

**INSTRUCTION MANUAL**  
**HB(B)2436, 2448, 2460, 2472**  
ID: 807157

## Important user information

Please read this entire manual to fully understand the safe and effective use of this product.




In case you have any comments about this manual we will appreciate receiving them at the address below.

## Warranty and Liability

Jouan Nordic A/S guarantees that the product delivered has been thoroughly tested to ensure that it meets its published specifications. The warranty included in the conditions of delivery is valid only if the product has been installed and used in accordance with the instructions supplied by Jouan Nordic A/S.

Jouan Nordic A/S shall in no event be liable for incidental or consequential damages, including without limitation, lost profits, loss of income, loss of business opportunities, loss of use, and other related exposures, caused by e.g. incorrect use of the product.

## Symbols used in this manual

	<p><b>WARNING</b> Used in case of danger of a serious accident or when documentation needs to be consulted.</p>
	<p><b>NOTE</b> Used to direct attention to a special item.</p>
	<p><b>WARNING ELECTRICAL SHOCK</b> Used in case of potential danger of electrical shocks.</p>

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Enclosure: Declaration of conformity

## 1. Introduction

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The HOLTEN LaminAir HB HBB-series are thoroughly tested Class II cabinets designed to provide protection of the operator, the surroundings and the work process itself against particle contamination or microbiological contamination.

This manual covers the HB and HBB types.

The types comply with the demands stipulated in "NSF Std 49", "Nordiska R3-Föreningens Norm för säkerhetsbänkar", or in AS 2252.2-1985 or in BS 5726:1992 or in DIN 12950 Teil 10.

## 2. Safety precautions

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In order to avoid unintended wrong attendance please read this instruction manual carefully.

For the Holten LaminAir types HB and HBB the following precautions should be noted!



The HB or HBB should not be used for group 4 pathogens.



Attention is drawn to the risk assessment requirements of the Control of Substances Hazardous to Health (COSHH) Regulations 1988. (UK)



The HB or HBB cabinets are not suitable for HIGH RISK biological agents. HIGH RISK biological agents include all etiological agents designated Class 4 by CDC, and oncogenic viruses classed high risk by NCI. (USA)



Never operate the HB or HBB cabinet with the cover of the fan removed. If the cover is off there is no personal protection and the fan will run with uncovered rotating blades.



The HB or HBB class II safety cabinets will not provide any protection for operator or surroundings against harmful gases or vapours



### NOTE

\*With special equipment anti blow back valve (exhaust to the outside) or with installed charcoal filters the cabinet will provide some protection against harmful vapours, please consult the specific instructions for these parts.

## 3. Description

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A Class II cabinet consists of a confined work space in which a stable parallel flow (laminar flow) provides protection against cross-contamination between the surroundings, the operator and the product. All operations take place through the work opening. Sub pressure in the work chamber draws room air into the cabinet through the work opening and down through the suction holes in the front of the tabletop. By this the operator is protected against possible emission of harmful substances from the product with which the operator is working.



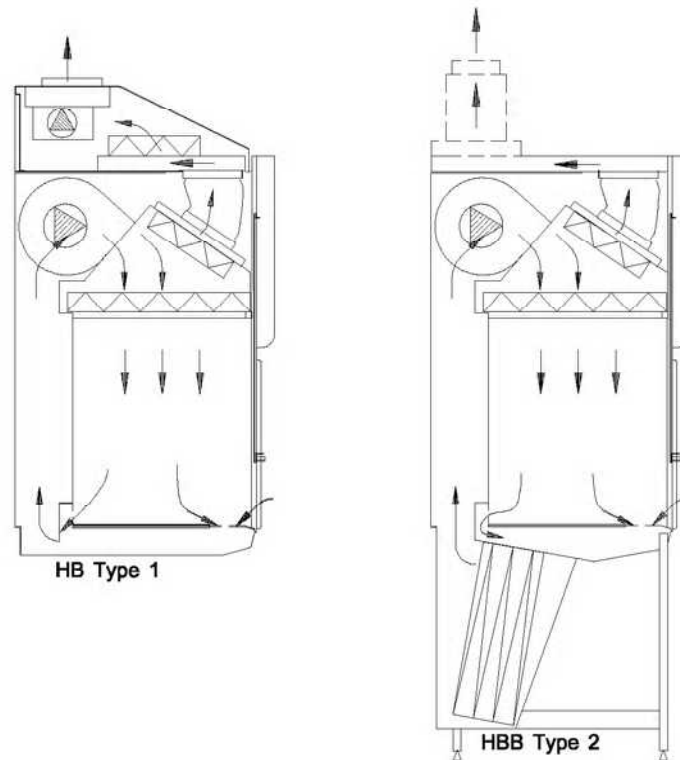


Figure 1: Flow patterns of HB or HBB

#### 4. Installation

Check that the dimensions of the unit make free access to the wanted site of installation possible. Lamp shield and front window can be demounted for obtaining a minimum width of 800 mm. The demounting should be carried out by a qualified service technician (contact your supplier for further information). If anti blowback valve is mounted the exhaust cover can be demounted. Remember to seal this again when remounting.

The installation site for the unit should be without draught and should be selected so that frequent passing-by of persons in front of the work opening is avoided.

The tabletops of stainless steel are mounted over the trough.

Adjust the levelling screws on the stand so that the tabletop is horizontal.

Connect cabinet to mains.



#### **WARNING ELECTRICAL SHOCK**

Prior to electric connection it must be checked that the mains supply corresponds to what is stated on the type plate.

For increased safety the connection can be carried out as a fixed installation.

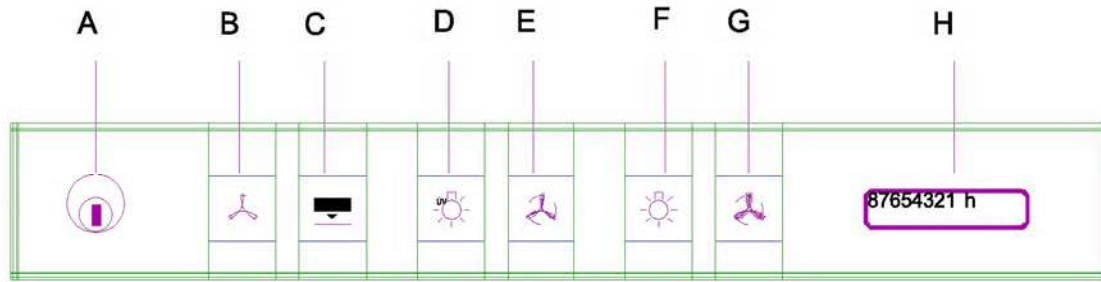
Valves for gases, vacuum or liquids are placed in a separate plate in the left or an authorized technician should carry out right side window and connection of these.

#### **If installed:**

##### **Anti blowback valve (exhaust to the outside).**

Installation of exhaust to the outside involves many considerations and precautions. Please consult the specific instruction on anti blowback valve in the part Special Accessories for details.

## 5. Operation



**Figure 2:** Control panel

**Re A:** The pushbutton for start/stop and the pushbutton switch for normal and reduced fan speed are activated by turning the lock switch 1/4 revolution to the right. After finished adjustment the lock switch is turned back again and removed.

**Re B:** Insufficient quantity of exhaust air is indicated by a red signal light and an acoustic signal. Activation of the alarm for insufficient airflow at normal speed indicates that the unit is defective. It is normally only possible to set the unit right by service (see paragraph concerning trouble-shooting).

At reduced speed, the signal light for insufficient quantity of exhaust air will light up and thereby indicates that in this state the unit does not provide full protection of operator and product. Change to operation at normal fan speed will, if the unit is faultless, cancel the alarm.

**Re C:** If the front window is not placed in its working position, i.e. if the hinged window is not completely closed or - if mounted the sash window or the push up window is above the horizontal green marking, this will be indicated by a signal light and by an acoustic signal. When pressing the pushbutton the acoustic signal will be silenced. The signal light does not turn off until the front window is placed in its working position again.

**Re D:** The UV-light is switched on independently of the state of the fan, however, only with the internal lighting switched off.

**Re E:** With the yellow switch it is possible to choose between normal and reduced speed. By operation at reduced fan speed both product and operator protections are reduced. The reduced speed of fan will only be enabled with the work chamber lighting switched off.



**WARNING**

Operation at reduced speed when the cabinet is not in use reduces the risk of contamination of the work chamber.

**Re F:** The work chamber lighting can be switched on and off independently of the working state of the fan.



**WARNING**

**Secondary functions:**


UV-light and reduced speed will only be enabled with the internal light OFF. Inactivation/activation of these secondary functions on the control panel is however always possible.

**Re G:** The internal fan of the safety cabinet is started and stopped by means of this switch. When the cabinet is working under safe conditions the green pilot light will light. At any alarm condition the green light will switch off.

## 6. Working rules

### 6.1. Working rules before work is started

- About 15 minutes before work is started the fan of the unit is switched on for operation at normal speed.
- A green control lamp indicates proper operation.
- The work chamber is to be carefully cleaned and disinfected. Use 70% ethanol or the like.
- It is recommended to use special lint-free wipes.
- Use preferably aqueous disinfectants on the front window and the side windows - never use disinfectants containing chloroform (see list on allowed disinfectants in the Appendix).
- Use mainly soft cloths in order not to scratch the windows.
- Objects and remedies must be carefully cleaned or disinfected before being brought into the work chamber.
- Sash, folding or push-up window is placed in working position and kept in that position during the entire work process.
- Necessary remedies for use during work must be placed within reach.
- Put on necessary personal clothes for protection of operator as well as product (e.g. gloves, masks, visors and general clean room clothing).

	<b>WARNING</b>
	<ul style="list-style-type: none"><li>• Never perform any work with the fan at reduced speed.</li><li>• The front window must be in working position during work.</li><li>• Place the product behind the front suction holes of the tabletop - as far back as possible.</li><li>• Work with tranquil movements.</li><li>• Never overload the work chamber.</li><li>• Reduce the number of transports into and out of the work chamber.</li><li>• Avoid products or remedies with strong emission of heat.</li><li>• Do not place the cabinet in places with direct draught towards the work opening.</li><li>• Avoid to place the cabinet where many persons pass by</li></ul>



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## 6.2. Working rules after work has been finished

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- Product, remedies, utensils and work chamber are again cleaned and disinfected carefully.
- Wipe off carefully and let the fan run for minimum 15 minutes without stop.
- If desired, the fan can be left running constantly at reduced speed.

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## 7. Technical description

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### Air movements:

Via the work opening room air is drawn in through the perforated area in the front part of the tabletop. The vertical superfiltered airflow from the main filter separates in the middle so that the air is partly sucked down through the perforated area in the front part of the tabletop and partly sucked down through the perforated area in the rear edge of the work chamber. The total amount of air is mixed below the tabletops.

### Prefilter (on HBB only):

Degree of detention 99.99% of particles Ø 0.3 µm (DOP-test). (The mixture of air from the work chamber and the work opening is filtered).

### Fan:

The air is led to the fan placed in the top of the unit. The fan is of a self-compensating type and has thus only an insignificant drop in the quantity of air by an increase in backpressure. By means of a built-in transformer the fan can be made to operate with increased power.

The air is then led to the pressure plenum. 25% is exhausted to the room through exhaust filters. 75% is led over the main filter and forms the unidirectional flow in the chamber.

### Exhaust filter:

Filter efficiency 99.999% of particles Ø 0.3 µm (DOP-test).

### Main filter:

Filter efficiency 99.999% of particles Ø 0.3 µm (DOP-test).

### Alarms:

- **Exhaust**

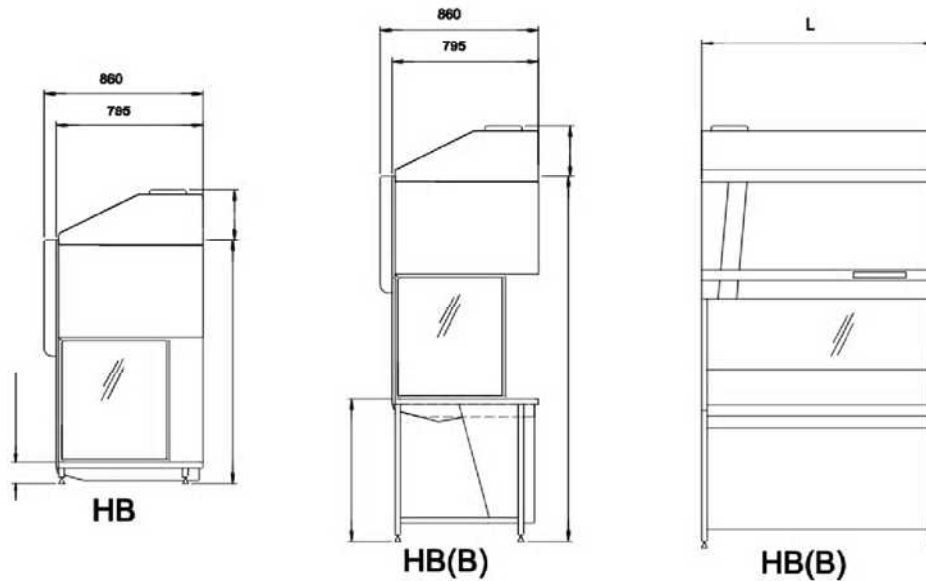
The unit has an alarm for too little exhaust air. The supervision takes place via pressure measuring over the exhaust filter - see also the paragraph concerning operation.

- **Front window**

If the front window is not in working position, i.e. if it is open or placed above the horizontal green marking, this is indicated by an alarm signal.



**8. Technical data**



**Figure 3:** Dimensions of HB/HBB models

	<b>Technical data</b>			
	HB 2436/ HBB 2436	HB 2448/ HBB 2448	HB 2460/ HBB 2460	HB 2472/ HBB 2472
H (see fig. 5)	315 mm	315 mm	360 mm	360 mm
L (see fig. 5)	965 mm	1265 mm	1565 mm	1865 mm
D (see fig. 5)	Ø 160 mm	Ø 160 mm	Ø 200 mm	Ø 200 mm
Weight	190/215 kg	200/225 kg	240/290 kg	250/300 kg
Capacity of trough	7.5/5.5 l	10/6 l	12.5/7.5 l	15/9 l
Quantity of exhaust air (nominal)	300 m <sup>3</sup> /h	400 m <sup>3</sup> /h	500 m <sup>3</sup> /h	600 m <sup>3</sup> /h
Dry heat emitted (recirculation to room) max.	415 W	530 W	665 W	775 W
Dry heat emitted (recirculation to room) nominal	270/365 W	335/465 W	420/581 W	485/675 W
Dry heat emitted (exhaust to the outside)	75 W	100 W	125 W	150 W
Mains voltage	220(115 <sup>*</sup> ) V	220(115 <sup>*</sup> ) V	220(115 <sup>*</sup> ) V	220(115 <sup>*</sup> ) V
Mains frequency	50(60 <sup>*</sup> ) Hz	50(60 <sup>*</sup> ) Hz	50(60 <sup>*</sup> ) Hz	50(60 <sup>*</sup> ) Hz
Current intensity	2 Amp	2 Amp	3.5 Amp	3.5 Amp
Max. load on wall sockets	6 Amp	6 Amp	6 Amp	6 Amp
Required mains cutout	10/16 Amp	10/16 Amp	10/16 Amp	10/16 Amp
Sound pressure level** (re 20 µPa)	<55 dB(A)	<55 dB(A)	<55 dB(A)	<55 dB(A)
Sound power level*** (re 1 pW)	60/61 dB	60/61 dB	60/61 dB	62/64 dB

\* Optional

\*\* According to DIN 12950 Teil 10

\*\*\* According to DIN 46535 Teil 1 Klasse 3, (ISO 3746).

Property of materials		
Subjects	Material	Treatment
Front windows and side windows	Clear polycarbonate	
Window frames	PVC	
Upper part, return duct and bottom part	Mild-steel plate ST 1203 DIN 16023	60 µm polyestercoating pre-treated to corrosion class 1
Stand	Iron pipe	60 µm polyestercoating pre-treated to corrosion class 1
Trough, tabletops and suction gate	Stainless steel AISI 304	Polished

## 9. Functional parts of the cabinet

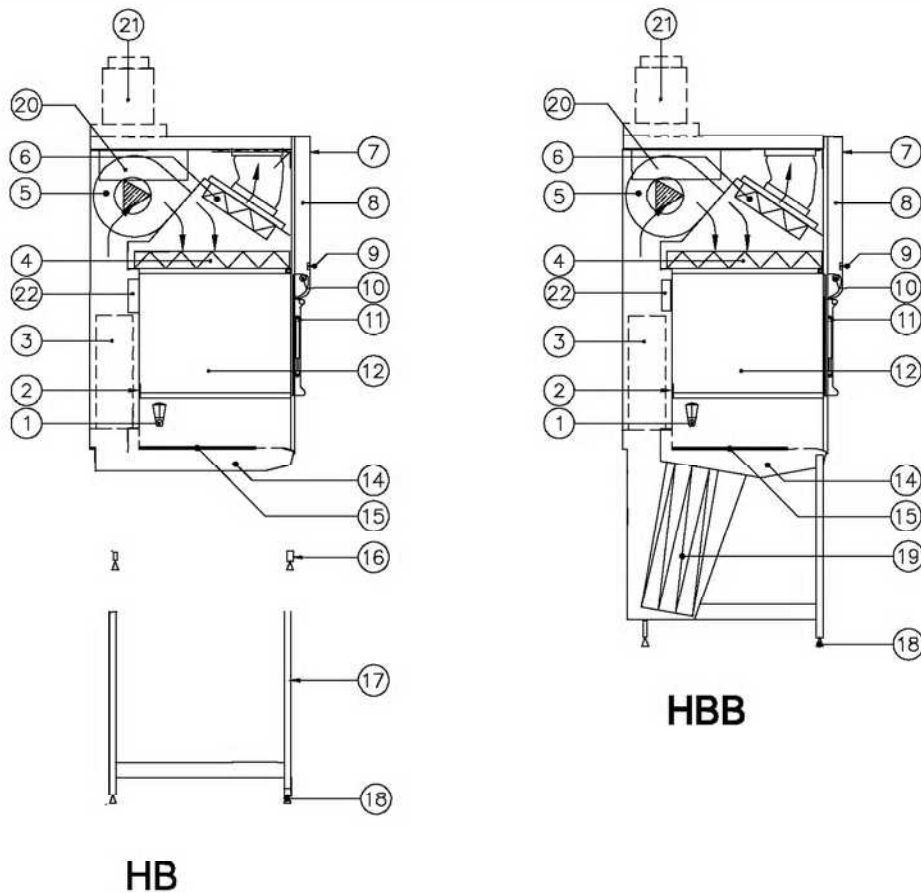


Figure 4: Components on HB and HBB

- ( 1) Valves\*
- ( 2) Electrical outlet
- ( 3) Charcoal filter
- ( 4) Main filter
- ( 5) Centrifugal fan
- ( 6) Mains connection
- ( 7) Anti blowback valve\*
- ( 8) Box containing the electrical parts
- ( 9) Exhaust filter
- (10) Lamp cover
- (11) Pressostats
- (12) Control panel
- \*(13) Light fittings
- \*(14) Front window
- (15) Work chamber
- (16) Cover plate, front\*\*
- (17) UV-light\*
- (18) Trough
- (19) Tabletops (tabletop\*)
- (20) Stand for HB tabletop version
- (21) Stand for HB floor model
- (22) Prefilter on HBB
- (23) Levelling screws.

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## 10. Maintenance

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### Recommended maintenance:

#### Daily:

The work area is disinfected. Also lift the table-top and carefully wipe the back and the trough.

#### Weekly:

Wipe the exterior of the unit with a mild detergent of household type. Antistatic spray can be used for cleaning the front window.

#### Regularly:

Reliable operation of the safety cabinet and compliance with standards are based on the following conditions:

- Correct air velocities.
- Correctly adjusted alarm limits
- Efficiency of the installed HEPA-filters.
- Tightness of the construction.

A qualified technician should thus test these parameters after approximately 5000 hours of operation or at least once a year. On the right side of the front cover there is a label stating the time for the next service check-up.

Testing of correct air velocities: Involves measurement of air velocities in the work opening as well as measurement of air velocities in the vertical laminar flow (see also the enclosed test report).

Testing of the efficiency of the installed HEPA-filters: By means of special measuring equipment - photometer or particle counter - the degree of detention of the filters is tested (see also the enclosed test report).

Testing of the tightness of the construction: All external seals and gaskets of the safety cabinet are inspected.

Contact your supplier for further information on test procedures.

#### Change of worn electrical parts

Light tubes incl. starter and choke coil, safety switches for front window, are accessible when the hinged front window is fully opened. The control panel, and electrical components are placed in and behind the front plate holding the control panel.

When changing these parts the two bottom fixing screws of the lamp cover are removed the lamp cover is lifted by the hand. Afterwards, the lamp cover is refitted and screwed on.

Transformer and mains fuse are placed in a separate compartment in the right side of the top of the unit. When changing these the screw to the lid is loosened and after the change the lid is refitted and screwed on.

If the cabinet is delivered with UV-light, this is placed on a special cover to be placed in the work opening. Change the UV-light tube in the same way as normal fluorescent light tubes.

See spare parts list for specification of electrical parts.

### Change of filters:

The cabinet is disinfected before the filters are changed.

Used filters are immediately placed in suitable containers marked "biohazard waste" and delivered to destruction together with the other infectious waste from the laboratory.



#### WARNING

Please make sure that the cabinet is neutralized or disinfected so that filter change can be done without any danger.

### 10.1. Change of main and/or exhaust filter

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- Disconnect the electrical supply.
- Dismount the hinged front-window (unscrew the windows).
- Dismount the front-cover (screws, internal multi-plug and PE-wiring).
- Remove the filter-clamps.
- Dismount the pressure chamber for the main-/exhaust-filter.
- Remove the old filter.
- Insert the new filter.
- Tighten the filter-clamps to 3mm compression.
- Reinstall the front-cover and the hinged front-window.

### 10.2. After filter change retest the cabinet for:

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- Correct air velocities.
- Correct alarm limits.
- Efficiency of the installed HEPA-filter.
- Tightness of the construction.

See spare parts list for specification on filters.



#### WARNING

When changing filters we recommend you to wear protective garments, surgical gloves and filter mask with installed HEPA-filter.



**11. Recommended spare parts list for HB/HBB**

HB 2436				
Description	Amount	Mark	Specifications	Holten no.
Exhaust filter	1 pcs.	Camfil	MDLA-GW-305x914x66-01 PU	95200013
Main filter	1 pcs.	Camfil	MDLA-GW-610x914x66-01 PU	95200003
Light tubes	1 pcs.	Phillips	TLD 30/83	844035
Starter	1 pcs.	Osram	ST 111, 220-240 V-4-80W	844053
Fuse cut-out	1 pcs.	Osram	5*20 mm 10 AT	841274
<b>If mounted</b>				
UV-tube	1 pcs.	Phillips	TUV 30 W	844031
Starter	1 pcs.	Osram	ST111, 220-240V 4-80W	844053

HB 2448				
Description	Amount	Mark	Specifications	Holten no.
Exhaust filter	2 pcs.	Camfil	MDLA-GW-305x610x66-01 PU	95200001
Main filter	1 pcs.	Camfil	MDLA-GW-1219x610x66-01 PU	95200004
Light tube	1 pcs.	Phillips	TLD 36/83	844027
Starter	1 pcs.	Osram	ST111, 220-240 V-4-80W	844053
Fuse cut-out	1 pcs.	Osram	5*20 mm 10 AT	841274
<b>If mounted</b>				
UV-tube	1 pcs.	Phillips	TUV 30 W	844031
Starter	1 pcs.	Osram	ST111, 220-240V 4-80W	844053

HB 2460				
Description	Amount	Mark	Specifications	Holten no.
Exhaust filter	1 pcs.	Camfil	MDLA-GW-305x762x66-01 PU	95200001
	1 pcs.	Camfil	MDLA-GW-305x914x66-01 PU	9500013
Main filter	1 pcs.	Camfil	MDLA-GW-1524x610x66-01 PU LPA 610-1524-69	95200005
Light tubes	1 pcs.	Phillips	TLD 58W/83	844028
Starter	1 pcs.	Osram	ST111, 220-240 V-4-80W	844053
Fuse cut-out	1 pcs.	Osram	5*20 mm 10 AT	841274
<b>If mounted</b>				
UV-tube	1 pcs.	Phillips	TUV 30 W	844031
Starter	1 pcs.	Osram	ST111, 220-240 V-4-80W	844053

HB 2472				
Description	Amount	Mark	Specifications	Holten no.
Exhaust filter	2 pcs.	Camfil	MDLA-GW-305x914x66-01 PU	95200013
Main filter	1 pcs.	Camfil	MDLA-GW-1830x610x66-01 PU	95200006
Light tube	1 pcs.	Phillips	TLD 58W/83	844028
Starter	1 pcs.	Osram	ST111, 220-240 V-4-80W	844053
Fuse cut-out	1 pcs.	Osram	5*20 mm 10 AT	841274
<b>If mounted</b>				
UV-tube	1 pcs.	Phillips	TUV 30 W	844031
Starter	1 pcs.	Osram	ST111, 220-240V 4-80W	844053

<b>HBB 2436</b>				
<b>Description</b>	<b>Amount</b>	<b>Mark</b>	<b>Specifications</b>	<b>Holten no.</b>
Prefilter	9 pcs.	Sofiltra-Camfil	3326-01, VZ R2L	95200029
Exhaust filter	1 pcs.	Camfil	MDLA-GW-305x914x66-01 PU	95200013
Main filter	1 pcs.	Camfil	MDLA-GW-610x914x66-01 PU	95200003
Light tubes	1 pcs.	Phillips	TLD 30/83	844035
Starter	1 pcs.	Osram	ST111, 220-240 V-4-80W	844053
Fuse cut-out	1 pcs.	Osram	5*20 mm 10 AT	841274
<b>If mounted</b>				
UV-tube	1 pcs.	Phillips	TUV 30 W	844031
Starter	1 pcs.	Osram	ST111, 220-240 V-4-80W	844053

<b>HBB 2448</b>				
<b>Description</b>	<b>Amount</b>	<b>Mark</b>	<b>Specifications</b>	<b>Holten no.</b>
Prefilter	12 pcs.	Sofiltra-Camfil	3326-01, VZ R2L	95200029
Exhaust filter	2 pcs.	Camfil	MDLA-GW-305x610x66-01 PU	95200001
Main filter	1 pcs.	Camfil	MDLA-GW-1219x610x66-01 PU	95200004
Light tube	1 pcs.	Phillips	TLD 36/83	844027
Starter	1 pcs.	Osram	ST111, 220-240 V-4-80W	844053
Fuse cut-out	1 pcs.	Osram	5*20 mm 10 AT	841274
<b>If mounted</b>				
UV-tube	1 pcs.	Phillips	TUV 30 W	844031
Starter	1 pcs.	Osram	ST111, 220-240 V-4-80W	844053

<b>HBB 2460</b>				
<b>Description</b>	<b>Amount</b>	<b>Mark</b>	<b>Specifications</b>	<b>Holten no.</b>
Prefilter	15 pcs.	Sofiltra-Camfil	3326-01, VZ R2L	95200029
Exhaust filter	1 pcs.	Camfil	MDLA-GW-305x762x66-01 PU	95200001
	1 pcs.	Camfil	MDLA-GW-305x914x66-01 PU	9500013
Main filter	1 pcs.	Camfil	MDLA-GW-1524x610x66-01 PUULPA 610-1524-69	95200005
Light tubes	1 pcs.	Phillips	TLD 58W/83	844028
Starter	1 pcs.	Osram	ST111, 220-240 V-4-80W	844053
Fuse cut-out	1 pcs.	Osram	5*20 mm 10 AT	841274
<b>If mounted</b>				
UV-tube	1 pcs.	Phillips	TUV 30 W	844031
Starter	1 pcs.	Osram	ST111, 220-240 V-4-80W	844053

<b>HBB 2472</b>				
Description	Amount	Mark	Specifications	Holten no.
Prefilter	18 pcs.	Sofiltra-Camfil	3326-01, VZ R2L	95200029
Exhaust filter	2 pcs.	Camfil	MDLA-GW-305x914x66-01 PU	95200013
Main filter	1 pcs.	Camfil	MDLA-GW-1830x610x66-01 PU	95200006
Light tube	1 pcs.	Phillips	TLD 58W/83	844028
Starter	1 pcs.	Osram	ST111, 220-240 V-4-80W	844053
Fuse cut-out	1 pcs.	Osram	5*20 mm 10 AT	841274
<b>If mounted</b>				
UV-tube	1 pcs.	Phillips	TUV 30 W	844031
Starter	1 pcs.	Osram	ST111, 220-240 V-4-80W	844053

## 12. Trouble shooting

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**NOTE**

If none of the following attempts will bring the unit to operate satisfactorily a qualified technician should be called in.

**1.☹ Problem:**

The cabinet will not start and the light will not emit light.

**1.☺ Possible setting-right:**

Check that the cabinet is connected to the wall socket; is this switched on? If necessary, try with other equipment to see whether there is normal voltage on the wall socket or not.

The cabinet is equipped with a fuse cut-out placed in the electrical box in the right side of the top of the unit. Try changing this.

**2.☹ Problem:**

The cabinet starts, but no light is emitted.

**2.☺ Possible setting-right:**

Change starter and/or light tubes.

**3.☹ Problem:**

The cabinet has started but the signal lamp for too little exhaust air is emitting light and the acoustic alarm is on.

**3.☺ Possible setting-right:**

Check that the suction holes in the tabletops are not covered and that the exhaust on top of the unit is not blocked.

If there is exhaust to the outside the exhaust duct system may be blocked and the booster fan stopped.



### 13. MINI (pressure gauge)

#### Introduction

The MINI pressure gauge is installed for the user who wants to keep track of the pressure development of the installed filters.

#### Operation

Particles caught in the filters increases the resistance in the filters and the fan has to increase pressure to keep the flow.

At a certain point it is not possible to keep the flow within permissible limits. The performance of the fan has to be increased, or if this is not possible the filters must be changed.

To foresee this need for service and replacement of filters the MINI is a good tool.

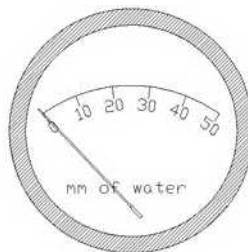



Figure 5: The MINI pressure gauge

#### Description

As the pressure measurement is made over the fan the measurement changes on the MINI have the same meaning on both HB and HBB:

**HIGHER PRESSURES:** Indicate blocked airways, either clogged filters or obstacles eg. papers or other material restricting the flow of the cabinet.

**LOWER PRESSURES:** Indicate that the fan is not operating properly, the mains voltage is too low, the setting on the transformer is wrong or the fan is operated at reduced speed.

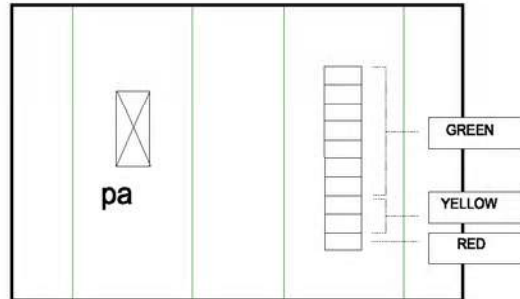
	<p><b>NOTE</b> The relationship between pressure and flow in the cabinet is not very clear. It depends on the type and size of the cabinet as well as on mains voltage, frequency and performance setting of fan.</p>
---	---

### 14. PI (pressure indicator)

#### Introduction

The PI is a visual pressure indicator that monitors the pressure development in the cabinet.

## Operation of PI



**Figure 6:** PI (pressure indicator)

With a certain setting of the fan the PI will show the flow in the cabinet.

### Green LED's:

Illumination of the green diodes when running the cabinet at full speed indicates: The flow is within allowed limits.

### Yellow LED's:

Illumination of the yellow diodes when running the cabinet at full speed indicates: Time for service, the flow is near the lower allowed limit.

### Red LED:

Illumination of the red diode when running the cabinet at full speed indicates: The flow is below the lower allowed limit.

The acoustic alarm is activated.

To silence the alarm press any of the red buttons on the control panel.

### Normal development on PI

The PI is calibrated so that the second or third green LED from the top will illuminate at an air velocity of about 0.4 m/s in the laminar flow.

When the cabinet is used, particles will build up on the filters. The flow resistance will increase. The fan will automatically try to increase the pressure, but the air flow volume will fall.

On the LED the pressure rise and thus the reduced flow is indicated by the downward movement of the light emitting LED.

When the yellow LED's are reached, this is a warning to the user.

The cabinet is ready for service involving either increased performance of the fan or replacement of filters.

The PI is calibrated so that with an air velocity of the laminar flow of about 0.25 m/s the red LED will illuminate and the acoustic signal will turn on.

Silence the acoustic signal by pressing any of the red buttons on the control panel.



### WARNING ELECTRICAL SHOCK

Whenever there is a change in the performance of the fan changed mains voltage or setting on the transformer the PI **MUST** be recalibrated.

## 15. VI (velocity indicator)

### Introduction:

The VI monitors the air velocity in the laminar flow of the cabinet.

### Operation:

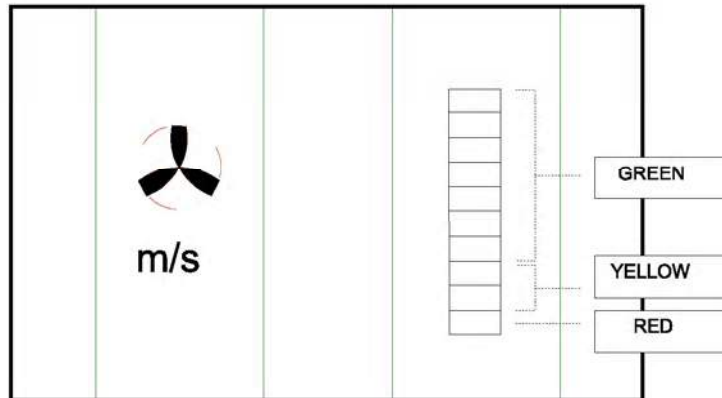


Figure 7: VI (velocity indicator)

**Green LED's:** Illumination of the green diodes indicates that the air velocity is within the allowed limits.

**Yellow LED's:** Illumination of the yellow diodes indicates that the air velocity is near the lower end of the allowed limits.

**Red LED:** Illumination of the red diode indicates that the air velocity is below the allowed limit. An acoustic alarm will be activated.

To silence the acoustic alarm press any of the red buttons on the control panel.

### Nominal values

The VI will be calibrated to the following factory settings of the LED's:

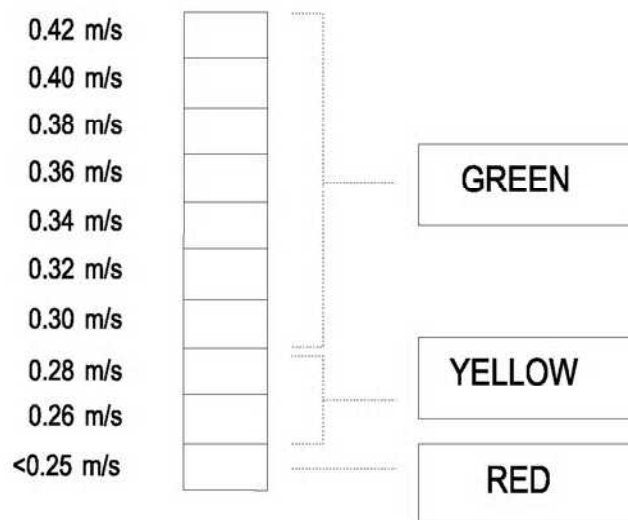


Figure 8: Nominal setting of VI

The VI can be calibrated to have other lower and/or upper limits than shown above.

## 16. AOS (ultrasound)

### Introduction:

The AOS is an ultrasonic sensor that registers movements in the work chamber.

### Operation:

Any movement in the work chamber enables the AOS for about 10 minutes.


No movement within about 10 minutes disables the AOS.

### Function:

When enabled the AOS works like the pushbutton for light, eg. it switches the light on (if not already on) and the secondary functions UV-light and reduced speed will be disabled e.g. the cabinet is forced to work at full speed and with the UV-light off.

## 17. Typical use of AOS:

1. Turn the cabinet on, turn OFF light, turn ON reduced speed.
2. Start working in the cabinet by sticking the arms into the work chamber.  
The AOS registers the movement and turns on the light, and makes the fan run at full speed.
3. Manipulations inside the cabinet retrigs the AOS system so it keeps on running at full speed and with the light on.
4. Whenever work has been finished manipulations inside the cabinet stops. After about 10 minutes the AOS is disabled and the cabinet returns to the state chosen on the control panel. In the present example a state with the light off and with the fan at reduced speed.

	<p><b>NOTE</b></p> <p>The retrig time is at a factory setting of 10 minutes, longer or shorter time is possible please consult your Jouan Nordic agent for details on setting of retrig time.</p>
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## 18. Resetable solenoid valve

### Introduction:

The resetable solenoid valve is a safety device that will not allow flow of gas to the gas valves unless the fan is switched on. Switching off of the fan can either be caused by mains voltage dropout or by stopping the unit.

### Operation:

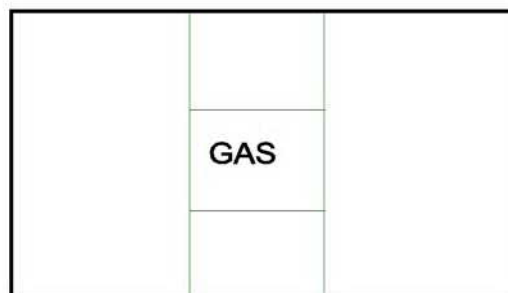


Figure 9: Resetable solenoid valve.

1. Start the cabinet.



2. Press the button marked GAS, the yellow signal lights up. The gas solenoid valve is open and is kept open as long as the fan is running.
3. If there is a voltage dropout or the cabinet is switched off, the gas solenoid valve closes.
4. To open for the gas supply start from 1 or 2 again.

## 19. Charcoal filters

### Introduction:

When handling harmful vapours or gases charcoal filters will reduce the possibility of harmful emission to the breathing zone of the operator or to the surroundings.

### Description:

In the HB/HBB models the charcoal filter is placed in the return air chamber, see figure 12. With this position the total volume of air is filtered.

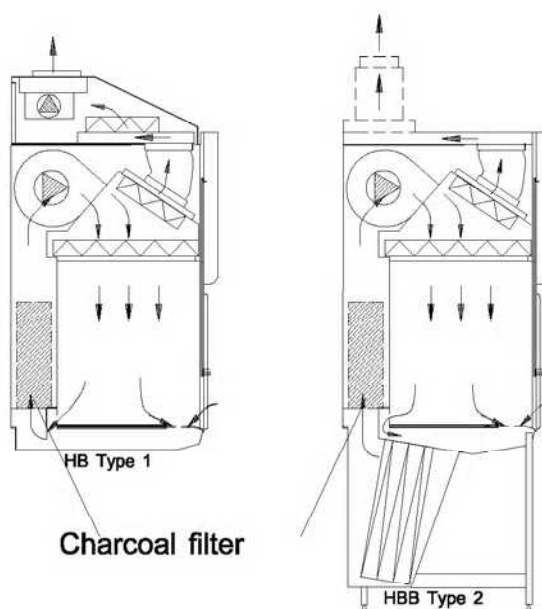


Figure 10: Position of charcoal filters in HB/HBB

This feature ensures low concentrations of pollutant in the work chamber, and will even further reduce the possibility of pollutant escaping to the laboratory.

### Markings:

Installation of charcoal filters is marked on the lamp cover of the cabinet with a large "C" and the text ACTIVATED CARBON.



Figure 11: Activated carbon sign

If cytostatic drugs are handled within the cabinet Holten LaminAir has for your convenience enclosed a sticker warning against CYTOTOXIC HAZARD, see figure 14.



Figure 12: Cytotoxic Hazard sign

## 20. Installation

### Important

	<p><b>WARNING</b></p> <p>In some countries the authorities require that handling of harmful vapours or gases in Class II cabinets must be done with exhaust to the outside.</p>
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Please check with the local authorities whether exhaust to the outside is required or not. Jouan Nordic recommend that installation of cabinets with charcoal filters is done with exhaust to the outside.

Consult the part "Anti blowback valve exhaust to the outside" for recommendations concerning selecting and installation of exhaust to the outside systems.

### Use:

	<p><b>NOTE</b></p> <p>that the installed charcoal filter is of a standard grade.</p>
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	<p><b>NOTE</b></p> <p>Not all vapours will be absorbed by standard grade charcoal.</p>
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Among them are nitrogenous gases, hydrogen sulphide, hydrogen chloride, amines and ammonia. Please consult your supplier of chemicals to get information on whether the installed charcoal filter has sufficient absorbent capacity towards the specific chemical.

### The efficiency of the charcoal filter depends on the following factors:

1. Expected concentration of the pollutant in the total flow.
2. Temperature in the work chamber of the cabinet.
3. Expected humidity in the work chamber.
4. Contact time of pollutant in filter (see technical information).
5. Presence of other pollutants handled at the same time as the actual.

## 21. Technical information on charcoal filter

	<p><b>NOTE</b> In some countries the authorities require that handling of harmful vapours or gases in class II cabinets must be done with exhaust to the outside.</p>
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Make	Camfil
Type	Camcarb 2000
Specifications	Standard grade
Recommended max. concentration of pollutant in recirculated flow	1% (volume)
Recommended max. temperature	+40°C
Recommended max. humidity	70%


### Cabinet information:

	HB(B) 2436	HB(B) 2448	HB(B) 2460	HB(B) 2472
Charcoal filters	6 pcs.	8 pcs.	10 pcs.	12 pcs.
Total weight of charcoal	8.4 kg	11.2 kg	14 kg	16.8 kg
Total volume of charcoal	16.8 l	22.4 l	28 l	33.6 l
Total volume through filter	1200 m <sup>3</sup> /h	1600 m <sup>3</sup> /h	2000 m <sup>3</sup> /h	2400 m <sup>3</sup> /h
Contact time	0.05 sec	0.05 sec	0.05 sec	0.05 sec


### Replacement of charcoal filters:

Make sure that the substances in the activated carbon have been neutralized.

Be sure that the cabinet is neutralized before changing charcoal filters.

	<p><b>WARNING</b> In order to avoid any possible danger we recommend the use of a mask with activated carbon filter, protective garment and surgical type gloves.</p>
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	<p><b>WARNING</b> After removal of activated carbon filters they should be placed in special bags for toxic material.</p>
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	<p><b>WARNING</b> When changing filters we recommend the use of a mask with activated carbon filters, protective garment and surgical type of gloves.</p>
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## 22. Procedure

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1. Using a scalpel cut the silicone around the cover at the back wall of the work chamber.
2. Remove the cover using the two aluminium handles.
3. The activated carbon filters will be situated horizontally mounted, in the return air chamber.
4. Place the special bag over one of the activated carbon filters. Turn the filter counter clockwise.
5. Lift the filter into the bag, seal the bag and remove the filter from the cabinet.
6. Proceed until all activated carbon filters have been removed.
7. Replacement of activated carbon filters are installed in the return air chamber by placing the filters on their mounting plates. Turning the filters clockwise will fasten the filter to the filter mounting plate.
8. Remove as much old silicone sealant from cover and opening as possible.
9. Remount the cover, silicone the cover around all four edges.
10. Rinse all tools used. Protective clothing and filter for filter masks is to be placed in the special bag, of the same type that has just been used for the filters.
11. The special bags should be handled as toxic material and sent to destruction in the same fashion as equivalent material from the lab is handled.

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## 23. UV-light

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### Introduction:

The germicidal effect of UV-light is used in the work chamber of Class II safety cabinets to destroy or inactivate micro-organisms in the air and on the surfaces.

### Operation:

1. Place the UV-lamp cover over the work opening of the safety cabinet.
2. Connect the UV-light electrical socket to the electrical outlet on the lamp cover.

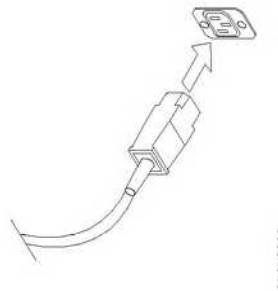


Figure 13: Position of UV-light.

3. Turn off the internal light in the cabinet.
4. Turn on the UV-light on the control panel.



## 24. Safety precaution



### WARNING

Never allow direct exposure of persons to UV-light. Exposure to UV radiation may cause reddening of the skin and inflammation of the mucous membranes of the eye

## 25. Technical data

Make	Phillips
Type	TUV 30 W
Power output UV-254 nm	9 W
Formation of ozone	None
Average useful life	3000 h



### NOTE

The polycarbonate or glass windows allows no transmission of harmful UV radiation.

## 26. Anti blowback valve (exhaust to the outside)

### Introduction:

The connection of safety cabinets to exhaust to the outside extraction systems involves some serious considerations.

In the following some considerations are put forward.

Holten LaminAir takes no responsibility for accidents caused by insufficiently working "exhaust to the outside" extraction systems.

## 27. Considerations for the exhaust to the outside system

### Exhaust to the outside ducting systems:

The exhaust system should minimize the effect on the safety cabinet of outdoor wind pressures. Up to 250 Pa at the end of the duct.

The discharge opening should be sited so that the exhaust opening is not influenced by air movements around the building.

The risk of exhaust air being drawn back into the building or other building through windows or air intakes should be considered.

The extraction ductwork should be clearly marked with BioHazard signs and it should be possible to identify ductwork leading to a specific cabinet.

So the ductwork should be cabinet specific. I.e. one extract system per cabinet. Sharing of ducts is not recommended.



Ductwork should follow the most direct route to the discharge point, there should be a minimum of horizontal run and a minimum of bends.

The exhaust fan should be situated apart from the cabinet and close to the discharge end of the duct so that only a minimum length of ducting is under positive pressure.

### Make-up air systems:

Safety cabinets should only be installed after first considering the type of make-up air system necessary to replace all of the air leaving the room through the cabinet. The air supply system must not compromise performance of the safety cabinet.

For air make-up by passive air inflow, openings, louvers or transfer grilles should be provided in walls and doors for make-up air to be introduced into the room from the surroundings preferably from the adjacent heated corridors.

Special considerations for Holten Laminair cabinets:

Never draw air from the cabinet when the internal fan is not operating.

In order to withstand back pressures in the ducting of 250 Pa we recommend that all Holten cabinets with extraction ducting should be equipped with separate exhaust fan.

## 28. Installation of exhaust to the outside systems

The size of the exhaust stub on HB(B) and the nominal exhaust air volume are given in table 1.

	HB(B) 2436	HB(B) 2448	HB(B) 2460	HB(B) 2472
Diameter of stub	Ø 160 mm	Ø 160 mm	Ø 200 mm	Ø 200 mm
Exhaust air volume nominal	300 m <sup>3</sup> /h	400 m <sup>3</sup> /h	500 m <sup>3</sup> /h	600 m <sup>3</sup> /h

Table 1.

### Typical exhaust air systems:

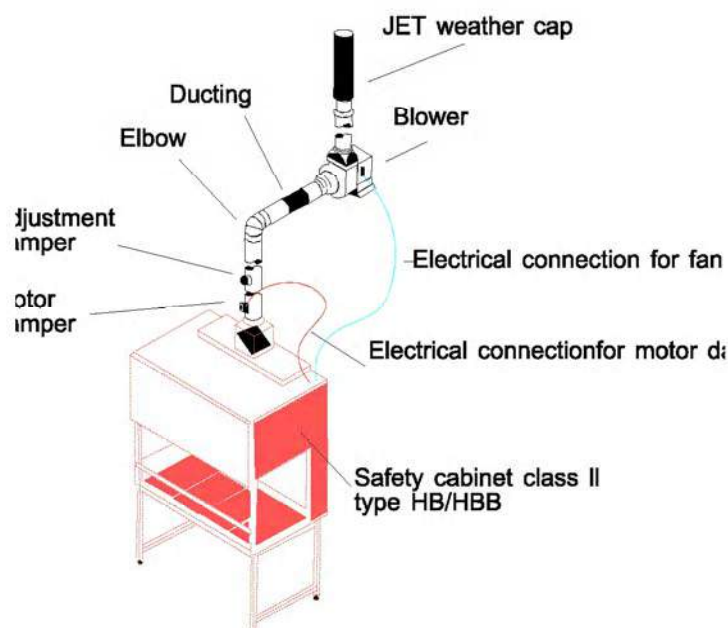


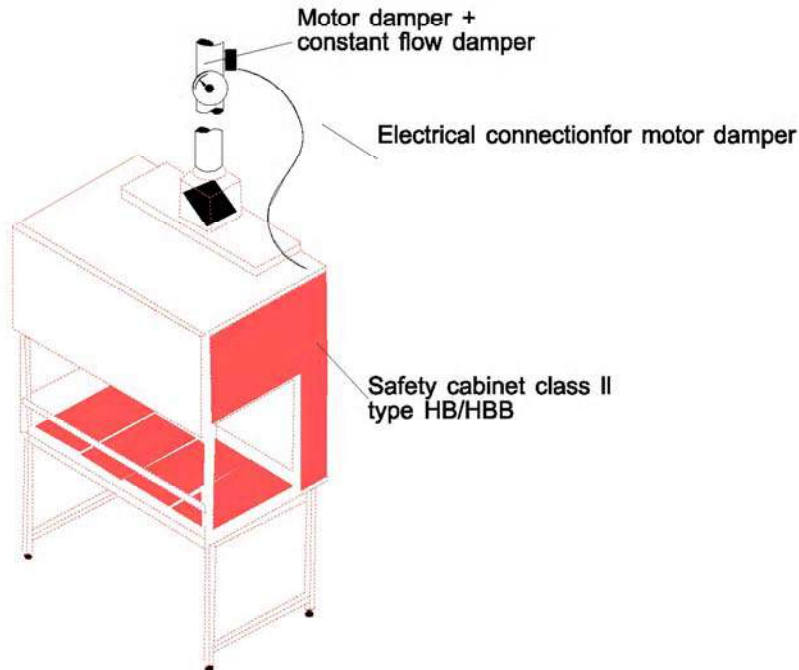
Figure 14: Example of a dedicated ducting system.

- **Advantages/disadvantages of dedicated ducting systems, directly connected:**

- ⊕ Saves no possible escape of contaminants to the inside.

No control device to keep flow within limits are needed.

- \_ Sensitive to outside pressures.



**Figure 15:** Example of a connection to centralized ducting system.

- ..... • **Advantages/disadvantages of directly connected to centralized ducting system:**

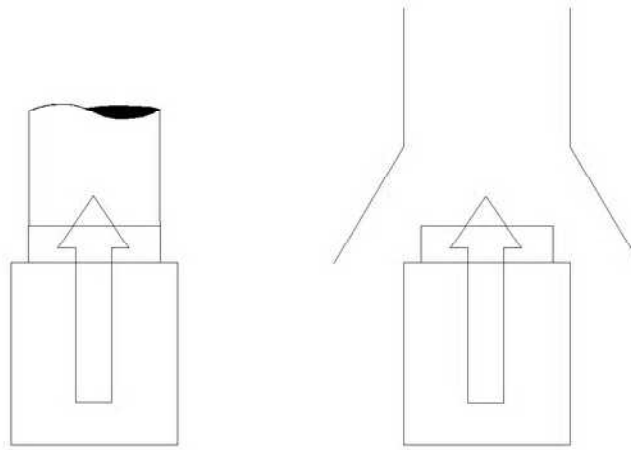
- ..... ⊕ Cost effective.

- ..... \_ Sensitive to outside wind pressures.

- ..... Control needed to keep flow within limits (Constant flow cleaner).


- ..... Possibility of spreading contaminants to surrounding rooms through ducting system.

- ..... • **Comparison of directly vs. indirectly connected:**



**Figure 16:** Direct and indirect connection to ducting system

	DIRECTLY	INDIRECTLY
⊕	No possible recirculation to the laboratory.	Not sensitive to wind pressures. Exhaust system can be on with the cabinet off.
–	Exhaust system and cabinet must be on and off at the same time.	Possible escape to the laboratory. Cabinet can run with exhaust system off.

	<p><b>NOTE</b> Sophisticated control systems that enable communication between exhaust to the outside extraction systems are available, contact your local agent or the technical Jouan Nordic department.</p>
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**End Remarks:**

If you do not feel that you have a comfortable overview of all details we recommend that you obtain specialists advice, e.g. your local agent or the technical department of Jouan Nordic A/S.



## Declaration of conformity

DS/EN 45014 Annexe A (Recommended form for declaration of conformity)

We:

Heto-Holten A/S  
Gydevang 17-19, DK-3450 Allerød

declare under our sole responsibility that the product

Model: **HB HBB 2436, 2448, 2460, 2472 BS Version**

to which this declaration relates is in conformity with the following standard(s) or other normative document(s):

EN 292-1:1993 Safety of machinery  
(Basic concepts - General principles)

EN 292-2:1993 Safety of machinery  
(Technical principles and specifications)

EN 60204-1:1992 Safety of machinery  
(Electrical equipment of machines - General requirements) ★

(if applicable) following the provisions of:

Directive 89/392/EEC Machinery

Directive 91/368/EEC Machinery (1. amendment)

Directive 93/44/EEC Machinery (2. amendment)

Directive 73/23/EEC Low voltage

Allerød, 16 June 1995

Jan Bøger, President