0001, is valid again.

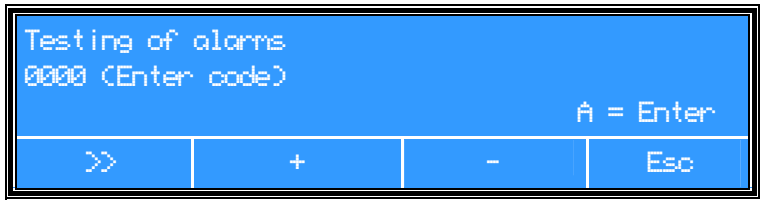
1	Cabinet in work mode. See*: Starting up the cabinet on page 23.*	 • Push button 1 (Menu). • Push button 3 (C). • Push button 1 (=>).  User code mode appears. • Push button A.  The information for the user code shows. The user code can be activated or deactivated. • Enter the user code using button 1 (>>), 2 (+) and 3 (-). • Push button A.  • Push button 4 (Esc) for starting menu.

Factory adjustments

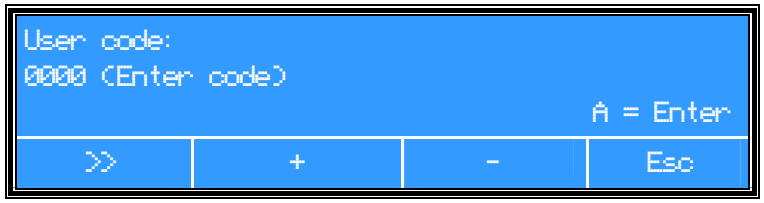
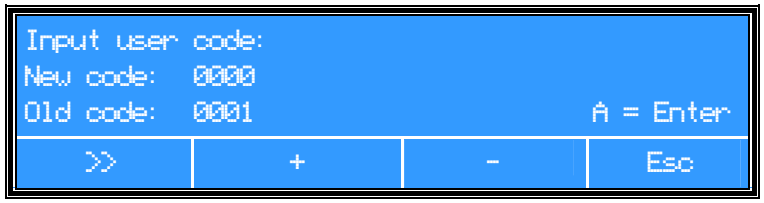
1	Cabinet in work mode. See*: Starting up the cabinet on page 23.*	
2	Factory adjustments:	• Push button 1 (Menu). • Push button 3 (C). • Push 2x button 1 (=>). • Push button A. • Enter the code for "Factory adjustment" (authorized personnel only).  Factory adjustment display shows. Factory settings can be changed here (authorized personnel only). See service manual for more information. • Push button A. • Push button 4 (Esc) for starting menu.

Testing of alarms

For service purposes only! More information given in *Appendix VII: Alarm-test procedure on page 72.*

1	Cabinet in work mode. See*: Starting up the cabinet on page 23.*	
2	Testing of alarms display shows:	• Push button 1 and 3 (C). • Push 3x button 1. • Push button A.  • Enter service code.
3	For service purposes only!	The various version numbers of the programs are shown on the display. In case of interference, inform you service organization about these numbers.

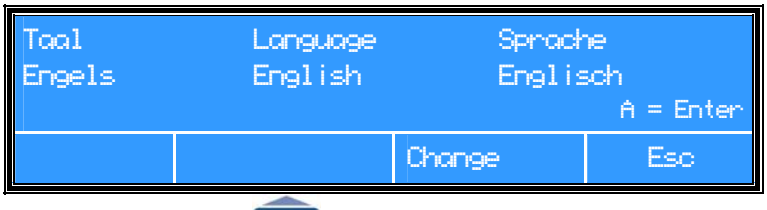
Change the user code

1	Cabinet in work mode. See*: Starting up the cabinet on page 23.*	
2	Change the user code	• Push button 1 (Menu) and 3 (C). • Push 4x button 1 (=>). • Push button A.  • Enter actual user code. • Push button A.  • Enter the new valid user code. • Push button A.
The pre installed valid user code is 0001. In case of emergency there is a special code to break the unknown or forgotten user code. In that case enter code 2882 and the original pre installed code, 0001, is valid again.		

Change language:

To change the language, first close the window, switch off the cabinet and all functions. Then the language can be changed and confirmed. As confirmation the 3 LED's (right) light up for 1 second and 2 short beeps will sound. The cabinet will be switched on automatically.

1	Cabinet in work mode. See*: Starting up the cabinet on page 23.*	
2	Change the language	• Push button 1 (Menu). • Push button 3 (C). • Push 5x button 1 (=>). • Push button A. Conditions: The fan has to be switched off (push ✱), the window has to be closed completely and sockets and FL-light must be switched off.

		 • Push button 3 (Change) to change the language. • Push button A.
3	Starting up	The cabinet switches on automatically
4	Stop	• Push button * to switch off the cabinet.

7 Alarms

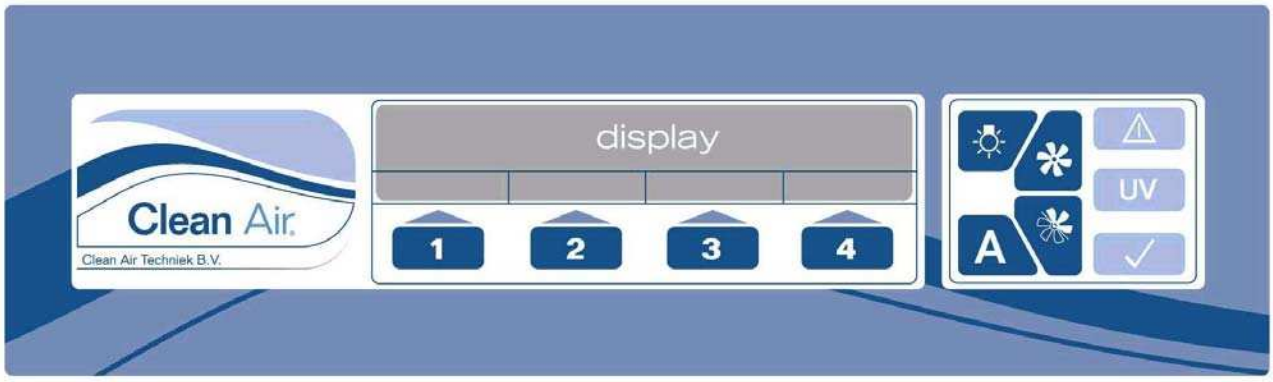


Figure 8 Operating panel

When there is an alarm situation the alarm indicator flashes red ⚠ and there is an acoustic signal. The safe working conditions are no longer granted.

Push button A for giving an acknowledgement that the user has seen the alarm. Only at the start up mode, the acoustic signal will mute. The alarm indicator will (always) keep on burning. Before acknowledging the alarm, the user code must be entered (only when the user code is activated).
An acknowledged alarm (with button A) shall be repeated every 7 minutes, as long as the alarm situation continues.
The buzzer has a SPL, sound pressure level, of at least 10 dB (A)* more than the sound pressure of the working cabinet. See *Appendix X: Required specifications on page 79.*
(*In one band of the Terz band analysis mentioned in the technical reports from the TÜV-Nord)

	**GENERAL DANGER** Make sure that there are no alarm situations during the use of the cabinet. Never work with a cabinet with activated alarm signals.

The different types of alarm signals will be discussed in the following chapter.

7.1 Most frequent window alarms

Window is not in work position

Figure 9

Window above window position:
Person protection is less, aerosols from the work area can go outside the cabinet, because of a weakened air curtain.
Product protection is less, aerosols from the outside can go into the cabinet, because of a weakened air curtain.

Window below window position:
Person protection stays intact.
Product protection cannot be granted.
The inflow air through the work opening has a higher speed and may pass the front air slits of the working surface.

Window top position (only with optional electrically operated window)

Figure 10

When the window has already reached its top position and you still try to get it higher, there will be a message on the display for several seconds.

Window aerofoil position (only with optional electrically operated window)

Figure 11

When the window is slid down and has reached the aerofoil position (aerofoil is in working position) there will be a message on the display. The window cannot slide any lower.

Window cleaning position

Figure 12

When the window is slid down in its lowest position and the aerofoil is open (not in working position), this message will be on the display.

7.2 Flow alarms

If one of the following alarms occurs and no apparent cause can be found, the service department has to be contacted. They will ask for the status of the cabinet, which helps to find possible causes (see *§6.8 Information status cabinet on page 38*).

Downflow too low

Figure 13

Product protecting downflow is too low.
Product protection becomes less, there is a chance that aerosols from the outside go into the working area. Person protection stays intact.

Downflow too high

Figure 14

Product protecting downflow is too high.
Product protection stays intact.
Person protection becomes less, because the collision of particles against the personnel's arms increases. Aerosols can escape through the air-curtain to the outside.

Inflow too low

Figure 15

Product protection stays intact.
Person protection becomes less; aerosols from the work area can go outside the cabinet, because of a weakened air curtain.

Inflow too high

Figure 16

Person protection stays intact.
Product protection becomes less.
The inflow air through the work opening has a higher speed and may pass the front air slits of the working surface.

7.3 Other alarms

Other alarms are:

Fan failure

Figure 17

Most likely the fuse is broken. Replace it with a new one. If the alarm is still there, contact your service organization.
To reset this alarm you must disconnect the power plug from the main voltage.

Window belt error (only for electrical window)

Figure 18

There is an error in the window suspension system. Contact your service organization.

Communication error

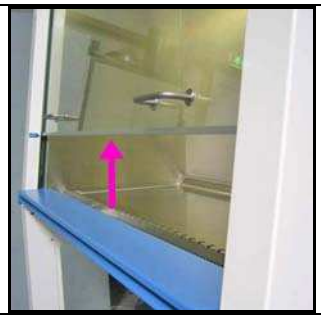
Figure 19

Contact your service organization.

	Overview possible alarms:						
	No alarm	Window above working position	Window below working position	Downflow too low	Downflow too high	Inflow too low	Inflow too high
Person protection:	Yes	No	Yes	Yes	No	No	Yes
Product protection:	Yes	No	No	No	Yes	Yes	No

Table 1: Alarm situations in work position

Procedure in case of alarms:

	Check if the window is in the working position.		

		When the window is back into the working position the alarm will not mute immediately. The cabinet needs time to get the correct airflows.
	In case the alarm is still present: Stop working, close the window, and push button  .	The cabinet goes into the saving position. When the button  is not pushed, the cabinet will automatically go into the saving position within 60 seconds, for protection of the product and cabinet.
	Read the alarms from the display. Contact your service organization.	 Working with the cabinet is not possible anymore.

8 Cleaning

8.1 Cleaning the installation

The installation has to be cleaned regularly. Preferably, each time after the installation has been used. Diluted disinfectants may be used. In most cases, hot water with a cleaning agent will be sufficient.
Chlorine containing cleaning agent is not recommended, because even small concentrations chlorine has an oxidizing effect on the material of the installation.
It is important to clean the worktop (see *§4.6 Worktop on page 13*), the space under the worktop and drip-trays regularly. A 1% solution of Natriumdodecylsulfat * (SDS-solution CAS-no. 151-21-3) in demineralised water could be applied for cleaning.
Remove the waste and place it in an appropriate container.
*) Literature:
See Mallinckrodt J.T. Baker data sheet: SDS is MSDS number No S3670
Mallinckrodt Baker Inc. 222 Red School Lane Phillipsburg, NJ 08865

Procedure for cleaning the cabinet

- Switch the installation in the working mode, see *§6 Starting up the cabinet on page 23*;
- Put on gloves;
- Clean the surface with the SDS-solution on a tissue (Natriumdodecylsulfat solution);
- Repeat this action with a new tissue;
- Clean the surface with a moist cloth;
- Repeat this action;
- Dry the surface with a paper tissue.

Cleaning the aerofoil

	**BIOLOGICAL DANGER** Never hinge the aerofoil outside a used cabinet without precaution (for instance disinfection)

- Put on gloves;
- Clean the top side of the aerofoil (see *§8.1 Procedure for cleaning the cabinet on page 51*);
- Take the aerofoil in the front slit and hinge the aerofoil outside. Take care whether you can take out the aerofoil, does the cabinet have to be disinfected first? (See *Appendix II: Disinfection on page 65*);
- Clean the sides and below of the aerofoil (see *§8.1 Procedure for cleaning the cabinet on page 51*);
- Clean all visible parts which are normally covered by the aerofoil (see *§8.1 Procedure for cleaning the cabinet on page 51*);
- Hinge the aerofoil back.

Cleaning the worktop

	**BIOLOGICAL DANGER** Never take the worktop out of an used installation without precaution (for instance disinfection)

- Clean the top side of the worktop (see *§8.1 Procedure for cleaning the cabinet on page 51*);
- Stick the auxiliary key in the slots at the front side of the worktop;

Figure 20 Auxiliary key

- Fold the worktop up against the back partition of the working space;

Figure 21 Fold the worktop against the back partition

- Clean the sides and bottom part of the worktop;
- Fold the worktop back in place.

Cleaning the inside of the window

Check if this procedure can be done safely. It is advised to disinfect the installation first (see *Appendix II: Disinfection on page 65*).

Procedure for cleaning and to disinfect the window with liquid:
- Put on gloves;
- Switch off the installation (See *procedure 6.3 on page 26*);
- Hinge the window open;
- Clean (and if necessary Disinfect) the window;
- Clean (and if necessary Disinfect) the rubber seal;
- Smear the seal thin with Vaseline;
- Hinge the window.

Please note: the cleanability of the EF/S biological safety cabinet is at least conform Class CI-B (EN 12469:2000-table 2: Clean ability performance).

8.2 Cleaning the UV-light (optional)

	**DANGER FOR ELECTROCUTION**

The UV-light must be cleaned regularly with alcohol (70%). Put on gloves and switch of the cabinet and let the UV-light cool down before cleaning. After cleaning the UV-light tube must be dried before using it.

9 Small maintenance and service

	**BIOLOGICAL DANGER** **BE CAREFUL!!** ▪ Before starting service with the cabinet always ask the responsible person if the cabinet is decontaminated so that when testing the HEPA-filters there is not any danger for the service engineer, labour personnel, the laboratory and the surroundings of the cabinet. If necessary disinfect the installation; for more information see *Appendix II: Disinfection on page 65*.

9.1 Periodic maintenance

A periodic maintenance has to take place regularly. To a certain extent, this depends on the frequency of use of the cabinet. Contact your service organization for advice.

- Validate the system on safety;
- Check for correct functioning of the electrical system;
- Check for correct functioning of assembled auxiliary machines;
- Check and, if necessary, test the fan;
- Check the HEPA-filter for efficiency and leakage;
- Check the installation and the exhaust system for leakage;
- Verification/calibration of the assembled air speed sensor(s);
- Check and adjust the alarm system.

9.2 Replacement of the pre-filter

(See *§4.9 Drip tray/pre-filter on page 14*).
Tip:
This procedure must be done with a running fan. Then the under pressure in the working area will stay. This is an extra safety aspect. Since this procedure can be done in a short time, the extra pollution of the HEPA-filters will be low.
This procedure is described for a right-hand orientated person. The described left hand may be changed for a right hand and right for left hand as long as this is done consistently (this procedure needs consistence due to contamination danger).

Supplies needed:

- Plastic bag (minimum measurement 75x50 [cm] with closure);
- Two pair of gloves;
- Working surface hook (auxiliary hook);
- Possible disposing requirements;
- New pre-filter (measurements of the pre-filter are necessary when ordering a new one, the measurements are printed on the type plate (see *§4.1 Type plate on page 12 and Appendix VIII: Stickers on page 74*).

Figure 22 Supplies needed

Procedure:

- Switch on the installation;
- Make sure that the window is in the working position and that there are no alarms;
- Put on the gloves and keep an extra pair ready for use on the aerofoil;
- Fold the edge of the plastic bag ±10 cm;

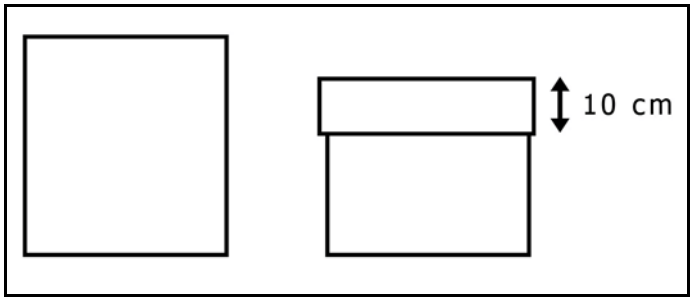


Figure 23 Folding the edge of the bag ±10 cm

- Lift up the worktop with your left hand using the working surface hook and put it against the back partition with your right hand;

Figure 24 Lifting up the worktop against the back partition

- Place the opening of the plastic bag inside the front aperture with your left hand;

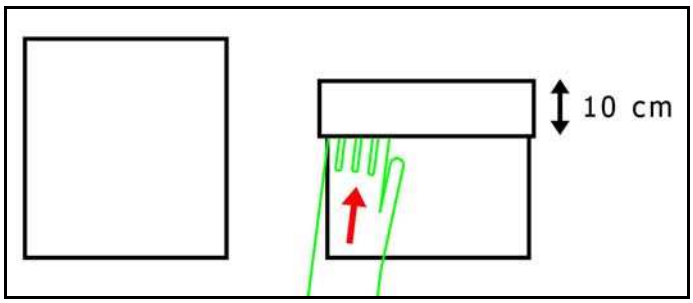


Figure 25 Positioning the left hand in the plastic bag

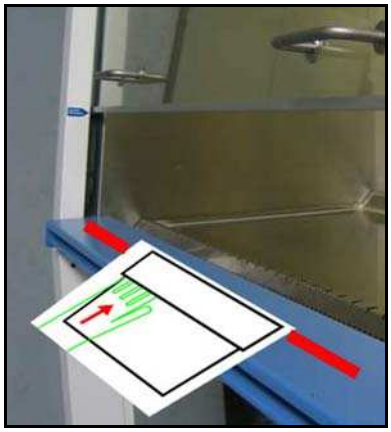


Figure 26 Positioning the plastic bag on the aerofoil

- Pull the pre-filter from its frame with your right hand;
- Roll the filter up (still with your right hand);
- Put the filter into the plastic bag;

Figure 27 Put the filter into the bag

- Fold back the edge of the plastic bag, not touching the inner side of the plastic bag;
- Press the air out of the bag (with its opening still in the working space);
- Seal the plastic bag airtight;
- Remove the plastic bag and place it in an appropriate container;
- Put on new gloves;
- Place a new pre-filter in the frame;

- Fold the worktop back in its position;
- Remove the gloves and put them in the appropriate container.

9.3 Replacing batteries of electrical window (optional)

Batteries need to be replaced if the electrical window (optional) cannot be operated for any longer than 5 minutes.
Disposal of empty batteries has to be done in accordance with local requirements. The batteries are chemical waste. See *Appendix IX: Information installed options on page 76* for more info about battery voltage.

9.4 Replacing the Fluorescent-light (FL light)

When an FL light (see *§4.20 FL-lighting on page 16*) needs to be changed, the top hood can be lifted and the reflector-panel has to be removed. Switch off the power of the installation. Replace the FL tube by a new one. Attach the reflector-panel again and close the top hood.

	**DANGER FOR ELECTROCUTION**

9.5 Service contact

For advice or any technical questions please contact your service organisation. Please refer to the following items:

- Type, Class, Project number and Serial number mentioned on the type plate (for the position of the type plate see page 12 and page 74);
- Version number of the software used in the safety cabinet.

Software Version:

1	Cabinet in work mode. See*: Starting up the cabinet on page 23.*	
2	Software version:	• Push button 1 (Menu). • Push button 3 (C). • Push 2x button 1 (=>). 

9.6 Service Contract

For information and orders concerning service or service contracts please contact Clean Air B.V.

10 Technical specifications

10.1 Physical surrounding

		EF/S-4	EF/S-5	EF/S-6
Transport physics				
Surrounding temperature	[°C]	From -25 up to 55	From -25 up to 55	From -25 up to 55
Surrounding temperature (max. 24 h)	[°C]	From -25 up to 75	From -25 up to 75	From -25 up to 75
Humidity	[%]	20 - 90	20 - 90	20 - 90
In use physics				
Surrounding temperature	[°C]	15 – 30	15 – 30	15 – 30
Surrounding temperature (max. 24 h)	[°C]	15 – 30	15 – 30	15 – 30
Humidity (not condensed)	[%]	30 - 80	30 - 80	30 - 80

10.2 General specifications

Dimensions		EF/S 4	EF/S 5	EF/S 6
Front aperture (work mode) (hxl)	[mm]	180x1180	180x1485	180x1790
Front aperture maximum height	[mm]	335	335	335
Outer meas. without support frame without exhaust hood (lxdxh)	[mm]	1373 x 794 x 1602	1678 x 794 x 1602	1983 x 794 x 1602
Height with support frame for work height 900 [mm] without exhaust hood	[mm]	2367 (1602+765)	2367 (1602+765)	2367 (1602+765)
Interior dimensions (lxd*[1]xh)	[mm]	1180 x 550/470 x 744	1485 x 550/470 x 744	1790 x 550/470 x 744
Work area (lxd)	[mm]	1170 x 415	1475 x 415	1780 x 415
Mass (without frame)	[kg]	215	275	315
Exhaust connection	[mm]	Ø 250	Ø 250	Ø 250
Window		8 mm laminated glass (2 layers)	8 mm laminated glass (2 layers)	8 mm laminated glass (2 layers)

Filter

		EF/S 4	EF/S 5	EF/S 6
Pre Filter	[mm]	G3 (EN 779) 1160x370	G3 (EN 779) 1460x370	G3 (EN 779) 1760x370
Downflow Filter	[mm]	Astrocell II Dry seal HEPA 12P4 457x1220x93 (mm) H14 acc. EN 1822	Astrocell II Dry seal HEPA15P4 457x1525x93 (mm) H14 acc. EN 1822	Astrocell II Dry seal HEPA 18P4 457x1830x93 (mm) H14 acc. EN 1822
Exhaust Filter	[mm]	Astrocell II Dry seal HEPA 3P6 305x610x117 (mm) H14 acc. EN 1822	Astrocell II Dry seal HEPA 7P3 305x762x117 (mm) H14 acc. EN 1822	Astrocell II Dry seal HEPA 9P3 305x915x117 (mm) H14 acc. EN 1822
1st HEPA filter				

Performance

		EF/S 4	EF/S 5	EF/S 6
Sound level (according to ISO 11201)	[dB A]	< 55	55	55
Average downflow speed (in work mode)	[m/s]	0,36 ±0,05 *2	0,36 ±0,05 *2	0,36 ±0,05 *2
Average downflow speed (in standby mode)	[m/s]	0,10 - 0,20	0,10 - 0,20	0,10 - 0,20
Minimal Average inflow speed in top of front aperture (in work mode)	[m/s]	>0,28 *3	>0,28 *3	>0,28 *3
Average inflow speed in whole front aperture (in work mode)	[m/s]	> 0,5 *3	> 0,5 *3	> 0,5 *3
Exhaust air flow (work mode)	[m^3/h]	400 +/- 25	540 +/- 25	650 +/- 25

*1 550/470 = Depth of the worktop/depth of the ceiling.

*2 As where no individual measurement should differ more than 20% from the mean.

*3 The average inflow velocity measured at the top of the front aperture should be at least 0,28 m/s, the overall average inflow velocity should be at least 0,40 m/s.

Electrics

		EF/S 4	EF/S 5	EF/S 6
Power connection	[V] [Hz]	230 +/- 5% 50	230 +/- 5% 50	230 +/- 5% 50
Needed main fuse box security	[A]	16	16	16
J6: Alarm, potential free contact	[V]	Max. 48	Max. 48	Max. 48
	[A]	Max. 1	Max. 1	Max. 1
Electrical insulation		Class 1	Class 1	Class 1
Electrical safety IEC 61000-4-11 Installation cat.		Class A II	Class A II	Class A II
Power sockets	$U_{max.}$[V] I_{max} [A]	230 3,15	230 3,15	230 3,15
	$P_{max.}$[W]	725	725	725
Power consumption in standby mode (with light switched off) excl. maximum power socket	P [J/s,W] I [A]	218 1,22	345 1,5	548 2,38
Power consumption in work mode (with light switched on) excl. maximum power socket	P_{nom} [J/s,W] $I_{nom.}$ [A]	428 1,86	483 2,1	644 2,8
Power consumption in work mode (with light switched on) incl. maximum power socket	P_{nom} [J/s,W] $I_{nom.}$ [A]	1153 5,02	1208 5,25	1369 5,96
Power consumption in max mode fan (with light switched on) excl. maximum power socket	P_{max} [J/s,W] $I_{max.}$[A]	704 3	699 3	1008 4,4
Power consumption in max mode fan (with light switched on) incl. maximum power socket	P_{max} [J/s,W] $I_{max.}$[A]	1429 6,3	1424 6,2	1733 7,6

Electrical window (optional)

		EF/S 4	EF/S 5	EF/S 6
Electrical motor "Bosch"	[V] DC	24	24	24
Batteries "Yuasa" (2 x 12V)	[Ah]	2	2	2

Lighting

		EF/S 4	EF/S 5	EF/S 6
TL-High output		1x	1x	2x
Colour		White – Nr.840	White – Nr.840	White – Nr.840
Diameter	[mm]	Ø16	Ø16	Ø16
Length	[mm]	1149	1449	849
Power	[W]	54	49	2x 39
Intensity (mean)	[Lux]	1150	800	1350

Fuses I/O Board

		EF/S 4	EF/S 5	EF/S 6
F1: PCB; 24 [V]	[A] T	0,5	0,5	0,5
F2: Option	[A] T	3,15	3,15	3,15
F3: Lighting	[A] T	1,5	1,5	1,5
F4: UV	[A] T	0,5	0,5	0,5
F6: Socket 1	[A] T	3,15	3,15	3,15
F7: Fan	[A] T	8	8	8
F8: PCB	[A] T	1,6	1,6	1,6
F9: PCB	[A] T	1,6	1,6	1,6

Fuses Option Board		**EF/S 4**	**EF/S 5**	**EF/S 6**
F1: Optional fan	[A] T	Max. 8	Max. 8	Max. 8
F2: Optional	[A] T	Max. 8	Max. 8	Max. 8
F3: Charge current	[A] T	1	1	1

Fuses Battery		**EF/S 4**	**EF/S 5**	**EF/S 6**
F4: Battery 1	[A] T	15	15	15
F5: Battery 2	[A] T	15	15	15

Options:

UV		**EF/S 4**	**EF/S 5**	**EF/S 6**
Type		UV-C	UV-C	UV-C
Power	[W]	30	30	30
Length UV-wave	[nm]	253	253	253
Diameter	[mm]	Ø 28	Ø 28	Ø 28
Length	[mm]	908,8	908,8	908,8

Gas valve		**EF/S 4**	**EF/S 5**	**EF/S 6**
Voltage	[V] DC	24	24	24
Current	[A]	0,4	0,4	0,4

Bunsen burner		**EF/S 4**	**EF/S 5**	**EF/S 6**
Voltage	[V] DC	9	9	9
Power	[W]	2	2	2

See also *Appendix X: Required specifications on page 79* and *Appendix XI: Part list critical components on page 80*.

11 Trouble shooting

Fault	Cause	Remedy
No power on socket of the cabinet	Socket is not activated	Activate socket on display push on 
	Fuse is broken	Replace the fuse
UV button is not visible on display	UV equipment is not installed	x
	Option UV is not installed	UV option has to be programmed please contact your service organization
UV is not working	Window not down	Window completely downwards
Gas button is not visible on display	Gas equipment is not installed	x
	Option gas is not installed	UV option has to be programmed please contact your service organization
Gas is not working	Fan in off position	Fan in work mode
FL-light is not working	Contacts of the FL are not locking in the power connections	Turn the FL-light slightly
	UV light is on	Switch of the UV light
MSC is locked	User code must be entered	Enter the user code (or de-activate the user code see Activating the user code on page 42)

Appendix I: Support frame EF/S

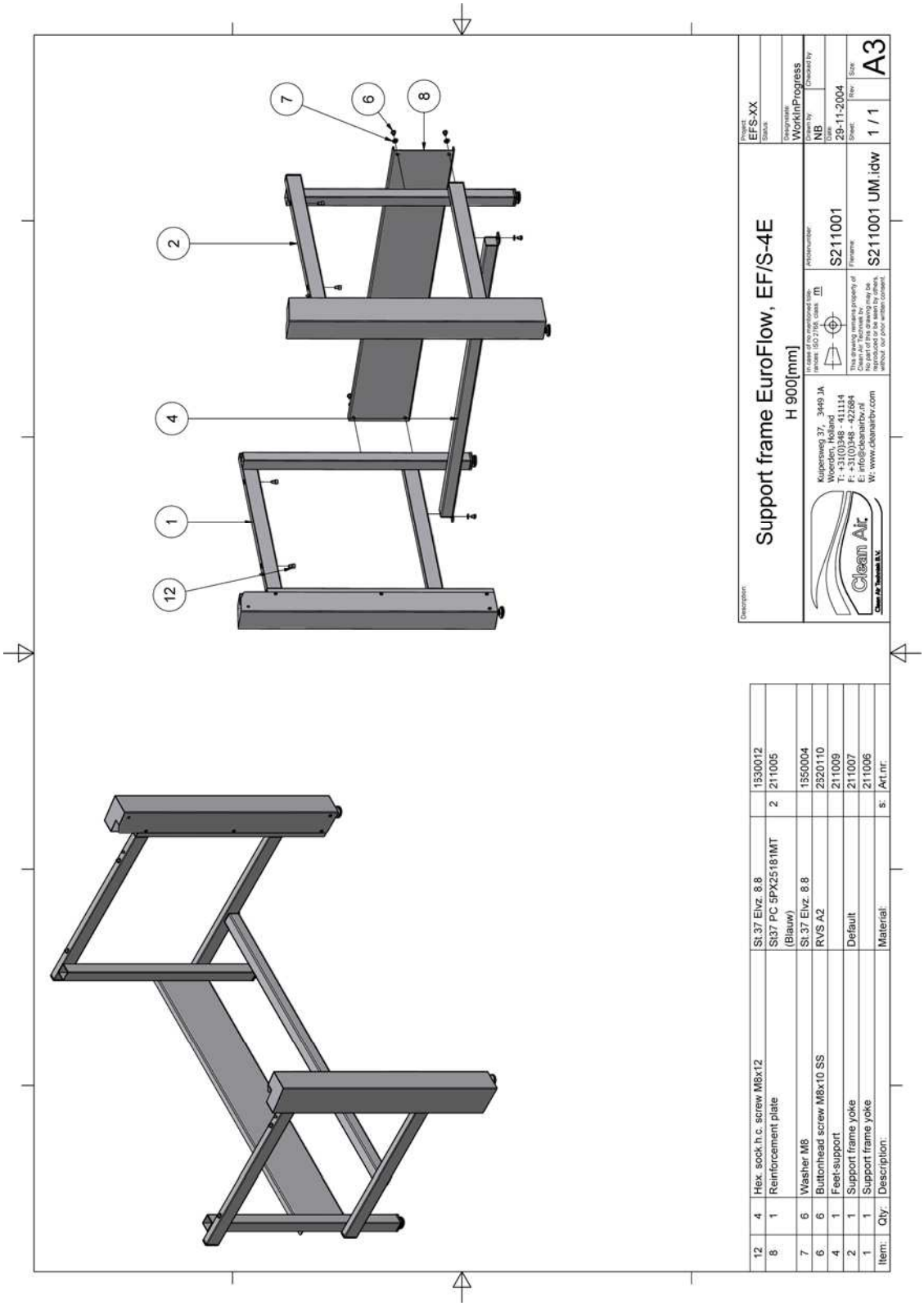


Figure 28 Support frame EF/S 4

Appendix II: Disinfection

Your Biological Safety Cabinet has a "built-in" disinfection software program.
This program knows a number of varieties, which are dependent on the installed options in the security cabinet, and the manner the cabinet has been installed.
The disinfection software of the control print is only available in version number 2.4 270307 or higher. **The disinfection software itself is no disinfection!** Biological Safety Cabinet EF/S can work according to automatic disinfection software only if this has been installed.
Consult your order confirmation for the installed options or contact Clean Air B.V.
In case additional information about disinfection is needed, please contact Clean Air B.V.
Check the website of Clean Air B.V. (www.cleanairbv.com, Products, Downloads) for more detailed information about disinfection.

Appendix III: Replacement of the HEPA-filters

Under normal circumstances, the life span of a HEPA-filter comprises several years. However, it will become clogged up gradually, until there is no longer a proper flow-through and the filter has to be replaced.
Replace both the downflow filter and the exhaust filter at the same time. This needs to be done since the total amount of air in the cabinet is based on filter proportion.

	**BIOLOGICAL DANGER** **BE CAREFUL!!** Before starting service with the cabinet always ask the responsible person if the cabinet is decontaminated so that when servicing the installation and the HEPA-filters there is not any danger for the service engineer, labour personnel, the laboratory and the surroundings of the cabinet. If necessary disinfect the installation; for more information see *Appendix II: Disinfection on page 65*.

The valid procedures for the disposal of possible contaminated material must always be followed. When the service engineer thinks this is not enough this will be discussed with the responsible person so that enough precautions can be made.

Clean Air Techniek B.V. strongly recommends specially trained technicians to carry out filter exchange. Certified service organizations are recommended. At all times keep to the service and maintenance procedures from Clean Air Techniek B.V.

Appendix IV: Efficiency test of the HEPA-filters

Requirements

According to the norm EN 12469:2000 HEPA-filters must meet a few requirements.

Efficiency test by means of a particle counter

The downflow filter and the exhaust filter must have an efficiency of 99,995% MPPS*. A local measured value can be a factor 10 higher, ≤ 0.05%.
*) Most Penetrating Particle Size

Efficiency test with a photometer

The downflow filter and the exhaust filter must have an efficiency of 99,99%. Any locally measured value must be ≤ 0.01%.

When a HEPA-filter does not meet the EN 12469:2000, it is allowed to repair it. However the surface of the reparation must not be more than 5% of the total surface of the HEPA-filter.

When this does not have sufficient effect the HEPA-filter must be replaced as described in *Appendix III: Replacement of the HEPA-filters on page 66*.

Test aerosol

With an EF/S cabinet, test aerosol can be added through the working area (*Figure 29* Pos A). The 100% measure point upstream concentration for the downflow filter as well as the exhaust filter is positioned in the middle of the service panel (see *Figure 29* Pos B and *Figure 30 100% measure point*).
When the bolt is removed, the measure probe (hose) can be stuck through the hole in the service panel, into the downflow plenum (*Figure 29* Pos E).
The downflow filter and the exhaust filter can be scanned (*Figure 29* Pos C en Pos D).

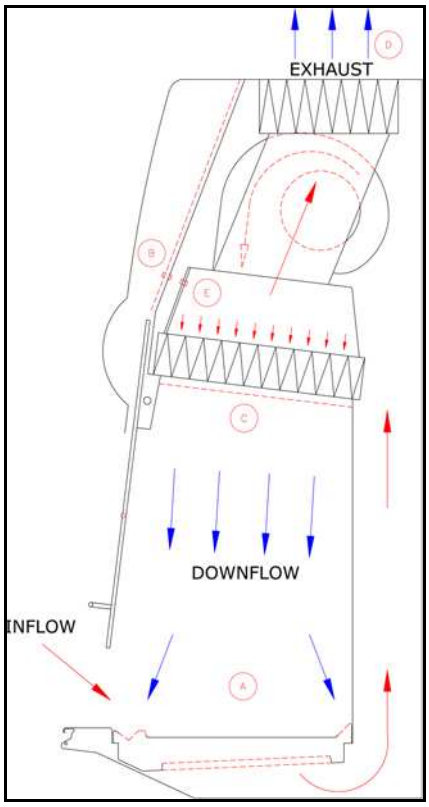


Figure 29 Sectional view EF/S

Figure 30 100% measure point

Appendix V: Measuring method air velocities

The measurement of air velocities is done according to the EN 12469:2000.

Air velocities downflow

- Switch on the cabinet;
- Measure the airspeeds according to the pattern of *Figure 33* with an anemometer at a height of 100 mm above the front opening (see *Figure 31*). This measurement must be done for at least one minute on each position.

*Air velocities inflow*1*

- Switch on the cabinet;
- Measure with an anemometer the average air velocity in the inflow, according to the pattern of Figure 32;
- Multiply these numbers with the surface of the exhaust opening: the result is the air volume through the safety cabinet;
- Divide the air velocity through the surface of the front opening: the result is the average value of the inflow air speed.

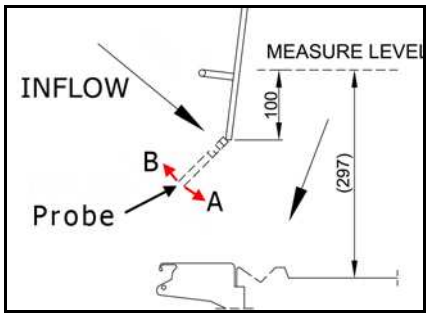


Figure 31 Measuring level

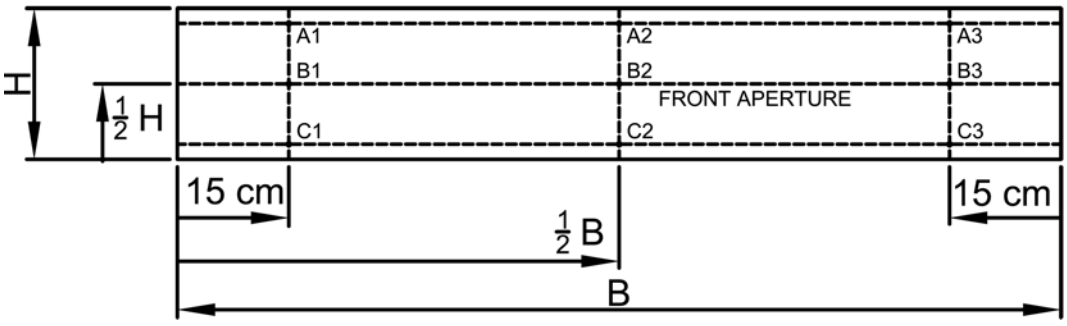


Figure 32 Measuring points inflow

(H = Heigth, B = Broad)

*1 The average inflow velocity at the top of the front aperture is measured and can be read in the display. The average inflow velocity measured at the top of the front aperture should be at least 0,28 m/s. Measuring these most critical measured values directly under the window ensures that the overall average inflow velocity is according to the guidelines of the EN12469:2000 (Annex H table H1 Mean inflow velocity to achieve operator protection > 0,4 m/s).

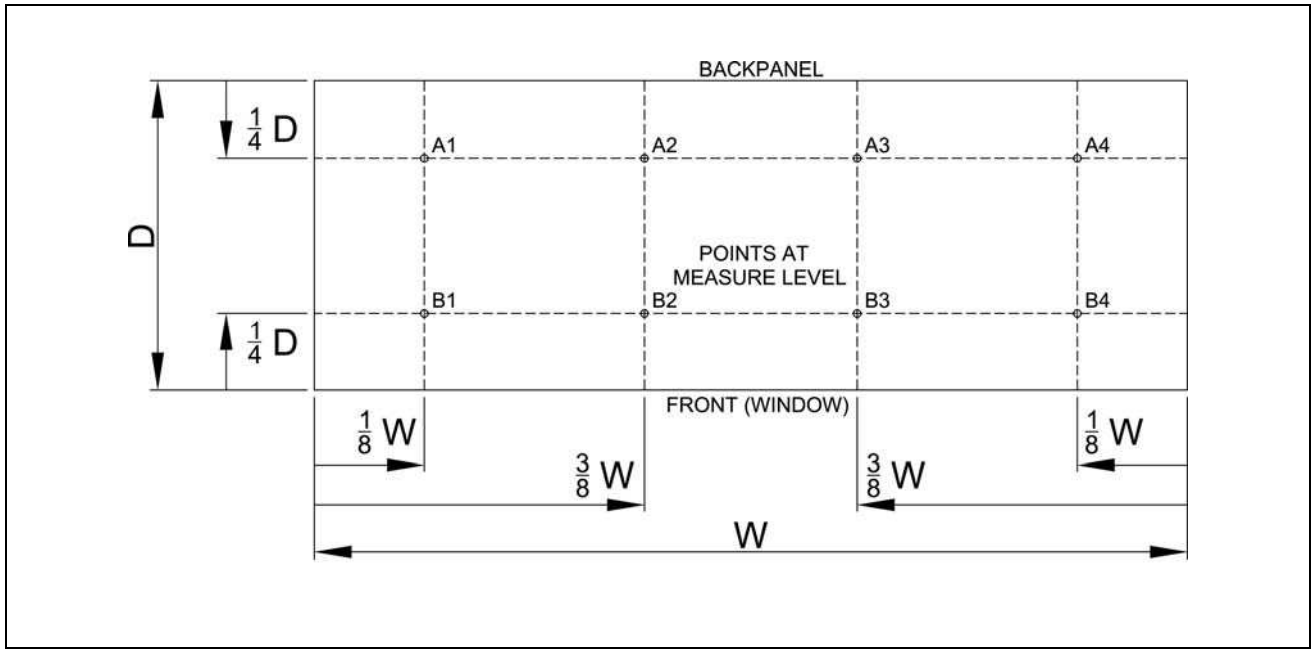


Figure 33 Measuring points downflow

(W = Width, D = Depth)

Appendix VI: Lay-out boards

Interface board

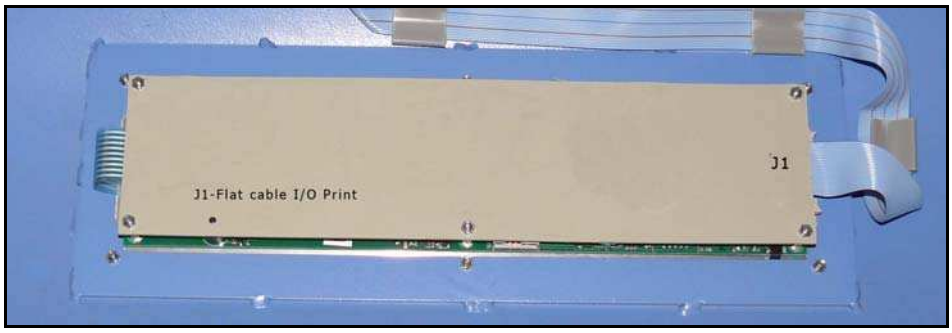


Figure 34 Interface board

Control board

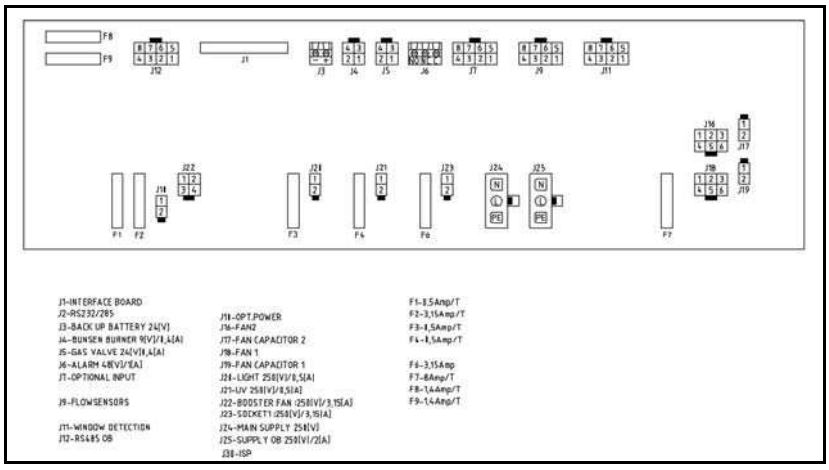


Figure 35 Control board

Option board (only with optional electrically operated window)

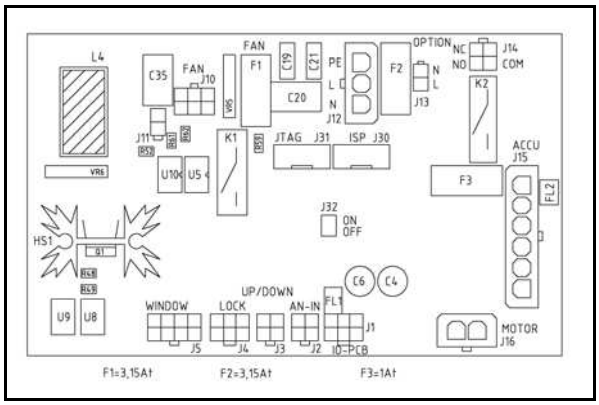


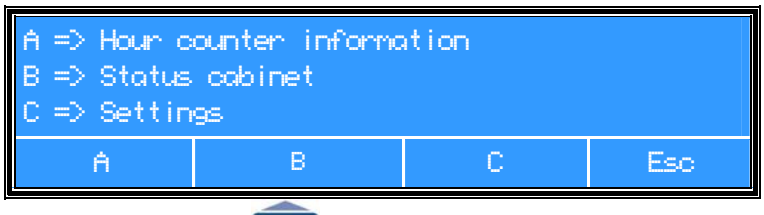
Figure 36 Option board

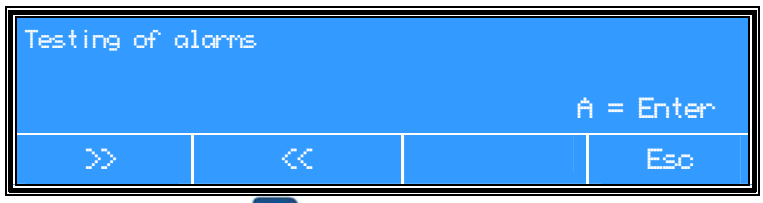
Appendix VII: Alarm-test procedure

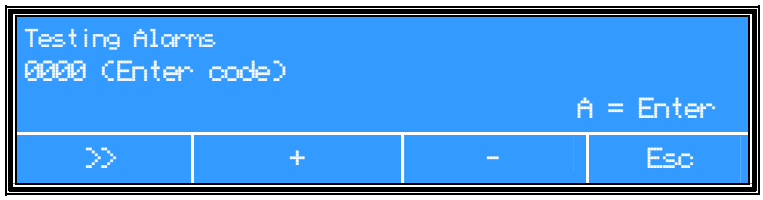
(Authorized personnel only)
To test the alarm borders, the automatic fan control must be overruled, so the fan power can be set by hand. The entire state of the cabinet will stay unchanged, except for the fan-power. The required test-code is 7733.
In this state, each 30 second, two short audible signals will be heard, to be remembered at the initial unsafe mode. After 30 minutes after the last button is touched, the fan returns to its work mode.

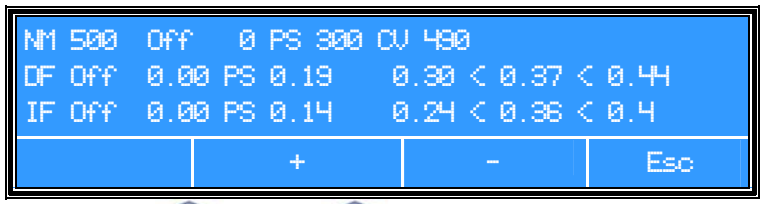
Alarm-test procedure

<table>
<tr><td>1</td><td>Cabinet in work mode.
See: Starting up the cabinet on page 23.</td><td> 

• Push button 1 (Menu).
 

• Push button 3 (C).</td></tr>
<tr><td>2</td><td>Alarm test</td><td>• Push 3x button 1 (>>).
 

• Push button A.
 

• Enter the test code: 7733.
• Push button A.</td></tr>
<tr><td></td><td>Alarm test settings
(NM = Normal mode,
PS = Power save mode,
DF = Downflow,
IF = Inflow, *1
CV = Current value)</td><td> 

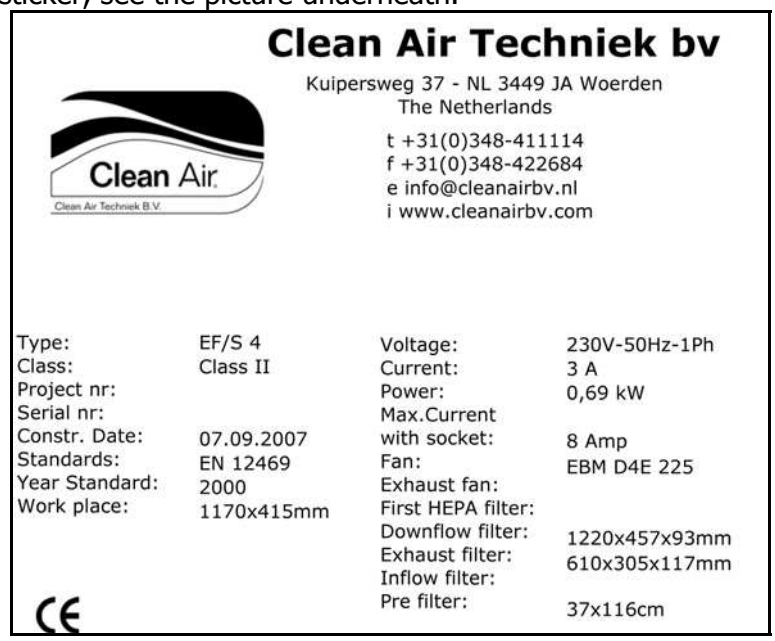
Push button 2 (+) or 3 (-) in order to adjust the fan speed.
Value CV will change.</td></tr>
</table>

Middle numbers are the actual values from the airspeed indicators, which are changeable with the use of the buttons 2 (+) and 3 (-).
First and last values are the set up alarm borders (for example: Downflow DF: lowest level is 0.30 m/s, highest level is 0.44 m/s and the actual value for downflow velocity is 0.37 m/s).
The fan speed is shown in tenths of percents (0 = min. and 1000 = max.).
To indicate the unsafe test mode, the cabinet will give each 30 seconds two short beeps as warning. After 30 minutes without input, the cabinet returns to normal operation mode.

$*^{1}$ The average inflow velocity at the top of the front aperture is measured and can be read in the display. The average inflow velocity measured at the top of the front aperture should be at least 0,28 m/s. Measuring these most critical measured values directly under the window ensures that the overall average inflow velocity is according to the guidelines of the EN12469:2000 (Annex H table H1 Mean inflow velocity to achieve operator protection > 0,4 m/s).

Appendix VIII: Stickers

1) Sticker cabinet type. This sticker can be found on the outside, underneath the cabinet. For an example of the sticker, see the picture underneath.



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e info@cleanairbv.nl
i www.cleanairbv.com

Type:	EF/S 4	Voltage:	230V-50Hz-1Ph
Class:	Class II	Current:	3 A
Project nr:		Power:	0,69 kW
Serial nr:		Max.Current	
Constr. Date:	07.09.2007	with socket:	8 Amp
Standards:	EN 12469	Fan:	EBM D4E 225
Year Standard:	2000	Exhaust fan:	
Work place:	1170x415mm	First HEPA filter:	
		Downflow filter:	1220x457x93mm
		Exhaust filter:	610x305x117mm
		Inflow filter:	
		Pre filter:	37x116cm

CE

2) Sticker filter type. This sticker can be found behind the top hood and on top of the cabinet (for downflow filter and exhaust filter).

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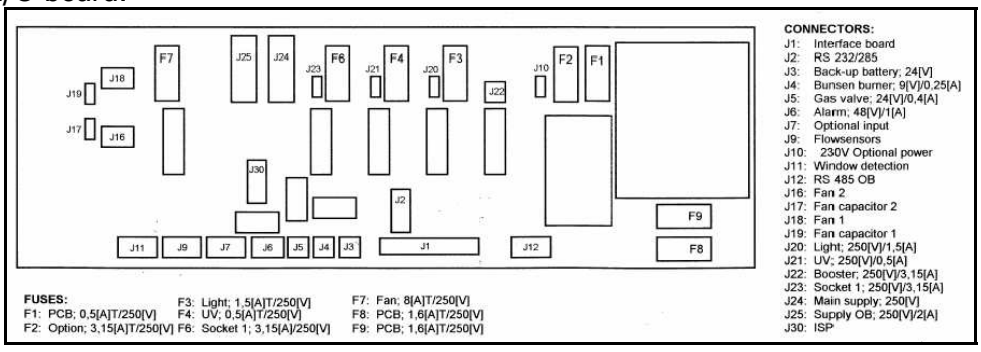
Filter type Astrocel 2 Hepa:	12P4
Serial number:	7459707-2
Date:	31.07.2007

3) Sticker I/O board.



FUSES:
F1: PCB; 0,5[A]T/250[V]
F2: Option; 3,15[A]T/250[V]
F3: Light; 1,5[A]T/250[V]
F4: UV; 0,5[A]T/250[V]
F6: Socket 1; 3,15[A]/250[V]
F7: Fan; 8[A]T/250[V]
F8: PCB; 1,6[A]T/250[V]
F9: PCB; 1,6[A]T/250[V]

CONNECTORS:
J1: Interface board
J2: RS 232/285
J3: Back-up battery; 24[V]
J4: Bunsen burner; 9[V]/0,25[A]
J5: Gas valve; 24[V]/0,4[A]
J6: Alarm; 48[V]/1[A]
J7: Optional input
J9: Flowsensors
J10: 230V Optional power
J11: Window detection
J12: RS 485 OB
J16: Fan 2
J17: Fan capacitor 2
J18: Fan 1
J19: Fan capacitor 1
J20: Light; 250[V]/1,5[A]
J21: UV; 250[V]/0,5[A]
J22: Booster; 250[V]/3,15[A]
J23: Socket 1; 250[V]/3,15[A]
J24: Main supply; 250[V]
J25: Supply OB; 250[V]/2[A]
J30: ISP

4) TÜV sticker

5) Work mode

6) Electro

7) Biohazard

(Biohazard sticker is delivered with the cabinet. Depending on the work that is done on the cabinet the customer must decide if there are any Biohazards and make the decision whether this sticker has to be adjusted or not).

Appendix IX: Information installed options

Exhaust hood

The exhaust hood is used in case the cabinet is connected to an external system.
On the hood a thimble, a booster fan or duct can be positioned.
The exhaust hood creates an extra barrier and produces extra air resistance.
This extra resistance is in most of the cases compensated by additional external fan power.
In case the exhaust hood is not connected to an external system as described above, the exhaust hood only produces extra resistance and will reduce the airflow in the exhaust chamber. In this case it is recommended to remove the exhaust hood or contact Clean Air B.V. for advice. For the same reason the exhaust channel may not be obstructed.

Installed options microprocessor

This chapter describes the codes from §6.8 Information about the installed options on page 39. Menu B from the microprocessor.

- Start up in "Menu-Display",
- Push button 1 (Menu),
- Push button 2 (B),
- Push button 1 (=>) for screen I,
- Push button 1 (=>) for screen II,
- Push button 1 (=>) for screen III.

<u>Screen I Installed options – Option</u>

Figure 37 Example of screen I

Explanation of the codes from the menu:
- #E0: no electrical window;
- #E1: electrical window; no functionality for fan;
- #E2: work mode, if cabinet is switched on;
- #C3 = relay K2 on option print;
- Accu: battery voltage.
  The value on the screen is the charging voltage (not from the battery itself!). To see the real battery voltage, slide the window up and down four times.

If the real battery voltage descends below 20.0 V (after sliding up and down the window for four times), contact your service organization.

Screen II Installed options – relays

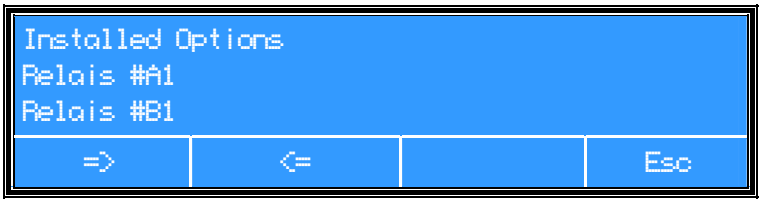


Figure 38 Example of screen II

Overview functions of relay K8, #A1-A12

Alarm #A1 - #A12 relay switching K8, on output J5 at the IO print:
Set up from #A1 until #A12:

A1 Relay ON = A & (HD * LD * HI * LI) DEFAULT
A2 Relay ON = A & (HD * LD * HI * LI * R)
A3 Relay ON = W & (HD * LD * HI * LI)
A4 Relay ON = W & (HD * LD * HI * LI * R)
A5 Relay ON = W & (HD * LD)
A6 Relay ON = A & (HD * LD)
A7 Relay OFF = A & (HD * LD * HI * LI)
A8 Relay OFF = A & (HD * LD * HI * LI * R)
A9 Relay OFF = W & (HD * LD * HI * LI)
A10 Relay OFF = W & (HD * LD * HI * LI * R)
A11 Relay OFF = W & (HD * LD)
A12 Relay OFF = A & (HD * LD)

Explanation codes used above:
W = Working mode, S = Save mode, A = Cabinet on and spare mode, HD = High downflow alarm,
LD = Low downflow alarm, HI = High inflow alarm, LI = Low inflow alarm, R = Window alarm, & = AND function,
* = OR function.

Functions are factory adjustments and cannot be changed by the user.

Overview functions of relay K3, #B1-B5

Alarm #B1 - #B5 relay switching K3, on output J22 at the IO print:

- #B1: the K3 relay is activated if the main fan is switched on (working mode / saving mode);
- #B2: the K3 relay is activated if the main fan is on half speed mode (saving mode);
- #B3: the K3 relay is activated if the main fan is in the working mode;
- #B4: the K3 relay is activated if the option Disinfection in the menu is chosen;
- #B5: the K3 relay is activated if there is an alarm from the analogue inputs.

Overview functions of relay K2, #C1-C5

Alarm #C1 - #C5 relay switching K2, on output J14 at the Option print:

- #C1: the K2 relay is activated if the main fan is switched on (working mode/ saving mode);
- #C2: the K2 relay is activated if the main fan is on half speed mode (saving mode);
- #C3: the K2 relay is activated if the main fan is in the working mode;
- #C4: the K2 relay is activated if in the menu is chosen for the option Disinfection;
- #C5: the K2 relay is activated if there is an alarm from the analogue inputs.

Screen III Analogue inputs (only if installed)

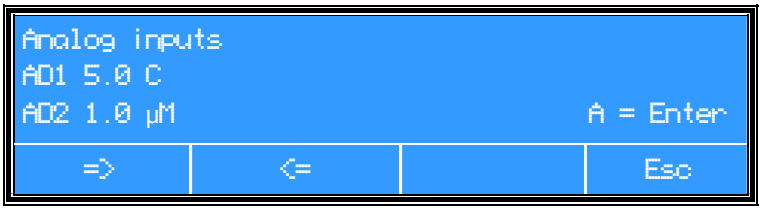


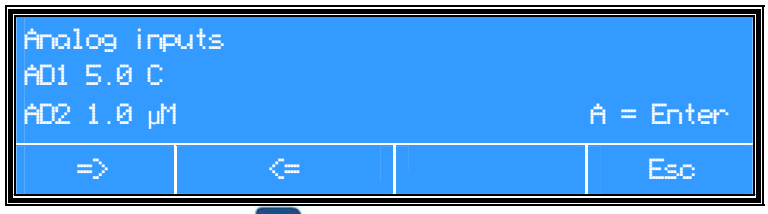
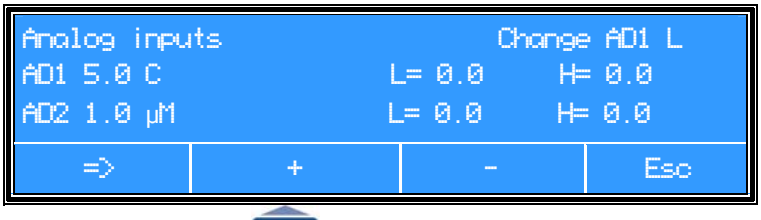
Figure 39 Example of screen III

Analogue inputs can be used to program alarm settings for e.g.:
- temperature (°C) of working surface;
- temperature (°C) of work area;
- particle counters (ppm);
- relative humidity (%);
- pressure (Pa in plenum).

If alarm limits are exceeded, an alarm will sound as short beeps with intervals.

To install alarm limits, start from the menu as described in *§6.8 Information about the installed options on page 39*.

(The display only shows when the options are installed):

1	Starting from screen III	 • Push button A.
2	**Settings for High and Low Alarm**	 • Push button 1 (=>), • Choose the required limits (L=Low, H=High) for AD1 and AD2 using button 2 (+) and 3 (–) • Push button 4 (Esc) to confirm the settings and to go back to the starting menu.

An alarm can be transferred, depending on the code:
- #B5, through relay K3;
- #C5, through relay K2 (option print).

Appendix X: Required specifications

Overview of the required specifications according to EN 12469:2000.

	Requirement (shortened)	**According to:**	**Complied:**
Front aperture height	Between 160 and 250 [mm]	EN 12469 Annex A.1	Type test: Yes
Lighting	At least 750 [lux] at work surface	EN 12469 Annex A.2	Type test: Yes
Sound level	<65 [dB(A)] when background level is <55 [dB(A)]	EN 12469 Annex A.3	Type test: Yes
Sound level Buzzer	Exceed 10 [dB(A)] more than installation sound pressure	EN 12469 Annex A.3	Type test: Yes
Vibration	<0,005 [mm] RMS at centre workspace, Between 20 and 20000 [Hz]	EN 12469 Annex A.4	Type test: Yes
Stability	Conform to EN 292-1and 292-1	EN 12469 Annex A.5	Type test: Yes
Materials, general	The material likely to be in contact with micro organisms should be uniformly corrosion resistant, non-flammable and non-absorbing	EN 12469 Annex A.6	Type test: Yes
Materials, general	Materials and sealants for joints should be durable and resistant to cleaning and disinfection agents and resistant to general use of MSCs.	EN 12469 Annex A.6	Type test: Yes
Materials, general	Manufacturers should ensure that the materials of construction will not be damaged by fumigation with formaldehyde	EN 12469 Annex A.6	Type test: Yes
Glass and front windows	Laminated safety glass or UV-resistant safety plastics	EN 12469 Annex A.7	Type test: Yes
Glass and front windows	Conform to EN 292-1 and EN 292-2	EN 12469 Annex A.7	Type test: Yes
Electrical safety	Conform to EN 61010-1	EN 12469 Annex A.8	Type test: Yes
Gas supply (optional) safety	Conform to EN 292-1 and EN 292-2	EN 12469 Annex A.9	Type test: Yes
Gas supply (optional) safety	Gas supply should be controlled by a suitable valve that can be opened when the cabinet is running and that closes under any other conditions	EN 12469 Annex A.9	Type test: Yes
Ergonomics	Maintenance can be carried out safely on the cabinet after installation	EN 12469 Annex A.10	Type test: Yes
Ergonomics	Considered according to prEN ISO 14738:1997	EN 12469 Annex A.10	Type test: Yes
Temperature	Air temperature in work space <8° above ambient laboratory temperature	EN 12469 Annex A.11	Type test: Yes
Leakage of carcass	No visible leakage with soap-bubble test	EN 12469 Annex B	Type test: Yes
Retention efficiency	Microbiological test method or potassium iodide (KI) method	EN 12469 Annex C	Type test: Yes
Aerosol challenge method	Particle counter: <0,05% Aerosol photometer: <0,01%	EN 12469 Annex D	Type test: Yes
Product protection	<300 CFU of B.subtilis	EN 12469 Annex E	Type test: Yes
Cross contamination		EN 12469 Annex F	Type test: Yes
Volumetric airflow rate		EN 12469 Annex G	Installation test: Yes
Design and airflow velocities		EN 12469 Annex H	Type test: Yes

An abstract of the Type test report can be sent on request by Clean Air Techniek B.V.

Appendix XI: Part list critical components

Component	Type specific	Art. no.	Supplier	Type
Downflow HEPA Filter	EF/S4	1001249	AAF	Astrocel II Dry seal 457x1220x93
Exhaust HEPA Filter	EF/S4	1020306	AAF	Astrocel II Dry seal 305x610x117
Torsion-spring	EF/S4	2700288	Torso	400mm, 20 kg
Fan	EF/S4	3000033	EBM	D4E 225-CC-01, 230V, 50Hz, 650W,
Gas spring	EF/S4	2702006	ACP	150mm, 250N
Gas spring	EF/S4	2700138	ACP	16-4-403-350-A23-B23-300N
FL-lighting	EF/S4	1440054	Osram	OSR Lumilux FQ54840HO PLUS, 54W, 230V
Ballast	EF/S4	1240054	Osram	OSR Quicktronic QTFQ154-240, 54W, 230V
Downflow HEPA Filter	EF/S5	1001549	AAF	Astrocel II Dry seal 457x1525x93
Exhaust HEPA Filter	EF/S5	1000706	AAF	Astrocel II Dry seal 305x762x117
Torsion-spring	EF/S5	2700290	Torso	400mm, 26 kg
Fan	EF/S5	3000002	EBM	RD25S-4EW.4N.1L
Gas spring	EF/S5	2702008	ACP	150mm, 300N
Gas spring	EF/S5	2700141	ACP	16-4-403-350-A23-B23-360N
FL-lighting	EF/S5	1440053	Osram	OSR Lumilux FQ49840HO PLUS, 49W, 230V
Ballast	EF/S5	1240053	Osram	OSR Quicktronic QTFQ149-240, 49W, 230V
Downflow HEPA Filter	EF/S6	1001849	AAF	Astrocel II Dry seal 457x1830x93
Exhaust HEPA Filter	EF/S6	1000931	AAF	Astrocel II Dry seal 305x915x117
Torsion-spring	EF/S6	2700289	Torso	400mm, 32kg
Fan	EF/S6	3000002	Ziehl Abegg	RD25S-4EW.4N.1L
Gas spring	EF/S6	2702003	ACP	150mm, 325N
Gas spring	EF/S6	2700136	ACP	16-4-403-350-A23-B23-420N
FL-lighting	EF/S6	1440056	Osram	OSR Lumilux FQ39840HO PLUS, 39W, 230V
Ballast	EF/S6	1240056	Osram	OSR Quicktronic QTFQ239, 39W, 230V
Air velocity-sensor	-	1330023	Kriwan	0,2-1 m/s
Air velocity-sensor	-	1330010	Kriwan	0,2-10 m/s
FL-holder	-	2030007	Vossloh	Voss-L-LMPH G5 100305.00
Starter (for UV only)	-	2040001	Philips	PH starter S10, 220-240V, 4-65W
Miniature-switch	-	63001P1	Omron	SS-5GL2
Mains filter	-	6400010	Acrotronics	F.BK.D-.3940.ZG, 10A
PCB-material	-	-	Duraver	FR-4, according to UL94
Socket	-	Misc.	e.g. Mennekes Schuko	-
Accu	-	1420133	Clean Air	2x 12[V]; 1,2 [Ah] Pb
Optional:				
Gas-/vacuum tap	-	2800013/2800048	Broen	1770
Gas valve	-	2820012	Bürkert	0-25[Bar] 2/2-way valve, normally closed, 24[V]
Bunsenburner	-	Misc.	Clean Air	1 SCS Lumos II 9V or Fuego

Articles mentioned above can be ordered at the service organization Particle Measurement & Validation B.V.

Particle Measurement & Validation B.V.
Kuipersweg 37
3449 JA Woerden
The Netherlands

Phone: +31 (0)348 423661
Fax: +31 (0)348 422684
E-mail: info@pmvbv.nl
Internet: www.pmvbv.nl

Appendix XII: Short user manual

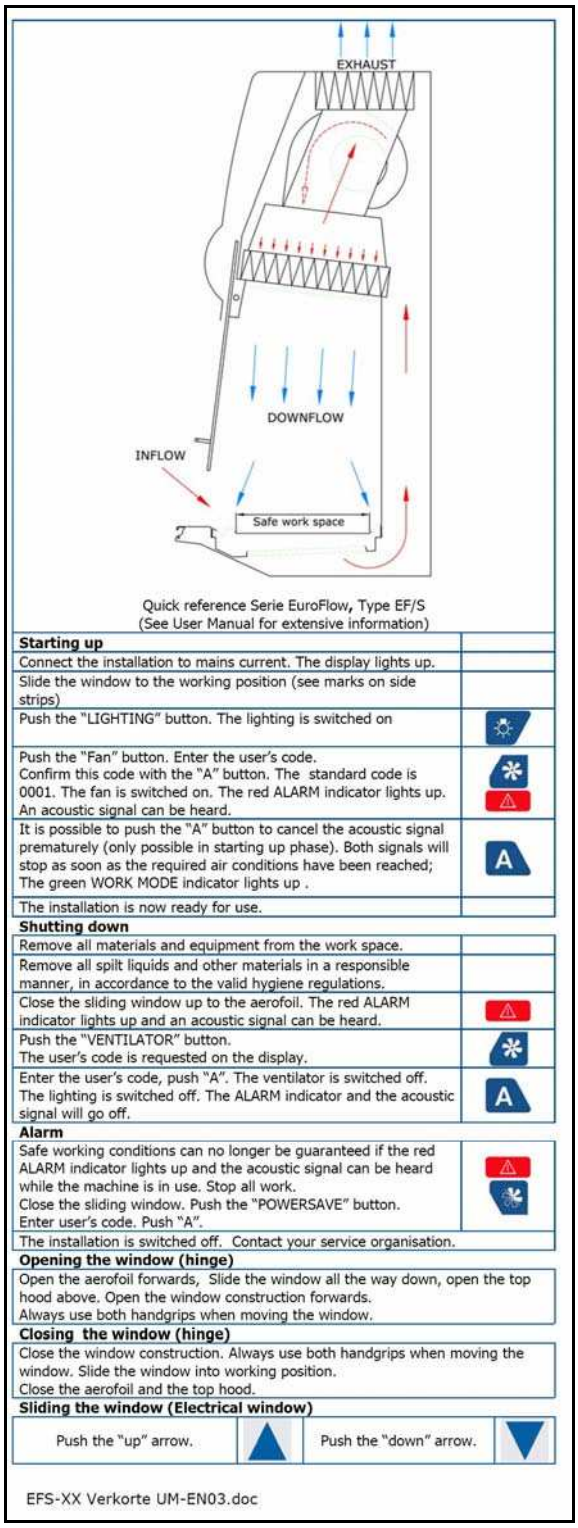


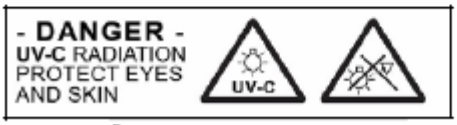
Figure 40 Short user manual

Appendix XIII: TUV Low Pressure Mercury Lamps

Special fluorescent lamps

Disinfection

Philips TUV disinfection lamps are low-pressure mercury-vapour discharge lamps consisting of a tubular glass envelope, emitting short-wave ultraviolet radiation with a radiation peak at 253.7 nm (UV-C) for germicidal action. The glass filters out the 185 nm ozone-forming line. A protective coating on the inside limits the depreciation of the useful UV-C radiation output (Longlife lamps). PL-S have a specially adapted starter providing almost instant starting characteristics already built into the lamp base. Note The UV-C radiation output of these lamps is indicated by the following warning signs

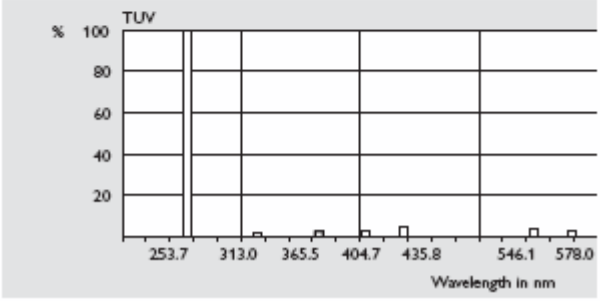


Applications
Philips TUV lamps are used for killing or inactivating bacteria, viruses and other primitive organisms. Typical application examples include air, water and surface disinfection in hospitals, bacteriological research and pharmaceutical institutions, and food processing industries, such as dairies, breweries and bakeries. They are also used for the disinfection of drinking water, waste water, swimming pools, air conditioning systems, cold storage rooms, packing material, etc. Finally, they are applied in a variety of photochemical processes.

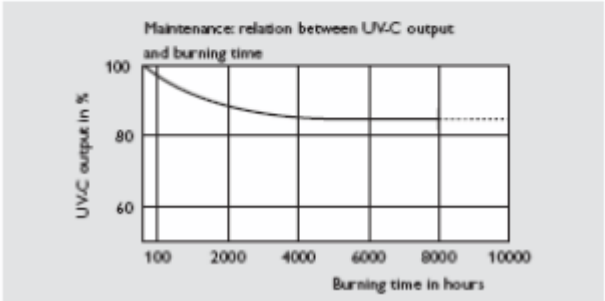
Note: Radiation of these lamps is harmful to eyes and skin. Installations with these lamps are to be screened off completely.

Dimensions in mm

Type		Cap/ base	Lamp voltage V	Lamp current A	UV-C radiation W	Useful life h	Depreciation 5000 hrs %	Nett weight g
TUV								
TUV 4W		G5	29	0.17	0.7	5000	30	16
TUV 6W		G5	42	0.16	1.5	8000	25	22
TUV 8W		G5	56	0.15	2.1	8000	20	29
TUV 11W		G5	37	0.33	2.1	8000	25	22
TUV 16W		G5	46	0.35	3.4	8000	20	29
TUV 10W		G13	45	0.23	2.5	8000	10	62
TUV 15W		G13	51	0.34	4.6	8000	12	75
TUV 25W		G13	46	0.60	7.0	8000	12	75
TUV 30W		G13	100	0.37	11.2	8000	12	140
TUV 36W		G13	103	0.44	14.6	8000	12	186
TUV 55W	HO	G13	83	0.77	16.5	8000	12	140
TUV 75W	HO	G13	108	0.84	25.5	8000	12	140
TUV 115W	VHO	G13	92	1.50	37.7	5000	12	290
TUV 115W	-R VHO	G13	92	1.50	31.0	5000	15	293
TUV PL-S								
TUV 5W	PL-S	G23	34	0.18	1.0	8000	15	30
TUV 9W	PL-S	G23	60	0.17	2.4	8000	15	41
TUV 11W	PL-S	G23	89	0.16	3.6	8000	15	58
TUV PL-L								
TUV 18W	PL-L	2G11	60	0.37	5.5	8000	15	66
TUV 36W	PL-L	2G11	105	0.44	12.0	8000	15	114
TUV 55W HF	PL-L	2G11	103	0.54	17.0	8000	15	145



Spectral power distribution



Appendix XIV: Statement of the agreement for machines

Manufacturer: Clean Air Techniek B.V.

Address: Kuipersweg 37
3449 JA Woerden
The Netherlands
Phone: +31 (0) 348 41 11 14
Fax: +31 (0) 348 42 26 84
E-mail: exportinfo@cleanairbv.nl
Internet: www.cleanairbv.com

Hereby declares that:

Type: _____
Project number: _____
Serial number: _____

is in compliance with the following directives:
- Machine Directive (98/37/EC);
- Low Voltage Directive (2006/95/EC);
- Electromagnetic Compatibility Directive (2004/108/EC).

And declares furthermore that the following national technical standards and specifications are used:
- NEN-EN 12469 (2000) Performance criteria for microbiological safety cabinets;
- NEN-EN 1822 High efficiency particulate air filters.

Signature:

.....

Name: .....

Quality controller
By order of the production controller

Woerden, date .....

Bijlage XV: Memo

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